Britain's **BEST-SELLING** PC magazine

ISSUE 54 • MARCH 1991 • £2.60

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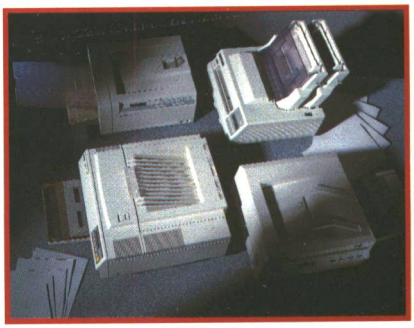
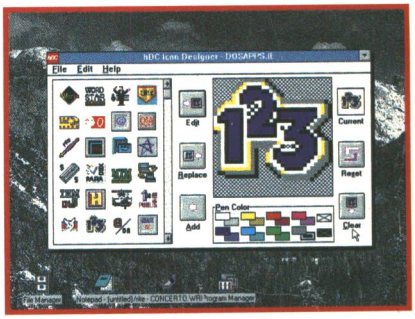


Four affordable PostScript laser printers on test

WINDOW DRESSING



The first wave of accessories for your *Windows 3* desktop

***NetWare* – full review of the leading PC network system**

Discover HyperMedia with *The Knowledge Engine*

Top Drawers – *CorelDRAW 2* vs *Arts and Letters*

***Talking Windows* – let your interface do the talking with this new comms software**

PLUS the latest news, hints, tips and answers, book reviews, *Programmers Workshop*, your letters and much much more...

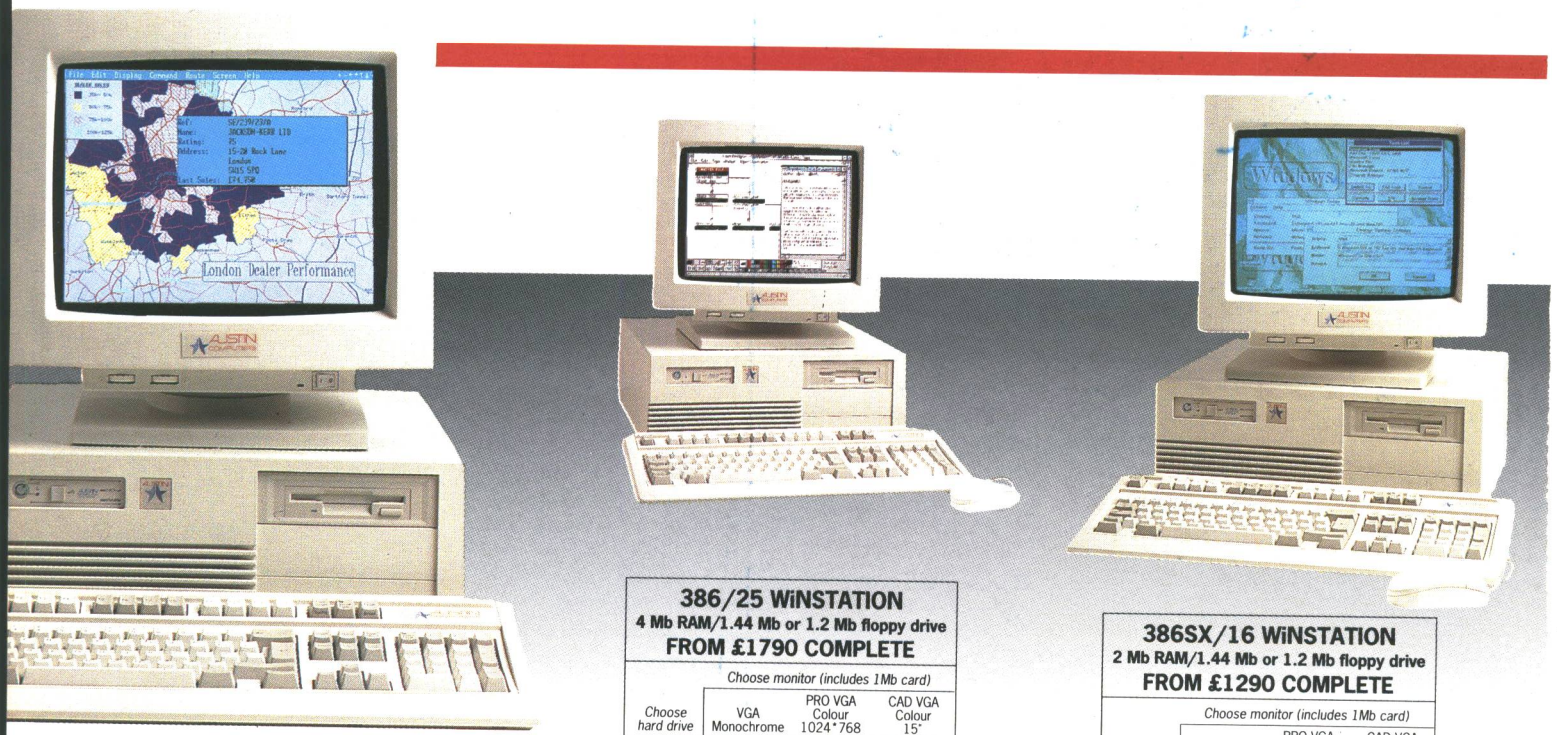
03

9 770961 272006

NEW – Make the most of your software's hidden talents in Applications Techniques

Austin

Spot the difference



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286/16 386SX/20 486/25e 386SX/16 1990 386SX/20 1991

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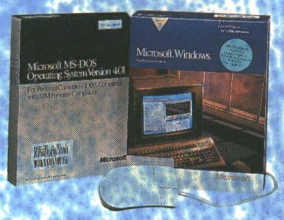

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In plain English, if you're thinking of considering Dell, you should be considering Austin first.

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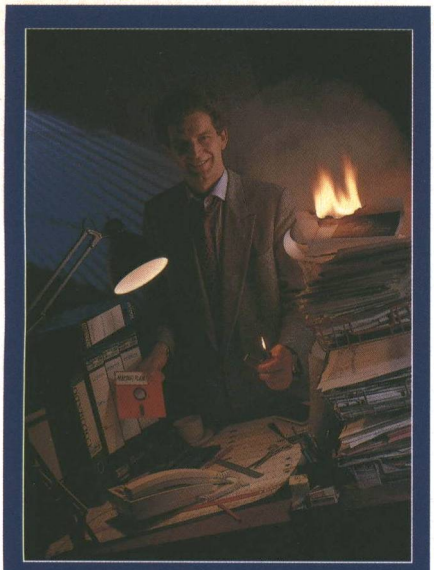
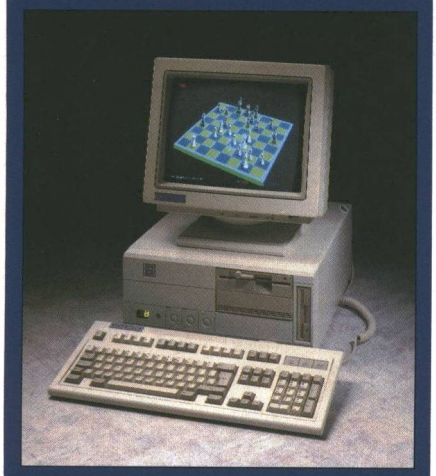
ISSUE 54 ● MARCH 1991

PC PLUS MENU



108 PROJECT PLANNERS

It's no easy job managing a project made up of a complex numbers of tasks. Project planning software is designed to help ease the burden. We review three of these packages available for the PC.



147 WIN A COLOUR VGA 286 PC

A Multiplex Genius 286 PC, worth over £1,000, is up for grabs in this month's easy to enter competition. This comes complete with 65 Mbyte hard disk, a 3.5-inch and 5.25-inch floppy disk drive, and a colour Super VGA display.

76 NEWS PLUS
A legal ruling in the United States has thrown doubt over Ashton-Tate's copyright of the *dBASE* database language; and on page 84 read our exclusive interview with Paul Sloane, managing director of Ashton-Tate (UK).

ON TEST

90 BRIEF ENCOUNTERS
A laptop PC that thinks it's a desktop PC, and a handheld colour scanner are among this month's collection of short reviews.

108 PROJECT PLANNERS
Project management software can help automate the planning process across a range of activities from software development to bridge building. Steve Patient puts three such packages to the test.

119 *WINDOWS* UTILITIES
A whole host of add-on software is now available for the *Windows* graphical environment. Simon Williams investigates.

124 *COREL DRAW! 2* V *ARTS & LETTERS*
Simon Williams tries his hand with the latest release of *CorelDRAW!* and the *Arts and Letters* drawing package.

131 *THE KNOWLEDGE ENGINE*
HyperMedia systems are designed to allow users to access information in a more flexible and intuitive manner than conventional databases. Mike Hardaker browses through Software Artistry's *The Knowledge Engine*.

138 SUB-£2,000 POSTSCRIPT LASER PRINTERS
Postscript-compatible laser printers are the best solution for DTP and complex graphics applications. We test four budget models.

150 *CHANCELLOR* vs *ACCOUNTING 3.1*
Accounting software has a reputation for being dull, but two packages have attempted to jazz up their act with charts and graphics. Tim Woodward opens up their ledgers.

156 *NOVELL NETWARE*
In the third part of our networking series, Manek Dubash assesses Novell's market leading network solution, *Netware*.

175 READING MATTER
Our regular round-up of the best in newly-published computer books this month includes a useful guide to using disk and RAM utilities, an investigation of encryption techniques, and a quick reference for *Z Basic* users.

197 *TALKING WINDOWS*
With Microsoft's *Windows 3.0* gaining in popularity, it was only a matter of time before a communications package was developed to take advantage of its features. Tony Dennis loads up Softclone's *Talking Windows* to go on line.

AFTER HOURS

169 GAMES NEWS
John Minson looks at what's new in the games world.

172 ON THE LIGHTER SIDE
Games reviewed this issue include *Rorke's Drift*, and *Moonbase*.

REGULARS

MASTHEAD Who's what and where in PC PLUS **9**

MAILBOX Your letters and our replies **101**

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EXIT You can't take it seriously **306**

BACKGROUND

27 pages of ***advice, guidance and information***

237 STEVE PATIENT
More thought-provoking analysis of PC issues

242 SUPERDISK TUTORIAL – SR-INFO
A guide to using this month's main *SuperDisk* program, *SR-INFO*, and the first in our tutorial series explaining how to design and program database applications.

254 APPLICATIONS TIPS
Making the most of today's complex PC applications isn't always easy. This new regular feature aims to help put this right, providing tips and techniques for using popular packages. This month we show how to use the mailmerge features of *Topcopy Professional* and look at data recovery for *Lotus 1-2-3*.

263 BEGINNERS' WORKSHOP
Our easy to follow series on *MS-DOS* continues

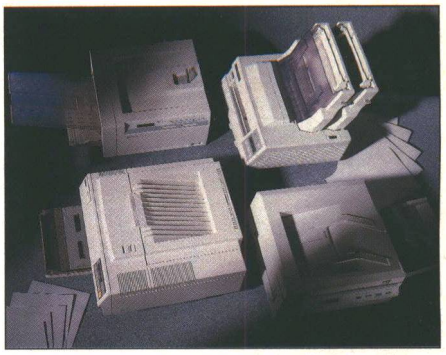
269 SIMON'S TOOLBOX
This month's look at useful utilities

275 WILF'S PROGRAMMERS' WORKSHOP
If you're a programmer, this is for you

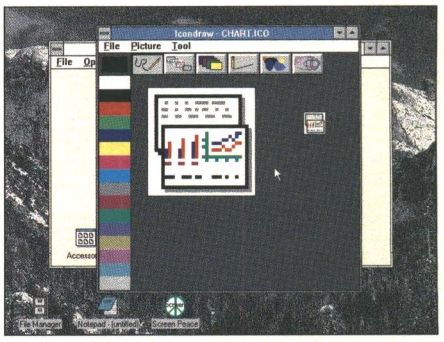
283 TONY DENNIS
Our regular spot for the comms enthusiast

287 HELP SCREEN
Seven pages of hints, tips and solutions to readers' problems, including putting the F11 and F12 keys to work on an extended AT keyboard, saving RAM when using Terminate Stay Resident (TSR) programs, and checking for faults on your hard disk.

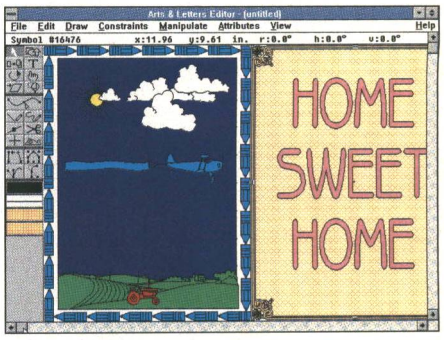
302 SUPERDISK REFERENCE
Technical help and how to write for the *SuperDisk*.



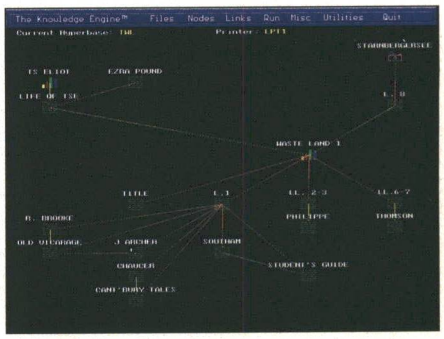
138 We review four PostScript laser printers costing under £2,000



119 Check out the latest batch of add-in programs for *Windows*



124 *CorelDRAW! 2* v *Arts and Letters*; which drawing package is best?



131 *The Knowledge Engine* – we try out this example of Hypermedia

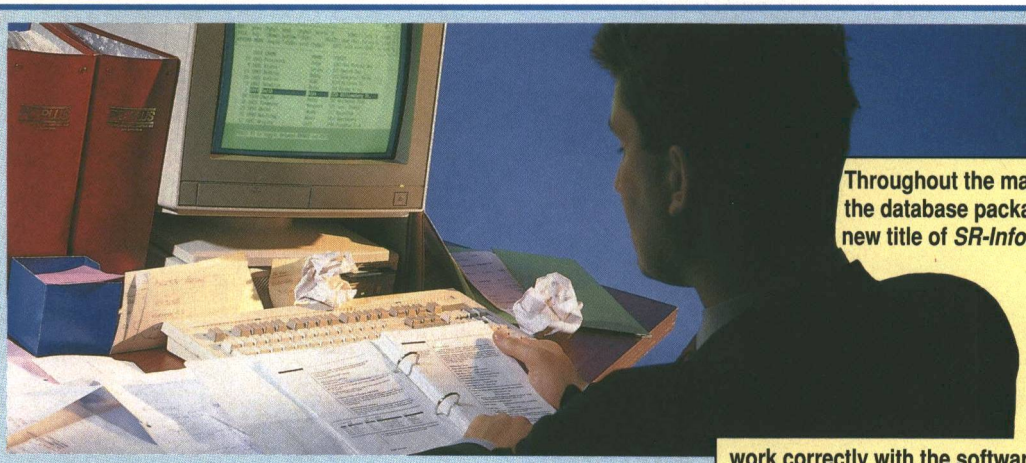
Turn the page for details of this month's

SuperDisk

ABC MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS
64,119
Jan – June 1990

SuperDisk

- **SR-Info:** *Learn how to build practical database programs*
- **Ranger:** *Help our hero fight for his copy of PC PLUS*
- **CdHidden:** *Manipulate hidden directories*
- **Timebar:** *Countdown for time-consuming batch files*
- **VAT calculator:** *Calculate all that added value*
- **Shorties:** *Simple directory changing, line drawing and much more*



SR-INFO

New Star Software

Throughout the magazine, we have referred to the database package on the *SuperDisk* by its new title of *SR-Info*. Even though the program files on the *SuperDisk* are labelled *PC-Info*, we assure readers that all operating instructions and tutorial material in the magazine will work correctly with the software supplied.

Shortly before publication it came to our attention that the name *PC-Info* is the property of Henco Software of Waltham, Mass., USA, and relates to a totally different data management system, which is marketed in the UK by Doric Computer Systems. Henco Software has agreed to us releasing this issue, subject to this acknowledgement, and we are grateful to them for this agreement. Anyone wishing to receive information on Henco's *PC-Info* package should contact Doric on (0923) 52288.

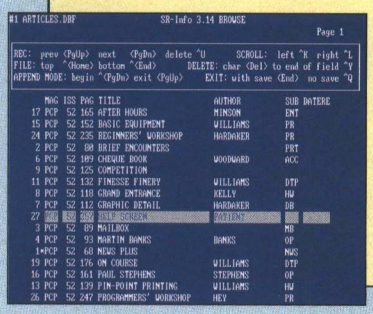
***SR-Info* is a product of Sub Rosa Inc, of Ontario, Canada, and is marketed in the United Kingdom by New Star Software, on (0245) 265017.**

A database system – storing banks of information in disk files – is one of the most important areas of computer use. With this month's *SR-Info* software and our new *Building Databases* tutorial series (starting on page 242), you can learn how to design database structures and to program database applications. The techniques demonstrated in the series will be valuable in developing anything from a simple private record collection database to a full-scale accounting system. Since *SR-Info* shares many of the operations of the *dBASE* family of packages, your skills will be transferable to a wide range of commercial products.

Setting up any database system involves two tasks: first, deciding what information to store (and how to organise it); second, writing the necessary programs to allow the database's users to input, retrieve and amend information. *SR-Info* is ideally suited to both tasks, with database construction tools and a full-featured programming language. It is a relational system, allowing you to link information between database files.

As the *Building Databases* series progresses, we will create a working application (including on-line enquiries and reports), recording details of magazine articles. You can use it to keep a list of PC PLUS features (we'll give you some data to start with!) as well as those of other magazines. Each month we'll show you how we've designed the database and program files; copies will be on the *SuperDisk* to save you typing them in. Once you've learned the techniques, you can make your own additions and amendments to the system. We'll publish the best enhancements sent in by readers.

The *SR-Info* package on this month's *SuperDisk* contains all the software required to follow our series, and has no time limits or missing features. It is shareware; if you keep using it or put it to use in a commercial application, you should register your copy with New Star Software Ltd on (0245) 265017.



Display T

Min hardware

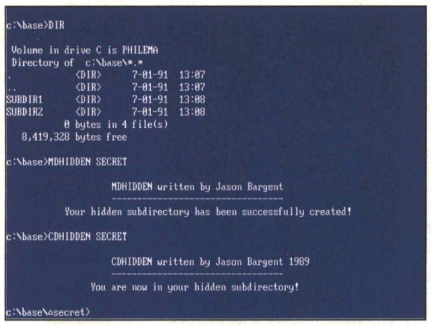
see *Help Screen* for details of symbols

CDHIDDEN

Jason Bargent

Display T

Minimum hardware 128



This little suite of programs works rather like CD, MD and RD (the usual MS-DOS commands), but with directories that have the 'hidden' attribute. There are means for hiding programs, data and directories, but it is difficult to make them readily accessible to the careful programmer yet secure from unauthorised use. Directories made using our utilities will be inaccessible to curious eyes using DIR or a similar command. As an added protection, the name assigned and used as a hidden directory will be preceded by a non-ASCII character. These programs – and details of their use in XXHIDDEN.DOC – will be found in the UTILS directory.

TIMEBAR

Philema Perspectives

Display T

Minimum hardware 128



Take the guesswork out of waiting for batchfiles to compile. Some BAT files take a long time to execute, with nothing visible happening: for example, when copying to create backup versions of files, or when deleting BAK files. This utility will take a line of your text display to produce a thin, long bar: while other things happen, *Timebar* will tick away, lengthening the bar until it reaches to the right side of the screen, or until a scroll instruction is sent to the screen. The row used can be specified, as can the colour scheme for the bar, the length of time, and whether or not an audible tick (of gradually rising pitch) is made. This can really brighten a boring batch file. Found in the UTILS subdirectory of the *SuperDisk,* full instructions are displayed if you type [?] as the sole parameter.

SHORTIES

In the SHORTIES directory this month, we specialise in Terminate and Stay Resident (TSR) programs: routines that stay resident once loaded, and then work at your will.

Display T

Minimum hardware 128

see *Help Screen* for details of symbols

CDPLUS

Mike Williams

This program modifies the CD (or CHDIR) function so that you can change directories with only a partial directory name: useful when you are in a hurry, or have forgotten some of the names in the path to a particular directory.

LINEDRAW

T V Foulkes

A fun utility that lets you draw single and double lines for borders and boxes on your text screen.

OPENER

Clockwork Software

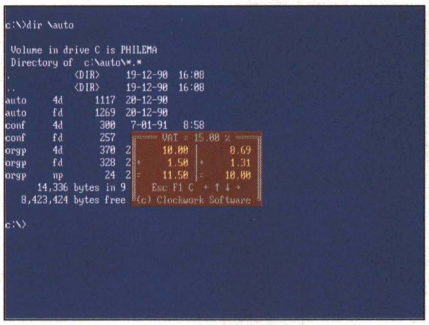
This provides a SET variable within your environment, constantly maintained as the decimal value of the ERRORLEVEL, making BAT files easier and faster.

VAT CALCULATOR

Clockwork Software

Display T

Minimum hardware 128



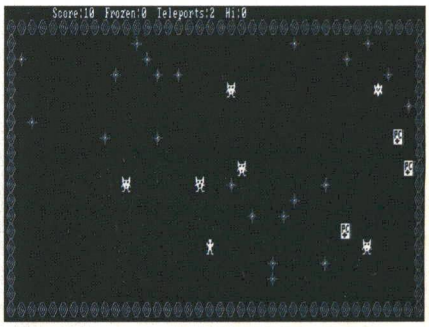
Just key a sterling amount into this little pop-up calculator, and it will tell you two different things: the VAT (and total with VAT added), and the original amount (along with the VAT it includes) in case you quoted an amount with VAT already included. This clever little program (found in the UTILS subdirectory of the *SuperDisk)* permits you to change several things: its colours, where it pops up on the screen, its hotkeys (used for making it pop up), and the VAT rate (shudder!). Instructions are called up by keying [?] as the only parameter, or with [F1] when the calculator has been popped up.

RANGER

PC Solutions

Display T

Minimum hardware 128



This is an arcade game with a few differences: it will run in text mode – so you can see it even on a monochrome system – and success lies in skill and forethought instead of speed and dexterity. Our hero Eric has a real problem, his trip to the shops (to buy PC PLUS) has become interrupted by zombies out to get him. Maybe Eric will take out a subscription from now on. Find *Ranger* in the GAMES subdirectory of the *SuperDisk.*

AND THERE'S MORE

In addition, the WORKSHOP directory contains files relevant to discussions in *Wilf's Programmers' Workshop,* in the *Background* section of the magazine.

In the MAGAZINE directory, you will find listings and snippets from various parts of the current month's issue.

FOR FURTHER INFORMATION...

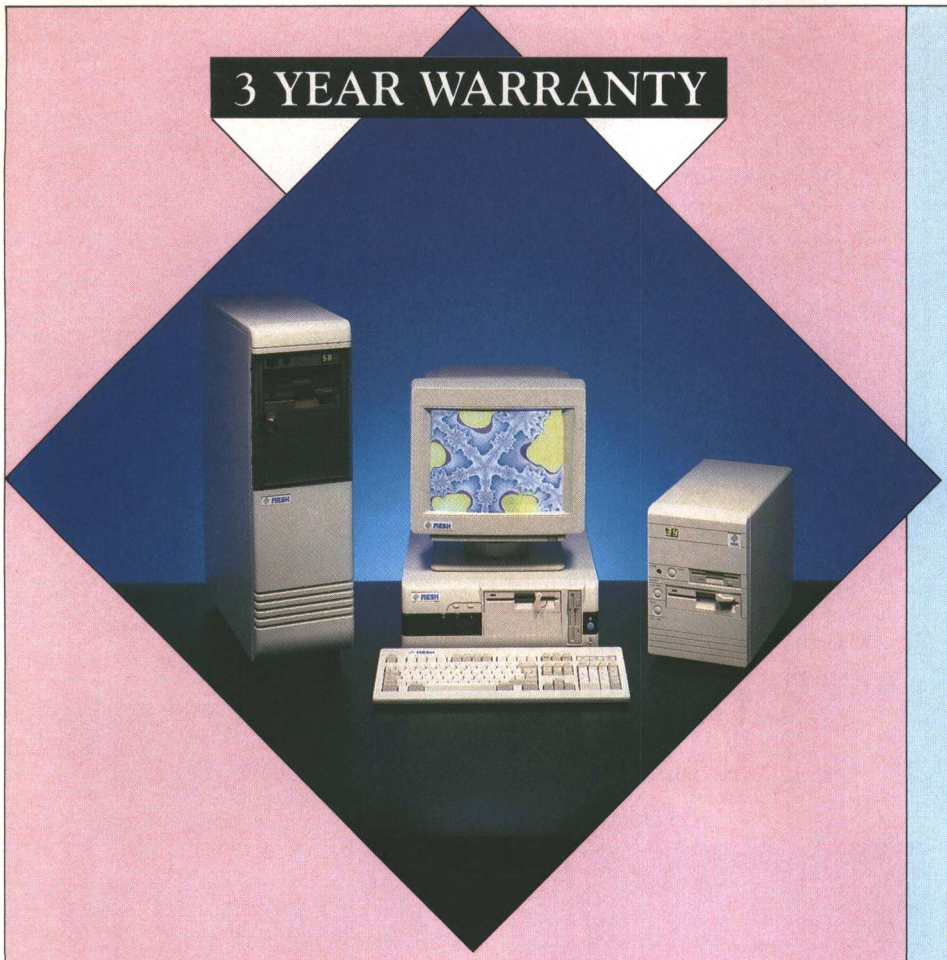
Please consult pages 302 for information about the *SuperDisk*, including:

...how to run the *SuperDisk*
...how to get help
...how to obtain a 3.5-inch *SuperDisk*
...how to obtain a 5.25-inch *SuperDisk*
...how to replace a defective copy
...how to install ANSI.SYS
...how to write a program for a future *SuperDisk*
...news about previous *SuperDisks*

£750

We pay anything from £20 for a short routine to £750 for a top-quality, broad appeal program. Turn to page 302 for full details on getting your program on to the PC PLUS *SuperDisk*.

3 YEAR WARRANTY



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"In the PC PLUS benchmark tests the Mesh machine came out as the clear winner . . ."

December 90
PC PLUS

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Hardware Checklist

M486B
33MHz 80486 processor, 8k internal cache, 64/128/256k second level cache (optional), 4167 weitek maths-co socket, 8MB ram, 1.2MB 5.25" & 1.44MB 3.5", 2 serial 2 parallel ports, 5 free slots, mouse, dos 4.01, Windows 3, GW basic

Mono	Hard disk	super vga colour
£3525	135MB(17ms)	£3775
£4439	320MB(16ms)	£4689
£4739	640MB(16ms)	£4989

M486A
25MHz 80486 processor, 8k internal cache, 64/128/256k second level cache (optional), Landmark 114 MHz mips 11.104, 4167 weitek maths-co socket, 8MB ram, 1.2MB 5.25" & 1.44MB 3.5", 2 serial 2 parallel ports, 5 free slots, mouse, dos 4.01, Windows 3, GW basic

Mono	Hard disk	super vga colour
£2879	90MB(17ms)	£3129
£2975	135MB(17ms)	£3225
£3889	320MB(16ms)	£4139
£3995	640MB(16ms)	£4245

M386C TOWER 386-33 CACHE
33MHz 80386, 32 bit processor, 64K (25ns) cache memory Landmark Speed 58.7 mips 7.779, 82385 Cache Controller 80387-33 or weitek maths socket 2 MB ram expandable to 16 MB 1.2MB 5.25" & 1.44MB 3.5", 2 serial 2 parallel ports, 5 free expansion slots, mouse, dos 4.01, GW basic, Windows 3

Mono	Hard disk	super vga colour
£1695	44MB(25ms)	£1945
£1929	90MB(17ms)	£2179
£2119	180MB(17ms)	£2369
£2779	320MB(16ms)	£3029
£3107	640MB(16ms)	£3359

M386B DESKTOP 386 25 CACHE
25MHz 80386, 32 bit processor 64K cache RAM (25ns) Landmark Speed 56 Mhz, 2 MB RAM expandable to 16 MB 80387-25 maths coprocessor socket 1.2MB 5.25" & 1.44MB 3.5", 2 serial 2 parallel ports, 5 free expansion slots, mouse, dos 4.01, GW basic, Windows 3

Mono	Hard disk	super vga colour
£1499	44MB(25ms)	£1749
£1809	135MB(17ms)	£2059
£1889	180MB(17ms)	£2139
£2729	320MB(16ms)	£2979

M386A-25 DESKTOP 386-25
25 Mhz 80386, 32 bit processor Landmark speed 34.5 Mhz 80387-25 maths coprocessor socket 2 MB Ram expandable to 16 MB 1.2MB 5.25" & 1.44MB 3.5", 2 serial 2 parallel ports, 5 free expansion slots, mouse, dos 4.01, GW basic, Windows 3

Mono	Hard disk	super vga colour
£1395	44MB(25ms)	£1645
£1615	90MB(17ms)	£1865
£1709	135MB(17ms)	£1959

M386SX DESKTOP
16MHz 80386 SX 32 bit processor, 80387 SX-16 maths socket 1 MB Ram (max 8 MB on main board)
1.2 MB 5.25" & 1.44 MB 3.5", 2 serial, 2 parallel ports, 5 free expansion slots, mouse, dos 4.01, GW basic, Windows 3.

Mono	Hard disk	super vga colour
£899	44MB(25ms)	£1149
£1075	90MB(17ms)	£1325
£1145	135MB(17ms)	£1395
£1209	180MB(17ms)	£1459

M286A DESKTOP AT
12MHz 80286 processor, 1 MB Ram (max 4 MB on main board), 80287 maths coprocessor socket, 1.2MB 5.25" & 1.44MB 3.5", 2 serial, 2 parallel ports, 5 free expansion slots, desktop case, dos 4.01, GW basic

Mono	Hard disk	super vga colour
£635	20MB(65ms)	£885
£675	44MB(25ms)	£925
£845	90MB(17ms)	£1095
£510	1 FDD	£760

LCD PORTABLES
11" Supertwist backlit LCD screen (Cold-Cathode-Fluorescent-Tube) Hi-resolution VGA, (640 by 480), Ext, dual display facility, 1.2MB 5.25" &/or 1.44MB 3.5", 2 serial, 2 parallel ports, 3 free expansion slots, 1MB Ram on M286 expandable to 4MB
2MB Ram on M386 expandable to 8MB
Mouse, dos 4.01, GW basic, Windows 3

Processor	Hard disk	Price
80286-12	44MB(25ms)	£1449
80386SX-16	44MB(25ms)	£1595
80386-25	90MB(17ms)	£2159

GAS PLASMA PORTABLES
11" Gas plasma screen, High-contrast Hi-resolution VGA, (800×600), (1024×768), Ext. dual display facility, 1.2MB 5.25" &/or 5", 2 serial, 2 parallel ports, 3 free expansion slots, 1MB Ram on M286 expandable to 4MB, 2 MB Ram on M386 expandable to 8MB
Mouse, dos 4.01, GW basic, Windows 3

Processor	Hard disk	Price
80286-12	44MB(25ms)	£1765
80386SX-16	44MB(25ms)	£1905
80386-25	90MB(17ms)	£2475

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DISTRIBUTION
News Trade Distribution UK & Eire only:
MMC Ltd – 0483 211222
News Trade Distribution Rest of World:
Comag Ltd – 0895 444055

COLOUR ORIGINATION
Avon Scanning and Planning, Bristol

PRINTING
Printed and bound by Chase Web Plymouth, a St Ives company

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Just as look-and-feel lawsuit mania, inspired by Lotus Development's crushing defeat of Paperback Software, seemed set to take over in the U.S. software industry, Ashton-Tate, publisher of the *dBASE* database family, has lost its case against Fox Software, producer of arch-clone *Foxbase+*.

This is not a good advertisement for American justice, showing clearly that it's corporate muscle-power, not the validity of the argument, that determines the outcome of such cases. *Foxbase+* is every bit as much a clone of *dBASE III Plus* as *VP Planner* is of *Lotus 1-2-3*, but Fox Software (and co-defendants Santa Cruz Operation) are a tougher, wealthier bunch than Paperback Software, and Ashton-Tate, after its traumatic recent history, a weaker predator than Lotus.

The result is, however, good news for the computer industry, and even for Ashton-Tate. For the industry it's a welcome reversal of the trend towards the legalised confiscation of general design techniques by whoever happens to put a brand name and shrink-wrap around them first. And for Ashton-Tate, it hopefully marks the end of an unhappy chapter in the company's history, and the start of a brighter new one.

Ashton-Tate should now realise that its future success lies not in trying to restrict the market, but in maintaining leadership of it, and in encouraging the growth of *dBASE* as a real standard for database management. In *dBASE IV 1.1* it now has a product that is not only saleable, but is arguably the best all-round package in the *dBASE*-compatible market. It is also still (just) recognised as the principal developer of *dBASE*-compatible product lines. However *dBASE* itself is in danger of being overtaken by more advanced designs, especially as a system for non-programming end-users. Above all, Ashton-Tate should recognise that the *dBASE* standard needs the innovations of developers like Fox and Nantucket to stay on top of the market.

Paul Stephens

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80386SX 20MHz	£439	H20
80386 25MHz	£539	H22
80386 25MHz with cache	£675	H23
80386 33MHz with cache	£795	H24
80486 25MHz with cache	£1875	H25

COMPUTER CASES

Full size standard AT case	£69	H26
Small footprint XT/AT desktop case with 200W Power Supply	£129	H27
Mini Tower case w/200W Supply	£149	H28
Full Size Tower w/200W Supply	£229	H29

POWER SUPPLIES

150W standard XT Power Supply	£49	H30
200W XT Power Supply	£54	H31
200W standard AT Power Supply	£59	H32

SOFTWARE

MICROSOFT

MS-DOS V3.3 - 3.5" or 5.25" format	£59	G01
MS-DOS V4.01 - 3.5" or 5.25" format	£69	G02
WINDOWS V3.0 - 3.5" or 5.25" f'mat	£89	G03

QUARTERDECK

QRAM - 3.5" or 5.25" format	£49	G04
QEMM 386 - 3.5" or 5.25" format	£59	G05
QEMM 50/60 - 3.5" or 5.25" format	£59	G06

WINCHESTER DISK DRIVES

NEC

40MB 28ms 3.5" MFM	£289	K01
110MB 3.5" ESDI	£559	K02
150MB 5.25" ESDI	£639	K03

FUJITSU

45MB 25ms 3.5" IDE or SCSI	£259	K04
90MB 25ms 3.5" IDE or SCSI	£359	K05
135MB 25ms 3.5" IDE or SCSI	£449	K06
180MB 25ms 3.5" IDE or SCSI	£499	K07

MAXTOR

380MB SCSI or ESDI	£995	K08
760MB ESDI	£1365	K09
760MB SCSI	£1450	K10
1.2GB SCSI or ESDI	£1995	K11
1.7GB SCSI or ESDI	£2495	K12

WESTERN DIGITAL

20MB 28ms 3.5" IDE	£199	K13
40MB 28ms 3.5" IDE	£219	K14

SEAGATE

88MB 15ms 3.5" MFM	£499	K15
329MB 14.5ms ESDI	£995	K16
337MB 10.7ms SCSI	£1115	K17
373MB 16ms ESDI	£1075	K18
613MB 16.5ms SCSI	£1329	K19
676MB 16ms ESDI	£1525	K20
1.2GB 16.5ms SCSI	£2250	K21

KALOK

20MB 40ms 3.5" MFM	£169	K22
32MB 40ms 3.5" RLL	£189	K23

HARD CARDS

20MB Hard Card (40ms)	£215	K24
32MB Hard Card (40ms)	£229	K25
40MB Western Digital "WD401FC" File Card (39ms)	£249	K26

INTERNAL FLOPPY DRIVES

TEAC

TEAC 5.25" 360K Internal FDD	£65	K27
TEAC 5.25" 1.2MB Internal FDD	£69	K28
TEAC 3.5" 720K Internal FDD	£59	K29
TEAC 3.5" 1.44MB Internal FDD	£64	K30
5.25" installation kit for 3.5" FDD's	£15	K31

EXTERNAL FLOPPY DRIVES

..for XT/AT compatibles, Toshiba Laptops, & Amstrad 2000 series

5.25" 360K Ext FDD w/cables	£99	K32
5.25" 1.2MB Ext FDD w/cables	£109	K33
3.5" 720K Ext FDD w/cables	£89	K34
3.5" 1.44MB Ext FDD w/cables	£99	K35

DISK CONTROLLERS

XT 2xFDC (360K/720K)	£19	L01
XT/AT 2xFDC (all 4 formats)	£39	L02
XT/AT FDC for 3rd & 4th floppy drives - operates with 2xHDD/2xFDD controller in the system	£59	L03
XT/AT 4xFDC (all 4 formats)	£69	L04
XT MFM 2x Hard Disk Controller	£39	L05
AT MFM 2x Hard Disk Ctlr (1:1)	£59	L06
AT MFM 2xHDC/2xFDC (2:1)	£59	L07
AT MFM 2xHDC/2xFDC (1:1)	£69	L08
IDE AT Bus/2xFDD Controller	£29	L09
XT/AT SCSI Host Adapter	£79	L10
AT SCSI HDD/FDD Controller	£89	L11
AT ESDI 2xHDD/2xFDD Controller	£129	L12

WESTERN DIGITAL

WDXT-GEN2PLUS XT MFM 2xHDC	£45	L13
WD1004-27X XT RLL 2xHDC	£49	L14
WD1003V-MM1 AT MFM HDC	£69	L15
WD1003V-MM2 AT MFM HDD/FDC	£79	L16
WD1003V-SR1 AT RLL HDC	£79	L17
WD1003V-SR2 AT RLL HDC/FDC	£85	L18
WD1006V-MM1 AT MFM HDC	£79	L19
WD1006V-MM2 AT MFM HDC/FDC	£85	L20
WD1006V-SR1 AT RLL HDC	£89	L21
WD1006V-SR2 AT RLL HDC/FDC	£99	L22
WD1006V-MC1 MCA MFM	£189	L23
WD1007V-SE1 AT ESDI HDC	£169	L24
WD1007V-SE2 AT ESDI HDC/FDC	£175	L25
WD1007V-MC1 MCA ESDI	£229	L26
WD7000-FASST2 AT Intelligent SCSI controller with Cache	£269	L27

TURBO CARDS

HYPERACE

Hyperace II 10MHz version	£249	G18
Hyperace II 12MHz version	£269	G19
Hyperace II 16MHz version	£299	G20

ORCHID

Tiny Turbo 286 10MHz	£179	G21
Tiny Turbo Extra 286 12MHz	£199	G22

INTEL

Inboard 386/PC 80386 based accelerator card with 1MB DRAM on board for 8088 based M/C's	£489	G23

MODEMS

MIRACOM

WS4000	£169	G24
WS3000	£289	G25
WS3000 with V22bis	£379	G26
KEYCARD 3000 V21/22/23	£289	G27
KEYCARD 3000 with V22bis	£379	G28
KEYCARD 1200PS/MCA	£295	G29
KEYCARD 2400PS/MCA	£425	G30
COURIER 2400e	£395	G31
COURIER 2400e Quad	£469	G32
COURIER 2400e Quad Internal	£489	G33

RACAL

MAXAM III PLUS	£479	G34
MAXAM IV	£395	G35
MAXAM V	£969	G36
MAXAM VII	£1269	G37

RS-422

RS-422 Card	£59	L28
Dual Port RS-422 Card	£69	L29
Dual Port RS-422/RS-485 Card	£109	L30
4 Port RS-422 Card	£249	L31
8 Port RS-422 Card	£499	L32

IEEE-488

IEEE-488 Card including BASIC & PASCAL support software	£129	L33
Elite IEEE-488 Card with DMA - PC Bus or MCA versions	£179	L34
BASIC, C, Pascal & Fortran support software for Elite IEEE-488 Cards	£69	L35
IEEE-488 Card with IEC625 - includes C & Pascal support software	£249	L36
IEEE-488 GP-IB Bus Analyser	£415	L37

DIGITAL I/O

8255 Digital I/O Card (48 lines)	£57	P01
64 line DIO with breadboard area	£129	P02
64 line DIO for PS/2 MCA systems	£195	P03
8255 Digital I/O Card (192 lines)	£195	P04

ANALOG/DIGITAL CONVERSION

8 bit AD/DA + Digital I/O + Timer	£162	P05
12 bit AD/DA	£89	P06
12 bit AD/DA w/DIO, Timer & DMA	£275	P07
High Speed 12 bit AD/DA with DIO + DMA - 60Khz sampling rate version	£570	P08
- 100Khz sampling rate version	£670	P09
14 bit AD/DA	£149	P10
8 bit 8 channel Digital to Analog	£199	P11
12 bit 8 channel Dig to Analog	£299	P12

INDUSTRIAL PC PRODUCTS

19" Ind PC Chassis (12 slots)	£1145	P13
Industrial Laptop PC - 12MHz 80286, 1MB memory and 40MB HDD	£2450	P14
Industrial PC Card Cage (8 slots)	£156	P15
19" Rack Mountable VGA Monitor	£815	P16
Dust & Liquid Free Keyboard	£95	P17
Node Computer - 5 slot cased passive backplane with 65Watt PSU	£197	P18
8 slot passive backplane	£59	P19
12 slot passive backplane	£79	P20

CPU CARDS

...for use with passive backplanes

10MHz 8088 based CPU Card	£135	P21
12MHz 80286 based CPU Card	£265	P22
12Mhz 80286 based CPU Card with Twin Serial & Parallel Ports, IDE Interface + 2 x Floppy Ctlr	£295	P23
16MHz 80386SX based CPU Card	£615	P24
20MHz 80386 based CPU Card	£895	P25
25MHz 80386 based CPU Card	£975	P26
33MHz 80386 - CACHE CPU Card	£1445	P27

DISK CARDS

360K SRAM Disk Card	£525	P28
360K EPROM Disk Card	£375	P29
720K EPROM Disk Card	£490	P30

LAB & INDUSTRIAL PC ENGINEERS ...!

Call us for a copy of our Lab and Industrial PC Products Catalogue.

YOU ASKED FOR IT!



- **top-quality, user-friendly technology**
- **prices that will make even your bank manager smile**

That's what you told us you wanted...so that's what we're giving you.

REEVES
CD-ROM

Technology, quality and economy



From our high-flying 486 to our budget 286, every machine In the brand-new Reeves PC range is bursting with advanced technology, solid as a rock for quality, and with such a low price tag that you'll wonder whether your eyes need testing!

You can afford CD-ROM technology now with our slimline 386 SX/CD desktop PC. It brings you the multi-media data, image and sound technology of the future through its Sony 680 MB CD-ROM drive for no more than a standard 386 SX price...not to mention the 40 MB hard disk, 3.5"1.44 MB disk drive, five expansion slots, Super VGA colour monitor — plus a FREE 680 MB CD-ROM sampler — **all for only £1499.**

We can also give you 486 CAD/CAM speed and sophistication for the price of a 386 system, complete with state-of-the-art Intel 486 microprocessor and phenomenal 128K secondary cache.

Or how about a 286 PC which gives you AT technology at an XT price? This entry-level system has 12 MHz speed, 1 MB memory and 40 MB hard disk capacity and, even with a Super VGA 1024 x 768 colour monitor, it still costs only £799!

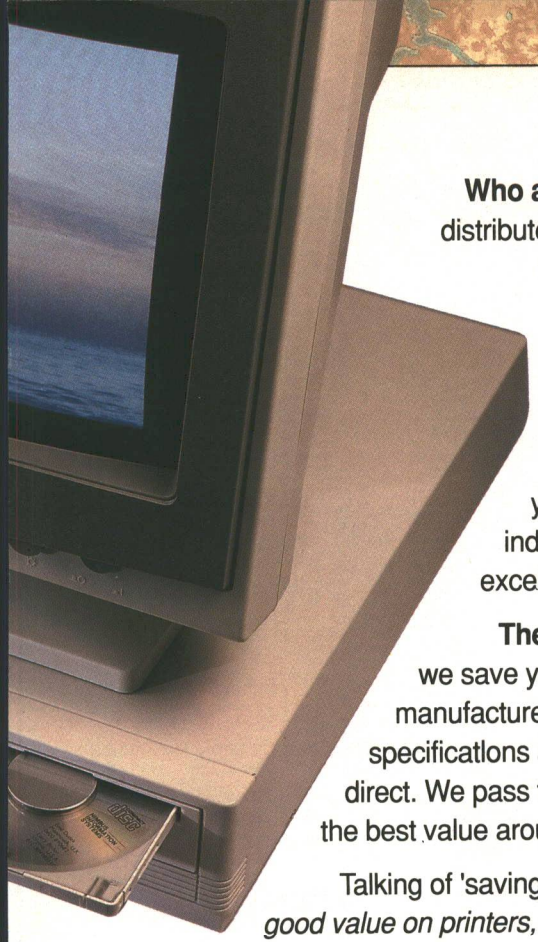
These are just some of the highlights of our new PC range. For more details of these, and our other systems, ask for our new brochure.

With Reeves you get more than you bargained for! 100% PC compatible, a sturdy metal case. Microsoft MS DOS 4.01, Windows 3, and Microsoft Mouse are **included free** with our new PCS range.



Reeves systems are supplied as 'plug & go' packages. We believe in including everything you need to run the system in the price, rather than charging you for 'extras'.

Our service doesn't end once you have made your purchase. You can count on us to give you a reliable after-sales service, including a cast-iron 12 month warranty, free hotline support and an optional quick response on-site service.



Who are Reeves? We manufacture and distribute computer hardware and software to all manner of clients, from Rolls-Royce, the IBA and to smaller companies and computer enthusiasts. We have been growing in size, stature and experience over the past 18 years, earning a reputation in the industry for efficiency, reliability and excellent aftersales support .

The secret of our low prices is that we save you money by having our systems manufactured to our advanced, high-quality specificatlons and supplying you, our customers, direct. We pass these huge savings on giving you the best value around.

Talking of 'savings'... if you're *looking for equally good value on printers, portables, monitors and other peripherals (plus an astounding price on Timeworks DTP software), look no further than the next page!*

	Hard Disk	VGA Mono	SuperVGA Colour
PCS286-16	40Mb/28ms	**£899.00**	**£999.00**
	85Mb/25ms	**£1049.00**	**£1149.00**
PCS386SX-16	40Mb/28ms	**£999.00**	**£1099.00**
	85Mb/25ms	**£1149.00**	**£1249.00**
PCS386-25	40Mb/28ms	**£1299.00**	**£1399.00**
	85Mb/25ms	**£1449.00**	**£1549.00**
	125Mb/22ms	**£1549.00**	**£1649.00**
PCS386-33Cache	40Mb/28ms	**£1499.00**	**£1599.00**
	85Mb/25ms	**£1649.00**	**£1749.00**
	125Mb/22ms	**£1749.00**	**£1849.00**
	210Mb/22ms	**£1899.00**	**£1999.00**
	320Mb/22ms	**£2349.00**	**£2449.00**
PCS486-25Cache	40Mb/28ms	**£1899.00**	**£1999.00**
	85Mb/25ms	**£2049.00**	**£2149.00**
	125Mb/22ms	**£2149.00**	**£2249.00**
	210Mb/20ms	**£2299.00**	**£2399.00**
	320Mb/20ms	**£2749.00**	**£2849.00**

INCLUDED

All PCS Machines include: Both 1.44Mb and 1.2Mb floppy disk drives, 14" Super VGA Colour systems with 1024x768 resolution and matching 1Mb video card, Microsoft MS DOS 4.01, Microsoft Serial Mouse, Microsoft Windows 3.0, 102 key UK keyboard, full soak test before shipping & full 12 month warranty.

PC286-12	40Mb/28ms	**£699.00**	**£799.00**

Including 12Mhz 80286 CPU, 1Mb Ram, 1.2 or 1.44Mb FDD,256k video Ram, MS DOS 4.01.

PC386SX-20CD	40Mb/28ms	**£1399.00**	**£1499.00**

Including 20Mhz 80386 SX CPU, 1 Mb Ram,1.44Mb FDD 512k video Ram, 680Mb CD Rom, MS DOS 4.01

CADCAM

NOVELL

SUPER VGA



386SX-20CD

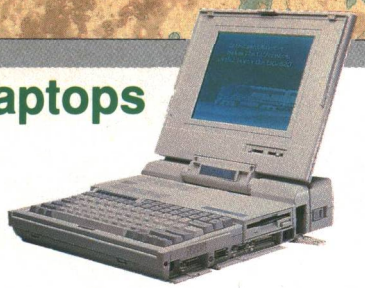
NEW RANGE

REEVES plc

0604-766433

VISA Access

Laptops



The Reeves LT286 is a fully featured flexible laptop offering unique features such as removable "*datasafe*" hard disk drive, a high resolution paper white VGA display and an abundance of expansion options. In the USA it is sold as the EPSON EQUITY.

LT286 ✷

Fast 286-12mhz Intel CPU. Removable 640x480 VGA paper white display. 1Mb Ram. 40 or 80Mb Removeable Hard Disk. Mains & Battery Operation. 720k/1.44Mb 3.5" FDD. 85/86 key UK keyboard.

40Mb £**1099**
80Mb £**1249**

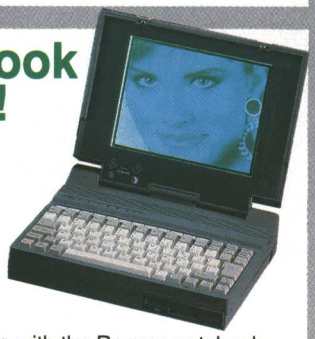
LT386-25 Cache ✷

Workstation performance you can carry like a briefcase."The Reeves Toshiba Beater".This powerful 386-25Mhz mains portable delivers power, performance and superb specification at a 386SX laptop price.

Superfast 386-25Mhz CPU. 4Mb Ram with 32k Cache. 40 or 100Mb fast access hard drive. 640x480 Crisp Bright VGA Display. Compact clamshell Case

40Mb £**2399**
100Mb £**TBA**

Notebook Magic!



Enter a new era with the Reeves notebook PC's, packing powerful desktop capability into a tiny A4 frame.

Notepad 286-12 ✷

Fast 80c286-12mhz Intel CPU.2Mb Ram Only 1.4" thin and 4.81bs light.Crisp Bright 640x480 VGA Paperwhite Screen. 20 or 40Mb Hard Disk.Battery and Mains operation. Includes external 1.44Mb 3.5"FDD. Similar to Sharp 6220 notebook but ***£1345*** less!

20Mb £**1299**
40Mb £**1499**

Notebook 386SX-16 ✷

80386sx 16mhz .2Mb Ram. 20 or 40Mb sub 27ms Hard disk 1.44Mb 3.5" FDD. Only 6.41bs and 5.3cm deep. Crisp Bright, VGA display. Battery and mains operation. 3-4 hour battery operation. A host of power management features.

20Mb £**1499**
40Mb £**1699**

Genius

The Industry's leading manufacurer of pointing devices offering superb quality and value for money.

GS4500 Hand Scanner ✷

The best solution for DTP with OCR

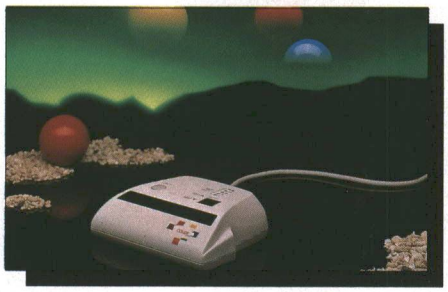


400 dpi scanner and controller. Prodigy OCR Software. Scanedit 2 Software. Dr. Genius Software

£**95.00**

GSC-105 Colour Hand Scanner ✷

Capturing The Universe of Colour

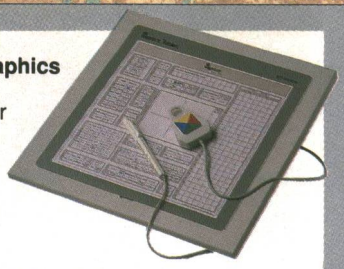


400 dpi colour scanner and controller. Colour Maestro Software. Scanedit 2 Software.105mm scan width, multi scan up to 300mm

£**279.00**

GT1212B Graphics Tablet ✷

Digitizing Your Inspirations



Genitizer 12"x12". Dr Genius Software. Utility Program.Autocad Template. Power Adaptor. 4 Button Cursor Puck

£**165.00**

GT906 Tablet ✷

Genitizer 9"x6". Utility Program. Autocad Template. Power Adaptor. 3 key stylus Pen

£**99.00**



GM6 Plus Mouse ✷

High Performance and Dynamic Resolution 200-800 dpi

GM6 Plus Serial Mouse. Dr.Halo 3 Software. Genius Menumaker software. Genius Mouse Pocket. Genius Mouse Pad. Genius Cutting Board. Fully Microsoft compatible

£**19.99**

Genius GMF303 Mouse ✷

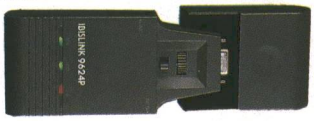
Stylish Design and unlimited capability

GM-F303 Serial Mouse (350-1050 dpi). Supports either PS/2 Mouse or Serial Port. Cascad 1 Software. Dr. Genius Software. Genius Menu Maker. Mouse Pocket and Pad. 9-25 pin serial adaptor. PS2 Mouse Adaptor

£**33.00**

International Modems

Our new CCIT approved international modems offers facilities and specifications at a price you can afford.



Ibislink Pocket Fax Modem

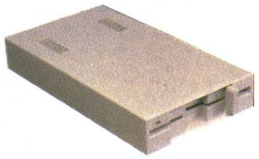
2400bps data modem. 9600bps send & receive fax modem. Communicates with any CCIT Group 3 fax. Includes software.

£**199**

Other Modems

2400 Baud Internal modem with software.....£**99**
9600 Baud Internal Fax/Data/Scanner modem .....£**199**
Amstrad MC2400 Internal Modem .....£**138**
Amstrad SM2400 External Modem .....£**159**

1.2 & 1.44Mb on your XT/AT



Yes it's true our brand new external disk drive range does it all.

Works on any PC XT/AT/386 Computer with free expansion slot. Supports 360k 720k 1.2Mb and 1.44Mb. Co-exists with internal drives, no modifications neccessary.

Card Only £**49.99**

Package including external disk drive (housed in attractive case), connecting cable and multifunction card.

1.2Mb/360k £**99.00**
1.44Mb/720k £**99.00**

Ideal for Amstrad, Olivetti and IBM PS30 Ranges.

Monitor Solutions

Selecting compatible video components is easy when you shop with Reeves. We have matched monitors and video cards to give you exceptional quality and value for money.

19" Colour CAD/CAM Package. ✷



- 19" High resolution Colour Monitor
- 1280 x 1024 Resolution 0.31" Dot Pitch
- 11OMhz Bandwith for flicker-free images.
- Includes matching 1280x1O24 graphics card with Autocad, Gem, Pagemaker etc, drivers.
- Ideal for CAD/CAM/DTP and graphics applications.

£**1799**

19" Mono DTP/CAD/CAM Package. ✷



- 1280 x 960 Resolution
- Facility to display two pages of DTP text at the same time
- Includes matching card with Ventura, Wordperfect, Autocad drivers.

£**999.00**

As above but 15" A4 size 1024 x 768 resolution

£**599.00**

14" Super VGA Colour Solution ✷



- 1024 x 768 Resolution 0.28" dot pitch

£**249.00**

NEW

- 10" 1024 x 768 Resolution

£**299.00**

Matching Video Cards

- 8 Bit 256k 800 x 600 in16 colours £**69.99**
- 16 Bit 512k 1024 x 768 in 16 colours £**99.99**
- 16 Bit 1Mb1024 x 768 in 256 colours £**139.00**

Buy both Monitor and card together and save £**29.00**

For Your Amstrad Portable ✷

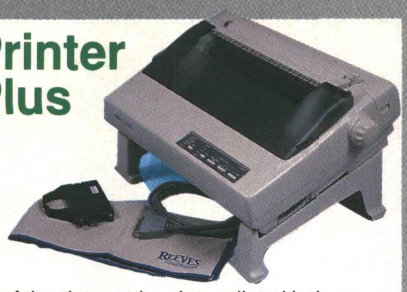


Excellent graphics capability, comes with tilt and swivel base and all connectors.

14" Colour £**165.00**

NEW
9 " Flat Screen Mono £**89.00**

Printer Plus



All of the dot matrix printers listed below come as ready to run packages with £49 worth of extras free!! Each one comes with a stand, paper perforation stripper, dust-cover, RTB maintenance contract and 6 ft right angled printer lead to give your paper a clear run. ✳

Dot Matrix 9 pin 80 column

Star LC10	£139.99
Star LC200 Colour	£189.99
Star FR10	£329.99
Epson FX850	£349.00
Epson LX400	£139.99
Epson LX850	£199.00
120D+	£129.00

Dot Matrix 9 pin 132 column

Star LC15	£275.00
Star FR15	£399.00
Epson FX1050	£419.00
Panasonic KXP1695	£349.00

Dot Matrix 24 pin 80 column

Star LC24/10	£189.99
Star LC24/200	£219.99
Star LC24/200 Colour	£269.99
Star XB24/10	£399.00
Citizen Swift 24	£249.00
Citizen Swift 124D	£199.00
Citizen Prodot 24	£329.00
Panasonic KXP1123	£199.99
Panasonic KXP1124	£219.99
Nec P2+	£229.00
Nec P60	£399.00
Epson LQ400	£199.00
Epson LQ550	£279.00
Epson LQ850+	£469.00

Dot Matrix 24 pin 132 Column

Star LC24/15	£349.00
Star XB24/15	£499.00
Panasonic KXP1624	£349.00
Epson LQ1010	£379.00
Epson LQ1050+	£579.00
Nec P30	£279.00
Nec P70	£499.00

Inkjet Printers

HP Deskjet 500	£399.00
HP Paintjet	£699.00
Canon BJ130E	£449.00
Canon BJ IOE	£289.00
Epson SQ850	£499.00
Epson SQ2550	£699.00

Laser Printers

HP Laserjet IIP	£799.00
HP Laserjet III	£1179.00
HP Laserjet IIID	£1899.00
Star Laserprinter 4	£849.00
Star LBP8II	£1199.00
Star Postcript	£1399.00
Panasonic KXP4420	£799.00
Panasonic KXP4450i	£1199.00
Panasonic KXP4455	£1849.00
Epson EPL7100	£799.00
Canon LBP4	£799.00

Printer Accessories

2 way switch Box Manual	£19.99
4 way switch Box Manual	£29.99
4 Way switch Box Automatic	£75.00

Cut Sheet Feeders, Colour kits and all other options available please call for pricing.

Software



Please specify disk size when ordering.All software UK versions supported by the manufacturer.

Accounting

Sage Sterling

Bookeeper	£ 69.99
Accountant	£179.99
Accountant Plus	£269.99
Financial Controller	£359.99
Cashtrader	£69.99
Payroll 2	£124.99
Jobcosting	£124.99

Sage Sovereign

Sales Ledger	£149.00
Purchase Ledger	£149.00
Nominal Ledger	£149.00
Cashbook	£149.00
Sales Order	£149.00
Purchase Order	£149.00
Stock Control	£149.00
Invoicing	£149.00
Payroll	£149.00
Job Costing	£149.00
Report Generator	£149.00

Map

Complete Accounts	£229.00
Integrated Accounts	£159.00
Cashbook	£95.00
Payroll	£69.00
Payroll 3	£139.00

DTP

The new force in DTP

Timeworks	£69.99
Deskpress	£179.00
Timeworks Tutor	£24.99
Timeworks Lite	£28.99
Scanart	£25.00
Drawart	£29.00
Davrelle	£69.99

Typographica

Standard Collection	£65.00
Prime Collection	£39.00
Fonts *(per font)*	£19.99
Ventura Gold	£499.00
Aldus Pagemaker v3.01	£439.00
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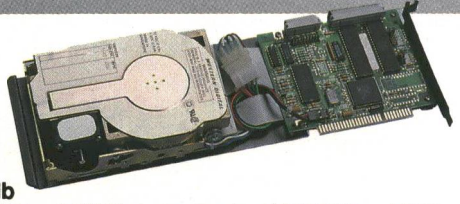

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GENIUS 286/386SX

GENIUS 286/16- SPECIFICATIONS

* Fully IBM AT compatible * 80286-12 Intel microprocessor with 80287 Coprocessor socket * 'O', wait state operation 16MHz by Landmark 1Mb Ram fitted expandable to 4Mb * Fast access 65Mb/23mS Mitsubishi hard disk fitted 1:1 Interleave * 1.2 Mb and 1.44 Mb Floppy disk drives * Choice of Super VGA Colour Mono or Hercules * Enhanced 102 keys keyboard * Real time clock * AMI BIOS * 1 parallel, 2 serial and one games port * 8 expansion slots, 5 free * 220 Watt power supply * 12 months nationwide on-site maintenance cover.

Hercules 14'' Mono	**£ 740.00**
VGA 14'' Mono	**£ 810.00**
Super VGA 14'' Colour	**£ 899.00**

GENIUS 386 SX - SPECIFICATIONS

*as Genius 286 but * 80386SX-16 processor *2Mb Ram fitted etc.

Hercules 14'' Mono	**£ 899.00**
VGA 14'' Mono	**£ 999.00**
Super VGA 14'' Colour	**£1,099.00**



386 SX CACHE

A powerful system using Mitsubishi's 65Mb voice coil fast access hard disk and disk cacheing giving optimum performance in the most speed critical applications. A full 4, 096K of system memory is standard and means that this system is able to run all multiuser, multitasking operating systems and software.

SPECIFICATIONS

* Fully IBT AT Compatible * 80386SX-20 Intel microprocessor with 80387SX Coprocessor socket * 'O' Wait state operation, 27MHz by Landmark * 4,096K Ram fitted expandable to 8Mb * Fast access 65Mb/23mS Mitsubishi hard disk with disk cacheing 1:1 interleave * 1.2Mb and 1.44Mb floppy drives fitted * Choice of Super VGA Colour mono or hercules monitors * enhanced 102 keys keyboard * Real time clock * AMI BIOS * 1 parallel, 2 serial, 1 games port * 8 expansion slots 4 free * Minitower case with 220 Watt power supply * 12 months nationwide on-site maintenance cover.

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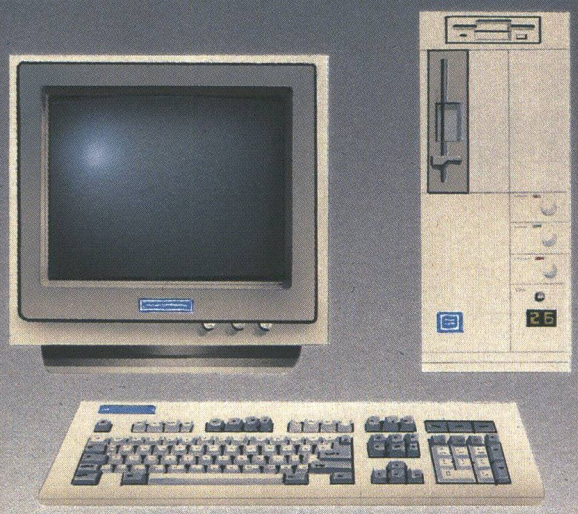

386-33 CACHE

SPECIFICATION

* Fully IBM AT Compatible * 80386DX-25 Intel microprocessor with 80387 coprocessor socket * 'O' Wait state operation, 34MHz by Landmark * 4,096K Ram hard disk cacheing, 1:1 interleave * 1.2Mb and 1.44Mb floppy drives fitted * Choice of Super VGA colour, mono or Hercules monitors * enhanced 102 keys keyboard * Real time clock * AMI BIOS * 1 parellel, 2 serial and 1 games port* 8 expansion slots 4 free *Minitower case with 220 Watt power supply * 12 months nationwide on-site maintenance cover.

Hercules 14" Mono	**£ 1,299.00**
VGA 14" Mono	**£ 1,449.00**
Super VGA 14" Colour	**£ 1,599.00**

386-55 CACHE - SPECIFICATIONS

* As 386-33 but processor is intel 80386-33 and system also features 82385-33 Cache controller/128k Cache memory fitted. Landmark speed 58-7MHz.

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VGA 14'' Mono	**£1,949.00**
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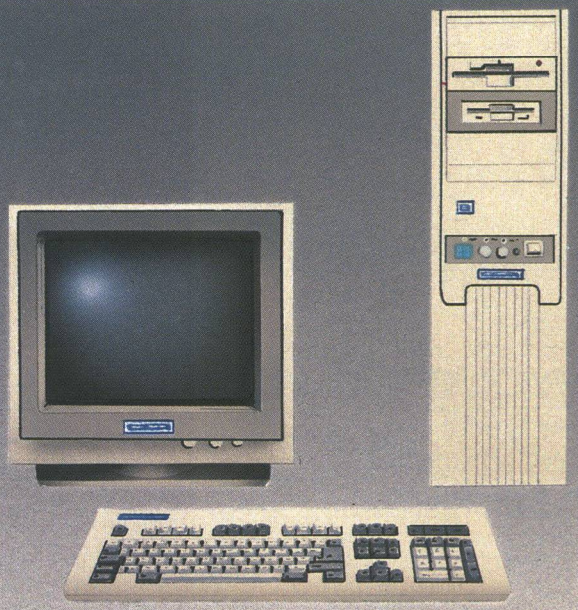

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The 486-120 Cache recently launched by Multiplex has been exhaustively tested for quality, reliability and total compatibility with over 800 popular software packages. It's advanced 'O' Wait state six layer motherboard with 80486-25 Intel microprocessor is designed using the very latest surface mounted VLSI chip set which optimises reliability. The internal CPU Cache and co processor make light work of even the most demanding DTP and CAD/CAM applications.

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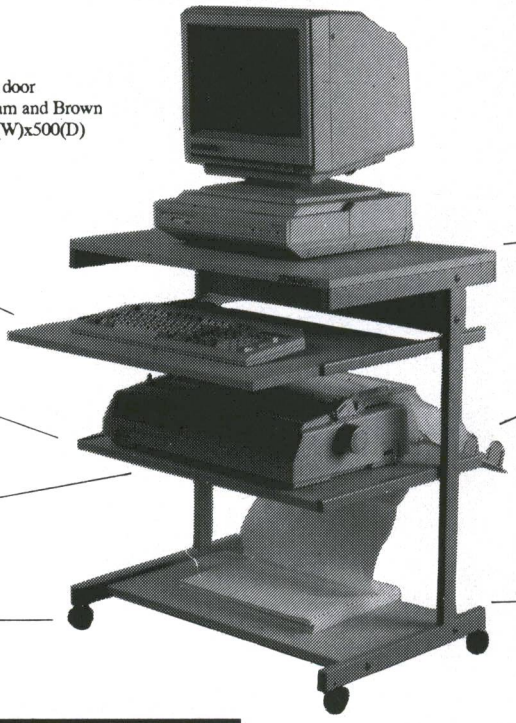

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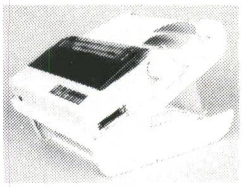

Feeds and refolds the paper underneath the printer.

Takes up hardly any more space than the printer itself

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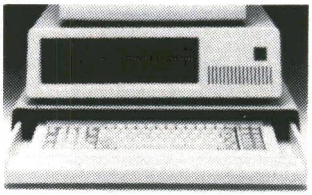
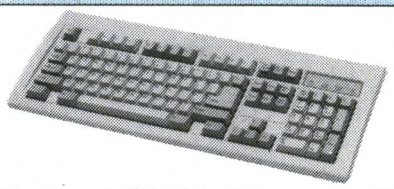


A0501 Keyboard Storage Drawer 29.50

KEYBOARDS



X1000 Amstrad 1512/1640, 101 key 63.00
X1001 IBM XT/AT, 102 key 39.00

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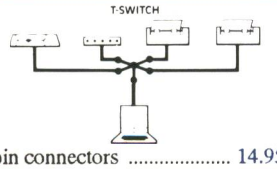

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X0003 4 Way, 36pin connectors 19.50
X0004 X Way, 36pin connectors 20.95
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All cables are 2m. Longer lengths available on request.
Cables only available when purchased with other products.

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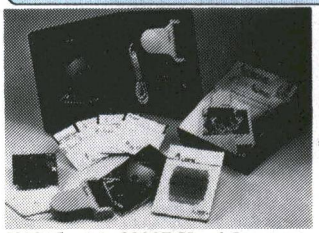

- *100-400 dpi*
- *105mm Scan width*
- *32 Grey levels*
- *Brightness control*
- *Free OCR & Graphics software*
- *Supports TIF/PCX/IMG/MSP/CUT file formats*

X2015 A4-8000P Hand Scanner, supplied with XT/AT i/face card, Image72 & AiOCR Software 99.00

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- *50-400 dpi*
- *216x356mm scan area*
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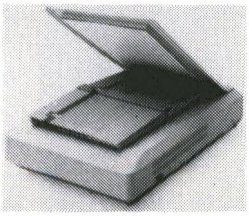
- *Supports TIF/PCX/MSP file formats*



X2110 Panasonic FX-RS506 Flatbed Scanner, with XT/AT i/face card. Graphics & OCR software 749.00

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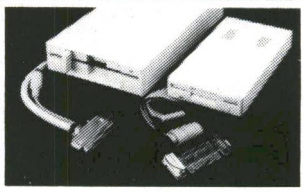

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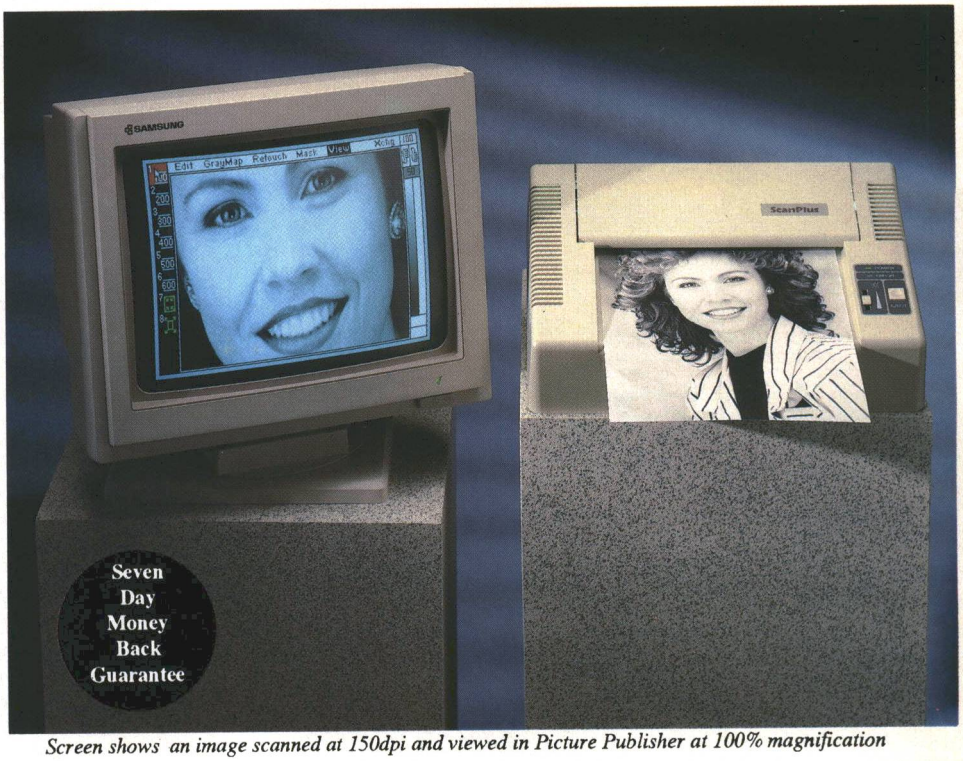

Screen shows an image scanned at 150dpi and viewed in Picture Publisher at 100% magnification

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Picture Publisher will let you:

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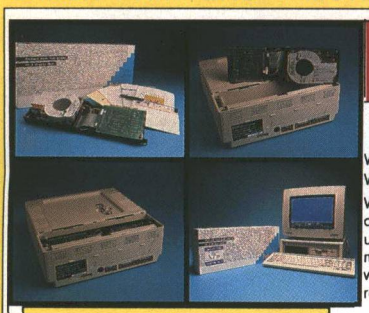

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4. Type *C: INSTALL* at A:>

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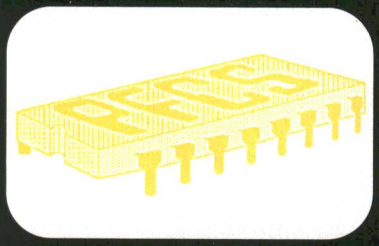

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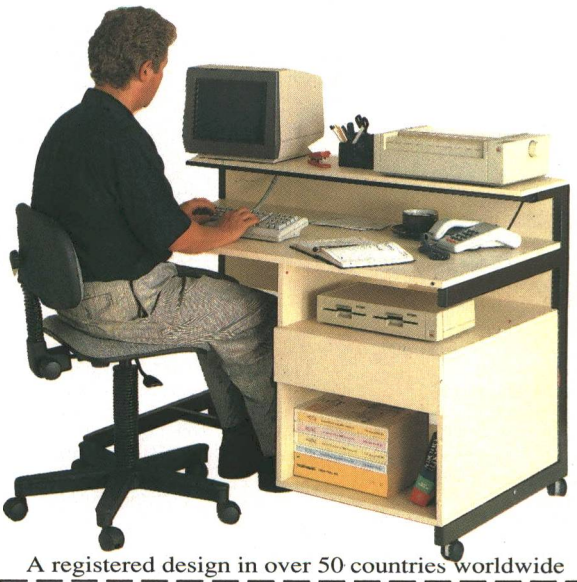

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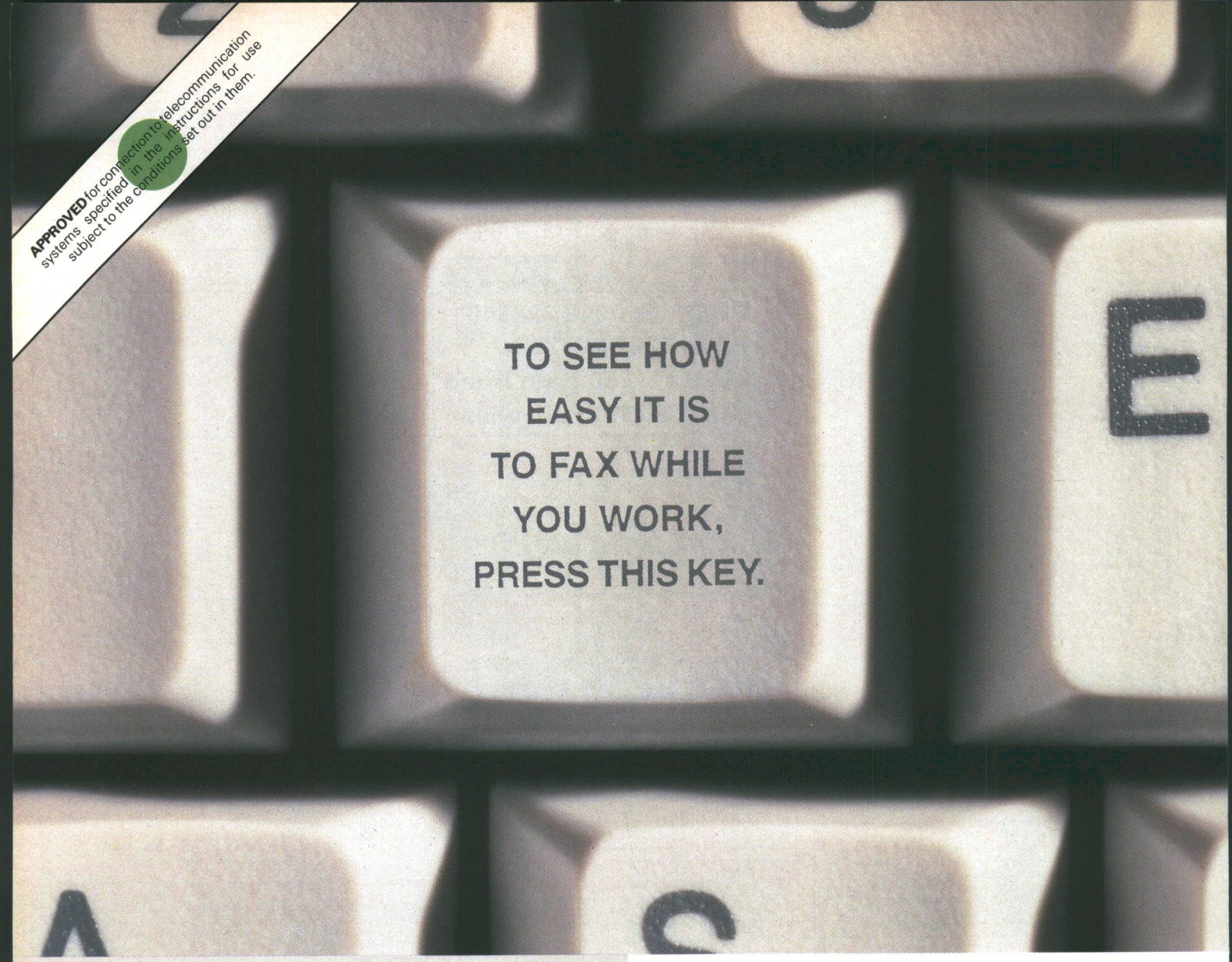

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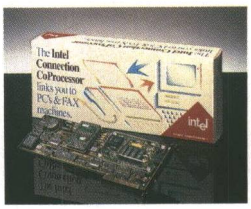

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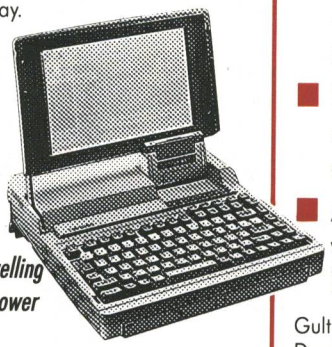

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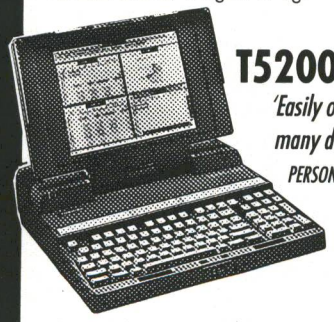
PC WEEK

Full AT desktop power in a truly portable machine. Fully compatible. MS-DOS 4.01 80C286 processor. 3.5" floppy diskdrive 720 KB/1.44 MB. 40 MB hard disk drive. Maths co-processor slot. Full-size keyboard. Backlit supertwist EGA display. Toshiba expansion slot. Maxtime Power Management. Auto Resume Mode. Weighs 5.7 kg.



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Top of the range, super-fast portable PC with full specification. Fully compatible. MS-DOS 4.01. 80386 processor. 2MB RAM extendible to 8 MB. 32 KB of high speed static cache memory. 40 or 100 MB hard disk. Maths co-processor slot. 92 key keyboard with numeric keypad. High resolution gas plasma VGA display. Two industry standard and one Toshiba expansion slots. Weighs 8.6 kg.

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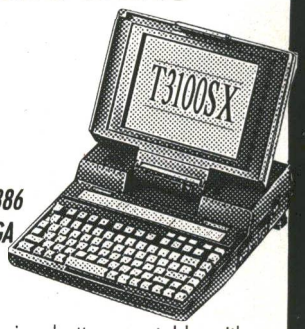

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WORD PROCESSING

Bradford—prints Wordstar and ASCII files in over 30 high quality fonts.

Childrens Wordprocessor—menu driven, large on-screen fonts, includes sample stories.

Fastype—typing tutor with good graphics, but on-line help bug.

Fontastic—fancy fonts with font designer.

Galaxy Lite V1—Latest version of (formerly) Galaxy V2.43, ideal for small WP tasks, and easy to use.

LQ (V2)—memory resident print enhancement, works alongside your word-processor.

Mindreader—guesses your next word, suitable for scientists, doctors etc.

Multilingual WP (11 disks)—Intext WP with support for Arabic, European, Farsi (Persian), Gaelic (Irish), Greek, Hebrew, Polish, Russian, Turkish, Urdu & Yugoslavian.

MultiWord—electronic thesaurus, which can operate as a standalone program, or as TSR.

New York Word (2 disks)—powerful features include tables, macros, indexing, split-screen editing.

PC Outline—memory resident thoughts organiser, up to 9 outlines on-screen with re-sizable windows.

PC Type II (3 disks)—latest version of Buttonware favourite can now work on up to 10 files, with boxes, lines and calculations (hard disk req.).

PC Write—can display mathematical foreign characters, split-screen editing, uses ASCII files (max 64K).

TechPrint—similar to WSMX80 but aimed at technical document production.

Spell Check—for use on ASCII files (eg PC Write), also includes EZ file and EZ graph.

Wordplan—can read 1-2-3 files directly (and automatically updates when values change), does calculations, has pull-down menus command language.

WSMX80—fancy print effects using Wordstar (prof) and your epson printer.

DATABASE MANAGEMENT

Card Index—simple tiling system, can print out 3×5 cards.

Catalist (2 disks)—powerful mailing list manager (over 32,000 names and addresses per list), duplication detection, post code formatting for over 100 countries, merge/split, output on labels up to 8 wide, Rolodex cards (hard disk req).

DBase III+? (2 disks)—well, not quite, but Wampum reads Dbase files, does reports, supports networking and more (requires hard disk).

DBSCAN—Documentation and analysis of dBase III/Clipper PRG files to enable future support & modification

HyperShell – (2 disks) multi-file Hypertext reference system, help system and menuing system, has intelligent text file viewer, directory browser/file manager, and applications user interface prototyping with pop-up menus etc.

PC File V (3 disks)—Latest version of Buttonware's popular database system, many powerful features but friendly and easy to use (replaces PC File + and PC File:dB). Hard disk required.

PDS* Member—Multi-denominational Church Membership and Giving System, relational files, labels, rotary cards, with members job and talent tracking, with full editing and password protection. (Hard Disk required)

Softbook – Freeformat hypertext system for authorising, self-instruction, lecture presentation. Includes sample database "PC Architecture & Assembly Language".

Speciality Database Software (3 disks)—for Record Collectors, Book-minders & Photographers. Store up to 1,000,000 records with search, sort and reports. New systems available (7 disks) are, Antique Documents, Coin Collectors, Comic Books, Film/Video, Home Inventory (Insurance), Memorabilia and Stamp Collectors.

VCR—keep a track of your video cassettes and print labels etc.

SPREAD SHEETS

As Easy As—amazing Lotus 123 compatible spreadsheet, reads 123 files, macros etc.

Calclink—memory resident program allowing the kind of calculations that would normally require a spreadsheet to be done within your favourite wordprocessor. (Omnigauge UK)

Lotus 123 Worksheets & Macros—includes cash flow, line-of-credit tracker, ratio analyser, stats calculator, growth capacity calc, queue analysis, new venture budget, quote generator.

Lotus 123 Worksheets (3 disks)—includes financial analysis, import utils, linear stats, biorythms, travel business expenses, flowchart symbols, stock portfolio analysis, rental property analysis.

Lotus 123 Tutorial—covers menus, printing and databases (release 2 ONLY).

Mipscalc Plus (3 disks) is Lotus compatible spreadsheet running under all versions of GEM, reads/writes Lotus .WKS files.

PC Calc + V2 (3 disks)—new features, more powerful, still integrates with PC File+ & PC Type+, extensive manual. (Hard Disk required).

Side Writer—print out ASCII files on their side, ideal for wide spreadsheets.

Symphony Worksheets & Macros (3 disks)—includes name and address notebook, appointment calendar, graphic macros with trig functions, two-column WP, chequebook, labels, resistance & tolerance of resistors.

GAMES/TRIVIA

Arcade Games (4 disks)—includes Bugs!, Jumpjoe, Datnoids, Nuclear Attack Simulation, 3-Demon, Kong, Bricks, Pyramid, Pitfall, PC-Golf.

Backgammon

Bermuda Triangle—sailing quest (EGA ONLY).

Blackjack!—accurate simulation.

Capitalist—incorporating Oligopoly and a new shareware version of Punter.

Casino Games—includes Bridge, Othello, Roulette.

Castle—popular adventure.

Cave Quest—fantasy role-playing game.

Football Forecast—Pools Prediction system has support for 214 teams in English & Scottish Leagues showing form, predictions and permutations.

Ford Motor Car—16 models, 4 events (including Grand Prix) also buyer's guide and ordering information.

Grand Prix—from authors of Popstar/Soccer Game etc.

Hack—adventure, DND style.

Jacaranda Jim—adventurous exploits in outerspace.

Games 15—Star Wars, Sea Wolf, Frogger etc.

Games 16 – Soviets, Bricks, FLIGHTMARE.

Games 17—Pac Man, Poker, Castle, Invaders etc.

Get Lucky!—adult games.

Mahjong—like oriental rummy with PUNGS, KONGS & CHOWS!

Monopoly/Tune Trivia—US version of famous board game, Tune Trivia like 'Name that Tune'.

PC Chess—play the computer or a friend, save load etc.

Pinball Rally—three versions of popular game.

The Popstar—cope with pressures of sex, drugs and rock 'n' roll as you tour the world.

Sleuth—murder adventure.

Spacewar—shoot 'em up with good graphics.

Soccer—yes! manage one of several teams and steer them towards glory.

Super Power—Six-a-game of superpower economics, trade and military conflict.

Trivia (3 disks)—The Trivia Machine has several categories and levels.

Willy the Worm—ladders, rolling barrels etc.

BUSINESS/VERTICAL

Forms Creation—design, save forms, save forms with data, printout. EZ Forms Exec.

Estate Agents System—storage and retrieval of information about properties, pending and closed sales, plus agents' details and helpful reports.

Estibid (5 disks)—contractors estimating/costing analysis includes sub-contractors, materials, transport costs etc.

Invoice and Statements—Simple to use, customer database, single or period invoices, auto-numbering, account summary with aged debt/VAT (Software Foundation Ltd). **(Hard Disk required).**

Land Surveyors Tools—Surveysoft calculations include traverse, field traverse, inverse & radial inverse.

Leadmaster—Sales program which tracks customers, prospective customers, and has progress file, re-contacts, standard letters etc.

Lightyear—business efficiency evaluation.

Make My Day—new version of this Time Management system, Appointment Calendar, Job Scheduler, Time Log and Expense Account Manager.

PDS* Quote—Quotation system, now includes context-sensitive help, pop-up calendar, pop-up calculator, import data etc. (Pro Dev Software).

Portfolio Manager—PFROI keeps track of many types of transactions including tax rates, multiple portfolios, depreciation, short sales and stock splits.

Project Management—uses critical path analysis and can handle up to 1,000 tasks.

Quickbid-Estimating package for Electricians, Plumbers, Builders.

Salesman—sales management which includes Clients, Product analysis, Note Pad and Appointments Diary. (Hard Disk required).

Stock Processing (Inventory)—includes levels, listing, ordering, editing, cash register module.

Service Plus (2 disks)—Maintenance and Service Call Tracking, suitable for electrical, plumbing, heating services etc.

The Controller (2 disks) – powerful project organiser. (Hard Disk required).

Timeplan—Time Recording and Costing system for up to 500 clients, 30 staff, 10 worktypes (shareware version allows up to 10 clients) (G G Software)

ACCOUNTS/FINANCE

Billing/Invoicing System (2 disks)—itemised invoices/bills with balance forward, finance charges, subtotals, balance due, also reports.

Cashbook (3 disks)—5 bank accounts, 5 cash accounts payments/receipts posting, 100 nominal accts/VAT codes, VAT summaries (Freeway UK).

Cash Trac—update of Personal Finance Manager, with checking accounts/print cheque, credit cards, pop-up calculator.

Corporate Financial Analyst (2 disks)—company accounts analysis and planning, needs no modelling or spreadsheet experience, (Computer Financial Models UK).

Home Finance Manager—Keep a record of Bank/Building Society accounts with monthly balances and details of standing orders also loan calculator with repayments/interest (Blackwood Software—UK).

Ledgermaster—(4 disks). Combines features of both previous popular packages, Accounts and Accounts Plus into one, includes both Nominal and Analysis options. (Freeway UK).

Page Accounting—fully featured word processor with special in-built features to allow accounting routines also.

Page Financial Controller (3 disks)—shareware clone of the similarly named package includes Sales Ledger & Statements, Invoicing with Discounts, Purchase. Ledger with Remittances, Nominal Ledger, Cashbook & VAT. Stock/Order Processing & Job Costing, network ready (Page Consultants-UK). Hard disk required.

Payroll (3 disks)—latest legislation, (Freeway UK).

Simplified Bookkeeping—expenses, income, bank account, payroll, accts receivable and summaries.

GRAPHICS

Altamira—design posters, cards, logos, garden/floor plans.

Clip Art 1 (3 disks)—approx. 120 trade logos/computer motifs for use with Timeworks/Ventura.

Clip Art 2 (3 disks)—approx. 200 images including Dollar, Dwarf, IBM, Piano, Scissors etc. for use with Timeworks/Ventura.

Dancad (2 disks)—from simple letterheads to complex 3D cog-wheels with animation & rotation, new version (2.0D-UK) has support for post-script laser printers (hard disk req).

DROEGE (2 disks)—Printed Circuit Board Design.

Draft Choice—one of the easier to use CAD systems which includes drop-down menus, on-line help, drawing, editing, viewing, measurement/query options plus more from the authors of As Easy As (Trius).

Express Graph—3D bar charts, pie charts, line graphs etc. from entered or imported data.

Finger Paint—paint program with Mac-like screen.

Gem Drawings/Paintings—extensive library.

Quest 3D (formerly Image 3D)—is a new version of this wire frame modelling system with view, zoom etc, now support CGA, EGA and VGA!.

PC Key Draw (4 disks)—latest version of popular CAD package now includes library disk, tutorial, and manual disks with superb demo and utility to convert graphics to IMG format for DTP.

Slide Presentation—use camera to take snapshots of screen, then display as at a slide-show, ideal for training, demonstrations etc.

The Draftsman (2 disks)—data graphs, slide shows from 123/Symphony/Visicalc.

EDUCATIONAL/STATISTICS

Amy's First Primer (ages 4-8)(NEW)(compiled version, is a collection of fun games for young children that help them with skills like counting, letter recognition, simple problem solving, pattern recognition and keyboard use.

Arcus Professional (4 disks)—Statistical package including Student's T-Test, F-Test, Z-Test, also linear, geometric & exponential regression analysis, Chi / Fishers / Irwins etc. (Buchan)

Childrens Games (ages 4-8)—hangman, alphabet, animals etc.

Eclipse—word and grammar game like hangman except guess words from document, rather than letters from a word (J Higgins).

Flash Cards (4 disks)—7,500 word vocabulary builder and spelling teacher (Advanced).

French Tutor—1,648 French/English word combinations, 3,200 verb conjugations and 196 French/English phrase combinations.

Funnels & Buckets—simple arithmetic tuition with arcade type action.

GCSE Physics/Computer Science (2 disks available separately)—exam revision.

German Tutor—1,600 German/English word combinations, 3,875 verb conjugations and 160 German/English phrase combinations.

IQ Builder—intelligence testing.

Italian Tutor—816 Italian/English word combinations, 1500 verb conjugations and 114 Italian/English phrase combinations.

Maths/Statistics—26 maths routines including prime factors, vector analysis, linear interpolation, gaussian quadrature etc., plus 18 stats calculations including Mann-Whitney, Chi-square, students, T-test, multiple linear regression etc.

Memory Master—Improve memory powers with these techniques.

PC CAI—a computer assisted learning language that allows you to write tutorials, tests, rolling demos, etc

PC Prompt—pop-up help with DOS commands/syntax.

Play 'n' Learn (ages 2-4)—for the very young, alphabet recognition, computer reaction etc, including Amandas Letter Lotto.

Spanish Tutor—1,550 Spanish/English word combinations, 3,596 verb conjugations and 150 Spanish/English phrase combinations.

Tutor—introductions to computers, binary numbers and the CPU, input/output devices, Disk Operating System, subdirectory structures, batch files etc.

Whiz Quiz—arithmetic/elementary mathematics, self grading according to age of user.

LANGUAGES/PROGRAMMING

A86/D86—probably the best 8086 assembler/disassembler around.

Basic Aids (4 disks)—G.W. basic.

B-Window/C-Window—windowing utils for Basic & C.

C Tutorial—for beginners to advanced.

C Spot Run (2 disks)—window and menu utils for C programmers.

Lisp—Xlisp programming language.

Logo—Jem version of turtle-based graphics language, popular with children.

Modula 2 Compiler (3 disks)—new version (2.0A) of this flexible but very powerful programming language.

Modula 2 Tutorial (2 disks)—companion to the above.

MVP Forth (2 disks)—full implementation.

Pascal—three compilers on one disk, Tiny, Facillis & Visible.

Prolog—ADA implementation of 5th generation AI language.

Quickbasic—tools and utils.

SDA(2 disks)—design screens for data input (Basic).

Turbo C Tutor (2 disks).

Turbo Pascal Tutor (2 disks).

Turbo Pascal Library (12 disks)—routines, programs, utils, statistics, sprites, animation, tools and much more.

UTILITIES

Ample Notice—appointments calendar, pop-up alarm clock, sideways addressing util for envelopes (can use data directly from the screen).

Deskteam—pop-op organiser includes notepad, alarm clock, calculator, DOS access.

DOSamatic—load and run several programs at once, switching instantly between them and DOS services.

Jumbo—Desk Diary + Phone Pad, everlasting with ability to store up to 255 pages per date.

PC Shell—unix-like command shell.

Label Maker/News Editor—design labels and include graphics from News Master graphics editor (Desai UK).

Professional Masterkey—disk utils like Nortons including file recovery, unerase etc.

Ram Test—chip diagnostics.

SimCGA—colour graphics simulator for Hercules cards, runs most CGA software.

Still River Shell—another alternative to GEM, this shell protects you from the command-line operation of DOS.

Sydex Utilities (2 disks)—including Anadisk for analysing whats REALLY! on a disk, Teledisk which can make an image of a complete disk with sub-directores etc (even some 'protected disks) which you can then download or upload with the help of a modem, and utils and emulator to handle over 100 CP/M formats on your PC.

Vmix (2 disks)—**multi-user operating system** along the lines of unix, adjusts itself to 8088 or 80286.

Zapcode—(optionally) Memory resident printer control utility to select fonts, margins etc for use with dot-matrix, laser, ink-jet etc (Morton Utilities)

SPECIAL INTEREST

Astrology/Horoscopes—birth signs, zodiacs etc.

Bible (7 disks)—includes Samfindex to allow quick search and retrieval of words, phrases etc (Bayliss UK). Hard disk required.

ESIE—configurable expert system including example which works out childs illness from questions and answers.

Genealogy—EZ tree traces and plots your ancestral roots.

Handwriting/Numerology—Handwriting and numbers analysis for those who can feel the 'Vibrations'. Also includes Biorythms.

Personal Tarot—enjoy professional quality Tarot card readings on your PC, easy to use, flexible, customizable with professional looking reports.

Pianoman—play, enter and save tunes, also construct stand alone tunes.

Procon Fortune—analysis of personality according to both Western & Eastern astrology. Also compatibility ratings, etc.

The Diet Disk—has several calculations for average weight loss, calories needed etc and shopping list showing calories.

COMMUNICATIONS

Fido—very popular bulletin board system with E-mail facilities and network capabilities, several in use throughout UK/Europe/USA.

Kermit (2 disks)—file transfer between mainframes/PC's, many non-IBM machines catered for.

PC VT—DEC VT 102/100/52 terminal emulation with file transfer.

Procomm UK—powerful but flexibile, with many file transfer protocols.

Wildcat (2 disks)—new bulletin board system which is easy to set up but very impressive.

SOFTWARE

PC Type II	£69.95
PC File V (NEW)	£89.00
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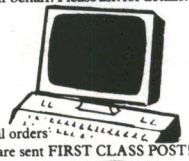

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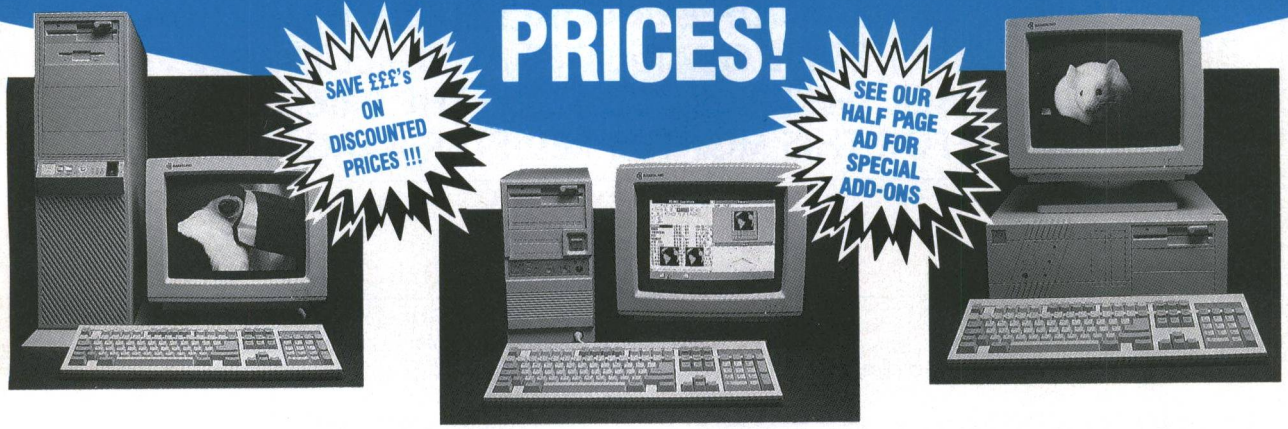

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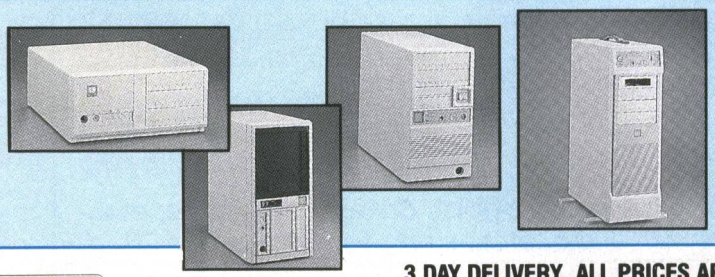

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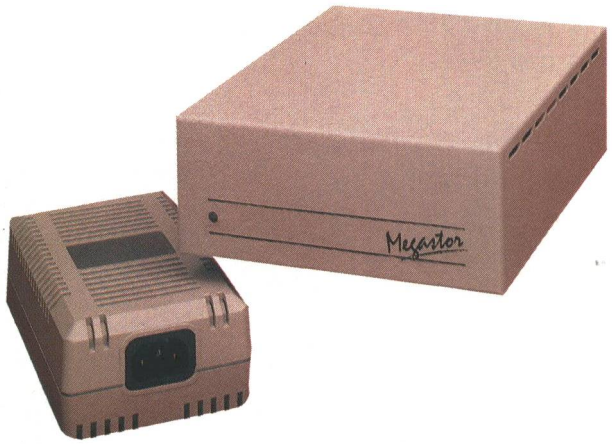

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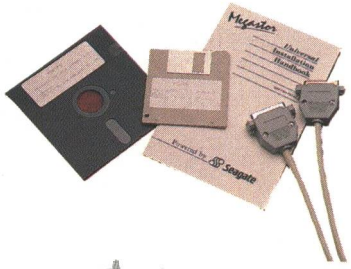

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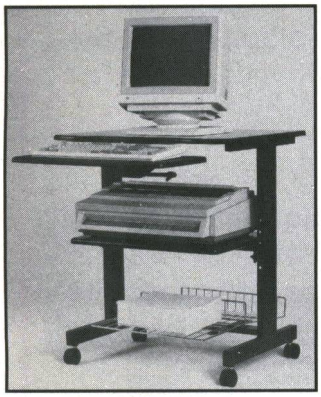

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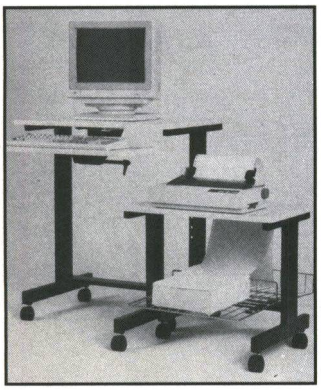

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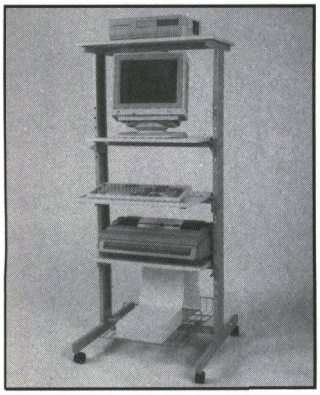

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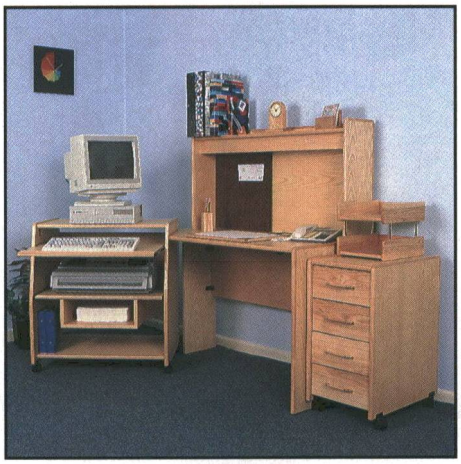

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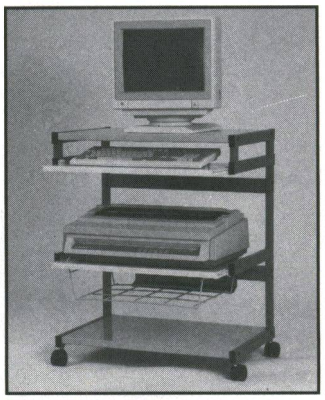

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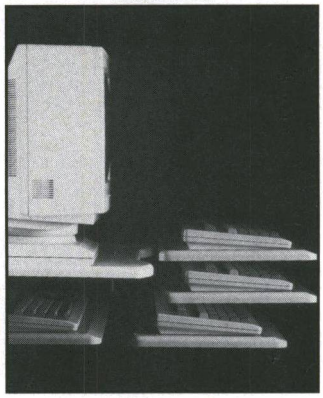

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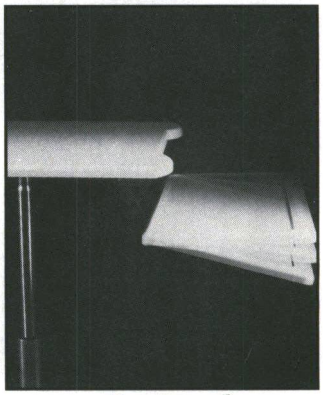

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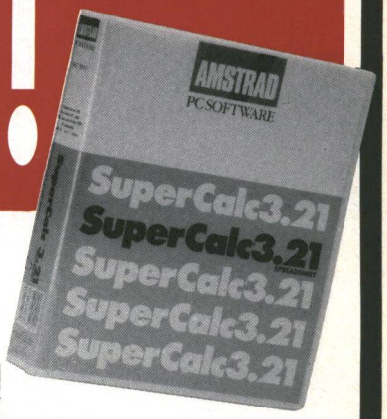

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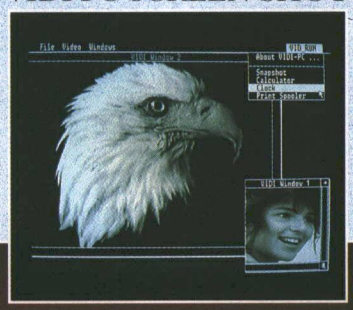

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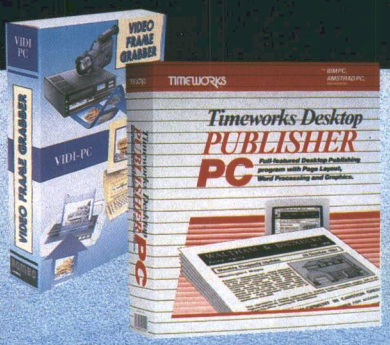

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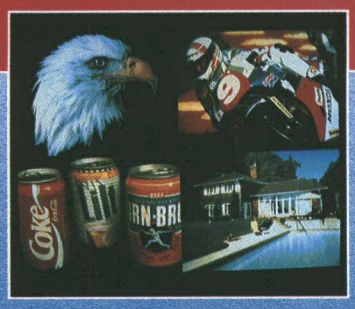

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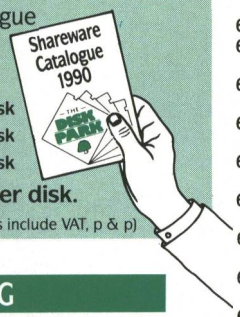

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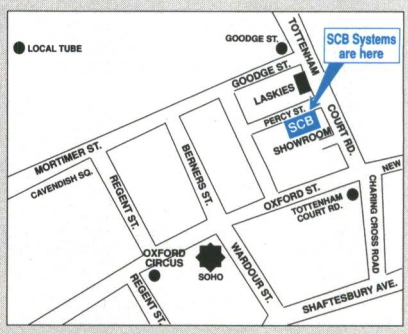

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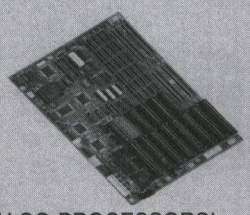

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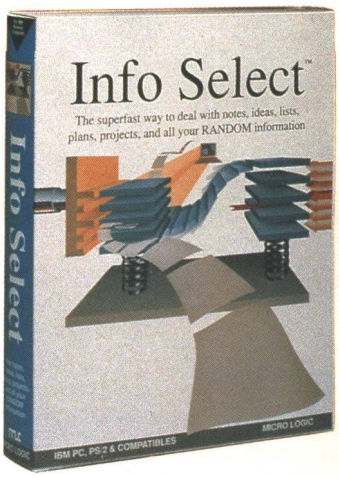

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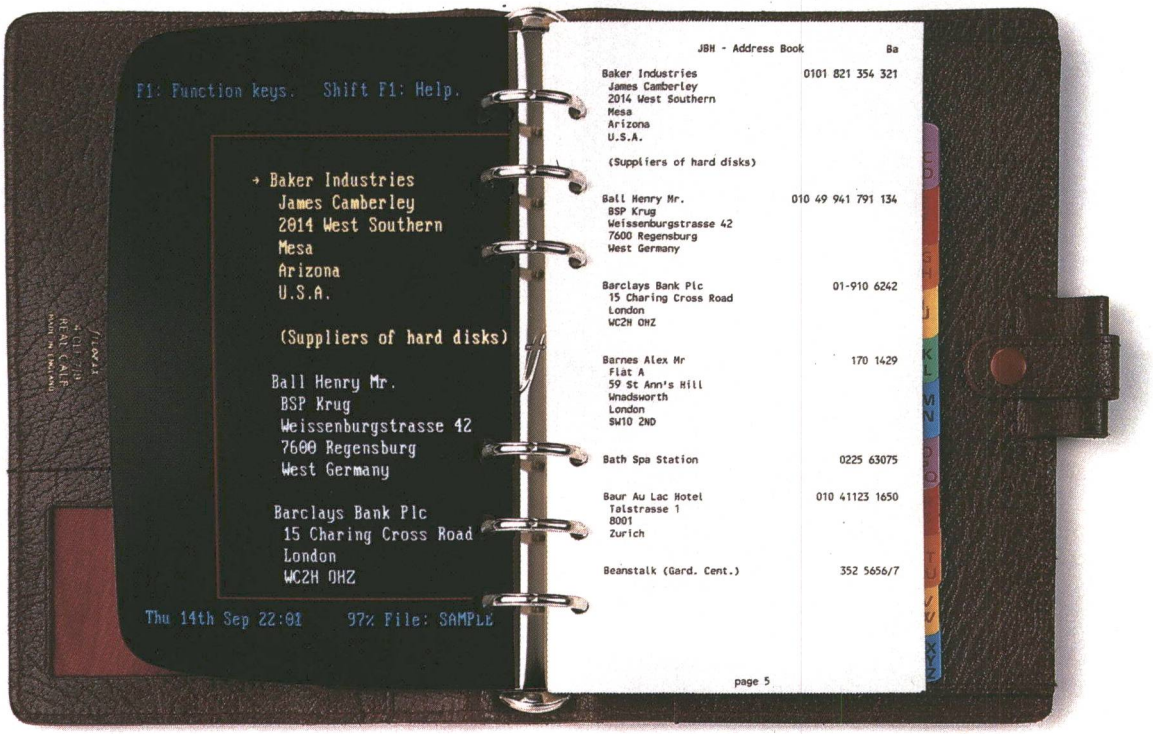

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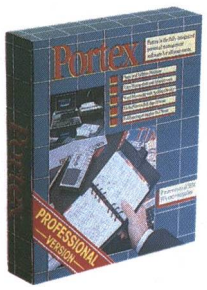

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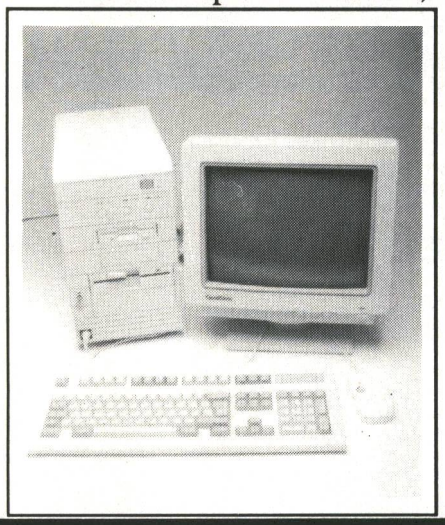





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TANDON

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SL286-40	£829	£889	£999	£1099
PCA12-40	£989	£1049	£1169	£1269
PCA12-110	£1185	£1249	£1369	£1465
SL386sx-40	£1029	£1085	£1199	£1299
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PCS 386sx HD20Mb	£1169	£1295
PCS 386sx HD40Mb	£1227	£1365
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PC20 III HD20	*	£489	£595	£579	£709
PC30 III HD20	*	£669	£849	£739	£889
PC40 III HD40		—	—	£839	£969

All * models include MS-DOS/typing tutor, Software and Tutorial video.

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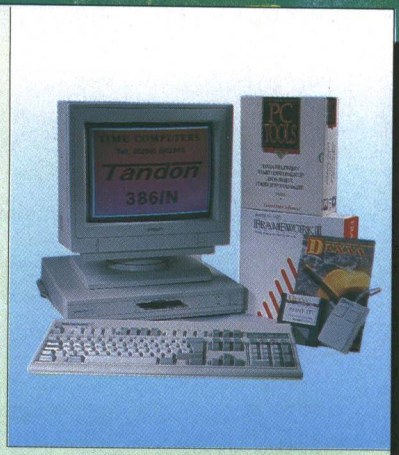

Specification

- 386/N (80386sx-16Mhz) or 286/N (80286-12Mhz) models. Sockets for optional maths coprocessors.
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	386/N *ST* models		
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4Mb	£1399	£1699	£2099
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VGA Mono prices above. VGA Col **£150**
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- MS-Dos 4.01. 102 Enhanced keyboard.
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- Mono, VGA mono, VGA colour, NEC Multisync 2A Super-VGA (800 X 600) or 1024 X 768 Super-VGA screens.
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- Ashton-Tate **Framework II** integrated software package. (wordprocessing, Spreadsheet, Database, Graphics and much more.) Worth over £400.
- Microsoft Compatible serial **Mouse** and software.
- Comprehensive **paint** package
- Additional high performance hard discs models. 100Mb may be insufficient for file-servers. We strongly recommend at least 200Mb.

ST	Hard Disc	386-20	386-33	486-33 EISA
4Mb RAM Models	100Mb	£2399	£2699	Call for latest Prices
	200Mb	£2799	£3099	
	300Mb	£3199	£3499	
	600Mb	£3999	£4299	
	1000Mb	£4999	£5299	

8Mb RAM ST Models £400 Extra

VGA mono prices shown above:

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VGA colour	£150 Extra
NEC Super-VGA colour	£250 Extra
1024 X 768 Super-VGA	£300 Extra
Tape streamers	£Call

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Removable data pacs (hard discs) For security, backup & versatility.



Specification

- PAC386 (80386sx-16Mhz) or PAC286 (80286-12Mhz) models. Sockets for optional maths coprocessors. 1 receptacle enabled. No floppy drive (Optional).
- 1Mb Ram expandable on motherboard to 4Mb on PAC286 and 8Mb on PAC386.
- Serial and one parallel ports. 5 expansion slots. MS-Dos 4.01. 102 Enhanced keyboard.
- PAC HD100 models fitted with additional 100Mb (19ms) fixed hard discs.
- VGA Mono prices shown. Call for other models

VGA Mono Prices	1Mb	4Mb
PAC 286	£Call	£1399
PAC 286 HD100	£1499	£1799
PAC 386	£Call	£1499
PAC 386 HD100	£1699	£1999

30 Mb Data Pac	£Call
40 Mb Data Pac	£Call
Floppy Drive: 3.5" or 5.25"	£Call

Laptops



Specification

- LT/386: 80386sx-16Mhz with VGA LCD screen and 40Mb or 120Mb (19ms) hard discs.
- LT/286: 80286-12Mhz with EGA LCD screen and 20Mb or 120Mb hard disc.
- Sockets for optional maths coprocessors. 1Mb Ram expandable. 3.5" 1.44Mb floppy disc drive. Serial and parallel ports. MS-Dos 4.01.

Model	HD	Price
LT/286 EGA	20Mb	£Call
LT/286 EGA	120Mb	£1599
LT/386sx VGA	40Mb	£Call
LT/386sx VGA	120Mb	£1999

Carry Case	£Call
Spare Battery Pack	£Call
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Ext. Numeric Keypad	£Call
Ext. VGA Monitor	£Call

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Using our Time-Link service the module in your machine may be exchanged for a more powerful one whenever you need to do so in the future, Thus a 386SL can be upgraded to a 486SL, and a 286SL to a 386SL or a 486SL. Other modules (e.g. 386-33 & 486-33) may be available soon.

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The new SL II range is available in Standard or the more popular high performance Special Time (***ST***) models.

Standard Models

Standard models come with 1Mb RAM, 3.5" 1.44Mb floppy drive, 4 expansion slots, 2 serial ports, 1 parallel port, 40Mb, 100Mb (19ms) or 200Mb (15ms) hard discs. 102 keyboard and Dos 4. VGA mono prices shown.

Module	40Mb	100Mb	200Mb
286-12	£Call	£1199	£1599
386sx-16	£Call	£Call	£1849
386sx-20	£Call	£Call	£1899
486-25	N/A	£Call	£2799

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ST models include all the features of standard models and the following extras:-

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- **PC-Tools** Deluxe 6.0 software utilities package. The best in the world! RRP £115.
- Microsoft Compatible **Mouse**
- Comprehensive **paint** package
- Additional high performance hard discs models. 40Mb may be insufficient for business use. We strongly recommend at least 100Mb hard disc capacity.

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ST	with 286 module		with 386sx-16 module			with 486 module	
RAM	**40Mb**	**100Mb**	**40Mb**	**100Mb**	**200Mb**	**100Mb**	**200Mb**
2Mb	£1149	£1449	£1399	£1699	£2099	£2649	£3049
3Mb	£1249	£1549	£1499	£1799	£2199	£2749	£3149
5Mb	£1449	£1749	£1699	£1999	£2399	£2949	£3349

VGA mono prices shown above. Other options (extra to VGA mono)

VGA Colour **£150**
NEC Multisync 2A Super-VGA colour (800 X 600) **£250**
1024 X 768 Super-VGA systems **£300**

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SPELLBOUND	ED 214	Excellent spelling Tutor. Animated graphics (colour required)
PC FASTYPE	ED 139	Another excellent menu-driven typing tutor
COMPUTER TUTOR	ED 141	If you're new to computers, then this is a must for you.
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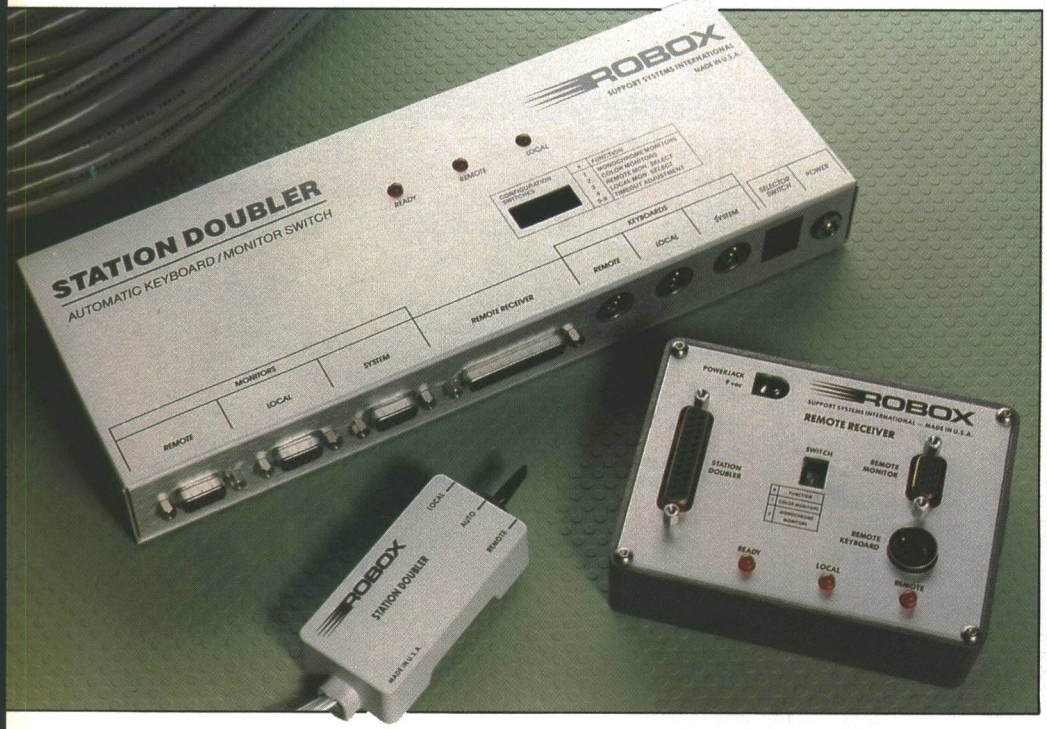

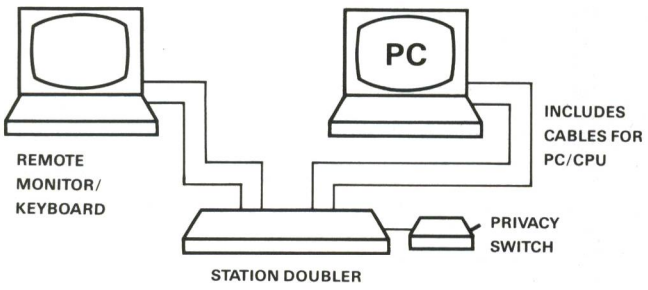

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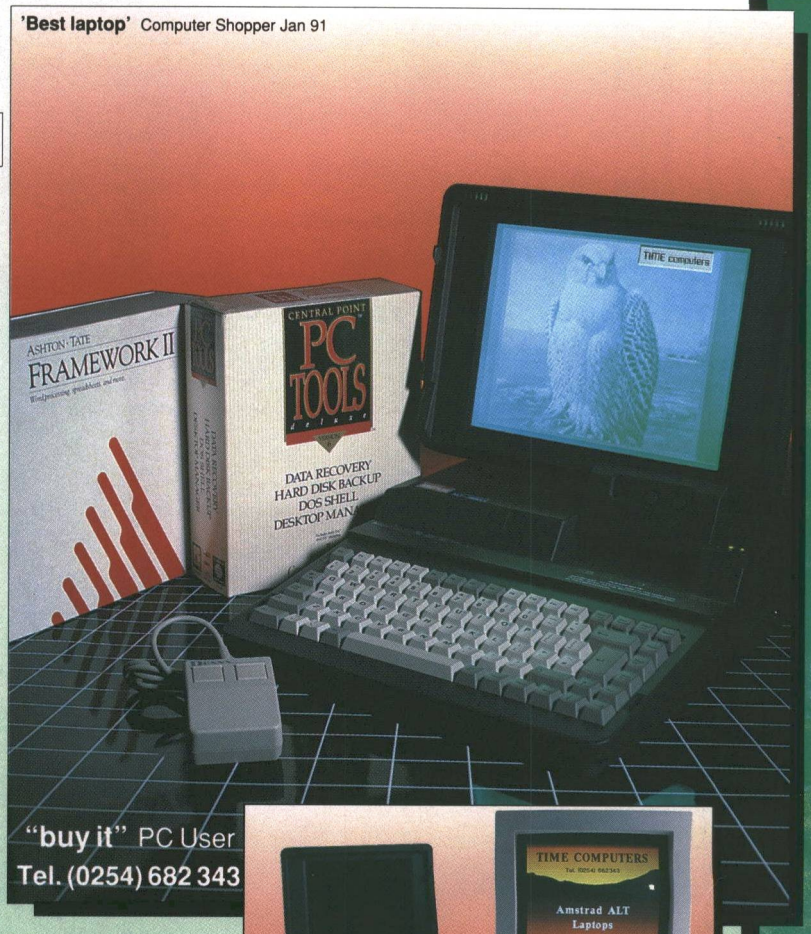

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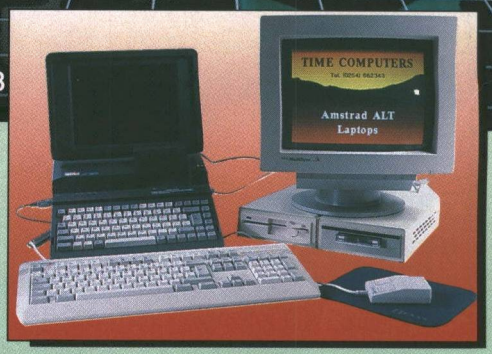

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NEW SYSTEM SLEUTH PRO £99.95

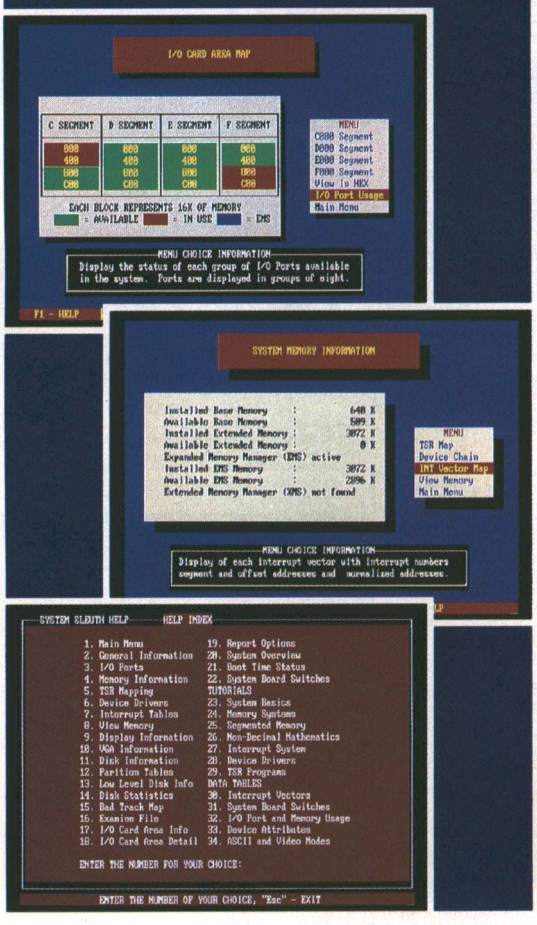
Includes Both PC Diagnostic And System Testing Software

PC Diagnostic and System Testing Product Comparison	SLEUTH	CHECKIT	MANIFEST
CPU DETECTION	✓	✓	✓
VIDEO ADAPTER DETECTION			
Primary Adapter	✓	✓	✓
Additional Video Modes	✓	-	-
ROM BIOS			
Release Date	✓	✓	✓
Version Number	✓	-	-
Manufacturer	✓	✓	✓
MATHS CO-PROCESSOR DETECT	✓	✓	✓
DOS VERSION IN MEMEORY	✓	✓	✓
NUMBER OF SERIAL PORTS	✓	✓	✓
NUMBER OF PARALLEL PORTS	✓	✓	✓
MEMORY			
Base RAM Available	✓	✓	✓
Extended RAM Available	✓	✓	✓
Expanded RAM Available	✓	✓	✓
TSR Map			
Entry address	✓	-	✓
Memory used by TSR	✓	-	✓
Interrupts hooked	✓	-	✓
Interrupts per TSR	✓	-	✓
XMS/EMS Memory Mgr Info	✓	✓	✓
Large-Frame EMS detection	✓	-	-
View Information in RAM			
ASCII	✓	-	-
Hexadecimal	✓	-	-
NUMBER OF FLOPPY DRIVES	✓	✓	✓
HARD DISK DRIVES			
Number of drives	✓	✓	✓
Number of cylinders	✓	✓	-
Number of heads	✓	✓	-
Partition table information			
Active partition	✓	-	-
FAT size	✓	-	-
Partition type	✓	-	-
Cylinders per partition	✓	-	-
Disk Drive Testing			
Random read	✓	✓	-
Random write	✓	✓	-
Physical format	✓	✓	-
Hard Disk Detail			
Number of subdirectories	✓	-	-
Number of files	✓	-	-
Total disk space	✓	✓	-
Directory space used	✓	-	-
File space used	✓	-	-
Free space remaining	✓	-	-
Used space	✓	-	-
Bad track map	✓	✓	-
BIOS Parameter Block Report			
Bytes per sector	✓	✓	-
Sectors per track	✓	✓	-
Number of FAT's	✓	-	-
Root directory size	✓	-	-
Sectors per cluster	✓	-	-
Sectors per FAT	✓	-	-
Number of hidden sectors	✓	-	-
View File Information ASCII	✓	-	-
Hexadecimal	✓	-	-
DEVICE DRIVER CHAIN			
Entry address	✓	✓	✓
Strategic Adress	✓	-	-
Device Name	✓	✓	✓
No devices driver supports	✓	✓	✓
INTERRUPT VECTOR MAP	✓	-	-
HARDWARE INTERRUPTS	✓	✓	-
CMOS INFORMATION	✓	✓	✓
ADDITIONAL INFORMATION			
User-Defined DOS Shell	✓	-	-
On-Line Help	✓	✓	✓
Detection of Joystick Port	✓	✓	-
DMA Assignments	✓	✓	-
Benchmark Testing	-	✓	✓
Mouse Support	✓	-	✓
System Testing			
User-defined tests	✓	✓	-
Keyboard	✓	✓	-
RAM	✓	✓	✓
Floppy drives	✓	✓	-
Hard disk	✓	✓	-
System board	✓	✓	-
Serial ports	✓	✓	-
Parallel ports	✓	✓	-
Mouse	-	✓	-
Joystick	-	✓	-
Video	✓	✓	-
SHOW CONFIG.SYS INFO	✓	-	✓
SHOW AUTOEXEC.BAT INFO	✓	-	✓
Virus Scan	✓	-	-
User-Defined Cache	✓	-	-
Backup CMOS Info	✓	-	-

Solve your system mysteries! *The software that knows* ***what evils lurk in the heart of your computer*** *is now the most comprehensive PC diagnostic and hardware testing software currently available.* ***Peer into the darkest recesses of your machine*** *and get a total insight into its innermost workings. Comprehensive analysis of memory and use of hardware interrupts (including the elusive IRQ16) lets you untangle conflicting hardware/software combinations.*

System Sleuth Pro now includes ***System Test, a complete physical health check for your hardware.*** *Isolate faults on any bit of hardware. Memory tests, faulty chip locations, hard and floppy disks, I/O ports, video displays, yes even the keyboard is tested. Its battery of reporting functions can be viewed on screen or sent to a printer. Over 300 screens of detailed on-line technical information to* ***help analyse where the source of the problem lies and help find a course of action!***

HALF PRICE OFFER FOR MANIFEST, CHECKIT AND SLEUTH 2.0 USERS!



System Sleuth 2.0 Press Reviews

"This is one of those programs that I didn't know I needed until I got it; now with all the hardware I try out around here, I use it all the time and I can't think how I got along without it."
Jerry Pournelle, Byte Magazine (US), May 1989.

"What I like about System Sleuth is that it doesn't require you to know beforehand where the source of the problem lies."
Glen Hartwig, Byte Magazine (US), June 1989.

"If you are concerned with the complex problems of how PC's work, and why they sometimes don't, I would strongly recommend this package."
Tony Kendle, Personal Computing UK), April 1990 .

"System Sleuth is an invaluable aid to anyone likely to get their hand dirty configuring computers. It is thorough and comprehensive.
Steve Malone, PC Magazine (UK), May 1990.

"If you regularly have to untangle the mess other users have gotten themselves into with cards that won't co-habit or device drivers and other TSR's that won't live quietly together, then either (Sleuth and Checkit) could save you a great deal of money."
Steve Patient, PC Plus Magazine (UK), June 1990.

"I don't know if this run of clearing up existing problems will go on for very long, but I am glad to have System Sleuth around."
Mike James. PC Buyers Guide (UK), May 1990.

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Passive and Active PC Diagnostic Software.
Includes both IBM 5.25" and 3.5" media.

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80C286 12MHz ● 1Mb RAM up to 2Mb RAM, 16Kb video RAM 128Kb in Slushware ● Supertwist backlit LCD 640 x 400 resolution. Double scan CGA ● 20Mb hard disk 25 m/s access time auto-parking ● 3.5" 1.44Mb floppy disk drive ● Parallel, serial, video interfaces ● 79 key layout with 102 key functionality ● 48 WHr NiCad battery ● 220/110V autoswitch PSU ● Zenith MS-DOS 3.3 plus ● Options for: internal numeric co-processor - replacement battery packs - external floppy disk drive - 3 slot expansion chassis - cigarette lighter adaptor - numeric keypad - internal modem + SkyFax

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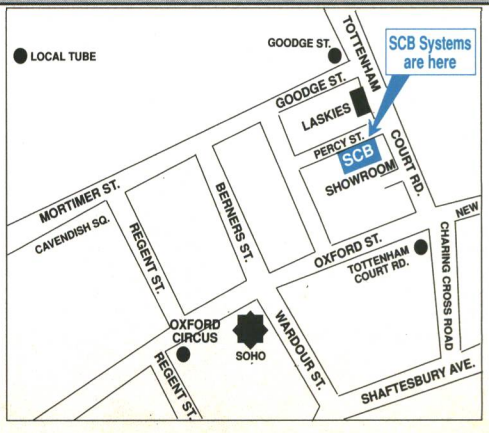

Strange Things Happen When Your Company's Computer System Goes Down



SOME OF THEM ARE NOT VERY FUNNY

PEOPLE DON'T GET PAID AND CUSTOMERS ORDERS GO HAYWIRE, SOME ARE NOT EVEN DISPATCHED!

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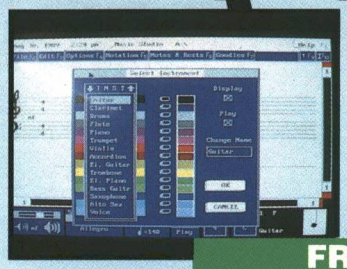

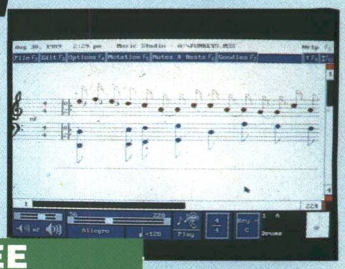

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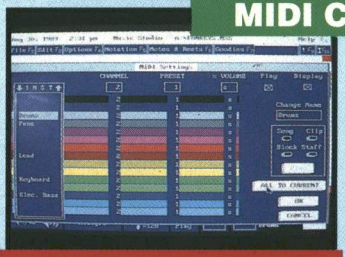

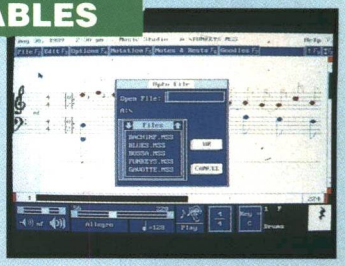

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- Music Studio has an unmatched range of features for the computer musician.
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- Advanced MIDI input and output makes for easy recording
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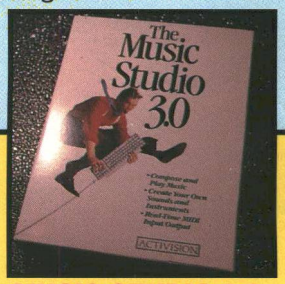
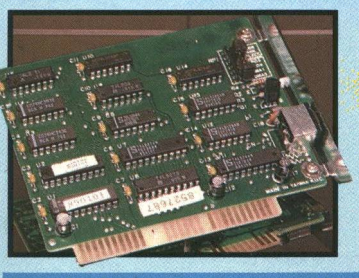


MUSIC STUDIO 3.0
AVAILABLE SEPERATELY (IF REQUIRED)
ONLY £59.99

INNOVATIVE HARDWARE DESIGN



- The Halfcard is the secret of this package. The PC normally only has a "Beep" (some don't even have a beep!). This innovative hardware features a 3 channel synthesiser chip giving true polyphonic output via external amp, headphones or the speakers provided. Plus full MIDI interface.
- Full MIDI hardware - MIDI in, out and thru - gives support for all MIDI instruments (you could pay over £200 for a similar MIDI interface alone!).
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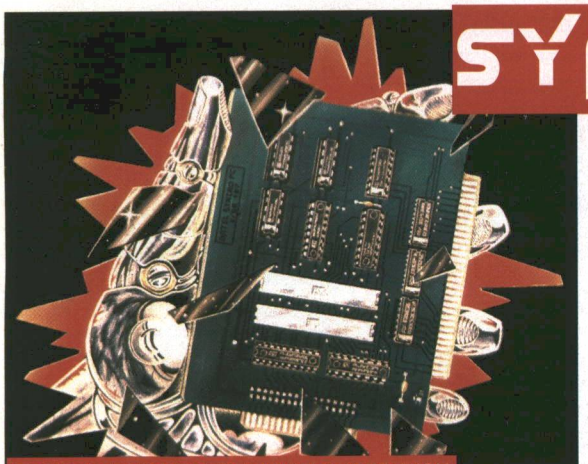

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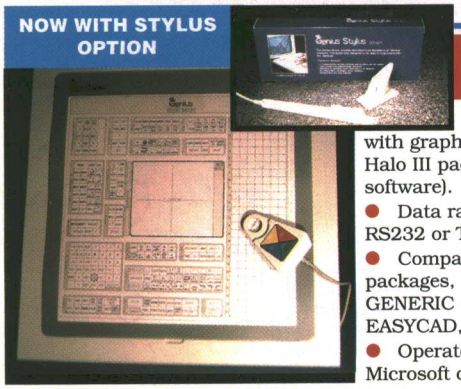

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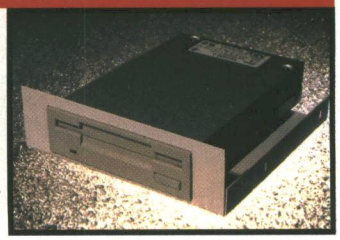

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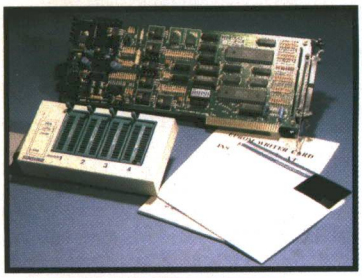

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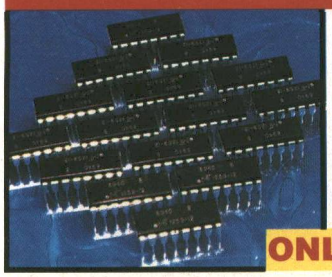

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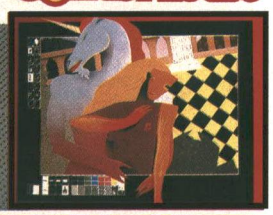

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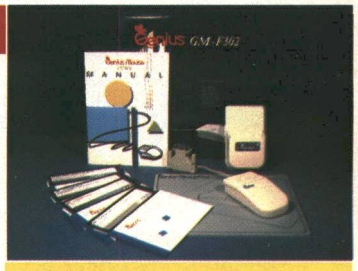

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DR GENIUS

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Animated Alphabet	(2) - Fun learning disk
PKZ Menu / PK Lite	(1) - Zip menu & Zip for .Com & .Exe
Finger Maps	(1) - Drawing programme
Elftree	(1) - File manager & menu system
Multiword	(1) - 60,000 synonym thesaurus
S R Info	(1) - Semi - Compiler dBase clone
Tutor Dos	(4) - Dos easy learn
POP DBF	(1) - Database access programme
E E Draw	(2) - Electrical eng. drawings
Nels Andersons Games	(2) - EGA TRECK 2.1 etc
Creative Graphics Archives	(1) - Vol.1 60 images of people & animals
Finance 101	(1) - Financial transactions-loans/insurance/leasing
K D Graf	(1) - EGA graphics with 3D option
Acteon	(1) - Hard disk management
T S R Chess	(1) - Chess that vanishes if "The Boss" appears!
Shooting Gallery 2.1	(1) - Skeet - quick draw - birds & bottles etc

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World	(1) - All you need to know
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Formgen	(1) - Designer forms
Optiks	(1) - Graphics util
Astrology & Biorythms	(2) - How you feel & why
Pivot	(1) - An easy print util
Procomm	(1) - Powerful comms package
Beyond the Titanic	(1) - Not for non swimmers !
Easy Projects	(1) - Work planner
Label Maker	(1) - Abolish writers cramp !
P C Tutor	(1) - Know your machine
Scrabble	(1) - Brain game
As Easy As	(1) - Spreadsheet
Skyglobe	(1) - The sky at night
T Square	(4) - CAD for every one
Air Traffic Controller	(1) - Not for the nervous !
Ham Radio 1	(2) - Useful tools for the enthusiast
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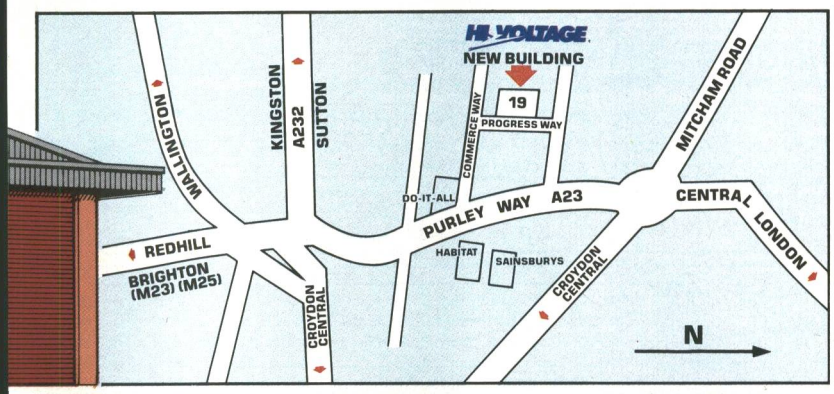

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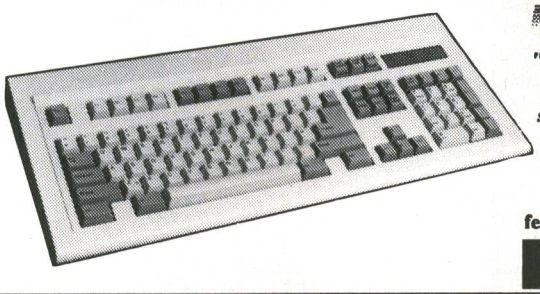

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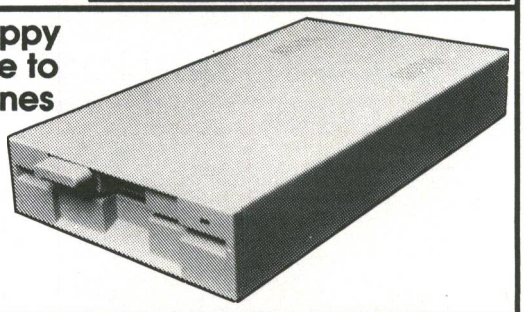

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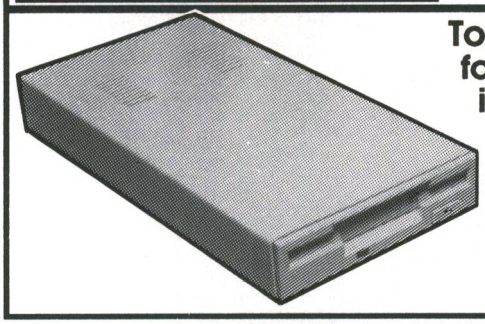

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PCS386sx MONO	N/A N/A	- -	1189.00 1367.35	1279.00 1470.85	1549.00 1781.35
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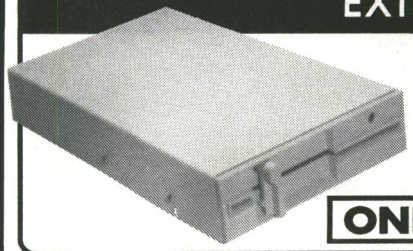

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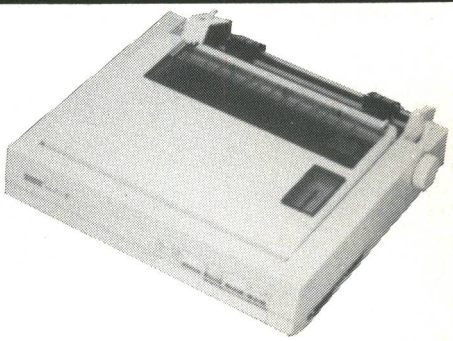

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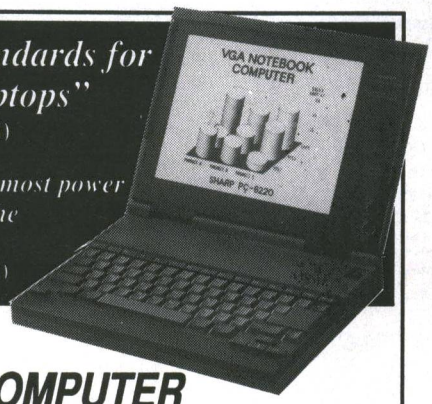

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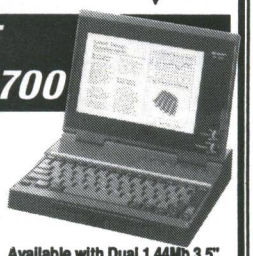

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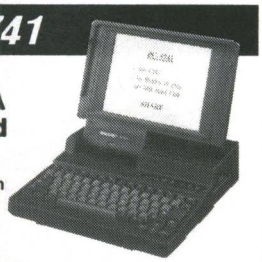

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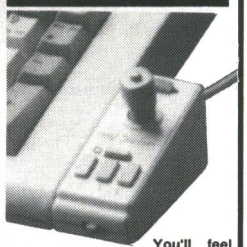

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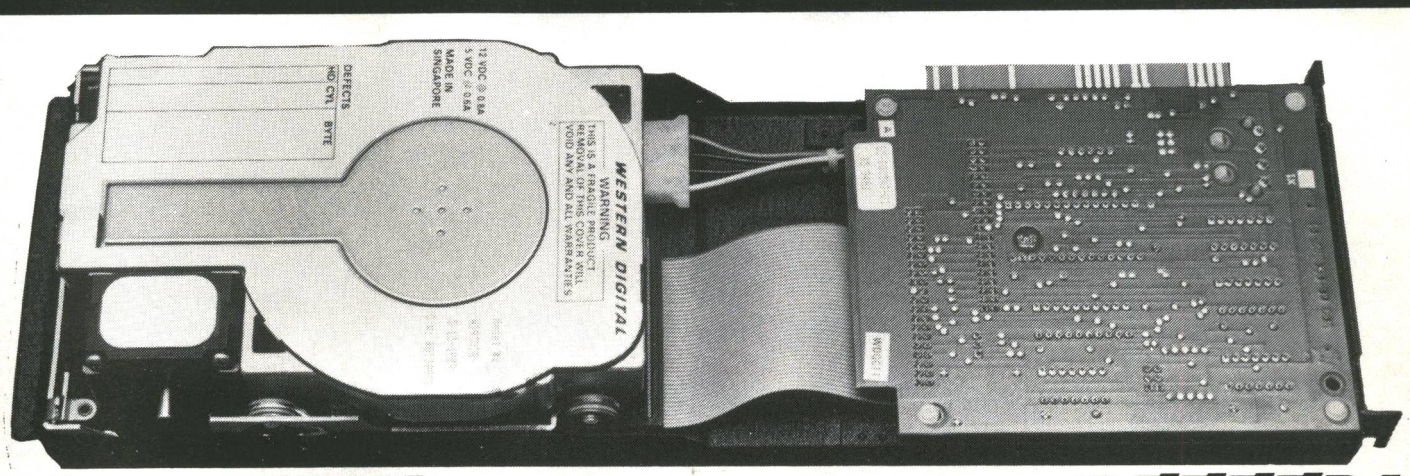
Western Digital Filecards



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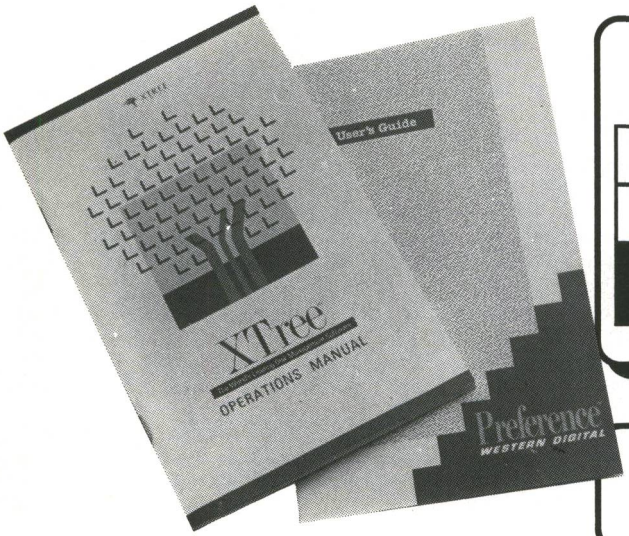

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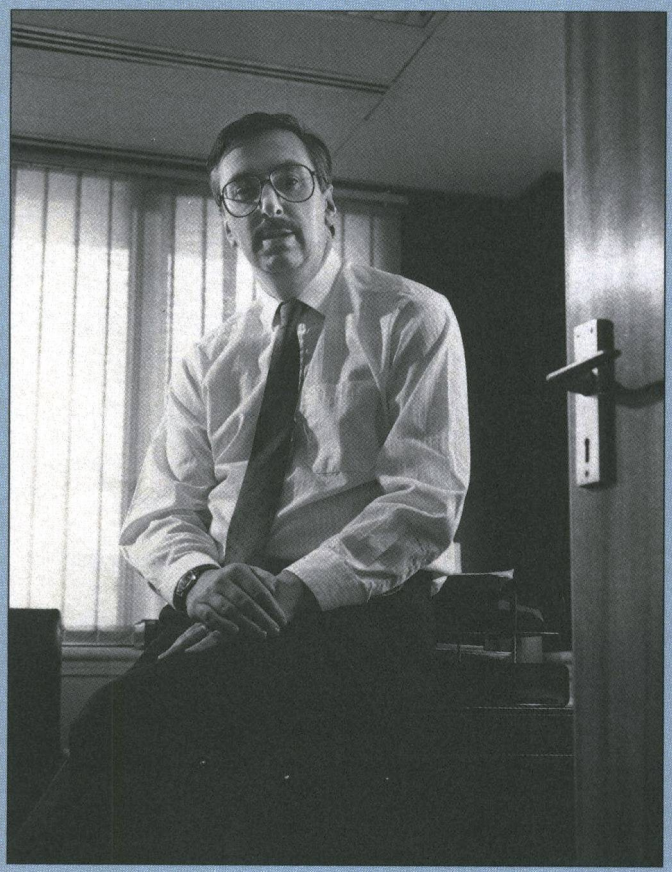
NEWS PLUS

The key news stories and product releases this month – edited by Dave Chadwick

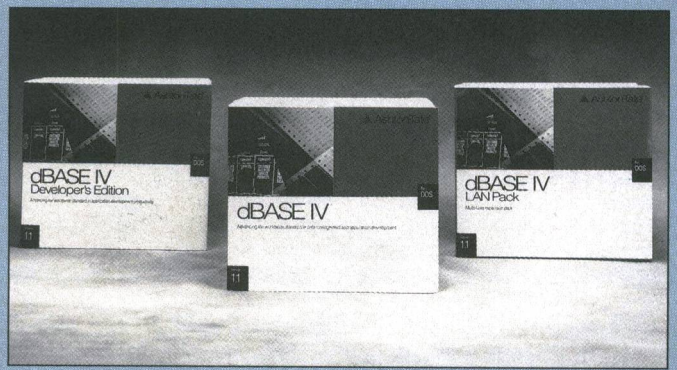
● **Swallowsoft Publications says it has responded to user demand by producing a PC version of its popular *WiseOne Expert System Shell*, originally developed for the Amstrad PCW word processor. The price is £39.95 (inc P&P) from Swallowsoft on (0420) 63793.**

● **Digital type specialist Fontware has introduced new drivers for its customised font cartridges specifically for *Windows 3*. For more details contact Fontware on (0329) 822857.**

DBASE WORLD FACES 18 MONTHS OF COPYRIGHT UNCERTAINTY



● **Copyright of *dBASE* is a non-issue in Britain because it is covered by the Berne Convention says Paul Sloane, MD of Ashton-Tate in the UK**



● **Ashton-Tate has been granted an appeal against a court ruling that would have removed its copyright over the *dBASE* language in the United States**

Ashton-Tate, publisher of the *dBASE* family of database products, faced disaster last month after a Californian judge not only threw out its look-and-feel suit against Fox Software, but also stripped the company of its copyright over the *dBASE* language. However, after intense legal representations, the same judge granted an 'early' appeal, which in America means a wait of around 18 months. Until the appeal is heard, the copyright issue remains unresolved.

The saga started in 1988, when Ashton-Tate filed a suit against Fox and co-defendants Santa Cruz Operation (SCO), claiming that its *FoxBase+* package infringed the copyright of *dBASE III Plus*, at that time the world database market leader. In December 1990, after two years of typically slow legal progress, Judge Terry J Hatter of the U.S. District Court (Los Angeles) shocked the computing world by throwing out the case 'with prejudice,' meaning that it could not be re-submitted to the same court, and at the same time ruling that Ashton-Tate's copyright over the *dBASE* language was invalid.

The basis of this judgement was Ashton-Tate's original copyright application for *dBASE II*, filed in the early 1980s. In it the company had failed to disclose that Wayne Ratliffe, the originator of *dBASE*, had based his design on a product called JPLDIS, developed on mainframe computers at NASA's Jet Propulsion Laboratory in Pasadena, and therefore belonging in the public domain under U.S. law. In the judge's view, Ashton-Tate had failed to disclose this fact 'knowingly and with intent to deceive', an assertion hotly denied by the company, which claimed that its copyright lawyer had simply 'never heard of' JPLDIS. Nevertheless, Judge Hatter proceeded to rule that Ashton-Tate did not in fact own the copyright to the *dBASE* language, and therefore had no right to sue Fox or anyone else for infringement.

The result was near pandemonium. Fox and SCO claimed outright victory, Ashton-Tate claimed that the judgement had applied patent law to a copyright issue and was therefore completely invalid, and a Philadelphia accounting firm filed a 'class-action' suit on behalf of everyone who'd bought *dBASE II, III* or *IV*, accusing Ashton-Tate of committing fraud under America's Racketeer-Influenced and Corrupt Organisations Act (RICO) by charging exorbitant prices while claiming that *dBASE* was copyright. Meanwhile in Britain, Ashton-Tate (UK) was quick to distance itself from the U.S. fray, pointing out that in Europe its products were covered by the Berne Convention, under which the publication of a work automatically vests copyright in its authors, with no need for registration.

Finally, in late January Judge Hatter, having rejected Ashton-Tate's motion for reconsideration in his own court, granted the company an early appeal to the Ninth Circuit Court in San Francisco. Such appeals are reserved for cases where an incorrect ruling may have a major effect on the outcome of other cases, and the move has been taken by some commentators to indicate that the judge was himself uncertain about the legal validity of his decision. 'Early' means a wait of around 18 months, but in the meantime the original verdict is ruled 'not final', and cannot be used as a precedent in other cases such as the Philadelphia class-action.

Ashton-Tate has promised to re-launch the Fox case if it wins the appeal; a loss would cause the software industry's biggest-ever upset. For the next 18 months though, everyone will just have to wait.

Paul Stephens

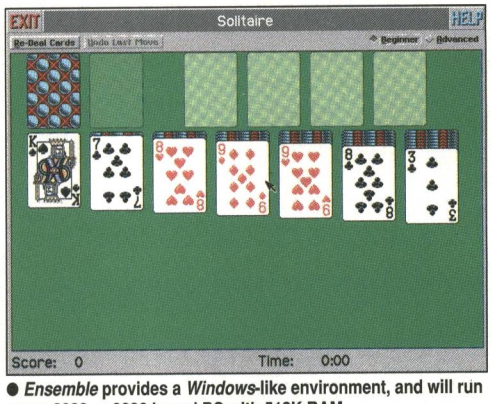
See page 84 for an exclusive interview with Paul Sloane, Managing Director of Ashton-Tate (UK) Ltd.

WINDOWS WITHOUT WINDOWS

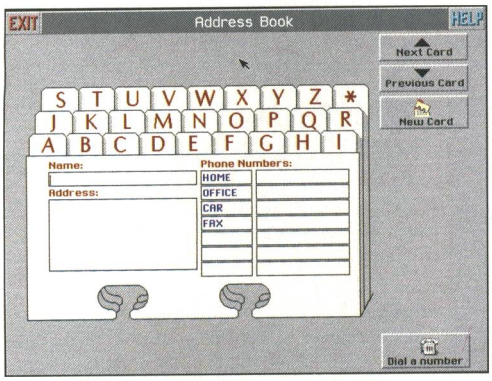
For users of entry level PCs, an interesting looking alternative to using graphics-based applications running under Microsoft's *Windows* has been introduced by GeoWorks. Called *Ensemble*, it is described as a suite of productivity applications based on a multitasking, windowing graphical environment called *PC/GEOS*. It will run on an 8088 or 8086-based PC, but unlike *Windows 3* only requires 512K of RAM. It does need a hard disk, and runs under DOS 2.0 or higher.

On seeing the package, Microsoft president, Bill Gates, is said to have requested a meeting with Geoworks, but was turned down. Whether he intended to discuss buying the company or suing it is not known.

As well as a file and disk manager called *GeoManager*, the package includes a word processor, combined address book and auto dialer, a calendar and scheduler, and a terminal emulator and communications program. It costs £159 (plus VAT). For more information phone Software Paradise on (0222) 887521.



● *Ensemble* provides a *Windows*-like environment, and will run on an 8088 or 8086 based PC with 512K RAM



● Microsoft's Bill Gates was rumoured to be interested in *Ensemble* - but did he want to buy it or sue GeoWorks?

INTEL BACK IN COURT

Intel's hard-working lawyers are back in action. Shortly after being bested in the courts by AMD (see *News Plus* , Issue 51), they're having to get the wigs and gowns ready once again, with Cyrix as the opponent this time around.

Cyrix, which makes chips that compete with Intel's 80X87 maths co-processors (add-on chips which can boost a PC's performance for floating-point calculations) has filed an anti-trust suit against Intel. This claims the integrated circuit giant is using illegal anti-competitive methods to monopolise the co-processor market. In reply, Intel has filed a suit against Cyrix, saying the smaller company's co-processor designs violate patents that are held by Intel.

Cyrix says that Intel has been making 'false and misleading statements, disparaging Cyrix's FasMath co-processors' in a document distributed to major PC manufacturers, including Compaq Computer and Zenith. The law-suit also states that Intel has threatened to sue Cyrix's Taiwanese manufacturer for patent infringement and intimidated suppliers in an attempt to dissuade them from supplying Cyrix products. According to Tom Brightman, a Cyrix Vice President, Intel will do anything it can, 'legal or illegal' to protect its co-processor monopoly. Intel denies the claims, saying that it is always very careful to avoid any breaches of anti-trust law.

Intel's suit, filed in a separate court, simply states that the Cyrix maths co-processors violate patents held by the company. Cyrix, in turn, denies this claim.

The two suits have resulted from months of talks between the organisations producing no positive action, and a feeling that the courts are the only place to settle the disputes.

Both anti-trust and patent cases tend to be fantastically complicated and long drawn-out affairs, so no quick judgement is expected in either case.

Mike Hardaker

IBM SELLS PRINTER BUSINESS

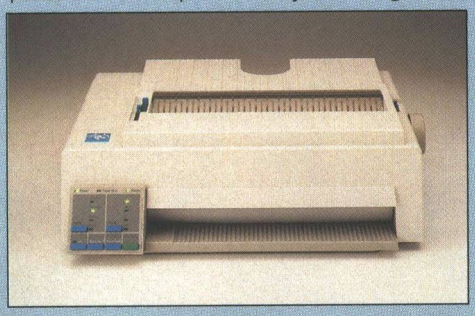
IBM was close to completing the sale of its typewriter, printer and supplies business as this issue of PC PLUS went to press. According to an IBM spokesman the sale is to 'raise money to fund the core business'.

The company was in the process of forming a separate subsidiary to market these product ranges, which will then be sold to a US investment company, Clayton & Dubilier. IBM will retain a 10 percent stake. US financial sources say that the sale should fetch $1.5 billion all told for a business which is currently estimated to bring in annual revenues of $1.8 billion.

The IBM spokesman commented that the company had always tended to neglect the marketing of its printer products compared to its PCs and larger computer offerings. Clayton & Dubilier aims to improve the profitability of the printer business by cutting manufacturing costs and improving marketing.

It is a slightly surprising move by IBM, which still depends heavily on sales of its mainframes (which have large profit margins) for its revenues. Mainframe sales are stagnating as systems based around networks of PCs become increasingly more cost-effective. Under these conditions one might expect IBM to try to diversify its product range rather than contract it.

IBM may have lost interest in printers because of the commodity nature of the market, with increasing competition (especially from the Japanese) lowering profit margins. However, PCs have become a commodity market too; so with mainframes going the way of the dinosaur, it has to adapt to the new market conditions or find another high profit earner if it is to maintain its preeminent position in the computer industry in the long term.



● IBM is set to sell its printer business for an estimated $1.5 billion to raise money to fund its 'core business'

● The Panther PC-compatible supercomputer add-in board is to be enhanced by the release of a 32 Mbyte DRAM expansion. Aimed at memory-intensive operations such as image processing, the daughter module slots directly into the Panther system board. No price as yet. Contact: (0256) 881377.

● A new LCD projection panel from 3M enables managers to give live, interactive computer presentations with all the visual impact of the large screen. For more information contact 3M Visual Systems on (0344) 58180.

● A new 40-page booklet, the *Director's Guide To Networking*, is available free from Information System Networks. The company can be reached on (0235) 555633.

● A new memory board from Arrow Computers breaks the current IBM PS/2 memory barriers. The IMME-23B gives up to 32 Mbytes of memory on a single Micro Channel board. This, and a 16 Mbyte version, is available by calling (0372) 742557.

● *MegaCAD*, a high-performance German CAD package for the PC, will be unveiled at the CadCam '91 show in March. Contact Coscom Ltd, on 061-872 9121, if you can't wait to get more details.

● The Megahertz range of 1Mbyte and 2 Mbyte memory expansion upgrades for Compaq and Toshiba portables are now available. All cards are said to support LIM/EMS memory expansion. Call PPCP on (0923) 36022.

● Lotus has announced a new version of *Lotus Realtime* to support *1-2-3/G* for OS/2. It will provide real-time access to financial market information, allowing traders to identify market opportunities and assess the risks involved, using multiple graphs and worksheets on-screen. Lotus can be contacted on (0784) 455445.

● A new 300 dpi thermal transfer colour printer is now available from Colorgraph. The CHC-443MV has a queuing function letting it handle up to 16 images.Price is around £3600 (plus VAT). Contact: (0734) 819435.

● *Black's Law Dictionary* forms the basis for a law spell-checker program for *Wordperfect*. It features 16,000 terms and phrases of jurisprudence, and another 83,000 commonly-used words. Price is £99. Contact Riva Ltd on 0420 22666.

● New from Harrier Computer Systems is the ST-1300 helical-scan cartridge drive offering 1.3 gbyte of data storage. For more information phone (0734) 328282.

WORDSTAR FOR WINDOWS

Wordstar has followed Lotus's lead by buying into the *Windows* word processor market. The company has signed a deal to market NBI's *Windows 3.0* based word processor, *Legacy*, under its own brand name *Wordstar Legacy*. It has also bought the rights to the *Legacy* program code which it will use as the basis for *WordStar For Windows* planned for release in six to nine months time.

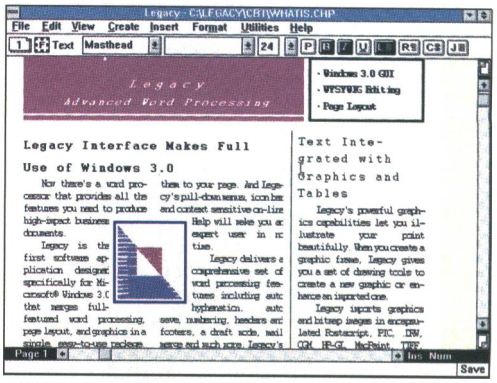
Wordstar Legacy will have improved file conversion facilities to import files from existing Wordstar word processing packages; otherwise it will be unchanged from NBI's *Legacy*. *Wordstar For Windows* will be fully keystroke compatible with existing Wordstar programs, including *Wordstar 2000*, but will still have the option to use the original *Legacy* commands.

NBI will continue to develop and market *Legacy* independently. The financial terms of the deal have not been disclosed, possibly to avoid the raised eyebrows that followed Lotus's announcement that it paid $65 million to buy Samna and its *Ami Professional* word processor. There have been some industry rumours that Wordstar had also been courting Samna with a view to a merger, and that *Legacy* is in fact its second choice for a *Windows*-based word processor. Could it be that Wordstar's interest in Samna upped the price Lotus had to pay?

Wordstar's purchase, hard on the heels of Lotus's acquisition, highlights the difficulties software companies are having developing major packages or converting their existing text based software for Microsoft's *Windows* environment. *Windows* may well be an easy environment for the user, but it also presents a notoriously long learning curve for software developers.

Users are still eagerly awaiting a *Windows* version of Lotus's best selling *1-2-3* spreadsheet, expected sometime this year, and a *Windows* release of Ashton-Tate's *dBASE IV* database package now seems unlikely to appear before 1991.

For a review of Wordstar's and Lotus's word processing acquisitions see our reviews of *Legacy* and *Ami Professional* in issue 53 of PC PLUS.



● **NBI's *Legacy***; the *Windows 3.0* based word processor will be the basis for *Wordstar For Windows*, to be released in 6-9 months time

ELECTRONICS CHALLENGE THE FILOFAX

The days of the Filofax and other paper-based organisers could be numbered, judging by the specifications of several new electronic equivalents. While the technical specs have improved considerably, what the market needs now is some reduction in prices, which are all around the £200 mark for the top end models.

Sharp has announced its IQ-8000 series, which uses a QWERTY keypad, has a larger screen, more memory, and more powerful built-in functions than the existing range – the IQ-7000. It can use the add-in application and memory cards already available for the IQ-7000 (although these won't make use of the whole screen area), and new cards are being designed specifically for the new range that will be able to boost its capabilities.

Top of the range is the IQ-8200, which has 128K of memory, a 40 column by 8 line LCD display, and weighs less than 290g. This gives it a technical specification apparently similar to Atari's Portfolio, although the models do have significant differences. The IQ-8200 scores in its slimline design, which should allow it to be carried fairly comfortably in a jacket pocket, whereas the bulkiness of the Atari makes this rather impractical.

Sharp's IQ-8200 has more comprehensive built-in diary functions than its previous range (and other electronic organisers). These include a two-month calendar display, a weekly view, and a page-a-day schedule planner complete with bar-chart facility. A new function is an outliner which lets you order and structure information and ideas, which should be useful for such things as keeping lists or planning articles or reports.

Another new built-in function is a business card database with fields to store company name, address, contact, telephone and fax number, and five free fields for other information. This is in addition to the telephone database, which has three separate directories.

Among existing functions, the memo feature has also been improved to let text wrap from one line to the next.

Like the IQ-7000, the new models can be linked with a PC for file transfer. This can be a crucial advantage; lose your Filofax and you've also lost all the information with it, but data held on an electronic version can easily be copied to a PC for back-up.

The IQ-8200 costs £249.99. A 64K model, the IQ-8000, is priced at £199.99 (Both prices exclude VAT). If interested, Sharp can be contacted on (061) 205 2333.

Casio has recently launched a top-end model in its SF series of digital diaries. The SF9500 is functionally the same as the SF-9000, but with an improved keyboard. This has a 32 column by six line display and 64K memory, and costs £189.95 (including VAT).

For a review of the Casio SF9500, see this issue's *Brief Encounters* on page 90.



● **Sharp's IQ8200 electronic organiser - a serious challenge to paper-based rivals?**

3COM ABANDONS NETWORK SOFTWARE

3Com's announcement that it is leaving the software business, leaves the top end of the PC LAN (Local Area Network) market a two-horse race between Microsoft and Novell.

3Com, one of the PC network pioneers, has handed *OS/2 3+* and *3+Open LAN Manager* over to Microsoft, its original partner when it developed the programs. Now, 3Com's technologies (including Macintosh and Novell NetWare connectivity) will form an integral part of the Microsoft *LAN Manager* for OS/2.

This is part of a general 'rationalisation' by 3COM, which is also selling its network-server and workstation manufacturing business and getting ready to lay off over ten percent of its staff. In the future the company will be concentrating on its mainstream business in the network hardware field.

Although Microsoft has handed overall responsibility for Intel-based PC versions of the OS/2 operating system to IBM (retaining only the OS/2 3.0 project for non-Intel workstations) it has been quietly consolidating its position in the OS/2 networking world. It recently accepted the SQL Server development responsibility from Ashton-Tate, and now it also enjoys the fruits of 3Com's fairly considerable cross-platform connectivity expertise now available.

Microsoft can now be expected to exploit this power-base by stepping up its attack on the one remaining competitor for *LAN Manager* in the high-end LAN market, Novell's *NetWare*. *NetWare* currently has something over 50 percent of all PC LAN sales, a strong position, but one which Microsoft feels is not insuperable. **Mike Hardaker**

(see page.156 for our review of Netware in the third part of our continuing series of networking made simple).

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Hard disk	45Mb 25mSec	45Mb 25mSec	90Mb 25mSec	90Mb 25mSec	130Mb 25mSec
Hard disk options	90, 130, 300Mb	90, 130, 300Mb	130, 300Mb	130, 300Mb	300Mb
I/O Ports	2xSERIAL 1xPRINTER	2xSERIAL 1xPRINTER	2xSERIAL 1xPRINTER	2xSERIAL 1xPRINTER	2xSERIAL 1xPRINTER
Graphics card	SVGA 1024x768 512Kb	SVGA 1024x768 512Kb	SVGA 1024x768 512Kb	SVGA 1024x768 512Kb	SVGA 1024x768 512Kb
Monitor	COLOUR SUPER VGA 14″	COLOUR SUPER VGA 14″	COLOUR SUPER VGA 14″	COLOUR SUPER VGA 14″	COLOUR SUPER VGA 14″
MSDOS	MSDOS 4.01	MSDOS 4.01	MSDOS 4.01	MSDOS 4.01	MSDOS 4.01
Software	Windows 3.0 & mouse	Windows 3.0 & mouse	Windows 3.0 & mouse	Windows 3.0 & mouse	Windows 3.0 & mouse
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● **SPSS is relaunching its data analysis and management software in separate modules. The *SPSS/PC+ 4.0* package has been repackaged to provide a base module with separate add-ons available for specific mathematical functions. More details from SPSS on (0932) 566262.**

● **New Comms packages that will support Toshiba's TC2400 modem for portable PCs have been launched. The Breakout range of software is available from PC Communications on (0895) 444452.**

● **Digital Matrix has released a 33 MHz EISA-based product with a 1200 Mbyte hard disk. With a data transfer rate of 33Mbyte/sec it is expected to out-perform any other 80486-based product. Contact: 021-722 3828.**

● **CDASH is the name of a new disk caching package. Operating in the background it optimises the efficiency of disk access for users of the Digital Research Concurrent DOS 386 operating system. Contact: Intelligent Micro Software on (0276) 686569.**

OBJECTS FOR WINDOWS

The advent of document-oriented (rather than application-oriented) computing came a stage closer to fruition recently with Microsoft's announcement of Object Linking and Embedding (OLE).

As with the existing *Windows* Clipboard, this will make it possible to cut a chart from a spreadsheet package and then paste into a word processor's document (for example). Unlike Clipboard cut-and-paste, OLE does not simply copy the graphical image – if you click on the imported object you are able to modify it using the spreadsheet's graphics module, just as if you were in the spreadsheet program itself. This will give *Windows* genuine object-oriented elements, with the code necessary for modification being directly associated with items of data.

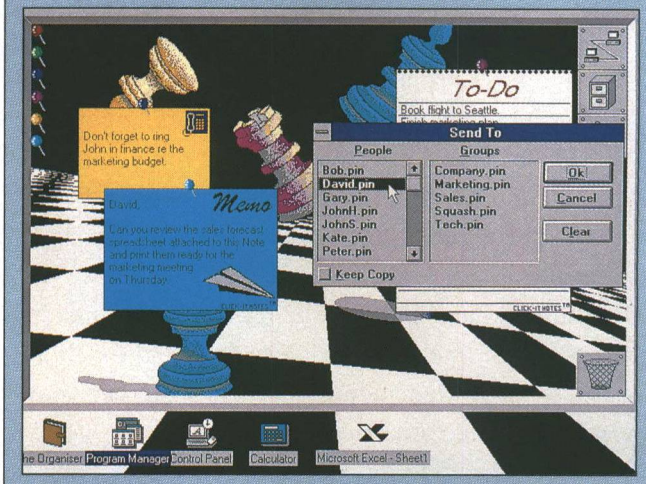
Although the specification has only just been made public, Microsoft has been developing programs with OLE for some time; *Excel 3.0* has it for example.

Mike Hardaker

WINDOWS PINBOARD

Software developer Threadz has come up with a solution to all those yellow notes people love sticking to their PC screens – electronic ones. The company has produced a *Windows 3* program called *Pinboard* which lets you create a note with a mouse click, type a message, and then drag it to where you want on the *Windows Desktop*.

Forty styles of note are provided, including phone messages, to-do lists, and memos. Notes can also be sent between users on a network. The program sounds fun, but the price seems less amusing starting at £79.95 for a single user version, up to £795 (both plus VAT) for an 'extender pack' for an extra 25 users. Contact NEOW, (0628) 668334.



● *Windows* users can now swap all those yellow sticky notes attached to their screens for electronic ones with *Pinboard* from Threadz

NYBBLES

Mike Hardaker's regular look behind the scenes of the PC world.

● Cramped by that measly 33MHz i486? Can't wait for Intel's summer launch of the 50MHz version? Help is at hand from Velox, maker of the IceCap. The IceCap sits on top of the microprocessor and cools it to zero degrees centigrade – so the 33MHz i486 can be 'clocked' to 50MHz without overheating (the major cause of unreliability with artificially-boosted chips). A tweaked i486 with an IceCap parked on top of it is at the heart of the 50 MHz IceJet motherboard, made possible by the production of a 50 MHz chipset by Taiwan's Microelectronics Corp. This supercharged board will cost you about $4,000 with 1 Mbyte of RAM, and systems based on it are expected to emerge as we go to press.

● The focus was on consumer audio with the recent announcement of Philips' Digital Compact Cassette (DCC), a competitor to Digital Audio Tape (DAT) which uses tape cartridges the same size as normal audio cassettes. Nevertheless, many observers believe it could be a great medium for data backup. DAT has a two-year head-start (as its supporters are reminding us constantly) but then so did Sony's BetaMAX video format. VHS still won, however, and Philips is hoping that DCC will come from behind in much the same way. On the other hand, Philips was responsible for the V2000 video format, one of the few things which can make IBM's PC Junior look like a runaway success.

● Microsoft's *OLE* (described above) is compatible with HP's similar *NewWave* 'application environment', according to Bill Crow – the man who is *NewWave*'s chief architect. Despite the Microsoft object-linking stealing some of *NewWave*'s thunder, Crow is keen to stress that his product includes a more robust file-system than raw *Windows* does, making linked objects inherently more secure and *NewWave* still valid. Microsoft accepts this but is rumoured to be working on a new file-system for release very soon.

● Virtual Reality (roaming around 3D 'artificial worlds' on the computer) is this year's next big thing. The Virtual Reality '90 conference, which took place in San Francisco at the end of last year, produced a few products which relate to the PC world. Although most VR happens on high-powered supercomputers Sense8 has produced *WorldToolKit*, a C library which allows the development of 3D virtual reality applications on high-end PCs.

● If a mouse is still a pretty nifty way of controlling a PC, goodness knows what the Virtual Reality input devices seem like. 'Spaceball' is a thing the size of a cricket ball (it says 'baseball' here, in fact) which sits on an arm-rest and is used for 3-D graphics manipulation.

'Cyberglove' is weirder yet; a glove (naturally) which contains 16 or 24 sensors – as you move your hand the sensors send input signals to your PC's serial port.

Strangest of all is the 'EyeController', which fits on a headband and lets you move things on screen just by moving your eyes!

● San Francisco's legislature has produced a bill to control VDU (visual display unit) usage in the city. Within two years all computer operators must have anti-glare screens, adjustable chairs, indirect lighting, compulsory 15-minute breaks every two hours and so on. Predictably, nobody likes it; the business community has attacked it as 'absurd' while the health lobby says it doesn't go far enough.

● The US Army's computer's in the Gulf are all to be fitted with anti-virus software after 5,000 Army machines were hit by recent virus attacks. McAfee's *VShield* is the product selected by the Information Systems Command.

● Does *Windows 3.0* confuse you? California's Individual Software may have the solution with its $49.95 package, *Professor Windows*. The program drops you into *Windows* to practice the skills it has taught you, taking you through applications like *Paintbrush* and *Write*. Individual is on (0101) 415-595 8855.

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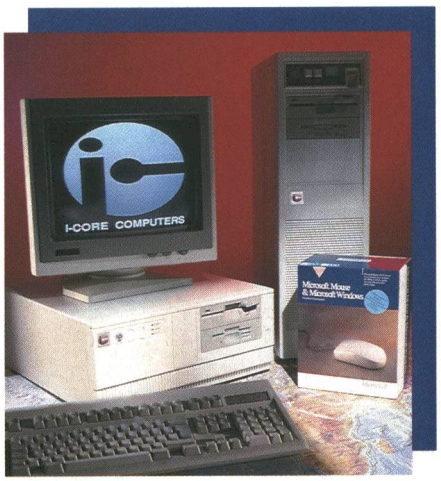

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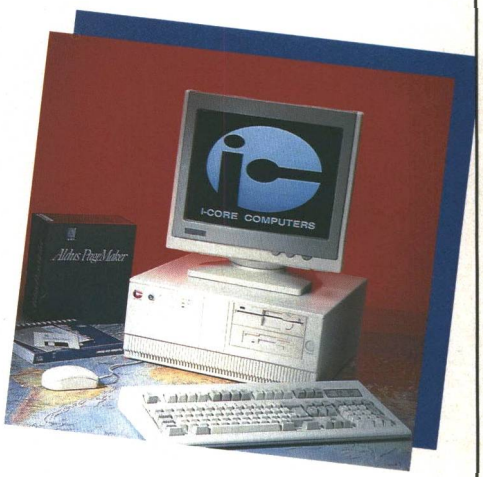

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EVENTS DIARY

FEBRUARY

● IBM '91
26 February-1 March. National Exhibition Centre, Birmingham.
Networking, applications, connectivity, and open systems are the primary themes explored in this event. For more information phone 071 404 4844.

● SCOTTISH COMPUTER SHOW
26-28th February.
Scottish Exhibition Centre, Glasgow. The main business show for Scottish computer users. Contact: Reed Exhibitions, 061-832 4242.

MARCH

● CADCAM
19-21 March.
National Exhibitions Centre, Birmingham.
An exhibition designed to cater for all aspects of computer-aided industrial design.
Contact: 071-404 4844.

APRIL

● EUROPEAN COMPUTER TRADE SHOW '91
14-16 April.
Business Design Centre, London N1.
An international trade fair, covering both the leisure and business sides of the computer industry. Contact: 061-480 9811.

● WHICH COMPUTER SHOW 1991
23-26 APRIL.
National Exhibition Centre, Birmingham.
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Contact: 081-948 9800

AMSTRAD SPRING OFFERS

Amstrad is bundling Canon's latest portable printer, the £345 Bubble Jet BJ-10e, with its ALT series of portable PCs during February and March. The complete packages cost the same as the portables previously did alone. Retail price for the ALT-286 based bundle is £1,599, with the ALT-386sx version costing £1999 (both prices exclude VAT).

This could be an attractive offer for those looking for a combination of portable PC and printer. Canon's BJ-10e seems well specified for its price; it's about the size of an A4 notepad, offers good print quality and is quiet in operation.

Also as part of its Spring promotion, Amstrad is bundling the *Lotus 1-2-3* spreadsheet free with its PC 3286 desktop models.

More details from Amstrad, on (0277) 230222.



US REPORT

From John Sterlicchi, based in California.

IBM CHASES LAPTOP CONTRACT

IBM is all set to make another attempt to launch a laptop worthy of the name. However this time there is a fairly powerful incentive for Big Blue to get it right – the US Navy wants to buy around 75,000 of them.

The military deal, dubbed 'Lapheld II' and valued at close to $400 million, calls for 75,000 portable PCs, 15,000 laptop printers and more than 50,000 integrated software packages.

'The contract would make a tremendous difference to any vendor trying to launch a new machine. Any vendor that wins it will gain instant presence for this machine', said Doug Kass, an analyst for Dataquest in San Jose, California.

IBM's machine is expected to be a seven pound, 386sx based laptop that runs at 20 MHz and features 2 Mbyte of memory, a 60Mbyte hard disk drive and a standard 3.5-inch floppy disk drive. As usual in these circumstances IBM denied any concrete plans to launch a laptop PC.

Securing the navy contract may be critical to the success of IBM's late entry into the laptop market. 'It is vital that IBM win the contract, and it's going to go after it tooth and nail', Kass said.

IBM will not try to win the bid alone. 'The winning of the contract will be a function of alliances', Kass said, adding that IBM's key partner in the bid will be Lotus Development Corp.

Other manufacturers vying for the navy contract will likely include Epson, whose 386sx is considered by some the de facto standard for laptop computers.

PEN-BASED OPERATING SYSTEMS

Pen-based computers will be all the rage in the 1990s and their manufacturers in the US are already being wooed by operating system developers hoping to be involved.

Microsoft is bragging that it has won the commitment of five developers for its *Pen Windows* handwriting recognition operating system, but the vendors in turn say they're still testing the quality of the software. While Officials of Momenta, a typical Silicon Valley start-up company (whose pen based computer is likely to appear this year) said it has looked at *Pen Windows*, it is also considering Go Corp's alternative called *Pen Point*.

Grid Systems Corp is also being slow in committing to one operating system. Grid confirmed plans to license *Pen Windows*, but won't rule out the possibility of using another pen input system, including Go's.

Microsoft has cited NCR Corp, Wang Laboratories Inc, and Kyocera as supporters of *Pen Windows* and its main advantage seems to be that it will run most current *Windows* applications unmodified. This feature could reduce the software development lag time often associated with new technology.

KAYPRO MAKES COMEBACK

That pioneer of the computer industry, Kaypro, which looked certain to be liquidated last summer is bouncing back.

Incredibly, the Californian company that began selling machines in the UK in the days of the CP/M operating system in the early 1980s went seven years until the last quarter of 1990 without stringing together a profitable three months. Last year the company had three chief executives – one lasting less than a month – and in October survived a court room attempt to close the operation down.

Its never-say-die founder Andrew Kay succeeded in convincing the board to appoint a man called Geoffrey Soule as boss last August and, with the help of new products, the company now has a chance of survival.

Kaypro rubbed shoulders with the best of them at the US industry's biggest trade show, Comdex in Las Vegas last November, and introduced three new MS DOS machines: the small footprint MD Series, the full function KC Series and a value for money MC Series.

The machines were well received and Kaypro took nearly $1 million in orders at the show alone. Soule now believes the company could make more than the December quarter's profit of $115,000 in the first three months of this year. It is believed the machines will eventually be distributed in the U.K. but, as yet, no date has been fixed.

COMPAQ SHORTAGE

It seems that Compaq Computer is having production problems with its LTE 386/20 machine and it may be seeing its edge over IBM and AST slip through its fingers.

Last week Compaq acknowledged in the US that it is having difficulty filling orders for the machine, which was the first 20 MHz 80386sx laptop on the market. Initial shipments were slated to begin in October of last year, yet many US dealers are still waiting for – or are just receiving – evaluation units of the 60 Mbyte hard disk machines.

IBM and AST are now hot on Compaq's heels, expected to deliver similar systems at lower prices before the end of this quarter.

Compaq claims it did not have the volume of shipping it had hoped for in the fourth quarter due to low manufacturing yields for various critical parts. The parts in question were not specified, but the company did imply that the problem has now been corrected.

Compaq aims to meet demand for the LTE 386/20 by March, but some dealers assert that its failure to live up to its initial claims and promises have permanently damaged its image for reliability. Compaq has lost points to both IBM and AST.

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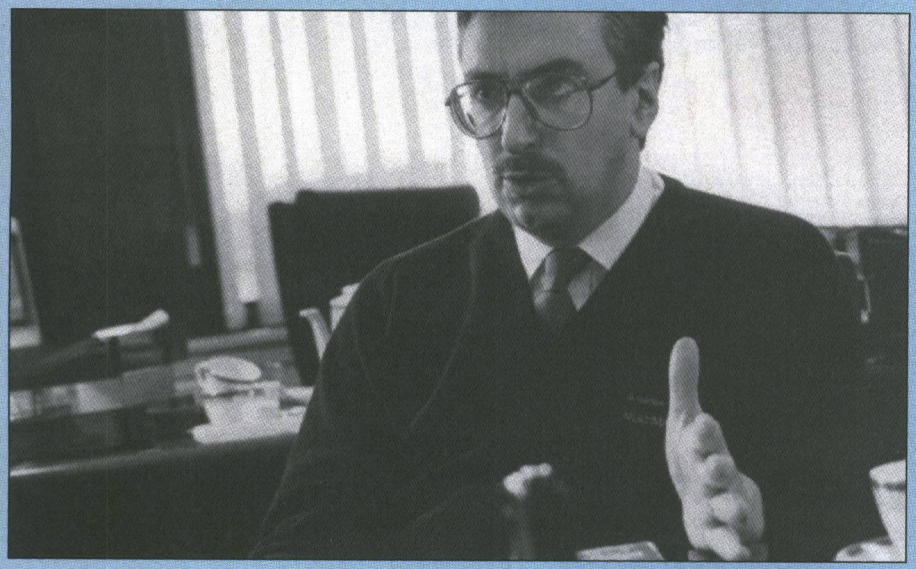

.....Paul Sloane

Ashton-Tate's U.S. lawsuit against Fox has backfired in the most spectacular way. But the company's UK Managing Director, Paul Sloane, still believes it was right to sue, as Paul Stephens discovered when he met him at the company's offices in Maidenhead.

Things have definitely not gone Ashton-Tate's way over the past couple of years. First, its new-generation d*BASE IV* database ran into a storm of criticism about its size, performance and reliability. Next, it took it 20 long months to produce the replacement version, 1.1, during which the company's competitors had a field day. Finally, in December last year, came the most dramatic blow of all, when a Los Angeles judge not only threw out its long-standing lawsuit against arch-rivals Fox Software, but also declared that the company no longer had copyright over the *dBASE* language.

All this might be enough to break the spirit of a U.K. subsidiary boss, forced to watch helplessly as the parent company lurches from crisis to crisis. However Ashton-Tate (UK)'s MD Paul Sloane, ex-Ministry of Defence, ex-IBM and a distinctly non-Americanised Northerner, refuses to be despondent, seeing the court decision as just a temporary setback.

'We think the Judge's decision was bizarre,' he says, 'and so do many people more expert in the law than I am. He never actually got to the key issue of the case, which is the look and feel, but stopped at this technicality over copyright. We are asking him to reconsider, and if he persists we will appeal. The Fox lawsuit isn't over yet.'

But doesn't he find the removal of copyright, surely the ultimate nightmare of any software company, deeply worrying? Apparently not. 'We see copyright as a non-issue in the UK. In this country copyright vests as soon as you release a product. This is under the Berne convention, to which all European countries are signatories. You don't have to register it as you do in the States, and new releases of *dBASE*, which are significantly different from the original version, have their own copyright.'

On the general question of look-and-feel, he recognises that the law needs clarification in the wake of the widely differing judgments handed down in the Lotus/Paperback and A-T/Fox cases. For his own part, he is keen to draw a distinction between what he terms 'developments' and 'rip-offs'. 'We do believe in innovation, and we do believe in development,' he says, 'what we think is that some line has to be drawn between a carbon-copy rip-off of a product, and something which takes an idea, develops it, and creates something that's more useable for a customer. We don't want to inhibit that at all.'

But if Ashton-Tate thought *FoxBase +* was a rip-off, then why, as Fox claims, did they try to buy it to re-launch as the *dBASE III Plus* Developer's Edition? Corporate inscrutability from Mr. Sloane – 'We never said that the product was without merit. We said it was identical.' As for whether other *dBASE*-compatible products, such as *Clipper* and *dBXL* would fall the wrong side of the 'rip-off barrier', he gives a cautious thumbs-up. 'It's not for me to say, but I'd guess they are much less likely to be the subject of legal action, because of the diversity of their features.' On the Fox case though, he has no second thoughts. 'I personally am quite hawkish about it – I think it was the right thing to have done.'

Looking back over the past few years, Paul Sloane accepts that Ashton-Tate's performance could have been better. 'I think we haven't been as prompt in our product development as I would have liked to have seen,' he says, adding quickly that in his opinion 'most MDs of software companies would say the same.' He also admits that the company has not yet fully caught up, citing the as yet un-released *dBASE* EXE file compiler as one of a number of products he would like to have seen released earlier. He's lukewarm when asked about the possibility of collaboration on standards with other *dBASE* language vendors such as *Nantucket* or even, once the legal dust has settled, *Fox* – 'It's not in my sphere of authority to comment on that, and probably best for me not to speculate. We believe we set the standards with *dBASE*, and to some extent it's up to other people to conform with them.'

On the general image of *dBASE*, he is frank. 'We've still got a lot of work to do – there is a perception of *dBASE* which we have to tackle. We have to promote the fact that it is much more friendly and capable than people believe.' Does this mean that Ashton-Tate will continue to promote *dBASE* in the end-user, non-programmer's market? He has no doubts. 'From the beginning we viewed *dBASE* very much as an end-user's, mass-market product – not as a programming language, another COBOL or FORTRAN. Our development strategy was to make it a product of choice for many users, from first-timers to developers, rather than just a compiler for a small number of developers only. From a revenue point of view the alternative course doesn't make a lot of sense.'

Ashton-Tate's immediate plans for *dBASE* consist of getting it out on as many computing 'platforms' as possible, with the DEC VAX minicomputer version already released, and versions for UNIX and the Sun workstation due in the first quarter of 1991. Next comes the 'server edition', for PCs talking to SQL (Structured Query Language) Servers across networks, and last of all come the versions for the OS/2 *Presentation Manager* and *Windows 3* Graphical User Interfaces (GUIs).

Why are the GUI versions taking so much time? 'When we bring out a *Windows* product it will have support for mouse, scroll bars, radio boxes and language extensions. That's taking us a while to put together.' As for the actual delivery date for a *Windows* version he concedes that it's 'not imminent – I think it's unlikely that you will see graphical products from us this year.'

Finally, after the trials and tribulations of the past two years, might Ashton-Tate not be tempted to concentrate more on its other applications, such as the *Framework* integrated package and its successful *Applause II* graphics product? The answer is emphatic. 'No. We see ourselves primarily as a database company – the other products come off that as a springboard. For Ashton-Tate to succeed, *dBASE* must succeed.' ●

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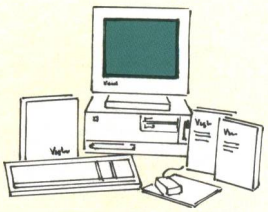

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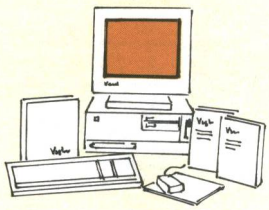

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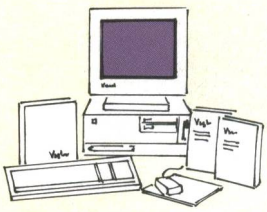

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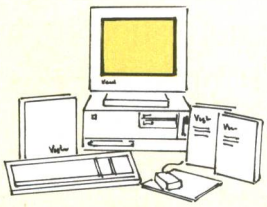

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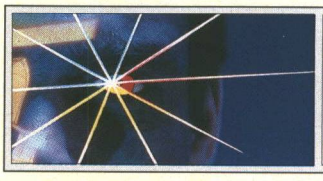

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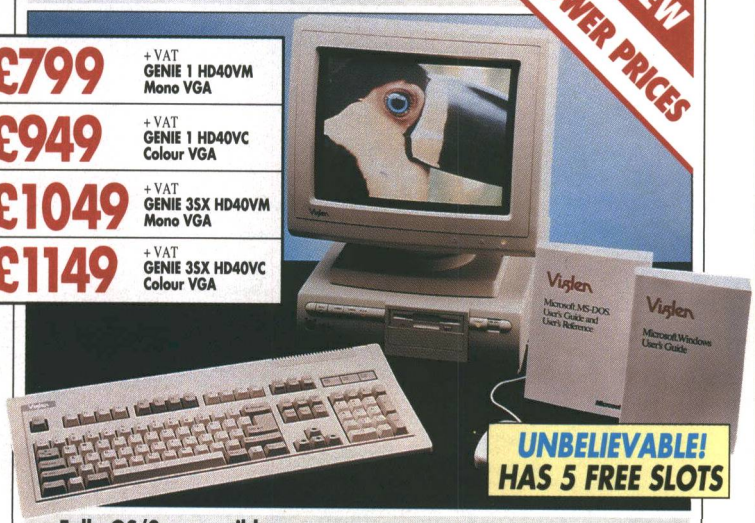


UNBELIEVABLE! HAS 5 FREE SLOTS

Fully OS/2 compatible

Now you can have more computing power and greater desk space at much less cost. The Genie offers, high-level performance and amazing expandability from one of the smallest desktop computers available. The British design uses the latest technology to provide a super-compact, reliable and stylish system.There are currently two models in the Genie range. The Genie 1 is an 80286 based system whereas the Genie 3SX is a very powerful 32 bit 80386SX based computer. The Genie range will run all the software written for the IBM PC/AT and additionally, the Genie 3SX will also run 32 bit software written for the 80386/80486 based processor. This makes the Genie range ideal for most applications from the basic high performance single user system, to the most demanding multi user application. The Genie with its small size is also ideal as a network workstations. The powerful Genie 3SX with its 32 bit capacity and hard disk expansion of up to 200MB (500MB soon) is even suitable as a network fileserver.

Full Specifications

GOOD VALUE! What to Buy for business

Genie 1 HD40VM - *VGA Monochrome System*

- Fully IBM AT compatible
- 1MB RAM (EMS or extended) expandable to 5MB on motherboard and more with expansion card
- 80286 processor with socket for 80287
- 6/12MHz, 0/1 wait state
- 1 x 1.44 Floppy Drive, option for additional external drive
- New Ultra High speed 40MB Hard Disk (<18ms, 1:1 interleave with Cache), option for higher capacities
- 102 key enhanced keyboard
- 2 serial ports
- Parallel printer ports
- VGA display
- 5 free slots (3 x 16 bits full AT size plus 2 x 8 bits)
- MS-DOS 3.30, with GW Basic option for 4.01
- VGA monochrome paper white monitor with 640 x 480 resolution
- Mouse and Microsoft Windows Version 3.0
- Landmark speed =16 MHz, SI=14

WHAT MICRO? BEST BUY

Genie 1 HD40VC - *VGA Colour System - As Genie 1 HD40VM specification and with*

- 14" Super VGA Plus .28 dot pitch Colour Monitor
- 600 x 800 resolution VGA card

BEST BUY! What to Buy for business

Genie 3SX HD40VM - *VGA Monochrome System - As Genie 1 HD40VM specification and with*

- 32 bit 80386SX processor with socket for 80387SX
- 8/16 MHz, 0/1 wait state
- 5 free slots (3 x 16 bits AT full size plus 2 x 8 bits)
- VGA Monochrome paper white monitor with 640 x 480 resolution
- Landmark speed = 20MHz, SI = 18

Genie 3SX HD40VC - *VGA Colour System - As Genie 3SX HD40VM specification and with*

- Super VGA Plus .28 dot Pitch colour monitor
- Very high resolution 1024 x 768 colour VGA card

- Price for each extra 1MB of RAM is £79 + VAT
  Price for a higher capacity drive instead of the 40MB is as follows:
  80MB £129 + VAT 100MB £299 + VAT 200MB £599 + VAT

AND PERFORMANCE AT THE RIGHT PRICE!

Vig™ II ELITE

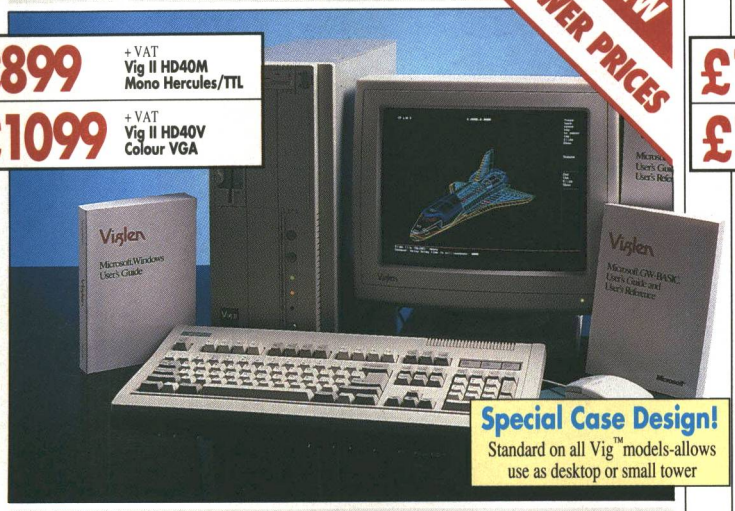
Landmark speed (New version 2.0) **20.8MHz**

HIGH SPEC NEAT 80286 AT

NEW LOWER PRICES

£899 + VAT Vig II HD40M Mono Hercules/TTL

£1099 + VAT Vig II HD40V Colour VGA



Special Case Design!
Standard on all Vig™ models-allows use as desktop or small tower

Fully OS/2 compatible

The Vig II Elite incorporates the latest NEAT (New Enhanced AT) technology chip set. The result is a powerful, fast and flexible computer with an Intel 80286-based 16 bit architecture.

The Vig II's advanced features allow 5MB of memory to be fitted directly on the motherboard. The Vig II is programmable to run 0 or 1 wait states, has selectable bus, DMA speeds and wait states. Memory can be configured to EMS LIM 4 standard.

Optimisation of OS/2 is assured by built-in high speed switching capability between protected and real mode. The Vig II Elite runs at 16MHz 0 wait state using interleave memory, enabling it to run at this level for 80% of the time and giving a high landmark speed.

The fast processing speeds of the Vig II Elite models make them perfect as network fileservers and for demanding applications such as CAD, DTP and so on, in single or multi-user environments.

Full Specifications

GOOD VALUE! What to Buy for business

VIG II HD40M – *Monochrome System*

- Fully IBM AT compatible
- Intel 80286 processor with 80287 co-processor socket
- 8/16 MHz switchable 0 or 1 wait state
- 1MB of RAM upgradeable internally to 5MB
- New Ultra High speed 40MB Hard Disk (<18ms, 1:1 interleave with Cache), option for higher capacities
- 1.2MB 5.25" and 1.44MB 3.5" Floppy drives
- Mono graphics Hercules compatible card
- Real Time Clock
- Latest BIOS
- Enhanced 102 keyboard
- Hi-res 14" flat screen amber monitor
- 2 parallel, 2 serial and 1 games port
- 8 expansion slots, 5 free
- 200W power supply
- Mouse and Microsoft Windows Version 3.0
- MS-DOS 3.30 with GW Basic-option for 4.01
- Landmark speed = 20.8MHz. SI test = 18

VIG II HD40V - *VGA Colour System - As VIGII HD40M and with*

- Very high resolution 16 bit 1024x768 colour VGA card
- 14" super VGA Plus .28 dot pitch colour monitor
- VGA, EGA, CGA, MDA and Hercules compatible
- Single parallel printer port

For the prices of RAM and higher capacity hard disks instead of the standard 40MB please refer to the prices at the bottom of the Genie column

Vig™ SX

Landmark speed (New version 2.0) **25.44 MHz**

HIGH SPEC 80386SX AT

NEW RECENTLY LAUNCHED

£1249 + VAT Vig SX-20 HD40M Mono Hercules/TTL

£1399 + VAT Vig SX-20 HD40V Colour VGA



Special Case Design!
Standard on all Vig™ models-allows use as desktop or small tower

Fully OS/2 compatible

The new Vig SX range is based on the Intel 16/32 bit 80386SX processor. The Vig SX is 100% IBM PC/AT compatible and will run both software written for the IBM PC/AT and the 32 bit software written for the 80386/80486 based systems.

The fast processing speeds of the Vig SX models make them perfect for the most demanding applications. They are ideal for both single user workstations running processor intensive applications and as fileservers for multi-user environments.

Full Specifications

VIG SX-20 HD40M – *Monochrome System*

- Fully IBM AT compatible
- 32 bit 80386SX processor with socket for 80387SXco-processor
- 10/20 MHz switchable 0 or 1 wait state
- 1MB of RAM upgradeable internally to 5MB
- New Ultra High speed 40MB Hard Disk (<18ms, 1:1 interleave with Cache), option for higher capacities
- 1.2MB 5.25" and 1.44MB 3.5" Floppy drives
- Mono graphics Hercules compatible card
- Real Time Clock
- Latest BIOS
- Enhanced 102 keyboard
- Hi-res 14" flat screen amber monitor
- 2 parallel, 2 serial and 1 games port
- 8 expansion slots, 6 free
- 200W power supply
- Mouse and Microsoft Windows Version 3.0
- MS-DOS 3.30 with GW Basic-option for 4.01
- Landmark speed = 25.44MHz. SI test = 18.70MHz

VIG SX-20 HD40V - *VGA Colour System - As VIGSX-20 HD40M and with*

- Very high resolution 16 bit 1024x768 colour VGA card
- 14" super VGA Plus .28 dot pitch colour monitor
- VGA, EGA, CGA, MDA and Hercules compatible
- Single parallel printer port

For the prices of RAM and higher capacity hard disks instead of the standard 40MB please refer to the prices at the bottom of the Genie column

TELEPHONE 081 997 3000

INNOVATION AND TECHNICAL SUPPORT

Vig™ III LS

Landmark speed (New version 2.0)
33 MHz

HIGH SPEC 80386 AT

NEW
HIGHER SPEC
NOW 25MHZ & 80MB
AS STANDARD

£1399 +VAT Vig III/LS HD80M Mono Hercules/TTL

£1599 +VAT Vig III/LS HD80V Colour VGA



Fully OS/2 compatible

The Vig III/LS is a true 80386-based 32 bit computer system – but priced lower than most 386SX machines. The Vig III/LS can handle the most demanding single and multi-user applications.

Full Specifications

GOOD VALUE! What to Buy for business

VIG III/LS HD80M - *Monochrome System*

- Fully IBM AT compatible
- Intel 32 bit 80386 processor
- Socket for 80387
- 8/25 MHz 0 wait state
- 2MB of RAM upgradeable to 16MB
- EMS LIM 4 driver
- High speed 80MB Hard Disk (<18ms, 1:1 interleave)
- 1.2MB 5.25" and 1.44MB 3.5" Floppy drives
- Mono graphics Hercules compatible card
- Hi-res 14" amber monitor
- Latest BIOS
- 8 slots, 4 free
- 2 parallel printer ports
- Enhanced 102 keyboard
- Real Time Clock with battery backup
- 2 serial & 1 games port
- 200W power supply
- Mouse and Microsoft Windows Version 3.0
- MS-DOS 3.30 with GW Basic-option for 4.01
- Landmark speed = 33MHz. SI test = 26.3, MIPS = 4.53

VIG III/LS HD80V -*VGA Colour System - As VIGIII/LS HD80M and with*

- Very high resolution 16 bit 1024 x 768 colour VGA card
- 14" super VGA Plus 0.28 dot pitch colour monitor
- VGA, EGA,CGA,MDA and Hercules compatible
- Single parallel printer port

- For 4MB instead of 2MB of RAM add £158 + VAT
- For 8MB instead of 2MB of RAM add £474 + VAT

DOT PITCH VGA

Viglen colour VGA systems are now supplied with the latest very high resolution .28 Dot Pitch 14" Super VGA Plus Colour Monitor with full FCC, TUV, UL, CSA and DHSS safety approvals. This monitor displays 1024 x 768 resolution and is IBM High Resolution 8514/A compatible. The results speak for themselves: none of the screens displayed in this advertisement were simulated - all were photographed directly off-screen.

For the whole range

- MS-DOS 4.01 instead of 3.30 available for £49.00 + VAT
- OS/2 (system requires minimum of 4MB RAM) £249.00 + VAT
- SCO Xenix 286 £495.00 + VAT
- SCO Xenix 386 £595.00 + VAT
- The 1024 x 768 resolution VGA cards fitted in the Vig range have 256K RAM as standard. This gives full colours in the standard VGA mode and four colours in the highest resolution 1024 x 768 mode. If sixteen colours are required in the highest mode 512K of RAM must be fitted onto the VGA card. Add £49.00 if this extra RAM is required.
- To obtain a very fast IBM 8514/A compatible high resolution graphics display, a Paradise 8514/A plus video card must be fitted to the system in addition to the VGA card. This card with 512k of RAM is £569.00 +VAT with a further £299.00 +VAT for an additional 512k of RAM.
- High capacity drives, streamers, networks and many other options are available from Viglen - please call.

Vig™ III

Landmark speed (New version 2.0)
38 MHz-52 MHz

HIGH SPEC 80386 AT WITH CACHE

NEW
HIGHER SPEC
80 MB AS STANDARD

£1599 +VAT Vig III/25 HD80M Mono Hercules/TTL

£1799 +VAT Vig III/25 HD80V Colour VGA

£2049 +VAT Vig III/33 HD80M Mono Hercules/TTL

£2299 +VAT Vig III/33 HD80V Colour VGA



NEW ENHANCED KEYBOARD
Viglen are proud to include a new smaller sized enhanced 102 key keyboard (not as shown in the pictures) with all of the Viglen range of computers. This new keyboard has been ergonimically designed by award winning British designers to provide all the benefits of a full 102 key keyboard in a size which is 30% smaller. The position of the keys remains unchanged from the standard 102 key layout. This new keyboard not only gives the user more deskspace but provides an ergonomic and more comfortable typing position.

Fully OS/2 compatible

The Vig III/25 and Vig III/33 are two of the fastest 80386-based systems on the market, and come with 32K of super-fast cache memory as standard. The Vig IIIs can handle the most demanding single and multi-user applications.

Full Specifications

VIG III/25 HD80M - *Monochrome System*

- Fully IBM AT compatible
- Intel 32 bit 80386 processor with 32K cache
- Socket for 80387 and Weitek 3167
- 8/25MHz 0 wait state
- 4MB RAM as standard upgradeable to 16MB
- EMS LIM 4 drive
- High speed 80MB hard disk (<18ms, 1:1 interleave)
- 1.2MB 5.25" and 1.44MB 3.5" Floppy drives
- Mono graphics Hercules compatible card
- Hi-res 14" amber monitor
- Enhanced 102 keyboard
- Real Time Clock with battery backup
- Latest BIOS
- 2 parallel printer ports
- 2 serial & 1games port
- 8 slots, 4 free
- 200W power supply
- Mouse and Microsoft Windows Version 3.0
- MS-DOS 3.30 with GW Basic-option for 4.01
- Landmark speed = 38.75MHz. SI test = 30.41, MIPS = 5.39

VIG III/25 HD80V -*VGA Colour System - As VIG III/25 HD80M and with*

- Very high resolution 16 bit 1024 x 768 colour VGA card
- 14" super VGA Plus 0.28 dot pitch colour monitor
- VGA, EGA, CGA, MDA and Hercules compatible
- Single parallel printer port

VIG III/33 HD80M - *Monochrome System - As VIG III/25 HD80M and with*

- 8/33MHz 0 wait state
- Landmark speed = 52.93MHz. SI test = 39.7, MIPS = 7.70

VIG III/33 HD80V -*VGA Colour System - As VIG III/33 HD80M and with*

- Very high resolution 16 bit 1024 x 768 colour VGA card
- 14" super VGA Plus 0.28 dot pitch colour monitor
- VGA, EGA, CGA, MDA and Hercules compatible
- Single parallel printer port

- For 8MB instead of 4MB of RAM add £316 + VAT

TELEPHONE 081 997 3000

DIRECT TO YOU!

Vig™ IV Landmark speed (New version 2.0) **83 MHz**

HIGH SPEC 80486 DESKTOP AT

NEW LOWER PRICES

£2549 + VAT Vig IV/25 HD100M Mono Hercules/TTL

£2799 + VAT Vig IV/25 HD100V Colour VGA



Fully OS/2 compatible

Introducing the Vig IV, the latest addition to the Viglen family of fully IBM compatible PCs. State-of-the-art design technology makes the Vig IV one of the most competitive and highest performance 486 PCs currently available. And it's ideal for use in the most demanding single and multi-user applications.

Full Specifications

GOOD VALUE! What to Buy for business

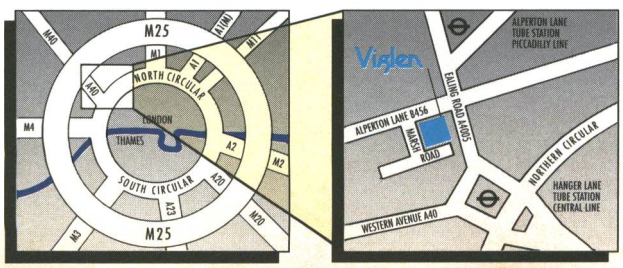
VIG IV/25HD100M - *Monochrome System*

- Fully IBM AT compatible
- Intel 32 bit 80486 processor with inbuilt co-processor
- Socket for Weitek 4167
- 8/25MHz 0 wait state
- EMS, LIM 4 driver
- 4MB RAM upgradeable to 16MB
- 64K extra cache memory expandable to 256K
- High speed 100MB hard disk (<23ms, 1:1 interleave) with option for 200 or 300MB hard disk
- 1.2MB and 1.4MB Floppy drives
- Mono graphics Hercules compatible card
- 8 slots, 5 free
- Latest BIOS
- 2 parallel printer ports
- 2 serial and 1 games port
- Fully proven ISA (Industry Standard Architecture) AT Bus
- Hi-res 14" flat screen amber monitor
- Enhanced 102 keyboard
- Real time clock with battery back-up
- 200W power supply
- Mouse, Microsoft Windows Version 3.0
- MSDOS 3.30 with GW-Basic-option for 4.01
- Landmark speed = 83.61MHz. Power meter MIPS = 11.30

VIG IV HD100V-100MB - *VGA Colour System - As VIG IV HD 100M and with*

- Very high resolution 16 bit 1024 x 768 colour VGA card
- 14" super VGA Plus 0.28 dot pitch colour monitor
- VGA, EGA, CGA, MDA and Hercules compatible
- Single parallel printer port

- For 8MB instead of 4MB of RAM add £316 + VAT
- For 200MB instead of 100MB of hard disk add £399 + VAT
- All the Vig range computers can be supplied in a large tower case. Please add £159 + VAT for this option.



DISCOUNTS AVAILABLE TO EDUCATION, PUBLIC SECTOR AND PLC COMPANIES

Ideal solutions to all your personal computing needs - that's what the Viglen range of compatible PCs provides - and at unbeatable prices.

The Viglen family is designed to combine the highest levels of performance with built-in reliability. We specify the latest and best in high technologies as standard, not as expensive extras.

The standard Vig range comes in specially designed, supercompact cases (smaller than footprint) and can accept 5 drives. All parts are of the highest standard and designed to meet all relevant international safety and specification requirements.

All Viglen PCs are assembled here in the UK and every one must pass the most rigorous series of quality and soak tests before leaving our West London factory. And our concern doesn't end there. We back up all our products with a comprehensive Customer Support and Technical Service that is second to none. And there's a low-cost on-site maintenance option available across the whole range.

What's more, we GUARANTEE that all Viglen PCs will run ALL the software that operates on the equivalent IBM PC/XT and AT systems. You can be 100% certain that if your favourite software - DOS, LOTUS, DBASE, WORDSTAR, AUTOCAD, NOVELL, XENIX, SAMS, SIMS or one of many, many other packages - works on an IBM it will run perfectly on a Viglen Personal Computer. That's real compatibility - guaranteed.

All Viglen systems come complete and ready to use; hard disk, MS-DOS, quality monitor, full user manuals - they're all included. There are absolutely no hidden extras, no unexpected additional costs. Just plug in a Viglen PC, watch it boot and you're ready to go.

The exceptional quality and reliability of the Viglen range of PCs puts real power, speed and versatility into your hands. Whatever your personal computing needs are, there's a Viglen model to more than meet them.

Personal Computing from Viglen - complete solutions, unrivalled value for money. You'll never look back.

Microsoft Windows Version 3.0 Upgrade

All Viglen personal computer owners can upgrade from Windows Version 2 to Version 3.0 for £35 + £5 carriage + VAT. Please quote computer serial number and type of disc format required (5¼" 1.2 Mb or 3.5" 1.44 Mb) when ordering.

TELEPHONE

081 997 3000

How to order: Just write to us with your requirements and enclose a cheque/postal order or credit card no. for the total amount plus £15.00 for Courier Delivery UK mainland only, plus 15% VAT. Credit card holders may order on our sales hotline 081 997 3000 (20 lines).
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(Closed lunchtime weekdays 12.45-1.45 pm and on Public and Bank Holidays)
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Network Solutions. Viglen can provide many networking solutions. If you have a specific requirement please call and ask for Network and Systems department.

Viglen™

16th Successful Year *YOU'LL NEVER LOOK BACK*

Viglen Ltd, Viglen House, 2Marsh Rd, Alperton, Middlesex HAO 1EY
Telephone 081 997 3000 Telex 919 304 VIGLEN G Fax 081 991 5115

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BRIEF ENCOUNTERS

This is our section of short reviews, in which we take a first look at new products as well as established ones which haven't made it to the main review pages. All the products featured here have been tested hands-on by our reviewers.

DYNABOOK LAPTOP

● Dynabook Technologies

Recent market research has shown that the majority of portable PC users don't actually use their machines on the move; instead they use them as machines that can be used both at work and at home. Many of the newer portable PCs have features that seem to be tailored for this sort of user. Dynabook Technologies has gone further than most, with its Dynabook laptop.

The core of the Dynabook is a smart matt-black laptop computer, weighing a fraction over eight pounds and measuring 11 by 13.5 by 1.7 inches. On opening the top of the clamshell, the 286-based Dynabook reveals a mono VGA screen and a keyboard with good tactile response, although the spacebar misbehaves at times.

One of the Dynabook's innovations is the optional 'docking module'. This was the first clue to the Dynabook's real potential. Simply, it duplicates all of the sockets and connections found on the rear of the Dynabook and connects directly to those sockets. So rather than having to unplug all your peripherals (disks, printers and so on) when you want to take the machine with you on your travels, all you have to do is unclip the docking module.

The mono VGA display is readable in all but direct light, although it is not the best LCD screen to be fitted to a portable. Inbuilt configuration and diagnostic software sets the parameters of the Dynabook to your requirements.

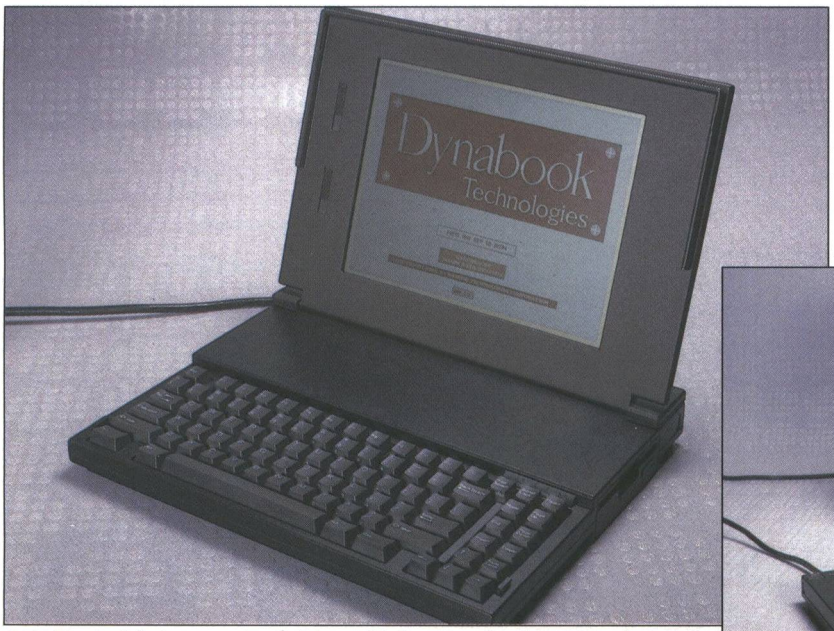
The modular concept is continued with a large flat lead-acid battery pack that fits underneath. Dynabook claims that this can give up to 4 hours processing time. This pack can be removed when the machine is connected to the mains.

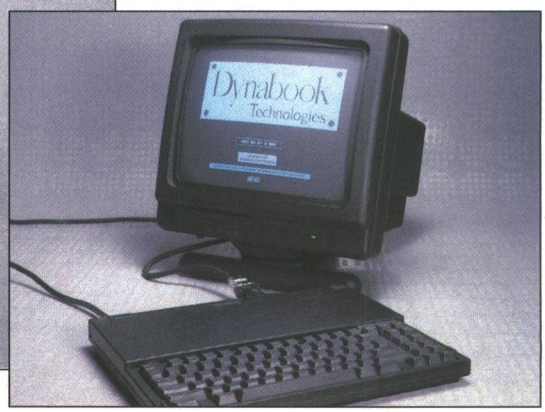
The hybrid nature of the machine is highlighted by the optional matching colour VGA monitor which comes on a tilt and swivel stand. In an office situation, the LCD display can be removed from the Dynabook and the colour monitor used in its place. The ergonomics are such that in this configuration it takes on the appearance of a fairly trendy, slimline desktop PC. The colour monitor can also be run in tandem with the LCD display if required. Other options are a mouse, full sized AT keyboard and a soft leather carrying case.

Technically, the Dynabook is reasonably well specified. It uses the consumption version of the 80286 processor (the 80C286), rated at 16Mhz, and has provision for a maths coprocessor. 2 Mbyte of RAM is standard, expandable to 4 Mbyte. Originally two hard disk options were offered, 20 or 40 Mbyte, but the company has just announced a new 110 Mbyte option. A 1.44 Mbyte floppy drive is standard. The operating system is MS-DOS 4.01. This is already installed as are the simple set up utilities and an energy management program to optimise battery life. There's also security software provided to protect information on the Dynabook from prying eyes, something not often provided on portable computers. A socket on the motherboard provides for the internal addition of an optional modem and phone jacks on the outside of the machine allow direct connection to the telephone system.

The case of the Dynabook is made from magnesium instead of the more usual plastic. Magnesium is a better conductor of heat than plastic and the rugged feel of the lightweight metal case should promise years of damage-free travelling. One drawback, though, is that the attractive matt-black finish seemed prone to scratching – the company's answer to this is to provide a bottle of touch-up paint!

Prices for the Dynabook range have





● The Dynabook laptop comes in a stylish matt black casing – complete with touch-up paint

just been cut by 45 percent, making the machines far more competetive than when first launched. The basic laptop configuration with 20 Mbyte hard disk now costs £1,795. You can get some 386SX-based portables for this these days, but if your priority is style and modularity the Dynabook may be worth a look.

Keith Pomfret

PC PLUS PRODUCT FACTS

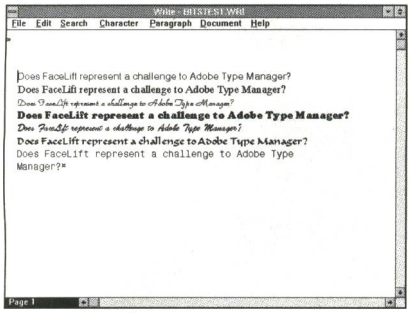
- **DYNABOOK LAPTOP**
- **£2,064**
- **Dynabook Technologies**
- **(0628) 473363**

FOR	AGAINST
■ Modularity.	■ Screen could be better.
■ Stylish.	■ Fiddly connectors.

***PC PLUS* VALUE VERDICT** ■■■□□

FACELIFT

● Bitstream



● *Facelift* automatically scales fonts for *Windows* applications, either on screen or on paper

Everybody remotely connected with font technology seems to be producing scaleable font packs for *Windows* at the moment. Bitstream's offering is called *FaceLift* and provides font outlines in its own proprietary format, together with a driver for both screen and printer.

The smartly packaged disk set comes complete with a well-illustrated manual. Installation involves copying the outlines and driver, together with the control utilities, to the *FaceLift* group of your *Windows* system. This is all done automatically, so all you need to worry about is setting the program up for your own printer.

FaceLift will work with any printer from a 9 pin dot-matrix, through to a PostScript laser. Dot-matrix and LaserJet printers are catered for by printing pages as screen dumps, while PostScript printers can still use their internal fonts, relying on *FaceLift* for the on-screen equivalents. It's in the screen representation that the program really comes into its own.

Each of the fonts in the seven supplied families is scaled automatically, as any *Windows* application calls for it. There is a slight pause the first time a new font is called, while the outline is loaded from disk and scaled to size, but after this it is held in a user-sized font cache. The same outlines are used to generate printer fonts, so the screen really does show a WYSIWYG (What You See Is What You Get) display, within the resolution limits of the screen.

FaceLift will handle Adobe Type 1 PostScript fonts as well as its own Bitstream format. This means that PostScript outlines can be used for screen display and downloaded to a printer. Three extra Bitstream font packs are also available, providing outlines compatible with the 35 font Adobe LaserWriter set (costing £206), the HP laserJet III set (£148) and a separate set of Bitstream's own selection (£229).

Bitstream is one of the major players in font technology and as such may make some inroad into this new and expanding market. However, it's possible that Adobe Type Manager and, later this year, Microsoft's *TrueType* technology will take the lion's share.

Simon Williams

PC PLUS PRODUCT FACTS

- **FACELIFT**
- **£114 Font packs £148 – £229**
- **Bitstream**
- **(0329) 822857**

FOR	AGAINST
■ handles Adobe fonts.	■ Microsoft's Truetype
■ Printer/screen display.	may make it redundant.

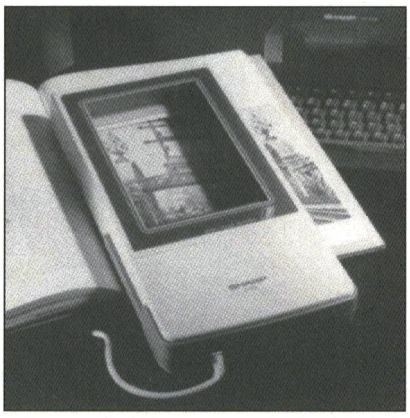
RANGE OF FEATURES	■■■■□
OVERALL SPEED	■■■□□
EASE OF USE	■■■■□
DOCUMENTATION	■■■■□
***PC PLUS* VALUE VERDICT**	■■□□□

Display: W | Issue disk | Min hardware: HD 640 | Other hardware

see *Help Screen* for details of symbols

JX100 COLOUR SCANNER

● SHARP



● Framing images to be scanned is easy with Sharp's JX100 colour scanner

Hand scanners have been around for some time now, but a portable colour hand scanner is a bit more unusual. The Sharp JX 100 measures 6.3 by 12.6 by 1.6 inches and hits the scales at 4.3lbs. It looks a bit like the sort of thing a double glazing salesman would bring into your

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lounge, with two pieces of glass between a black and cream frame. It connects to the PC via a serial cable and has a mains lead for the power supply. The scanning software supplied is *PC Quickscan 100*.

The scanner is laid on top of the document to be scanned, the image being viewed through the two frames of glass, which makes it easy to line up the required portion of the image. The area that can be scanned is 6.3 by 3.9 inches, and a resolution of 200 dots per inch (dpi) is possible in colour and up to 400dpi in mono.

The scanning software is intuitive to use and when the review documentation (which was pretty basic anyway) went astray, it was simple to run all of the features from the on screen menus. The image being scanned is built up in a window on the screen and it is possible to check that it has been framed as required after a single 'master' scan.

The time taken to scan an image depends on the resolution required but typically it took about two and a half minutes for colour and 45 seconds for mono at 200dpi.

Scanning the image as a halftone (where shades of light and dark in the image are created using black dots of various sizes – as in a newspaper photograph) took three minutes, and as a duotone (similar to a haftone, but the image is composed using black and one colour) nine minutes.

The Sharp JX 100 is one of only a few colour hand scanners currently on the market, and at £545 (plus VAT) seems to be good value for money. The results are good and it proved easy to transfer images for use within a desktop publishing (DTP) package.

Keith Pomfret

PC PLUS PRODUCT FACTS

- **JX100 COLOUR SCANNER**
- **£625**
- **Sharp**
- **061-205 2333**

FOR	AGAINST
■ Price.	■ Garish colours.
■ Ease of use and results.	■ Quirky serial interface.

***PC PLUS* VALUE VERDICT** ■■■■□

MOBILE COMPUTER MC 400

● Psion

The MC 400 portable computer is not MS-DOS compatible but does allow you to transfer files with a standard MS-DOS PC via built-in *Laplink* software. Its main use is likely to be as a second machine for use when travelling, and when away from the main PC. An MS-DOS version of the machine is available, but it takes more current, giving a battery life of around 30 hours (rather than 70 hours for the MC 400), and costs £1,489, rather than £799 for the MC 400.

It comes in a smart grey clamshell case, roughly A4 in size and just under 50mm thick. The sides and back are peppered with flip-down and slide-in covers which hide serial and parallel ports, a phone socket, battery pack, mains input and even sockets for microphone and speaker.

Two of the biggest covers, which are only accessible when the machine is open, take the MC 400's solid-state RAM and EPROM cards. Flash EPROM is one of the major innovations of the MC 400. Developed in conjunction with Intel, it's a form of non-volatile memory which can be erased and reused from within the machine, without exposure to ultra-violet light. Unfortunately, you can still only erase an EPROM card wholesale – there's no way yet to delete individual files and reuse the space. There is enough space for four cards in each machine.

The screen of the MC 400 is 600 by 400 pixels, used to display a proprietary graphical interface.The screen is poor, with no backlight, and is hard to read in anything but good ambient lighting.

Another novel feature is a screen pointer which is operated using a finger on a small touch pad between the keyboard and the screen. This is usable, but I was thankful for the keyboard shortcuts offered by the operating system and built-in applications alike. The MC 400 comes with a notepad, card file, calendar and a number of other productivity tools. The notepad is good but screen-scrolling is slow and the spreadsheet supplied seems more than adequate for calculations on the move. It's Lotus-compatible, too. A number of additional specific applications are now also becoming available.

The biggest drawback of the MC 400 is its price. The machine is comparatively expensive and the solid-state storage modules are more so (£114 for 256K of EPROM). The innovations of the Mobile Computer make you want it to succeed. The pricing, however, is discouraging and corner cutting, like the omission of a mains adapter and the provision of *LapLink* software but no connecting lead; these do little to endear you to the machine.

Simon Williams

PC PLUS PRODUCT FACTS

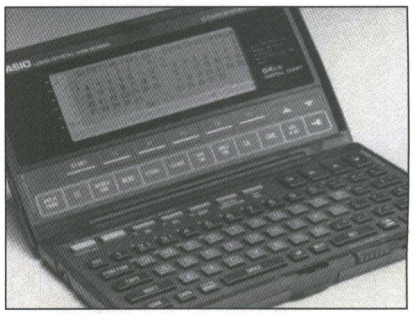
- **MOBILE COMPUTER MC400**
- **£799**
- **Psion**
- **071-262 5580**

FOR	AGAINST
■ Novelty value.	■ Price of machine and storage.
■ Buil-in applications.	

***PC PLUS* VALUE VERDICT** ■■■□□

SF-9500 DIGITAL DIARY

● Casio



● Casio's SF-9500 Digital Diary – the next yuppie status symbol?

The Filofax, and its ring-bound organiser derivatives, are in such widespread use these days that they have all but lost their yuppie pretensions. The next



● Psion's MC 400 isn't MS-DOS compatible but it has built-in *Laplink* software for file transfer with a PC

A PITY WE IDN'T HAV A FUJITSU DL 1100

The DL1100 is the 24 pin dot matrix desktop printer that thinks big.

It prints on A3 portrait so you're no longer restricted by the limitations of A4.

Yet, even with this unique capability it is still smaller than most traditional A4 printers. In fact, the DL1100 is barely larger than the paper it prints on. So it can't be accused of taking up a lot of desk space.



Nor does it take up a lot of your time. It prints at the rate of 200 cps and at a whisper quiet 53 dBA.

Despite its size it boasts the largest memory of all desktop printers. 24K bytes to be precise.

It can store 11 typical pages of data. Any data too, because it's compatible with all standard business software.

Thanks to the set-up program disc which comes free, to configure the DL1100 via your PC is simplicity itself.

Yes, it's a pity if you've just splashed out on a less advanced printer.

Particularly when you could have had the DL1100 for only £375 (and for an extra £55 a colour upgrade facility too).

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executive toy, though, could be their electronic equivalent.

The SF-9500 is currently the top model in Casio's range of digital diaries. Using it in place of your paper-based organiser may not be as extravagent as might first appear however. Like some of its competitors, the SF-9500 has an option to link it to a PC for transferring files. This allows you to back up your data on the PC, so that if you lose your organiser at least you haven't lost all your data with it.

The diary has a 32 character by six line LCD display which, although it has a contrast adjustment, needs a reasonable light level to be easily readable. It has 64K of memory and can take extra IC cards, which fit beneath the keyboard, for additional memory and applications. Unlike some other electronic organisers, it has a QWERTY keypad. It's probably too small to touch type on, but is fine for entering data using two fingers.

Key to the diary's use is its built-in applications. These include a diary (surprise), consisting of calendar and schedule displays, business card and telephone databases, a memo facility, world time function and a calculator. The calendar displays two months worth of dates at once, with days highlighted if a schedule has been entered. The schedule function includes a graphical display of the time that you have allocated each day.

Overall, the applications can be a bit fussy to use, but the SF-9500 does make a compact alternative to a conventional address book and diary. Its memo facility is a bit limited for doing more than entering lists of items though. At £190, it is rather an expensive alternative to paper.

Dave Chadwick

PC PLUS PRODUCT FACTS

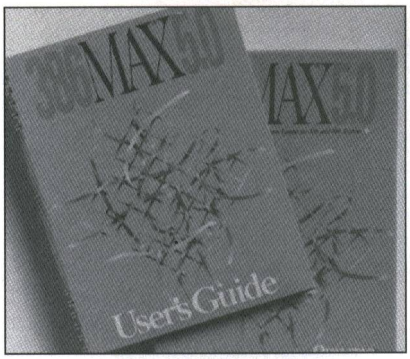
- **SF9500 DIGITAL DIARY**
- **£190**
- **Casio Electronics**
- **081-450 9131**

FOR	AGAINST
■ Quite compact.	■ Price.
■ Data transfer with PC.	■ Fussy to use.

***PC PLUS* VALUE VERDICT** ■■■□□

386MAX 5.0
● IDS

386SX, 386 and 486-based computers benefit from the ability of these chips to map memory from one place to another – to pretend that memory is at one address even though it's really elsewhere. *386MAX* takes advantage of this ability to place TSRs (Terminate and Stay Resident programs) and device drivers into the empty areas between 640K and 1 Mbyte of the PC's memory which MS-DOS reserves for itself, and



● ***386MAX 5.0*** **is designed to steal memory from MS-DOS to run your TSRs**

doesn't ordinarily allow application programs to use.

386MAX installs automatically. It backs up your CONFIG.SYS and AUTOEXEC.BAT files before altering them. As it works to find the best configuration your PC will reboot several times – but warnings are issued every time in order to avoid heart attacks among users and there is always an option to abort the process.

For *386MAX* to take advantage of memory re-mapping it needs to run in protected mode. Not all programs that do this will work at the same time. *386MAX* supports the VCPI (Virtual Control Program Interface), so *386MAX* can coexist with other protected mode programs – though *Windows 3* only runs in Real mode with *386MAX* installed.

Once successfully installed you should find that various parts of your software system – TSRs, device drivers and buffers, have been shifted out of the 640K area, leaving you with more room to manoeuvre. Naturally, the more software you were in the habit of loading the greater the improvement will be. If the system is altered after installation the *386MAX* installation routine must be run again to ensure that the system is always operating at maximum efficiency.

I tried it on my own system – which has no TSRs and no device drivers, other than KEYB, and gained 7K. A peer to peer *MainLAN* network server went from 434K free to 445K free, but these results are less impressive than the claims made by the vendors.

Steve Patient

PC PLUS PRODUCT FACTS

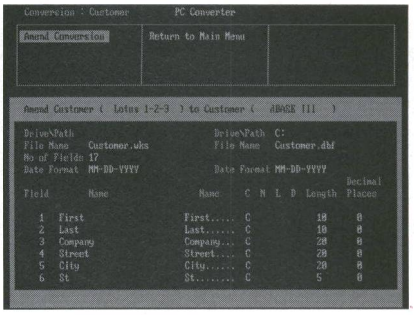
- **386 MAX**
- **£90**
- **IDS**
- **071-631 0548**

FOR	AGAINST
■ Spelling checker.	■ Separate frames for text and graphics.
■ Screen-grab utility.	

RANGE OF FEATURES	■■■■□
OVERALL SPEED	■■■■□
EASE OF USE	■■■■□
DOCUMENTATION	■■■■□
***PC PLUS* VALUE VERDICT**	■■■□□

Display: T | Issue disk: 3½ or 5¼ | Min hardware: 640 HD

see *Help Screen* for details of symbols



● ***PC Converter Plus*** **converts files between different data types, including Lotus *1-2-3* and *dBASE***

PC CONVERTER PLUS
● MGA SOFTCAT

Many people have found the *Word for Word* program a real blessing: it converts files from just about any word processor format into just about any other. *PC Converter Plus* treads the same path, but it converts data files. The formats supported include Lotus *1-2-3* (but not Release 3.x), *dBASE* (up to *III Plus)*, comma-delimited ASCII, DIF SYLK and Delta.

The conversion process is menu-controlled and very simple to use, and can turn a *dBASE* file into *1-2-3* format (or the other way around) in not much time at all.

However, the program lacks the overall usefulness of *Word for Word*. There are far fewer standard data formats than there are different word processor files, and the structural information they hold is generally less complex. Consequently, most database and spreadsheet packages provide their own translation utilities, making it relatively straightforward to get a file from format A to format B without paying the extra for this program (even if you have to pass through a third, commonly-understood format).

Having said that, it must also be mentioned that there are certain environments where *PC Converter Plus* would certainly prove its worth. An accountant, for example, who regularly accepts all different sorts of data from a range of clients would certainly find it extremely useful. For most of us,

PC PLUS PRODUCT FACTS

- **PC CONVERTER PLUS**
- **£80**
- **MGA Softcat**
- **(0297) 226601**

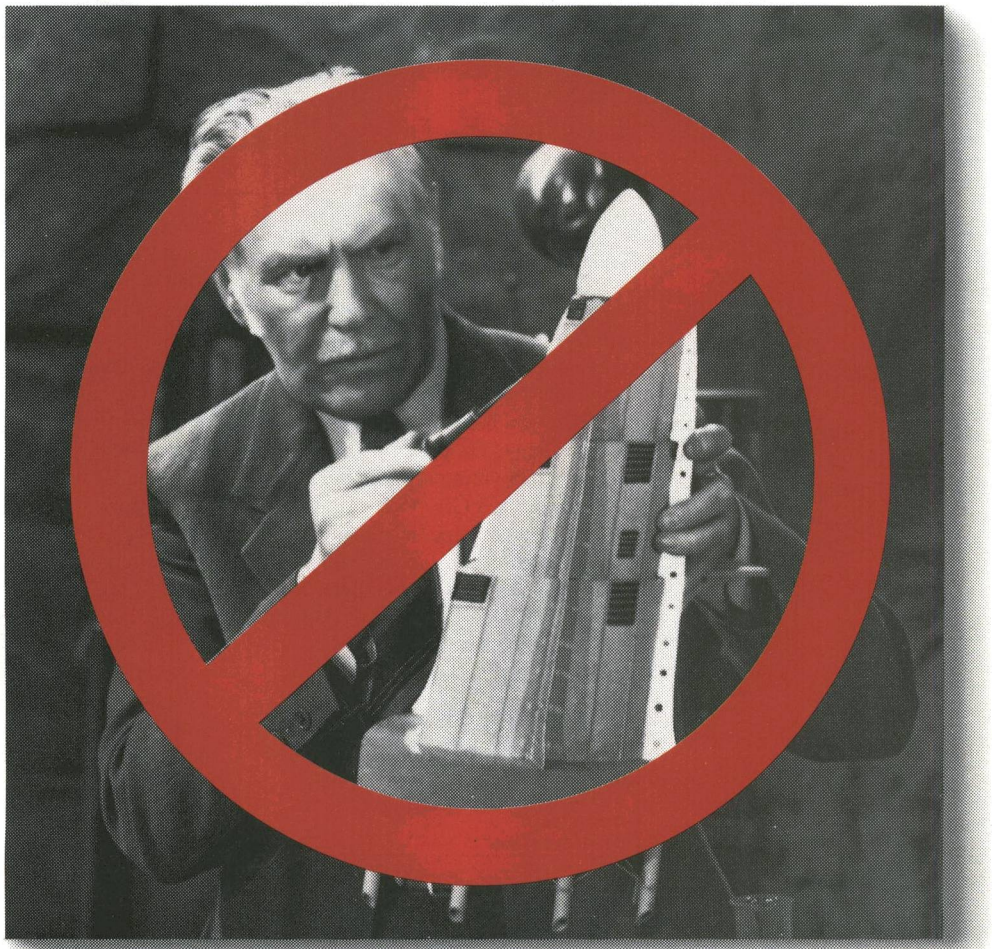
FOR	AGAINST
■ Wide range of conversion formats.	■ Expensive luxury.

RANGE OF FEATURES	■■□□□
OVERALL SPEED	■■■■□
EASE OF USE	■■■■□
DOCUMENTATION	■■■■□
***PC PLUS* VALUE VERDICT**	■■■□□

Display: T | Issue disk: 3½ 5¼ | Min hardware: 256 | Other hardware: HD

see *Help Screen* for details of symbols

You don't have to be a rocket scientist to program in BASIC.



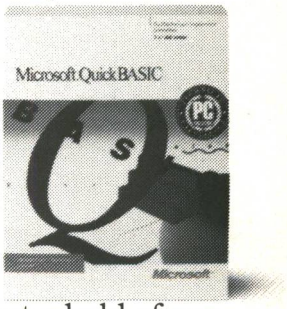
Granted, with Microsoft's BASIC Professional Development System, rocket scientists can work wonders every day of the week.

But if you want to work better in this stratosphere, Microsoft® QuickBASIC is all you need.

Instead of an I.Q. test, you get a step-by-step printed tutorial that guides you through a complete working program. And our handy on-line electronic manual lets you put your finger on anything you want to know instantly, or copy and paste sample code into your program window.

Meanwhile, our on-line training and Easy Menus make you feel at home in your new environment in minutes—not hours. And to simplify things even more, our intuitive interface offers context-sensitive help. Plus a debugger that gets your program up and running in record time.

Naturally, this BASIC also turns out code at record speed—150,000 lines per minute. Not surprisingly, *PC Magazine* called it "...perhaps one of the greatest software programs ever written" and gave it their Editor's Choice Award.



All of which only goes to prove one thing: you don't have to be a rocket scientist to conquer new frontiers.

Just smart enough to get a hold of our Microsoft QuickBASIC.

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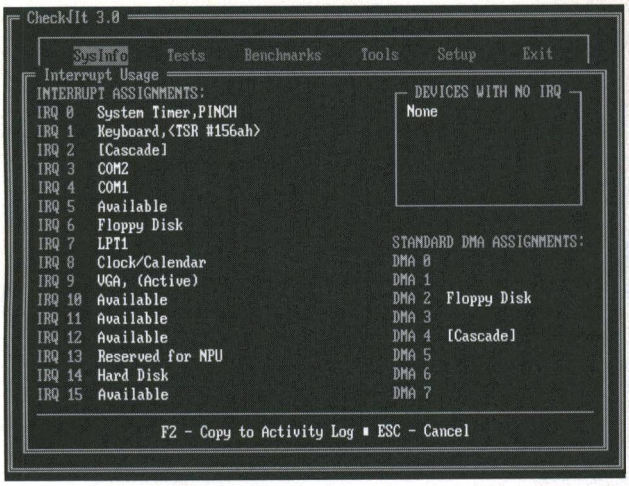
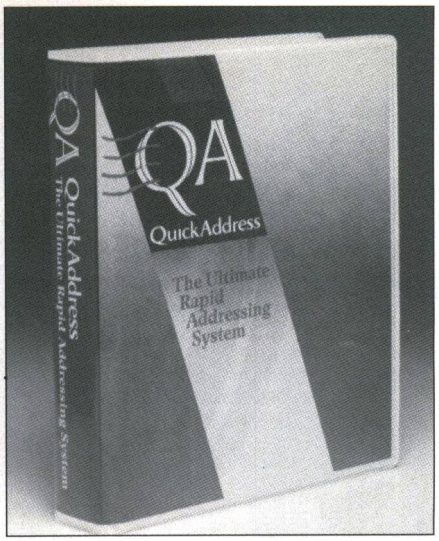


● *CheckIt* investigates the configuration of your PC and includes improved hard disk diagnostics, saving your PC's memory



● Do you know the postcode, but not the address? If so then *Quickaddress* can probably help. But can you afford it?

however, it constitutes a rather expensive luxury.
Mike Hardaker

CHECKIT 3.0
● Touchstone/CCD

It's remarkable how little you can tell about a PC by looking at it. Even when you've taken the lid off much remains hidden. When fitting adapter cards, for instance, a clash can occur if two or more cards are trying to use the same hardware interrupt lines (that's why they're fitted with jumpers, so you can change which one they try to use). That's where a program like *CheckIt* comes in. Touchstone calls its program PC diagnostic software, which is a good description. It pokes around inside the PC and ferrets out a remarkable amount of information, although it failed to detect my mouse.

Like the earlier version of the program (reviewed in issue 45) *CheckIt* garners information on memory, hardware (including adapter cards) and software. It tells you what device drivers are present, which IRQs (interrupt request queues) are in use and which DMA (direct memory access) channels are free. If you know enough about the memory chips in the PC under test it will also check them out individually.

Improvements over the earlier version include virus detection software, machine speed and hard disk benchmarks, floppy disk drive alignment tests and a format program for ATs (not XTs). Hard disk diagnostics, which were weak on the earlier version, are much improved. You can now run other utilities from within *CheckIt* and add them to *CheckIt's* menus. Thus your favourite specialist utilities can appear as if they were all part of one program.

For most diagnostic purposes *CheckIt* will prove more than adequate – especially for well documented machines. *CheckIt* will certainly prove invaluable in locating and fixing device contention problems. Despite the excellent manual, information on the more arcane areas of PC innards still require the user to have a good knowledge of the PC – without some such understanding many of the facts will leave you none the wiser.

One area where *CheckIt* still lacks depth is in providing information on video adaptors. VGA (Video Graphic Array) adaptors come in so many configurations, with such disparate abilities (odd modes), that it helps to be able to look closely at them. Perhaps that will be included in the next version.
Steve Patient

PC PLUS PRODUCT FACTS

■ **CHECKIT**
■ **£114**
■ **CCD Ltd**
■ **(0253) 841686**

FOR	AGAINST
■ Wide range of info.	■ Limited information on adaptor card.
■ Hard disk support.	

RANGE OF FEATURES	■■■■□
OVERALL SPEED	■■■□□
EASE OF USE	■■■□□
DOCUMENTATION	■■■□□
***PC PLUS* VALUE VERDICT**	■■■■□

Display: T | Issue disk | Min hardware

see *Help Screen* for details of symbols

QUICKADDRESS
● Quick Address Systems

The system of post codes used in the UK has quite a lot going for it. With just a nine or ten character code you can specify any street and sometimes a particular house anywhere in the country. The Post Office insists it speeds the handling and prompt deliver of mail, especially if the local sorting office is fully mechanised.

Not wishing to let a good thing pass, the PO has started to licence out its post code system, so that anyone can refer to an address knowing nothing more than the code. The idea is that if you send a lot of mail, you only have to enter a post code to have instant access to the corresponding address. *QuickAddress* turns this concept into an easy-to-use address database, accessed by a small (50K) pop-up program.

The software comes on a set of six 1.2 Mbyte disks, with a slim manual bound in a ring binder. Installation is straightforward; the only real decision you have to make is whether to install the entire post code data file or just selected regions. The full file takes up 6 Mbyte, but a couple of regions will only set you back a couple of megabytes. The program runs as a Terminate and Stay Resident program which is called up with a simple hot-key sequence. Enter a post code and the corresponding address normally shows up in under a second – never more than two. The address can be fed into an underlying database or word processor through the keyboard buffer, as if typed by hand. The system works admirably, my own post code, for instance, tying down the address to one of three houses in the road.

What isn't so admirable is the cost. It's hard to believe Quick Address Systems are serious in asking over £1,000 for the system. Mind you, this is the single user fee; a network of two or more users pays £690 per user! Half the price would look excessive.
Simon Williams

PC PLUS PRODUCT FACTS

■ **QUICKADDRESS**
■ **£1,006 + £489 per year after first year.**
■ **Quickaddress Systems.**
■ **071-924 4056**

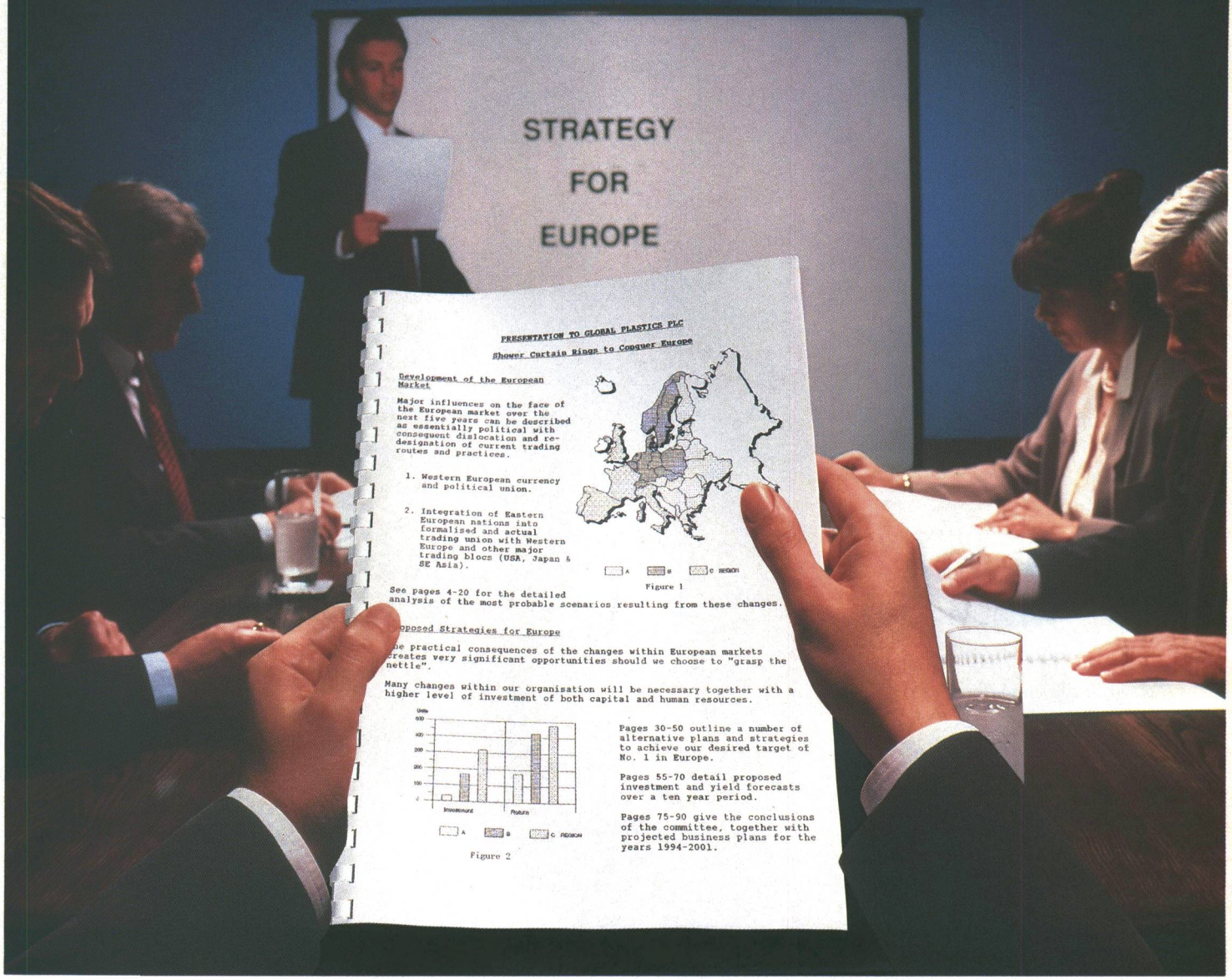
FOR	AGAINST
■ Fast.	■ Price.
■ Works as a TSR	

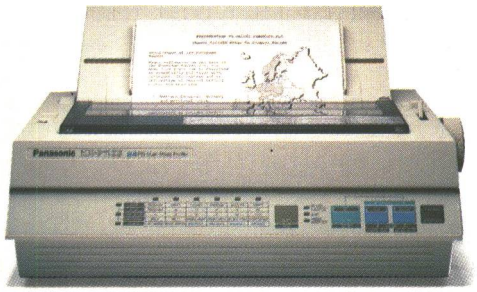
RANGE OF FEATURES	■■■□□
OVERALL SPEED	■■■□□
EASE OF USE	■■■■□
DOCUMENTATION	■■■□□
***PC PLUS* VALUE VERDICT**	■□□□□

Display: T | Issue disk | Min hardware

see *Help Screen* for details of symbols

The new Panasonic KX-P1123. For when you need to create the best impression.





When quality matters, move up to Panasonic's 24-pin high performance dot matrix printer, the KX-P1123. With four Letter Quality fonts, document presentation is crisp, clear and black – simply stunning!

What's more, with a brisk speed of 63 cps, or up to 240 cps in draft mode, this is a professional printer with a huge appetite for work.

Outstanding value for money, the KX-P1123, with easy-to-use front panel controls, features a generous 10K buffer and full software and interface compatibility. Paper handling, with push/pull tractors and rear, top and bottom paper paths, is exceptionally versatile.

For more information, dial 100 and ask for Freefone Panasonic or fax Julie Everard on (0344) 853707. Remember, you never get a second chance to make a first impression.



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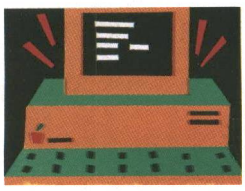

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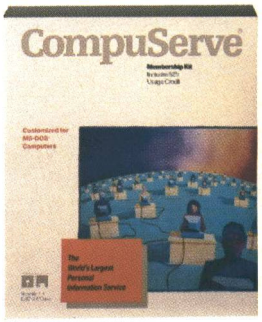

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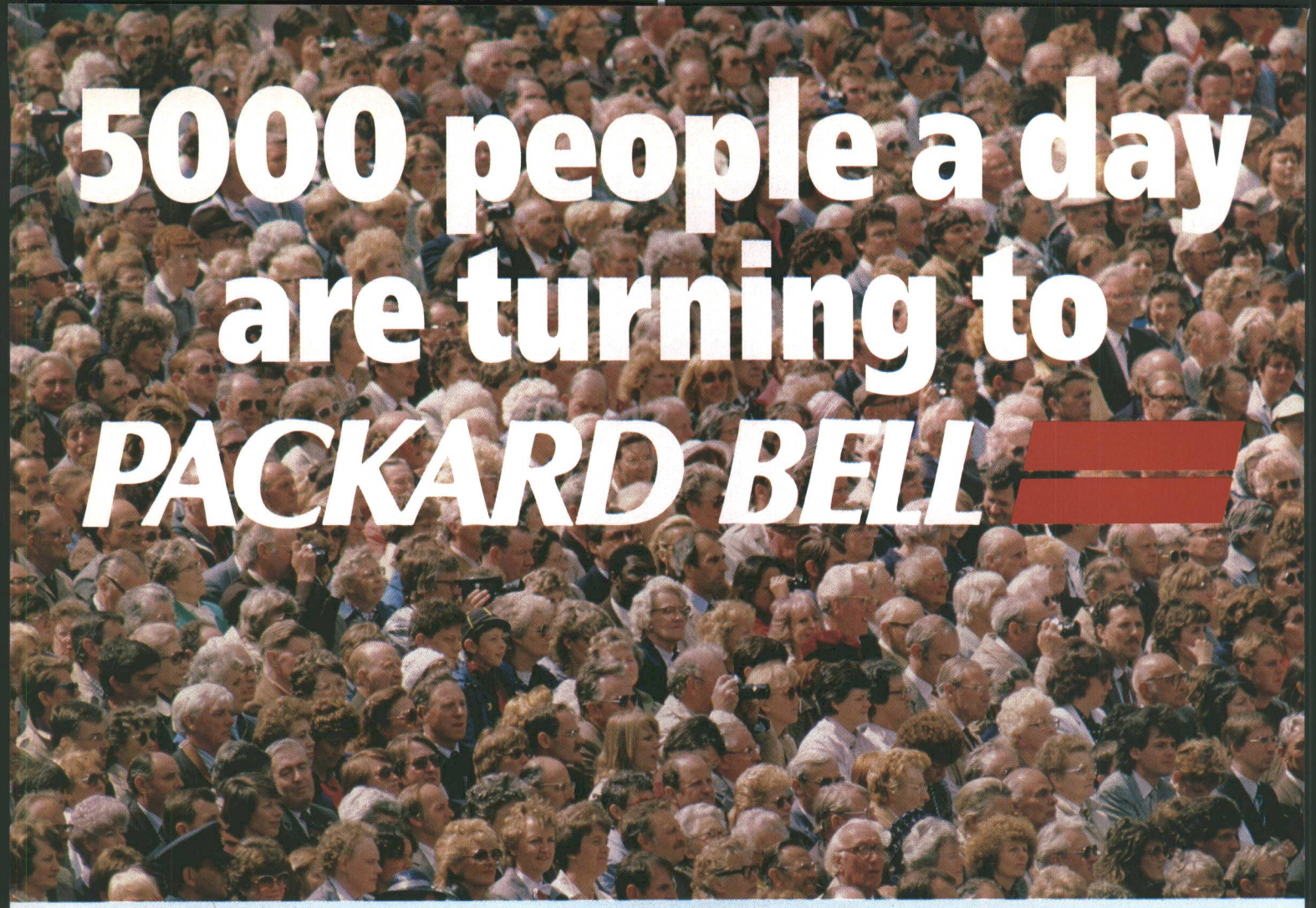

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ANSWERING TO YOU

Regarding Stephen Richards' letter on the temporary demise of British Telecom's Phonebase service (Mailbox, issue 53), I'd like to point out that Phonebase is alive and well and presently living on Prestel. To access it, just key *192*. It's simple to use – there are just a few abbreviations to remember, with a help facility to remind you. It's a bit expensive before 6pm – around 10p per minute – but this drops to 2p per minute (plus VAT) after 6pm, which beats the 39.6p plus VAT it's going to cost to ring directory enquiries from April.

Roger Brownlow,
Wealdstone,
Middx.

It also sounds a lot cheaper than those 33p per minute answering-machine lines that dish out everything from cricket scores to road-tests of cars. Now, about the PC PLUS Brief Encounters *Line – only 33p per minute and....*

PUBLIC SERVICE ANNOUNCEMENT

A statement recently appeared in a computer magazine to the effect that *Timeworks Publisher* is now a shareware product. GST Software Products would like to make it clear that this is wholly untrue. The statement did not originate from GST, and was made without our knowledge or permission.

Under no circumstances has *Timeworks Publisher* been offered as shareware, and there is no intention on our part to do so.

Joanna King,
Marketing Manager,
GST Software Products,
St. Ives,
Cambs.

The statement didn't appear in PC PLUS, but we're glad to help set the record straight.

IN NEED OF ASSISTANCE

about this WIMP bizness – i red sumwhere that peeple whu uze PCz pridust far more reederble text than all thoze wot had worked with Apple mackintoshis. Havin uzed a mak for yeers i have two disagrre, az I find the makk haz had no advers affex on my grammur ur litracy.

Yurs,

durKiss Bled.
Leytonstone,
Lundun.

PASCAL – THE FINAL COMMENTS

After reading Paul Stephens' *dBASE* vs Pascal article (PC PLUS issue 51) I had thought of writing in, but didn't bother. It was, I assumed, simply a device to stimulate debate. This month, I've changed my mind.

I hold no reverence for the British educational system; there is a great deal wrong with it. Unfortunately, the 'ivory tower' which Paul Stephens attacks is not the only enemy. The 'concrete bunker' is growing in strength.

Inhabitants of the ivory tower say 'never mind what it's good for; let's admire it'. Those of the concrete bunker say 'never mind how it works; can I hit people with it?'. Neither is going to serve us very well in the future.

As pointed out by A. Burrows (*Mailbox*, issue 53), there is a vital difference between education and training. If you don't understand that, you don't understand the education system. Sequentially, education must come first; it provides the basis on which training can be built.

There is an analogy in natural languages; both French and Chinese are widely spoken, but neither will be immediately relevant if you are offered work in Germany. On the other hand, both of my (depressingly multilingual) brothers tell me that the first language you learn is the hardest, and that if you learn any one Indo-Teutonic language and one other, you will then be able to cope anywhere. The programming equivalent of this would be to learn one imperative language (such as *dBASE* or Pascal) and one declarative language.

While the Open University's reply to Chris Sandall (*Mailbox* issue 53) is not the most helpful, it is considerably more useful and honest than Paul Stephens' comment on it.

Firstly, no course can guarantee that it will lead to a job in computing; those days are past. Second, M205 is an introduction to the Fundamentals of Computing, and should be judged as such; it is not an introduction to the Fundamentals of Business Databases.

Certainly, our education system is badly in need of an overhaul, but this must start from at least a vague knowledge of the present situation. Sadly, Paul Stephens seems to know SFA about the present situation and is content to substitute eighth-grade schoolboy taunts for facts. By the way, SFA means 'Sweet Fanny Adams' – I learnt it while watching a Scottish programmer apply his useless knowledge of Pascal/Modula in a non-academic and strictly non-user-friendly battlefield setting.

Felix Grant,
Weston-Super-Mare,
Avon.

I shall be taking the Open University's M205 course this year, and hope to apply it to *Turbo Pascal*, as well as Pecan's. I found the debate surrounding this course at first stimulating, and then disappointing. What seemed a reasonable discussion about the particular language used has degenerated into an attack on academia which has little constructive value.

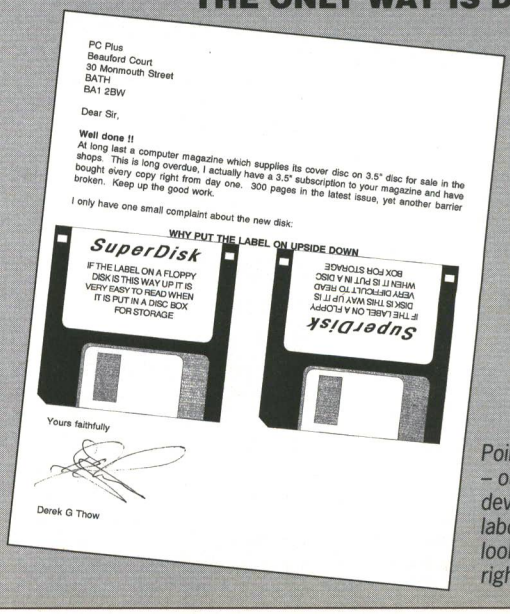
Part of the problem is that computing is now such an enormous subject that no single language or course can teach even its fundamentals. Pascal must however come closer than the confines of *dBASE*, to which there are a number of objections.

First, it only addresses commercial computing on PCs. In terms of the number of transactions processed worldwide each day, *dBASE* cannot even come close to COBOL in importance. It is not a portable standard, but tied to one supplier. Ashton-Tate was in trouble last year, and the OU would be wrong to teach a language which could have a limited life.

Maybe the solution is to use an Algol-derived language, like Pascal or C, and COBOL as well. The student can then decide which language is appropriate for a particular application, although in practice when a programmer joins a team there is often little choice of language.

The OU's point in surveying universities seems to be to find a good teaching language, not one which would necessarily find the

THE ONLY WAY IS DOWN



Point taken, Derek – our product development laboratory is looking into it right now.

student a job. I was disappointed to see that the OU are content to follow other academics rather than take the lead. Perhaps Paul Stephens could have made his point better if he'd suggested that the computer industry should have been consulted, but quite who the 'industry' is I don't know. The British Computer Society is tarred with the academic brush, and suppliers usually have vested interests.

Judging from the job ads in the weekly trade press, the in-vogue skills currently seem to be UNIX and C on the whole. I don't recall ever seeing an advert for a *dBASE* programmer; a few do occasionally appear for Pascal, but they are not all that common. In order to get a job, Chris might be better off taking a course in plumbing.

Clive Darke,
Carnforth,
Lancs.

Paul Stephens replies (for the last time): It's actually the other way round – my original article was an attack on academia, which degenerated into a discussion on which programming languages to use! My point was precisely the 'education versus training' one that Felix Grant and others have raised – that the major issue was not the particular programming language being taught (that is the training), but the basic concepts and attitudes being instilled (that is the education). If you don't believe me, try reading the column again.

However I must also say that only in Britain could you find such die-hard separatist views as expressed by educationalists in these pages over the past two months, almost to the extent of saying that education must positively not contain any element of training, for fear of contamination. Is it really not possible to teach people some useful, practical skills as part of the educational process?

THE STING

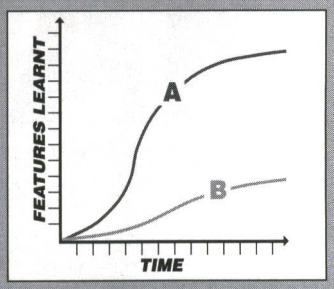
Il would like to point out that my description of *Tasword PC* as 'staggeringly nubile' (Mailbox, issue 50) was a typing error. In fact I really meant to type 'supine and waspish'. I still see no review of *Tasword PC 2*.

Phil Morley,
Peterborough,
Northants.

Now we don't want to be accused of patronising sarcasm here, Phil, so in view of that we'll say no more than 'what an unusual and evocative description of a word processor.' Our WP guru, Simon Williams, is on the track of Tasword PC 2.

IT'S ALL A PLOT

Although I have tried hard, I am unable to suppress a flicker of pedantry whenever I come across the phrase 'steep learning curve', used to imply that a piece of software is difficult to master. This is presumably meant to be a description of the curve relating time to the fraction of the package that has been learnt, but when plotting the independent variable (time) along the X-axis, such curves typically have a sigmoid shape.



My illustration (above) shows two such curves; curve A represents a package that is easy to learn, while curve B shows a package that is difficult. Which curve is the steeper?

The purpose of this letter is to exorcise my pedantry. However, it is perhaps important in a subject as jargon-ridden as computers that some attempt is made to use language accurately.

David Oliveira,
London.

er.. You're absolutely right! You could of course plot time on the Y-axis (so it became a graph of 'time expended for percentage of features mastered), but it does seem to more naturally belong across the X-axis.

In fact the real origin of the word 'steep learning curve' appears to be the general association of the word 'steep' with difficulty or cost ('£500 is a bit steep', or 'it's a steep uphill struggle'); the graphical association was quite handy and (almost) fitted, so in the great tradition of computer jargon, another Phrase Was Born.

FOUND GUILTY

I was somewhat disappointed by Martin Kelly's review of our product *Fleetfinder* (PC PLUS issue 53), in which he compares it unfavourably with Lotus Magellan, a product which uses an indexing system to find text in disk files.

There are three problems with indexing systems. First, they are out of date almost as soon as they are produced. Second, they take up disk space. Third, they take a long while to compile.

The 20 minutes quoted by Martin for *Magellan* to index his disk was almost certainly just for text files. In contrast, for *Fleetfinder* to have taken as long as seven minutes to find a file, the search cannot have been restricted to just word processor documents, but must have included all program and system files as well, which is not a realistic test.

Martin also failed to mention ease of use. *Fleetfinder* is a very simple tool, with no complex bells or whistles. A reminder of the action of each function key is always available, and help windows can also be displayed.

By the way, I wonder if PC PLUS knows something we don't, but we reckon that VAT is currently 15 percent, not 25 percent. *Feetfinder* actually costs £125 plus VAT, which equals £143.75, not £156 as quoted.

John Lewis,
Fleetwood Systems,
Chester.

THE PRICE IS...

I read with interest Steve Patient's review of the Covox speech processing system (PC PLUS 52). As an owner of this product I thought Steve's assessment was fair, including his comments that the system is pricey. It is a case yet again of U.K. importers fleecing consumers, and in the process doing themselves and the computer industry a great disservice.

At current exchange rates, one U.S. dollar equals 52 pence. However, when you compare the price for buying the Covox equipment direct from the States with that charged by the U.K. companies that import the stuff, you find some startling results.

For example, the Voice Master Key 1 has a U.S. price of $149.95, plus $10 shipping. This comes to £82.79, but the price from the U.K. distributor is £189 plus VAT. The Key II package costs £119.37 direct from America, but £249.95 from the U.K. distributor.

I am not advocating that we all get into the business of personal imports, because we have all read about the problems of local support. However I really do believe that it is time U.K. retailers started giving the public a better deal. That way the industry will expand faster, and we will have more reasonably priced goods.

Mr. I. A. Bisson,
Guernsey,
C.I.

There really are two sides to this story. We've repeatedly said in PC PLUS that much computer hardware and software is far too expensive, but this refers mainly to the large-volume items, such as big-selling software packages.

For the low-volume hardware importer, we think things are different (although whether to the extent shown in Mr. Bisson's price comparisons, we're not so sure.) An importer probably doesn't pay the U.S. manufacturer much less per unit than Mr. Bisson did, and on top of that has to add overheads for U.K. storage, stock capital, advertising, support, and even the cost of shipping a couple of units round the U.K. computer press for review, after which they're unlikely to be in a saleable condition. On top of that they're not even guaranteed to sell them all, so must make some provision for unsold stock.

It is possible to buy direct from the States, and this can save money. But if the customer wants other people to do the work of importing the equipment, holding it in stock until you want to purchase it, and then providing you with a guarantee under U.K. consumer law, they've got to be prepared to pay them to do it.

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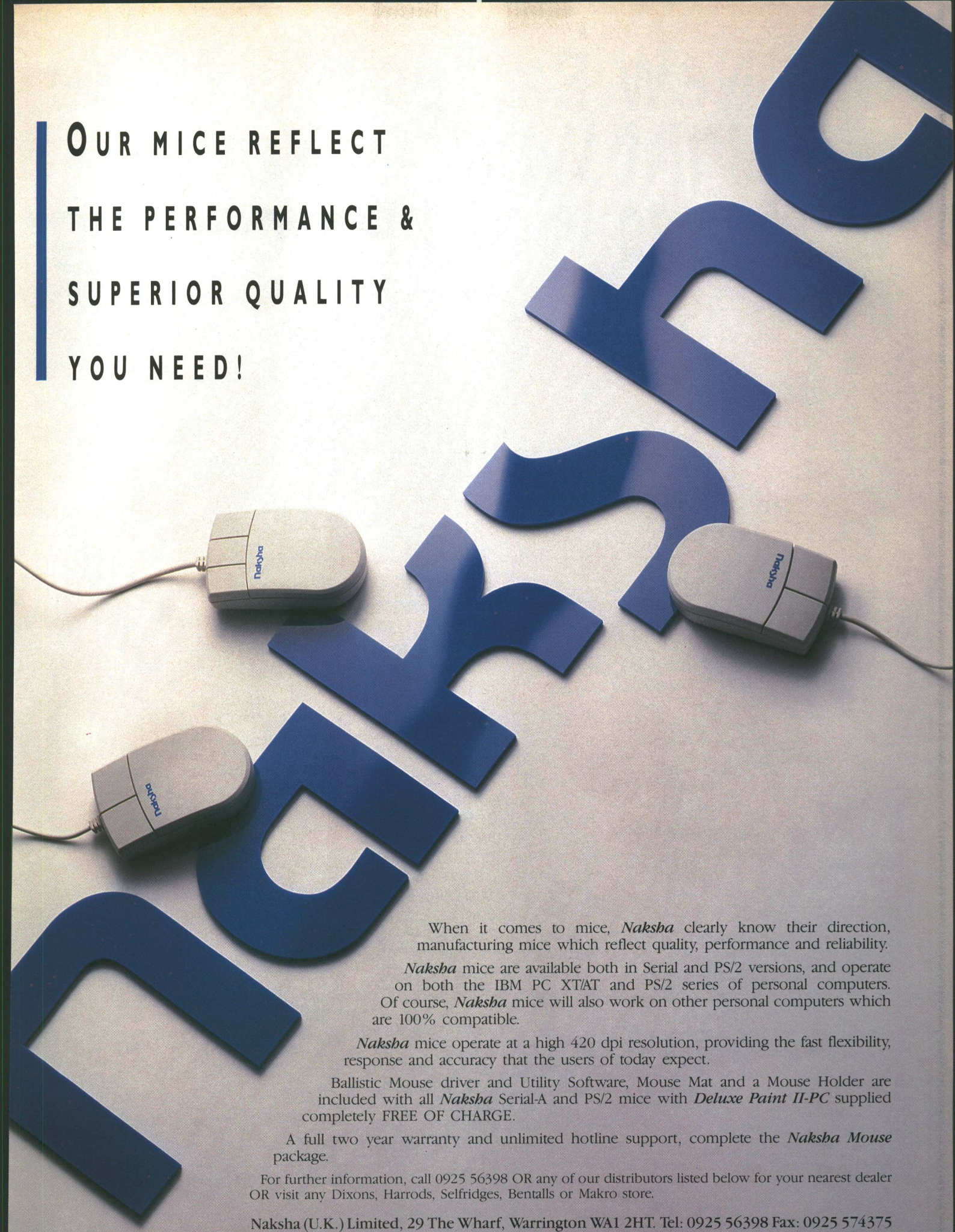

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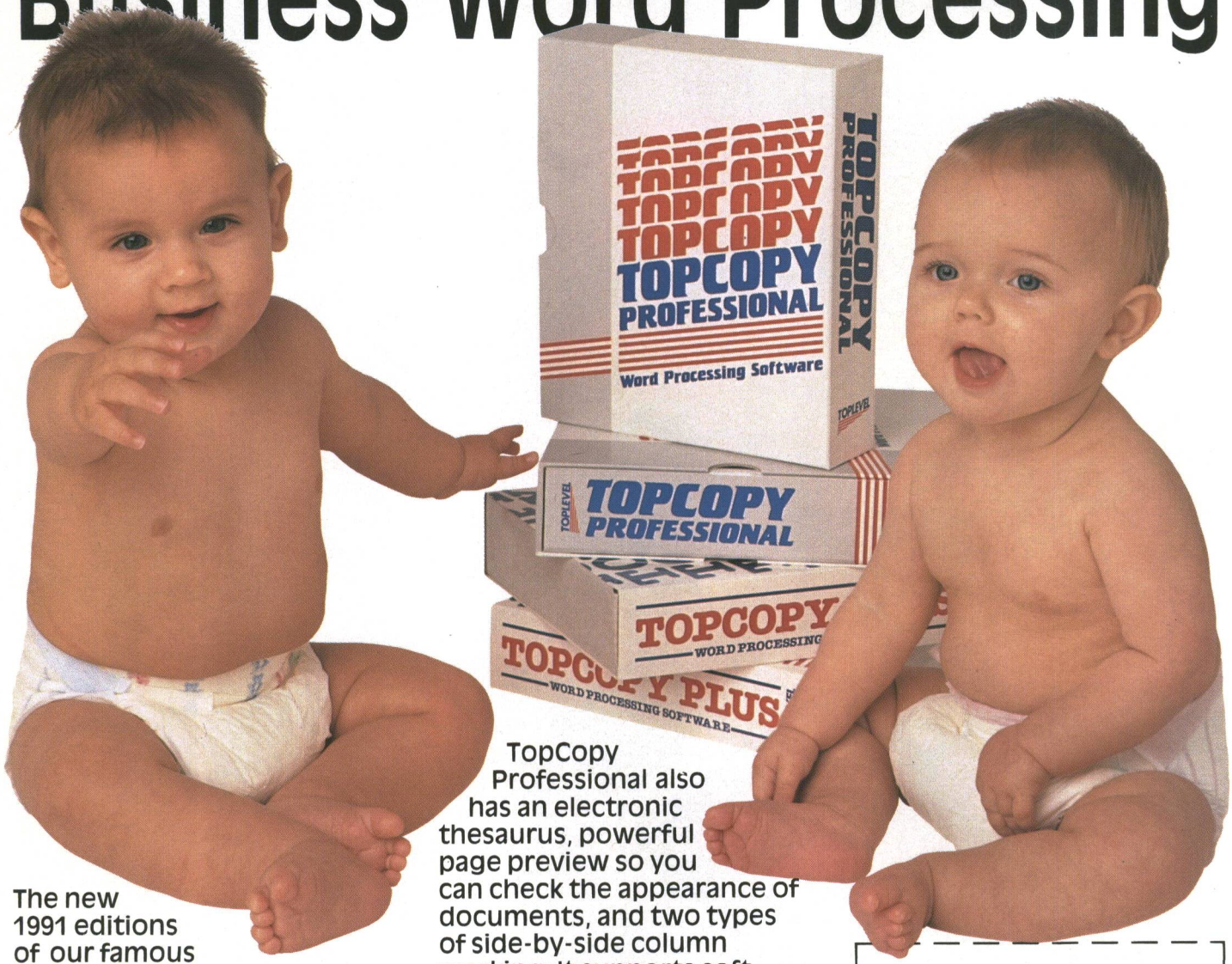

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MARTIN BANKS

I'm not entirely sure that I should say this in polite company, but I feel you're probably adult enough to take it, so I will.

UNIX. There, I've said it now.

It may not seem the most relevant subject for conversation in a magazine like this, but I can't help feeling that it is something we may have to come to terms with as we face the future.

As it stands UNIX is a curse on the face of the happy computerer. It is damnably clever and extremely useful – it can do things like real multi-tasking which make DOS look decidedly puny. However, it's also a fearsomely complex beast, the like of which has been known to make grown men weep.

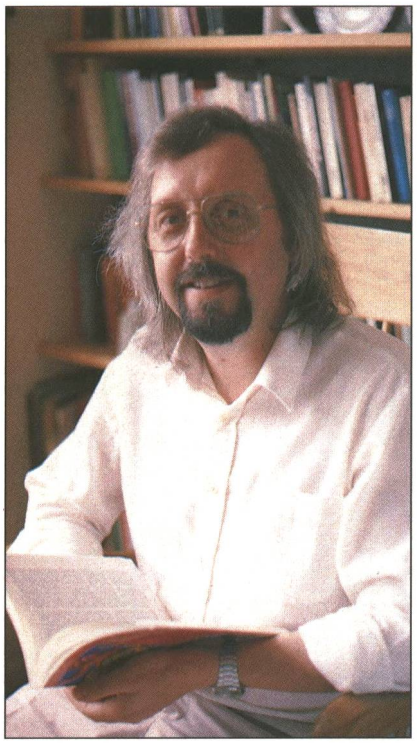
Even installing UNIX on a PC is something only to be undertaken with fear and trepidation. It is worthwhile making friends with a psychotherapist – you will need one. The average PC UNIX system comes on some 30, 1.2 Mbyte floppies and makes demands on the intellect which (without wishing to insult any experienced DOS user) are beyond the experience of most humans.

As well as being long-winded, its installation is also curiously infuriating. For example, you have to tell the operating system what device drivers it should load up when booted, something DOS does not expect. So, load up an application and configure it to work with your printer, and then try it. The result is zilch printout – unless of course you remembered to configure the correct printer device driver in the operating system to begin with.

So, given that UNIX represents the encoded outpourings of some tortured, malicious gargoyle, why bother with it? The answer is to be found in its damned usefulness once you have beaten it.

This usefulness is now starting to find its way down to our level. Not only are there versions of UNIX which happily run on PCs, such as those from Santa Cruz Operation and Interactive Systems, some of the choicer hardware platforms are becoming decidedly affordable.

For example, take Sun Microsystems' SPARC chip set. This drives some of the fastest 'professional' workstations around, yet the lower-end systems of Sun's product range are now cheaper than top-end PCs or Apple Macintoshes. In addition, the chip set itself, which Sun uses in its own workstations, is available as a commodity product to other manufacturers. In other words, Sun is aiming to make the chips a rival for Intel and its 386/486 family of processors.



'Installing UNIX on a PC is something only to be undertaken with fear and trepidation. It is worthwhile making friends with a psychotherapist – you will need one'.

What else? Well, how about the fact that the SPARC chip sets are fast enough to emulate a PC running DOS. Coupled to the fact that it's now possible to load up DOS applications into UNIX and run them, it means that you needn't even know you are running *Flight Simulator* on a different operating system. Sun apparently reckons that, for some applications, its emulation is actually faster than DOS on a 386 PC.

Something else to add here is an 'economies of scale' argument. Most PC users will not have considered they are using a machine with either an ABI or API – an Application Binary Interface and an Application Programming Interface – but it is these which have made the PC what it is. As the processor and operating system are the same regardless of make, the interface of the program to the operating system, and through that to the processor itself, is the same regardless of the make of PC (OK, so some PC clones are a bit eccentric sometimes. In general it holds true). The same rules are only now being applied to UNIX systems – each manufacturer's version has been its own, unique kluge. But with the shift of UNIX to the PC platform, and the rise of the SPARC chip set as a commodity product, ABIs and APIs come into prominence.

It means that software producers can now develop one package and have it run on a wide range of systems, just like in the PC business, making the UNIX market suddenly attractive. Even DOS software companies such as Lotus and Ashton-Tate are moving their DOS products to UNIX for that reason.

What will make the transition even easier is the already broad standardisation between *Windows 3.0* and the 'hot tip' UNIX user interface – Motif. Learn one and you can instantly use the other. As with all good GUIs, motif brings with it that most important of blessings, a mask for the horrors of command line programming, making UNIX useable by just about anyone.

Put these bits together and what do you get? An as yet unrealised potential for UNIX as the base for genuine personal computing. All that is then missing is fast enough hardware at the right price. Yes, fast and big PCs already exist but they are arguably too expensive for what they provide when compared to SPARC-powered systems.

This could be why some PC companies are now developing systems based on the SPARC chip set. Two of the most interesting are direct-mail specialists, CompuAdd, and portables king, Toshiba, so it does not take too much theorising to work out where they may be hoping to take us.

It may be a few years yet before they are everyday high street products, but it will happen. ●

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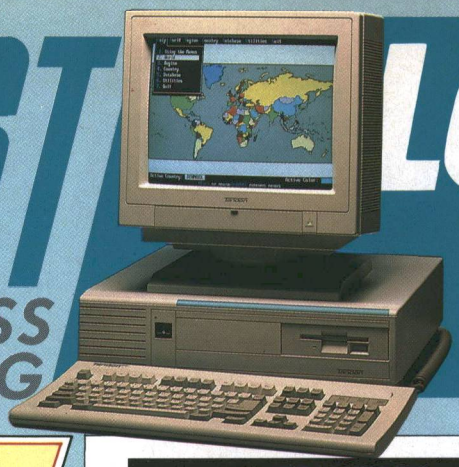

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M1818 18 pin	2.06	2.32	2.75
M1918 18 pin	2.80	3.15	3.73
M1824 24 pin	2.50	2.82	3.34
M1924 24 pin	3.39	3.81	4.52
CANON			
BJ-10E portable	1.91	2.15	2.55
CITIZEN			
120D PLUS	0.75	0.85	1.00
124D 24 pin	1.24	1.40	1.65
SWIFT 24 24 pin	1.58	1.78	2.11
SWIFT 24X 24 pin	2.33	2.62	3.10
EPSON			
LX-400	0.88	0.99	1.17
LX-850	1.25	1.40	1.66
FX-1050	2.74	3.08	3.65
LQ-400 24 pin	1.32	1.49	1.76
LQ-550 24 pin	1.80	2.03	2.40
LQ-850 PLUS 24 pin	2.95	3.31	3.93
LQ-860 24 pin Colour	3.53	3.97	4.71
LQ-1010 24 pin	2.58	2.90	3.44
LQ-1050 PLUS 24 pin	3.87	4.35	5.16
LQ-1060 24 pin Colour	4.52	5.08	6.03
LQ-2550 24 pin Colour	5.35	6.02	7.14
SQ-850 Inkjet	3.43	3.86	4.58
SQ-2550 Inkjet	5.01	5.64	6.69
DFX-5000	7.68	8.70	10.41
DFX-8000	14.46	16.39	19.60
HEWLETT PACKARD			
DESKJET 500 Inkjet * (3 Yrs.)	2.99	3.36	3.98
PAINTJET Inkjet *	4.69	5.28	6.25
IBM			
PROPRINTER III	1.88	2.12	2.51
PROPRINTER IIIXL	2.40	2.70	3.20
PROPRINTER X24E	2.77	3.12	3.69
PROPRINTER XL24E	3.43	3.86	4.58
QUIETWRITER III	4.25	4.78	5.66
QUICKWRITER 5204	5.06	5.69	6.74
EXECJET 4702	4.13	4.64	5.50
NEC			
P20 24 pin	1.47	1.65	1.96
P30 24 pin	1.93	2.18	2.58
P60 24 pin	2.82	3.17	3.76
P70 24 pin	3.60	4.05	4.80
P90 24 pin	5.09	5.72	6.78
PANASONIC			
KXP 1081	0.86	0.97	1.15
KXP 1180	0.94	1.06	1.25
KXP 1695	2.33	2.63	3.11
KXP 1123 24 pin	1.23	1.38	1.63
KXP 1124 24 pin	1.43	1.61	1.91
KXP 1624 24 pin	2.33	2.63	3.11
STAR			
LC10	0.89	1.00	1.18
LC200 colour	1.21	1.36	1.61
LC24-200	1.42	1.60	1.89
LC24-200 colour	1.74	1.95	2.31
LC15	1.82	2.04	2.42
LC24-10	1.23	1.39	1.64
LC24-15	2.31	2.60	3.08
FR10 *	2.06	2.32	2.75
FR15 *	2.72	3.06	3.62
XB24-10 *	2.70	3.04	3.60
XB24-15 *	3.61	4.06	4.81

PLOTTERS

HEWLETT PACKARD			
7440A A4 *	3.17	3.56	4.22
7475A A4/A3 *	4.57	5.14	6.09

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Hewlett Packard cont.	5YR	4YR	3YR
7550A + A4/A3 *	15.47	17.54	20.97
7570A A1/A2 *	13.84	15.68	18.76
ROLAND			
DXY-1100 A4/A3	4.02	4.52	5.36
DXY-1200 A4/A3	5.28	5.94	7.04
DXY-1300 A4/A3	6.64	7.47	8.85
DPX-2500 A2 *	16.54	18.74	22.42
DPX-3500 A1 *	23.60	26.75	31.99
GRX-300 AG A1 *	21.10	23.92	28.60
GRX-400 AG A0 *	28.37	32.15	38.46

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AMSTRAD 1640 Series			
PC1640-SD/MONO *	2.50	2.82	3.34
PC1640-DD/MONO *	2.80	3.15	3.73
PC1640-HD30/MONO *	3.46	3.90	4.62
Extra for EGA COLOUR *	0.52	0.58	0.69
AMSTRAD Series III			
PC3086-SD/MONO *	3.32	3.73	4.42
PC3086-DD/MONO *	3.95	4.44	5.27
PC3086-HD30/MONO *	4.84	5.44	6.45
PC3286-SD/MONO *	4.54	5.11	6.06
PC3286-HD40/MONO *	6.09	6.85	8.12
PC3386SX/MONO *	7.61	8.62	10.31
Extra for COLOUR *	0.63	0.71	0.84
Extra for VGA COLOUR *	1.33	1.50	1.77
COMMODORE			
PC10 III DD/MONO *	2.72	3.07	3.63
PC20 III HD20/MONO *	3.68	4.15	4.91
PC30 III HD20/MONO *	4.87	5.47	6.49
PC40 III HD40/VGA MONO *	6.27	7.05	8.36
Extra for COLOUR	1.03	1.16	1.38
Extra for VGA MONO	0.66	0.75	0.89
Extra for VGA COLOUR	1.77	1.99	2.36
IBM			
PS/1-SD/MONO *	5.09	5.72	6.78
PS/1-HD30/MONO *	6.64	7.47	8.85
Extra for COLOUR	1.48	1.66	1.97
PS/2 30-002 DD/MONO *	4.16	4.69	5.55
PS/2 30-021 HD20/MONO *	5.31	5.97	7.08
PS/2 30-286 HD30/MONO *	7.54	8.54	10.22
PS/2 50-061 HD60/8512 COL *	11.35	12.86	15.38
Extra for 8512 COLOUR	1.03	1.16	1.38
Extra for 8513 COLOUR	1.55	1.74	2.07
Extra for 8515 COLOUR	2.73	3.07	3.64
OLIVETTI			
PCS 86-SD/MONO *	3.50	3.94	4.67
PCS 86-DD/MONO *	4.13	4.64	5.50
PCS 86-HD20/MONO *	5.31	5.97	7.08
PCS 286-DD/MONO *	5.80	6.52	7.73
PCS 286-HD20/MONO *	6.39	7.19	8.52
PCS 286-HD40/MONO *	7.01	7.88	9.34
Extra for VGA COLOUR *	0.96	1.08	1.28
TANDON			
286N/12-40MB MONO *	5.68	6.39	7.57
386SX/16-40MB MONO *	6.86	7.72	9.15
PCA12-40MB MONO *	7.30	8.22	9.74
PCA12-110MB MONO *	8.20	9.30	11.12
SL286-40MB MONO *	6.12	6.89	8.16
SL386SX-40MB MONO *	7.12	8.07	9.66
SL386SX-110MB MONO *	8.41	9.53	11.40
SL486-110MB MONO *	14.19	16.08	19.23
SL486-200MB MONO *	15.92	18.04	21.58
PAC286-1.2MB MONO *	7.16	8.05	9.54
PAC286-1.44MB MONO *	7.08	7.97	9.44
PAC386SX-1.2MB MONO *	8.02	9.09	10.88
PAC386SX-1.44MB MONO *	7.95	9.02	10.78
DATAPAC 30MB	1.22	1.37	1.62
DATAPAC 40MB	1.44	1.62	1.92
386/20-40MB MONO *	11.04	12.51	14.97
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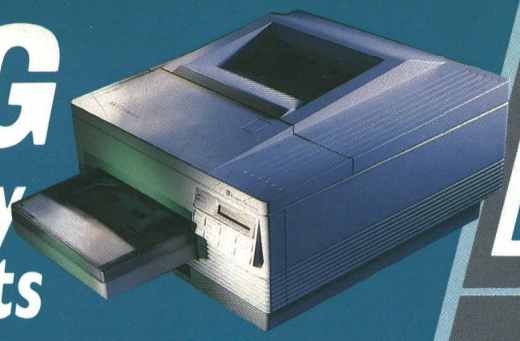

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386/33-300MB MONO *	18.62	21.10	25.24
486/33-110MB 2MB MONO *	29.67	33.62	40.21
486/33-300MB 2MB MONO *	34.10	38.64	46.22
486/33-600MB 2MB MONO *	38.53	43.66	52.23
486/33-110MB 8MB MONO *	34.61	39.22	46.91
486/33-300MB 8MB MONO *	39.39	44.64	53.39
486/33-600MB 8MB MONO *	43.95	49.82	59.58
486/33-1200MB 8MB MONO *	48.43	54.88	65.65
Extra for VGA MONO	0.44	0.50	0.59
Extra for VGA COLOUR	1.33	1.50	1.77
Extra for NEC 2A SUPER VGA	2.07	2.33	2.76

PORTABLE P.C.'s

AMSTRAD			
ALT 286	8.92	10.11	12.10
ALT 386-SX	11.21	12.70	15.19
SHARP			
4641, 40MB	7.01	7.88	9.34
4702, DD *	5.09	5.72	6.78
4721, 20MB *	7.54	8.54	10.22
4741, 40MB *	8.51	9.64	11.53
6220, 286-20MB NOTEBOOK *	12.11	13.72	16.41
5541, 286-40MB	10.86	12.31	14.72
5741, 386SX-40MB *	16.82	19.06	22.80
8041-386 40Mb VGA Colour *	32.88	37.26	44.57
8081-386 80Mb VGA Colour *	38.83	44.01	52.64
TANDON			
LT/286 12Mhz 20Mb	8.85	10.04	12.00
LT/386SX 16MHz 40Mb	10.79	12.23	14.63
TOSHIBA			
T-1000SE	5.24	5.89	6.98
T-1000LE-20MB	7.16	8.05	9.54
T-1000XE-20MB	6.20	6.97	8.26
T-1200-20MB	7.19	8.15	9.75
T-1200XE-286/20MB	8.92	10.11	12.10
T-1600-40 286/40MB	12.45	14.12	16.88
T-2000SX-20 386SX/20MB	15.09	17.10	20.45
T-2000SX-40 386SX/40MB	16.47	18.67	22.33
T-3100E-20 286/20MB	8.92	10.11	12.10
T-3100E-40 286/40MB	10.72	12.15	14.54
T-3100SX-40 386SX/40MB	15.57	17.65	21.11
T-3100SX-80 386SX/80MB	17.16	19.45	23.26
T-3200-40 286/40MB	11.55	13.10	15.66
T-3200SX-40 386SX/40MB	15.99	18.12	21.67
T-3200SX-120 386SX/120MB	18.69	21.18	25.33
T-5200-100 386/100MB	22.22	25.18	30.12
T-5200-200 386/200MB	25.33	28.71	34.34
T-5200C-200MB COLOUR	29.90	33.89	40.53
ZENITH			
SUPERSPORT-286E 20MB	10.93	12.39	14.82
SLIMSPORT-286E 20MB	12.45	14.12	16.88
SUPERSPORT-286E 40MB	13.29	15.06	18.01
SUPERSPORT-386SX 40MB	16.12	18.27	21.86
SUPERSPORT-386SX 120MB	20.90	23.69	28.33

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CANON LBP-8 III 8ppm *	8.37	9.49	11.35
EPSON EPL-7100 6ppm *	5.50	6.19	7.34
HP LASERJET IIP 4ppm *	5.01	5.64	6.69
HP LASERJET III 8ppm *	7.61	8.62	10.31
HP LASERJET IIID 8ppm *	11.49	13.02	15.57
IBM 4019E 5ppm	5.87	6.60	7.83
KYOCERA F800T 8ppm	7.16	8.05	9.54
KYOCERA F800 8ppm	7.38	8.30	9.84

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KYOCERA F1000 10ppm	10.25	11.61	13.89
KYOCERA F1200S 10ppm	11.77	13.34	15.95
KYOCERA F1800 18ppm	15.58	17.65	21.12
KYOCERA F2200S 10ppm	16.41	18.60	22.24
KYOCERA F3300 dual bin 18ppm	20.77	23.54	28.15
KYOCERA P2000 P/S 10ppm	20.15	22.83	27.31
NEC Silentwriter 2 S60 6ppm *	6.20	6.97	8.26
NEC Silentwriter 2 S60P 6ppm *	8.92	10.11	12.10
OKI Full range available			
PANASONIC KXP-4420 8ppm *	5.24	5.89	6.98
PANASONIC KXP-4450i 11ppm *	7.61	8.62	10.31
PANASONIC KXP-4455ps 11ppm*	12.25	13.89	16.61
QMS Full range available			
QUME Crystal print Super S2	7.40	8.39	10.03
QUME Publisher II Postscript	13.56	15.37	18.38
STAR LP8-II 8ppm *	7.61	8.62	10.31
STAR LP8-II Starscript P/s 8ppm *	8.85	10.04	12.00

SOFTWARE

ACCOUNTING			
SAGE STERLING			
CASH TRADER	0.61	0.68	0.81
BOOK KEEPER	0.50	0.56	0.67
JOB COSTING	0.92	1.03	1.22
PAYROLL II	0.92	1.03	1.22
ACCOUNTANT	1.37	1.54	1.82
ACCOUNTANT PLUS	1.96	2.20	2.61
FINANCIAL CONTROLLER	2.60	2.92	3.47
WORD PROCESSORS			
DISPLAYWRITE 5	1.84	2.07	2.45
LETTERPERFECT	0.98	1.10	1.31
LOCOSCRIPT PC	0.75	0.85	1.00
MANUSCRIPT	1.85	2.08	2.46
MULTIMATE 4	1.92	2.16	2.56
SPRINT	0.92	1.04	1.23
TOP COPY PRO	0.83	0.93	1.10
WORD 5	1.65	1.85	2.20
WORD FOR WINDOWS	1.90	2.14	2.53
WORDPERFECT V5.1	1.76	1.98	2.34
WORDSTAR PRO V6	1.37	1.54	1.82
WORDSTAR 2000PLUS R3	1.54	1.74	2.06
SPREADSHEETS			
EXCEL 3	1.68	1.89	2.24
LOTUS 123 V2.2	1.76	1.99	2.35
LOTUS 123 V3.1	2.21	2.48	2.94
QUATTRO PRO	1.68	1.89	2.24
SUPERCALC 5 Rev D	0.66	0.74	0.88
DATABASES			
AGENDA	1.45	1.63	1.93
CARDBOX PLUS	1.47	1.65	1.96
CLIPPER V5	2.28	2.57	3.04
DATAEASE V4.2	2.92	3.28	3.89
DBASE IV V1.1	2.46	2.77	3.28
PARADOX III	2.46	2.77	3.28
INTEGRATED PACKAGES			
FRAMEWORK III	2.31	2.60	3.08
LOTUS WORKS	0.88	0.99	1.17
SMARTWARE II	3.06	3.45	4.09
SYMPHONY V2.2	2.69	3.02	3.58
MICROSOFT WORKS V2	0.71	0.80	0.95
DTP/GRAPHICS/CAD			
AUTODESK ANIMATOR	1.47	1.65	1.96
COREL DRAW V2	1.80	2.03	2.40
DRAW PERFECT	1.89	2.13	2.52
DESKPRESS	1.31	1.47	1.74
FREELANCE PLUS V3.01	1.78	2.00	2.37
GRAPH WRITER II	1.78	2.00	2.37
HARVARD GRAPHICS V2.3	1.79	2.02	2.39
PAGEMAKER V3.1	2.85	3.21	3.80
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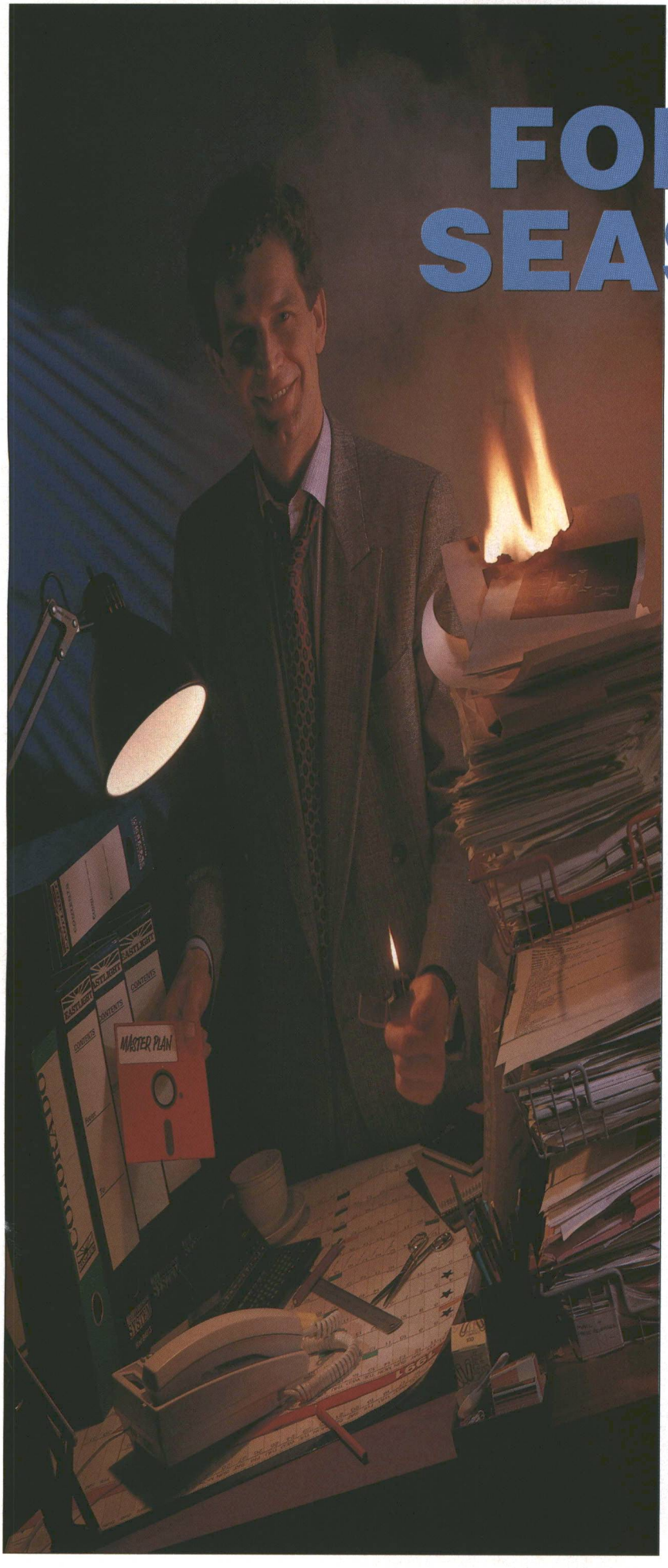


PLAN FOR ALL SEASONS

The ability to represent a plan of action graphically can be extremely useful. Steve Patient looks to the future with three project planning packages.

The overall problem for a project manager is to ensure that the right people are in the right place with the right materials doing the right job at the right time. Similar management disciplines are needed across a broad range of disciplines, from microchip design to undersea tunnelling. Project management software is simply a management tool intended to automate the planning processes normally carried out by hand.

Current project management disciplines originated in ship building industries in World War 1. Henry Laurence Gant invented a system he called Bar Charts (but which bears his name, Gants). His deceptively simple idea was to put a time scale across the top of a sheet of paper and all the tasks involved in the project down the left hand side. Each task has a start date and a finish date marked as an horizontal bar. The chart gives a good visual indication of when tasks start and finish and which run concurrently.

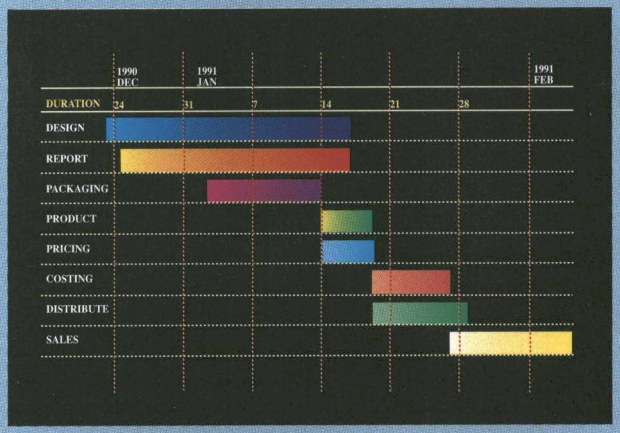
The Gant chart is less useful with extremely complex projects involving multiple dependencies. In the 1950s Lockheed developed an alternative system to help it design and build the Polaris missile system. It called this system PERT, for Program Evaluation Review Technique. Here each task is

BLUEPRINT FOR SUCCESS

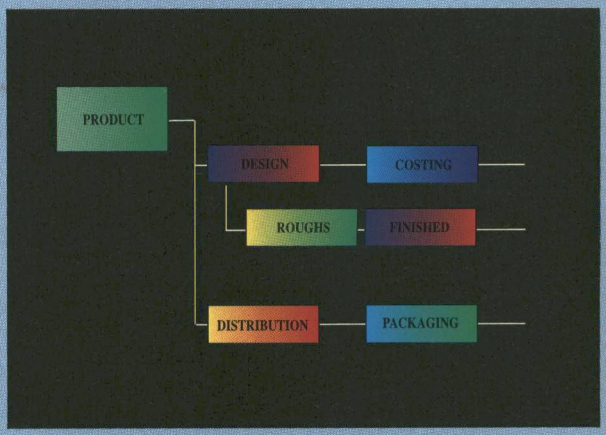
In a properly drawn up Gant chart the bars begin at the top left of the sheet and form a rough diagonal to the lower right – making a clear visual statement on the anticipated progress of the project. Some tasks must start only after another task finishes. For example, you can't lay a ship's keel until the design drawings are produced – this is called a Finish to Start dependency. Other tasks might overlap. Plumbing could be installed while decks are laid. This is a Partial Dependency, whereby a task can start as soon as another is sufficiently advanced. In contrast, some tasks need a gap – called Lag Time – between them. For example, you can't lay carpet around wet paint, time must be allowed for drying.

A Gant chart requires experience to draw up, but once drawn it forms the basis for costings, contracts and day to day management. A hand drawn Gant chart is still the commonest management aid on building projects in the UK. It works well where there is a clear sequence of events. The Gant chart is less useful with extremely complex projects involving multiple dependencies. Here the PERT chart comes into play. Instead of the simple bars of the Gant chart, Program Evaluation Review Technique (PERT) charts adopt a net as their basis. Every task is represented as a box connected to other boxes. The advantage of this arrangement is that following the lines from the left side of a box shows which tasks must be performed before that task can begin. Similarly, going the other way shows which tasks are dependent on the current task.

A project involving perhaps thousands of individual, interdependent tasks – like major application software design – is much better suited to PERT – but it can usefully be applied to smaller projects too. PERT incorporates another idea developed slightly earlier – that of the CPM or Critical Path Method. This isolates those tasks which are critical to the project completing on time from those that can slip or are merely ancillary. Fitting the engines in a ship is obviously critical, whereas lack of laundry facilities won't hold up the launch date. CPM enables a manager to calculate the minimum time scale of a project by highlighting the critical tasks.



● The deceptively simple Gant chart forms the basis to much project planning



● PERT charts takes over from Gants when projects become very complex

represented by a box linked to other boxes. Thus the relationships and dependencies of any given task to any other tasks can be seen at once (see *Blueprint For Success).*

RESOURCE ALLOCATION

Tasks must have resources allocated in order to expedite them. A resource is thus any finite commodity that is required to complete a task: money, men, hours, machines or raw materials. Project management software helps in the allocation of these resources.

Automatic Resource Levelling (ARL) ensures that a project will be completed with available resources. It takes information about the resources, about whether a task can be delayed and by how much (called its Float) and calculates how best to allocate resources to complete the project – this may involve splitting tasks, doing part now and part later, or increasing a resource. Sometimes the only way to complete the project with the available resources is to push back the completion date. ARL enables a manager to examine the options, facilitating a sensible decision.

Resources have costs associated with them, whether they're human, machine or raw materials. Some costs are fixed, others are variable. A project schedule is either resource driven (resource critical) or duration driven (time critical) – the trade off is between resources and time. Project management software allows 'what if' calculations. State a resource level or cost and see how that affects the time required to finish the project or state a time and see how much extra resource is required to meet the target date. In practice these two methods are often combined to produce an acceptable compromise.

BREAKDOWN

Whether PERT or Gant charts are used, breaking a large project down into sub projects makes it easier to run. Inevitably though, generating and tracking the paper work becomes a major project in itself. This is one of the areas in which project management software helps. Good project management software will produce costings based on commitment of resources, periodic reports based on the current state of the project, charts showing the differences between the current state of the project and the original planning, updated schedules, resource allocations and so on.

Entering the data on a project is usually done via task forms – though scheduling forms are also popular. Software should offer a variety of entry methods. It should also update the whole project when information changes.

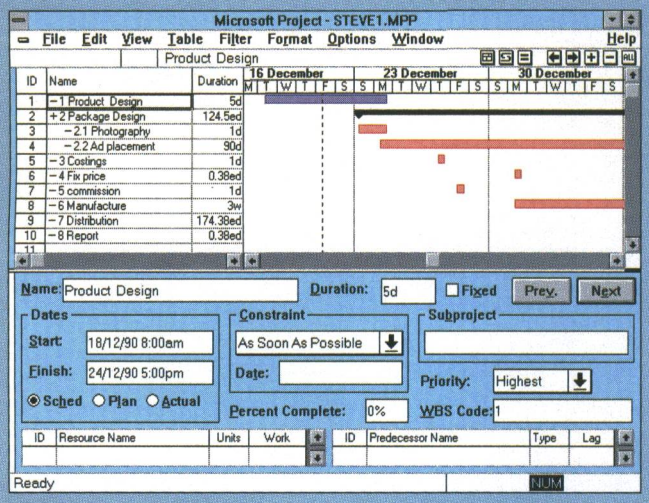
Different tasks require different calendars. Machines will work 24 hours per day, every day, while day workers will need Bank Holidays off as well as weekends. Materials will only be delivered during normal working hours but security guards work nights seven days a week. This kind of information may not seem very interesting, but in fact it can be very important in order to schedule staff rotas as flexibly and efficiently as possible.

CHARTING SUCCESS

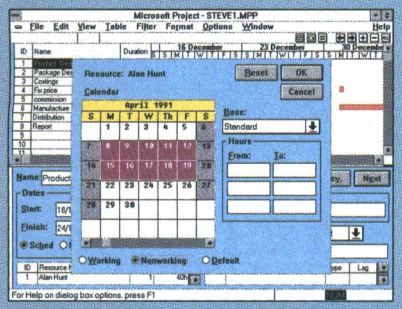
One area where project management software differs from the paper-based kind is in the provision of Work Breakdown Structures (WBS), sometimes called Outlines. These combine elements of both Gant and PERT charts. A WBS turns your project into a hierarchical chart, with the overall goals first, sub-tasks and sub-sub-tasks (and so on) indented below them. This is designed to show task dependencies at a glance. An outline also provides a fast way to enter the main tasks of a project, should this be necessary.

To see how much easier project management software makes the project manager's job we looked at three representative project management packages in detail. Microsoft's new

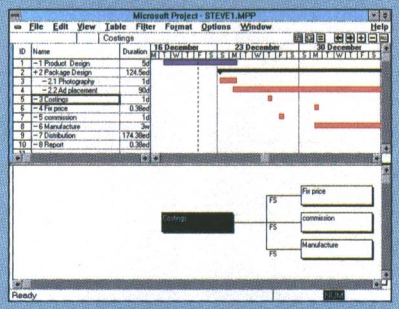
PROJECT FOR WINDOWS



● The default view in *Project for Windows* depicts a combined Task Entry Schedule and Gant chart with a Task Entry form at the base of the screen.



● In *Project for Windows* every resource has an associated calendar – each of which can be unique. This one is having holiday days added



● A variety of alternative views are available via the menus – or customise your own. This one shows a Task PERT at the bottom



Project for Windows, Harvard's *Project Manager 3.0* and *Micro Planner* from Micro Planning International.

PROJECT FOR WINDOWS

● Microsoft

Project for Windows is a *Windows 3*-based product. Installation takes just a few minutes and then you can start planning. However, the interactive tutorial is good and well worth investigating – it doesn't replace the manual for the tricky stuff but it will get you up and running. The manual is up to Microsoft's usual high standards though it's laid out as an alphabetic reference, a trend started by *Word for Windows*. A knowledge of the subject helps in finding what you need, especially with the more arcane aspects of project management. The on-line help is excellent but it's usually faster to go to the manual.

When you start *Project for Windows* the project work area is divided in half horizontally, with a combined view of a Gant chart and a Task Entry schedule at the top and a detailed task entry form at the bottom. These two windows are easily replaced by alternative views from the View menu, including a PERT chart, various resource views and alternative task views, including a Task PERT, showing task dependencies. Setting up alternative or adding customised views as the default, is straightforward. You can open as many projects as you wish and switch between them.

The fastest way to set up a new project in *Project for Windows* is with an Outline. Since you can't promote or demote tasks that have resources or dependencies assigned to them the beginning of a project is the only time an outline can easily be altered. It's best to regard outlining as a prototyping tool.

Durations of tasks are all taken from the default date – which is always the current date (though the timescale ranges from minutes to years). Once you've entered the required tasks – in the correct order – and their durations, the simplest way to generate a useful Gant chart is to select groups of tasks and assign Finish to Start dependencies to the whole group – instant Gant charts result. Precise task relationships, resources, float times, lead and lag times (how long before or after another task the current task can start) and so on are edited into the task afterwards.

Editing tasks is easy in both Gant and PERT views. In the PERT boxes the figures are edited by invoking a Task Form (just double click on the box). In the Gant chart it's more exciting. You can use forms or the mouse. Task times and durations are altered by dragging the bars on the Gant chart. Start and finish times on the associated forms are automatically updated to reflect the changes. At times it's like a game as the numbers whizz around trying to keep up with the changes on the chart.

SORTING IT ALL OUT

Re-ordering tasks is straightforward. Selecting, cutting and pasting tasks makes moving them around singly or in groups simple. *Project for Windows* automatically renumbers the tasks. If you want to view the tasks in a different order they can be sorted on up to three key fields (for example, Start Date and Duration). However, subordinate tasks (or summary tasks) in Outlines won't appear with their previous associates in the re-ordered list, so keep them hidden (collapsed) to avoid confusion. Also, altering the ordered list makes it necessary to sort it again.

Entering resources is best done in one go on the Resource Chart, but the Task Forms are used to add resources at any time. *Project for Windows* prompts to find out whether it should add the new resource to the Resource List. Once on the list resources are allocated to a task using mouse clicks and the form is automatically updated. One of the nice features of *Project for Windows* is just



how much of the form filling it does in this way.

Projects and sub-projects can share the same set of resources, with *Project for Windows* keeping track of assignments. Linking projects and sub-projects enables managers to concern themselves only with their specific level of responsibility.

For many projects a Gant chart, with those responsible for a task entered as a resource, is enough, but when it isn't *Project for Windows* has all the features that a full time project manager needs. For example, examining selected aspects of a large project makes them easier to work with. *Project for Windows* enables the user to decide the criteria for task selection. These might be tasks that begin on a specific day, tasks that have gone over budget or tasks that involve a specific sub-contractor. The ability to quickly set up an *ad hoc* filter for these criteria can turn a crisis situation into a controlled one.

Project for Windows includes Automatic Resource Levelling, designed to ensure the project gets completed. It will add time to the Delay field in the task description, and the way in which it chooses to delay tasks is set using criteria like task priority and whether or not overall project delay is acceptable. While it doesn't directly support Time Critical analysis it does report on over-allocated resources, giving you the chance to add more. Once chosen, the resource levelling criteria are added to the WIN.INI (Windows Initialisation) file so that the program starts up next time knowing your preferences.

Once a project is entered, some kind of printout is required. *Project for Windows* will print any screen view apart from Task Forms, Resource Forms and Task PERT charts. Printouts are exactly as they appear on screen except that colours are replaced with shading on Gant chart bars output to non-colour printers. There is an option to add legends (titles), headers and footers to printouts as well as to alter fonts. Printouts available from the File menu are those for which screen views don't exist, like Periodic Task Summaries. Printout is attractive, but since it's always done in graphics mode it's a touch slow. Nevertheless, *Project For Windows* is a formidable entry into the project planners market.

MICRO PLANNER

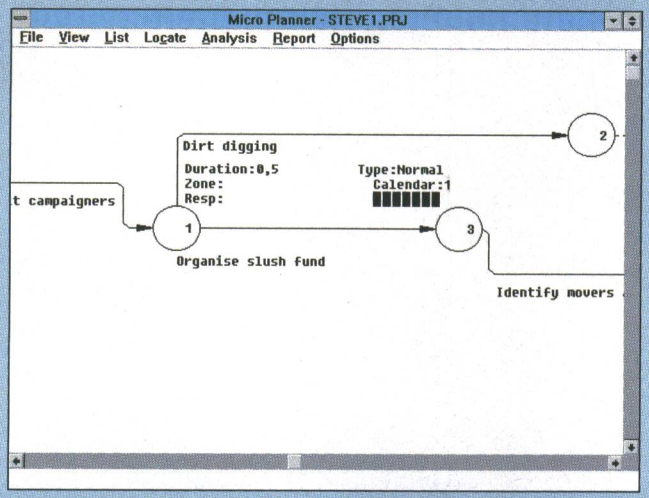
● Micro Planning International

This is a *Windows*-based project manager, though the contrast between it and *Project for Windows* couldn't be greater. *Micro Planner* opens on to one of the most mysterious screens you're ever likely to see. There is nothing there but a small circle numbered '1' with five cryptic words above it – this is disconcerting and extremely user-hostile for a *Windows* program, though ultimately one should not be put off.

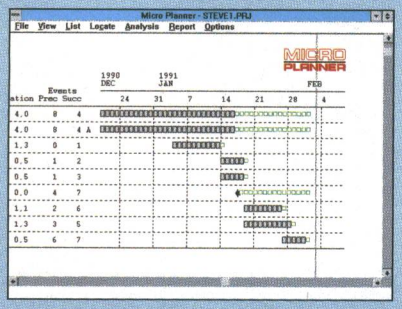
Unlike most project planners, which tend to assume you will work with scheduling lists and Gant charts, *Micro Planner* assumes you want to work with a network – in fact it insists on it. What you see on the opening screen is a project with a single Event and no Activities. In fact, it has to be said, events and activities are fundamental to the way *Micro Planner* works.

The term activities can include just about anything you can do with the program. For example, fixing windows, writing a manual or suborning a local planning officer are all relevant activities. They are what project planners usually call tasks. An event is simply the point at which an activity starts or finishes. This paradigm – or model – is thus not quite a PERT chart, since it's the lines connecting the events that have all the interesting properties. Indeed, *Micro Planner* throws out most traditional project planning jargon in favour of its own. There is no mention of either Gant or PERT in the manual or the

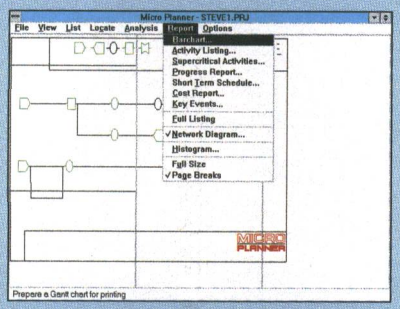
MICRO PLANNER



● An activity in *Micro Planner* is shown by the line connecting two events. Activities that precede and follow the one centred are also displayed.



● Part of an activity report as previewed in *Micro Planner*. Oddly, the default printed output of the program is a Gant-style chart



● Like the other project planners *Micro Planner* supports a variety of reports and printouts – the one on screen is an overview of the net

program – though it does hang on to the Critical Path.

DATA ENTRY

There is no way to enter project data as a list of activities. An activity is created by clicking on an event and dragging, forming a second event with a connecting line. The activity is then selected and its data entered. This, at least, is familiar ground. The most important information to be entered is Duration. This must be in weeks and days (to a project maximum of 2,144 days). You can also enter a task description and the earliest and latest start and finish dates. For Finish to Start activities that's straightforward, but leads and lags are more involved.

Leads and lags involve what *Micro Planner* calls Dummy activities. Each of these dummy activities carries the information concerning the time overlap. There are other dummies as well that are needed to solve logic problems in *Micro Planner*, as for instance when some, but not all, of the activities meeting at an event are necessary for subsequent activities – it gets confusing fast.

All activities have Types. Overlapping activities are of type Ladder, for example. Hammock types are used to span a number of other activities – several spanning a whole project will provide the basis for a top level report shorn of detail. Incorrect types can cause *Micro Planner* to incorrectly analyse a project or fail to analyse it at all.

Events also have types, though the only really critical ones are Begin and End. Several Beginnings and Endings will co-exist happily in one project; indeed, totally unrelated sets of events and activities can co-exist in one project, all sharing the same set of resources. In fact this seems to be the only way to include sub-projects.

Events have Zones and Responsibilities attached. These are just convenience labels. *Micro Planner* treats a Zone as equivalent to a summary task, one that includes lots of others. Responsibility is a sub-task, though it could just as easily be the name of a person. You don't have to use them at all. An Event also has an optional name.

Micro Planner supports six calendars. Any resource can have any calendar assigned to it. Again, *Micro Planner* treats resources in an unusual manner. They have names, quantities and a value. The value is either per day or total and is simply a number. There's no provision for stating how many hours per day the resource is available, or what hours, nor whether it costs different amounts at different hours. *Micro Planner* does maintain a running total of resource costs. Once defined, resources are assigned to tasks manually or by clicking on them, up to a maximum of 20 per task.

Manipulating project data in *Micro Planner* is fiddly. To edit an event you select it, which centres it on screen with all its associated logical connections radiating out from it – but you can never see more than a few of these events and activities at one time. *Micro Planner* claims this to be a feature but a zoom facility would have been a much better one. Double clicking the selected activity enables editing.

To edit an activity a similar process occurs, except that all you then see is the centred activity and its two associated events. It's all too easy to forget what you're doing, especially if what you're doing is moving the activity – best to write down the events you wish to connect it to when you first see them.

There are other views, including a bar chart (not a Gant chart, note). This is unattractive and confusing – worse, it can't be edited directly. There are also various reports available. All reports appear on screen before printing. Oddly, going via the report option is the only way to gain a zoom view of a complete net – though, again, this can't be edited.

REPORTING

Once a project is entered *Micro Planner* will provide all the reports you would expect, project summaries, resource analyses and so on. In a rather extraordinary turn about, *Micro Planner* likes to print out a rather elegant bar chart as the master plan for a project – which makes you wonder why it won't let you enter data in a similar manner. The net printout is slightly less attractive, and not very easy to read. No attempt is made to avoid a web of criss-crossing lines. As with the other packages reviewed, large charts are usually printed as tiles on A4 sheets though (as with the other two packages) it will drive a plotter.

There's no doubt that *Micro Planner* is an idiosyncratic implementation; for example, every project must start on a monday, but it does have a good degree of internal consistency. However, the emphasis on logical connections tends to obscure the time element completely – which outside the world of software development is often the most critical element. On the other hand, the way it's implemented doesn't do a lot to highlight logical dependencies either. The *Micro Planner* ring-bound manual is a big plus in understanding and using the product; it's excellent, well written and well laid out – in fact you couldn't use the software without it.

A useful extra is that if you are



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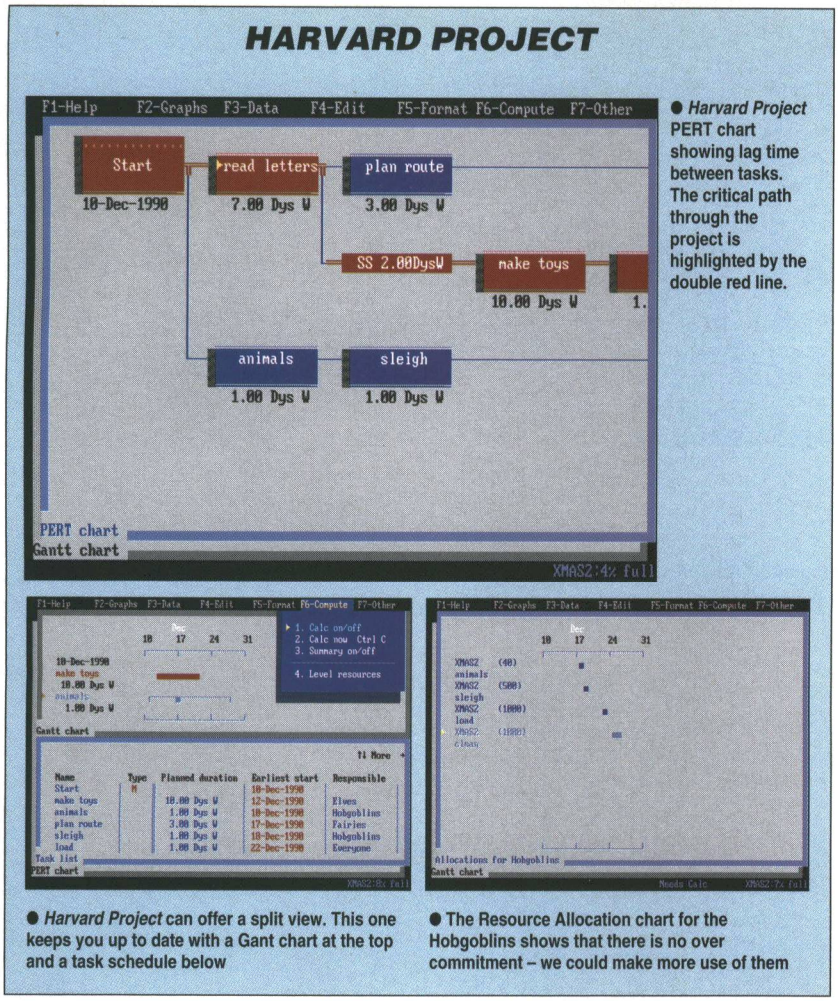

● *Harvard Project* PERT chart showing lag time between tasks. The critical path through the project is highlighted by the double red line.

● *Harvard Project* can offer a split view. This one keeps you up to date with a Gant chart at the top and a task schedule below

● The Resource Allocation chart for the Hobgoblins shows that there is no over commitment – we could make more use of them

working in a multi-machine office PC *Micro Planner* is file compatible with the Macintosh version.

HARVARD PROJECT
● SPC Software Publishing

Harvard Project is a text-based planner – and none the worse for that. It will operate in 25-line or 43-line modes (on EGA or VGA monitors), with the 43-line mode surprisingly easy to work with.

Project creation is carried out in a variety of ways, though the fastest (and the default method) is via the Quicktrack screen. This is comparable to the way *Project for Windows* works in Outline mode. Quicktrack is simple and intuitive to use and, unlike *Project for Windows*'s Outline, automatically creates dependencies as you enter tasks. Tasks that have a Finish to Start dependency go on one line, a new line starts tasks that have some other relationship (entered later using the Link option).

The menus are accessed using the Function keys – there's no mouse support in *Harvard Project* – though most of the commonly used options have Quickkey (sic) alternatives. There are few enough of these that an hour or so of use suffices to learn them.

Harvard Project comes with an interactive tutorial every bit as good as that in *Project for Windows*. It stops short of trying to explain the more advanced features and makes little attempt to show how to move from one part of the program to another. However, working through it – which takes about an hour – makes entering that first project considerably less fraught.

With the basic project tasks entered and their relationships established, it's time to allocate resources to them. Resources are best entered wholesale, using the Resource List screen. Each gets a name, a quantity, a cost (with separate provision for overtime payments), daily availability and, if required, its own calendar (the default is to share the project calendar). One problem is that *Harvard Project* doesn't regard materials as an expendable resource, unlike *Micro Planner*, which makes material provision renewable.

Resources are allocated to tasks via a resource allocation form. Unfortunately, there's no way to select resources from the list of those available – they have to be typed in. This is awkward, since the list isn't visible when you do this. A partial solution is to split the screen. Like *Project for Windows, Harvard Project* supports a horizontal split-screen showing two different views of the project. So you can have your resource list and your task list visible simultaneously. That way, when you invoke the resource allocation form you only have to remember the name and spelling for a second or two. If a resource isn't known it asks if you'd like to add it to the resource list.

Harvard Project is day-oriented, and though it supports timescales from minutes to years it assumes that tasks start on a particular date. It's awkward to make meaningful Gant charts for very short projects.

TASK MASTER

Harvard Project makes it simple to assign relationships between tasks, which is good since it insists that all tasks are related. It can't perform calculations while there are unrelated tasks in the project (the error message is terse – 'Incomplete'). It automatically inserts a Start and Finish task (these are Milestone tasks, with no duration and no resources), and regards a project missing either of them as incomplete.

Harvard Project is good at pointing out over-commitment of resources (though it allows it), and equally good at sorting them out using Resource Levelling. Once this is carried out, tasks that *Harvard Project* has delayed are marked, and you are given the opportunity to return to the original project state. It's surprising how often that's exactly what you want to do – regardless of which package is used.

THE SUB-PLOT

Harvard Project makes sub-projects, easy to create. A section of an existing project is specified as a sub-project and simply drops out of view, best done from the PERT chart. A single box remains with the name of the sub-project. It is edited in exactly the same way as the main one, continuing to share its resources, and can be incorporated back into the main project view at any time.

The Critical Path is always shown in both Gant and PERT views of the project. But there are other useful ways of looking at it. For example, *Harvard Project* has a WSB (Work Structure Breakdown) view called Outline that shows task dependencies with indents. Despite being text-based it also shows three zoom levels on the PERT chart, extremely useful for a project overview.

With the project complete it's time for the paperwork. *Harvard Project* will produce so many types of report that it has a batch mode. Simply specify which reports you want and go for a meal – *Harvard Project* will spend the time you spend tucking in churning them out. These reports are customised using templates – which specify headers and footers, vertical or sideways printing, and draft or quality (where applicable).

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a disk file rather than to a printer if required. This is useful if the aim is to incorporate information into a larger document produced with a word processor or desktop publishing package. It's also possible to import and export data in *Lotus 1-2-3 2.0* format, *dBASE III* format and as ASCII (which most software copes with).

CONCLUSIONS

Project for Windows and *Harvard Project* are very similar in the way they work, and in their accessibility. *Project for Windows* has the edge on both features and ease of use, though it's fair to ask just how many of them the user will ever employ. The price you pay for those features is the need for a powerful machine. *Project for Windows* is unusable on a 1 Mbyte machine. *Micro Planner* works well in real mode under *Windows 3* or *Windows 286* while *Harvard Project* is quite happy on an XT – and works as well as or better than, *Project for Windows* for most tasks. However, all three need a hard disk.

Micro Planner's idiosyncratic approach makes it awkward to use for anyone familiar with traditional project planning disciplines. Moreover, anyone familiar with it would find it strange to change to a more traditional package. None of this would matter if it did the job better than traditional methods, but it doesn't, it just does it differently. ●

PROJECT PLANNERS – THE COMPETITION

There are a number of project planning packages on the market. Packages tend to overlap with job costing software. Some are industry specific. Be warned that very high prices are often charged for specialist and/or multi-user project planners.

HORNET PROJECT MANAGEMENT

● Claremont Controls (0669) 21081 ● £1,006

This package is critical path oriented. Each project can include up to 255 sub-projects. Scheduling can be time or resource critical.

INSTAPLAN

● Deepak Sareen Associates 081-908 2423 ● £114

A basic project manager that supports the production of Gant and PERT charts, schedules and costings. It's big brother *Instaplan 5000* uses up to 8 Mbytes of memory for large projects and includes resource levelling.

POWERPROJECT

● Asta Development Corporation (8444) 261700 ● £914

This package presents a graphics-based system that uses a mouse for task entry and linking. It supports sub-projects. Output is to printers or plotters.

PRESTIGE

● Zentech International (0252) 376388 ● £3,450 single user

A project management system that integrates into a number of relational databases. These include Oracle and Ingres. Multiple projects are supported.

QUICKPLAN II

● Mitchell Management Systems (0753) 859252 ● £339

This project planner is menu driven for ease of use. It uses networks for projects each of which can have up to 400 tasks.

TIME LINE

● Symantec (UK) (0628) 776343 ● £604

Time line is an easy to use graphics-based project management package. It allocates resources to tasks on a percentage of total basis. An add-in module, *Time Line Graphics*, is required for presentation graphics.

PC PLUS PRODUCT FACTS

	Project for Windows	*Micro Planner*	*Harvard Project*
Supplier	Microsoft	Micro Planner International	SPC Software Publishing
Price	£569	£454	£799
Contact	(0734) 500741	(0272) 509417	(0344) 867100
Interface	*Windows 3*	*Windows 286/3*	Text
Tasks	2,000	1,364	350
Total Resources	40,000	26	2000
Resources Per task	20	20	200
Calendars	one per resource	6	one per resource
Task links	20	1,363	349
Timescale	minutes/years	days/weeks	minutes/years
Resource level	yes	yes	yes
Variance tracking	yes	yes	yes
Issue disks	or	or	
Display type	H C E V	H C E V	T
Min hardware	HD	HD	
Optional hardware	plotter	plotter	plotter
Speed	■■■□□	■■■■□	■■■■□
Range of features	■■■■□	■■■□□	■■■■□
Ease of use	■■■■□	■■■□□	■■■■□
Documentation	■■■□□	■■■■□	■■■□□
Value verdict	■■■■□	■■■□□	■■■□□

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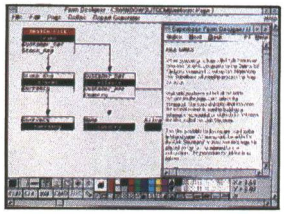

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WINDOW DRESSING

If you're one of the growing number of Windows 3 *users, there's now a host of add-in products to enhance this graphical environment. Simon Williams takes a cross section.*

After the first flush of enthusiasm dies down, there are a few idiosyncrasies in *Windows 3* that begin to niggle. They've obviously niggled a few other people, as an ever-increasing flow of utilities, improvements and accessories attempts to plug the gaps. From the humble icon designer to the *Windows* batch file interpreter, they present themselves as 'what you really need to get the most out of your graphical user interface (GUI)'. But how good are they, and how genuinely useful?

HDC FIRST APPS
● NEOW

This set of *Windows* utilities is designed as a work aid for new users, though most seasoned users are likely to find it useful, too. As always with a pre-arranged set of accessories, there are utilities missing and others whose inclusion you question. If you're an inveterate fiddler with backdrops and screen savers you'll love this package, though there are several utilities with more heavyweight application. You can select the combination you want and leave out any you find superfluous. You can also add extra utilities, called *MicroApps,* such as the icon designer also reviewed on page 121.

When you install the *MicroApps* manager, the only visible sign of its existence is that the off button on each *Windows 3* frame shows the hDC logo on a red background. It still offers the standard *Windows* menu, but shows the *MicroApps* manager menus as well.

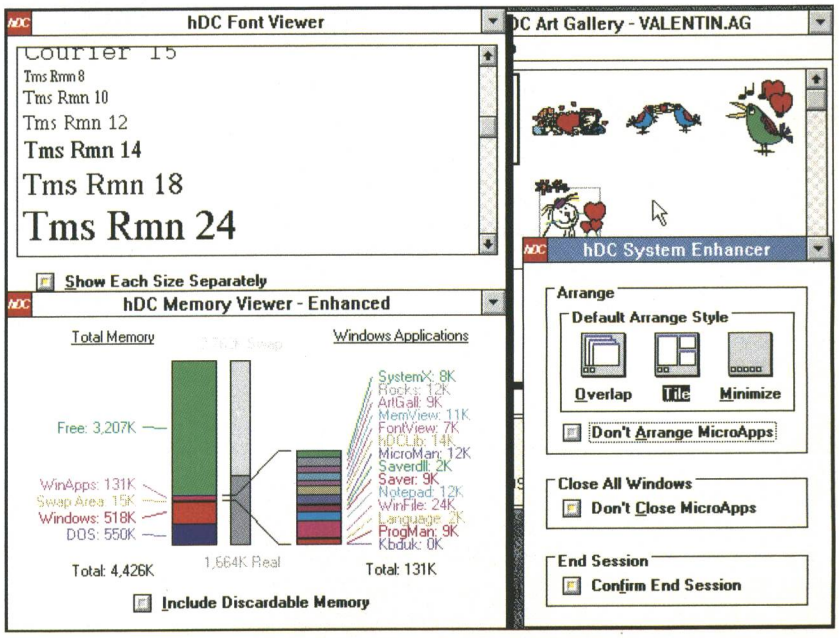
So which utilities do you get in this set? *Art gallery* is a graphics file viewer for files copied from the *Windows* clipboard. It can take both bitmaps and vector image files and enables the creation and maintenance of libraries. Any library can be viewed and browsed through the gallery's window. These windows show the images in reduced form, but a double-click on an image's icon will show it at true size. The *Alarm Clock* is typical of the species, but you can edit the alarm tune played and save the sound as a named file.

Auto Save lets you save your work at intervals you select, or after a given number of keystrokes. It can be customised to let the user choose the applications where files are saved automatically. *Character Set* is a simple IBM character set display, but it does enable you to ship awkward characters into documents of other applications with the copy facility.

Desktop controls the display of the backdrop to the *Windows* desktop (or Wallpaper in *Windows* terminology), and also has a screen-saver option which blanks your screen if your PC has not been used for a set period and displays a series of animated graphics. The backdrop option includes a number of animated graphics sequences, a fractals image builder and a calendar. When *First Apps* is loaded a number of start-up effects can be applied to the backdrop, such as Zoom and Fade – pure trivia, but it's great fun.

As the name suggests, *Font Viewer* shows samples of all your currently installed fonts, both bitmap and vector. *Memory Viewer* draws a graph of current memory use within *Windows.* It's very handy if you need to spot the application currently guzzling RAM.

Rocks is a 3D asteroids-type game which, although simple in concept requires fast reactions and can be addictive. *System Enhancer* provides shortcuts for *Windows,* like closing all existing windows at a stroke – or click. It also allows for zooming windows,



● hDC *MicroApps* come in many shapes and sizes – all controlled from their own little red buttons

rather than 'sudden burst'.

Work Sets is one of the most useful utilities in the collection. This accessory calls up just the applications you specify and opens them on screen at optimum size, either overlapping or tiled. It does it automatically, once you've selected one of the work sets you're offered. You can, of course, make up your own work sets with the applications you find most useful placed together.

In the end, you need to decide if all this gadgetry is really going to be worth while. It's very well presented with a decent manual, but it does seem pricey.

PC PLUS PRODUCT FACTS

- HDC FIRST APPS
- £115
- NEOW
- (0628) 668334

FOR	AGAINST
Useful additions.	Some utilities a little trivial.
Open ended.	

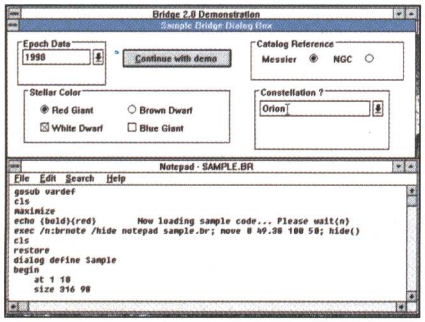
RANGE OF FEATURES	■■■■□
OVERALL SPEED	■■■■□
EASE OF USE	■■■■□
DOCUMENTATION	■■■□□
PC PLUS VALUE VERDICT	■■■□□

Display | Issue disk | Min hardware

see *Help Screen* for details of symbols

BRIDGE

● The Softbridge Group



● The *Bridge* editor incorporates a sub-editor, which generates the correct code automatically

One thing you can do in DOS which you can't do in *Windows* is run batch files. This is a deficiency *Bridge* sets out to rectify – the application is a programming language which can automate *Windows* commands and run custom front-ends. It's rather more comprehensive than the standard DOS batch language though, offering commands to handle keyboard input and make structured branches as well as providing full *Windows* GUI support.

There's a lot to this product, from the gigantic twin A4 ring-bound manuals, to the program and dialog box editors, to the integrated debugger which can trace and single-step the code you create. The supplied demonstration program, written entirely in *Bridge*, shows all the display features of *Windows 3*, from file selectors to combo boxes (which contain both file and option lists). It also demonstrates how you can use *Bridge* commands to call *Windows* applications and inject characters into the keyboard buffer to operate them automatically. You can do the same for many DOS applications and the program can run as a DOS batch file extender, though it has to be launched from *Windows*. There is a built-in DOS module which works full-screen or through a window.

On starting the *Bridge* batch editor, you see the program's flexibility. If you need a dialogue box, you call up the auxiliary dialogue editor and design the window on-screen. The dialogue editor then generates the *Bridge* code and inserts it directly into the text source.

Bridge understands a much wider syntax than the DOS batch language. You can define local and global variables and arrays; branch to other code; execute it as sub-routines; and work via the FOR...IN command.

Many of the functions relate explicitly to *Windows*. At this base level you can define some very effective front-ends. You can even put together simple utilities, although you are limited from programming anything on the grand scale by lack of some functions

CONCERTO

● Phillips

The *Windows 3.0 Program Manager* provides an easy way to run programs, simply by double-clicking on the program's icon. *Concerto* takes this approach a step further by letting you set up icons that represent documents, rather than the applications that use the documents. Clicking on a particular document icon then runs the relevant program and opens the particular document. The idea of associating documents with their parent application is not new or unique; in fact the non-IBM compatible Apple Macintosh (Mac) computer bases all its file handling around the idea.

It is also quite possible, with a little bit of work, to set up either Digital Research's *GEM* or *Windows* to work in this way, too. What *Concerto* does is to give you a ready-made desktop where documents, rather than applications, are the order of the day.

Once installed, you can start *Concerto* from *Program Manager* from the file manager, or tie it into your AUTOEXEC.BAT file and run it by default each time you use *Windows*. The program incorporates a system of 'users', so each person using a *Windows*-based PC can have individual control of the documents on his or her own desktop. If you're the only user, you still have to sign-on to the system though. The default desktop screen shows five icons: an archive, a wastebasket, a folder of templates, a disk and a printer. The last two enable direct access to disk and printer, as might be expected, although the disk service only latches on to a single, specified drive.

The *Wastebasket* is a deferred delete command, as with the Mac. Drag a document over this icon and it is gone,

PD AND SHAREWARE

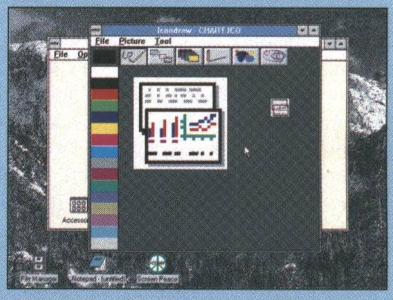
Windows seems to have attracted a lot of attention among the PD/shareware programming fraternity. Much of this, though, still seems concerned with relatively minor utilities – there are a lot of icons and icon designers around!

Of the icon designers, *IconDraw* is probably about the best. It offers you all the basic paint facilities you need, but with the annoying exception of cut and paste for some reason. Registration for this is $15.

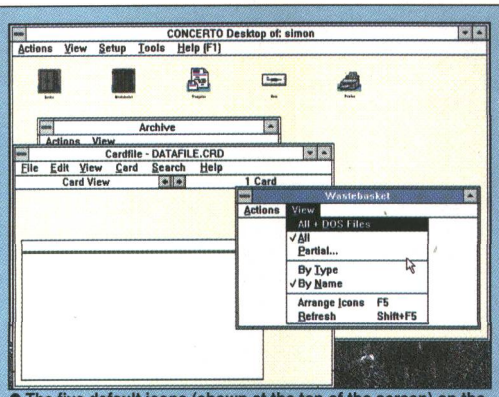
Icon management is slightly different – the idea is to maintain a bank of icons, which can be cut from existing *Windows* applications, and to attach them easily to icon-less programs. *IconTamer* (shareware – $15.95) does most of the hard work here, and will work in collaboration with *IconDraw* to give pretty comprehensive control of your icons.

Second Chance allows more than one application to be tried for a matching document filetype. Normally, under *Windows 3*, you assign filetypes on a unique basis. *Second Chance* can assign up to 16 applications to the same filetype. If the first on the list doesn't do the job then the next one down is simply tried instead. This is true PD at the cost of the disk.

The *Windows* utilities mentioned here are all available from Omicron Systems on (0702) 710391, except *IconDraw* which is available from the *Windows* Conference on CIX.



● *IconDraw* is an American shareware utility – no pixel cut and paste facility though



● The five default icons (shown at the top of the screen) on the *Concerto* desktop cover most work functions

but not forgotten – unless you deliberately empty the wastebasket or leave the file in limbo longer than your pre-defined 'holding' period.

The Templates folder offers a number of standard, empty documents for the various applications that *Concerto* supports. You can edit these templates and create new ones at will, but you can only select from the pre-defined icon types supplied with the program – no icon editor is included. This means that any word processing document is likely to have the same document icon even if, for example, you use both *Windows Write* and *WordPerfect* on your system. This can be a problem.

More annoying is the confusion of terminology within the program. While *Word for Windows* can happily be termed an editor and *PC Paintbrush* can as well at a pinch, it's hard to think of *dBASE* or *Lotus 1-2-3* in that way. *Concerto* documents are structured within folders and filing cabinets and these are held within archives. While the office equipment analogy might hold, there is a fairly common computing use of the term archive, implying a compacted file produced by a product such as *PKZip*.

Overall, *Concerto* is easier to use than the *Program Manager*, though if you're prepared to get your hands dirty most of its advantages can be achieved through the supplied *Windows 3* accessories and the use of groups. The *Wastebasket* may be a life-saver though.

PC PLUS PRODUCT FACTS

- **CONCERTO**
- **£132**
- **Phillips Information Systems**
- **(0206) 575115**

FOR	AGAINST
■ Simplifies applications.	■ Over-rigid method.
■ Retrievable w/basket.	■ Confusing terminology.

RANGE OF FEATURES	■■■□□
OVERALL SPEED	■■■□□
EASE OF USE	■■■□□
DOCUMENTATION	■■■■□
PC PLUS VALUE VERDICT	■■■□□

Display | Issue disk | Min hardware | Other hardware

see *Help Screen* for details of symbols

and by the fact that *Bridge* is an interpreter which has to be in place before a batch file can be run. Speed doesn't seem to be a problem though, as tasks are never that processor-intensive.

Windows makes the whole business of debugging a lot simpler. It is very easy to run an application in a window, while viewing a debugger in a second window and the source code in a third. *Bridge* makes this particularly easy. An extension to this useful utility would make a good general-purpose *Windows* programming language.

A new version of *Bridge* is soon to be released which allows the use of bitmaps, such as icons, in dialogue boxes. It also includes *BrTape*, an extended version of the *Windows Recorder* enabling you to edit the sequence of keystrokes and mouse movements once you've defined them. Softbridge originally programmed the *Recorder* under contract to Microsoft, so it should know what it's doing.

It's a good, well documented product, though at its asking price, with full network support and with run-time fees of £63 per station, *Bridge* is clearly aimed at the corporate market. A single-user version is also available at £115, but this doesn't include the DOS module. ●

PC PLUS PRODUCT FACTS

- **BRIDGE**
- **£569 (network) £115 (Single user)**
- **Softbridge**
- **071-262 1959**

FOR	AGAINST
■ Full dialogue/menu support with good editors.	■ Not cheap. ■ You pay for runtimes.

RANGE OF FEATURES	■■■■□
OVERALL SPEED	■■□□□
EASE OF USE	■■■□□
DOCUMENTATION	■■■■□
PC PLUS VALUE VERDICT	■■□□□

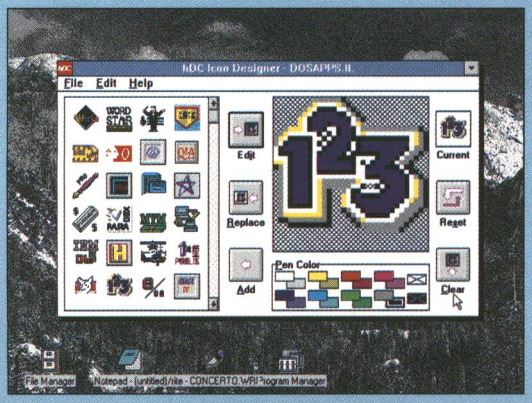
Display | Issue disk | Min hardware | Other hardware

see *Help Screen* for details of symbols

ICON DESIGNER
● Neow

This is a *MicroApp*, designed to work with *Windows* and supplied complete with a copy of the *MicroApps* manager. It installs simply enough and becomes just another utility on the manager's list.

The *Icon Designer* itself is a perfectly reasonable program, enabling full-colour icons to be created from scratch or edited to taste. Both actual size and zoomed views are shown all the time, together with a selection of those from one of the three icon libraries included with the product. The editing facilities are limited to pixel by pixel spotting and drawing. Also, there's no facility to move an area of an icon within the pixel matrix, nor to copy part of one icon and combine it with another. All this tends to make editing rather tedious and fiddly.



● The hDC *Icon Designer* looks good, but offers fewer paint facilities than some shareware products

The three libraries of icons supplied, over 125 in all, cover general use, business and DOS applications. They are all apparently 'designed by professional graphic artists', but despite this they do vary rather a lot in quality. Some are very good, while others look rather tatty. Those icons depicting well known applications, such as *WordStar* or *Q&A*, don't make use of their established logos. Although this could be the result of trade mark restrictions, it's rather annoying having to learn new images for familiar products.

The selection of icons is good and they're easily incorporated into your *Windows* system using the *Program Manager*. If you can't find the image you want, there are two additional packs of hDC icons available to supplement the designer. Just as well, as the editor itself is a bit low on features.

PC PLUS PRODUCT FACTS

- **ICON DESIGNER**
- **£49.95**
- **NEOW**
- **(0628) 668334**

FOR	AGAINST
■ Good range of icons.	■ Poor editing facilities. ■ Patchy icon quality.

RANGE OF FEATURES	■■□□□
OVERALL SPEED	■■■□□
EASE OF USE	■■■□□
DOCUMENTATION	■■□□□
PC PLUS VALUE VERDICT	■■□□□

Display | Issue disk | Min hardware | Other hardware

see *Help Screen* for details of symbols

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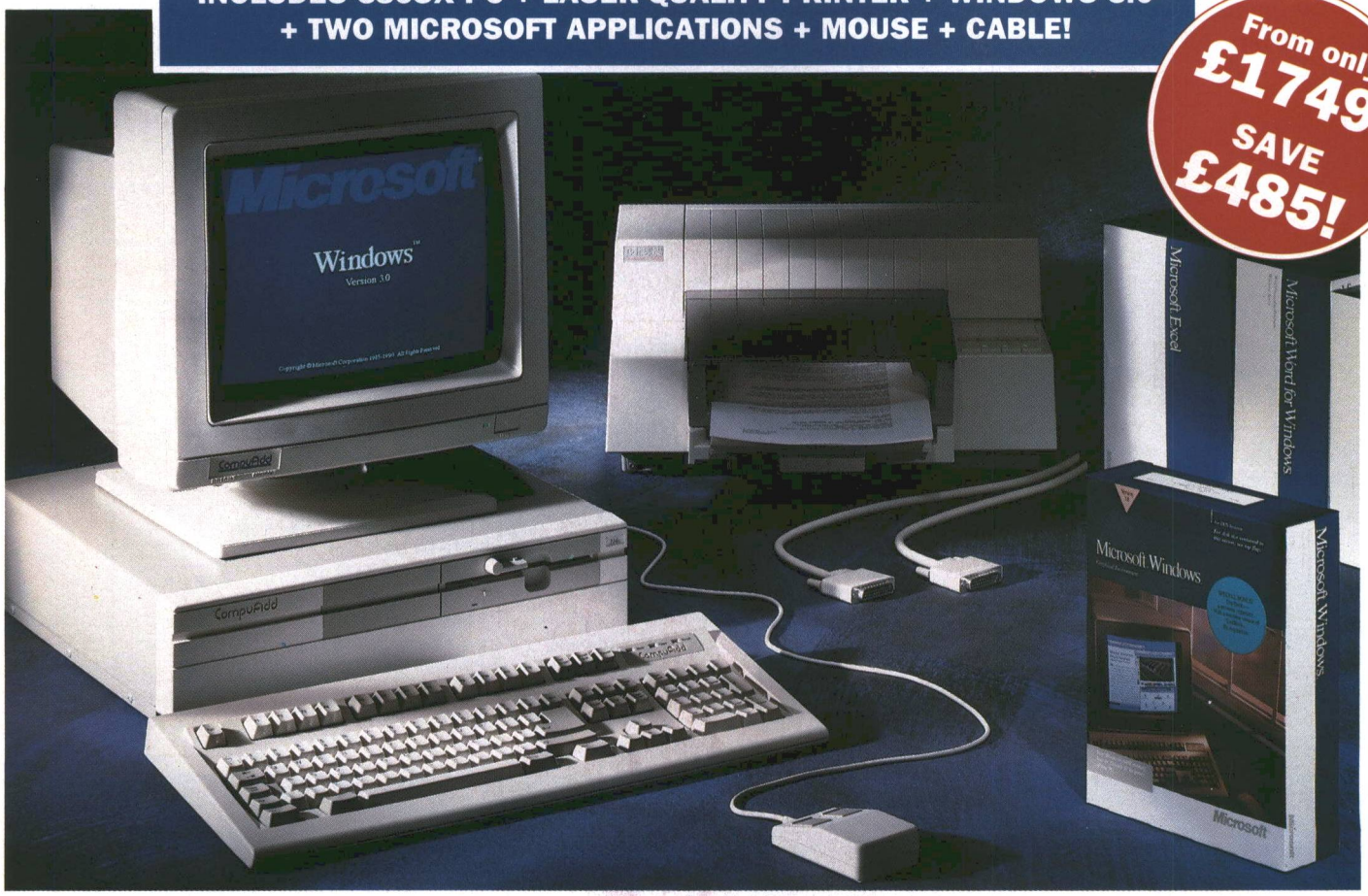

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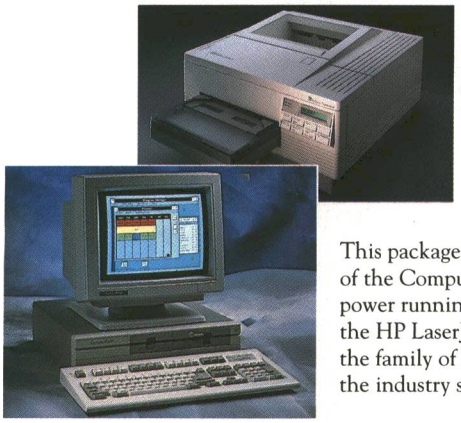

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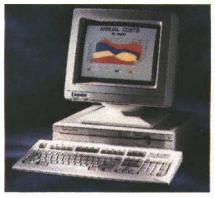

Low-profile system unit
386SX processor, running at 16 MHz
1 MB RAM, expandable to 4 MB
0 wait-state page mode memory
Dual IDE hard drive interface
Dual diskette drive controller
Two serial ports, one parallel port
Three 16-bit, and two 8-bit expansion slots
Game port interface
80387SX maths coprocessor support
Choice of 40, 80 or 110 MB hard disk
Choice of 5.25" 1.2 MB or 3.5" 1.44 MB floppy drive
Choice of monographics, mono VGA or colour VGA monitor
Includes MS-DOS 4.01, Microsoft Windows 3.0, Mouse, System Utilities and Diagnostic Diskette.

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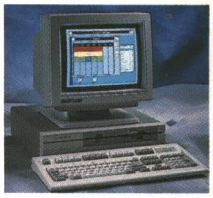

386SX processor, running at 20 MHz
1 MB RAM, expandable to 4 MB on motherboard
0 wait-state page mode memory
Dual IDE hard drive interface
Dual diskette drive controller
Two serial ports, one parallel port
Three 16-bit, two 8-bit expansion slots
Game port interface
80387SX maths coprocessor support
Choice of 40, 80, or 110 MB hard disk
Choice of 5.25" 1.2 MB or 3.5" 1.44 MB floppy drive
Choice of MGA or colour VGA monitor
Includes MS-DOS 4.01; Microsoft Windows 3.0; Mouse; System Utilities and Diagnostic Diskette.

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1346

DRAWING COMPARISONS

Once the Apple Macintosh was the leading machine for computer graphics, but now the PC is catching up fast. Simon Williams looks at two of the principal PC graphics programs, CorelDraw *and* Arts and Letters.

GRAPHICS

The PC really is becoming accepted as a valid vehicle for computer graphics. At the same time, computer graphics are becoming accepted as a valid way of illustrating and advertising products, expressing difficult concepts and making statistics more palatable. *Windows 3* has helped achieve this acceptance and more and more suppliers are writing for this interface. With the use of *Windows* comes a tendency to imagine that all users have unlimited disk and memory space, and both the packages reviewed expect over 10 Mbyte of disk space and a full 640K of main memory to start with. Both would like more and will work with extended memory if available.

The extra space they've taken gives them the opportunity to extend the range of functions and facilities they offer, and a number of complex graphic manipulations are now included as standard. There's still something of a sense of magic in seeing a PC produce a series of 'in-between' drawings from one image to another, or a graduated fill from one colour to another. This is, no doubt, only part-way down the graphics development line for art packages – it's already pretty spectacular.

CORELDRAW! 2

● Ctrl-Alt-Deli

CorelDRAW! is without doubt one of the best general drawing packages on the PC market. Since its introduction, it has won numerous accolades and acceptance by both individual and corporate users. Even the market leader can't stand still, however, and the programmers at Corel haven't been idle. Version 2 removes one or two shortcomings and introduces many new ways of manipulating graphics and text.

The package comes in a mammoth box, even larger than its predecessor, and this houses numerous manuals, quick reference card, a point-size ruler, an introductory video but, alas, no Corel key fob! The manuals cover tutorial and user guide to the program itself, technical reference and separate descriptions of the auxiliary trace utility, clip-art, typeface conversion and the visual file manager. A ring binder might have been a good way of presenting all these, and would certainly have kept them together better.

Installation is straightforward, but you won't get much change from 8.5 Mbyte of disk space, if you install the samples as well as the program. The clip-art files take a further 9 Mbyte! It's worth installing the samples, if only initially, as they show what can be done with the program in the hands of professional graphic artists – there are some stunning screens, matched by a very good selection of black and white printed images throughout the manuals.

BASE LEVEL

The main screen of *CorelDRAW! 2* is deceptively simple. The familiar menu bar and toolbox is supplemented by a colour bar along the bottom of the screen. This can be used to pan through all the available colours for fills and outlines. Other than the colour bar, the most obvious difference between version 2 and earlier versions is an extra menu.

As before, you draw on an outline screen which shows no line thicknesses, fills or colours. These are left to the optional preview screen, which can be called up beside the outline screen or below it. This way of working is not ideal; it's not fully WYSIWYG (What You See Is What You Get) and reduces the size of the available working area. Nevertheless, the preview screen is updated very quickly and it can prove

COLOUR CONFIDENCE

Colour output is becoming more and more important in graphics packages and both *CorelDRAW! 2* and *Arts and Letters* pay close attention to it. Both applications support the three main systems for specifying colour: RGB (Red Green Blue), CMYK (Cyan Magenta Yellow Key – the printer's term for black) and Hue and Saturation. Both packages can produce colour separations for both spot and process colour printing. They vary a little in the way they handle their colour palettes, though.

***CorelDRAW! 2* uses colour matching licensed from Pantone for spot colour reproduction. The Pantone company produces a catalogue which can be used to specify a precise colour to anyone else using the same system. The manual warns to use a Pantone chart rather than relying on the screen representation of colour. This is particularly important with a 16-colour display as other shades are fairly crude dithered approximations.**

Process colours are specified from a wide palette and are mainly defined by their CMYK content, for example C20 M20 Y60, though a few key ones are named. You can create your own process colours and customise a palette to show the ones you want.

***Arts and Letters* uses its own colour range, divided into 18 separate palettes and labelled by name on the supplied colour reference chart – it strongly resembles a Dulux colour selector with names like *Robin's Egg, Cherub* and *Confetti*. The same warnings about screen colours apply. To create a new colour under this program you specify its content in any of the three supported systems and give it a name – you can then call it up by name.**

Call for separations and both programs will print registration marks and colour names on their print-outs. Both can also specify the frequency and angle of PostScript print screens; essential information if sending output to a commercial printer for reproduction.

less distracting for some drawing tasks.

As with DTP packages like *PageMaker*, *CorelDRAW! 2* uses the analogy of a drawing board on-screen, letting you draw and make up objects anywhere on it. Only those objects lying on the notional 'sheet of paper' will be printed, though.

The drawing tools include freehand drawing, rectangle and ellipse. Freehand lines are automatically converted to Bezier curves on completion and rectangles and ellipses can be constrained to squares and circles with the [Ctrl] key.

The Bezier curve is the crux of *Corel*. Nodes are automatically added to most lines and picking up any node allows you to reposition it or to change the shape of the curves leading from it, by manipulating the node's control handles. This is a very versatile system and takes some of the hit and miss out of curve drawing. Nodes also show on square-sided figures and dragging them converts a rectangle into a rounded rectangle or an oval in a very smooth, well-automated way.

CorelDRAW! 2 is an object-based program, meaning that all graphics are described by the mathematics of their outlines, rather than the dot patterns that make them up. Objects can be resized, reshaped and grouped freely and will always print at maximum resolution. The use of nodes on the outlines of objects allows easy editing, particularly as you can remove or add nodes from anywhere along their length. Version 2 lets you specify the position of nodes by entering co-ordinates as well as by placing them with the mouse.

Bitmap images can also be handled within the program, but it's better to convert to an object using either of the auto-trace facilities.

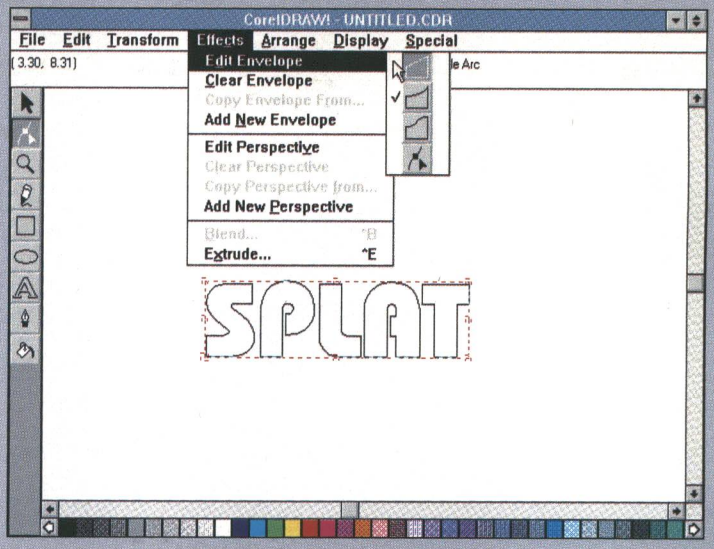
HIGH LEVEL

The tracing of bitmaps is a very skilled business. Although the program does the hard work of converting the edges of the bit-image into an outline, it matters a great deal how precise you set the tracing to be. With precision set too high, the program traces every dimple in the bitmap; set it too low and you lose a lot of detail.

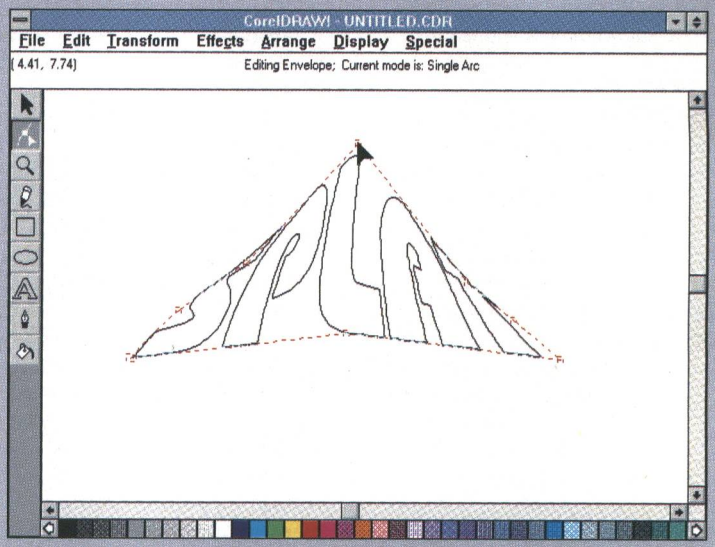
CorelDRAW! 2 offers two tracing routines. The simple autotrace function available from earlier versions is still there, but there's also an improved version of *CorelTRACE*, which will fill the outline with a specified colour at the end of tracing. Both programs give you options to fine tune tracing, and both work reasonably well, though they're better tracing curved outlines than straight ones.

Colour support is good, and as before offers true Pantone colour

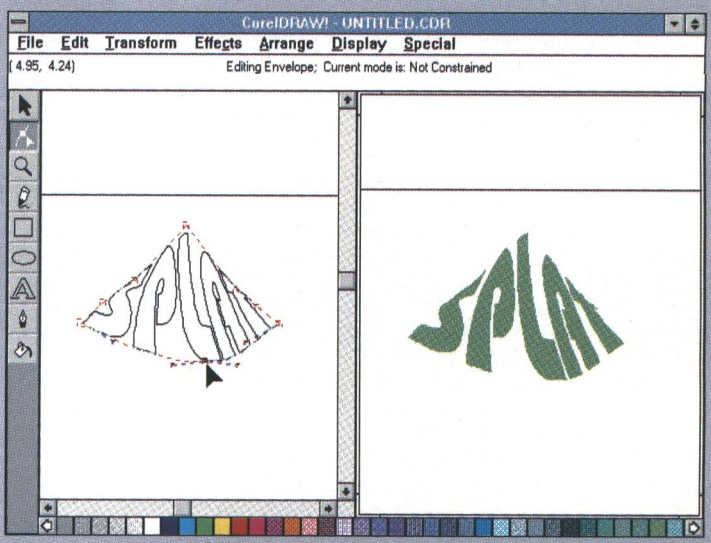
CORELDRAW! – DRAWING A WINDOW ENVELOPE



● A new feature of *CorelDRAW!* 2 is its ability to stretch an object, which could be a piece of text, to fill a graphic shape. Select the object to be reshaped and Edit Envelope from the Effects menu. The envelope can be made up of straight lines, or simple or complex curves

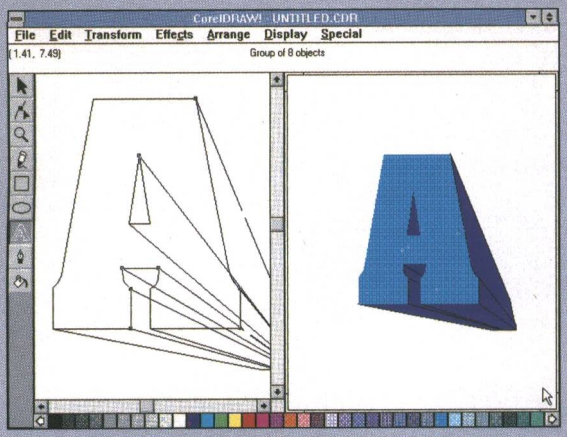


● Drag out the handles of the control boxes and the bounding box takes the shape of the selected envelope. Once the shape is complete, stopping the drag redraws the enclosed graphic in the resulting envelope. Envelopes can also be copied from existing graphics

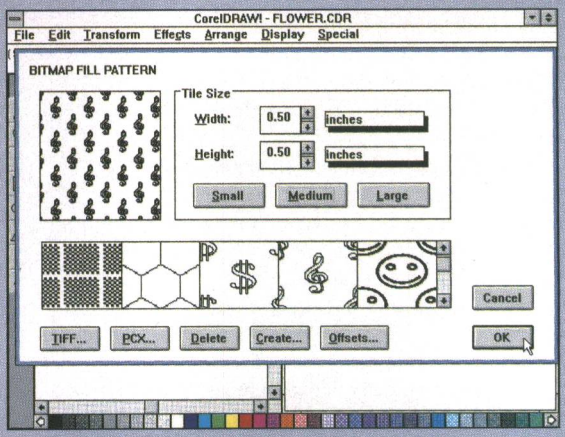


● The curves of the bounding envelope can be reshaped by moving the control points on any of its eight nodes. Again, the enclosed object takes up the shape when all points are released. A fourth option applies no predefined shape to the envelope as it's dragged

COREL DRAW! – FROM FILL PATTERNS TO 3D



● Combining the extrude and perspective functions makes solid text and 3D objects much easier to create



● As well as the standard fill and texture pattern, you can import many different bitmaps and vector graphics to use as fills within the program

matching. However, this has to be achieved by code number or colour name, as a standard 640 by 480 VGA screen has only 16 true colours. Others shades are approximated with a dither.

NEW FEATURES

It's difficult to know where to start as there are a great many new features in version 2. Many come under the general heading 'Effects', and a new menu option by that name is added to the menu bar. New effects include envelopes, extrusion, perspective and blend.

The idea of an envelope should be familiar to anyone who has used an object-oriented package; in its simplest form it is the bounding rectangle of the object. What the envelope effect of *CorelDRAW! 2* does is to allow stretching of the bounding rectangle along angled straight lines, pre-defined curves or freely with the mouse. The object within the bounds, which may be a graphic or text, then takes on the shape of the envelope.

Extrusion takes a two dimensional form and adds a third dimension to make it into a solid. It's something like using a pastry-cutter. The extruded object can be either a wireframe or a true solid, complete with hidden line removal. An extension of this effect is to apply perspective, and *CorelDRAW! 2* now offers a number of perspective aids, including vanishing point generation.

The blend function takes two objects and produces a selected number of intermediate forms, each of which can be handled separately. The result is much like 'in betweening' in animation, and can automatically handle a change in colour in the process of blending. Used with a certain amount of discretion, this effect can add a great deal of impact to a finished graphic.

Not all the new features come from the effects menu. There's the ability to use bitmap or vector images as fill patterns and the introduction of an extra 51 typefaces, giving a total of 153 fonts. The *WFN Boss* utility, supplied with the package, can convert from a number of other font formats too. As a very useful bonus, it can also convert from Corel's own font format to Adobe type 1. This gives you, in effect, 153 *Windows* scaleable fonts for use with Adobe's *Type Manager*.

Mosaic, the visual file manager, is also worth a mention. It provides a quick and easy way of grouping *CorelDRAW! 2* pictures into libraries for work or display. It works by using small monochrome bitmaps, created by *Corel* each time an image is saved.

IN THE END

CorelDRAW! 2 is a very worthy successor to one of the best vector graphics packages on the PC. It has been expanded in useful ways with a plethora of value-added utilities, built-in and stand-alone. The two-screen work scheme continues to detract from its ease of use and there are so many features now that the learning curve for new

PC PLUS PRODUCT FACTS

- **CORELDRAW! 2**
- **£529 (special offer £344 until end February)**
- **Ctrl-Alt -Deli**
- **(0908) 662759**

FOR	AGAINST
■ Font and symbol libraries.	■ 'Two Screen' operation.
■ Object positioning.	■ A lot to learn.

RANGE OF FEATURES	■■■■■
OVERALL SPEED	■■■□□
EASE OF USE	■■■□□
DOCUMENTATION	■■■■□
PC PLUS VALUE VERDICT	■■■■□

Display: W | Issue disk: or | Min hardware: HD 640 | Other hardware: EMS

see *Help Screen* for details of symbols

THE COMPETITION

Graphics is a wide application area. There are simple drawing packages designed for the budding computer artist, those designed for illustration work in DTP and those primarily concerned with presentation graphics, either through the use of photographics slides or by direct display from a PC projection screen. Both the packages in this review fall into the illustration and presentation graphics areas. Other packages which fit the same category include:

ANIMATOR ● AUTODESK (0483) 303322 ● £402
Good art package, but major application is for animated graphics. Reviewed in PC PLUS 40.

ARTLINE 2 ● DIGITAL RESEARCH (0635) 35304 ● £454
Rework of GEM-based graphics package. Now runs from the DOS command line or from *Windows*. Revieved in PC PLUS issue 51.

DESIGNER ● MICROGRAFX 081-547 1638 ● £684
Similar in concept to *Corel* and *Art and Letters* and written by the authors of *Windows DRAW*. Reviewed in PC PLUS 50.

DRAW APPLAUSE ● ASHTON-TATE (0628) 33123 ● £569
Fairly basic drawing functions, but heavily linked into business presentations. Includes good slideshow utility.

HARVARD GRAPHICS ● SOFTWARE PUBLISHING EUROPE (0344) 867100 ● £454
Well-known name in presentation graphics, but rather dated user interface leaves something to be desired. Good, but not that good.

ILLUSTRATOR ● ADOBE 081-944 1296 ● £684
This is a sound drawing pacakage but maybe a bit short on features. Revieved in PC PLUS issue 50.

users can be quite steep. Overall, though, it is still the application for the serious PC graphic artist.

ARTS AND LETTERS

● Roderick Manhattan

Arts and Letters gives the initial impression of being designed for the less-skilled user. Its working method is easier to grasp than *Corel's*. When you start to burrow beneath the surface, though, it has many of the features of *Corel,* while still updating the display quickly enough not to need a preview screen. This, in itself, is an advantage.

The program is supplied with four manuals, a process colour chart and twin sets of 720K 3.5 and 1.2 Mbyte 5.25-inch disks. The manuals are well written and clear – they present a series of tutorials, a reference guide, a clip-art catalogue and a separate guide to the file conversion utility, *Decipher*. Installation is, like *Corel's,* straightforward, and again takes up over 8 Mbyte, including the font and symbol libraries.

ARTS

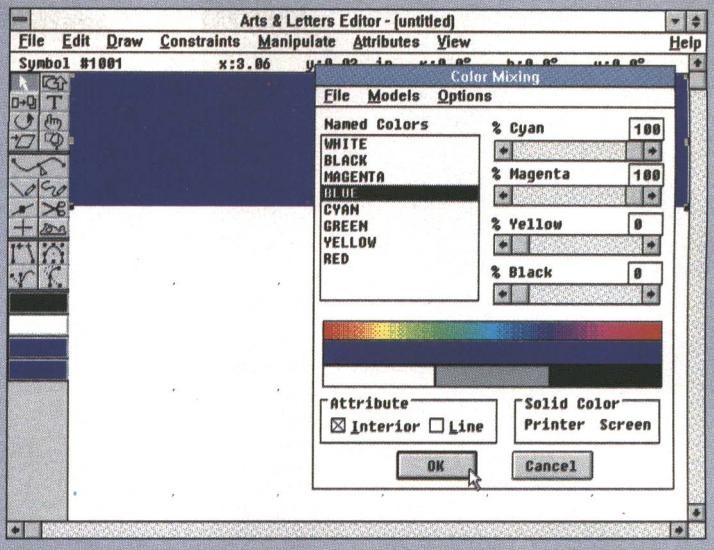
There are nowhere near as many fonts supplied with *Arts and Letters* as with *Corel,* but they are subjectively better formed (though not as good as those from Adobe *Type Manager)*. When it comes to symbols and other art clips, though, *Arts and Letters* leaves the opposition standing. Over 5,000 images are supplied, varying from simple rectangles and circles to complex figures, vehicles and office sundries. Unlike the clips supplied with most packages, they have a strong cohesion of style – they're not samples from a dozen different companies.

Clips are not just accessories in *Arts and Letters,* they are a core part of the program. There are no rectangle or circle tools, for instance – instead you call up the appropriate symbol and stretch it to size and shape. There is no reason why basic shapes shouldn't be created like this – in some ways it's a lot easier – and other shapes, like triangles and stars, can be created in just the same way. This rather 'lateral' approach to drawing and editing is a feature of the program.

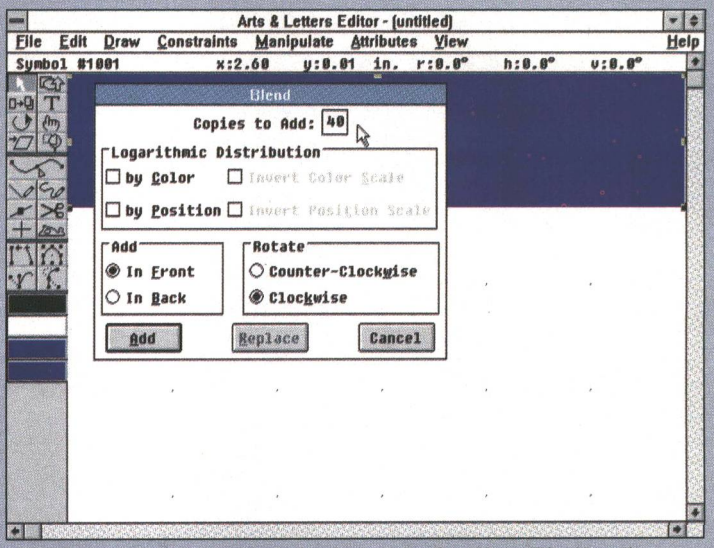
The toolbox down the left-hand side of the *Arts and Letters* screen looks more complex than it is. There are none of the flyout menus of *CorelDRAW! 2,* so most of the features are on display all the time. The toolbox offers duplication, rotation and slant tools and a tool for adding clips, as well as the more usual selection, line and curve icons. A number of switches are also included, and their icons help to make the panel look complex.

In fact, these switches are useful ➧

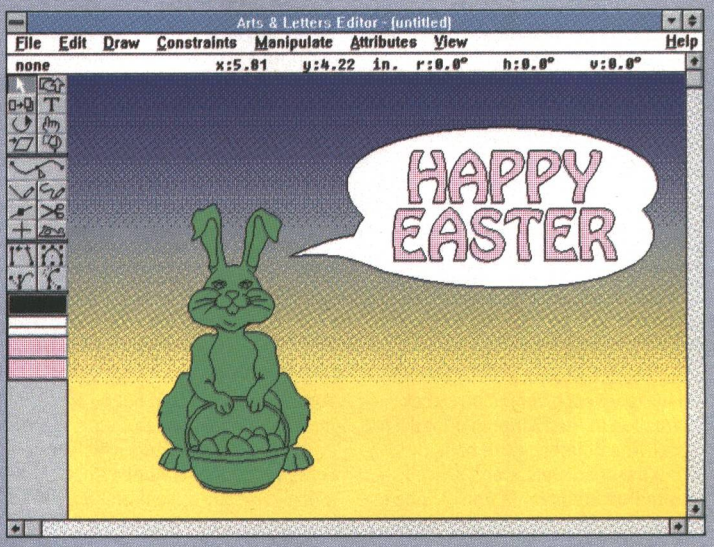
ARTS & LETTERS – GRADIENT BACKGROUNDS



● Variably shaded backgrounds are all the rage in PC graphics at the moment and *Arts and Letters* can do them with style, though less simply than Corel. In *A & L* you first load a rectangle from the symbol library and position it to represent the start of the gradient

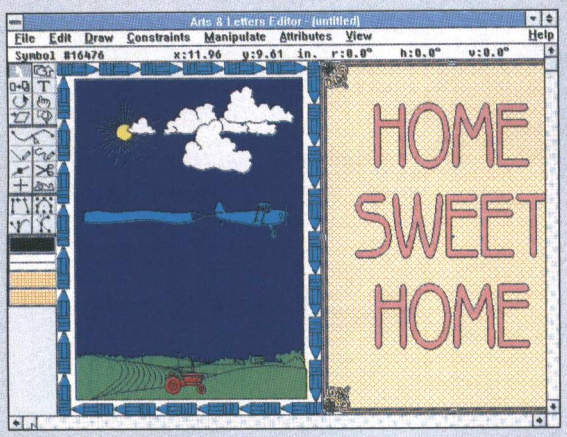


● Select the starting colour and remove any coloured outline. Choose Blend from the Manipulate menu and enter the intended number of coloured strips from start and finish. Drag a duplicate of the original rectangle to the finish position and give it another colour

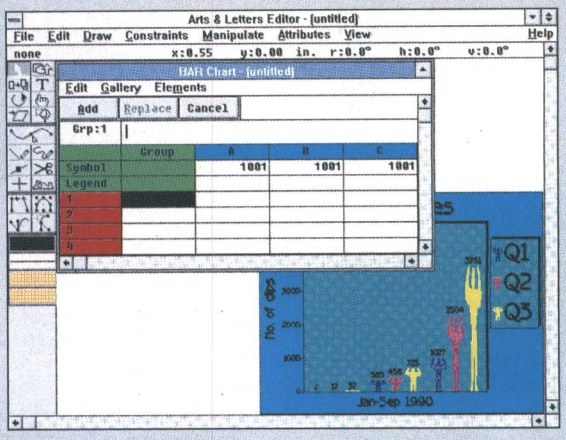


● Select Complete Blend and a smooth gradient is generated between the two rectangles. The colours can be graded linearly or logarithmically and filled in straight lines or radially from a given centre. Simply specify start and finish colours

ARTS & LETTERS – FROM CHARTING TO CLIP-ART



● A selection of the massive range of clip-art. *Arts and Letters* lets you view many pages of your document at once



● Automatic charting is a distinct bonus in *Arts and Letters*, giving it added value in the corporate business market

additions to the *Arts and Letters* arsenal and show again the thought that's gone into the use of the package. The curve slope tool maintains the slope of the curve to the selected node, so that you can't inadvertently disturb the second line segment coming from that point. 'Maintain smooth joins' limits the angles for the curves at a node, to prevent sharp changes of direction.

There are extensions to this idea in the Constraints menu. You can save and recall any angle, length or set of co-ordinates and apply them to another object. This is an easy way to match curves, create parallel straight lines or position objects on a common node. You can also force a line to the vertical or horizontal and align any two or more objects in either plane.

LETTERS

Although its name might lead you to think that *Arts and Letters* is heavily text based, its text facilities are nothing extraordinary. Although you have direct control over font, size, kerning and letter and word spacing, all these attributes are controlled by number or left for automatic adjustment. There's no facility to stretch the text envelope and persuade *Arts and Letters* to adjust the inter-character spacing to suit. A minor point perhaps, but wide character-spaced text is particularly in vogue at present and it would be useful to be able to stretch it easily to a given width.

As with *Corel*, you can convert any piece of text to a series of curves and then have the same facilities to alter character outlines as you would with any other graphic object. Text can be given coloured and patterned outlines and fills, offering huge scope for fancy text effects. *Arts and Letters* can't automatically stretch text to fit a given envelope, though.

What it does have, which again shows its leaning towards presentation graphics, is the ability to construct charts. You can enter figures directly into a table window and the program will generate a wide range of graphs and charts from the figures. All aspects of the graphic are available for editing, in exactly the same way as manually created objects or clip-art.

The great strength of *Arts and Letters* is its clips. It's much easier to construct graphics pages from ready-made images, and relatively easy to pull the clips apart into their constituent parts. You can also change the angle of view and stretch or distort simple shapes to make a bewildering range of designs from a single symbol. You even have the option of colouring clips to make them your own – part of the tutorial deals with clip-art conversions.

IN THE END

Arts and Letters is a very likeable program. The new user can get down to work almost at once and produce presentable graphics in a surprisingly short time. As you become familiar with the product, though, you discover a lot of extra facilities hidden just beneath the surface. There is surprisingly little this program can't do. It may not have the strength in depth of *CorelDRAW! 2*, but it gains a lot from its straightforward approach and all-in-one display system.

Which product is best? A comparison with the DTP world and products like *Ventura Publisher* and *DESKpress* is appropriate. Though *DESKpress* has less control in some areas than *Ventura*, for many applications it is easier to use and quicker to learn. *Arts and Letters* is closer to *CorelDRAW! 2*, but still retains the ease of use that will often make it the better choice. ●

POSTSCRIPT FONTS

When you print from either *CorelDRAW! 2* or *Arts and Letters* to a PostScript printer, text is not printed as PostScript fonts. These programs use their own internal formats and finished pages, including any text, are sent to the printer as a series of PostScript descriptions. These descriptions will be of the curves that make up each character, rather than an instruction to PostScript to print a particular font. The difference can be fairly academic, but the characters aren't as well formed as with PostScript fonts from Adobe's *Type Manager*, for instance.

Although you can convert *CorelDRAW! 2* fonts to Adobe Type 1, using *WFN Boss*, the resulting outlines are obviously less well rounded and inferior in shape. You have to balance this against the flexibility of being able to output the characters in virtually any way you like. An example in the *CorelDRAW! 2* manual shows a portion of text stretched vertically at the bottom for effect. This effect is easy to create with the internal *Corel* fonts, but would not be easy with genuine Adobe outlines.

The only art package which currently works with genuine Adobe PostScript outlines is that company's *Illustrator* application. This is a worthy graphics package in its own right, although lacking some of the special effects offered by either of the two products here. A new version of *Illustrator* is due out soon.

PC PLUS PRODUCT FACTS

- **ARTS & LETTERS**
- **£569**
- **Roderick Manhattan**
- **071-978 1727**

FOR	AGAINST
■ Massive clip-art library.	■ Awkward colour gradients.
■ Colour separation.	■ No Pantone colour matching.
■ Charting facilities.	

RANGE OF FEATURES	■■■■□
OVERALL SPEED	■■■■■
EASE OF USE	■■■■□
DOCUMENTATION	■■■■□
PC PLUS VALUE VERDICT	■■■■□

Display: W | Issue disk: 3.5 or 5.25 | Min hardware: HD 640 | Other hardware: EMS

see *Help Screen* for details of symbols

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2Mb	£1059	£1159	£1399
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80386sx 16 Mhz. **1Mb, 2Mb, 4Mb or 8Mb** Ram models. 1.44Mb 3.5" floppy drives. 40Mb (28ms), 100Mb (19ms) or 200Mb (15ms) high performance autoparking hard discs. **Mouse. PC Tools 6.0. 1992 Pack. Time PCS Package.** Optional 3 year Time-cover.

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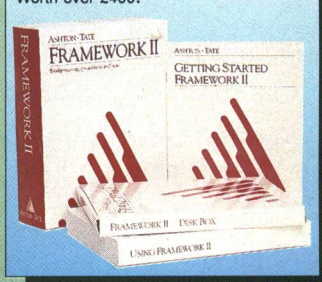

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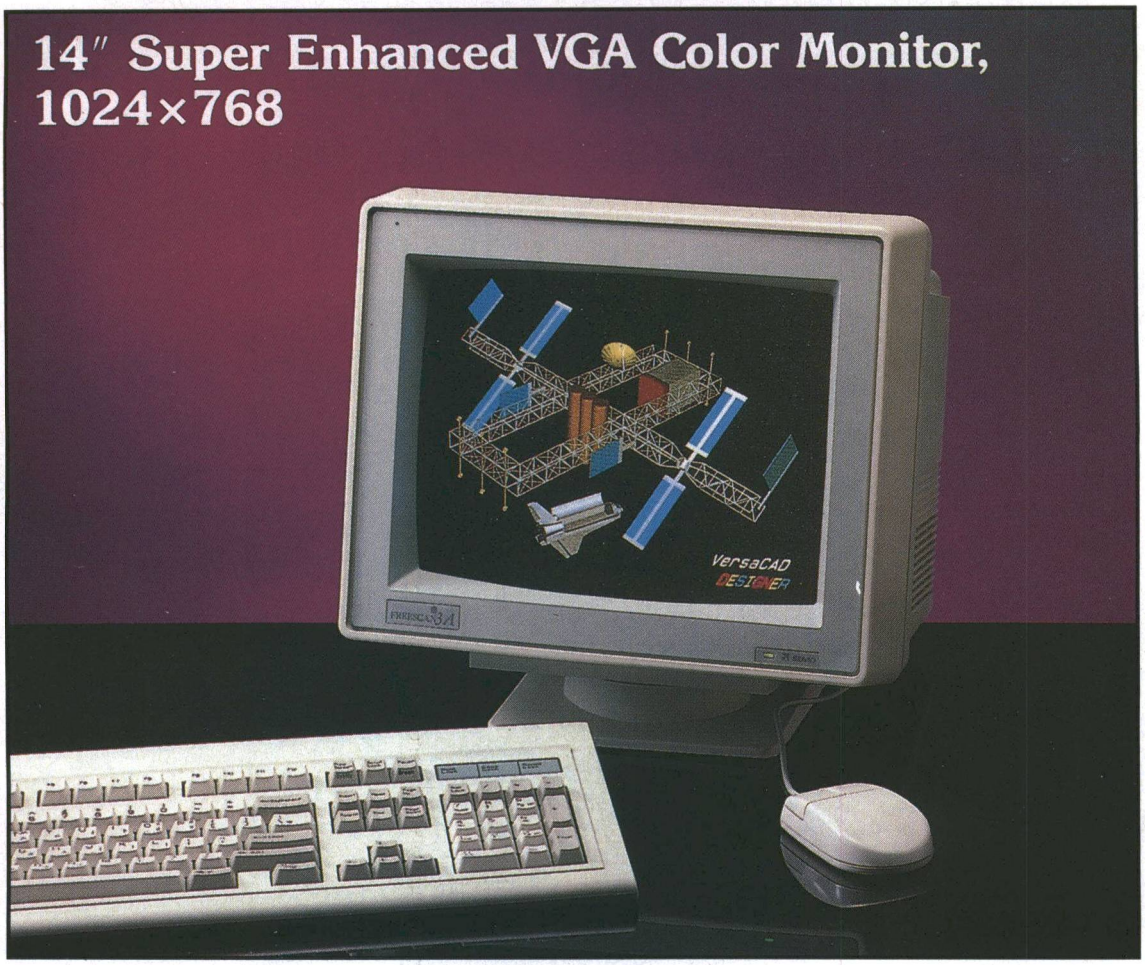

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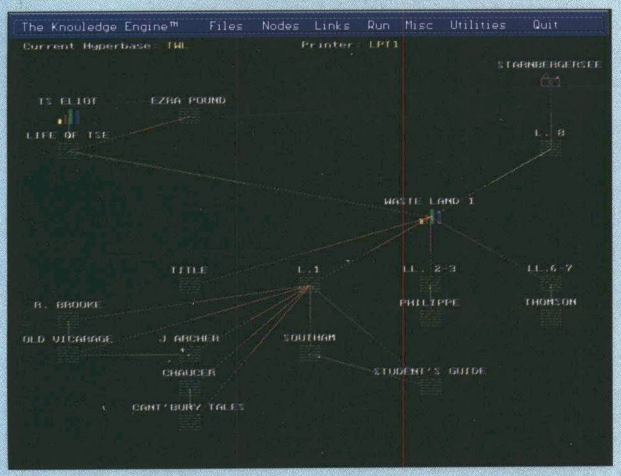
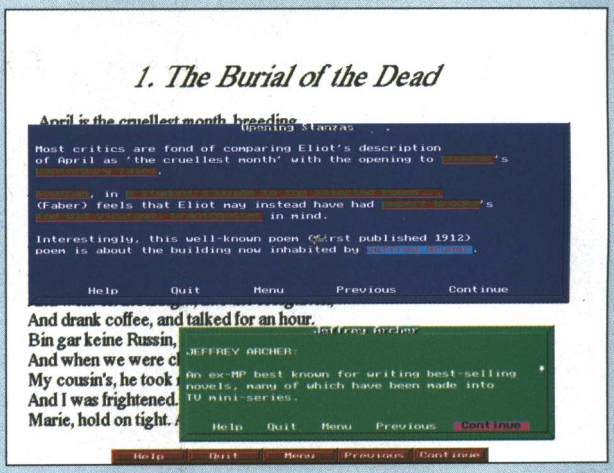


● This is what is known as HyperSpace, it includes a graphical representation of the nodes and their relationship to one another

THE WASTE LAND



● A button on a section of the poem summons an explanatory panel. A button on that has then been pressed, to reveal a second level of information

KNOWLEDGE ENGINEERING

Mike Hardaker looks at The Knowledge Engine, *a HyperMedia development system with a powerful programming language.*

HYPERMEDIA

Ever since 1945, when Vannevar Bush (President Roosevelt's Scientific Adviser) wrote an article predicting the MEMEX – a machine which would allow the user to browse and make associative links through multiple sources of information – the idea of free-form information retrieval has fascinated the technical community. We had to wait until the 1960s before it was christened 'hypertext' and that name has since been replaced by 'HyperMedia' – a term which implies the user can browse through visual and aural data as well as conventional text.

As is often the case, HyperMedia has had to wait for the hardware technologies to catch up with the idea. With today's sub-£2,000 386s and the rapid acceptance of VGA (Video Graphics Array) as the base business graphics standard, that time may well now have come.

Software Artistry Inc's *The Knowledge Engine* uses current graphics capabilities (up to Super VGA) and really requires a fast processor, but it delivers most of the goods demanded by a HyperMedia development system. It doesn't really provide the user-defined database envisaged by Bush (and limits itself to visual data – whether text or graphics), but instead exploits 'hot-button' links from one piece of data to another to provide a valuable tool for creators of multimedia educational tools.

To create an application with *The Knowledge Engine* you start off in 'HyperSpace', (simply the area in which you develop your program). The idea is to create a hierarchy or a network of files (each file being referred to as a node) which are used to describe or explain a concept. For our sample application we took an educational theme, a HyperMedia guide to T.S. Eliot's poem *The Waste Land*.

REFERENCES

Although poetry may seem an odd choice for a technical illustration, *The Waste Land* is a good example of something where conventional paper-based information management is limiting. Eliot is a notoriously allusive poet and even bothered to provide a 'notes' section to this poem. A typical sixth-former will read it with difficulty, flipping between the main text and the notes, pausing to consult a critical summary, or a biography. Anyone who's ever cleared a trail through a badly-arranged technical reference manual will be familiar with the problems.

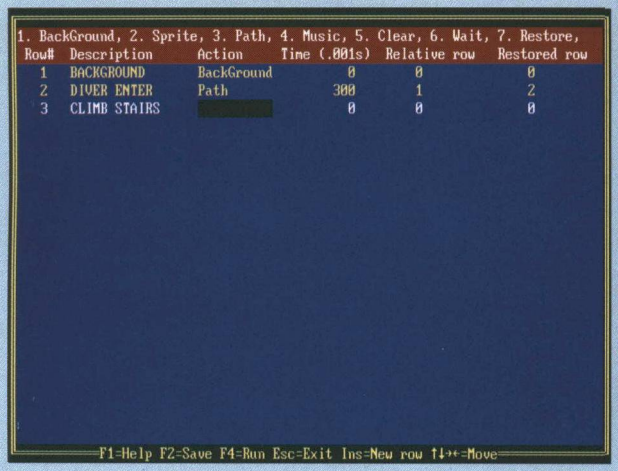
The first task was to produce a fair copy of the original text. Since the relevant text will be on-screen most of the time it might as well be readable, so we created it as a graphical file in an elegant font. This was saved in the .PCX format and then introduced as the first 'node' of our 'hyperbase'. The key study areas of this file were then defined as 'buttons' which could later be selected to provide some explanatory information.

The next stage was to produce some text files containing the explanations. *The Knowledge Engine* has a crude text editor which proved adequate for this task, but most word processors can be configured. Since a reference node may need to have buttons linking to yet more information, there is a syntax for defining a word as a text-mode button.

LINKS

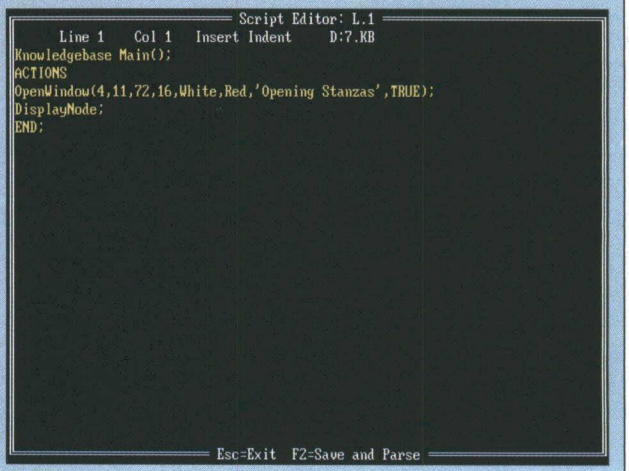
Next, the links between these nodes are established. If a button has been defined in the source node, it can be used to create a link. Otherwise, a default link can be established taking you to the next logical place in the application . Links needn't be to text files, incidentally – the authorial credit could just as easily go to a digitised picture of T.S. Eliot himself as to his biography. Apart from text and graphic/image nodes there are Operating System Nodes (which run an MS-DOS command such as DEL ELIOT.*), Program Nodes (which run an external program like WSTLND.COM), Document Nodes (linking to a word-processor file in its internal format, like JGFRAZER.DOC), Formula Nodes (which offer spreadsheet-like calculation facilities), Expert System and Control Nodes (which use the built-in *KML*

ANIMATE



● The actions of the Animator are controlled by a combination of text-files like this, and some point-and shoot control of the sprites

SCRIPT



● A simple script produced with the *KML* language. This simply defines a window with a border which is then opened on screen

HYPERMEDIA

language – see *The KML Programming Language)* and Animation Nodes.

GET ANIMATED

Animation Nodes let you show animated sequences created by a special program included with *The Knowledge Engine*. This lets you move 'sprites' over a background image (all graphics are in the standard .PCX format) and its capabilities are really only limited by your artistic skill and effort. A graphics program is provided but you'd be better off with a proper paint program.

The animator wasn't actually needed for our sample application but it could have been used to create an opening screen with the title moving slowly over a likeness of the poet and then gently dissolving. This would have constituted the first node of the application.

TIDYING UP

Once the basic framework of references has been established, it's time to tidy up the application, making it appear as smart as possible for the user. As set up, each reference flips you to a completely new screen. Text is normally displayed in the PC's text mode while graphics mode is used for the .PCX files. Mode switching like this has an unfortunate tendency to make the screen wobble around.

By writing simple scripts in the *KML* language, it is possible to have text popping up in a window, over another node. With careful positioning of these windows you can then let the user see a chain of references develop on screen. Colours can be changed at this point and the windows can be given rather natty 3D borders.

Finally, the application can be distributed to the users, complete with a run-time module which lets them view screens but not make changes. The package comes with a single run-time licence, with more available.

LIMITATIONS

Unfortunately, *The Knowledge Engine* has no sound support. So if we wanted to be able to hear T.S. Eliot's own rendition of *The Waste Land* we would have to call an external sound-generation program. This omission is somewhat odd, as Software Artistry is an IBM 'Business Partner' and Big Blue makes great play of its add-in hardware which can give audio and real-time video (also not supported) to a PS/2.

The point is that by restricting itself to conventional PC data (with the addition of digitised photographs) it is feasible to run *The Knowledge Engine* on a PC with an average-sized hard disk, real-time audio and video being somewhat liberal with disk space.

In general, *The Knowledge Engine* is a very powerful HyperMedia development tool, ideal for creating instructional or explanatory applications. If the expert system facilities in *KML* are exploited fully to produce 'intelligent' applications, even more power is available. The combination of tools enables you to produce highly-tailored presentations, and the user interface is reasonable, if somewhat idiosyncratic (given the importance of *Windows* as a platform for graphical applications, it would have made sense to have *Windows*-compatible commands, at the very least). The documentation is scruffily presented (why wasn't the system itself used to provide a HyperMedia manual?) but adequate. ●

PC PLUS PRODUCT FACTS

- **THE KNOWLEDGE ENGINE**
- **£460**
- **Keyword Software**
- **(0942) 41172**

FOR	AGAINST
■ Customisable.	■ Inconsistent user interface.
■ The *KML* language.	

RANGE OF FEATURES	■■■■■
OVERALL SPEED	■■■■□
EASE OF USE	■■■□□
DOCUMENTATION	■■■□□
PC PLUS VALUE VERDICT	■■■■□

Display: C E M V | Issue disk | Min hardware: HD 640 | Other hardware: EMS

see *Help Screen* for details of symbols

THE KML PROGRAMMING LANGUAGE

In *KML The Knowledge Engine* can proudly boast a fully-fledged programming language. It is a block-structured procedural language similar in feel to Modula 2, with some added high-level primitives for screen handling and the like (making windowing, colour control and so on surprisingly simple). Various extras, such as database retrieval statements and an application programmers' interface (API) for embedding *KML* in C or Pascal programs are available for an additional charge.

***KML* has many of the list-handling facilities found in languages like LISP and PROLOG – although it is a procedural rather than a declarative language – which (together with a full-featured inferencing engine) makes it suitable for the development of knowledge-based 'Expert' systems. Being able to write an expert system within a HyperMedia environment has many potential applications – a fault-finding program can contain illustrations of the suspect parts, and even animations showing how to replace them, while hypertext reference information can provide backup for the diagnostic process.**

For simple screen manipulation, *KML* is really very easy to use. If you want to use its full power you will find it somewhat trickier, on the other hand. This should not deter 'amateur' programmers, however, for *KML*'s syntax is relatively straightforward and the ability to create simple procedures in a very short time makes the effort of learning the language a relatively rewarding experience.

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VGA mono prices shown above. Other options (extra to VGA mono)

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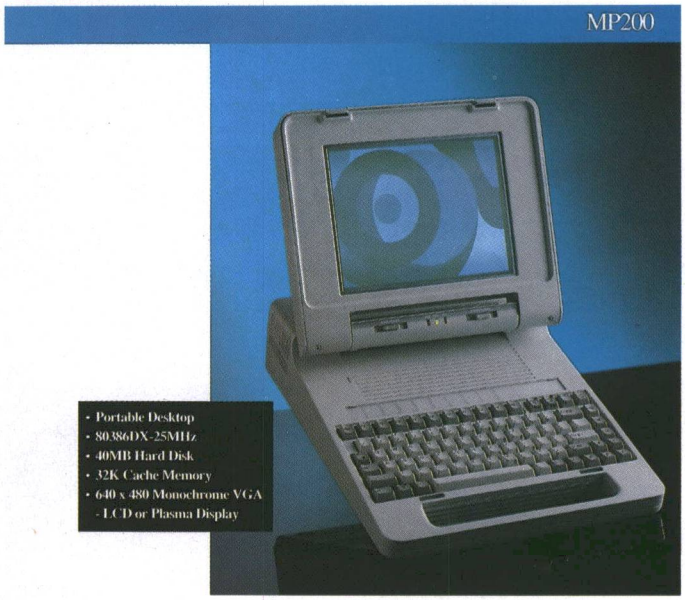

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SPEED	25MHz	33MHz	25MHz	33MHz	25MHz	20MHz	16MHz	12MHz
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RAM	4MB	8MB	8MB	4MB	1MB	1MB	1MB	1MB
MAX RAM	8MB	64MB	64MB	8MB	8MB	8MB	8MB	8MB
HARD DRIVE	40MB	40MB	40MB	40MB	40MB	40MB	40MB	40MB
INTEL SOCKET	80387	80387 built-in	80387 built-in	80387	80387	80387sx	80387sx	80287
WEITEK SOCKET	ABACUS 3167	ABACUS 4167	ABACUS 4167	ABACUS 3167	ABACUS 3167			
NO. OF SLOTS	1 AT-16BIT	8 32BIT EISA	8 32BIT EISA	8 AT-16BIT	8 AT-16BIT	8 AT-16BIT	8 AT-16BIT	6 AT-16BIT
DOS 4.01a	YES	YES	YES	YES	YES	YES	YES	YES
3 BUTTON MOUSE		YES	YES	YES	YES	YES	YES	YES
CASE	LAPTOP	FULL TOWER	FULL TOWER	FULL TOWER	MID-TOWER	DESKTOP	DESKTOP	DESKTOP
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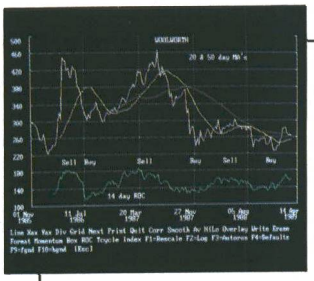

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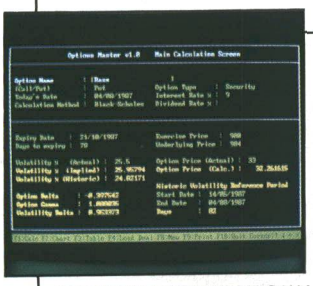

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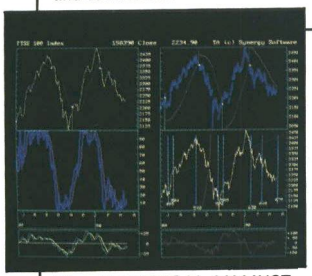

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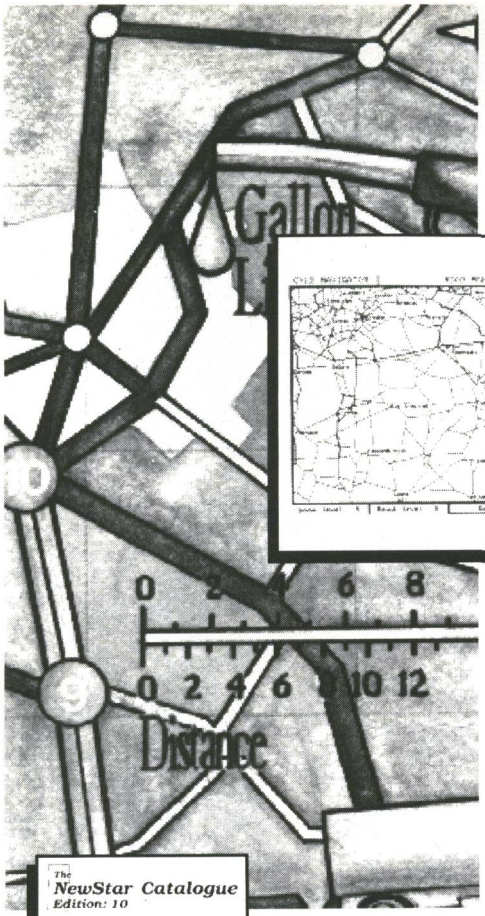

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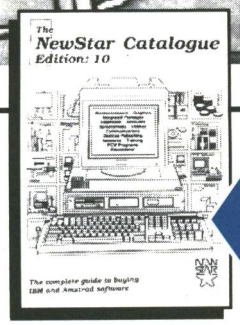

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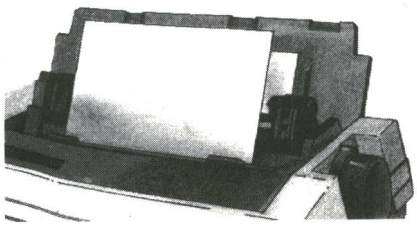

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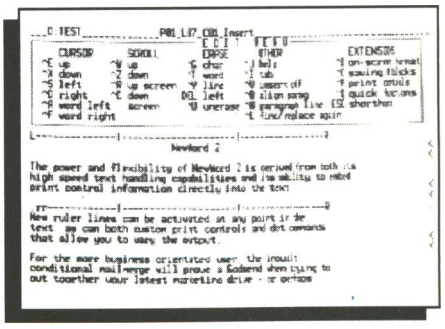

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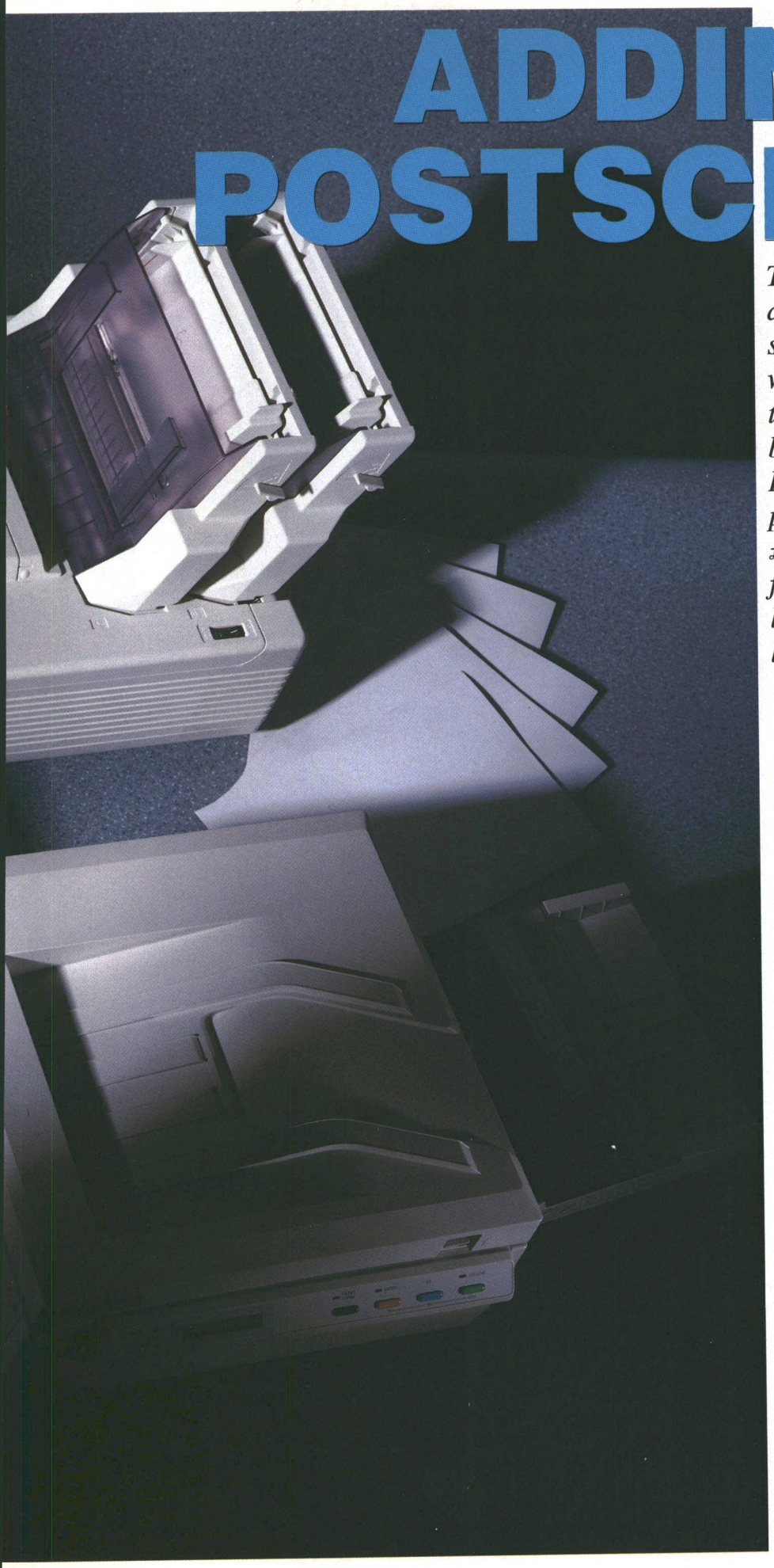
ADDING A POSTSCRIPT



The PostScript page description language is the simplest and most effective way of printing special typefaces and graphics – but until recently prices of PostScript-equipped laser printers started at around £3,000. Now prices are falling. Simon Williams looks at four Postscript lasers each under £2,000.

The PC industry has grown up with the daisywheel, the dot-matrix and the laser printer in turn. Each type of printer has its own idiosyncrasies, features and way of working. The Apple Macintosh, by contrast, has had PostScript from its very early days and has little of the same confusing plethora of printer and font systems.

PostScript is a printing standard, a Page Description Language (PDL), with which applications can describe the precise composition of a page. The page is created in the printer; once the instructions have been sent to it, its own processor and PostScript interpreter do most of the printing work, leaving the PC free to get on with other tasks.

One of the key features of a PostScript printer is its ability to scale fonts automatically from a series of outlines. Using PostScript means you can often forget the vagaries of fonts and the printer companies that supply them. More and more PC applications now offer PostScript; they address the standard and the printer does the work.

There is a new breed of budget PostScript printers. Part of it is made up of older machines which have made back their development costs and can now be sold more cheaply. Against this trend is another which takes a new, less expensive, laser engine and adds a



The compact lines of the little Brother machine belie its power, which is mainly due to its fast PostScript emulator. (right) The 16-character LCD display offers all its controls via a menuing system. (left) All the scaleable PostScript fonts are also available in LaserJet mode.

PostScript interpreter to it. How do the two species compare?

To find some answers we looked at the Brother HL-4PS , Fujitsu RX7100RX, Mannesmann Tally MT906PS and Star LaserPrinter 8.

DESIGN AND CONTROLS

BROTHER	■■■■■
STAR	■■■■■
FUJITSU	■■■■■
MANNESMANN	■■■■■

There are a wide variety of shapes and sizes in our test group. The neatest of the bunch, both in absolute size terms and arrangement of controls and ports, is the Brother. This machine houses the same Canon engine that powers the HP LaserJet IIP and the Apple personal LaserWriter. Although comparatively slow, this engine is very compact, extremely quiet and easy to maintain. Unlike the HP and Apple offerings, the Brother is designed wider than it is deep, with the controls ranged along a sloping panel on its longer side. The sockets for serial, parallel and network connection are high up on the back panel, making them easy to reach. The 16-character Liquid Crystal Display (LCD) shows paper type, orientation and number of copies. The comprehensive menu system is also displayed here.

The Star uses a similar menuing system, via its LCD display. The printer is big and a little dated looking and is an obvious hybrid of the company's LaserJet-compatible machine. Paper feed is from a front entry tray which projects by over half its length from the front of the printer. Output is on to the top of the machine or face-up to a fold out tray at the rear. Connections for serial and parallel leads are at the rear.

The Fujitsu is very different in appearance. Although the box itself is quite small, two large paper bins fit to the top of the machine, complete with bent wire paper supports, and an output stacker attached to the front. This tray can be folded up when the printer isn't working, but has to be in position, adding 210mm to the printer's depth, when it's printing – unless you like to collect your documents from the floor. The control panel on the top right of the printer's front is clear and has a neat four LED paper-type selector, as well as the more normal LCD display. There's no data LED on the panel; the LCD reports progress of a print job, instead. The print density control is handily positioned at the front, with the mains switch on the top panel and I/O sockets at the rear.

Never one for fancy design, the Mannesmann Tally is functional in a Teutonic sort of way. It's square lines are broken only by the control panel projecting from the front and an angled paper input tray which adds 50 percent to the printer's width. Sockets are ranged along the back of the machine. The controls themselves use another menuing system, this time with buttons for Yes and No to each displayed choice.

SET UP/EASE OF USE

BROTHER	■■■■■
STAR	■■■■■
MANNESMANN	■■■■■
FUJITSU	■■■■■

None of the printers is particularly difficult to set up, though the Brother and Star benefit from having their drum/toner units in one easy-to-use cartridge. The Mannesmann Tally uses a complicated two-part developer kit and has no cover for the photosensitive drum. The exposed drum of the Fujitsu was also a potential problem. The manual warns of damage if it's exposed



The unconventional lines of the Fujitsu take up quite a bit of room, but you do get twin paper bins and three font-card slots as standard. (left) The control panel is complemented by a separate paper-type selector. (right) The print quality is quite adequate despite its slow speed.

to light for more than three minutes.

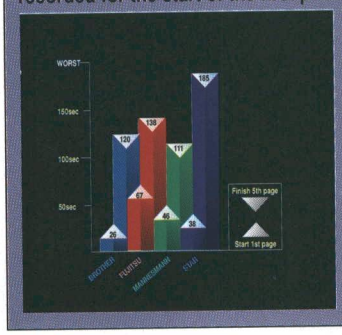
In use, the Fujitsu is easily the noisiest, with a wide repertoire of chuntering and cog growls, but the Mannesmann can also be obtrusive when it wanted. The Star is fine, apart from the occasional wizz as it turns its drum over. The quietest of the batch is the Brother, with the new Canon mechanism largely responsible for this.

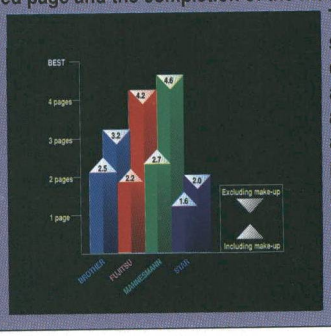
The printers' manuals are generally good, though those for the purpose-built PostScript printers were more detailed than those where PostScript had been added. The Star and Mannesmann fit this category. Only the Mannesmann manual gives enough differentiation of PostScript and LaserJet modes.

Paper-handling on the Mannesmann and Star normally involves a single 'U turn' in the paper path, though both can also print straight through to trays at the opposite end from their input bins. This means that both can print on heavy grade paper and the Mannesmann even has a 'heavy form' option button. The Fujitsu also has a straightforward paper path, though in all cases this involves a single right-angle turn. The most complicated paper-path is the Brother's, which follows a figure 'S'. The manual recommends quite light-weight paper for this machine.

SPEED TESTS

For these texts, a sample page of text with a small graphic logo was printed from the reference manual of *Word for Windows*. The page was printed five times and timings recorded for the start of the first printed page and the completion of the fifth.





The first time shows the speed of page make-up and the second adds in the actual speed of printing. The graphs on the right show how many pages were printed in one minute.

PRINT SPEED/QUALITY	
MANNESMANN	■■■■■
BROTHER	■■■■■
FUJITSU	■■■■■
STAR	■■■■■

In terms of print quality there is little to choose between these four printers. All produced sharp outlines. The black areas produced by the Star are a little patchy, but this can be put down to specific conditions which can usually be overcome by adjustment. Things were not so equable after the speed tests. The page-per-minute figures quoted by the printer manufacturers are about as accurate as the character per second figures quoted for dot-matrix. They often take no account of the page make-up time and are only tested on identical, text-only pages. The results of our tests are shown in the table above.

As you can see, the Brother printer was much faster than any of the others at constructing a page in memory. This must be put down to Brother's proprietary PostScript clone, BR-Script. The emulator is obviously much faster than the Adobe interpreter in the Fujitsu



Solid and square, the Mannesman Tally is a capable machine, but with nothing to distinguish it from the crowd. (left) The controls use a menuing system with buttons for Yes and No. (right) Print quailty is not compromised by the high speed of the machine.

and noticeably quicker than the emulators in the other two printers. When it comes to overall print times, the Brother loses to the Mannesmann Tally, which runs sheets through much quicker. The Star appears to perform a partial page remake between each copy, accounting for its poor showing on print time, even though it was speedy on first-page make-up.

COMPATIBILITY

FUJITSU	■■■■■
MANNESMANN	■■■■□
STAR	■■■■□
BROTHER	■■■□□

Three out of the four printers tested use 'lookalike' PostScript interpreters. These are programs written by companies other than Adobe. Most are quicker than the original, but there are always worries that clones may not be compatible.

The Fujitsu is the only machine to have a genuine Adobe interpreter and is slow to process pages as a consequence. The Brother gives a good account of itself, except in printing the *Ventura Publisher* capability page. All was fine except for some of the numerals in the point size test (see print samples on page 140). The numerals have been redesigned in the Brother fonts, but such a discrepancy could be worrying.

The Mannesmann did best overall in the speed tests, and this wasn't at the expense of incompatibilities. Strangely, the Star was undecided about the name of its PostScript emulator.

A subsidiary compatibility issue is the LaserJet emulation which all the printers offered. Only the Brother offers anything more recent than the LaserJet II, and in addition to its LaserJet IIP emulation it could use most of its scalable fonts as LJ IIP fonts as well as PostScript ones. (See the table on page 144 for other printer emulations.)

SINCEREST FLATTERY

Adobe is the company responsible for developing the Postscript language and as such issues licenses to clone manufacturers. Three of the printers on test use PostScript emulators. As with other clone programs, these emulators are designed to provide the same functions, but with some other advantages; they may cost less to buy, be faster or provide extra facilities. In the case of the two emulators used by Brother and Mannesmann Tally, it is the cost of the Adobe licence fees and the speed of the interpreters which are the main deterrent. The Brother emulator in particular, is considerably faster than Adobe's, completing the make up of a test page in less than a third of the time of the true PostScript interpreter. While some of this speed difference may be put down to differences in printer processors and their speeds, BR-Script seems to be a great improvement on PostScript.

Where you may lose out is in the compatibility of an emulator with 'the real thing'. Again taking the BR-Script emulator as an example, the Times font it uses appears to have different numerals from the genuine Adobe font. You may not mind this variation, but for some applications it could be vital. There is also the chance of other incompatibilities. At this stage, it may still be a question of 'slow and solid' against 'fast and flighty'.

OVERALL

BROTHER	■■■■■
MANNESMANN	■■■■□
FUJITSU	■■■□□
STAR	■■■□□

The Brother HL-4PS shows what can be done with a good modern laser engine in a compact case. As well as using a fast PostScript emulator, it has the sense not

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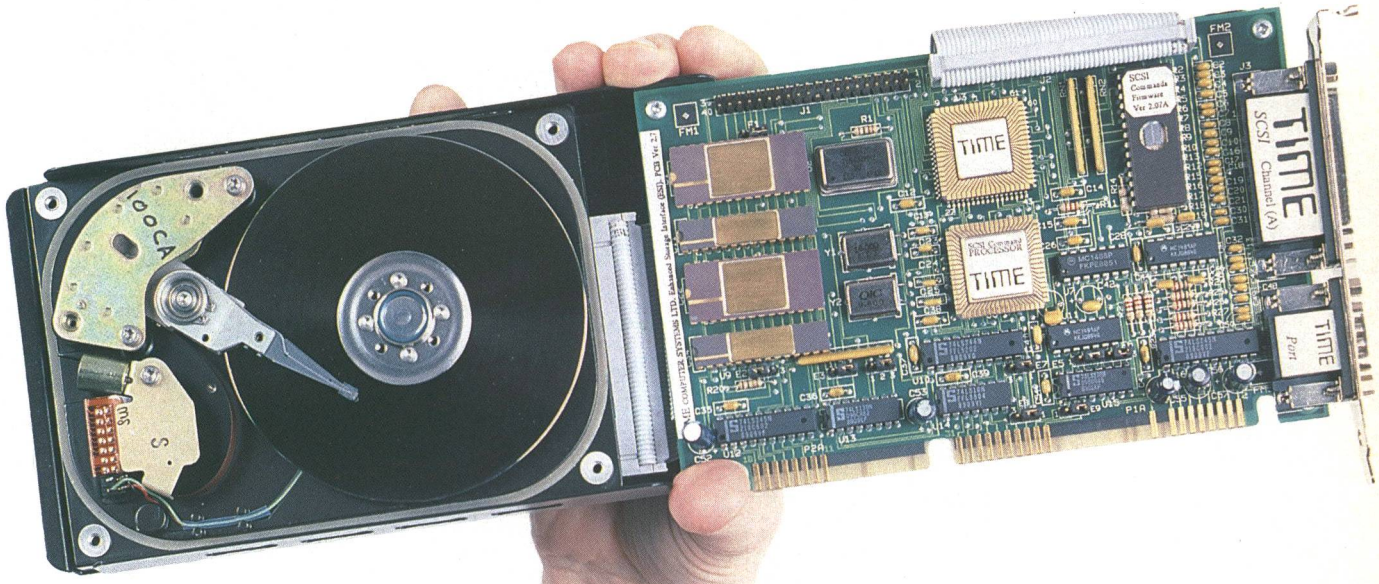

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Basically a LaserJet II clone with a PostScript emulator added, the LaserPrinter 8 is a peculiar hybrid. (left) Control is via menuing on the prominent panel. (right) The quality of our sample printout was slightly hampered by patchiness in the solid black areas.

to restrict the printer's other uses. Providing an up-to-date LaserJet emulation and use of its scaleable fonts in both modes gives it wide appeal over the complete range of PC uses. The printer is quiet and unobtrusive, and the only question mark is the odd design of some of its font numerals.

Mannesmann Tally has produced a good, solid, no-fuss PostScript printer in their MT 906PS, though the obtrusive paper-feed tray detracts from the otherwise compact design of the machine. However, it prints faster than most and has an easy menu system for setting up its many parameters.

You get a lot of printer for your money with the Fujitsu RX7100PS. It has come down considerably in price since it was first introduced. Unfortunately, this does mean that the design is a little long in the tooth, with the front exit paper tray being particularly off-putting. The machine is also noisy to the point of annoyance. However, it does come with twin feed bins as standard.

The Star LaserPrinter 8 II is a hybrid and not the most attractive in the company's range. It proved slow in use and looked rather tatty, with its stuck on name plate and projecting paper-feed tray. A new model is due from Star. ●

PC PLUS PRODUCT FACTS

	Brother HL-4PS	Fujitsu RX7100RX	Mannesmann MT906PS	Star LaserPrinter 8
Contact	061-330 6531	081-573 4444	(0734) 788711	(0494) 471111
Price inc VAT	£1,719	£2,179	£2,184	£1,724
Rated Speed (ppm) *	4	5	6	8
Resolution (dpi)	300	300	300	300
Paper sizes	A4 letter Exec B5	A4 letter Legal B5	A4 Letter Legal	A4 Letter Legal Exec B5 COM10 DL C5
Bins	1+1 optional	2	1	1
Capacity	50+250	2x250	150	150
Fonts	35+38HP	35+3HP	35	35+3HP
Font card slots	2	3	2	2
Memory Supplied	2 Mbyte	2 Mbyte	2.5 Mbyte	2 Mbyte
Max Mem	6 Mbyte	2 Mbyte	4.5 Mbyte	4 Mbyte
Dimensions WxDxH	410 x 345 x 190	405 x 700x 415	620 x 405 x 205	460 x 630 x 240
Emulations	BR-Script HP LJ IIP	Adobe PS LJ II	MT PS LJ II	LincPage HPLJ II IBM Proprinter Epson EX800 Diablo 630
Postscript Source	Brother	Adobe	Mannesmann	Star
Interfaces	Par, Ser Appletalk	Par, Ser Appletalk	Par, Ser	IBM Par, Cent Par, Serial

* These are the manufacturers' ratings. See graphs on page 141 for the results of our own tests

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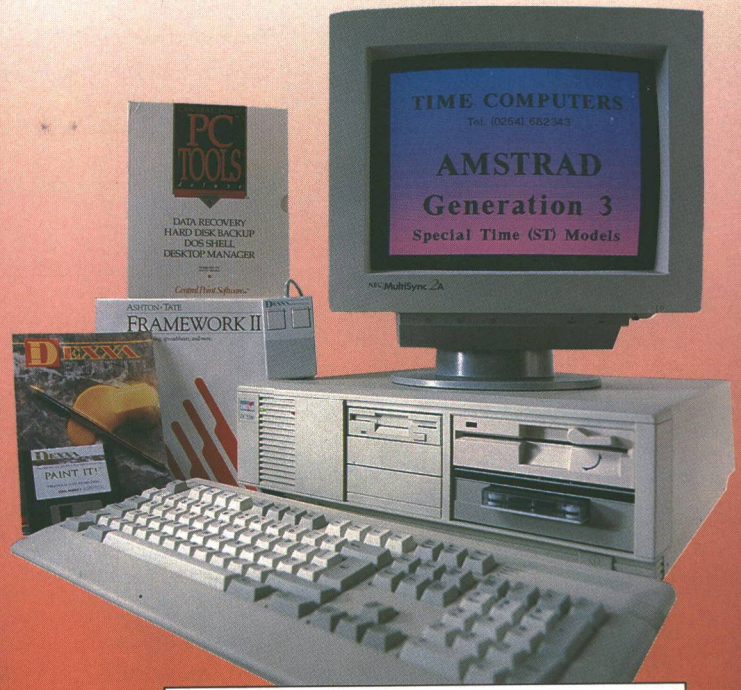

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Model	CPU	RAM	40Mb
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3386	80386sx-20	1Mb	£Call

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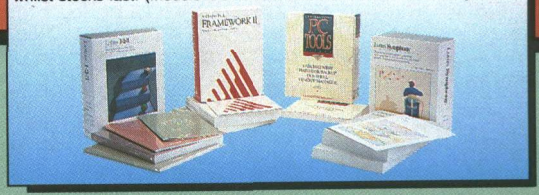
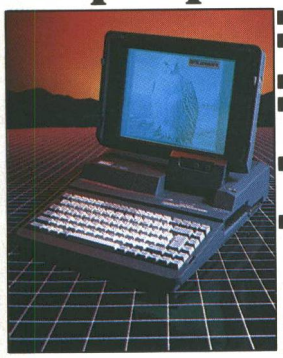


Laptops



- 80386sx-16 (ALT 386) and 80286-16 (ALT 286) models. 6Kg weight.
- 1Mb Ram. Maths Coprocessor socket. 85 Key keyboard.
- 1.44Mb 3.5" floppy disc drive.
- VGA (640X480) backlit LCD hi-res screen with 32 shades of grey.
- 2 serial & 1 parallel ports.
- Ample external ports: VGA monitor port. 5.25" floppy / tape streamer port. 102 Enhanced keyboard port.
- Removable built in rechargeable battery. Built in battery charger & switching (110/240W) power supply.
- Standard (ISA) half length 16bit expansion slot.

ALT 286 20Mb £Call
ALT 386 40Mb £Call

Special TIME (ST) models also include:-

- Mouse
- Software Pack (Select 1)
- Paint package.
- Extra RAM models
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ALT 286 *ST*

RAM	20Mb	40Mb	120Mb
1Mb	£Call	£1649	£1949
2Mb	£1599	£1799	£2099
4Mb	£1749	£1949	£2249

External Options

Ext. Keyboard	£69
Ext. Screens:	
VGA Mono	£79
VGA colour	£169
HR VGA col	£249
NEC Multisync	£329

ALT 386 *ST*

RAM	40Mb	120Mb
1Mb	£Call	£2149
2Mb	£1949	£2299
4Mb	£2099	£2449

3286 *ST*

80286 16Mhz. 1.44Mb 3.5" floppy drive. 40Mb, 100Mb (19ms) & 200Mb (15ms) autoparking hard discs. 5 expansion slots. 5 drive bays. 102 keyboard, Mouse, Paint package, Software pack. **VGA mono prices shown.**

RAM	40Mb	100Mb	200Mb
1Mb	£Call	£1179	£1529
2Mb	£1049	£1299	£1649
2.5Mb	£1079	£1329	£1679
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  - NEC Multisync 2A £250
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3386 *ST*

80386sx 20Mhz. 1.44Mb 3.5" floppy. 40Mb, 100Mb (19ms) & 200Mb (15ms) autoparking hard discs. 5 expansion slots. 5 drive bays. 102 keyboard, Mouse, Paint package, Software pack. **VGA mono prices shown.**

RAM	40Mb	100Mb	200Mb
1Mb	£Call	£1579	£1929
4Mb	£1629	£1879	£2229
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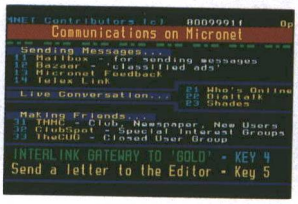



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WORK OF GENIUS

A 286 PC complete with colour Super VGA monitor is up for grabs in this month's competition. PC PLUS, in conjunction with British-based computer supplier, Multiplex computer systems PLC, is giving away a Genius 286 PC worth over £1,000.

The Genius comes equipped with a 65 Mbyte Mitsubishi hard disk drive, plus both a 5.25 and a 3.5-inch floppy disk drive. It has 1 Mbyte of RAM, which is expandable to 4 Mbytes. Twelve months on-site maintenance is also included with the prize.

As usual it's simple to enter. All you have to do is answer the five questions on the right – all the information you need can be found in this issue of PC PLUS.

The first correct answer picked from the bag on 15 March 1991 will be the winner. Please write your entry on a postcard and send it to:

Multiplex 286 PC Competition
PC PLUS
Beauford Court
30 Monmouth Street
Bath BA1 2BW

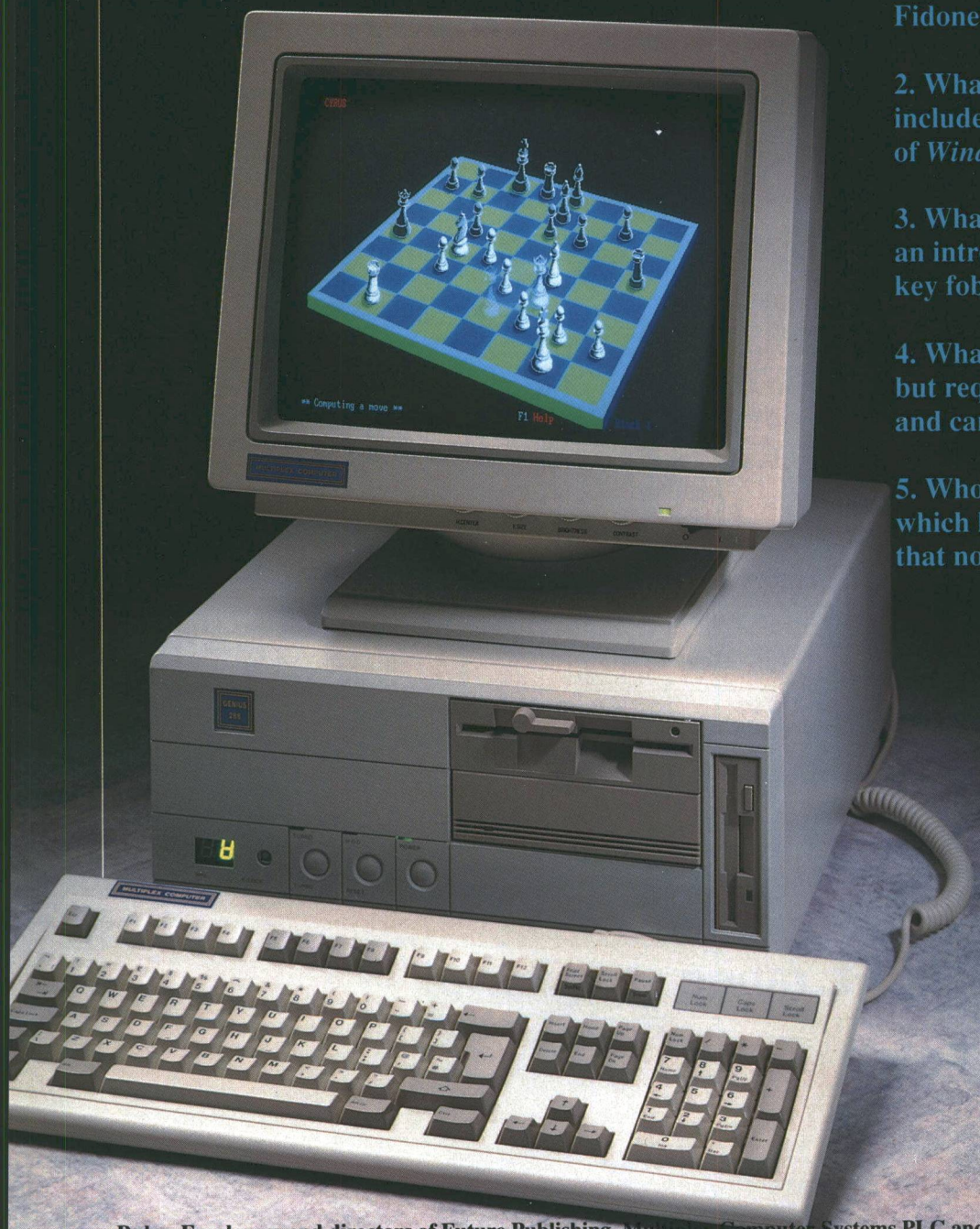
1. What started life as a Fidonet board?

2. What looks certain to be included in the new release of *Windows?*

3. What comes equipped with an introductory video, but no key fob?

4. What is simple in concept but requires fast reactions and can be addictive?

5. Who invented a system which he called Bar Charts, that now bears his name?



Rules: Employees and directors of Future Publishing, Multiplex Computer Systems PLC and associated or subsidiary companies or their agents, together with members of their families may not enter the competition. Anyone else can enter but if you try to do so more than once you will be disqualified. There is no cash alternative and the judges' decision is final. No responsibility is taken for lost entries. The prize winners names will be published in the May 1991 issue of PC PLUS.

EPSON PC's and Printers-

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The Lowest Cost XT, AT or 386
XT from £499
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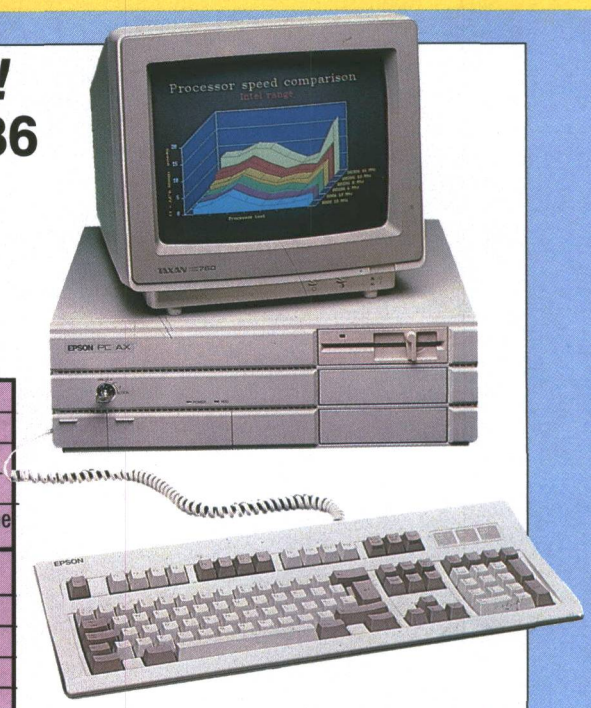
386 from £1099

All with hard disk and mono display.

The lowest cost XT, AT and 386 computers ever offered. These models offer exceptional performance at a **NEVER TO BE REPEATED** price.

	PCE	PCAX	PCAX3
Processor	10Mhz 8088	12Mhz 80286	20Mhz 80386
Memory	640kb	640kb	1MB exp. 16MB
Floppy Drive	360KB	1.2MB	5.25in 1.2MB
Hard Disk	20MB 40ms	20 or 40 MB 40ms	40MB 20ms 8kb cache
PRICES			
Mono	**£499**	**£649** (20MB)/**£699** (40MB)	**£1099**
VGA Mono	**£599**	**£749** (20MB)/**£799** (40MB)	**£1199**
VGA Colour	**£699**	**£849** (20MB)/**£899** (40MB)	**£1299**
On-site Warranty	**£35**	**£45**	**£55**
3 yr on-site w'ty	**£230**	**£290**	**£400**





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	PSE	PCAX2E
Processor	10Mhz 8086	12Mhz 80286
Memory	640KB	1MB exp. to 5MB
Floppy Drive	3.5in 720KB	3.5in 1.44MB
Hard Disks	20MB 40ms	40MB 28ms
PRICES		
Mono	**£679** MCGA	**£849** Mono
VGA Mono	–	**£949**
Colour	**£779** MCGA	**£1049** VGA
On-Site Warranty	**£35**	**£45**
3 yr on-site w'ty	**£230**	**£290**

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The *NEW* EPSON EL range

	EL2	EL3s	EL3/33
Processor	10Mhz 80286	16Mhx 80386sx	33Mhz 80386
Memory	640Kb exp. 4.6MB	1.6MB exp. 5.6MB	2MB exp. 12MB
Floppy Drive	3.5in 1.44MB	3.5in 1.44MB	3.5in 1.44MB
Hard Disk	20 or 40MB 28ms	40MB 25ms	40 or 120 MB 25ms
PRICES			
VGA Mono	**£929** (20MB)/**£1089** (40MB)	**£1349**	**£2369** (40MB)/**£2659** (120MB)
VGA Colour	**£1179** (20MB)/**£1349** (40MB)	**£1599**	**£2659** (40MB)/**£2949** (120MB)
On-Site Warranty	**£45**	**£50**	**£55**
3 yr on-site w'ty	**£290**	**£345**	**£400**



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The EPSON POWER range

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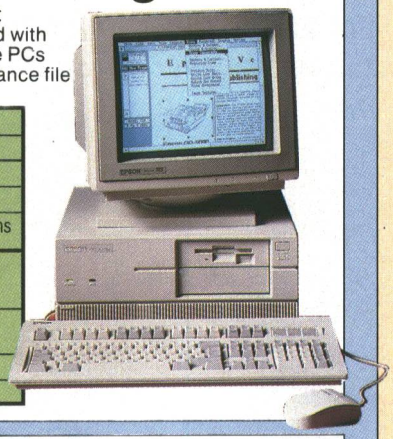
	PC AX3S	PC AX3/25
Processor	16Mhz 80386sx	25Mhx 80386
Memory	2MB exp. 14Mb	4MB exp. 16MB
Floppy Drive	3.5in 1.44MB	3.5in 1.44MB
Hard Disks	40 or 100 MB 28ms	100 or 200MB 28ms
PRICES		
VGA Mono	**£1199** (40MB)/ **£1399** (100MB)	**£2499**
VGA Colour	**£1299** (40MB)/ **£1499** (100MB)	**£2599**
On-Site Warranty	**£50**	**£55**
3 yr on-site w'ty	**£345**	**£400**



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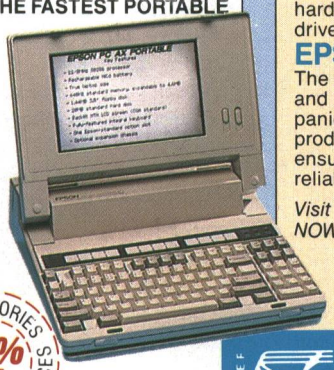
	PC AX Portable	PC AX3s Portable	PC AX3/33 Portable
Processor	12Mhz 80286	16Mhz 80386sx	33Mhz 80386
Memory	640KB exp. 4.6MB	2MB exp. 6MB	4MB exp 12MB
Floppy Drive	3.5in 1.44MB	3.5in 1.44MB	3.5in 1.44MB
Hard Disks	20 or 40MB 28ms	40 or 80MB 28ms	80MB 19ms
Power	Battery & mains	Battery & mains	Battery & mains
LCD Screen	CGA	VGA	VGA
Weight	8.05kg	8.3kg	7.85kg
PRICES			
20MB version	**£1089**	–	–
40MB version	**£1399**	**£1999**	–
80MB version	–	–	**£4499**

SPECIAL **OFFER** Epson PC Portable XT–20MB **£999**



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LQ850+88cps LQ 300cps draft, 80 col	**£439**
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FX1050 As for FX850 but with 132 col	**£339**

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GRAPHICS COUNT

A picture tells a thousand words – or so they say, and a graph can speak volumes when it comes to highlighting trends. With this in mind Tim Woodward looks at two accounting suites with graphics and charting built-in.

ACCOUNTING

The usual procedure for turning precious accounting data into a snappy pie or bar chart, is to use a spreadsheet or graphics program for the job. You would normally start by exporting the required information from your accounting package to an ASCII file, and continue by importing the newly formed file in to your favourite graphics manipulator.

There are one or two accounting systems that make the whole business easier by offering to output well-known formats, such as *Lotus 1-2-3* or DIF (Data Interchange Format) files. However, unless you enjoy dabbling in DOS and the world of file formats, getting your quarterly sales split by region and displayed in an exploded pie chart can still prove to be a pretty traumatic experience.

With the advent of the *Windows 3.0* graphical user interface, it seemed likely that someone would do something about this situation soon – and now they have. In the latest release of *DacEasy Accounting* (version 3) you can display graphical trends via the memory resident *Graph+Mate* option. Not to be outdone, Benchmark has released *Chancellor*, an updated version of the well-established *SNiP* accounting package. This new edition also boasts built-in graphics capabilities.

CHANCELLOR

● Benchmark Computer Systems Ltd

Benchmark emphasises the graphic capabilities of *Chancellor* very strongly and the ease with which they can be produced (see *Graphics*).

Aside from these new visual capabilities *Chancellor* is comprised of the usual nominal, sales and purchase ledgers. Unusually, stock control and sales order processing modules are included in the price.

Installation is a well-automated, simple affair with the entry of a passcode being one of the few demands made of the user. This copy protection device prompts for a series of digits, which must be entered before the installation can go any further. Once you've entered the passcode that's an end to the matter – no key disks required in drive A: or 'dongles' dangling down the back of your PC.

After installation the system allows a little customisation. You can choose the menu layout, either the typical pull down menu bar, or the more old fashioned full-screen type (the latter being more familiar to *SNiP* users).You must also let *Chancellor* know what sort of video card you possess.

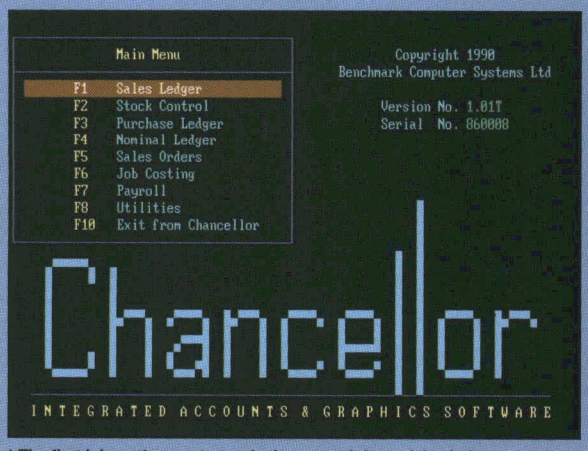
Up to 26 companies can be processed from one set of program files, and there is a switch to cater for those still on VAT Cash Accounting (see *Cash Accounting* on page 152).

DEMONSTRATIONS

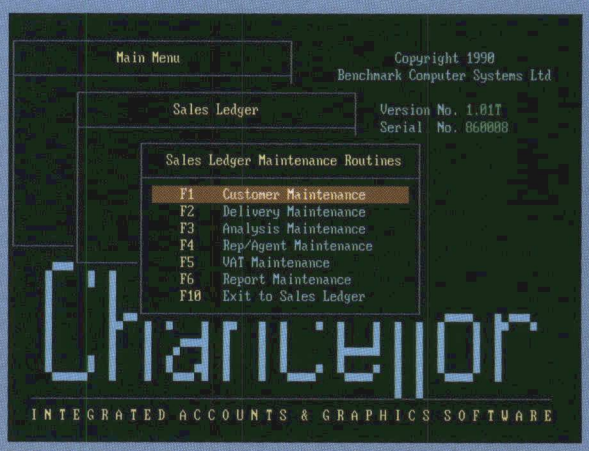
Although the package arrives with a set of demonstration data files to play with, there are no sample nominal layouts to choose from. A suggested chart of accounts is mentioned in the documentation, but you still have to set up all the nominal codes from scratch.

The nominal ledger is adequate, not being the most interesting item at the

CHANCELLOR – TURNING FIGURES INTO PICTURES



1.The first job on the way to producing a graph is to pick a ledger....



2. Next, locate the maintenance route for the file required....

GRAPHICS

When it comes to making graphs of your data, *Chancellor* offers a pretty painless method of achieving a desirable effect. Wherever there is an account maintenance routine, there is also the facility to graph data. This means you can make graphs of customer and supplier accounts, sales analysis, reps turnover, purchase analysis and nominal balances. Each of these can further provide a two-year, this-year or last-year view, or a two-year comparison. Profit versus Costs are also on the menu, along with an age analysis if this is required.

If your graph looks a bit lacking, it could be that you haven't been running *Chancellor* long enough to accumulate the two years past history. If this is the case, pressing [Alt]+[F9] will allow you to enter data directly into the graph files, and this can be done by the column or by month order. The type of graphics available cover bar, line (including high/low comparison) and stacked bar and area charts. Three dimensional effects do not appear to be possible. Rare, however, is *Chancellor*'s support for a plotter as printer for the graphics, and this obviously opens up the possibility of full colour high quality output.

DacEasy *Accounting 3.1* manages to offer graphics on the menu via a pop-up utility called *Graph+Mate*. This TSR (Terminate and Stay Resident) application must be loaded prior to the main accounting package to work, the accounting program can then be loaded from within *Graph+Mate* when required. With the help of *Graph+Mate, Accounting 3.1* data can be transformed into colourful bar, stacked bar and pie charts. Even three dimensional pie and line graphs are possible.

Choosing the data for inclusion in a graph is a little more complicated than with *Chancellor*, and basically revolves around a user-selected list of fields to include. First, you must select the file you wish to use, then the fields within that file you want to compare. Next, a range of records to graph is offered and off you go. The facility to create formulas for 'what if' comparisons and the like is a very important inclusion, as is the ability to save graph formats for later use without all the paraphernalia associated with the initial creation.

Not only does *Graph+Mate* fulfil its purpose of charting DacEasy *Accounting 3.1* data, but the program can also accept the input of ASCII files created by other applications. This opens up an altogether different range of possibilities and, when allied to the fact that DacEasy report generator output can also be processed, turns the Graph+Mate combination into an extremely worthwhile proposition.

best of times. The built-in data entry routines cover both the usual debit and credit journals and, thankfully, cashbook postings as well – the cashbook entries catering for VAT analysis. Usefully, any account can be nominated as the bank account from which to pay.

To round off the nominal ledger *Chancellor* also offers automatically reversing accruals and prepayment journals, including the ability to set-up a list of recurring entries for standing orders. If you get stuck remembering a code you can always scan through a selection of nominal accounts, or create a new one – a highly practical facility available across all the modules.

ANALYSIS

The sales and purchase ledgers are pretty much identical twins, except for order processing offered in the sales module. There are also one or two features to cater for businesses which have a large number of discount dealings, such as quantity price breaks and special prices per customer.

Further breakdown of sales can be obtained via an analysis file, and your hard-working reps can even be assigned codes to enable appraisal of their performance.

Chancellor is a bit mean in only allowing eight lines when posting entries from a previously prepared document, but this can be overcome by using the program to create and print the invoice in the first place. Printed invoices and orders can all be adapted to fit your own stationery to a certain extent, and there is a report generator in each module which is useful for those who may need to get at any extraneous information behind the run-of-the-mill data.

STOCK CONTROL

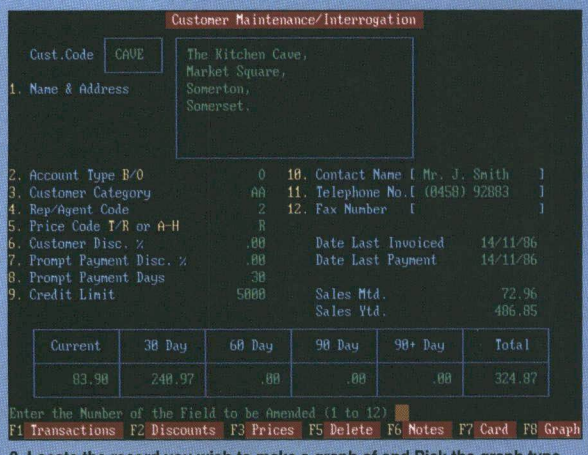
Stock control integrates automatically with invoicing, as you might expect, and although there are safeguards to prevent negative stock being invoiced you can override this if you wish – untidy but often unavoidable. Products are held on file at average cost price and, unusually, the stock control module features one level of parts explosion. This means you can nominate a single level of components that go to make up an assembly – great for those manufacturing concerns that buy in parts to make a finished article; not so brilliant for those who like to have a good mess around.

IN ACTION

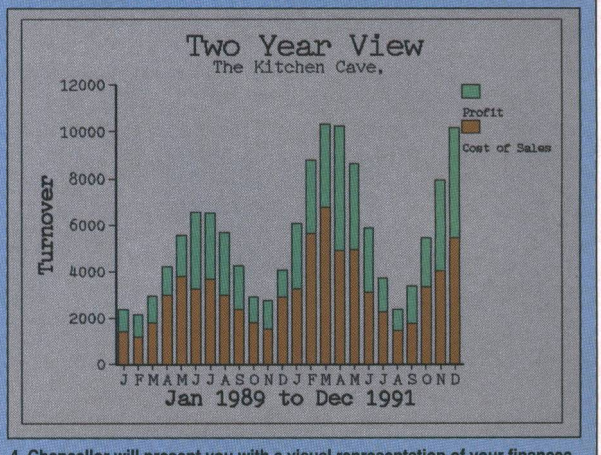
In use *Chancellor* relies almost entirely on function key control. This proves a rather less than intuitive way of working as the keys never seem to perform the same function in any two places. For example [F1] could mean 'Yes' in answer to a prompt, or it could mean 'Look up an account code' or even 'Amend a price', depending on exactly where you are in the program.

Chancellor's graphics capabilities offer an easy way to produce some quite effective pictorial representations of your financial affairs, but suffice it to say they do not play nearly as big a role in the program as promotional hype would lead you to believe. Regardless of that, the graphing options provided are both very simple to use and are unusually accessible – when it comes to

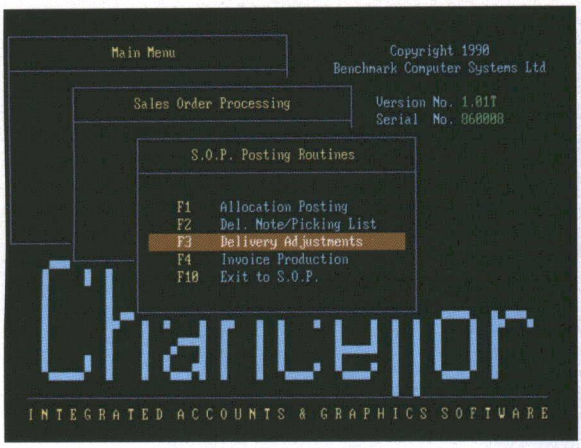
CHANCELLOR – GETTING GRAPHIC WITH YOUR ACCOUNTS



3. Locate the record you wish to make a graph of and Pick the graph type....



4. Chancellor will present you with a visual representation of your finances



● For the first time Benchmark's Chancellor offers you the option of setting up your system with pull-down menus. The *SNIP* versions are still an option, if you prefer to work in the more established way

CASH ACCOUNTING

The whole point of the VAT Cash Accounting scheme was to make life easier for cash-based businesses, who could simply calculate 15 percent of their takings and their outgoings manually to arrive at what they owed – any real benefit other than that is purely psychological. I suppose it just feels better not paying the VAT until you get paid – but then you can't claim any VAT back until you pay your suppliers either, so where is the benefit?

There is some advantage in the instant bad debt tax relief I suppose. After all, if you haven't accounted for the tax and the customer doesn't pay, then there is nothing to claim back. On the other hand, if you get that many bad debts maybe you should investigate your credit control procedure!

Cash accounting may seem simpler to you, but as a computerised accounting system manages VAT totally automatically there is no need to make life simpler for it. Indeed, computerised accounting systems actually make the changeover to cash accounting very difficult to administrate, and computerising a business that is already using the scheme can be like unravelling spaghetti.

It's nice to see the option of cash accounting on the menu, but take my advice – if you're thinking of computerising your accounts in the future give VAT cash accounting a miss!

charting accounts data that is really saying something.

PC PLUS PRODUCT FACTS

- **CHANCELLOR**
- **£918**
- **Benchmark Computer Systems Ltd**
- **(0458) 43418**

FOR	AGAINST
■ Accessible graphics.	■ Awkward function keys.
■ A/C code scanning.	■ Expensive.

RANGE OF FEATURES	■■■□□
OVERALL SPEED	■■■■□
EASE OF USE	■■■■□
DOCUMENTATION	■■■□□
***PC PLUS* VALUE VERDICT**	■■■□□

Display	Issue disk	Min hardware	Other hardware
W		HD 640	

see *Help Screen* for details of symbols

ACCOUNTING 3.1
● DacEasy (UK) Ltd.

Back in 1984 DacEasy introduced an accounting package that seemed likely to become something of a budget phenomenon. In those day's Sage was only just realising the benefits of price slashing, and DacEasy's seven modules for under £100 looked quite a bargain.

Since then of course there has arisen a whole new budget market, and briefly it seemed DacEasy had disappeared. It now seems this was mainly due to UK distribution problems, and now the company is back in force with the release of *Accounting 3.1*.

Accounting 3.1 consists of the usual sales, purchase and nominal ledgers – with invoicing, stock control and purchase order processing thrown in for good measure. Like *Chancellor*, the installation routine will quickly copy the files to your hard disk. There are, however, a few more questions to be answered before you can move on.

The system needs to know which modules you will be using, your printer type (no plotters on the list) and a whole list of descriptions for department codes, interface table codes and so on. The interface table is really an analysis function for those who don't use the nominal ledger, although the program still requires these even if you have the nominal ledger installed. For the service-based company a file also contains details of charges and descriptions for your various services – which does make invoicing a lot quicker and works similar to stock 'look-up' in practice.

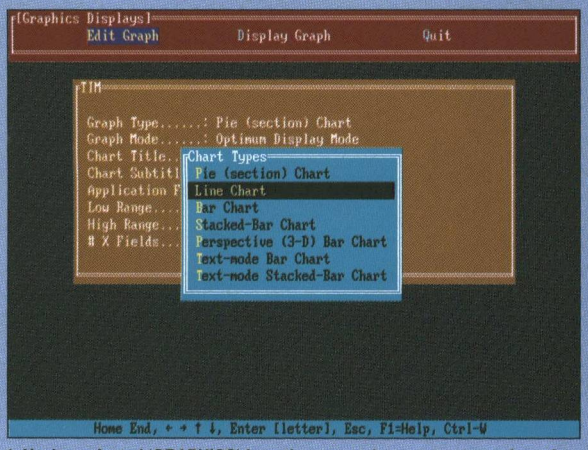
MODULES

Sample layouts are provided to get you started and further pre-defined structures biased for stock, service or even solicitors and insurance brokers are available from the technical support office. The nominal headings themselves operate in a tiered fashion, with up to five levels of sub-accounts branching off the main one. This approach enables plenty of analysis, without turning the basic layout into a cluttered mess.

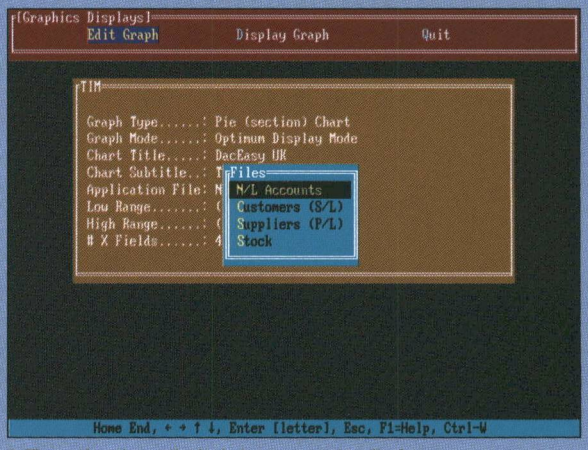
Sadly, entries to the nominal ledger direct are all debit and credit journals, without a cashbook in sight. It is still surprising how many accounting systems ignore cashbook entries, and still leave only journals for transactions directly through the nominal ledger. Obviously there are still those who mistakenly believe a business never buys anything unless it is on credit.

Accounting 3.1 doesn't offer pre-

DACEASY ACCOUNTING – CHARTING YOUR SUCCESS



1. Having selected 'GRAPHICS' from the menu, choose your type of graph....



2. Then select the particular ledger you want to display...



...power to the people

PC 486-25

25 MHZ 80486 CPU, 8K Internal Cache, 128 K External Cache support (Optional), 8 MB Ram, Both 1.2 & 1.44 MB Floppy Drives, Tower Case, Parallel/Serial Ports, MS-DOS, Mouse, Weitek Maths Co-processor Support.

	Mono	VGA
40 MB 28 MS	£2660	£2910
120 MB 19 MS	£2880	£3130
150 MB 16 MS	£3210	£3460
320 MB 16 MS	£3540	£3790

PC 386-33

33 MHZ 80386, 4 MB Ram (Option 16), 64 K Cache. Both 1.2 and 1.44MB Floppy Drives, Parallel/Serial ports, Tower Case, MS-DOS, Microsoft Compatible Mouse, 80387/Weitek Maths Co-processor Support.

	Mono	VGA
40 MB 28 MS	£1510	£1760
120 MB 19 MS	£1730	£1980
150 MB 16 MS	£2060	£2310
320 MB 16 MS	£2380	£2630

PC 386-25

25 MHZ 80386, 4 MB Ram (Option 16), 64 K Cache. Both 1.2 and 1.44MB Floppy Drives, Parallel/Serial ports, Tower Case, MS-DOS, Mouse, 80387/Weitek Maths Co-processor Support.

	Mono	VGA
40 MB 28 MS	£1290	£1540
120 MB 19 MS	£1510	£1760
150 MB 16 MS	£1840	£2090
320 MB 16 MS	£2170	£2420

PC 386S-20

20 MHZ 80386SX, 1 MB Ram, 1.2 or 1.44MB Floppy Drives, Parallel/Serial ports, Mini Tower Case, MS-DOS, Mouse, 80387SX Maths Co-processor Support.

	Mono	VGA
40 MB 28 MS	£850	£1100
120 MB 19 MS	£1070	£1320
150 MB 16 MS	£1400	£1650
320 MB 16 MS	£1730	£1980

PC 286-20

20 MHZ 80286, 1 MB Ram, 1.2 or 1.44MB Floppy Drives, Parallel/Serial ports, Desktop Case, MS-DOS, Mouse, 80287 Maths Co-processor Support.

	Mono	VGA
40 MB 28 MS	£780	£1030
120 MB 19 MS	£1000	£1250
150 MB 16 MS	£1320	£1570
320 MB 16 MS	£1650	£1900

PC 286-12S

12 MHZ 80286, 640 K Ram, 1.2 or 1.44MB Floppy Drives, Parallel/Serial ports, Slim Desktop Case, MS-DOS, Mouse, 80287 Maths Co-processor Support.

	Mono	VGA
40 MB 28 MS	£680	£930
80 MB 19 MS	£850	£1100
120 MB 19 MS	£900	£1150

HAVAL WKS Workstations From £480.00
All Systems come with 102 Key Keyboard, 14in Monitor, 12 Months full warranty with a full 14 day money back guarantee.
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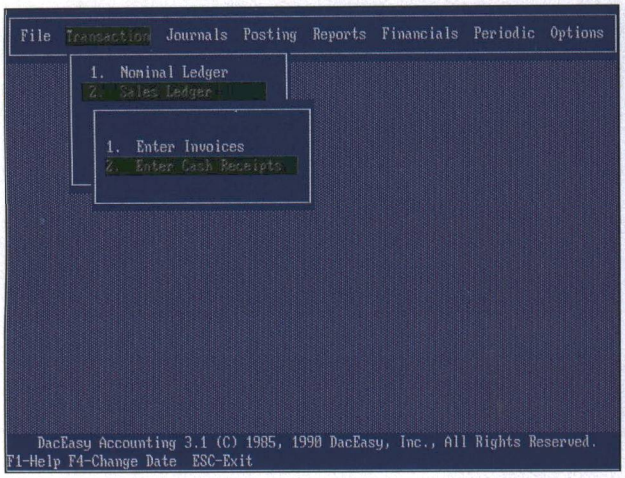
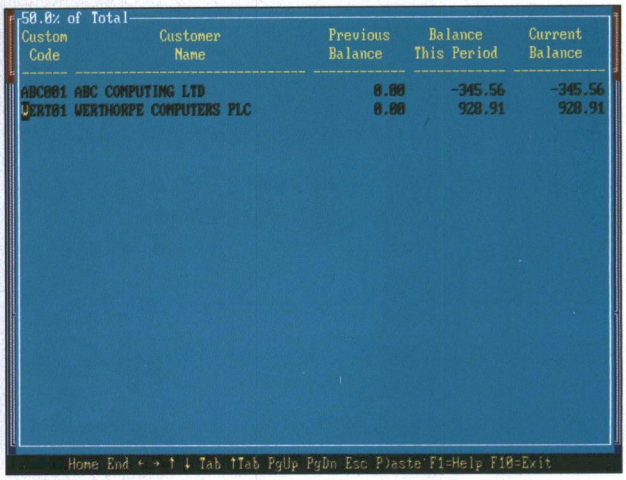
Telephone: 021-359 1807 Fax: 021-333 3094



● Like the *Chancellor* accounting package, DacEasy also offers convenient drop-down menus. They're a quick and handy way of making selections



● DacEasy doesn't present quite so refined an account list as that offered by *Chancellor* – but it still does the job quite satisfactorily

defined accrual, prepayment or recurring journals, in fact the only item of interest in the nominal ledger would seem to be the inclusion of forecasting capabilities. These are a great way of arriving at next years' budgets however, turning out figures based on either the previous year plus a percentage, the trend since last year or even a straight line method based on the last three years statistical data.

SALES & PURCHASES

Accounting 3.1 manages one or two surprises in the sales and purchases ledgers. For instance, the program supports a regime of finance charges for overdue accounts – useful in the current world financial climate. The program will add to the customers' account a sum based on the finance charge you specify for each sales ledger account, calculating its figure per 30-day period on a pro-rata basis. A nice idea, but as the manual points out this practice is not widely accepted yet in the UK – so be prepared to offend if you use it!

Like *Chancellor*, invoicing and stock control are linked to provide automatic look-up and inclusion during sales invoicing. Products are valued at standard, average or latest cost but unusually are allowed only one sales price. A useful stock-take entry routine, however, makes life a little bit simpler when you need to adjust stock levels.

Many of the extras, available separately for previous versions, now come parceled with DacEasy *Accounting 3.1* in the form of *Graph+Mate*. For example, you can now look-up account codes and create new accounts whilst posting transactions, export data to ASCII files and customise the management reports. *Mate* actually manages things you might expect the basic program to handle anyway, so it is about time the whole parcel was marketed together. The 'Graph' part of the deal, however, adds dimensions not found on the *Chancellor* menu (see *Graphics)* – although these require a little bit of effort.

This latest version of DacEasy's accounting software does seem to offer a lot for the money. The *Graph+Mate* utilities do make the program more functional than before, although their 'pop-up' nature still gives something of a bolt on feel to the upgrade.

Accounting 3.1 is well worth your attention, it has more functionality and works out a lot cheaper than *Chancellor*. That said, the manually instigated update from subsidiary ledgers and a lack of cashbook facilities in the nominal ledger both contrive to make the program look a little old fashioned in these days of 'real time' accounting. ●

PC PLUS PRODUCT FACTS

- **DACEASY ACCOUNTING 3.1**
- **£200**
- **DacEasy UK**
- **081-780 2400**

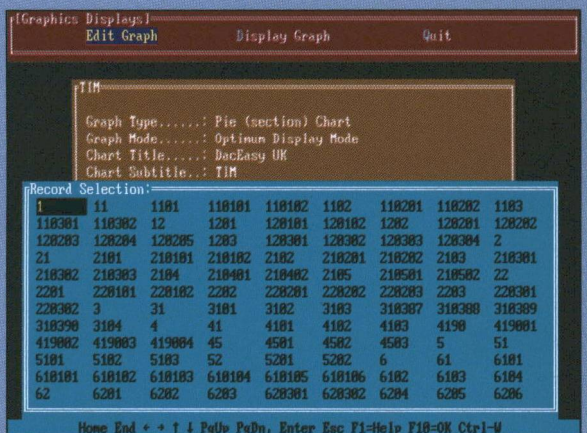
FOR	AGAINST
■ Useful and good value.	■ Lack of cashbook.
■ *Graph+Mate* extras.	■ Improvised extras.

RANGE OF FEATURES	■■■■□
OVERALL SPEED	■■■■□
EASE OF USE	■■■□□
DOCUMENTATION	■■■□□
PC PLUS VALUE VERDICT	■■■□□

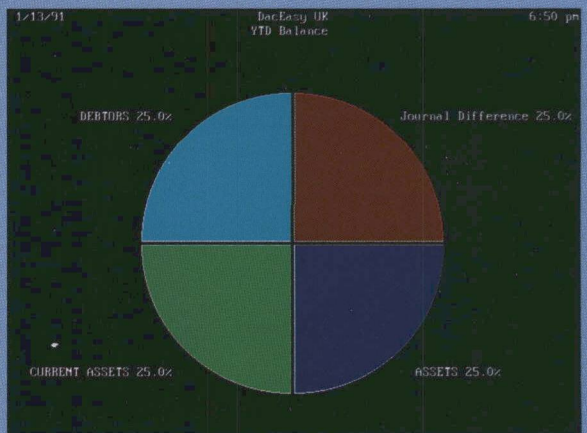
Display | Issue disk | Min hardware | Other hardware

see *Help Screen* for details of symbols

DACEASY – ACCOUNTING FOR YOUR PRESENTATIONS



3. Define which fields to include in the chart, then pick the records to view



4. And that's the result, fairly uninformative here due to the lack of data

Tandon 386/N

The compact 386sx business system...

The new 386/N business PC range from Tandon is based on an ergonomic and very attractive slimline design. Despite being only 2.5 inches tall, it does not compromise on quality, reliability, specification and performance.

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TIME are the UK's largest authorised Tandon dealers. We provide all models fully tested and ready to use with full after sales support and a 3 year Time-Cover warranty option. The high performance ***ST*** models are only available from TIME & come with over £500 worth of software and extras. E.g. Framework II, PC-Tools, Mouse, Paint pack, extra RAM etc.

at a price that is right.

The 386/N is part of the entry level range from Tandon and as such it comes at an entry level price which makes it incredible value.

A 286 too!

The N range from Tandon also includes the 286/N based on the 286-12 cpu which also provides excellent value.



TIME for Tandon

The new N range is available in Standard or the more popular high performance Special Time (***ST***) models.

Standard Models

Standard models come with 1Mb RAM, 3.5" 1.44Mb floppy drive, 2 free 16bit expansion slots, 2 serial ports, 1 parallel port, 40Mb, 100Mb (19ms) or 200Mb (15ms) hard discs. 102 keyboard, Dos 4.01. Password protection. VGA mono prices shown. VGA colour models are £150 extra.

Model	40Mb	100Mb	200Mb
286-12	£Call	£1099	£1499
386sx-16	£Call	£1299	£1699

3 Year Warranty

Comprehensive 3 year Time-Cover warranty option covering all parts, labour & carriage costs and full provision of free loan equipment should yours need repair. Includes labour and carriage cost-free upgrade services. Please call for details.

ST Models

ST models include all the features of standard models and the following extras:-

- **PC-Tools** Deluxe 6.0 software utilities package. The best utilities package in the world! RRP £115
- Ashton-Tate **Framework II** integrated software package. (wordprocessing, Spreadsheet, Database, Graphics and much more.) Worth over £400.
- Microsoft Compatible serial **Mouse** and software.
- Comprehensive **paint** package
- Additional high performance hard discs models. 40Mb may be insufficient for business use. We strongly recommend at least 100Mb hard disc capacity.
- Additional RAM (1Mb, 2Mb, 4Mb or 8Mb RAM models). We recommend a minimum of 2Mb RAM.

80386sx-16 or 80286-12. 1Mb, 2Mb, 4Mb or 8Mb(386sx only) RAM models. 3.5" floppy drive. 2 Free 16 bit expansion slots. 2 serial & parallel port. 40Mb, 100Mb (19ms) or 200Mb (15ms) hard discs. 102 keyboard, VGA mono, VGA colour or NEC Super-VGA screens. Dos 4.01. All the above extras. Optional **3 year** warranty. 386/N ST also availble with 8Mb RAM (£400 extra to 4Mb prices).

ST	286/N *ST* models			386/N *ST* models		
RAM	40Mb	100Mb	200Mb	40Mb	100Mb	200Mb
1Mb	£899	£1199	£1599	£1099	£1399	£1799
2Mb	£999	£1299	£1699	£1199	£1499	£1899
4Mb	£1199	£1499	£1899	£1399	£1699	£2099

VGA mono prices shown. Other options extra

VGA Colour **£150**
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NETWORKS

PART iii

NOVELL NETWARE

In the third part of our focus on networking we turn to the standard-bearing Novell Netware. Manek Dubash examines this dedicated operating system aimed at larger scale networking requirements.

Back in 1983 Novell made its mark on the PC industry by being first in the uncharted field of networking. Microsoft built no networking support into MS-DOS. In an area without standards, whoever got there first would define them.

Networking was seen as a means of sharing expensive peripherals such as printers, hard disks and modems. Now the buzzwords are data sharing and workgroup computing.

Since then, Novell has built itself into the position of market leader, especially at the workgroup or departmental level. Novell claims *Netware* runs a total of 400,000 network servers worldwide, supporting over four million users.

In reaching this position, Novell has spawned a variety of networking products centred around the various levels of red-boxed *Netware*. Novell's *Netware* comes in a number of flavours, each geared to specific needs – and cunningly specified so that you are likely to want that extra feature that only upgrading will bring. It is this multi-level product range that has probably been the major factor in the Utah company's success.

Complexity characterises Local Area Networks (LANs) – not surprising when you consider both the sheer number of components that must work together, and the potential number of combinations of hardware and software that the Network Operating System (NOS) must service. This situation prompted Novell to institute a certification programme to test various pieces of hardware – file servers and network adaptor boards in particular – for adherence to nascent industry standards and its ability to run *Netware*. In this sense, Novell has been instrumental in eliminating 'almost-compatible' machines as hardware manufacturers seek to display the *Netware*-certified label.

However, a machine absent from the certification list may be just as capable of running *Netware* as one that appears. Maybe the maker did not bother to submit it for testing – Novell levies a charge for the service – or maybe it is too new to appear yet. We have found, for example, that a number of machines

THE NETWARE PRODUCT RANGE

The major distinctions between *Netware* levels relate to capacity, such as the number of workstations they can support (even the lowest level will support a virtually unlimited number of users, but only four concurrently). Another is the processor type they demand, as suggested by the name of the most powerful, *Netware 386;* the remainder will run on a 386 but in 286 mode.

Another major difference is that lower levels of *Netware* can be run in non-dedicated mode – that is, the server will act as a workstation as well. The only advantage is a saving on one computer. This is an unsafe and speed-sapping situation, though, as the savings on a computer could be wiped out if a DOS application crashes. In that case, all unsaved network files will be lost, potentially costing more than the £1,000-odd price tag of a reasonably-specified 286 server.

Only *Netware 386* will load additional modules that add to its functionality while up and running. The others need the server to be taken down and the VAP (Value-Added Process) file loaded. Similarly, if the hardware changes (if you add a new disk drive, for instance) the operating system program file will need to be regenerated. It is not a difficult task but is less convenient than being able to add extra features on the fly, as with the *386.*

NETWARE ELS (ENTRY LEVEL SOLUTION) LEVEL I ● £595

The cheapest *Netware* system is designed for small setups of up to four concurrently-active workstations. It makes the lowest demands on the hardware although, as with most network systems, the more memory available, the better performance will be. It cannot accept VADDs (Value Added Disk Drivers) as the system's built in disk drivers recognise only Western Digital-controlled devices so no alternatively-interfaced drives, such as IDE, SCSI or ESDI, can be attached. Third party software in the form of VAPs (Value Added Processes) are also unacceptable to *ELS I.*

ELS LEVEL II ● £1,415

Aimed at small companies and departmental workgroups, *ELS II* is closer to the rest of the *Netware* family by virtue of its greater connectivity, openness and hard disk capacity. The number of concurrent users is doubled, though still relatively limited and, according to Novell, performance is up. One of the main changes from *ELS* level I is the addition of support for the Apple Macintosh, together with the removal of the two volume limit on hard disks. UPS (uninterruptible power supply) and OS/2 v1.1 workstation support appear for the first time too, as do full security and accounting features. It also has limited internetworking via the serial port.

ADVANCED NETWARE V2.15 ● £2,495

Advanced Netware is aimed at medium-sized companies starting out in networking or those needing internetworking. It has all the *ELS II* features, and openness is increased by the degree to which it will internetwork and connect to mainframe hosts. The number of users increases markedly along with performance and the amount of disk space the server will accommodate – see table on p.160 for details. Up to four network cards can be run off *Advanced Netware* for internetwork bridging. Note that *Netware 286's* limit of five printers can be exceeded using an optional print server kit.

without certification run *Netware* perfectly well. However, when entrusting a number of people's work to a single machine containing one or more disk drives, it may be wise to err on the conservative side and seek a certified machine to use as your server.

NETWARE LEVELS

Novell provides three tiers of product: *ELS* (Entry Level System), *Advanced Netware* and *Netware 386* version 3.1 (See *Netware Product Range*). We will be taking a detailed look at what each level provides, and where it's suited.

For the purposes of this review we assume that purchasers will have *Netware* installed for them – in the case of *ELS* and *Advanced Netware* this is probably the best and certainly the least complex initiation procedure. First we will look at the features common to the three products.

COMMON FEATURES

The key difference between *Netware* and most other network operating systems is that it is dedicated – it does not run on top of DOS but can take over the entire machine, formatting the disk in a special manner so that a user with, for example, a copy of *Norton Utilities* cannot peek in and copy data.

All *Netware* versions are now free of the keycard copy protection feature, which Novell removed a couple of years ago following considerable user disgruntlement. All use the same IPX transport protocols (the software standard for transferring data across the physical link of network interface cards and cabling) – an area where Novell has been less successful in establishing a standard, as programmers still tend to write for IBM's NETBIOS alternative. However, all versions of *Netware* include a NETBIOS emulation, and all support both Token Ring and Ethernet hardware architectures.

All *Netware* versions use a number of mainframe-style techniques for improving disk performance. For instance, 'elevator seeking' queues up disk access requests and performs them in an order which results in the lowest number of head movements, and so lowers seek times.

'Directory hashing' holds in memory an index of each file's position so that, when a read or write is to be performed, *Netware* does not have to look at the disk for its location nor scan through a long list of filenames to match the workstation's request. And that standby for users of slow disk drives, a disk cache, retains chunks of disk data in memory, second-guessing what will be requested next and reducing the need to look at the disk at all.

DATA PROTECTION

Data protection is one of *Netware's* key features. All versions duplicate both the directories and the File Allocation Table (FAT) – MS-DOS only duplicates the FAT, which tells the operating system where files are stored.

At disk initialisation time, *Netware* sets aside two percent of disk space as a 'Hot Fix' area; subsequently, each disk write is compared to a copy in memory before the system discards it, and if the

NETWARE SECURITY

The level of security provided by *Netware* is typified by the way it handles passwords typed in at workstations; they are encrypted before their voyage down the wire rather than at the file server, thus lessening the risk of security breaches via cable tapping. Password formats can be set for both individuals and groups to ensure they are a minimum length and that they are changed regularly. Passwords can be allotted an expiry date and the supervisor can configure the number of failed login attempts allowed before the system rejects a user.

Login scripts tailor drive mappings and messages; the supervisor can instate a suite of menus that typically offer users an application choice list, rather than having to type in commands at the DOS prompt.

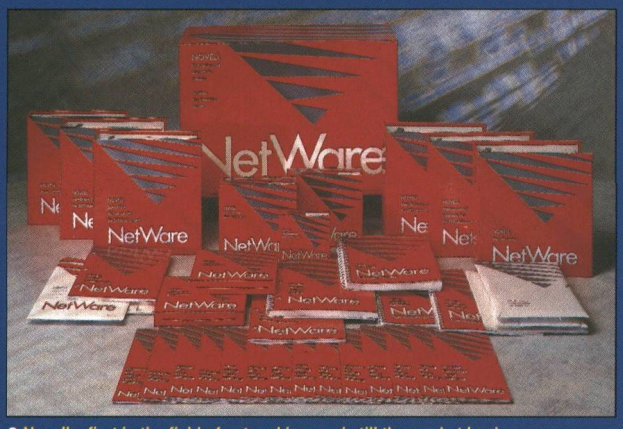
Netware permits restrictions to be placed on the times and places at which users can log in so that, for example, the supervisor can ensure that those normally expected on the network during working hours cannot log in furtively after everyone else has gone home. Restrictions can be placed too on the amount of disk space each user is allotted.

Netware also allows control over the files and directories that individual users or groups of users can see. For instance, users can be allowed to read the file listing in the 'public' directory, where *Netware* places its utility programs, but they may not change or add files. Other so-called 'trustee' rights allow users, for instance, to write but not modify access control for other users, which can be useful for shared directories.

Separate rights can be attached to files and directories which apply to all users and are *Netware's* equivalent of DOS' read-only attribute for security purposes.

With all these tools, *Netware* remains ahead of the game in the security field, but it can be tricky to sort out. To help, a *Netware* utility will report on what it considers breaches of security on a user-by-user basis.

Finally, *Netware* allows computing departments to charge user departments for the amount of time and/or disk space they consume, a feature geared towards larger organisations.



● Novell – first in the field of networking, and still the market leader

SFT ADVANCED V2.15 ● £3,725

SFT (System Fault Tolerant) *Netware* is designed for 'mission-critical' applications. Running in dedicated mode only, it adds data integrity features to *Advanced Netware* like disk mirroring, disk duplexing and transaction tracking. Disk mirroring involves duplicating the server's hard disks, and writing and reading identical data to both drives. Should one disk fail, the other will shoulder the load automatically. And duplexing carries the same redundancy principle to the entire disk sub-system, including drive power supplies, controllers and cabling. Dual systems should yield better performance too.

SFT's transaction tracking is aimed at ensuring that, if a group of files in a database is being updated when a failure occurs, only the current transaction is lost. When normal service is resumed, the system rolls back to the last successfully completed transaction, while under a non-tracked regime, the whole file could be corrupted or lost.

NETWARE 386 ● £5,995

Novell's flagship product is intended to substantiate the company's relentless drive upmarket. Introduced last year, *Netware 386* was rewritten to exploit 386-specific instructions; it will also use 486-specific features. Its capacity is dramatically increased and volumes can now span disk drives which means the tragedy of having to split disk drives larger than 255 Mbyte into a number of logical volumes is abolished; it should also lead to better performance. *Netware 386's* maximum of 32 terabyte (32 million megabyte) hard disk space is theoretical as no PC can yet accommodate that many drives. Its fault tolerance features are identical to those of *Netware SFT*.

And due to the 386 chip's dynamic memory management, the network installer need no longer cast its configuration in concrete, only to have to bring the server down to regenerate the NOS when usage changes. Instead, *386* works out for itself what configuration is needed and allocates resources, such as file cache memory, routing tables and directory buffers on the fly.

It also brings a new concept in user management. Workgroup management allows you to set up groups managed by departmental supervisors; workgroups are an addition to *Netware's* existing user groups who may remain grouped by function rather than department.

two are not identical, the information will be redirected to the Hot Fix Area. This system is dubbed System Fault Tolerance (SFT) level I; a more powerful level II version is found in more advanced *Netware* versions.

USER PERSPECTIVE

As described in the opening of our networking series (PC PLUS issue 52), *Netware* is a 'dedicated server' system, in which one PC acts as a file server, sharing its hard disks, printers and other devices with a group of 'workstation' PCs. The server runs Novell's own *Netware* Server Operating System, and the Workstations run (most typically) MS-DOS, plus Novell interface software and, of course, MS-DOS application programs.

Most versions of *Netware* look much the same from the workstation. The menus are very similar and most utilities are common to all versions. However, *Netware 386* does offer some new commands, and removes some previous utilities. (These changes will be discussed later).

Workstation memory usage is a *Netware* strong point. With some network drivers demanding anything up to 200K of workstation memory, today's RAM-hungry applications are often finding it difficult to function under such circumstances. *Netware's* workstation drivers occupy a relatively miserly 56K, and have the option of being loaded into high memory (above the 640K MS-DOS limit) on a 386 or 286-based machine, leaving the conventional memory unaffected.

Alternatively, recent releases of the workstation software will run mostly in expanded or extended memory leaving around 5K in main memory in addition to the IPX hardware driver's 16K. From our tests it seems that Novell still needs to finish polishing these drivers to work flawlessly with other applications using expanded or extended memory; they still tend to crash the system.

All versions provide three types of user: the supervisor (a 'go anywhere do anything' account created when the file server is first set up), operators of the file server console, and ordinary users and groups of users.

It is the supervisor's job, as the sole initial user, to set up accounts for others. If there are more than a few, it is a rather repetitive chore creating identical or near-identical accounts, so *Netware* offers user groups, whereby a single account can be 'cloned' by the simple expedient of giving it a new name and password; the rest of its security rights and other privileges remain just the same as the account from which it was cloned.

Netware's user groups also allow users with similar needs to be added to a group, thereby giving them all access to the same files. None of this stops each user being given their own home directory in which they can store private files visible only to the supervisor.

PRINTING

If the Novell-supported Netwire conference on the CIX on-line conferencing system is typical, then most of the technical support questions Novell receives relate to printing. This is due not to any deficiencies on *Netware's* part but to the complex nature of the problem.

To address these problems, *Netware* provides workstation utilities and a server queue manager. Alternatively, print jobs can be spooled to a disk file and printed later using another utility. The queue manager will, for example, print banner pages so that users can identify their job, alter a job's priority and multiply the number of copies as required.

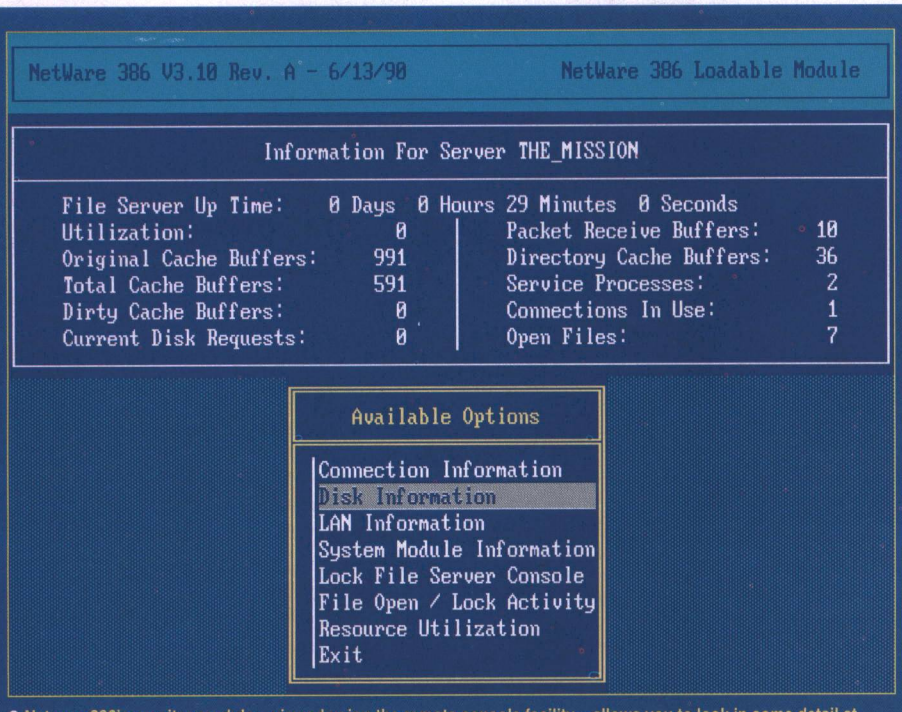
OTHER FEATURES

Netware's other services include the purging of deleted files – it keeps dead files for a user-definable period or until the disk space they occupy is needed by live files. Some *Netware* features should have been part of DOS, such as a report of disk space usage in the current directory; in all versions apart from *386*, a *Netware* volume is restricted to one physical disk drive. It allows directories to be renamed, a shameful omission from DOS. And Novell provides various network utilities so that for instance, you can view who else is logged in, check which servers are available and broadcast messages.

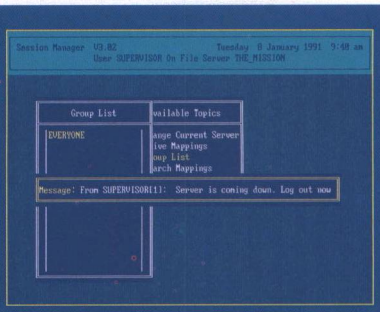
CONCLUSIONS

Novell's position is not all sweetness and light. Criticisms flew at the lateness of *Netware 386* – although most major software companies have had this sort of trouble recently. And *Netware* does not include any form of network analysis tools that would allow administrators to sort out traffic bottlenecks – a bit like trying to redesign Hyde Park Corner without having seen either it or even a map. Some users have also experienced difficulties with Novell's NETBIOS emulation.

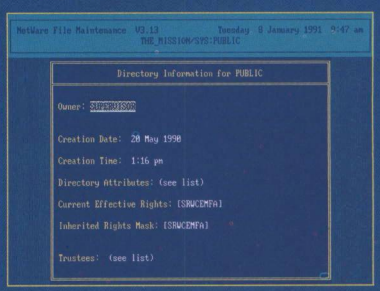
Nevertheless, the products offer high functionality and performance, and are cleverly marketed: *ELS II* offers just



● Netware 386's monitor module – viewed using the remote console facility – allows you to look in some detail at memory allocation, at connections and open file information.



● The session manager shown above will broadcast a message, change drive and search mapping and switch servers



● The Filer facility allows users, owners and attributes of files and directories to be altered – this option is open to specified users

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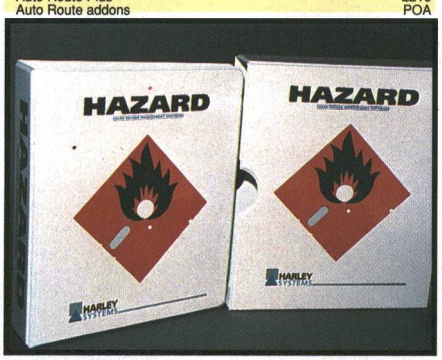

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enough extra features for those who may not need the added capacity to want to upgrade to it. Similarly, *Advanced Netware 286 v2.15* adds hardware independence, allowing a wider range of servers and larger, faster disk drives to be used. *SFT* is a specialist product offering the reassurance of data integrity features, albeit at a price. Some of its features could be replaced, for most, by a well-maintained and properly observed backup procedure. *Netware 386* is a high-powered, future-proofed product which can bring data across the network faster than many machines can deliver it from a local drive. Novell provides upgrade paths between each system.

For the average small business, *Advanced 286* is probably as high as you need to go and, in most cases, *ELS* levels I or II are likely to satisfy and have the supreme advantage of low hardware requirements.

With Novell's market clout, wide product range and third party support, it looks like staying in the network driving seat for a good while longer. ●

PC PLUS PRODUCT FACTS

- **NETWARE**
- **Prices – *See page 156-7***
- **Novell (UK) Ltd**
- **(0344) 860400**

FOR	AGAINST
■ Product range.	■ Cost.
■ Third-party support.	■ Complex to set up.
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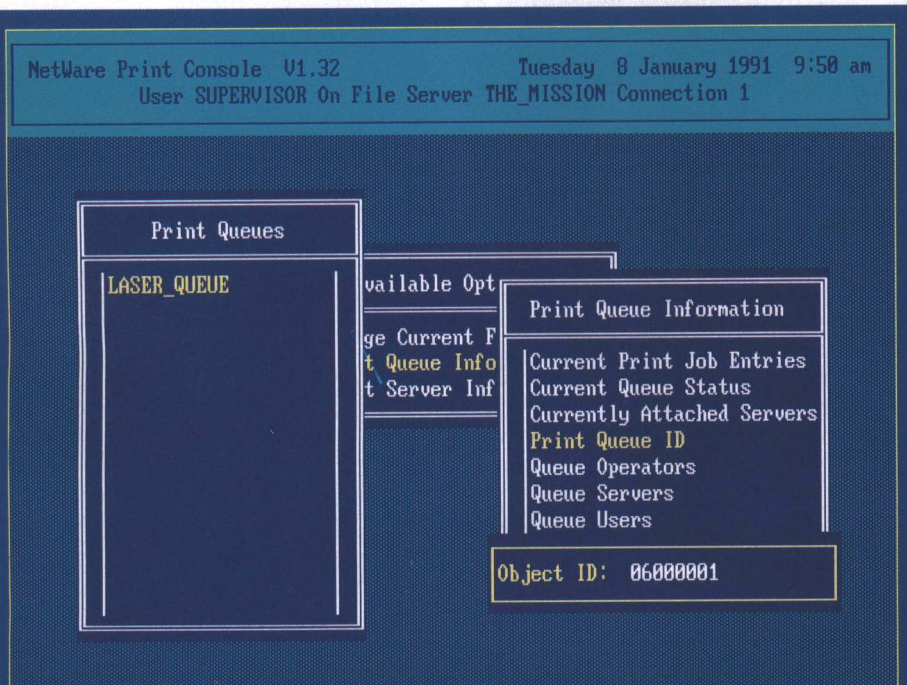
Display	Issue disk	Min hardware	Other hardware
H C E V	High Density	HD 1 Mbyte	EMS

see *Help Screen* for details

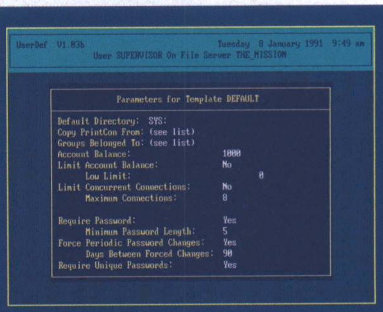
PC PLUS PRODUCT FACTS

NETWARE VERSIONS Latest version	*ELS I* 2.15	*ELS II* 2.15	*Adv* 2.15	*SFT* 2.15	*Netware 386* 3.10
Max concurrent users	4	8	100	100	250
Max no. printers	5	5	5	5	16
Max no. open files	1,024	1,024	1,024	1,024	100,000
Max file size (Mbyte)	256	256	256	256	4,000
Max no. files / volume	32,000	32,000	32,000	32,000	32,000
Max volume size (Mbyte)	255	255	255	255	32,000,000
Max no. drives	2	2	32	32	1024
Max no. volumes	2	32	32	32	32
Minimum CPU required	80286	80286	80286	80286	80386*
Non-dedicated server	Y	Y	Opt	N	N
Min RAM req'd (non-ded)	2 Mbyte	2 Mbyte	2 Mbyte	N/A	N/A
Min RAM req'd (ded)	1 Mbyte	1 Mbyte	1 Mbyte	2 Mbyte	2 Mbyte †
Ethernet support	Y	Y	Y	Y	Y
Arcnet support	Y	Y	Y	Y	Y
Token Ring support	N	Y	Y	Y	Y
Macintosh support	N	Y	Y	Y	Y ‡
NETBIOS emulation	N	Y	Y	Y	Y
Password encryption	N	Y	Y	Y	Y
Non-std disk interface	–	–	Y	Y	Y
3rd party s/w	N	Y	Y	Y	Y
UPS support	N	Y	Y	Y	Y
Transaction tracking	N	N	N	Y	Y
Disk mirroring	N	N	N	Y	Y
Disk duplexing	N	N	N	Y	Y
Accounting	N	Y	Y	Y	Y
Message handling	N	N	Y	Y	Y *
LAN-LAN connections	N	Y	Y	Y	Y
LAN-mainframe	N	Y	Y	Y	Y
WORKSTATIONS					
Minimum CPU required	8088	8088	8088	8088	8088
Base RAM required	256	256	256	256	256
RAM overhead	56K	56K	56K	56K	56K
No. utils:	52	52	52	52	65

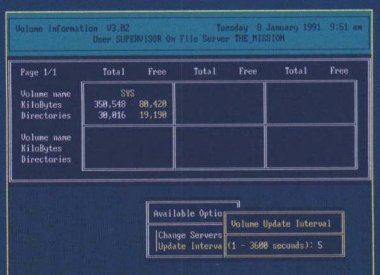
* Add 1 Mbyte of RAM for hard disks of 70 Mbyte and over
† Note that only *Netware 386* allows a volume to span morethan one physical drive
‡ Optional extra



● The print console, run at the workstation, is for tasks such as manipulation of print job priorities and users. Print jobs can also to be spooled to a disk file and printed later using another utility



● Userdef gives access to user management facilities, including the default settings for passwords as seen here



● Volume information is available using, among other tools, Novell's volume information utility, whose information is updated regularly

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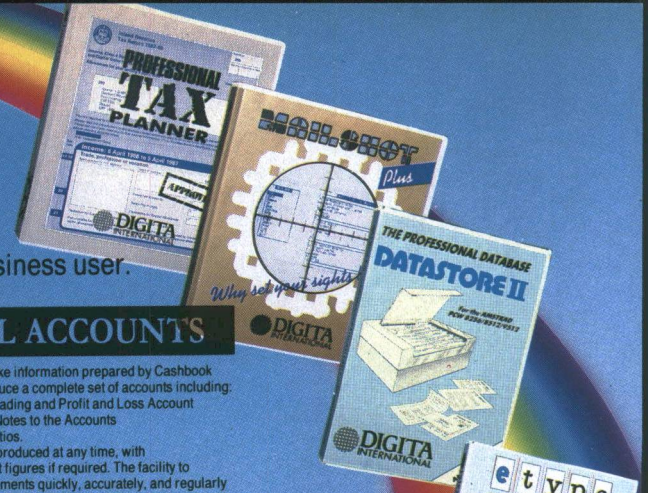

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PAUL STEPHENS

I recently spent an enjoyable 90 minutes talking to Tom Cairns, newly-appointed boss of Tandon in the UK. The meeting is part of a growing trend towards 'non-disclosure' briefings, in which companies tell us (some of us) their secret product plans in return for a signed promise not to publish them before the authorised date – useful, but a bit frustrating on the odd occasions when they tell you about something really big, and you've got to keep shtum for weeks or even months.

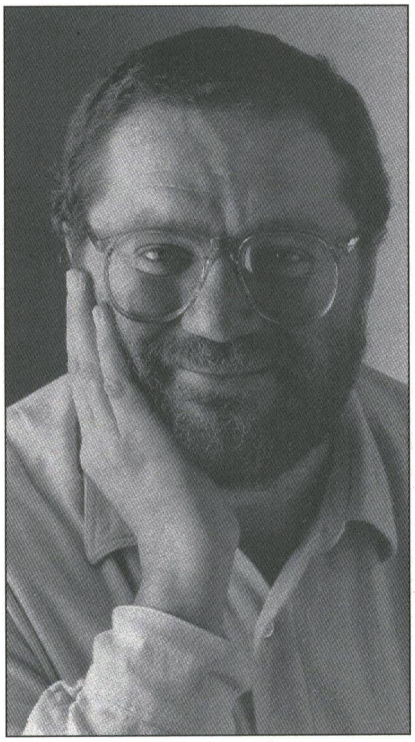
Thus I can't write about forthcoming launches in any detail, except to say that they've got a semi-new hardware idea which, if a success, could make choosing and buying a PC a bit less of a gamble – figure it out for yourselves!

Tandon started life as a disk company – its founder Jugi Tandon apparently claims to have invented the floppy disk, although I think that may be the 'micro' (that is 5.25-inch) version, as I'm sure the original 8-inch floppies were introduced by IBM as a way of issuing software updates to its mainframe sites.

Of course, Tandon also 'invented' the Data Pac a few years ago. I say 'invented' because the Pacs are exchangeable hard disk cartridges, and when I was a young person on steam-driven computers exchangeable disk packs, including IBM's hermetically-sealed 'Winchester' unit, were the norm. It was only later that large-capacity (300 – 3,000 Mbyte) fixed units took over, largely on the grounds of cost, and the name 'Winchester' (taken from the IBM lab where the cartridges were developed) was erroneously applied to the non-exchangeable, un-sealed units being fitted to micros.

So far Data Pacs haven't really set the world alight, with no-one except Tandon fitting them as original equipment to their PCs. This is a shame, as the basic idea of a removable hard disk cartridge is a very good one – not only does it let you store your data in a fireproof safe at night, it also means you can take a whole 'computer's-worth' of data around with you. This is only useful if there are enough PCs around with a Data Pac drive for you to plug your disk cartridge into. Turning up at a client's with 30 Mbytes of product catalogue and nowhere to download it will not impress.

This comes back to the crucial point



of getting other manufacturers to fit Pacs to their PCs, making it an industry standard. Tom Cairns, who's very keen on Pacs (and has some product developments up his sleeve), tells me he's setting up a sales force to achieve just this, but I think it's more than just a sales problem.

Creating standards is very difficult in an unregulated market populated by competing suppliers, each with its own research and development teams. Occasionally the committee approach works, but more often an individual firm comes up with a good idea, which then has to make the journey from non-disclosable secrecy to universal acceptance. In the two outstanding success stories of the past fifteen years – the VHS video system and the IBM PC – the key factor has been that the originator allowed its competitors to manufacture their own kit.

Allowing your competitors to build something you've spent millions developing is of course a big step, and the two firms involved – JVC and IBM – went about it in different ways. JVC still exercises rigid control over the licencing of the VHS system and gets royalties for every VHS machine built, but it has struck basically reasonable deals all over

'An individual firm comes up with a good idea, which then has to make the journey from non-disclosable secrecy to universal acceptance.'

the world. IBM has done it rather differently, initially adopting a 'don't copy the BIOS and we won't sue' approach, then trying to switch to JVC-style licensing, with only partial success. In both cases the rest of the industry still feels confident enough that they will be able to continue manufacturing to viably commit themselves to the standard.

I have to say that until we can buy Miniscribe or Amstrad Data Pacs I don't think the system stands much chance, and with the prospect of 20 Mbyte, 3.5-inch floppy drives that can also read and write 720K and 1.44 Mbyte disks on the horizon, Jugi should perhaps rethink.

Tom Cairns is also, it turns out, an ex-Apple man going back a long way; right back, in fact, to the days of the Apple II and the birth of the Lisa, which in turn begat the Macintosh. There's something about this period I've always wanted to know. After the Apple II, which had very successfully established 'open architecture' and the plug-in expansion slot, why did Apple do a complete about-turn and make the Lisa and Mac two of the most rigidly closed-architecture, non-expandable computers on earth? What's more, why did they do it just as IBM were going open-architecture with the PC?

Tom, clearly an Apple man no more, blames it on sheer bad judgement, especially on the part of Apple's co-founder Steve Jobs. Apparently Jobs had a vision of computing which he felt was so pure and so good that he didn't want anyone spoiling it with nasty expansion cards and the like.

What Steve Jobs missed was that people liked having the option to replace the II's primitive AppleDOS with the more advanced CP/M just by plugging in a card. What's more, however good the new Lisa/Macintosh was, they would still like that and similar options tucked away for a rainy day. A case of Pragmatism 1, Purity 0, and by no means the first in history, either. ●

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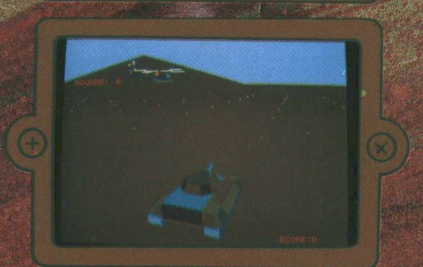

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AFTER HOURS

What's the difference between a computer game and a computer game? John Minson waxes philosophical, only to discover that a lot of the similarities may be merely skin deep.

This month's crop of games is an unusually diverse and imaginative selection. There's a fantasy game in which you search for runes and there's a fantasy game in which you search for keys. Then finally there's a fantasy game in which you search for pieces of a magical talisman... You get the picture?

If variety is the spice of life then computer gaming resembles an inert corpse, at least on the above evidence. How many potential players have been put off by the apparent likeness of the programs that line the shelves of their local software shop?

Interestingly, there are similarities between this month's mix, but they're not so easily spotted. The three releases mentioned above are totally different, once you look beneath the surface at the game mechanics. *Darkspyre's RuneQuest* is a role-playing game emphasising exploration, while the *Hunt For Elvira's Keys* is more akin to the traditional adventure.

Dragon's Breath is dissimilar again, being basically a management game, as is another of the month's offerings– *Moonbase*. While both have different settings (heroic fantasy and science fiction) and different user-interfaces, success in both of them ultimately depends on making the most of strictly limited resources. However, a casual glance at their boxes doesn't give much away. *Moonbase* looks essentially serious, even heavyweight, while *Dragon's Breath* (right) could be easily mistaken for an arcade game.

Why is it that designers habitually fall back on Hobbitry and the like to provide settings for their games? Although there are obviously many fantasy fans out there, more serious gamers may well be put off by the triviality of all the Middle Earth trappings. A strategist may not want to command 137 Earthlings against 4,000 Thargs. However, when it's Redcoats versus Zulus they'll happily man the barricades at *Rorke's Drift*.

Is it just the publishers' lack of imagination and their conservatism, or simply laziness that leads to such apparent uniformity? And are you missing out on mentally challenging programs because the barbarian on the box would look a little incongruous next to your copy of *1-2-3*?



ENTERTAINMENT

QUICK PLAYS

ATF II



Serious simulation specialist DI puts the accent on arcade-style accessibility with this highly-playable futuristic war-plane game. Even that old bugbear, landing, which most people find more difficult than dogfights, is handled by the on-board computer, leaving the pilot to fly above the battlefield – effectively represented as a fast-moving patchwork landscape – jamming ground to air missiles, shooting down the enemy and performing flashy victory rolls. Luckily, playability doesn't necessarily equate with stupidity and there's a strategic element when it comes to equipping the plane and planning a mission. Each action also reflects on the general progress of the war, making for a campaign element of sorts. However it never gets too serious; the map wraps around so if you fly off one side you re-appear on the other! A brisk diversion.

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- **Digital Integration (0276) 684 959**
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Display	Issue disk	Min hardware	Optional
H C E V M	OR	512	

DRAGON'S BREATH

Not a halitosis simulator this one, but a swords and sorcery management game. There are three competing warrior wizards, played by humans or the computer, all trying to conquer local villages, while searching for the pieces of a lost talisman. Instead of allocating cash towards traditional armies they hatch dragon eggs for a fire-breathing airforce, while providing R&D funds for magical ingredients.

Atmospheric graphics take the edge off the cold economics, while the magic system, in which spells can have negative side effects, is particularly well rounded. There's an optional arcade game for raids, although as it's rather uninspired you may prefer to let your PC pilot your dragon.

PC PLUS PRODUCT FACTS

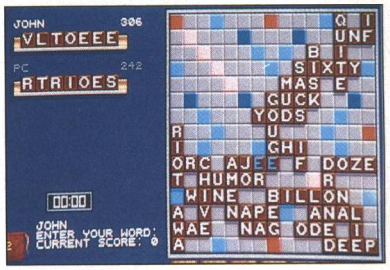
- **DRAGON'S BREATH**
- **Palace 071-278 0751**
- **£29.99**

PC PLUS VALUE VERDICT ■■■■□

Display	Issue disk	Min hardware	Optional
H C V E Y		640	

DELUXE SCRABBLE

There have been authorised and unauthorised versions of computer *Scrabble*, aka spelling-checker's revenge, before. But *De-Luxe Scrabble*, from Virgin/Mastertronic out in the Spring, is undoubtedly the most successful incarnation of the classic word game. As has been demonstrated in the past, microchips have no problem remembering a seven letter word which uses Z, V, X and P, then placing it on a triple word score. Now, Virgin/ Mastertronic has added timers and, providing you have at least 2.5 Mbyte of hard disk space, definitions of all those obscure words. Up to four can play, human or computer. The preview version used an American dictionary, which will be changed. Apart from the fact that on the toughest level there was time to make a complete meal, never mind the proverbial cup of tea, while my 286 PC puzzled, this will delight dedicated Scrabblers everywhere.



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Y C V E M		640	

172

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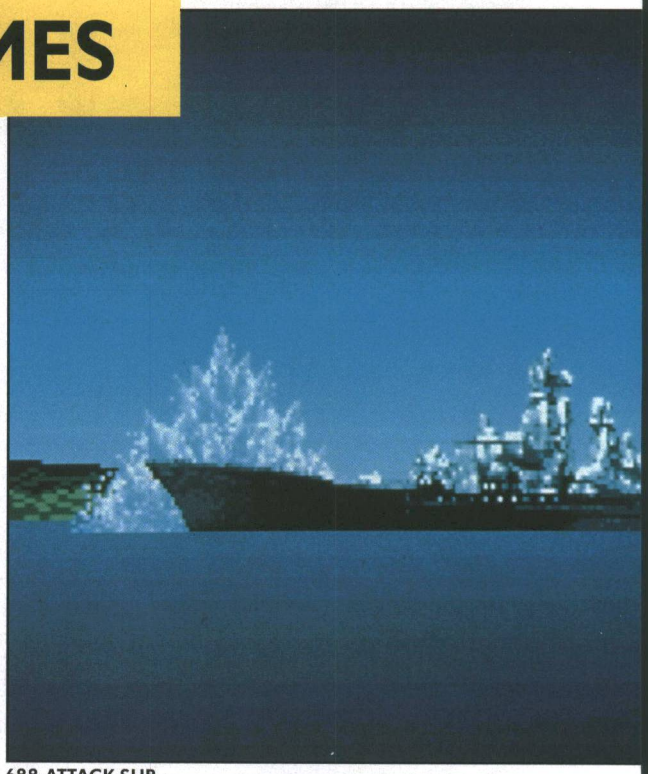
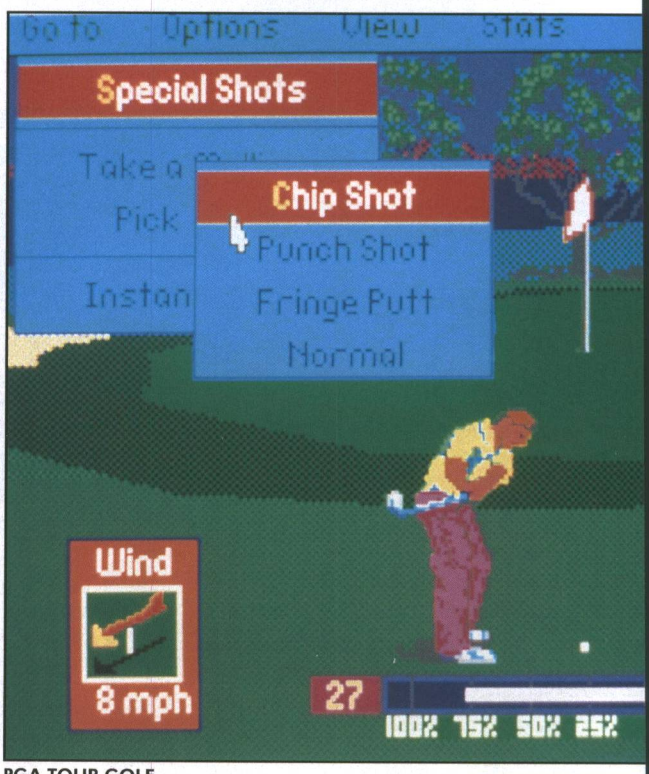


688 ATTACK SUB



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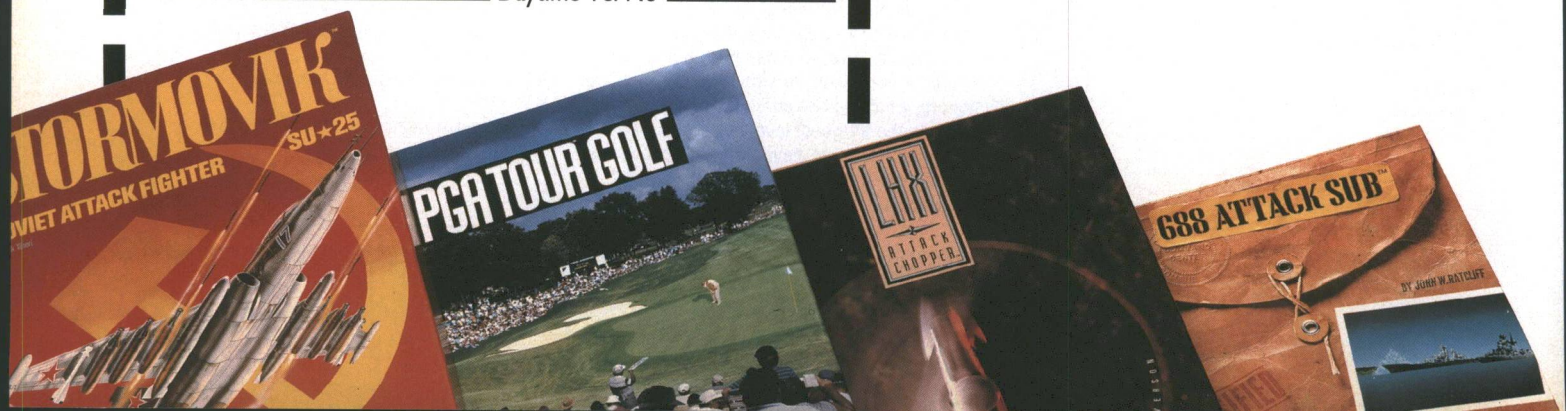

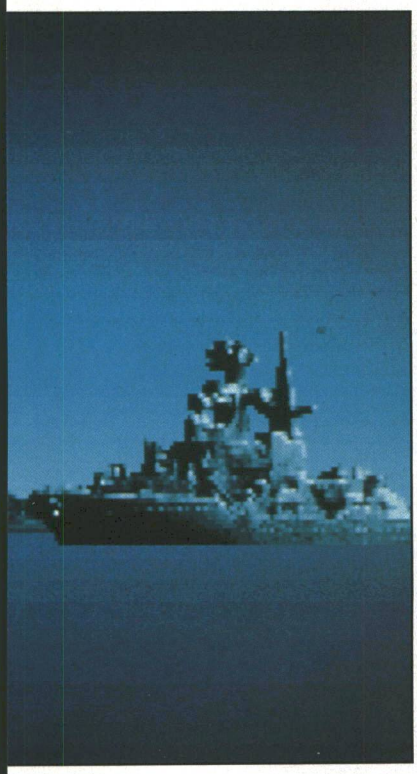

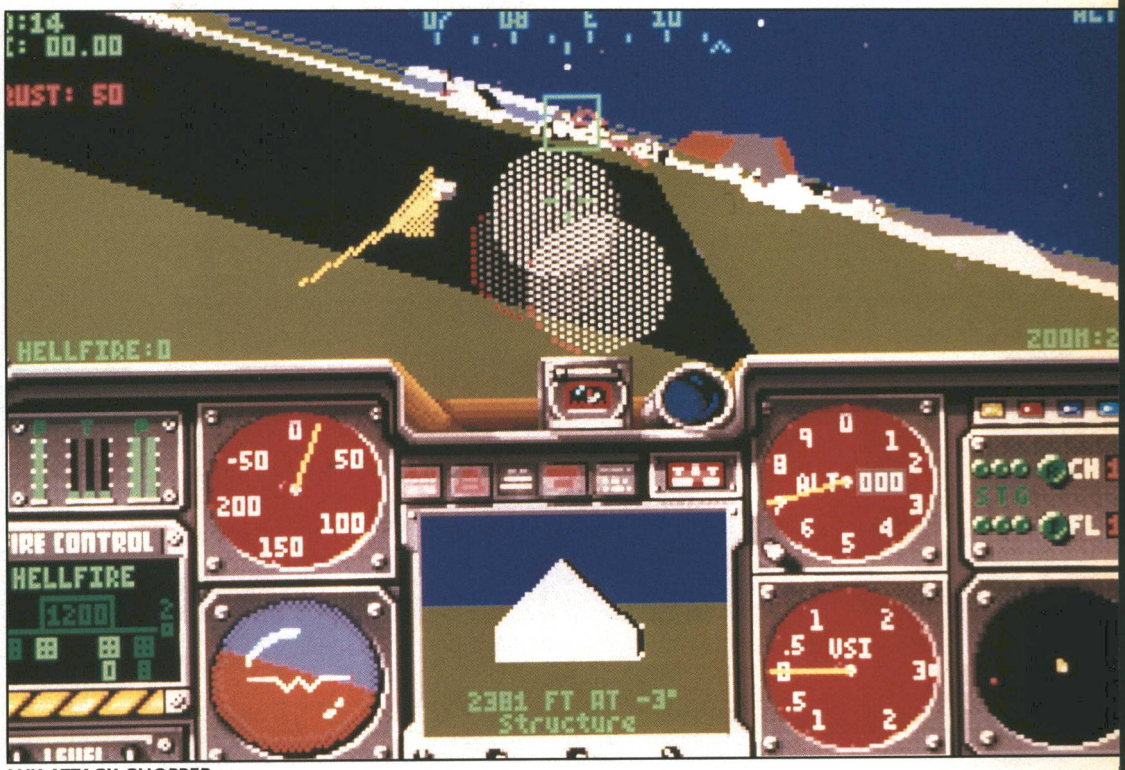

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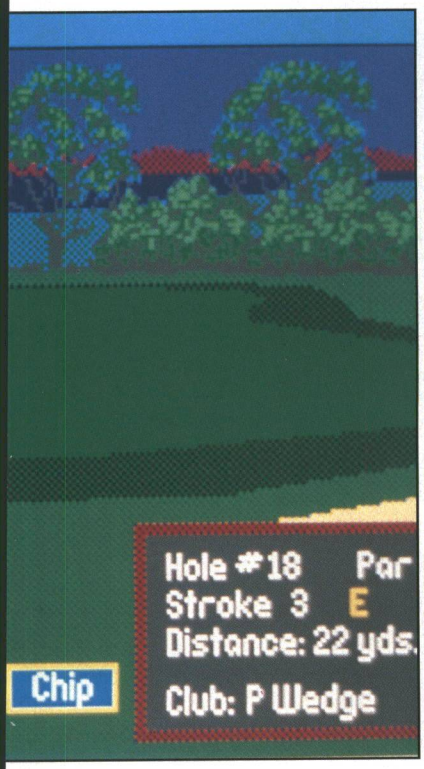



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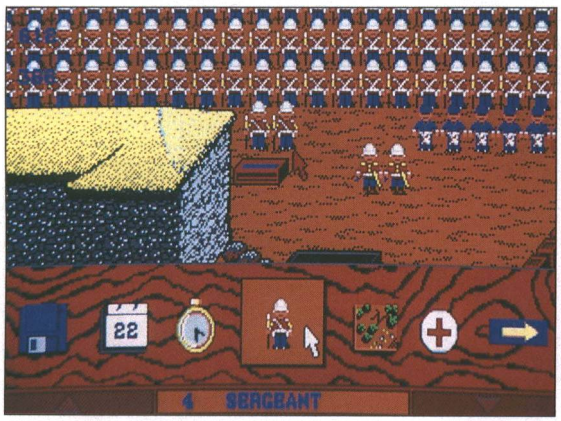
RORKE'S DRIFT

Here's a battle you can't win. As anybody who's ever watched the movie *Zulu* will know, the plucky Brits were outnumbered 400 to 1. If you're a bad loser stick to playing the Zulus, as success for the Brits can be measured in terms only of how long they survive.

Unlike most wargames, which betray their board origins by using standard symbols, the inspiration for Rorke's Drift is table-top simulations using miniature figures. You're not issuing orders to anonymous tokens but an army of individuals, albeit rather squat, strangely similar ones. And this is the main problem with the game; giving orders to 137 soldiers is a drag.

Not that there's anything wrong with the command system, which works smoothly enough. You can even auto-repeat orders. It's just tricky keeping track of which diminutive private is doing what. As the screen only provides a small window on the battlefield, you're constantly scrolling around to discover what's happening elsewhere. And there's just not time to tell every soldier to re-load before firing. I'm sure if I was faced with 4,000 Zulus I'd probably do that for myself anyhow!

You're advised that the game is best suited to fast machines, and even on my 286 reactions to commands seemed sluggish, making for even more frustration. There's also some dubious programming that leads to men standing in walls. If you're fascinated by the subject you'll probably forgive these shortcomings, but more casual armchair generals will be overcome by boredom before they discover cheerful cockney commander Michael Caine among the ranks of their troops.



● Strategy for *Rorke's Drift*; don't fire till you see the whites of their eyes

PC PLUS PRODUCT FACTS

- RORKE'S DRIFT
- £24.99
- Impressions
- 071-371 9191

GRAPHICS	■■■□□
INSTANT APPEAL	■■■□□
LASTING APPEAL	■■□□□
PC PLUS VALUE VERDICT	■■□□□

Display: C V E | Issue disk | Min hardware | Other hardware

See *Help Screen* for details of symbols

DARKSPYRE

Why is it that authors of the fantasy novellas which inevitably accompany sword-and-sorcery games always lapse into such a hey-nonny style? The prose in *Darkspyre*'s booklet is particularly tortuous. Luckily the game itself is a very decent, pseudo role-playing game.

I dwell on the documentation since not quite enough effort has been taken to explain the game's mechanics, though as one of your tasks is to discover how to survive in Castle *Darkspyre*, this may be intentional. Instead, the game's authors describe at some length their ambition to re-create the experience of playing a table-top Role Playing Game (RPG). Certainly the influence of *Dungeons And Dragons* is strong; this is advantageous at times but also limiting.

I wholeheartedly agree with the decision that you only command one character. A crucial factor in role-playing is that you empathise with your hero, something which is far less likely if you're concentrating on a team of adventurers. You can let the program generate your protagonist, which can be either sex (congratulations to the authors for realising not all computer gamers are male) or create it yourself via a neat, text biography, personalised to the choices you make. Either way it has various attributes for characteristics such as strength or skills with weapons.

Once in *Darkspyre*, things take a more traditional turn. The point-of-view is from the castle's rafters as you scuttle around a maze in search of various objects (weapons and keys). This is the downside of re-creating a table-top RPG, and one with a somewhat unimaginative referee at that. There is no real atmosphere, at least in the early levels, and it's easy to lapse into the feeling that you're merely roving the labyrinthine corridors of some supernatural hotel in which knights, wraiths and poisonous slime-beasts lurk behind the doors.

Role-playing is distinct from all other games in that they are intended to give the sensation of being free to wander a world created by the game-master; a world without fixed ways of achieving things. Unfortunately, in *Darkspyre* you're bound by a pre-determined maze and follow a set course to success. Experimentation leads to discovering the game designer's solution to a problem, not working out an individual answer.

That said, *Darkspyre* is still a satisfying combination of strategy and puzzles. The control system is relatively smooth, once learnt, and the fact that everything happens in real-time really keeps the pressure up. Though the straitjacket of the designer's will is intrusive, the game can certainly hold you spellbound on the intellectual if not the emotional level.

PC PLUS PRODUCT FACTS

- DARKSPYRE
- £29.99
- Electronic Zoo
- (0285) 641541

GRAPHICS	■■■□□
INSTANT APPEAL	■■■□□
LASTING APPEAL	■■■■□
PC PLUS VALUE VERDICT	■■■□□

Display: C V E | Issue disk | Min hardware | Other hardware

See *Help Screen* for details of symbols

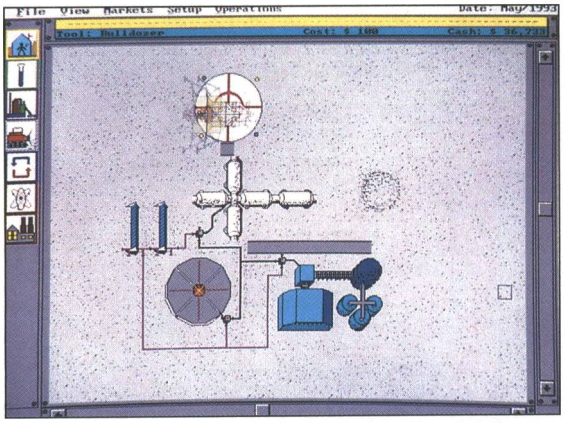


● Better beware of the silver slime on the other side of that door in *Darkspyre*.

MOONBASE

In space, nobody can see you breach the planning laws. This is your opportunity to create an urban sprawl of nuclear reactors, mines and the odd luxury hotel, somewhere up there on the surface of the moon. However, you'll have to have more financial success than those brave businessmen of Docklands or an ungrateful government will cut off your air supply – literally.

Wesson International (the game's designers) previously specialised in air traffic control simulators, so it should be no surprise that this latest flight of fantasy keeps its feet firmly rooted on terra-firma. The company claims that great care has been taken to ensure accuracy and the program claims to simulate science-fact rather than implausible science fiction.



● How would Prince Charles react to these 'monstrous carbuncles'?

As commander of the *Moonbase* you allocate limited resources, studying economic trends to decide which industries to develop, ensuring that energy requirements are met, getting involved in exploration for valuable natural assets and eventually, or so the idea goes, ridding yourself of dependency on NASA's grant in the process and declaring devolution, although events happening simultaneously on earth, such as a war or economic strife, may mean finances are involuntarily curtailed.

A handy Macintosh-style user-interface makes for easy play and real-time action keeps up the pace to the finish – ultimately the end result is strangely convincing. In fact. if there is one grumble to be made then it would have to be the price. It's something of a special interest program but for £45 you could almost build a beach house at the Sea of Tranquility.

PC PLUS PRODUCT FACTS

- MOONSCAPE
- £44.99
- Wesson International/Mindscape
- (0444) 831545

GRAPHICS	■■■□□
INSTANT APPEAL	■■■□□
LASTING APPEAL	■■■■□
PC PLUS VALUE VERDICT	■■■■□

Display: C H M E V | Issue disk | Min hardware | Other hardware

See *Help Screen* for details of symbols

ELVIRA

Horror hostess Elvira's high-camp movie debut, *Mistress Of The Dark*, provides the rough basis for this mammoth game. Not only does it require a hard drive, it will gobble up all of 4.6 Mbytes of it. True to its subject matter, this game is big in every sense of the word, and requires a minimum of EGA and a processor speed of 8 Mhz plus to be able to play it. So now you've got an added incentive to go and get that upgrade you always promised yourself.

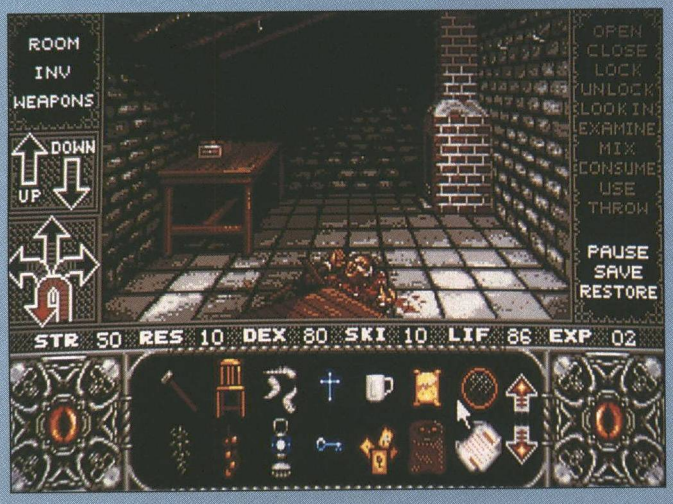
Certainly the graphics are an important aspect of appreciating *Elvira*. She's very pleasing to the eye, as is the game. Much of that chunk of Winchester is filled with pictures of locations in and around her castle, which has a nasty spirit problem. Thus the game involves scouring the place, from the grounds to the lady's chamber , in search of the six keys that are required for access to Elvira's chest. As if you needed a greater incentive than that, this trunk contains the only way to stop the world being overrun by the undead.

Glorious graphics, presenting your point of view, fill the main window. Animation is limited to important details, and the scenes change and develop in steps as you progress through the castle, with each room having a separate description and a significance all of its own. However, it's a relief to see an alternative to those endless Sierra-style games that seem to go on for ever (and can).

The program can be totally mouse driven, so clicking on arrows moves you around, clicking on menus issues commands; actions within the scenes may involve the examination of different objects and more icons are used to move them around.

Much of the game's interest comes from mapping its scene, which is kept varied by the inclusion of many different, beautifully drawn environments – from a maze of dungeons to an Elizabethan garden. There are plenty of puzzles to solve and spells to cast. In fact, much of the game is spent collecting ingredients, which Elvira cooks up into magical potions in her kitchen. Exploring the castle brings you into contact with its ghostly denizens, most of whom are hostile. Combat calls for accurate timing in matching your opponents' moves, but doesn't make too many demands on arcade-game haters.

Much praise is due to the program's authors, Horrorsoft. They've lived up to their name by including some decidedly grisly scenes which seem to go against the good natured humour of Elvira herself. That said, this is an ingenious adventure, if your machine is powerful enough to make the most of it.



● Something nasty in the woodshed. Better run back to Elvira in the kitchen.

PC PLUS PRODUCT FACTS

- ELVIRA
- £39.99
- Accolade
- 071-736 1391

GRAPHICS	■■■■■
INSTANT APPEAL	■■■■■
LASTING APPEAL	■■■■□
PC PLUS VALUE VERDICT	■■■□□

Display: E V | Issue disk | Min hardware | Other hardware

See *Help Screen* for details of symbols

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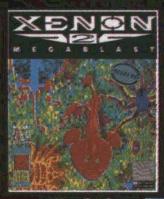

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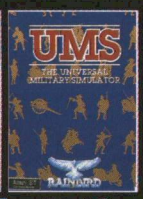

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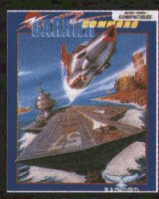
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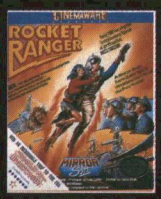

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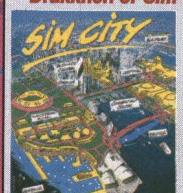

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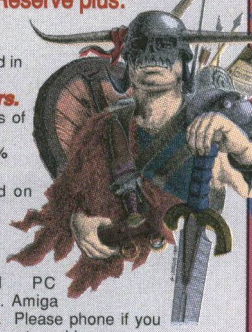

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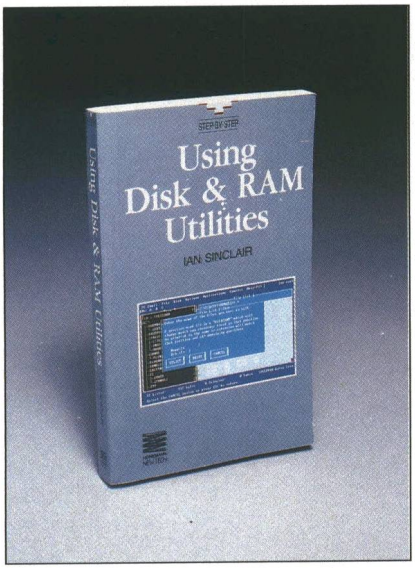
READING MATTER

From the mysteries of file encryption to quick reference for Z BASIC users, PC PLUS surveys this month's crop of computer literature.

USING DISK AND RAM UTILITIES

Ian Sinclair
Heinemann ● (0865) 311366
ISBN:0-434-91892-X ● £14.95



One of the most prolific authors of computer texts turns his attention to disk utilities of the *PC Tools* type in this 290-page book. The text is divided into 85 short sections and four appendices, which makes for bitty reading but is useful if you're trying to locate a particular topic. The book is well indexed and has a good table of contents, so you've little excuse for not finding your way around.

The rather general title is a little misleading, particularly if you read the cover blurb which mentions *Norton Utilities* and *Ultra Utilities*. In fact, only *PC Tools* and *File Rescue Plus* are covered by example. Though the other utility suites work on similar lines, a good part of the book is devoted to step-by-step examples which users of other programs will find of little value.

Those with either or both of the programs covered by the book should find it very useful, as it contains detailed descriptions of most aspects of file recovery. It explains the basics of file layout on disk, how you can often recover a file by repairing its directory entry and how to increase file access speed by 'compressing' the files.

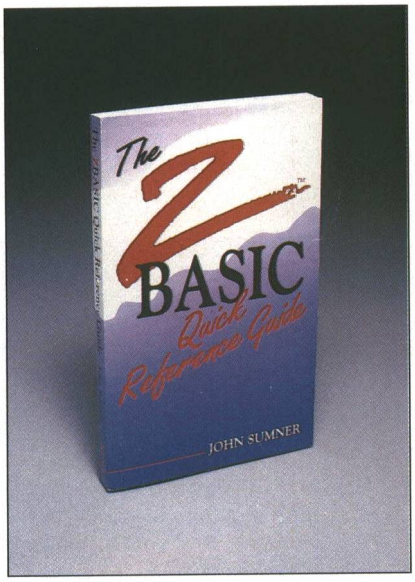
This last is an odd term to use, since programs such as *MoreDisk* do actually compress the data on a disk. In fact what Sinclair writes about is not compression, but 'defragmentation', that is the process of reorganising files so that they are stored in contiguous spaces on the disk.

Sinclair's clean and precise writing style makes the book easy to learn from. Its target audience is the PC user who needs to know what can and can't be done to recover lost data. You really need one of the two example utilities to get the most from the book, but with that proviso it covers its subject well.

Simon Williams

THE Z BASIC QUICK REFERENCE GUIDE

John Sumner
Kuma Computers ● (0734) 844335
ISBN:0-7457-0140-X ● £14.95



Z BASIC is a fast and flexible dialect of the BASIC programming language with some interesting features, such as device-independent graphics. Unfortunately, its own manual is a dense, several hundred-page tome which may prove a daunting reference when absorbed in the middle of programming. *The Z BASIC Quick Reference Guide* is designed to fill in the comprehension gaps and is certainly much more manageable, although even this pared-down version still runs to 320 pages.

It follows its title closely and gives a complete list of each *Z BASIC* keyword on a separate page, with syntax, command description and details of any parameters the command can take. Also included on each page is a menu bar showing the versions of the language which support that page's command.

One of the useful features of *Z BASIC* is that it is available in MS-DOS, CP/M, Macintosh and Apple II variants. The main core of commands are common to all versions and it is without doubt very useful to have details of the ones you should stick to if trying to program across machine platforms. The index is also cunningly arranged as a quick cross-reference to command availability.

What the book really lacks is examples. Although the author is at pains to absolve himself from any attempt to teach the language, recommending instead that the reader picks up a BASIC primer from his local book store, there is so much that can be illuminated by small code segments that it's really a great shame none are included in the book. There's plenty of space on its sparsely-covered pages for this extra copy and it's tempting to think Sumner has merely extracted arm fulls of text from the *Z BASIC* manual. The only bit of source code which is supplied is an entry routine found at the back of the book. This allows for more sophisticated parsing than a simple INPUT statement.

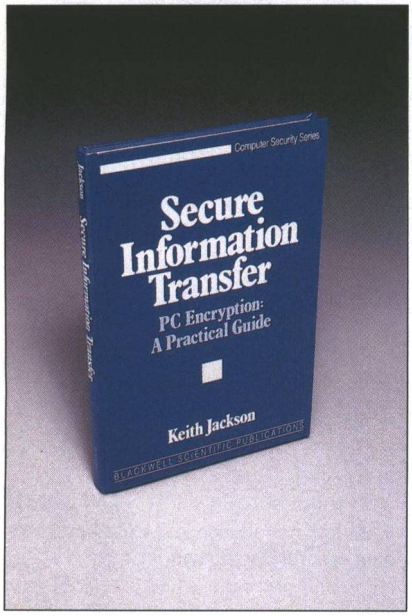
If you find your *Z BASIC* manual too cumbersome to use effectively when programming, you will probably find *The Z BASIC Reference Guide* fairly helpful for its clarity. There's little new material here, though, and the price may well not be right.

Simon Williams

BOOKS

SECURE INFORMATION TRANSFER

Dr Keith Jackson
Blackwell Scientific Publications
(0685) 240201
ISBN:0-632-02664-2 ● £20.95



There is a great interest among personal computer users in encryption. This is the method by which someone can render a message unintelligible to anyone except the specified recipients. This process is vital to those involved in moving sensitive information around electronically. This may sound like the stuff of spy novels but in fact it is already affecting our everyday lives – for example, *Swift*, an information network used by banks worldwide sends around 1.2 million encrypted messages each day.

Electronic Data Interchange (EDI) is also growing rapidly, with thousands of companies already involved. Encryption ensures security as well as proving the source and integrity of the messages themselves.

Dr Keith Jackson mostly concerns himself with published security algorithms, specifically DES (Data Encryption Standard) and the RSA algorithm (named after its inventors, Rivest, Shamir and Adleman). The first is a symmetric data encryption method, where the method must be kept secret, while the second is an asymmetric method, where the encryption method is normally published. This sounds like magic. However, knowing how a message was encrypted won't help you de-encrypt it.

The book begins with general principles, discusses the problems involved in relying on commercial encryption programs, goes on to design and construct a DES-based encryption program (complete with 55-page *Turbo Pascal* listing) and finishes with some useful technical appendices. It's really rather an odd book, neither deep enough to be a reference nor light enough to read for fun. Perhaps it is intended for reading by someone who needs to be able to brief managers on the subject?

Steve Patient

SHORT STORIES

KILLING THE PAPER DRAGON

Fred Metzgen
Heinemann Newnes ● (0483) 300966
ISBN:0-434-91316-2 ● £16.95

This book is sub-titled *Electronic Data Interchange In Business* which goes some way to explaining the meaning of the Paper Dragon reference. The book is aimed at managers who are considering the move to the paperless office and describes techniques for making the best use of EDI (Electronic Data Interchange).

USING SUPERCALC 5 IN BUSINESS

P K McBride
Heinemann New Tech ● (0865) 311366
ISBN:0-434-91308-1 ● Price:£27.50

This 300-page book is aimed specifically at users of version 5 of *SuperCalc*. It covers the expansions to the command set, 3D graphics and *Lotus 1-2-3* emulation. A floppy disk which holds example files, macros and worksheets used in the book is also included. There are also sections on fault finding using the audit facility, 3D worksheets and sharing data over a network.

THE dBASE IV LANGUAGE

Mike Lewis
Sigma ● (0625) 531035
ISBN:1-85058-202-5 ● £6.95

***dBASE IV* is a useful but highly complex language and Mike Lewis's book is intended to provide a handy quick-reference tool for programmers working in it.**

Nearly 100 pages of text provide an alphabetical guide to most of the relevant aspects of the language.

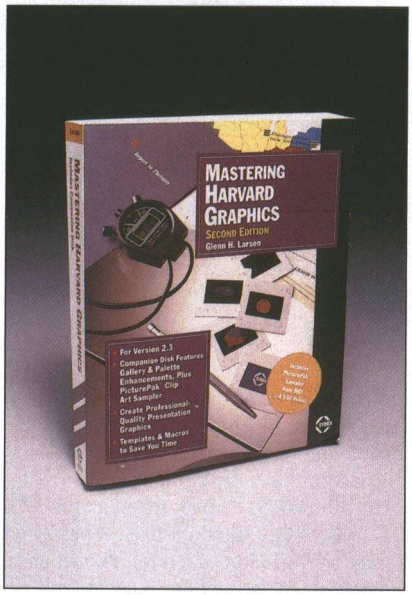
USING PERSONAL COMPUTERS IN MARKETING

Susan Morris
NCC Blackwell ● (0865) 791 100
ISBN:0-85012-795-5 ● £16.95

Based on ten years experience of using PCs in marketing, the author aims to show marketing staff how PCs can be used to develop a range of marketing tools. Chapters look at how to create customer and product databases, use of PCs for market intelligence, new product development, forecasting and developing marketing plans, and automating market research techniques.

MASTERING HARVARD GRAPHICS

Glenn H. Larsen
Sybex/Longman ● (0279) 426721
ISBN:0-89588-673-1 ● Price:£22.95



Mastering Harvard Graphics runs to over 500 pages in Sybex's typical modern, well-spaced style. There are plenty of illustrations in the book, as you would expect for a treatise on graphics.

Harvard Graphics has been one of the leading PC presentation graphics applications for years. Indeed, the program virtually created the term. It is thus an obvious topic on which to expect to find a large number of novice guides, some accessible, some not. What Larsen tries to do, in the early sections of this book, is to lead the new user into the program as painlessly as possible, before going on to offer guidance and tips to seasoned users later on. The approach is sober and professional, with none of the annoying jolliness that characterises some American texts.

The book is full of margin notes, and these take the form of tips, further information and warnings concerning *Harvard*'s 'idiosyncrasies'. These notes, in themselves, are very useful and Larsen isn't afraid of pointing out shortcomings in the product and ways of working round them. His overall tone though is enthusiastic.

A novel addition to the book is a free 360K disk attached to the cover (I wonder where Sybex got that idea from?). On the disk is a sample pack of clip-art compatible with *Harvard Graphics* including a series of predefined chart templates and three additional colour palettes. This free gift is a valuable extension to the book itself, and goes some way to making the apparently high cover price seem more reasonable. Any serious user of *Harvard Graphics* will undoubtedly find this volume a great help in getting the best from the package.

Simon Williams

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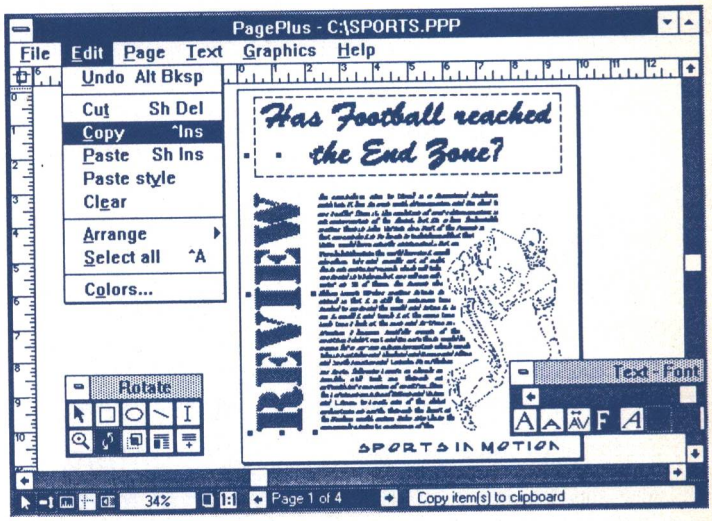

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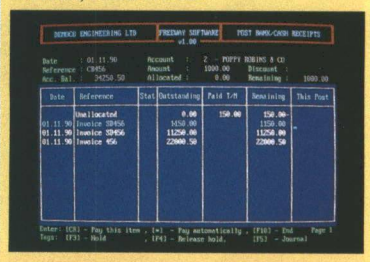

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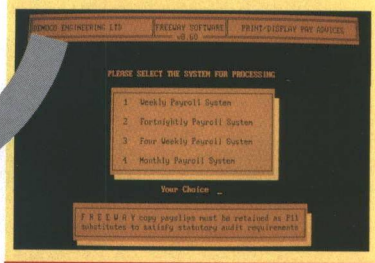

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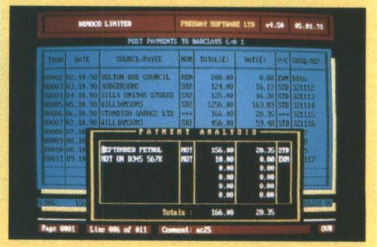

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DR. ALAN SOLOMON'S

DESERT ISLAND DISKETTES

Marooned on an island with just the bare essentials of life – a 386 PC and a laser printer – what would be your eight sanity-saving software packages? This month Dr. Alan Solomon puts the question to Bob Hay, Chief Executive Officer of FAST, the Federation Against Software Theft.

FAST, the anti-piracy organisation backed by leading publishers such as Lotus and Ashton-Tate, has for the past five years been running a steady campaign against all forms of software theft, from the back street duplicators of Hong Kong to the licence-breaking activities of big corporations in the UK. Its leading light throughout that time has been Bob Hay, a tough but persuasive Scot whose 31 years in the Metropolitan Police was good preparation for the cat-and-mouse game of catching software felons red-handed.

There'd be little scope for chasing software pirates on an uninhabited desert island, so the ever-kindly Dr. Solomon has offered to supply Bob with eight software packages (original shrink-wrapped with full licences, of course!) to help pass the time. So what's his choice?

1 NORTON UTILITIES

(*Dr. S: Do you realise that's exactly the same first choice as Nigel Grant made last month?)* 'Well that shows how prudent Nigel is. It's far too easy to wipe out vital information on a PC. I'm sure to erase something important accidentally, and I'll need *Norton* to get it back – it's happened before, and it'll happen again. Is MS-DOS included on the machine?' (*Dr. S: Yes, it's pre-installed for you, with a manual and all the blank floppies you might need.)* 'OK then, BACKUP will get me out of trouble. Security is very important, especially when its my own hard work!'

2 THE SPANISH TUTOR

'The biggest problem on the island is going to be boredom. I've always wanted to learn languages – I did Latin and French at school, so I'd like to learn Spanish, even though I might have to wait a while to be able to speak it to anyone! I think computerised language teaching will really take off when we have multi-media systems – video disks, speech synthesis and recognition and so on – so that the software package will be able to hold a conversation with you and check your pronunciation. Until then, even a simple package can be good way for learning the basics of a language.'

'So is there a suitable Spanish package I can take with me?' (*Dr. S: Yes, there's a thing called* The Spanish Tutor, *and another in the series called* The French Mistress.) 'I think I'd better stick to Spanish, thank you!'

3 WORDPERFECT

'Another program that will help me with the boredom is a word processor. My choice is *WordPerfect,* as I know it already and I think it stands up to anything else that's on offer. I think I can get the essential parts of *WordPerfect* onto just one disk, as I can manage without a spell-checker or thesaurus. I'll write a diary of my life on the island, all about how I got cast away here, and what happened next. And I might try an autobiography; I've got a lot of good stories to tell'.

(*Dr. S: What about shelter?)* 'Hopefully some tools to build with will be washed up – that's what Robinson Crusoe had. And I suppose I've got a solar-powered generator for the computer – I can use that to power a heater to keep warm. Another thing I'd like to do is record the island flora and fauna; that would be interesting. And, of course, I would eat them.'

4 MICROSOFT FLIGHT SIMULATOR

'And can I have a joystick too, please?' (*Dr. S: Well all right, you can have it instead of a modem') Flight Simulator* stands head and shoulders above most packages because it concentrates on reproducing the true flying experience rather than just zapping aliens or whatever. Also, since Microsoft used some very low-level programming tricks in writing it, it's also been used as a benchmark in testing true IBM PC hardware compatibility, so I'll know straight away if this 386 you've given me has got a dodgy BIOS chip (*Dr. S: What ingratitude – it's washed-up stock from a highly reputable manufacturer!).*

'I did my National Service in the RAF. I was a Senior Aircraftsman, Signals. That turned out to be very useful, as I learned keyboard skills. When I left the RAF I joined the Metropolitan Police, and became an Operational Commander. I had 500 people in my group, and had to manage all those resources. I used card files, and lots of paper – *dBASE* hadn't reached my part of the Met by then.

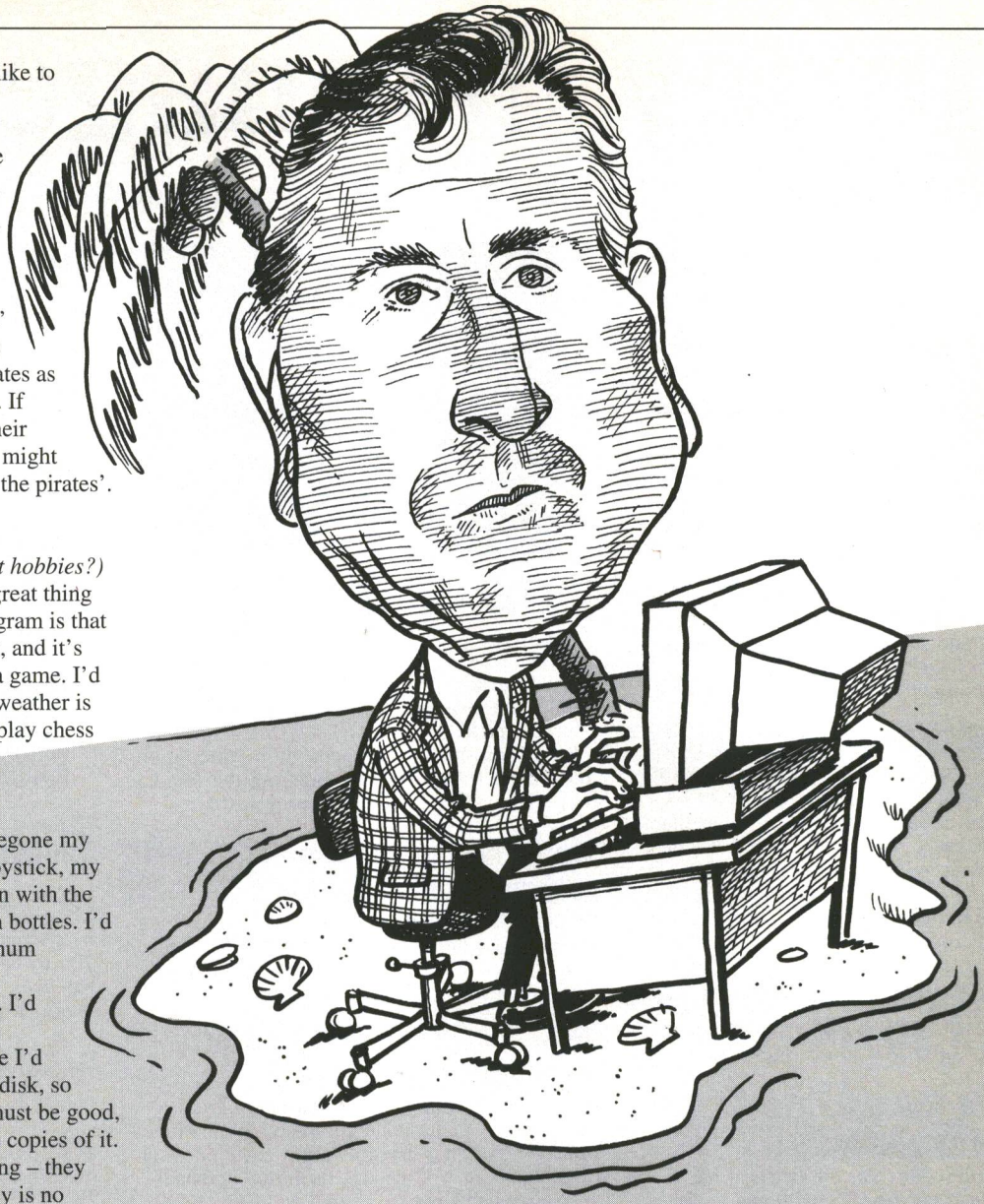
I retired in 1985, and was headhunted into FAST, starting the day after I left the force – that was 1985. Many retired policemen go and work for a private security company; I didn't fancy that, and I thought the FAST organisation would be a lot more fun.'

5 DBASE IV

'To manage the information on flora and fauna of this island, I'd like a database. *dBASE* IV is my preference. However I won't need a very complex database, so I expect I could manage with *dBASE II.* You can only have two files open at once, but for my flora-fauna database, that'll be enough. I can't

program in *dBASE,* but I'd like to learn how.

On the question of learning, wouldn't it be nice if software manuals didn't all presuppose an HNC in computing; you have to get a 'Using ...' book just to have most packages explained to you in 'normal' language. You know, books like that are used by the pirates as a substitute for the manuals. If software publishers made their originals more digestible, it might make life more difficult for the pirates'.



6 CHESS 2000

(Dr S. asks, what about hobbies?) 'Chess – I love chess. The great thing about a computer chess program is that you don't need an opponent, and it's always willing to give you a game. I'd like *Chess 2000,* and if the weather is bad, I can stay indoors and play chess against the PC.

7 FONTASY

'Since I've already foregone my modem in exchange for a joystick, my only hope of communication with the outside world is via notes in bottles. I'd like to give the notes maximum impact by using desktop publishing to produce them. I'd really like *Ventura* or *Pagemaker,* but I'm not sure I'd have space for them on my disk, so how about *Fontasy?* That must be good, since we see so many pirate copies of it.

Pirates are very discerning – they only use the best, and money is no object. Did you know that if you go to Hong Kong, Malaysia, Abu Dhabi or Amman, buy one $10 pirate copy of a database, spreadsheet, and word processor, then you can import it into the UK quite legally. You declare that it's for your own use, and customs are quite happy about it. Multiple copies – that's different, but one copy for your own use is legal. It's a crazy loophole – it ought to be made illegal.'

8 GROLIER ENCYCLOPAEDIA CD ROM

'Can I be a bit sly here? I'd like a CD ROM player, so I will be able to have the *Grolier Encyclopaedia* on CD. This island might be small, but its sure to be teeming with life. I would be careful not to do any damage – apart from eating a few of them! The *Grolier* would help, as some of the plants might be toxic, and others might be medicinal.

I enjoy gardening, and I'd want to create a garden. Not a formal English garden, but something appropriate to the island, based on what is available. I could do some interesting experiments with the native plants. I can cook too – not just boiled eggs, but a decent meal, given the ingredients.'

(Dr. S: You're allowed one luxury) 'I'd like the complete works of Dickens. I'm not sure which of his works is my favourite – they're all so good.'

(If you could only choose one disk, which one would it be?) 'The word processor. My bleached bones won't tell the story, but my diary ceratinly will, and at least I can leave something behind.' *(I'm sure it won't come to that – I'm sure you'll be rescued by a search party, sponsored by the top ten business software publishers)*

Thank you Bob Hay, of FAST

(Music plays, sound of waves on a sandy beach fading into the sunset ....)

THE INDUSTRY TODAY – BOB HAY'S VIEW

'Survival is the most important thing. Without survival, there is nothing else. The PC leisure industry today is facing a survival issue, and they might have to change from disk-based to cartridge based software – the pirates are killing the industry. This means higher costs to the consumer, but survival is the prime necessity for the software houses.

If that happens, it'll be terrible, as the kids won't be able to graduate from game-playing to programming, or database or spreadsheets. That would be awful for them. Some people seem to think that pirating games is not wrong – incorrect. And also, if the minds of the children are in an environment where the parents tape music, copy books, and the teachers use photocopiers illegally, then they come to accept it as permissible. It's very insidious, and when the kids grow up and go into business, they take that attitude with them. It's bad for society as a whole, not just the computer industry. When the law is in disrepute, where does that lead to?

Stealing software has all sorts of consequences that are more serious than the obvious ones. I'm not very optimistic that this will be recognised – educationalists are under great financial pressure. The kids are great – today as ever, but society is letting them down. The environment is now more lawless, more conducive to wrongness, more difficult.'

Money Manager PC

The UK's best-selling small business & personal accounts system – Your questions answered

What does it do?

Money Manager is an accounting program which is particularly easy to use and quick to set up. With it you can record all your financial transactions, and produce a wide variety of reports which will keep you well informed and totally in control of your financial situation.

How easy is it to use?

If you can read a bank statement and load a disk into your computer, then you can use Money Manager. You do not need specialised accounting or computing knowledge, just common sense. Feedback over the years from thousands of users of all kinds has been incorporated into the program, the manual and the on-screen help facility, making the program exceptionally user-friendly.

Who uses it?

By mid-1990 there were over 40,000 users of Money Manager. Businessmen, doctors, architects, self-employed tradesmen, consultants, solicitors, company department managers, banks, book-keepers, accountants, club treasurers, farmers, schools, expense-account holders etc. Roughly one third of users use it for organising their personal finances.

How much does it cost?

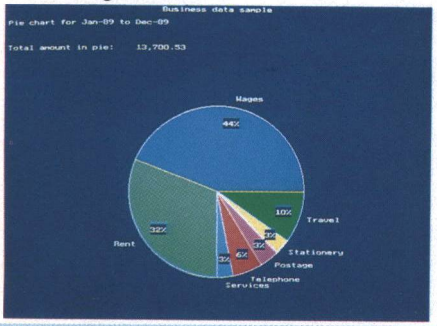
Only **£49.95** (incl VAT)

At such a low price, can it be any good?

The cheaper the software, the better it has to be in order to succeed. At £250 you can afford a few unhappy customers, but at £49.95 you cannot afford hundreds of them.

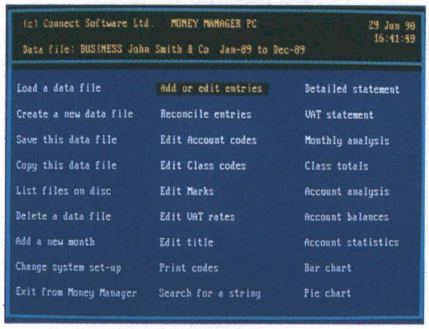
How does it compare with other software?

With enough time, patience and skill, you might set up a spreadsheet and database to do some of what Money Manager does. We think you probably have better uses for your time, patience and skill! Traditional accounting software has its place, but many users like you find it far more difficult, expensive, time consuming and frustrating than they can afford or are willing to tolerate.



Will it run on my computer?

Money Manager will run on all IBM-compatible PCs, from a single floppy-disk mono machine upwards. You can install the program on your hard disk, choose your own colour scheme and use a mouse. *Versions of the program are also available for other computers (please call).*



How do I run it?

Simply type MONEY, and this menu will appear on the screen. "Point" at what you want to do to make it happen. If you do anything wrong, the program will gently tell you so. If you get stuck, press the F1 key for helpful and relevant information to appear in a window on the screen. If you get lost, pressing the Esc key will always bring you safely back to base.

Can I set up the system to suit my own requirements?

Of course! Everyone tends to see and do things in their own individual way, and we have made it very easy to set up the system to suit your own circumstances and preferences.

How many different sets of accounts may I have?

Most other accounting systems restrict you to the accounts of just one company. With Money Manager you may have as many different sets of accounts as you need – business, personal, special projects etc.

How much information can I work on and see at one go?

Each set of accounts contains twelve months' information, with up to 500 entries per month. You can advance the file a month at a time, so that you always have the last twelve months' information at your fingertips to browse through and analyse. All your previous years' accounts will also be readily available on your disk.

How many bank accounts will it handle?

You may define up to 20, which may be bank accounts, or deposit accounts, petty cash, credit cards, trading accounts or general sales and purchase accounts. A special routine allows for the transfer of money from one account to another.

How many types of income & expenditure can it analyse?

You can define up to 50 "Classes" of income and expenditure, and arrange them in groups. You may for example have a group for Overheads comprising Electricity, Rent, Stationery, Travel, Wages etc., or a group for Motoring comprising Petrol, Maintenance, Insurance, Tax etc.

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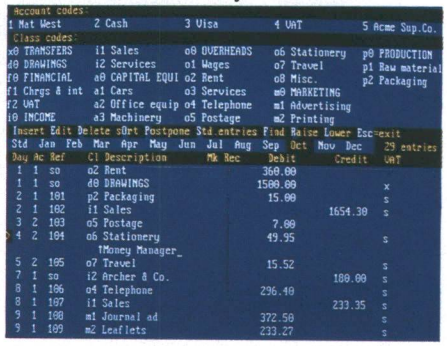
How do I actually enter data?

Select the appropriate menu item, and you can scroll up and down through the entries to remind yourself of what has already been entered (see below). Then simply open up a new line and type in the new entry. The computer will check the data as you put it in, and sort the entries into date order if you wish.

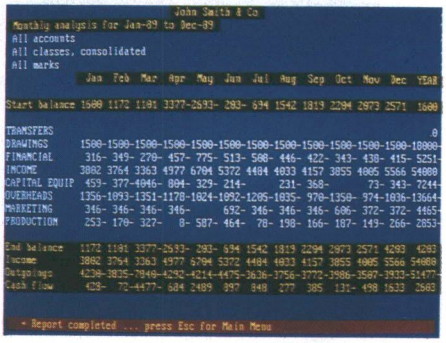


Can I correct mistakes and omissions?

Unlike most other accounting systems, Money Manager is very forgiving, and understands that people make mistakes or forget things. It allows you to correct errors at any time after the entry has been made. You can also enter data for previous months at any time.

How do I produce a report?

Select the appropriate item from the menu, and answer a simple series of questions. You can be as selective as you like – anything from "show me a brief summary of all my transactions" to "list in detail all entries concerning purchases of petrol for personal use using a credit card".



What sorts of reports does it produce?

The information can be displayed in a wide variety of ways to suit your varying requirements. There are detailed statements, showing each entry individually as in a bank statement, with the running balance in the right-hand column. There are various spreadsheet-style reports showing for example a column of totals for each month or for each account, reports showing income, expenditure and cash-flow month by month, etc. And of course there are the graphical bar-charts and pie-charts which can often reveal so much more than the bare figures. The variety of reports is one of the strong features of Money Manager – far more than can be shown here, but if it is useful it is probably included!

JOHN SMITH Ltd

Detailed statement for Jan-90

Account 1 (Nat West)

Day	Ac	Ref	C1	Description	Debit	Credit	Balance
				Starting balance			2,543.49
1	1	so	o2	Rent	360.00-		2,183.49
1	1	011	a2	Printer	458.85-		1,724.64
1	1	so	d0	DRAWINGS	1,500.00-		224.64
3	1	012	o3	Rates	130.45-		94.19
6	1	014	o5	Postage	45.20-		48.99
6	1	015	x0	Trnsfr to Ac 3	142.32-		93.33-
6	1	016	i1	Sales		483.34	390.01
7	1	so	i2	Archer & Co.		150.00	540.01
9	1	019	1	Sales		936.35	1,476.36
9	1	0110	i2	Services		150.00	1,626.36
10	1	0111	x0	Transfr to Ac 4	743.26-		883.10
12	1	0113	i1	Sales		839.37	1,722.47
14	1	0114	m1	Journal ad	346.00-		1,376.47
15	1	so	o1	Wages	500.00-		876.47
18	1	0115	o4	Telephone	230.29-		645.18
20	1	0116	i1	Sales		1,243.19	1,888.37
26	1	0121	p2	Cartons	34.00-		1,854.37

Can I print the reports on my printer?

Any report can be printed on your printer as well as on the screen. The program can be set up to work with Epson dot-matrix, Diablo daisywheel or HP laserjet compatible printers. In the unlikely event that your printer is not compatible with one of these, you can easily enter the commands required by your particular printer.

JOHN SMITH Ltd

VAT statement for Oct-89

Day	Ac	Ref	C1	Description	Exmt/0-rtd	Taxable	Rate	VAT	Total
OUTPUTS:									
2	1	102	i1	Sales		1,438.52	s	215.78	1,645.30
2	1	so	i2	Archer & Co.		156.52	s	23.48	180.00
8	1	107	i1	Sales		202.91	s	30.44	233.35
16	1	1014	i1	Sales		823.91	s	123.59	947.50
25	1	1018	i1	Sales		739.47	s	109.57	849.04
				TOTALS		3,352.34		502.86	3,855.19
INPUTS:									
1	1	so	02	Rent	360.00-		-		360.00-
2	1	101	p2	Packaging		13.04-	s	1.96-	15.00-
3	2	103	05	Postage	7.00-		-		7.00-
4	2	104	06	Stationery		11.79-	s	1.77-	13.56-
5	2	105	o7	Travel		13.50-	s	2.02-	15.52-
8	1	106	o4	Telephone		257.74-	s	38.66-	296.40-
8	1	108	m1	Journal ad		323.91-	s	48.59-	372.50-
9	1	109	m2	Leaflets		202.84-	s	30.43-	233.27-
13	3	1011	o7	Travel		20.19-	s	3.03-	23.22-
14	3	1013	06	Printing	1.94-	28.07-	s	4.21-	34.22-
17	5	1015	p1	Raw materials		149.97-	s	22.49	172.46-
22	2	1016	o7	Travel		17.37-	s	2.61-	19.98-
22	2	1017	o5	Postage	48.67-				48.67-
29	3	1019	07	Travel		20.36-	s	3.05-	23.41-
30	2	1020	06	Stationery		7.26-	s	1.09-	8.35-
				TOTALS	417.61-	1,066.04-		159.91	1,643.56-

Summary:		
VAT due	on outputs	502.85
VAT deductible	on inputs	159.91
Net VAT payable		**342.94**
Value of outputs	(excl VAT)	3,352.34
Value of inputs	(excl VAT)	1,483.65

Will it do my VAT?

A single character entered in the VAT column of each entry is all the system needs to produce a fully detailed VAT report for the month, quarter or year. Doing your VAT return will now only take you a couple of minutes, and you will have at your fingertips all the information you need to keep the VATman happy (!).

And if I'm not VAT-registered?

No problem – simply ignore anything to do with VAT, and the VAT-related features of the program will not get in your way at all.

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What else has it got?

- Bank statement reconciliation
- Standard entries (e.g. standing orders)
- Part-VAT/part exempt entries
- Up to 8 different VAT rates
- Up to 50 "Marks" for extra identification
- Text-string search facility
- Reports can be exported to a disk file
- Context-sensitive help windows
- Pop-up five-function calculator
- "Macro" facility to record and play back often-used sequences of key-strokes.
- Hercules CGA EGA VGA display compatibility
- 2 sample sets of accounts included for training

Do I need so many features?

All the facilities in Money Manager are there because large numbers of people have found a need for them. If there is something you don't need at the moment then you can simply ignore it until the need arises.

Is the manual in English?

Yes! The manual incorporates feedback from conversations with hundreds of users. We are so confident that the program and manual really are easy to understand that our telephone help-line is free and indefinite.

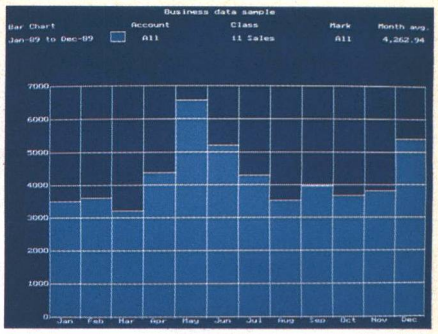
What about Final Accounts?

Connect Software also produce a program called Final Accounts for users of Money Manager wishing to prepare comprehensive end-of-year accounts. It uses the Money Manager data and produces reports showing trial balance, asset depreciation, profit & loss, balance sheet, capital allowances, private use calculations, tax calculations, source & application of funds, accounting ratios, comparison of this years' figures with last year's etc etc. Please call us for further details.

money manager PC

I have some more questions . . .

Call us on 081 743 9792 – there is usually someone intelligent and informed available to talk to you.



What do users say about it?

I am so impressed with the software – I think it is superb and surpasses many other packages I have bought at more than twice the price of Money Manager. Thanks for a fantastic, easy to use piece of software that represents outstanding value for money. **D.A.J. (Lincs)**

Few things in life are truly genial and your Money Manager is one! **N.T. (Warminster)**

I cannot let this opportunity pass without repeating my satisfaction with Money Manager. I am using it for the book-keeping of several small businesses. Before I retired recently after 40 years in banking, 24 of which were as a branch manager, I would have been delighted if my small (and some not so small) business customers had presented me with figures and statistics of their businesses as produced by Money Manager. It really is a program which, being so easy to use, could save many businesses from the chaos and disaster which can, and so often does, result from poor or non-existent book-keeping. **R.A.L. (Cheshire)**

I have been very pleased with the program, in fact it is an indispensable part of my business. It's incredible that it can be so good at this price. **L.P. (Walsall).**

I should like to say how pleased and impressed I am with Money Manager. It seems to me far simpler, faster and more flexible than any of the other accounts packages I have looked at. I have so far used it to prepare two sets of accounts for a small business, and am delighted with the results. **R.D.H. (Yeovil)**

Next to my word-processor this has to be my most frequently used program and certainly has made an astounding change to our finances. All in all . . . brilliant! **Dr. I.N.P. (Co. Durham)**

I would like to congratulate you on an excellent program. I am treasurer of a local cycling club and the help the program gives me in that job is tremendous, and impresses the auditors too! It is also very useful to be able to keep track of my personal accounts, and know to the penny how much I owe to the various credit card companies. Keep up the good work! **J.F.N. (Wilts)**

Only **£49.95** (incl VAT)

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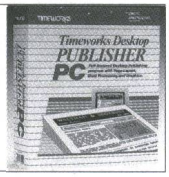

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55sx-061 386SX 16MHz 2Mb 60Mb	£1499.00
65sx-061 386SX 16MHz 2Mb 60Mb	£1799.00
65sx-121 386SX 16MHz 2Mb 120Mb	£1999.00

IBM COMPONENTS

IBM MOUSE	£48.00
IBM KEYBOARD	£135.00
IBM 8503 MONO	£149.00
IBM 8512 14" COLOUR	£339.00
IBM 8513 12" HIGH RES COL VGA	£439.00

PCS 92 PACKAGE TO TAKE YOUR BUSINESS INTO EUROPE FREE FROM CORPORATE COMPUTING AND OLIVETTI

This unique bundle is offered with all Olivetti PC's. Devised specifically for the European single market and 1992. A hardware and software solution for all businesses getting ready for this important event.

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OLIVETTI PERSONAL COMPUTERS

FREE ON-SITE MAINTENANCE WITH ALL OLIVETTIS

PCS 86

A new desktop Personal Computer with an 8086 processor running at 10MHz. A choice of single or dual 3.5" 720k floppy drives or one floppy drive plus a 20Mb Hard Drive. Systems are fitted with 640k RAM expandable to 2.4Mb.

	VGA Mono	14"High Res VGA Col
PCS 86 single drive	£CALL	£CALL
PCS 86 dual drive	£CALL	£CALL
PCS 86 20Mb HD	£739.00	£869.00

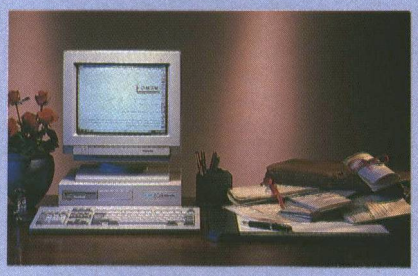
PCS 286

A high performance desktop computer with an 80286 processor running at 12MHz. Options include dual 3.5" 1.44Mb floppy drives and a choice of 20 or 40Mb hard disks. 1Mb of RAM expandable to 4Mb is standard.

	VGA Mono	14"High Res VGA Col
PCS 286 Dual Drive	£819.00	£919.00
PCS 286 20Mb HD	£889.00	£999.00
PCS 286 40Mb HD	£969.00	£1079.00

NEW OLIVETTI PCS 386SX

A new high performance desktop Personal Computer with an 80386SX processor running at a super fast 16MHz clock speed. The 1Mb RAM can be upgraded to 8Mb and a choice of 20, 40 and 100Mb Hard Drives are offered along with a 1.44Mb 3.5" floppy drive.



Timeworks DTP† plus Tree 86 with all PCs†

Single Drive	14" Mono	£1039.00
20Mb Hard Drive	14" Mono	£1199.00
40Mb Hard Drive	14" Mono	£1299.00
100Mb Hard Drive	14" Mono	£1549.00
Single Drive	14" Colour	£1159.00
20Mb Hard Drive	14" Colour	£1339.00
40Mb Hard Drive	14" Colour	£1419.00
100Mb Hard Drive	14" Colour	£1679.00

NEW 3rd GENERATION AMSTRAD 3000 SERIES

Amstrad, the future...

PC3086 The entry level machine of the 3rd generation range for business computing. An 8MHz 8086 Central Processor, 640k RAM and a choice of 1 or 2 3.5" 720k or 5.25" 360k floppy drives and an optional 30Mb Hard Drive.

3086 Single Drive	12" Mono	£475.00
3086 Dual Drive	12" Mono	£565.00
3086 30Mb Hard Drive	12" Mono	£685.00
3086 Single Drive	14" Colour	£565.00
3086 Dual Drive	14" Colour	£645.00
3086 30Mb Hard Drive	14" Colour	£765.00
3086 Single Drive	14" HRCD	£645.00
3086 Dual Drive	14" HRCD	£725.00
3086 30Mb Hard Drive	14" HRCD	£845.00

Timeworks DTP† plus Tree 86 with all PCs†

PC3286 This is a powerful 80286 processor running at 16MHz and there is a 1Mb RAM which is expandable to 16Mb. There is a choice of one 3.5" 1.44Mb or 5.25" 1.2Mb floppy disk drives. 40Mb Hard Disk.

3286 Single Drive	12" Mono	£645.00
3286 Hard Drive	12" Mono	£855.00
3286 Single Drive	14" Colour	£725.00
3286 Hard Drive	14" Colour	£935.00
3286 Single Drive	14" HRCD	£795.00
3286 Hard Drive	14" HRCD	£995.00

PC3386SX This has a speed of 20MHz with a 80386SX processor and 1Mb RAM. There is a 3.5" 1.44Mb floppy disk drive and 40Mb hard disk.

3386SX Hard Drive	12" Mono	£1155.00
3386SX Hard Drive	14" Colour	£1235.00
3386SX Hard Drive	14" HRCD	£1325.00

CORPORATE CC88E PC SPECIAL

A new, affordable XT from Corporate. Fully burn tested & assembled here in the UK. 8088-2 16 bit CPU running at 4.77/8MHz, 640K RAM,optional 30Mb Hard Drive, 8087 co-processor socket, 360K 5.25" Floppy Drive & optional 3.5" drive, Second FDD controller, 3 Half Height bays, Serial & Parallel ports, VGA Graphics card, 102 Key Keyboard, Real Time clock, MS DOS 3.3. Package includes:

1. Toolworks Office Manager, integrated package with spreadsheet, word processor, database & spell checker.
2. Toolworks DOS Tutor, a powerful interactive program designed to teach beginners how to use IBM compatible computers.
3. Toolworks Back-up Pro, a fast, easy & safe back-up program with data compression & Networking compatibility with 4 different back-up modes.
4. Mavis Beacon Teaches Typing, touch typing tutor.

The above software is only available with dual or hard drive machines

	With VGA mono monitor	With VGA colour monitor
Single Drive	£325.00	£459.00
Dual Drive	£399.00	£499.00
Hard Drive	£499.00	£599.00

FREE full on-site maintenance



NEW LOW PRICES

AMSTRAD 1640/2086

Call for special Amstrad 2086 pricing

LocoScript PC FREE with Amstrad 1640

Lotus 1-2-3 V. 2.01 FREE with Amstrad 2086

AMSTRAD 1512

Amstrad 1512 dual drive mono with Ability integrated software £339.00

Amstrad 1512 dual drive colour with Ability integrated software £379.00

	*Single Drive	Dual Drive	30 MB Hard Drive	SD+32MB Hard Card	DD+32MB Hard Card	SD+40MB Hard Card	DD+40MB Hard Card
1640 Mono	£335.00	£419.00	£539.00	£490.00	£574.00	£525.00	£609.00
1640 Colour	£415.00	£499.00	£609.00	£570.00	£654.00	£605.00	£689.00
1640 ECD	£495.00	£569.00	£689.00	£650.00	£724.00	£685.00	£759.00

Timeworks Free with Amstrads† Contact the trained sales team now on (0923) 243301

• All Amstrad computers come with FREE on-site maintenance. • Systems with Hard Disks & Hard Cards come with TREE 86 software. • Professional 8 hour call out on-site maintenance available. *Not supplied with Timeworks DTP

VISA

Telephone: (0923) 243301 Fax: (0923) 37946

Access

Portable Computers

NEW OLIVETTI NOTEBOOK COMPUTERS

Olivetti D1000 Electronic Notebook

A new hand-held, compact notebook for saving addresses, telephone numbers, notes, currency and metric converter &calculator. 32K data bank memory. Qwerty & numeric keypads. Size 148 x 65 x 18mm. **£61.00**

Olivetti T600 Travel Assistant

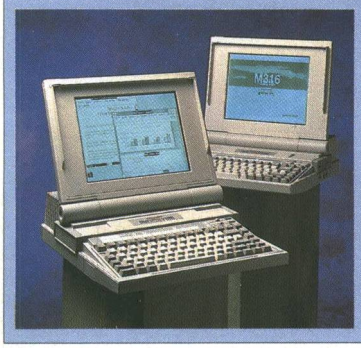
The solution with your communications abroad. Fourteen travel scenarios available in six different languages - English, German, French, Italian, Spanish and Dutch. 5K data bank memory. 32 character LCD, Dimensions (mm) 153 x 80 x 22. **£61.00**

Olivetti D2000 Electronic

To organise your telephone directory, to record your ideas, to calculate your expenses and to remember appointments. 64K data bank memory. Qwerty professional keyboard. Size 154 x 82 x 20mm **£113.00**

Call Corporate Computing on (0923) 243301 for SPECIAL PRICES

OLIVETTI PORTABLES FROM CORPORATE COMPUTING



M211V

16MHz 80286 processor, 1Mb RAM expandable to 2 or 5Mb. 20Mb hard drive, 3.5" 1.44Mb floppy drive **£1599.00**

M211V as above with 40Mb Hard Drive **£1799.00**

Corporate Computing special offer

M316 - *STATE OF THE ART PORTABLE*

An 8036SX 16MHz, 1Mb RAM standard (expandable to 5Mb). 20Mb hard drive option with 3.5" 1.44Mb floppy drive **£1799.00**

M316 as above with 40Mb Hard Drive **£1949.00**

TOSHIBA PORTABLES

T1000

4.7MHz Processor with a 512k memory and battery. 1.44Mb floppy disk drive, 3.5". Supertwist display, CGA 640 x 200 res, 6.4Lbs **£469.00**

T1000XE

9.54MHz Processor, 20Mb hard disk, 1Mb memory and battery. CGA 640 x 200 res & a backlit supertwist display. MS-DOS 3.3 in ROM. 5.9Lbs **£889.00**

T1200HB

9.54MHz Processor, 20MB hard disk, 1Mb memory, 1.44Mb floppy drive, 3.5". Backlit supertwist display MS-DOS 3.3,as CGA 640 x 400 res 11.5Lbs **£1089.00**

T1200XE

12MHz Processor with 20Mb hard disk, 1Mb memory 1.44Mb floppy drive, 3.5". Sidelit supertwist display, CGA 640x400 res MS-DOS 4.01 7.9Lbs **£1375.00**

T1600/20

12MHz Processor with 20Mb hard disk, 1Mb memory 1.44Mb floppy drive, 16 scale backlit supertwist display EGA 640 x 400 res MS-DOS 4.01 11.5Lbs **£1699.00**

T1600/40

The features for the T1600/40 is the same as the T1600/20, yet it has a 40Mb hard disk. **£1799.00**

T3100SX/40

16 MHz Processor, 40Mb hard disk, 1Mb memory 1.44Mb floppy drive,16 shade VGA graphics, gas plasma display. MS-DOS 4.01. 15Lbs **£2579.00**

T3100SX

80386SX processor 16/8MHz, 1Mb RAM, expandable to 13Mb, a 3.5" 1.44Mb floppy drive and an 80Mb hard disk are all standard. **£2899.00**

T3100e/20

12MHz Processor with a 20Mb hard disk, 1Mb memory and Mains. 1.44Mb floppy disk drive, 3.5". Gas plasma display and a CGA 640 x 400 resolution. MS-DOS 4.01. 13.21Lbs **£1519.00**

T3100e/40

The features for the T3100e/40 is the same as the T3100e/20 but with 40Mb hard disk. **£1789.00**

T3200

12MHz Processor with a 40Mb hard disk and 1Mb memory and mains. 1.44Mb floppy disk drive, 3.5". 4 scale shaded gas plasma display and an EGA 640 x 400 resolution. MS-DOS 4.01. 18.7Lbs **£1899.00**

T3200SX

16MHz Processor with a 40Mb hard disk, 1Mb memory, mains, 1.44Mb drive, EGA 640x400 VGA graphics, 16 scale gas plasma display MS DOS 4.01. Weight only 17.4Lbs **£2539.00**

T5200/40

20 MHz Processor with a 40Mb hard disk, 2Mb memory and mains. 1.44Mb floppy disk drive, 3.5". EGA 640 x 400 and VGA graphics, 16 scale gas plasma display. MS-DOS 4.01. 18.7Lbs **£3189.00**

T5200/100

The features for the 5200/100 are the same as the T5200/40, but with 100Mb hard disk. **£3565.00**

TOSHIBA PORTABLE ACCESSORIES

Carry Case (T240L) T1000/SE/XE/1200	**£35.00**
Carry Case (T2381) T1200HB/T1600	**£40.00**
Carry Case (T241) TT3100/5100	**£40.00**
Carry Case (T239L) T3200/5200	**£50.00**
Additional battery T1000SE/XE/T1200XE	**£45.00**
Additional battery T1200HB	**£45.00**
Additional battery T1600	**£45.00**
Additional battery T31000SX	**£69.00**

PSION MOBILE COMPUTERS



MC200

7.68MHz Processor with 128k RAM and 256k flash eprom. 4 solid state drivers. 640 x 200 supertwist LCD blue and white screen. The built in software consists of a test processor, database, diary, calculator, alarm and terminal emulation, 4.3Lbs **£455.00**

MC400

Processor with 128k RAM and 256k flash eprom. 4 solid state drivers. 640 x 400 retardation film LCD black and white screen. The MC400 contains the same software as the MC200. 4.3Lbs **£645.00**

MC600

7.68MHz Processor with a 256 flash eprom and 768k RAM and 1Mb internal RAM disk. MS-DOS 3.2. 4 solid state drives and 640 x 200 CGA retardation film LCD black and white screen. LapLink III software. 4.3Lbs **£1199.00**

PSION ORGANISER

Organiser II XP 2 line display, 32 character screen, 32k ROM, 32k RAM, Diary with alarm, filing system, clock, calculator, programmable. **£85.00**

Organiser II LZ 4 Line display, 80 character screen, 64k ROM, 32k RAM. Filing system, diary with alarm, clock, calculator, programmable. Week at a view Calendar, Stopwatch. **£115.00**

Organiser II LZ64 64 The features on the Organiser II LZ64 are the same as the Organiser II LZ yet has the addition of a 64k RAM **£155.00**

AMSTRAD PORTABLES

ALT-286

16MHz Processor, 20Mb hard disk and 1Mb memory. 1 .44Mb floppy disk drive, 3.5". 640 x 480 - VGA backlit FTN LCD screen. 6Kg **£1299.00**

ALT-386sx

16MHz Processor, 40Mb hard disk 1Mb memory. 1.44Mb floppy disk drive. 3.5". 640 x 480 res VGA backlit FTN LCD screen. 6Kg **£1659.00**



ATARI PORTFOLIO

4.9MHz Processor with a 128k RAM and 256k ROM. There is the supertwist LCD Mono screen. 80 x 25 and 40 x 8 character modes. 240 x 64 graphics modes. MS-DOS 2.11. 5 built in applications inserted, 495g in weight. **£159.00**

ATARI PORTFOLIO ADD - ONS

Serial Interface	**£48.00**
Parallel Interface	**£32.00**
Memory Expansion to 256K	**£148.00**
32/64/128 RAM cards	**£40.00/£73.00/£110.00**
Card Drive	**£57.00**

FACSIMILE

Amstrad FX5000.

Latest Amstrad Fax machine. Group 3 compatible. Complete with telephone and number memory. On-site maintenance **£349.00**

Amstrad FX9600T.

Group 3 compatible - up to 50 number memory. Parallel port. Document feeder. 16 grey-shade transmission. On-site maintenance.

Save £100.00 while offer lasts **£425.00**

Amstrad FX9600AT.

All the features of 9600T, plus answerphone built in. Auto fax/answerphone switch. On-site maintenance.

Save £100.00 while offer lasts **£499.00**

Scanner Interface for Amstrad 9600T Fax **£99.00**

Amstrad Fax Paper. Box of 10 **£35.00**

Brother Fax 150.

Very cost effective fax machine with 16 shades of grey, number memory, security password. A very neat machine with on-site maintenance **£440.00**

C-FAX SRI.

Fax card by Communicate. Provides all the features of a fax machine for a fraction of the cost. Group 3 compatible, all standard desktop fax features, password protection, simply plug into your PC with a standard BT socket **£169.00**

Worldport 2496 Pocket portable Fax & Data Modem – ideal for portable people **£475.00**

Dialatron Faxlink

Revised version of Faxlink, allowing connection of fax and telephone to a single shared line **£69.00**

Brother Fax 150 + Faxlink	**£500.00**
Amstrad FX500 + Faxlink	**£400.00**
Amstrad FX9600T + Faxlink with trade in	**£475.00**
C-Fax Card + Faxlink	**£220.00**

ALL PRICES EXCLUDE VAT

Laser Printers

QMS



COLOURSCRIPT 100 MODEL 10

A4 paper size, 1 page per minute print speed, 1,200 page per month duty cycle, 300x300 DPI resolution, Centronics parallel, RS-232 serial and Appletalk interfaces, SCSI interface for external hard disk, 4Mb RAM (expandable to 8Mb), 1Mb ROM and 35 resident fonts **£4720.00**

EPSON

EPL7100

The Epson EPL7100 is capable of 6ppm with 300dpi resolution & 24 fonts. 512k RAM is expandable to 6Mb. The dimensions of the EPL7100 are 185mm x 495mm x 381mm (HxWxD) **£839.00**

INK JET PRINTERS

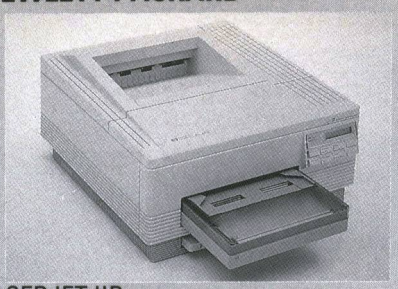
EPSON SQ 850 80 COL 600 CPS 198 NLQ	**£479.00**
EPSON SQ2550 132 COL 600 CPS 198 NLQ	**£689.00**
DICONIX 150 PLUS IMPROVED QUALITY	**£249.00**
CANON BJ 130e	**£529.00**



NEW BJ10e This is a compact bubble jet printer that can complete 100cps (12 cpi) in high quality mode and the resolution is 180 x 360 dpi at economy mode and 360 x 360 dpi on high quality mode. There is a 37Kb input buffer. The dimensions of this printer are 310mm (W) x 216mm (D) x 48mm (H). **£295.00**

HP PAINTJET XL	**£1695.00**
HP PAINTJET 30 COLOURS 90 DPI 167 NLQ	**£685.00**

HEWLETT PACKARD



LASERJET IIP

Able to complete 4 pages per minute. It is a 512K RAM expandable to 4.5Mb. Extensive software support. 14 internal fonts. 50 sheet paper tray. Parallel/ Serial interfaces. One font cartridge slot. **£729.00**

LASERJET III

8 pages per minute. 8 internal scaleable fonts. 14 built-in bitmapped fonts. HP-PCL5 printer language. HP-GL/2 Vector graphics. Parallel and Serial and extended interfaces. **£1099.00**

LASERJET IIID

The HPIIID replaces the HPIID. It can complete 8 pages per minute and there is HP PCL5 printer language and HP resolution enhancement technology. It can also be configured to Macintosh compatible with the addition of the HP Postscript printer cartridge. **£1539.00**

HEWLETT PACKARD ACCESSORIES

1Mb Memory U/G for IIP and III	**£113.00**
2Mb Memory U/G for IIP and III	**£CALL**
Toner Cartridge for IIP	**£45.00**
Toner Cartridges for III	**£59.00**

NEW DESKJET 500

This HP Deskjet 500 replaces the HP Deskjet and HP Deskjet Plus. 16k memory, capable of 3 pages of text and two pages of graphics per minute with a resolution of 300 DPI. **£389.00**

STAR LP-811 POSTSCRIPT

This is the latest laser printer from Star, and can complete 8 pages per minute, it has a 200 sheet paper tray. 2Mb RAM. There are 5 emulations and 35 scaleable fonts. **£1599.00**

Star LP-8 8ppm	**£1119.00**
Star LP-8 IIT 8pp,	**£POA**

NEC & PANASONIC

NEW NEC SILENTWRITER2 S60

The NEC S60 HP Laserjet and Diablo 630 emulation printer is capable of 6ppm (A4). The 1.5Mb memory is standard and there are parallel and RS232 interfaces. **£865.00**

NEW NEC SILENTWRITER2 S60P

Fully licensed Adobe Postscript S60P is capable of 6ppm with parallel, serial and appletalk interfaces **£1335.00**

NEC SILENTWRITER2 266

Completes 8 pages per minute and has 8 resident fonts. The 1.5Mb RAM is expandable to 5.5Mb. A high performance NEC V50 Processor. HP Laserjet 11 &Diablo 630 emulation, P/S interfaces **£1285.00**

NEC SILENTWRITER2 290

This is Postscript and is able to complete 8 pages per minute. It has a 2Mb RAM. It has a high performance MC68000 processor and there are 35 fully scaleable fonts resident. Parallel, Serial and Appletalk interfaces. **£1765.00**

NEC LC890XL

This is Postscript and is able to complete 8 pages per minute. The 4Mb RAM is expandable to 8Mb. There are 3 emulations and 35 resident fonts. Also there are two 250 sheet paper trays. There is a built-in SCSI interface for and optional NEC 20Mb. Parallel, Serial and Appletalk interfaces. **£2489.00**

NEC COLOURMATE PS

This Postscript prints 1 full colour print per minute. High performance MC68020 Processor with a 8Mb RAM. NEC thermal transfer engine. It also has 35 colour fonts and a Parallel, Serial and Appletalk interfaces. **£6485.00**

NEC POSTSCRIPT 8ppm **£1869.00**

PANASONIC KX-P4450i

The KX-P4450i can complete 11 pages per minute. Parallel and Serial interfaces are included as standard with 512k of RAM. Two 250 sheet paper trays and 28 resident fonts. **£1109.00**

PANASONIC KX-P4420

8 pages per minute. 512k RAM expandable to 4.5Mb. 250 sheet paper tray. HPII emulation, 22 resident fonts. Parallel interface **£835.00**

PANASONIC KX-P4455 ADOBE POSTSCRIPT

Capable of 11ppm, 2Mb RAM, dual bin paper feed. 39 scaleable fonts, 26 internal fonts in HP Laserjett II emulation mode. **£1799.00**

Dot Matrix Printers

PANASONIC

KX-P1624 24 PIN 136 COL	**£319.00**
KX-P1695 9 PIN 136 COL	**£329.00**
KX-P1180 9 PIN 80 COL 192 CPS 38 NLQ	**£135.00**
KX-P1124 24 PIN 90 COL 192 CPS 63 NLQ	**£215.00**



NEW PANASONIC KX-P1123

A new 24 PIN Dot matrix printer. Draft speed 192cps and 63cps LQ. 5 printer styles yet produces 13 font print styles. Narrow carriage width, Top, rear and bottom paper feed. Paper parking facility. **£CALL**

NEC

P9XL - CALL FOR SPECIFICATION	**£845.00**
P30 24 PIN 72CPS LQ 108 CPS HS LQ and 216 CPS in draft mode 72 NLQ	**£265.00**

NEW NEC P20

24 pin, 80 col dot matrix printer capable of 72 CPS LQ, 108 CPS HS LQ and 216 CPS in draft mode. Similar design to P30 **£CALL**

NEC P60/P70

The NEC P60 and P70 are 24 pin and 100 CPS LQ, 250 CPS HS LQ and 300 cps draft, large selection of resident fonts and a high speed Gothic LQ font. Built in buffer. The NEC and EPSON software is compatible with the printers. The IBM proprinter X24e emulation is optional. However the P60 has 80 cols and the P70 has 130 cols. **P60 - £395.00 P70 - £499.00**

IBM PRINTERS

Proprinter III 4201 9-pin 320CPS 65NLQ	**£285.00**
Proprinter IIIXL 4202 9-pin 320CPS 65NLQ	**£375.00**
Proprinter X24E 4207 24-pin 288CPS 96NLQ	**£439.00**
Proprinter XL24E 4208 24-pin 288CPS 96NLQ	**£535.00**
Quickprinter 5204 24-pin 396CPS 188LQ	**£789.00**

STAR

LC10 9 PIN 80 COL 130 CPS 30 NLQ	**£129.00**
LC15 9 PIN 132 COL 150 CPS 37 NLQ	**£259.00**
LC24-15 24 PIN 132 COL 167 CPS 66 NLQ	**£319.00**
FR10 9 PIN 80 COL 300 CPS 76 NLQ	**£299.00**
FR15 9 PIN 132 COL 300 CPS 76 NLQ	**£375.00**
XB24-10 24 PIN 80 COL 240 CPS 80 NLQ	**£389.00**
XB24-15 24 PIN 132 COL 240 CPS 80 NLQ	**£499.00**

STAR XB 2410

A high performance 24 pin SLQ and LQ printer is able to achieve SLQ printing with48 pin quality. Featuring print speeds of 240 cps in draft elite for 80 cps in any of its 21 LQ fonts. Included are 4 super letter quality fonts. Parallel version. **£389.00**

NEW STAR LC24-200 & LC24-200 COLOUR

These two 24 PIN dot matrix printers perform at 200 CPS Elite and 67 CPS letter quality, there is a high speed draft facility of 222 CPS combined with a 30k buffer. 5 fonts & 7 colours with colour version standard. **LC-24-200 £219.00 Colour £249.00**

NEW STAR LC-200

A multi purpose 9 PIN dot matrix printer with COLOUR capable of 180 CPS draft elite & 45 CPS NLQ. There is a high speed draft facility of 225 CPS at 12 CPI. 8 resident fonts and a 16k buffer standard. **£179.00**

AMSTRAD

LQ5000di 24 PIN 132 COL 288 CPS 98 NLQ **£289.00**

EPSON

LX400 9 PIN 80 COL 180 CPS 30 NLQ	**£129.00**
LX850 9 PIN 80 COL 200 CPS 30 NLQ	**£195.00**
FX850 9 PIN 80 COL 264 CPS 54 NLQ	**£320.00**
FX1050 9 PIN 132 COL 264 CPS 54 LQ	**£389.00**
EX1000 9 PIN 132 COL 300 CPS 60 LQ	**£540.00**
LQ400 24 PIN 80 COL 180 CPS 60 LQ	**£195.00**
LQ550 24 PIN 80 COL 180 CPS 60 LQ	**£269.00**
LQ850+ 24 PIN 80 COL 264 CPS 88 LQ	**£459.00**
LQ1050+ 24 PIN 132 COL 264 CPS 88 LQ	**£569.00**
LQ860 (COL) 80 COL 290 CPS 88 LQ	**£509.00**
LQ1060 (COL) 132 COL 290 CPS 88 LQ	**£629.00**
LQ2550 (COL) 132 COL 400 CPS 132 NLQ	**£749.00**
TLQ4800 48 PIN 132 COL 250 CPS 83 NLQ	**£1689.00**
DFX5000 HEAVY DUTY 533 CPS LINES PER MIN	**£1299.00**

EPSON LQ850+

Fast, flexible and quiet 24 dot matrix. Prints from 88 cps to 300 cps. Prints at densities of 10, 12, 15 cpi. The two standard fonts can be modified to eight other styles. Built-in friction and tractor feed and there is a 6K input buffer. Standard serial and parallel ports. Printer offers broad connectivity. There are optional interfaces and the printer can be used for most paper sizes, such as A4 and multipart stationery **£459.00**

ROLAND PLOTTERS

DXY 1200 A3	**£719**	DXY 1300 A3	**£899**
DPX 2500 A2-A4	**£2395**	DPX 3500 A1-A4	**£3425**
GRX 300	**£3999**	GRX 400	**£4099**

NEW LOW PRICES

OFFICIAL ROLAND PLOTTER SUPER DEALER

HEWLETT PACKARD PLOTTERS

7440	**£529.00**	7475	**£765.00**
7550B	**£2599.00**	7570	**£2159.00**
7575	**£2389.00**	7576	**£3699.00**

VISA

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Access

Software

WORDPROCESSING

Gem 1st Word Plus	£165.00
Word for Windows	£269.00
Wordstar Express (for all PC's)	£69.00
Top Copy Plus	£75.00
Locoscript PC	£79.00
Sprint (Borland)	£139.00
Wordstar 2000 V3	£245.00
Wordstar V6.0	£199.00
PC Write	£75.00
Protext V.5	£79.00
New Word II	£65.00
Microsoft Word V5	£265.00
Word Perfect Version 5.1	£239.00
Word Perfect Personal (dual media)	£99.00
Multimate V4	£275.00

DATABASES

DBase III (Amstrad) Value purchase	£69.00
Prodata – Arnor	£57.00
Fox Pro	£425.00
Masterfile PC (now includes WP)	£64.00
DBase IV – Market Leader	£355.00
DBase IV Developer	£590.00
Paradox 386	£359.00
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Turbo Pascal Professional	£129.00
Turbo Pascal Tutor	£42.00
Zortech C V3	£49.00
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Microsoft Quick Pascal	£52.00
Microsoft Quick C Quick Assembler	£90.00

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DR DOS 5	£85.00
Telemagic V.2	£215.00
Norton Backup	£62.50
Norton Anti-Virus (Dual Media)	£115.00
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Due to recent expansion we have the following staff vacancies in the North & South of England.

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If you would like to share in our success please forward your CV to the address below.

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	Per Box	5 or more
M2D DS/DD 48 TPI 5.25"	£7.00	£6.00
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MF2HD DS/HD 3.5" 1.6Mb	£25.00	£23.00

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Fully Guaranteed

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Corporate DS/DD 3.5" 135 TPI	£10.00	£9.00
Corporate DS/HD 3.5" 1.6Mb	£20.00	£18.00

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SAGE Chit Chat Pack	£189.00
Crosstalk	£79.00
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Dataflex Modems	
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Quadcom Pocket	£319.00
Biscom Internal	£185.00
Biscom Pocket	£239.00
Stradcom Internal	£145.00
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IBM PC/XT/AT/PS/2 and Amstrad PC and other IBM compatibles. The 420dpi resolution provides fast and responsive interaction. Complete with Deluxe Paint IIPC, Mouse driver, menu driver and warranty.

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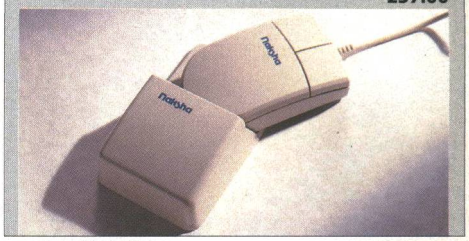

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Corporate A4 Scan Plus with Pic Publisher	£199.00
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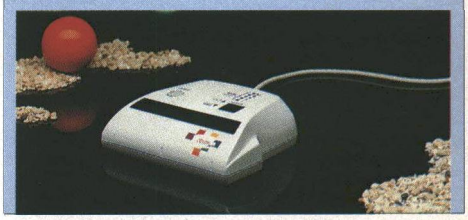
Genius GS-C105 Hand-held colour scanner. 400dpi, including controller and software **£299.00**



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The card has two ports for the usage of certain software which may require two joysticks.

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"Thankyou and congratulations on your super express reply, keep up the good work!" L.M.S. Inacio, Porto Santo, Portugal.

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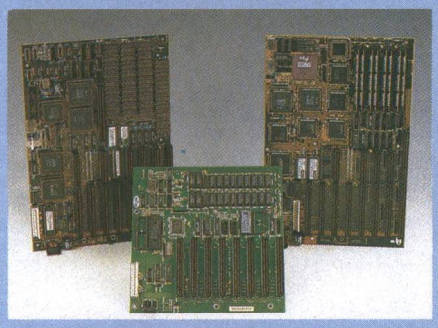
MOTHERBOARDS

TURBO XT MOTHERBOARD - up to 640k, 4.77/10MHz Select, 8088-1 CPU 8087 co-processor option. AMI Bios, 8x8 bit slots, Mini XT size (22.5 x 22.5 cms) RAM combinations 4164, 4464, 44256, 41256 DRAM 120ns. Ok memory £59.00
640k memory £99.00

80286-12 MOTHERBOARD - (8/12MHz Selectable) 80287 option, AMI Bios 3 x 8 and 5 x 16 bit slots. Up to 8meg on board (combinations of SIPP and DRAM, eg 2 Mb = 36 x 256k D-RAM and 4 x 256k SIPP) Battery backed RTC. Size 22.5 x 33cms.
Ok memory £125.00
1Mb memory £189.00

80286-16 16MHz MOTHERBOARD - (8/16 selectable) 80287 option, AMI Bios, 3 x 8 and 5 x 16bit slots. Up to 8Mb on mother board (combination of SIPP and DRAM, eg 2meg = 36 x 256k D-RAM and 4 x 256k SIPP) Battery backed RTC. Size 22.5 x 33cms.
Ok memory £199.00
2Mb memory £339.00

80386-SX 16MHz MOTHERBOARD - AMI Bios, 3 x 8 and 5 x 16 bit slot Up to 8Mb on m/board 16Mb total (Combination SIPP/256/1Mb DRAM) 80387-SX co-pro option. Battery backed RTC. Size 22.5 x 33cms.
Ok memory £299.00
2Mb memory £439.00



NEW SX 20MHz MOTHERBOARD - AMI Bios, 3 x 8 and 5 x 16 bit slot Up to 8Mb on m/board 16Mb total (Combination SIPP/256/1Mb DRAM) 80387-SX co-processor option. Battery backed RTC. Size 22.5 x 33cms.
Ok memory £399.00
2Mb memory £539.00

25MHz MOTHERBOARD (20/25 MHz selectable) AMI Bios, 80386-25 CPU 80387/Weitek options. P82C20 25MHz chip set. 1 x 32, 5 x 16 and 2 x 8 bit slots. Up to 8Mb on M/board 16Mb total. Baby AT size, 22.5 x 33cms. 80387/Weitek co-processor options. C & T CS8230 chip set. 22.5x33cms. Battery backed RTC.
Ok memory (Expandable to 16Mb) £545.00
2Mb memory £689.00

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Ok memory (Expandable to 16Mb) £799.00
4Mb memory £1099.00

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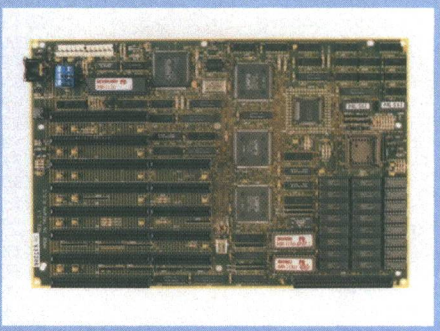

COMPUTER CASES

Chosen for their practical design, construction material (metal cases), expandiblity and accessibility. All Corporate Components motherboards fit each of the cases.
Deskline W43.5cm x D42cm x H14.5cm 200 WATT Power Supply 3 x 5.25" slots 1 x 3.5" slots, turbo switch, keylock and speaker £99.00

Baby Hi-Line W19cm x D40.5cm x H43cm 200 WATT Power Supply 3 x 5.25" slots, turbo switch, keylock & speaker £129.00
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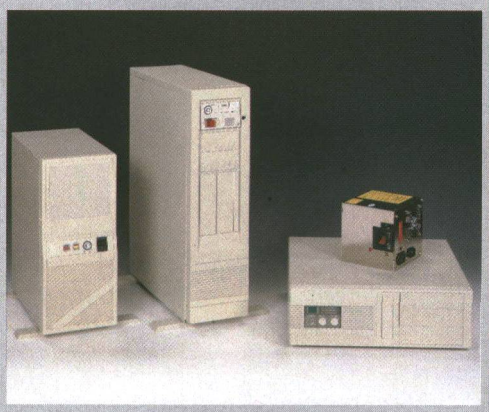

POWER SUPPLIES

Deskline 200 WATT, 14.8cm's high, 16.5cm's deep, 14.8cm's wide £55.00
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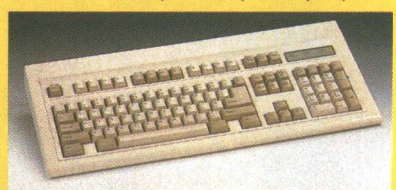
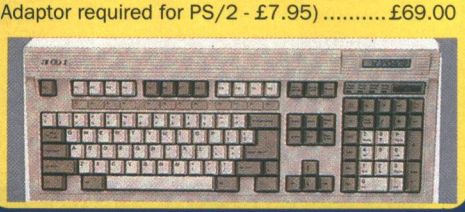
Tactile 102 key keyboard for XT/AT/386. (PS/2 option available, this requires PS/2 adaptor) £39.00



NEW Enhanced Keyboard with calculator.

● Fully enhanced keyboard ● Numeric keypad doubles as sophisticated business calculator with memory function I Fully compatible with XT/AT/386 (Adaptor required for PS/2 - £7.95) £69.00



MATHS CO-PROCESSORS

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INTEL 80387-SX (SX386) ...£209.00
INTEL 80387-20(386) £265.00
INTEL 80387-25(386) £329.00
INTEL 80387-33(386) £409.00
WEITEK 3167-20 .....£289.00
WEITEK 3167-25 .....£415.00
WEITEK 3167-33 .....£525.00
WEITEK 4167-25 .....£595.00
WEITEK 4167-33 .....£729.00
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IIT 286-2C87/10MHz £145.00
IIT 286-2C87/12MHz £179.00
IIT 286-2C87/20MHz £195.00
IIT 386-3C87/16MHz £189.00
IIT 386-3C87/20MHz £219.00
IIT 386-3C87/25MHz £279.00
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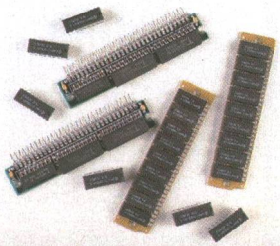

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DRAM(64k) 120NS ..£1.50 DRAM(64k) 100NS £1.95
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DRAM(1Mb) 80NS ...£6.50 DRAM4464 120NS £1.95
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FD20 360k/1.2Mb 5.25" £55.00
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TMC850 Future Domain Card 8 bit, for Hard Drives above 84Mb £99.00
ST02 - SCSI 8-bit adaptor & FDC £39.00
TMC885 Future Domain Card 16 bit, for Hard drives above 84Mb with floppy controller £175.00
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ST08A - As above for AT & FDC £29.00
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XT RLL HD £45.00
AT 2HD/2FD MFM 2:1 ..... £85.00
AT MFM 2HD/2FD 1:1 ..... £95.00
AT RLL 2HD/2FD 1:1 ..... £95.00
The Corporate IDE/FDD is a 16 bit disk controller for AT bus PC's. Supports 2 hard disks & 2 floppy drives with integrated drive electronics & standard floppies. With cables & LED disk activity connector . £29.00
Corporate 1006V - 16 bit MFM disk controller for AT bus machines, supports 2 hard disk and 2 floppies. Supports 1:1 Interleave. WD-1006V-MM2 compatible, disk activity LED connector & cable set £75.00

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Parallel mono hercules graphic card £45.00
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XT 2nd serial kit (for card above) £9.00
AT I/O Card: serial/parallel/game £29.00
AT 2nd serial kit (for card above) £9.50
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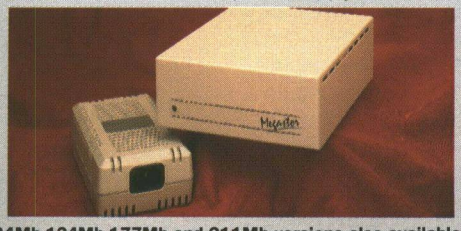

84Mb 124Mb 177Mb and 211Mb versions also available

HARDCARDS

A hard disc card is identical to a hard disc system within a computer, yet it fits in one of the expansion slots at the back of the PC. 32Mb or greater capacity models can be configured as drive C or drive D or any other logical drive partitioned into two or more drives.
MEGASTORE-This is a 32Mb hardcard running at 62ms complete with Tree86 software. There is autoparking which keeps the data safe when the computer is moved. It will operate in either the C or D drive - 32Mb Megastore Hard Card £159.00
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MEGASTORE 40 - A new intergrated, high performance 40Mb hard card with TREE86 included FREE. For all XT machines.
40Mb Megastore Hard Card £199.00



NEW IMPROVED TREE 86 FILE MANAGEMENT SOFTWARE *FREE WITH ALL HARD CARDS

TREE 86 is a quick and efficient dual media file management program for your computers hard disk. It allows you to back up, move, erase, copy, rename, print, view or execute any file. The simple menu driven, tree style structure display makes this program the ultimate hard disk companion.

***TREE 86 is free with all hard cards.**

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SIZE	TYPE	MODEL NO.	ACCESS TIME	MEDIA SIZE	PRICE
20Mb	MFM	225	65ms	5.25"H/H	£149.00
30Mb	RLL	23812	65ms	5.25"H/H	£169.00
40Mb	MFM	251-1	28ms	5.25"H/H	£239.00
40Mb	MFM	251	40ms	5.25"H/H	£219.00
65Mb	RLL	277R	28ms	5.25"H/H	£259.00
80Mb	MFM	4096	28ms	5.25"F/H	£429.00
60Mb	SCSI	177N	24ms	3.5"H/H	£319.00
84Mb	SCSI	1096N	24ms	3.5"H/H	£349.00
94Mb	SCSI	2106N	18ms	5.25"H/H	£595.00
183Mb	SCSI	2209N	18ms	5.25"H/H	£699.00
337Mb	SCSI	2383N	15ms	5.25"H/H	£1299.00

*"TYPE" refers to MFM, RLL, SCSI or AT.
H/H = Half Height
F/H = Full Height

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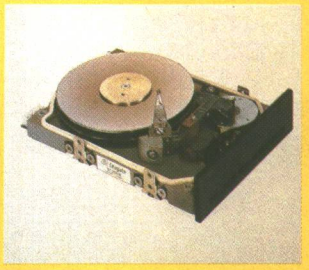
NEC 3142 40Mb 3.5" MFM 28ms installed in 5.25"frame (use with or without frame) £199.00



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242Mb ST274A 16ms 5.25" .. £939.00
337Mb ST2383A 16ms 5.25" £1199.00

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Internal drive (with software) £195.00
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Adaptor board XT/AT £43.00
Adaptor board PS2 ..... £37.00
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Formatted 40Mb £18.00
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Internal drives will fit Corporate Componants External Drive Kits.

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Complete sub-system with interface cable. Compatible with Toshiba, Tulip & Sharp portables . £345.00

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For Zenith Supersport range. £345.00
Additional cables £27.00

PLEASE SPECIFY MODEL WHEN ORDERING

EXTERNAL DEVICE KITS

Suitable for External Floppy Drives, External Hard/SCSI/ESDI Drives, Tape Streamers and Optical Drives.

External case (no rear panel) £24.50
External case (floppy rear panel) 37 pin D £34.50
External case MFM/RLL rear panel 37 pin D (inc fan) £42.50
External 40W Power supply for above cases £29.50
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37 pin cable for floppy and hard drives £7.50
25 pin to 50 pin Centronics cable for SCSI type £7.50

TAILORED KITS FOR 5.25" HALF HEIGHT DRIVES

HD001 MFM/RLL - with external box, cable, power supply and PC slot adaptor £79.50
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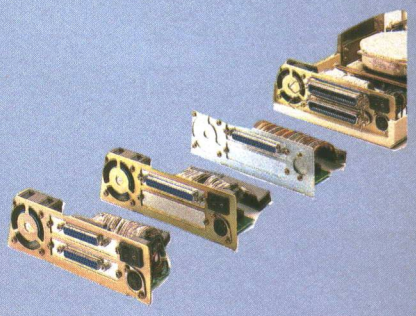

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FD16	Amstrad 2086/ 2286/2386	5.25/360k	£70.00
FD23	2286/2386	5.25/1.2Mb	£80.00
FD301	IBM PS/2	5.25/360-1.2Mb	£169.00
FD30	Olivetti PCS 3000 series	5.25/360	£159.00
FD31	PCS286/386 3000 series	5.25/1.2Mb	£179.00

EXTERNAL FLOPPY DRIVES FOR PORTABLES

Model	Portable	Type	Price
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FD620	ALT286/386	5.25/1.2Mb	£149.00
FD400	Toshiba & Sharp*	5.25/360k	£145.00
FD401	Toshiba AT Range	5.25/1.2Mb	£169.00

* PLEASE CONFIRM WHICH SHARP PORTABLE BEFORE ORDERING

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640 x 480 - 256 colour, 800 x 600 - 16/256 colour, 1024 x 768 - 16 colour (interlaced or non-interlaced). Provides 132 column display for programs like Lotus 1-2-3, Lotus Symphony, Word Perfect etc. Compatible with VGA, EGA, CGA, MDA and Hercules standard Multiple soft fonts allowing user to design and use character fonts, ideal for scientific and foreign language applications. An ideal configuration is the Tystar VGA Colour Monitor, 1024 x 728 (.28 dot pitch) with Card. **Complete price £335.00**

Ocean 8 bit VGA 256k Card **£89.00**

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CORPORATE Z-VGA 16 - A 16 bit VGA card featuring enhanced resolution over the VGA standard with 512k memory. It is register level compatible with VGA, EGA, CGA and Hercules, analogue and TTL monitor outputs. Driver allows VGA BIOS to run from RAM instead of ROM. Application drivers include Windows, Autocad, Ventura, Lotus 1-2-3, Symphony, GEM 3, Wordperfect etc. £120.00
THE CORPORATE EGA+ A low cost entry into high resolution colour graphics. EGA, CGA, MGC compatible, switchable between modes, 256k video memory. 640 x 480 and 132 columns. Parallel printer, light pen support & bus mouse port £49.00

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NEC 3D 14" High resolution 1024x768 (8514A) pixels. Automatic horizontal sync 50-90KHz, digitally controlled display MDA, CGA, EGA, VGA, PGC, 8514A, Apple Mac II, Hercules, Super VGA. 0.28mm. PC, XT, PS/2, AT, Mac compatible £394.00
NEC 4D 16" High res (1024x768) colour interlaced/ non interlaced monitor, auto horizontal synchronisation 30-52KHz, auto vertical synchronisation 50-90Hz. Digitally controlled display area.VGA, 8514A, Apple Mac II, Super VGA, NEC MultiSync Graphics Engine. 0.28mm. PS/2, AT, Mac compatible £709.00
NEC 5D 20"High res (1024x768) colour, dynamic beam focus CRT, 0.31mm. Automatic horizontal synchronisation 30-60KHz, automatic vertical synchronisation 50-90Hz. Digitally controlled display area. VGA, 8514A, Apple Mac II, Super VGA, 1024x768, 1280x1024 interlaced/non interlaced & Apple £1579.00
PHILIPS CM8833 CGA Dark screen14" colour, 600 x285, TTL-Digital/RGB analog input signals, CVBS input for video/stereo sound, complete with earphone socket. £215.00
PHILIPS C9053 EGA* Dot pitch of 0.39mm, 200 charactors, 640x200 CGA & 640x350 EGA resolution £260.00
PHILIPS VGA 14" 9809* £329.00
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At last the affordable desk-top page scanner – the Corporate ScanPlus is a compact sheet fed A4 scanner featuring HP Scanjet compatability which provides an easy and efficient way to read text, graphics, pictures or any image into a personal computer. It has a resolution of 300dpi and can scan up to 64 levels of grey. •A4 Sheet fed page scanner with small footprint •Scans an 11" page in 7 seconds •HP Scanjet compatible with existing application including DTP and OCR software •PC interface included. Uses I/O addresses 270-273. IRQ 3,4,5,9 selectable •Comes with The Picture Publisher, for editing and enhancing the scanned image. Runs under Windows 3 (not included) •Greymap alteration - brightness, posterise, tonemap etc. •Retouching - paint, sharpen, smooth, flood etc •Editing - cut, paste, crop, tint fill, invert, etc •Compatible with existing OCR s/w.

Special offer £199.00

Requires VGA to operate software.



CORPORATE SPECIAL BUNDLES

Tystar VGA/ColorImage VGA Card £335.00
Tystar VGA + ColorImage + Scanplus £529.00
Corporate ScanPlus + Windows 3 .....£259.00
Acer 31 monitor + Ocean VGA Card £259.00

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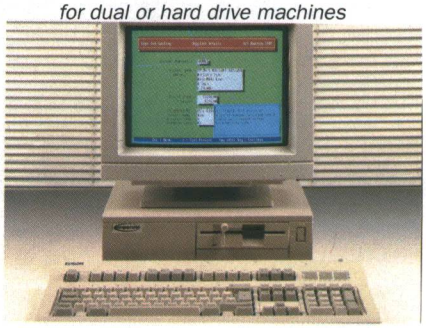
1. Toolworks Office Manager, an integrated package with spreadsheet, word processor, database & spell checker.
2. Toolworks DOS Tutor, a powerful interactive program designed to teach beginners how to use IBM compatible computers.
3. Toolworks Back-up Pro, a fast, easy & safe back-up program with data compression & Networking compatibility with 4 different back-up modes.
4. Mavis Beacon Teaches Typing, touch typing tutor.

The above software is only available for dual or hard drive machines



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AT Accessory kit - Novell .....
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PS/2 Accessory kit - Novell .....
Cartridges - 300Mb per side .....

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RICOH RS-8200HH/8200HY

Half-height external twin system. 800Mb on-line. Easy installation beneath a CRT. Allows copying data between cartridges

RS-8200HH Dual Drive .....
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Corel PC/AT Kit WORM .....
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Compatibility ..... 12cm or 8cm CD
Capacity ..... 540MB (MS-DOS)
..... 560MB (Macintosh)
..... 180MB (8cm)
On board RAM ..... 8KB data buffer
Error rate ..... <10-12 (soft)
Error rate ..... <10-12 (hard)
Error rate ..... <10-12 (seek)
Optional Battery Pack - Capacity ..... 700 mAh
Running time ..... 90 mins approx
Charge time ..... 15 Hrs approx
Audio - No of channels ..... 2 (stereo)

DESCRIPTION	CODE	PRICE
CDR-35 portable drive	CC35B1040	£289.00
CDR-82 internal drive	CC35B4030	£399.00
CDR-72 external drive	CC35B4029	£429.00

ACCESSORIES/SOFTWARE

XT/AT-Bus SCSI I/f kit	CC35B1050	£129.00
MCA-Bus SCSI I/f kit	CC35B1020	£129.00
Apple Mac Interface kit	CC35B1015	£55.00
Rechargeable battery for CDR-35	CC35B4101	£49.00
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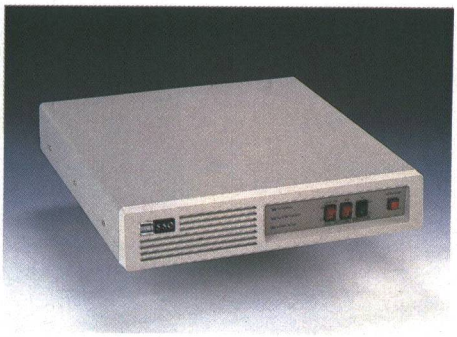

CD ROM PC SPECIAL

MINI TOWER 386-SX (16MHz) 80386 SX-16 CPU, 80387-SX Co-Processor option. 2Mb RAM, Zero Wait State (100ns) 40Mb 28ms self parking hard drive 1:1 controller, parallel and serial ports, Microsoft compatible mouse, AT 102 key keyboard, 220 watt PSU. Super VGA 1024 x 768 graphics card, 14" VGA colour display. NEC 540Mb internal CD-ROM (CDR 82) with SCSI AT - Bus interface, Microsoft DOS AMI Bios and 1 years on site warranty maintenance. Complete PC with CD ROM package only £1999.00



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	Mono VGA	Colour VGA
40Mb Hard Drive (self parking)	£799.00	£899.00
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	Mono VGA	Colour VGA
40Mb Hard Drive (self parking)	£999.00	£1099.00
120Mb Hard Drive (self parking)	£1349.00	£1449.00

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Access

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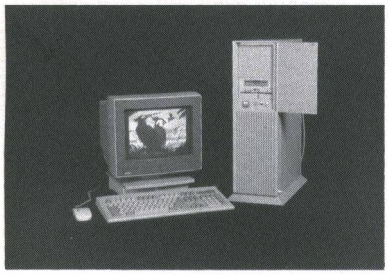

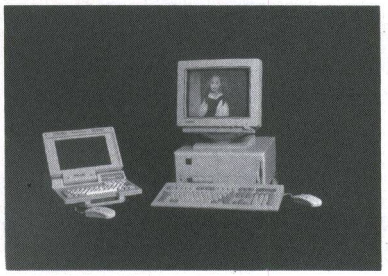

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CACHE	-	-	-	-	OPTIONAL	32K	8K
MEMORY	640K	1Mb	1Mb	1Mb	2Mb	2Mb	4Mb
F/DISK	720K	1.2 or 1.44	1.2 or 1.44	1.2 or 1.44	1.2 or 1.44	1.2 or 1.44	1.2 or 1.44
H/DISK	OPTIONAL	OPTIONAL	40 Mb	40 Mb	40 Mb	90 Mb	130 Mb
CONTROLLER	XT	IDE	IDE	IDE	IDE	IDE	IDE
DISPLAY	MONO	MONO	MONO	MONO VGA	MONO VGA	MONO VGA	MONO VGA
DSP CARD	MDA	MDA	MDA	256K VGA	256K VGA	256K VGA	256K VGA
K/BOARD	102 KEYS	102 KEYS	102 KEYS	102 KEYS	102 KEYS	102 KEYS	102 KEYS
PORTS	2S,1P	2S,1P,1G	2S,1P,1G	2S,1P,1G	2S,1P,1G	2S,1P,1G	2S,1P,1G
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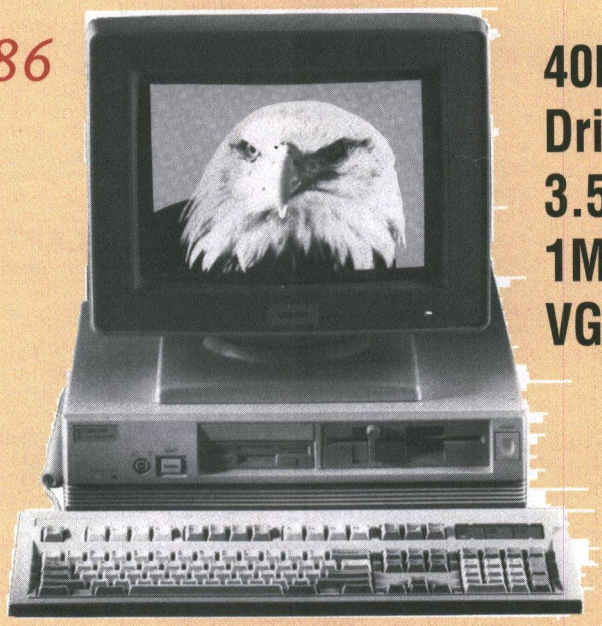

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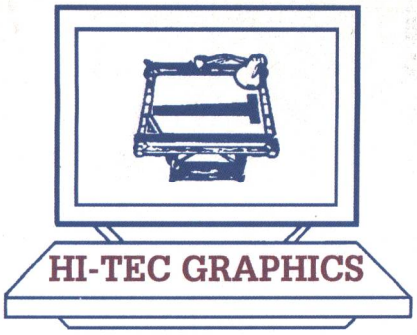

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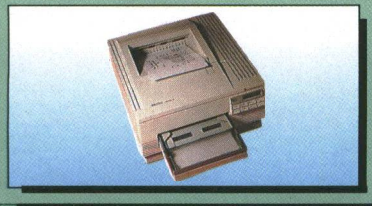

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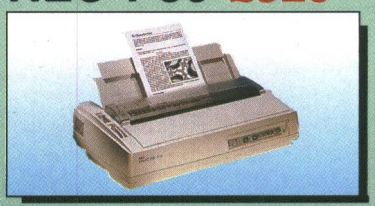

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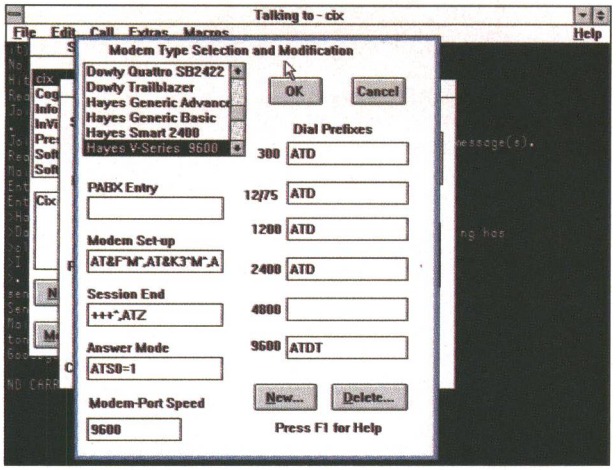
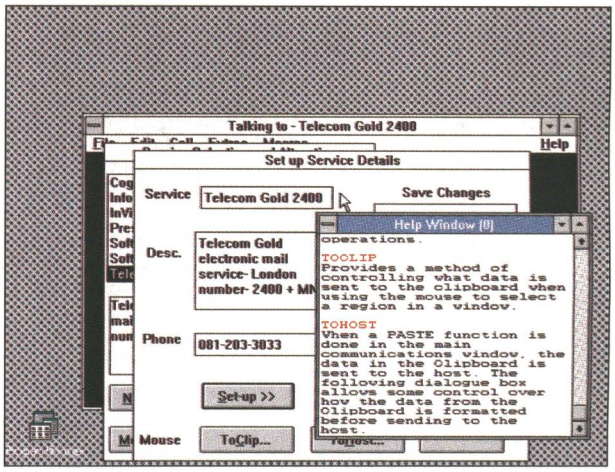


● Being a *Windows* program means simple tasks, such as choosing your modem, are accomplished at the click of a mouse button



● Help screens can be easily summoned as well; here the on-screen help explains the operation of the clipboard

Comms users can now buy a package for use with the Windows 3 *Graphical User Interface (GUI). Tony Dennis goes on line.*

TALKING WINDOWS

A modem and communications software can open up the outside world to your PC. A wealth of software is already available to let you get 'on line' but Softklone UK's *Talking Windows* is among the first *Windows 3* comms packages.

Talking Windows (TW) attempts to overcome the basic limitations of *Windows*' own comms program, *Terminal,* and adds some sophisticated features of its own. It supports an impressive range of modems and makes use of the Zmodem, Xmodem and Kermit file Transfer protocols. Usefully, it can automatically put itself into background mode when carrying out a file transfer, leaving the user free to get on with something else.

Unlike *Terminal, Talking Windows* has a script language, which enables the user to automate an on-line session. Though not very comprehensive, this language makes it possible for the PC to log on to an electronic mail system, download waiting mail and then disconnect itself. More interesting is its mode switching which allows the user to swap from videotex (Prestel) to ASCII (text) while still on-line. This is handy since Prestel has many gateways to ASCII-based systems which are easier to use in on-Prestel mode.

For review purposes, *Talking Windows* was run on a 386-based PC with 4 Megabytes of memory. Unfortunately, *Talking Windows* still kept giving 'out of memory' errors which proved untraceable. To be fair to Softklone, though, *Windows* itself refused to recognise the existence of an extra serial port, COM3, which is normally available courtesy of a Hayes ESP serial port card.

One *Windows*-specific feature offered by this package is support for Dynamic Data Exchange (DDE). This is a facility (built into *Windows*) by Microsoft that effectively allows two applications to be linked in real time. In this particular context, DDE can be utilised to link data currently being displayed in a Prestel page with figures shown in a spreadsheet. The spreadsheet has to offer DDE as well. This feature could prove useful for someone monitoring share prices using Prestel's Citiserve service – as prices change, the spreadsheet would update itself in front of the user's eyes!

In addition to DDE, *Talking Windows* is compatible with *Windows*' standard clipboard facility. The clipboard enables the user to cut and paste between two different applications. Theoretically it could be utilised to upload text to Prestel's Email system, Mailbox too. However, a specific Mailbox text editor would have been much nicer.

FROZEN WINDOWS

Under the Extras menu in *Talking Windows* is a particularly interesting facility called *Frozen Windows*. Using the Freeze command, the program captures the current screen's contents to a separate window. This facility could usefully be employed to capture the main menu screen from a bulletin board system, for example. The real purpose here is to let a mouse be employed while the user is on-line. Clicking on a menu item shown in the frozen window should then send the highlighted character to the service. It didn't seem to work too well on Prestel, though.

SUPPORTIVE ROLE

As far as possible, this particular program does hide from the end user the intricacies involved with going on-line. Fortunately for those struggling to learn PC communications, Softklone has its own support bulletin board too and the correct settings for this service even form an integral part of the *Talking Windows* package.

As a comms package *Talking Windows* is thus quite adequate, but it isn't inspiring enough to make some-one want to rush out and buy *Windows 3*. At £300 it isn't cheap either. ●

PC PLUS PRODUCT FACTS

- **TALKING WINDOWS**
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- **Softklone UK**
- **(0628) 819200**

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■ Windows cut and paste.	■ Poor macro language.
■ Beginner-friendly.	■ No Prestel m/box editor.

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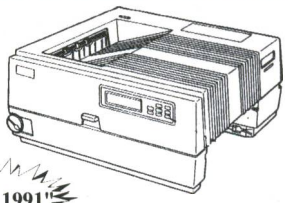

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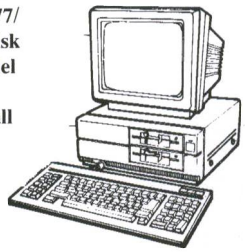

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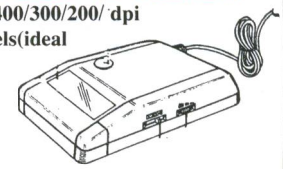

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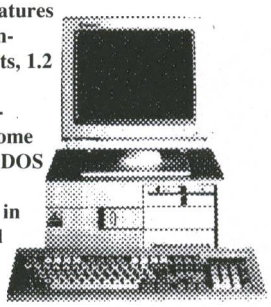

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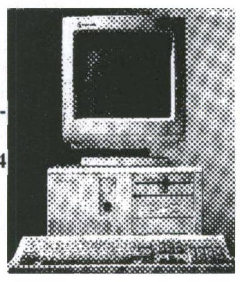

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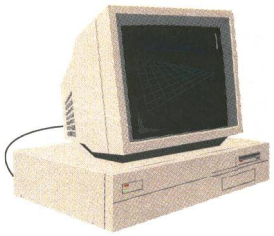

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Datacard™ XL40	40	N	25	8	£269
Datacard™ XL100	100	N	20	8	£439
Datacard™ 30	30	Y	60	8	£229
Datacard™ 40	40	Y	25	8	£299
Datacard™ 100	100	Y	20	8	£479
Slimcard™ XL40	40	N	24	8	£299
Slimcard™ 40	40	Y	24	8	£349
Slimcard™ 100	105	Y	19	16	£599
Smartcard™ 40	40	Y	24	16	£399
Smartcard™ 100	100	Y	19	8	£499
Smartcard™ 200	200	Y	15	16	£899

- Slimcards are only 1 inch thin and take a single expansion slot. Slimcard 100, Smartcard 40 & Smartcard 200 require 16bit AT type slots.
- All cards (Except Datacard 30 & 30XL) require DOS 3.3 or higher.
- Software Pack: Select from PC Tools Deluxe (dual media) **or** Framework II (3.5" disc format). XL models do not come with software pack.
- 2 year warranty option available on all models.

Please specify your PC type when ordering

Time for the facts

What is it? A hard-disc card is identical to a hard disc system but fits in one of the expansion slots at the back of the PC (takes 1.5 slots-Slimcard takes 1 slot). It is very easy to fit and remove and does not void the pc warranty. It has a low power consumption and can be used in twin floppy drive PCs and with most PCs which already have a hard disc. 32 Mb or lower capacity models can be configured as drive c: or drive d: (or any other logical drive if using Dos 3.3 or higher). Higher capacity models are supplied partitioned into two or more drives. Many partitions are possible using Dos 3.3 or higher. Dos 4 (also certain Dos 3.3s) allows partitions greater than 32 Mb. Hard-disc cards advertised here are compatible with all PC compatible computers with standard expansion slots.

Reliability. This is the most important factor. User should realise that not all hard discs are equally reliable. Hard disc failure is well recognised as one of the main reasons for computer malfunction. Our experience in selling and maintaining thousands of hard disc cards & hard disc upgrade systems allows us to recommend only those that are the most reliable.

Compatibility. All hard disc cards advertised here are compatible with PC compatible computers with standard expansion slots. Smartcard 42, 200 & 250 and Slimcard 100 require a 16 bit slot. DOS only handles 2 physical hard discs without device drivers. We do not recommend a hard disc card if you already have 2 physical hard discs installed. The ROM software of these cards may reside at one of several memory addresses to increase compatibility. If your computer or expansion cards already use the default address, this may be changed to another address by simple switches/ jumpers on the hard disc card.

Access Times:The speed at which data is found on the hard disc is determined by the access time [milliseconds (ms)]. Fast hard discs have lower access times. Access times of 70 to 50 ms are reasonably fast for PC & XT systems whereas 286s & 386s benefit greatly from access times of less than 28ms.

Data Transfer Rates. This depends mainly on the hard disc interface (SCSI, ESDI & IDE faster than ST506) and to a lesser extent on the hard disc, your computer (AT faster than a PC) and the way the hard disc is formatted (with optimum interleave for drive and computer). Hard-disc cards advertised are optimised for the best performance (Approximately 300 to 600Kbytes/Sec.!)

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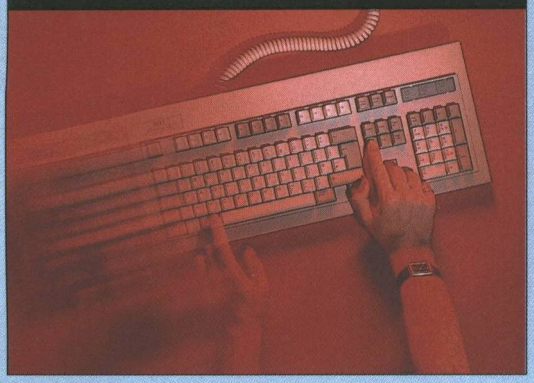

Ctrl-Alt-Deli

ReBoot was featured on *SuperDisk 51*. This free copy will be slowing down, so here's your chance to buy the real thing! This utility is designed to give your PC maximum flexibility.

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Reboot	£24.95	PC 930	SAVE £5

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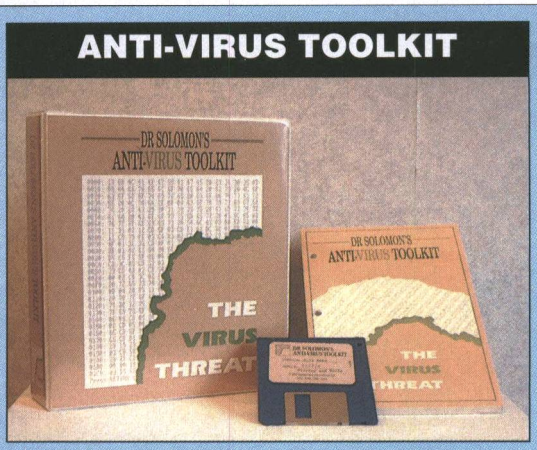

S&S Enterprises

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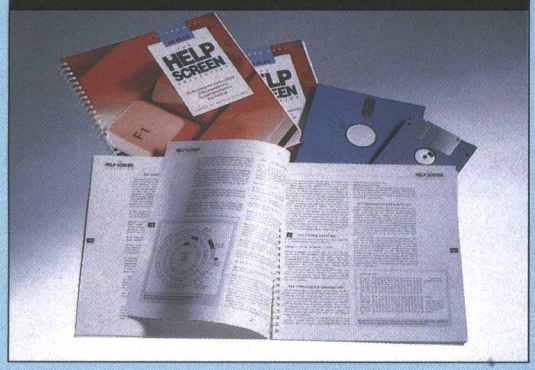

This book brings together the most useful tips ever published in PC PLUS. All the programs are also available on disk.

Description	Price	Order No
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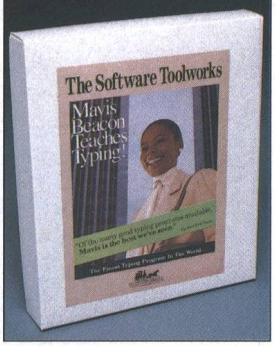

Learn to touch-type the easy way with this Mindscape package renowned for its success rate.'Probably the best typing tutor on the market.'
PC PLUS issue 43

Description	Price	Order No	HALF PRICE
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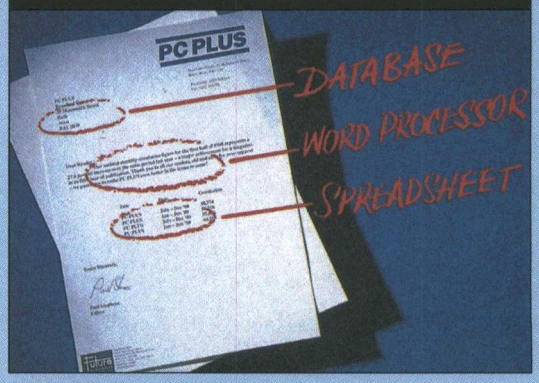
SLICE



Volkswriter

Slice, featured on issue 52's *SuperDisk*, allows you to incorporate database and spreadsheet data directly into a word processing document.

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Slice	£34.50	PC928	HALF PRICE

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Description	Price	Order No	
J.Nicklaus Golf	£34.95	PC926	SAVE OVER £5

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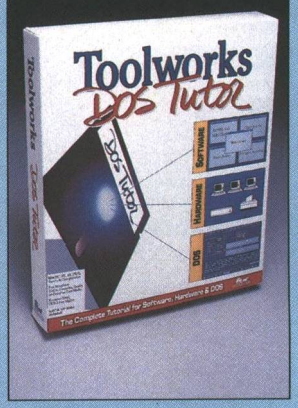

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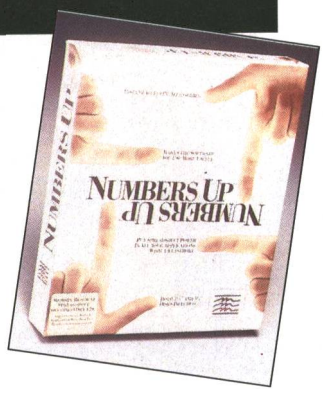

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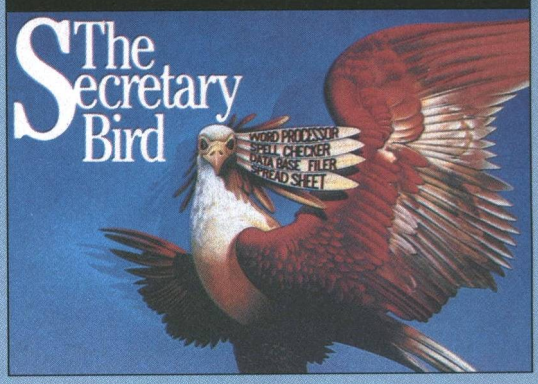

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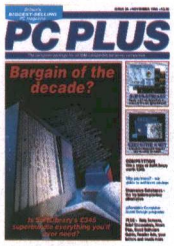

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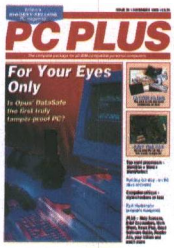

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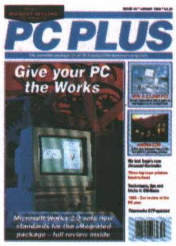

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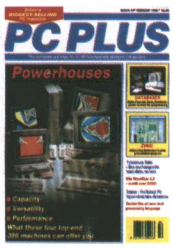

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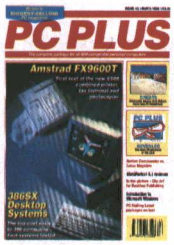

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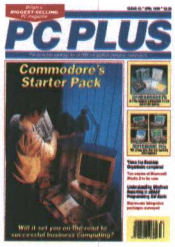

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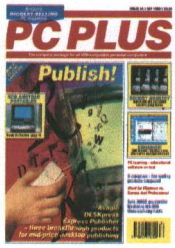

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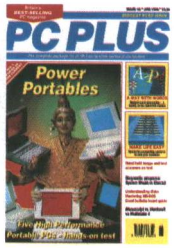

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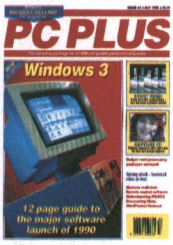

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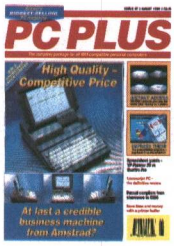

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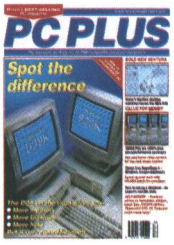

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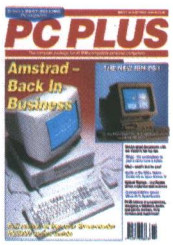

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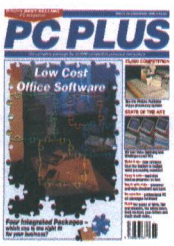

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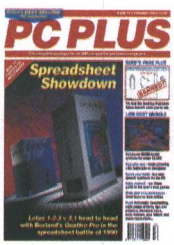

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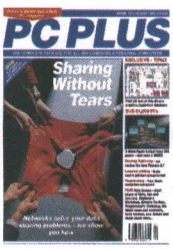

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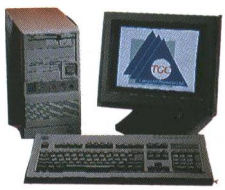

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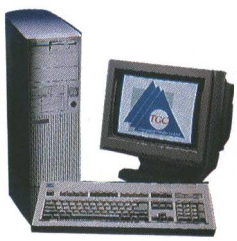

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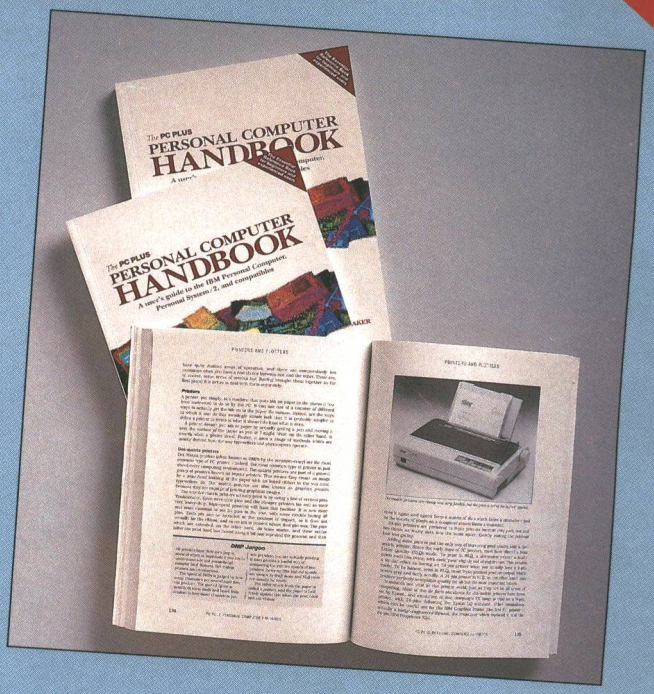

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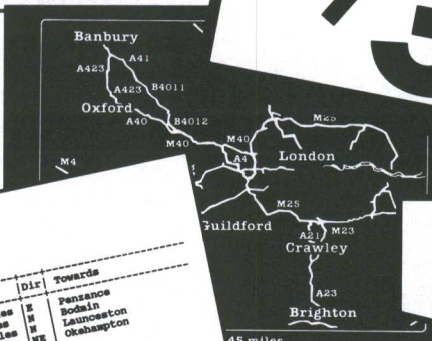

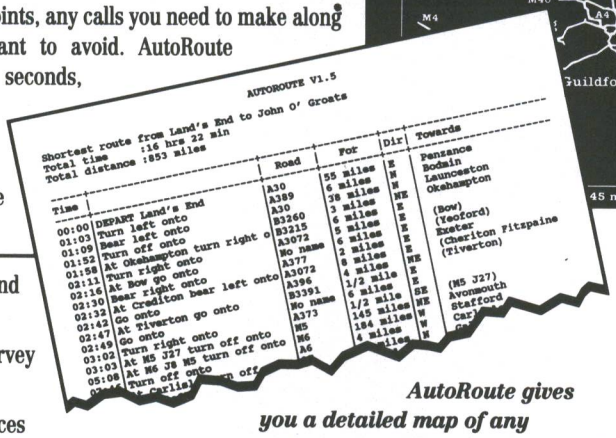
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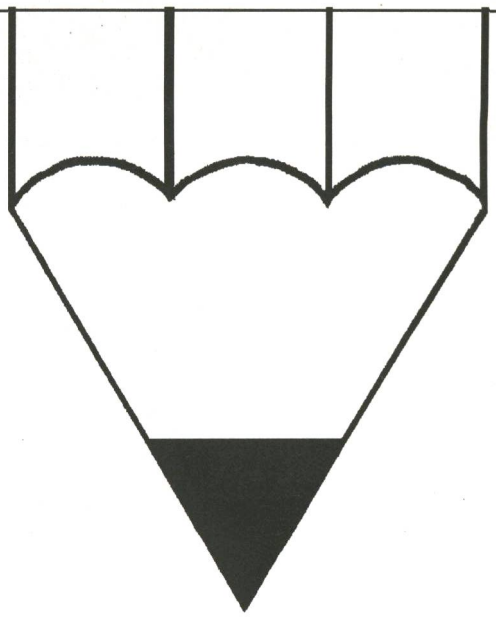

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40Mb + SD + 12" mono £865
Single drive 14" colour £735
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All generation 3 units include 1 year on-site maintenance
Full range of additional drives available

OLIVETTI PCS

Software MSDOS 3.3, GW Basic, PCs starter tutorial, Microsoft Works 2.0. Colins On-linc, Euro tutor, Eurotab, Eurobase, Euro Letters, Portsoft, call, Quickstart card, 1 PCs 1992 manual.

PCS	VGA Mono	14" HR VGA Colour
86 SD	£495	£625
86 DD	£565	£695
86 20Mb	£735	£865
286 DD	£785	£905
286 20Mb	£855	£975
286 40Mb	£935	£1055
386sx Bd	£1008	£1134
386sx 20Mb	£1175	£1300
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All models come with free on-site maintenance

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Olivetti original external drive £179
Olivetti mouse £29

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Citizen Swift 9 ..... £185
New 24 Pin Swift 24 ..... £245
Colour Upgrade for Swift £40
Prodots 24 ..... £360

ALL CITIZEN PRINTERS COME WITH 2 YEAR WARRANTY.

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LX850 ..... £185
FX850 ..... £315
FX1050 ..... £395
EX800 ..... £425
EX1000 ..... £559
LQ400 ..... £199
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LQ1050 ..... £549
LQ860 ..... £509
LQ1060 ..... £625
LQ2550 ..... £725
SQ850 Inkjet £495
SQ2550 Deskjet £675
FX5000 ..... £1125
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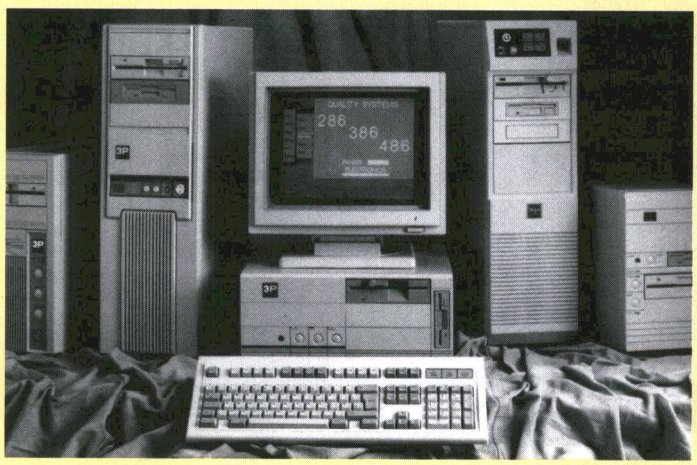

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386 SX	0k	19Mhz	£285
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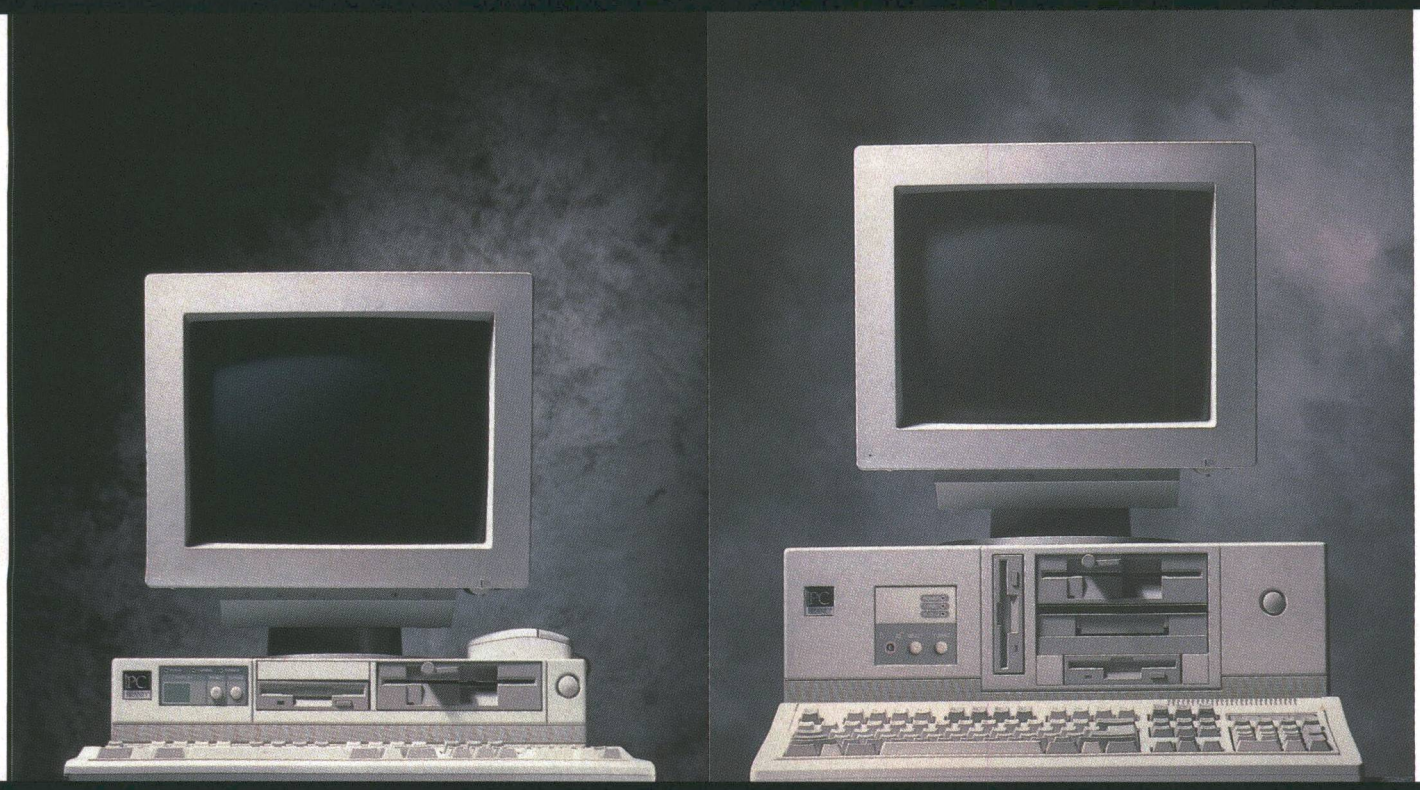

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- Zero wait state operation

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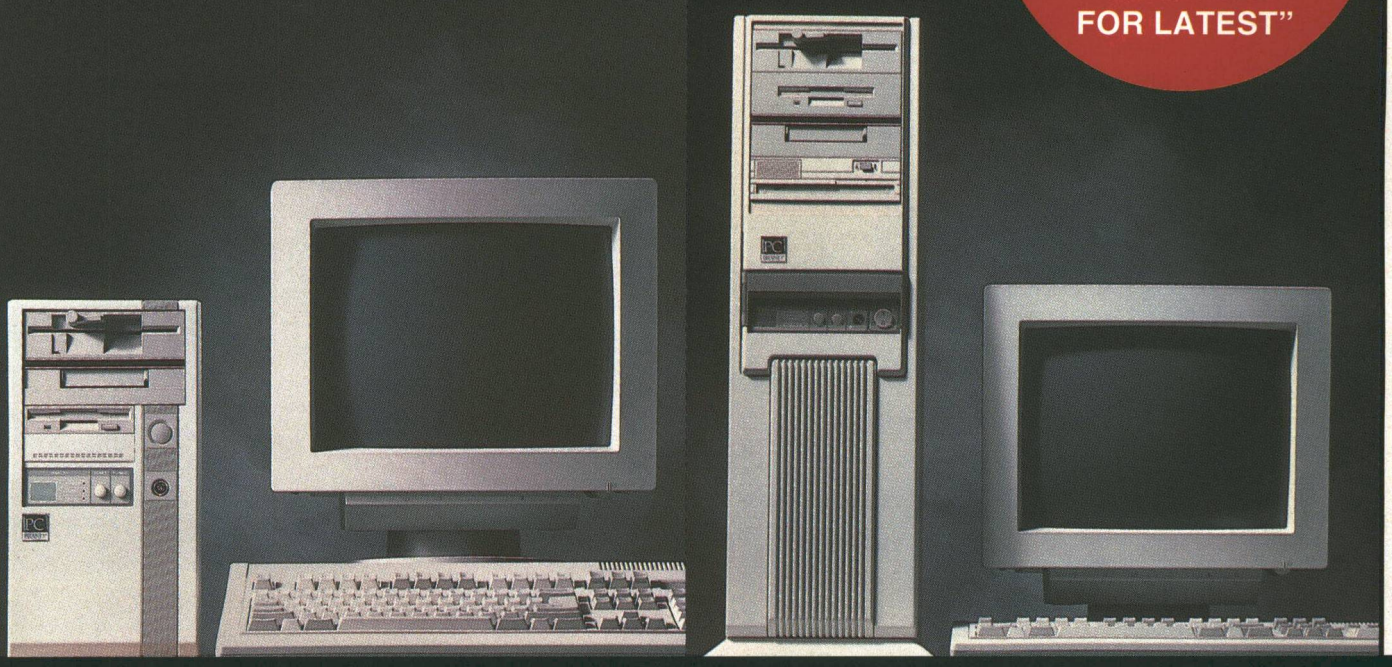

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-PC Magazine, 25MHz 386PC's

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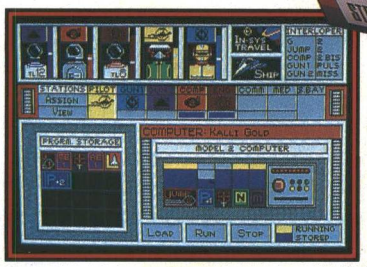

.....Now with the help of corrupt Imperium officials the Zhodani and the Outward Coalition are planning a fifth. Smuggling arms to traitorous groups within Imperium borders the Zhodani are planning to strike from within.

BASED ON MEGATRAVELLER BY GAME DESIGNERS' WORKSHOP, THE WORLD'S MOST POPULAR SCIENCE FICTION GAMING SYSTEM

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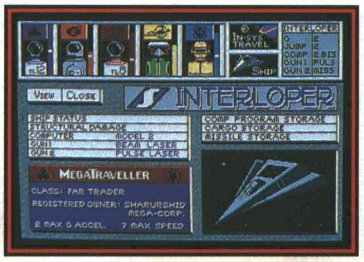
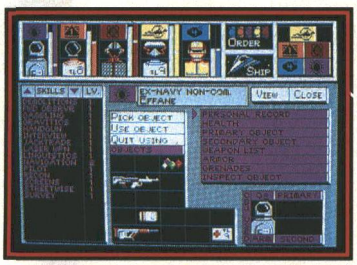




IMAGINATION

Flexible gaming system supports any playing strategy and allows multiple solutions to problems and obstacles.



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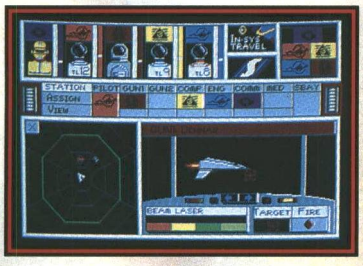

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28 planets and satellites to explore in 8 systems filled with exciting puzzles, dangerous subplots and interesting characters to encounter.

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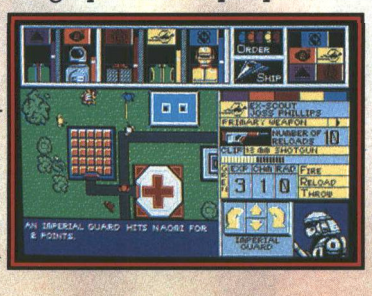

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- 8 expansion slots
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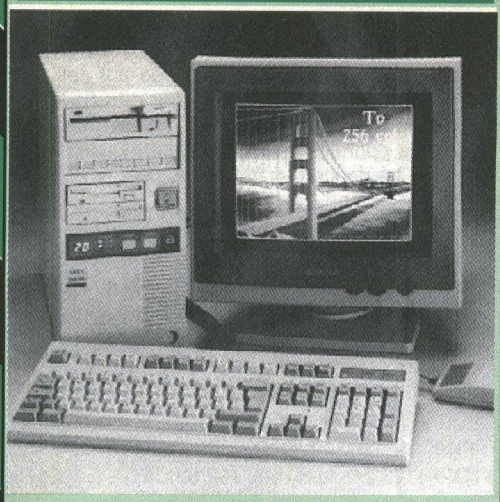
- Slide in metal case with function display
- Legal BIOS and built-in games card and clock

The Aries IBM PC-XT 88 and Aries PC-AT 286 compatibles are now supplied with Digital Research's GEM, Microsoft MS DOS 3.30, GW-BASIC 3.21, the powerful Finesse 1.1 desk top publishing package, Multiwriter WORDPROCESSOR & Spell-checker, PC Organiser and 12 months on-site maintenance warranty. So you not only get the best all round value in PC compatibles, (£300+ worth of FREE software & hardware with every system), but you also get a complete and powerful WYSIWYG DTP software package that takes you from typewritten text onto typeset quality layouts. LOGITECH MOUSE too is included with the package. WATFORD GIVES YOU MORE FOR YOUR MONEY. (P.S. To operate Finesse DTP, you require a hard disk system).

Extended finance over a period of 12, 24 or 36 months now available. Please telephone or write in for details.

Aries PC 386-SX



The Aries PC 386-SX combines many of the powerful features of the 386 system with the frugality of a price tag more at home on a 286 system. With 8/16MHz CPU, this system provides virtually full 386 performance, including the more convenient scheme of memory control that allows easy configuration of expansion RAM as EMS for DOS application.

Features:

- 80386-SX CPU with optional 80287/80387 maths co-processor
- 8/16 MHz selectable speed
- Legal Bios with built-in setup routine
- For OS/2 and XENIX compatible

Specifications:

- 1Mb RAM on-board expandable to 16Mb
- 1 x 5.25" - 1.2 Mb drive fitted
- 1 x 3.5" - 1.44 Mb drive fitted
- 40Mb 28ms hard disk drive fitted (1:1 interlaced)
- HDD/FDD controller card
- 102 key keyboard
- Case with keylock
- Eight expansion slots
- Two serial and one parallel ports
- Logitech mouse
- FREE 12 months on-site maintenance
- £300 worth of software (MS DOS 3.30, GW BASIC 3.21, DR's GEM, Finesse 1.1 DTP pack, Multiwriter wordprocessor and spellchecker, PC organiser) FREE with every micro.

New Low Prices

- **System 1** - Specification as above + a 14" hi-res flat screen mono monitor **£1098**
- **System 2** - As System 1 plus a 14" hi-res flat screen EGA monitor & card **£1268**
- **System 3** - As System 1 plus a 14" hi-res flat screen VGA monitor & card **£1399**
- **System 4** - As System 3 but fitted with 80Mb 28ms fast hard disk drive **£1544**
- **System 5** - As System 3 but fitted with 155Mb 16ms super fast hard drive **£1899**

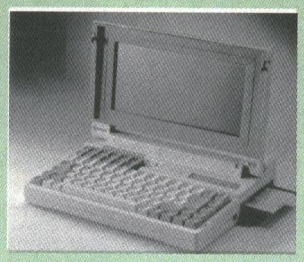
PC External Disk Drives

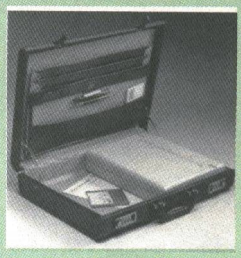
For IBM PC, Amstrad 1640 & compatibles. Supplied complete with case, cables and power supply. Ready to plug.

PCS-3L5	3.5"	-	720K cased drive	£85
PCS-3H5	3.5"	-	1.44Mb cased drive	£95
PCS-5L2	5.25"	-	360K cased drive	£86
PCS-5H2	5.25"	-	1.2Mb cased drive	£99

P.S. Not all XT compatible micros can accept the high density drives.

Aries Notebook PC XT & Aries Notebook PC NB286-12





First the desk top, then the luggable, then the lap top and now the notebook PC, a truly portable design of PC computer. Imagine an IBM PC compatible computer so small that it will fit inside your briefcase with room to spare, so light (just over 7 pounds) that it is easy to carry wherever you go.
Many deskbound PC users yearn for the convenience of a genuinely portable PC - a real PC - not a "nearly" PC, but one that works with any existing software, something that they are already used to.
The Aries Notebook range of PCs has made the dream a reality with the world's most powerful compact laptop, it is also the world's first portable PC with built-in hard disk, for under £1,000! Now the 8088 based Aries Notebook range has been expanded to include an extremely powerful and fast 80286 based processor chip, with performance better than many desktop machines. Despite their convenient size, these machines run the same software at the same speeds as any equivalent desk-bound 40-pounder.
The Aries Notebook PC's have 1Mb RAM as standard, including 384Kb EMS, an advanced Liquid Crystal Display with switchable backlights and a standard layout full size keyboard with a comfortable tactile feel.They are also equipped with a full complement of six built-in ports, one printer, one external floppy drive, mouse port and a CGA colour monitor port. The obvious benefits include the ability to connect directly to a printer and to a full size desktop computer to transfer data or text, etc. or to a modem for communications.
The performance of this notebook PC from Watford Electronics is already well understood by the PC fraternity, it's precisely the same as any regular desktop monster with the same processor and memory configuration. But most PC users are not looking for surprises, just reliable PC computing - which is what you get from Watford Electronics. Multiwriter 2 wordprocessor/spellchecker, and PC Organiser diary software is supplied with all Notebook PCs to get you started, so now you can take computing power with you where you want to go, in the office, workshop or laboratory, on site, on the train, plane or at home.

Aries Notebook I, II and III

These Aries Notebook PCs have energy-efficient 80C88 processor chips running at 10MHz. Model I is supplied complete with a single 3.5" - 1.44Mb floppy drive. The Notebook Model II and III are supplied with a 28ms fast access hard disk, 20Mb and 40Mb respectively.
In his independent review (Computer Shopper - May 1990) the reviewer writes: "The Aries Portable offers exceptional value for money...The computer itself is very much what you'd expect a notebook to be, small, with a cramped but very usable keyboard and a respectable backlit display, it is nice to see that you can actually use the extra 384K as EMS memory - there is even a utility that can turn the EMS into a RAM drive for you" In his final verdict he writes: "Overall, the single most outstanding feature has to be the price tag. A notebook PC with hard disk for under £1,000 has no competition at the moment. If you have a small briefcase, weak arms, or just like the concept of a truly portable computer, then this is your man."

Specifications:

Processor:	80C86 running at 10MHz - Zero Wait State - real time clock/calendar.
Memory:	1Mb RAM - 640Kb + 384Kb LIM/EMS.
Drive:	Internal 3.5" floppy drive (Notebook I) Internal 2.5" 20Mb hard disk (Notebook II) - 28ms access speed. Optional external 3.5" or 5.25" floppy drive.
Display:	Electro-luminescent (B) backlit transflective supertwist LCD - 80 x 25 characters. - 840 x 200 bit mapped IBM CGA compatible
Keyboard:	Full size Qwerty layout, integrated numeric keypad.
Power:	Internal NICad battery - mains adaptor - External 12V DC.
Standard interfaces:	Parallel printer port - twin RS232 serial ports - external disk drive port - CGA colour monitor port - PS/2 mouse port.
Dimensions:	300mm (W) x 220mm (D) x 61mm (H).
Weight:	3.2Kg (including battery + hard disk).

NOTEBOOK PRICES

Notebook I	- with internal 3.5" 1.4Mb floppy	**£599**
Notebook II	- with internal 20Mb hard disk	**£899**
Notebook III	- with internal 40Mb hard disk	**£999**
Notebook NB286-12	- with internal 3.5" 1.44"Mb floppy and 28ms 20Mb 2.5" hard disk	**£1285**

New - Aries Notebook NB286-12

The New Aries NB286-12 has extensive features and facilities, much the same as for the 80C88 based Notebook series, but with the faster, high efficiency 80286 processor running at 12MHz, and with both a built-in 1.44Mb floppy disk drive and 28ms 2.5" 20Mb hard disk.

"...the strongest feature of the Aries is its hard disk, with a data transfer rate that would put most desktops to shame...the only notebook reviewed that incorporates a 16MHz processor (landmark speed). These two factors combine to make it the strongest performer...In terms of value, the Watford comes up on top..."

"VERDICT: Excellent specification and performance. This has to be THE choice based on price and ability."
Computer Shopper Jan. 1991

Specifications:

Processor:	80286 running at 12MHz - Zero Wait State - real time clock/calendar.
Memory:	1Mb RAM - 640Kb + 384Kb LIM/EMS.
Drive:	Internal 3.5" floppy drive 1.44Mb - internal 2.5" 20Mb hard disk - 28ms access speed
Display:	Electro-luminescent (EL) backlit transflective supertwist LCD - 80 x 25 characters. - 840 x 200 bit mapped IBM CGA compatible
Keyboard:	Full size Qwerty layout, integrated numeric keypad.
Power:	Internal Nicad battery - battery charge indicator - mains adaptor provided supplies 12V DC
Standard interfaces:	Parallel printer port - twin RS232 serial ports - external disk drive port - CGA colour monitor port - PS/2 mouse port.
Accessories:	Internal removable Nicad battery pack - AC mains adaptor/charger.
Dimensions:	300mm (W) x 220mm (D) x 61mm (H).
Weight:	3.2Kg (including battery + hard disk).

ACCESSORIES

- External 3.5" 720K/1.44Mb floppy drive **£89**
- External 5.25" 1.2Mb floppy drive **£89**
- Spare battery pack **£29**
- Car cigar lighter adaptor **£35**
- Carrying case **£28**

Continued →

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-site Maintenance on all Multiscan colour monitors, all Panasonic, Hewlett Packard (3 months) and all Laser Printers and Roland Plotters. Should the machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours. (UK mainland only).
(Offer applicable only when bought at prices advertised in this advert).

Aries 14" Monochrome

These State of the Art monitors have been engineered for dual-frequency output on a chemically etched, non-glare, flat screen. IBM compatible, high resolution (720 x 350 lines), band width: >20MHz.

Type		Description	Price
ArM1000G	-	high resolution green	£65
ArM1000A	-	high resolution amber	£68
ArM1000W	-	high resolution paper white	£70

Aries 14" EGA Monitor

Stylishly designed, high contrast non-glare screen, 16-64 colours, switchable to green or amber screen for wordprocessing. EGA compatible. Resolution (600 dots H. x 350 lines V.). Built-in tilt & swivel base.

- Aries EGA colour monitor £249
- EGA colour card £99
- EGA colour monitor plus card £319

Aries 14" VGA Monitors

Monochrome: 14" flat screen non-glare, 1024 x 786 high resolution paper white, VGA monitor. Caters for CGA, EGA, VGA and Super VGA incl. swivel base only £85

Colour: The state of the art flat screen, high resolution 800 x 600/1024 x 768 colour monitor

- Aries VGA colour monitor £269
- VGA colour card £99
- VGA colour monitor plus card £358

Multiscan Colour Monitors

- Eizo 9060Z £399
- Eizo 9070S £599
- Panasonic £325
- NEC IIA £289
- NEC 3D £358
- NEC 4D £695
- Taxan 770LR £393
- Taxan 775 £393
- Taxan 795 £475
- Taxan 870 £575
- Taxan Viking £1269

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
IBM PCs pair	-	£7.75
Brother HR15/20	£6.00	£5.00
DMP2000	£3.25	£4.75
RX/FX80/85/8000/MX80	£2.95	£4.95
RX/FX100/1000	£3.95	-
Kaga/Taxan KP810/815	£3.25	£5.00
EX/LQ500/550.800/850	£3.50	£6.00
EX/LQ1000/LQ2500	£4.00	£5.50
LX80/86/400/800/850	£3.00	£5.00
NEC P2200	£6.00	£5.00
Panasonic KX1080/81	£2.95	£4.75
Star LC10/NL10	£4.25	£5.00
Star LC24-10	£3.95	£6.00
SQ2500	£23.00	£5.50

Our attractive dust covers are manufactured from translucent P.V.C. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Roland Plotters

(Official Roland Appointed Distributor)

- DPX 2500 £2389
- DXY 1200 £705
- DXY 1100 £538
- DXY 1300 £895

Access

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Canon Bubblejet Printers

- Canon 10E £269
- BJ130E £410
- 10E Cut Sheet Feeder £54

Citizen Printers

- 120D Plus £99
- 124D Printer £169
- Prodot 9 £239
- Prodot 24 £339
- Swift 9 £149
- Swift 24 £216
- Swift 24 colour option £32
- Prodot 24 Cut Sheet Feeder £120
- Swift 24 Ribbons: Black £4; Colour £13

Hewlett-Packard Printers

- Desk Jet 500 £370
- Quiet Jet Plus £379
- Desk Writer £485
- Scan Jet Plus £735
- Desk Jet cart. £14
- HP Think Jet £245
- Paint Jet colour £649
- Paint Jet cart. £24
- Paint Jet XL £1435
- Rugged Writer £875

- Paintjet cartridges black £19 colour £25
- Desk Jet 500 256K RAM cartridge £129
- HP Epson FX emulation cartridge £59

Star Printers

- LC10 £118
- LC200 colour £160
- LC10 II £139
- XB24-10 £360
- LC15 £245
- XB24-15 £480
- LC24-10 £172
- XB24 colour kit £35
- LC24-15 £310
- FR10 £275
- LC24-200 £215
- FR15 £365
- LC24-200 colour £230

Cut Sheet Feeder

LC10/24-10/200 £65 LC15/LC24-15 £125
XB24-10 £80 XB24-15 £139

Serial Interfaces

SPC-10 LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15; LC-200; LC24-200 £49
8K Ser FR10/15; LC-200; LC24-200; XB24 £60

Buffers

- 32K Ram card for LC24-10, 15 & 200 £55
- 32K Ram card for XB24-10 & 15 £55

Ribbons

- LC10; LC10-II; LC15 black £4 colour £6
- LC-200; LC24-200 black £5
- LC-200 colour £11 LC24-200 colour £12
- XB24-10; XB24-15 black £5 colour £12

Laser Printers

- Canon LBP-4 4ppm £695
- Canon LBP IIIT 8ppm £1580
- Canon LBP-8 IIIR 8ppm £1740
- Epson EPL-7100 6ppm £735
- HP Laserjet IIP 4ppm** £665
- HP Laserjet III 8ppm £1185
- HP Laserjet IIID 8ppm £1775
- Panasonic KX-P4420 8ppm £699
- Panasonic KX-44550i 11ppm £1105
- Panasonic KX-4455 Postscript 11ppm £1699
- Qume Crystal Print WP+ £739
- Qume Crystal Print Ser. 2 £1028
- Qume Xtal Print Postscript £1949
- Star LP-8 II £1089
- Star LP-8 Star (post)script £1299

**Lower paper cassette tray & Premier Collection software, FREE with every HP Laserjet IIP printer purchased from us. Offer subject to availability.

Laser Toners

Canon 2 & 4	£57	Laserjet II	£56
Epson GQ	£16	Laserjet IIP	£60
Star LP-8	£56	Laserjet III	£66
KX-P4420/50	£22	Qume Crystal	£59

HP Laser Ram

- IIP & III 1Mb £99
- II & IID 4Mb £325
- IIP & III 2Mb £125
- Star LP-8 1Mb £143
- II & IID 1Mb £102
- Star LP-8 2Mb £285
- II & IID 2Mb £127
- Star LP-8 4Mb £429

Laser Drum & Developer

Laser	Drum	Developer
Epson GQ500	£99	-
Panasonic 4420	£69	£59
Panasonic 4450	£99	£80
Qume Drum	£76	-

Jetpage Postscript Cartridge

- for Laserjet II £369 IID & III £375
- Laserjet various font cartridges £69
- Laserjet superset font £275

SPECIAL OFFERS THIS MONTH

HP Deskjet 500 printer	£349
Canon BJ 10E printer	£239
Genius GS-4500 scanner	£85
Super VGA colour monitor	£245
TAXAN 795 Trinitron	£445
Philips Cm8833-II monitor	£175

Panasonic Printers

- KX-P 1081 £124
- KX-P1180 £129

N.B. The above two printers are supplied with FREE lead (please specify the micro type) & 1000 sheets of fanfold paper.

- KX-P1123 £173
- KX-P1592 £219
- KX-P1124 £180
- KX-P1624 £305
- KX-P1540 £390
- KX-P1695 £310

Panasonic Cut Sheet Feeders

(P35) KX-P1540 £175 KX-P 1592/1595 £175
(P36) KX-1123/24 £85 (P37) KX-P 1180 £79
(P38) KX-P1624/1695 £124

Panasonic Printer Buffers

P12 4K buffer board for 1081 £55
32K buffer chip for 1124/1180/1540/92/95 £16

Panasonic Serial Interfaces

P17 P1081/1592 £32 P19 P1124/118 £55

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595 £8
P115 for KX-P1180 £8
P145 for KX-P1124 £8
P140 for KX-P1540 £10
Colour ribbons for KX-P1081, 1592 & 1595 brown, blue or red £9.95 each

Epson Printers

EX800	£405	LQ1050+	£520
EX1000	£535	LQ1060	£606
FX850	£294	LQ2550+	£729
FX1050	£368	LX400	£116
FX1060	£599	LX850	£195
LQ400	£178	SQ850	£459
LQ550	£248	SQ2550	£719
LQ850	£425	DFX5000	£1105
LQ860	£489	DFX8000	£2070

Cut Sheet Feeders for

LX400/800/850/LQ400/500/550 £69
EX800/FX800/850/LQ800/850 £130
FX/LQ1000/1050/SQ850 £159
LQ2550 £390 SQ2550 £166.76

Tractor Feed for

LQ800 £44; LQ850/FX850 £69; LQ1050/FX1050 £85; LQ2500 £90; LQ2550 £90.

Accessories

- EX800/1000 colour option £55
- EX800/1000 colour ribbon £18
- LQ2500 colour option £65

Epson Printer Interfaces

All three interfaces fit inside the printer

RS232 £32 RS232 + 2K buffer £52
IEEE 488 £95 RS232 + 8K buffer £75

Printer Leads

IBM parallel lead 2 metres	£6
IBM parallel lead 5 metres	£13
IBM parallel lead 10 metres	£19
Double ended 36 way Centronics lead 4	£7
Double ended 36 way Centronics lead 6	£9
RS232 lead (various)	£P.O.A.
IBM keyboard extension lead coiled	£5

Universal Printer Sharer

Connect up to 5 micros to 1 printer or 5 printers to 1 micro with our combined Sharer/Changer. These units are made to a very high standard. For extreme reliability, they all have printed circuit boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics	P&P
2 to 1	£16	£17	£3
3 to 1	£22	£24	£3
5 to 1	£32	£36	£4

(Cables extra at £6 each. Please specify type required when ordering).

Handy Printer Switch

A handy 2 way compact printer switch. Enables one micro to be connected to 2 printers or vice versa.

Centronics £18; Serial £17

Auto Printer Sharer Switch

Connects	Serial	Centronics
2 to 1	£36	£39
4 to 1	£59	£55
8 to 1	-	£85

256K Multi Spooler

These Auto Centronics Printer Sharers have built-in 256K of printer buffers. They can be used as auto sharers, printer buffers or both.

- 2 In / 2 out **£135**
- 4 In / 2 out **£169**
- 8 In / 1out **£199**

Compact Converter Units

- Serial to parallel **£36**
- Parallel to serial **£37**

(Cables for printer switches extra £6 each)

Listing Paper (Perforated)

- 1000 sheets 9.5" x 11" fanfold **£7**
- 2000 sheets 9.5" x 11" fanfold **£11**
- 1000 sheets 9.5" x 11" NCR 2 part fanfold **£21**
- 1000 sheets 15" x 11" fanfold **£9**
- 1000 sheets true A4 fanfold paper 70gms **£11**
- 2000 sheets true A4 fanfold paper 70gms **£19**
- Teleprinter roll (Econo paper) **£4**

All our fanfold paper is micro perforated leaving a smooth clean edge when the tractor feed strips are detached.

Carriage:
1K sheets £2.50, 2K sheets £3.00

Printer Labels

On continuous fanfold backing sheet.

1000	90 x 36mm (single row)	**£6.00**
1000	90 x 36mm (twin row)	**£6.25**
1000	90 x 49mm (twin row)	**£7.50**
1000	102 x 36mm (twin row)	**£6.75**

Maths Co-Processor

8087-5MHz	£55
8087-8MHz	£75
8087-10MHz	£90
80287-6MHz	£85
80287-8MHz	£125
80287-10MHz	£99
80287-12MHz	£155
80387-16MHz	£189
80387-20MHz	199
80387-25MHz	£239
80387-33MHz	£285
80387SX-16MHz	£185

BOOKS (No VAT on Books)

Carriage on books varies between £1.00 to £3.50, depending on their weight.

1-2-3 For Business 2nd Edition	£20.95
1-2-3 Mastering - 2nd Ed.	£20.95
1-2-3 Quick Reference	£7.95
1-2-3 Special Ed. (QUE) - Using	£22.95
1-2-3 Using - Release 2.2	£22.95
1-2-3 Using Release 3	£22.95
8086/8088 Assembly Lang. Programming	£13.50
Ability - Using	£12.95
Accountancy software in Business - Using	£14.95
Advance C Tech & Application	£19.95
Amstrad Basic 2 - User Guide	£9.95
Amstrad Technical Manual for 1640	£19.95
Amstrad PC Programmers Ref. Guide	£15.95
Amstrad PC1512-1640 Step by Step - Using	£10.95
Assembly Language - Quick Ref.	£7.95
Autocad - Inside	£27.45
Autocad - Using Release 10	£27.95
Business Companion on the 1640	£12.95
Clipper - Using	£22.95
Computer Users Dictionary	£8.95
Corel draw made easy	£24.95
Corel Draw Quick Ref. Thro V1.2	£7.95
C- Introducing	£9.95
C- Programming Language 2nd Ed.	£24.95
dBase II & III - Understanding	£7.95
dBase III - Understanding	£21.95
dBase IV - Handbook	£19.95
Display Write made easy	£19.95
DOS+ on the 1512 - Using	£9.95
DOS & Bios Function - Quick Ref. Guide	£7.95
DOS Plus Manual/Amstrad PC	£9.95
DOS Power Tools (includes a disk)	£45.95
Excel IBM Version - Using the	£22.95
GW Basic Quick Prog. REf	£8.95
Hard Disk Instant Reference	£10.95
Hard Disk - Managing your	£20.95
Hard Disk - Using your	£27.45
IBM PS/2 Handbook	£19.95
IBM PC AT - Inside the	£20.95
Local Area Networks 2nd Generation	£20.95
Lotus 1-2-3 Desktop Companion Soft/B	£24.95
Lotus 1-2-3 for Business 2nd Ed	£22.95
Microsoft 'C' Systems Prog. In	£23.95
Microsoft GW BASIC	£12.95
Microsoft Windows - Illustrated	£18.45
Microsoft Windows 3 - Using 2nd Ed.	£20.95
Microsoft WORD 5.0 - Using	£20.45
MS-DOS - ABCs of 2nd Ed.	£17.95
MS-DOS Advanced Programming 2nd Ed.	£22.95
MS-DOS for Beginners	£14.95
MS-DOS Handbook 3rd Edition	£18.95
MS-DOS Quick Prog. Ref. Guide	£8.95
MS-DOS Masters Tricks of 2nd Ed.	£24.95
MS-DOS Quick Reference Guide	£7.95
MS-DOS - Using	£19.95
MS-DOS - Running 4th Edition	£19.95
MS-DOS Supercharging 2nd Ed.	£17.95
MS-DOS Users Guide 2nd Edition	£27.95
Netware User Guide	£22.95
Norton Programming Guide to IBM	£19.95
Norton Utilities - Inside the	£21.95
Novell Network - The ABC of	£21.95
Novell Network - Mastering	£27.95
Novell Network - Using	£22.95
Operating the IBM Network	£18.95
Pagemaker on IBM - Mastering	£21.95
Pagemaker - Using	£22.95
PageMaker Desktop Publishing	£15.95
PageMaker IBM PC - Mastering	£21.95
PageMaker - Illustrated	£18.45
PageMaker on IBM PC - Using	£20.95
PageMaker - Using Aldus	£21.45
Pascal - Introduction to	£21.95
PC Crash Course 2.0 2nd Ed.	£14.95
PC-DOS Using 2nd Ed. Vers. 3.3	£20.45
PC-DOS Using 3rd Ed.	£21.95
PC's & Compatible for Beginners	£14.95
PC System Prog. Developers Guide	£23.95
PC Tools - Quick Ref.	£7.95
PC Upgrading & Repairing	£25.95
Personal Computing - 1st Book of	£13.95
Programming Guide to EGA & VGA Cards	£24.95
Quattro - Mastering	£21.95
Quattro Pro VI - Using	£22.95
Smart II - using	£22.95
Smart, tips, tricks and traps (QUE)	£22.95
Smartware II - Using	£21.45
Supercalc 4 Mastering	£22.95
Supercalc 5 - Using	£20.95
Supercalc Professional	£17.95
Symphony 4th Edition - Mastering	£24.95
Symphony Made Easy	£19.95
Symphony - Using Special Ed.	£27.45
Timeworks Publisher Companion	£12.95
Turbo C++ - Using	£22.95
Turbo Pascal - Advanced Techniques	£20.85
Turbo C Bible	£24.50
Turbo Pascal Program Library	£22.95
Unix - Using	£27.45
Unix - Sys V - An Introduction to	£27.95
Upgrading & Repairing PC's	£25.95
Ventura Instant Reference	£10.95
Ventura Mastering - 2nd Ed.	£22.95
Ventura Tips + Tricks	£18.95
Ventura Tips + Tricks 2nd Ed.	£27.95
Window 3.0 Programming	£27.95
Window 3.0 Quick Ref.	£7.95
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3.5" hard disk on a controller card. "Simply Plug and Play". For Amstrad 1640 & XT compatibles.

- **WD-XT 20Mb** **£150**
- **WD-XT 30Mb** **£189**
- **WD-XT 40Mb** **£215**

For PC AT & AT compatibles

- **WD-AT 30Mb** **£315**

Hard Disk Drives (Bare Units)

- **WEHD20** 21Mb hard disk **£135**
- **WEHD30** 30Mb RLL hard disk **£155**
- **WEHD40/28ms** 42Mb HD including partitioning software **£210**
- **WEHD65** 65Mb HD RLL **£249**

Controller Cards

- **WEXT100C** XT controller and cables **£39**
- **WEXT200C/RLL** XT controller and cables **£44**
- **FDD/HDD 2HD/2FD** controller for AT **£82**
- **AT** embedded drive adaptor **£18**

Hard Disk Kits

- **WEHD20 (KIT)** 21Mb HD with XT-Amstrad controller + cables **£169**
- **WEHD30 (KIT)** 32Mb HD with XT/Amstrad controller & cables **£199**
- **WEHD40 (KIT)** 42Meg B HD with XT/Amstrad controller & cable **£235**

Floppy Disk Drives

- **UC200** 5.25" 360K 48tpi double sided disk drive **£47**
- **UC600** 5.25" 1.2M 96tpi double sided high density, disk drive **£57**
- **UC35/4** 3.5" 720K drive with 5.25" kit **£51**
- **UC35/6** 3.5" 1.44M drive with 5.25" kit **£59**

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For **XT** & **AT**. 60Mb external kit with software, short controller, cable and documentation. Backs up 60Mb in less than 12 minutes.

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- **4EGA Card,** 256K RAM, compatible with CGA & EGA **£75**
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- **MULTI I/O Card** includes: Real time clock/calendar, Serial/parallel/games **£43**
- **SERIAL/PARALLEL/GAME Card** (+2nd serial optional port) £29

3M Data Cartridge

DC100	**£12**	DC300XLP	**£16**
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Lifetime warranty on 3M disks from Watford.

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91Mb	3.5"	20ms	**£485**
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91Mb	H/H	18ms	**£630**
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670Mb	F/H	16ms	**£1495**

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91Mb	H/H	18ms	**£630**
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HD Controller Cards

SCSI hard disk controller	**£199**
ESDI hard disk controller	**£165**
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4164-15	£2.50	41256-12	£4.00
4464-12	£7.50	1Mb DIL	£7.00
4464-15	£7.00	1Mb ZIP	£7.75
41256-15	£3.50	256K x 4 ZIP	£5.00

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Please specify package type required when ordering

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Main casing for PC AT	**£44**

Access

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Continued → → → → → →

Watford A4 Desktop Scanner

This new image scanner is supplied complete with Windows and OCR software. It is the most convenient way to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, newsletters etc. from your DTP package.

The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc with its fast paper feed system, or may be detached from the feeder to become a convenient hand-held full page scanner for larger documents or pictures. Scanned images can be digitised in 100 to 400 dots per inch resolution with 16, 32 and 64 levels of grey scaling. The images can be trimmed and scaled to suit your DTP columns and frames. In low resolution modes it takes just ten seconds to scan a whole A4 page, while in the high resolution modes it takes twenty seconds. Image file formats come in four variations to suit all applications, TIF compressed and uncompressed, PCX and IMG.

The OCR software can be used to great effect to scan a text document like a page from a book or magazine article, and convert what the scanner sees as a pattern of dots and spaces into an ASCII text file which can be used in word processor or other application. To put it simply, you scan a page of text, the OCR software converts it to a text file which saves you the trouble and time of typing the text in yourself.

The OCR can read three different character font styles, Courier, Times Roman and Helvetica, all in a variety of size or pitch, but can also be taught by the user to recognise other styles to maximise its usefulness. Files ready for spellchecking, and Lotus 123 spreadsheet analysis can be created in a fraction of the time it would take to type the information.

Minimum system requirements are a PC/AT, (or a PC/XT with clock speed greater than 6.5MHz) and 640Kb RAM and a hard disk.

The scanner, the PC card with integral scanning software, Runtime Windows 2.1 and OCR software is available now at the incredibly low price of:

Just £499

Portable Rack

Allows a 3.5" ST-506 hard disk drive to slot into a 5.25" disk drive slot in any PC system. Allows you to carry your hard disk around with you. Has a built-in key lock for security. The rack handle folds away neatly. Can be carried around safely. Ideal for businesses where security is of importance.

Launch Offer £32

TEX Eprom Erasers

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs!

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- Spare UV tubes **£12**

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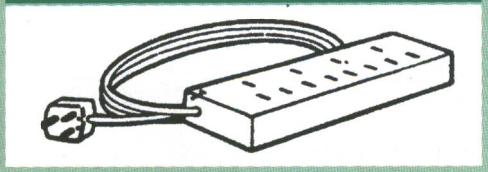

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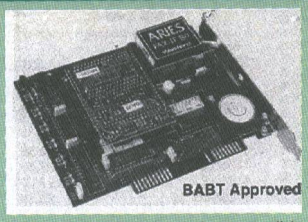

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- Received faxes can be converted into graphics files or viewed and zoomed directly from Herc, CGA or EGA compatible screens or printed to Epson (FX), IBM Grphis or HP Laserjet compatible printers.
- Outgoing faxes automatically compiled with senders ID plus a fax header sheet
- Software managers fax phone list, schedules call time, maintains log of incoming and outgoing faxes and allows single faxes to be transmitted to any number of recipients.
- Fax-It '89 requires an IBM XT or AT compatible running DOS 3.1 or better, hard disk, CGA/EGA, or Hercules display cards.

Only £165

APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use

'Fax Line' Fax Splitter



The Watford Fax-Line Fax Splitter doubles the utility of any phone line by automatically detecting and routing incoming fax to the fax machine, otehrwise it routes the call to the telephone after a very brief message. Calls can even be directed to an answering machine. Standard BT connections provide simple plug-in-and-go operation. Fax-Line saves you hundreds of pounds in BT rental. **BABT approved.**

Launch Price:

ONLY £55

(For a live 24 hour demo of Watford Fax-Line, please phone 0923 22 22 21)

Accelerator Cards

Sota 286i- 12.5MHz

286 upgrade card for PC XT compatibles

- 12.5MHz clock speed
- Can toggle between 80286 and 8088/8086 mode
- Performs faster than a PS/2 Model 60 and up to 10 times faster than an IBM PC
- Optional 80287 maths processor socket
- Complete with software for RAM disk, disk cache & printer spooler
- Optional up to 8Mb additional RAM upgrade

£299

Sota 386i - 16MHz

386SX Upgrade Card for PC XT Compatibles

- 16MHz clock speed
- Can toggle between 80386SX and 8088/8086 mode
- Performs 2.5 times faster than a IBM AT and up to 15 times faster than an IBM PC!
- Complete with software for RAM disk, disk cache & printer spooler
- Optional up to 8Mb additional RAM upgrade
- Makes programs such as Windows 3, AutoCAD, Lotus 123 and DBase fly on your system

£349

Genius Mouse

Programmable mouse 200 to 800dpi, supplied complete with Dr. Halo 3 software, mouse mat, mouse holder and a user manual.

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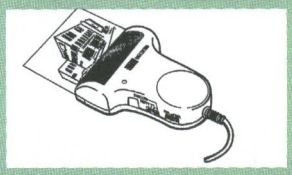
GS-4500 Handy Scanner

Now with OCR software



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Size: 423mm x 415mm x 45mm Wt. 2.2Kgs
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8MB Memory, Built-in Co-Processor
On-Board 256k Cache
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250W Power Supply Unit
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8MB Memory, Built-in Co-Processor
On-Board 256k Cache
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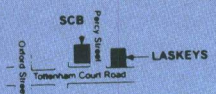

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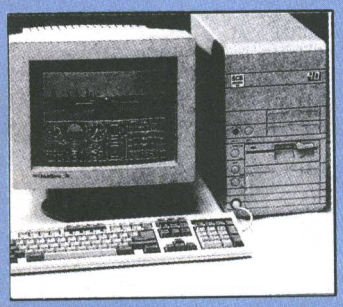

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80286-12 MHz COMPACT AT DESKTOP SYSTEM, 1MB RAM EXPANDABLE TO 4MB.

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80386 SX 16MHz MINI TOWER SYSTEM, 1MB RAM EXPANDABLE TO 8MB.

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65MB/28MS - RRL	899.00	999.00	1199.00
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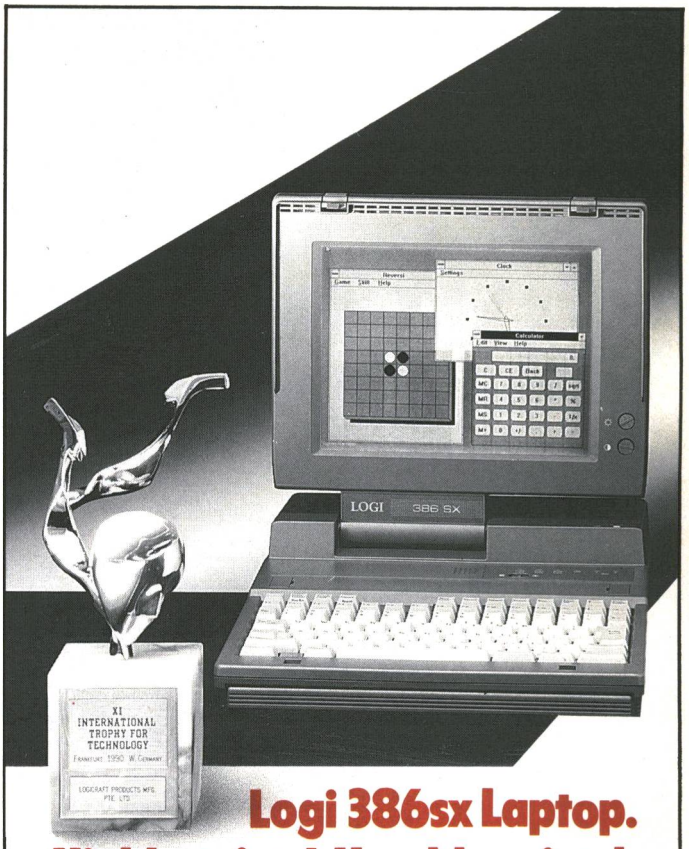

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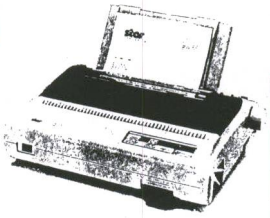

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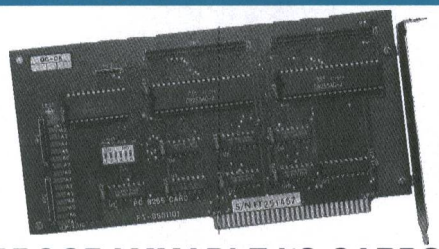

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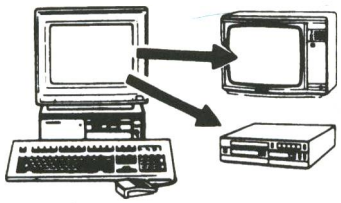

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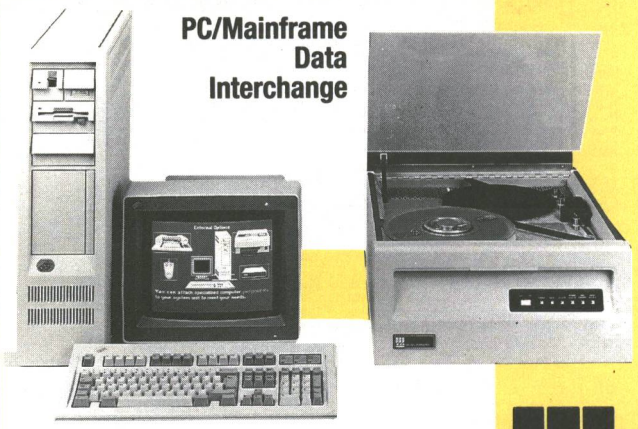

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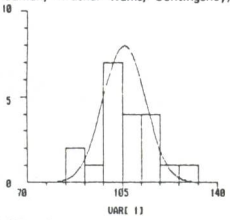

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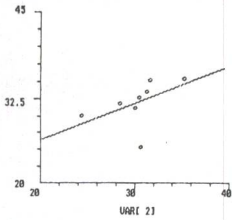

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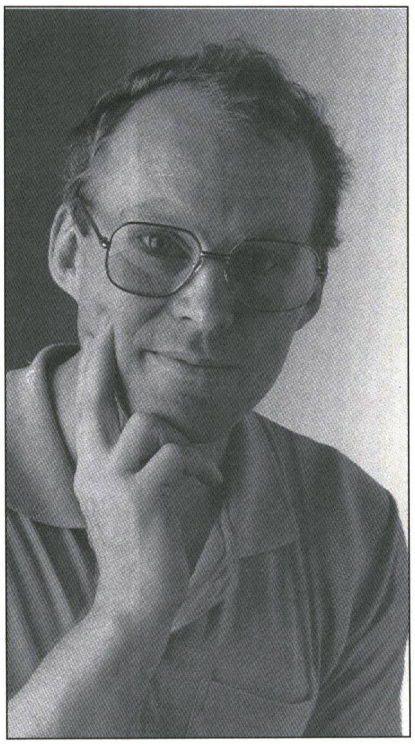


Remember Maxwell's Daemons? No? It's just that a recent reference to them put me in mind of their software equivalent. At the moment these are little more than a kind of thought experiment. It goes like this; if I load *Protext* it's so I can work on the last article I worked on, unless it's finished, or unless it's before 10 am, or unless it's the last Thursday of the month, in which case I'm immediately going to run *Mirror* and download a column from CIX – which I will run a conversion macro over before loading.

In a well run world my software would know this, so is it stupid or what? All right, it's stupid. Some software tries to help. *Brief* will load all the files I'm working on, arrange them in the same windows and with the cursor at the same point. *Windows 3* remembers the state of the desktop, though MS-DOS programs have to be shut down before I can quit. There are programs that will carry out actions at specific times – but I have to set them running. Currently there is no general solution to the problem of artificial stupidity – only partial solutions. But one day software daemons may offer one.

What they will do is make like the better kind of servant – the kind that anticipates your wishes and does as you would have commanded. Your daemon sits behind the screen and studies you, noting everything you do and all prevailing conditions in order to anticipate your wishes. To do this it needs total access to your environment.

If you load your contact manager software when the phone rings but exclude your daemon from the conversation then it will not be able to adopt the appropriate relationship. If it could, then answering the phone would soon becomes a signal to the daemon to open a screen window with the contact manager in it. Instant mind reader. Of course, most requirements depend on more complex sets of circumstances so, to be be effective, the daemon must have total access to the minutiae of your life.

There are folk working on these software daemons even as we speak but, apart from a multitasking operating system, we need better integrated electronic working environments to make them practicable. Your personal daemon needs access to your phone, your fax and your television. It needs access to on-line services, the PCs of your friends and colleagues, co-workers and business acquaintances (to talk to their daemons), your doctor, dentist and... well everything.

This all sounds a bit expensive. Well, certainly the first part, but probably not the second. For daemons to effectively take control of your life – er, to serve you properly, the infrastructure of society must change. Just as a telephone is useless if there's no one to call, so daemons must travel in flocks to be effective. Daemon shall speak unto daemon and it's you they'll talk about.

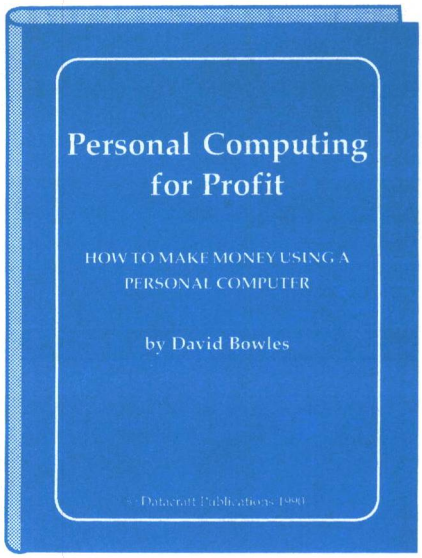
None of this is any more threatening than having your entire money supply monitored by the computers of the clearing banks. Just as letting the bank in on your financial affairs frees you from having to pay cash for everything, so having your daemon talk to a stranger's daemon enables you to make effective decisions faster.

For example, you phone a builder (well, your daemon does). You ask for a quote on a loft conversion (your daemon tells you he's done six that year, all completed on schedule). He offers to call that Wednesday at three to look at the job (your daemon confirms this is OK).

You ring off and do something else while your daemon rings around the three satisfied customers the builder's daemon offered as referees. The daemon knows how these things work – all you did was to ask for a quote, the rest happened automatically.

Right, I'll just save this and run the spell checker over it before converting it to *WordStar* format and putting it on a floppy disk. Honestly, you'd think the software could do that much for itself, wouldn't you? ●

How to make MONEY using your PC



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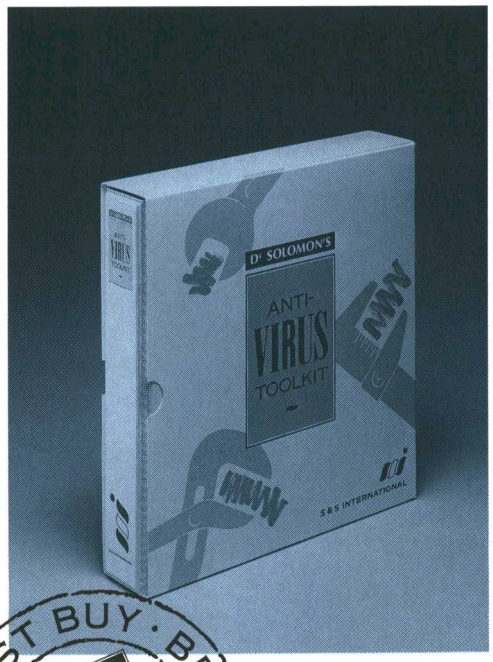

● ***FACT*** A virus is simply a program which copies itself without your knowing about it

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● ***FACT*** Viruses can spread in many different ways and can be set to trigger in any number of different circumstances

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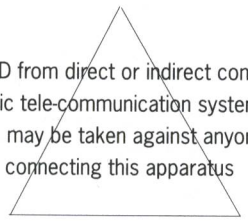

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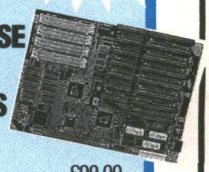

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BUILDING DATABASE SYSTEMS

Database applications are the core of all business computing. In a new series, Paul Stephens and Wilf Hey look at the theory and practice of designing and programming database applications, using SR-Info, *the database software package on this month's* SuperDisk.

SUPERDISK TUTORIAL

Throughout the magazine, we have referred to the database package on the *SuperDisk* by its new title of *SR-Info*. Even though the program files on the *SuperDisk* are labelled *PC-Info*, we assure readers that all operating instructions and tutorial material in the magazine will work correctly with the software supplied.

Shortly before publication it came to our attention that the name *PC-Info* is the property of Henco Software of Waltham, Mass., USA, and relates to a totally different data management system, which is marketed in the UK by Doric Computer Systems. Henco Software has agreed to us releasing this issue, subject to this acknowledgement, and we are grateful to them for this agreement. Anyone wishing to receive information on Henco's *PC-Info* package should contact Doric on (0923) 52288.

***SR-Info* is a product of Sub Rosa Inc, of Ontario, Canada, and is marketed in the United Kingdom by New Star Software, on (0245) 265017.**

Across the world, more computers run 'database' applications than any other kind of work – in fact as much as all the other types of work put together. A 'database' system can be anything from a giant corporate mainframe running accounting, order processing and personnel applications to a single PC keeping a list of club members. What they have in common is the basic task of keeping ordered sets of data records, enabling their users to enter new information, change existing information, and produce reports.

To create a working database system you need two sets of skills: first to design the database structures (which determine where each piece of information is stored on the computer's disks), and second to write the application programs which will enable the 'end user' to access and manipulate the data.

For that reason, we've built this series in two parts. In *Designing a Database* we'll look at the basic design principles which apply to all database projects, irrespective of which database package or programming lannguage is being used. In *Developing with SR-Info* we'll apply those principles to an example project, using the *SR-Info* database software on this month's *SuperDisk*.

These two parts will run in parallel – each month we'll discuss the theory,

DEVELOPING WITH SR-INFO

SR-Info, provided as shareware with this month's *SuperDisk*, is an ideal tool for learning about database programming. Like Ashton-Tate's famous *dBASE* package, it contains both a programming language and a full set of developers' tools to set up databases and test data. The programming language has a lot in common with *dBASE's*, and once you've learnt one you'll have few problems adapting to the other.

The first step you must take is to install *SR-Info* on your system (see page 243). Once you have started, all functions will be exactly the same, whether you have a hard disk or a floppy-based system.

THE CLASSIC FIRST STEP

When you have started *SR-Info* you'll find that the screen presents a blank area, a cursor and a prompt, quite similar to MS-DOS. This is *SR-Info's* version of the infamous 'dot prompt', and it's the starting point for all development work (incidentally, try typing `HELP` and see what happens).

The rules state that all programming courses must start with a 'hello world' program, so let's do ours now. At the prompt, type

```
? 'Hello World!'
```

and see what happens. Now try:

```
WRITE HWORLD
```

(Screen clears, you're in the text editor)

```
? 'Hello World!'
RETURN
```

(now press [End], screen clears back to the prompt)

```
DO HWORLD
```

(you should now see the result)

These two ways of saying 'hello world' show *SR-Info's* two modes of working – interactively from the prompt, or in 'program mode'. In the former, you type in commands one by one, and *SR-Info* executes them for you. In the latter you store sequences of commands ('programs') in disk files (HWORLD.PRG in our example), then tell *SR-Info* to execute them by using the DO command.

As a developer, you'll use interactive mode to create database structures, type in test data and examine test results. You'll also use *SR-Info's* built-in text editor (called by the WRITE command) to prepare source programs. Once you've tested them, your end-users can run them in program mode as a complete application.

DOWN TO BUSINESS

Now it's time to start looking at our example application, a system to keep track of articles in magazines. This will eventually build up into a multi-file relational database, and this month we start by building the record layouts for the two principal database files – ARTICLES.DBF, which contains a record for each article, and MAGFILE.DBF, which contains a record for each magazine. To look at the

AN SR-INFO DIR LISTING

```
PC-Info 3.10 April, 1990
(C) Copyright 1984-90, Sub Rosa Inc.

1>dir
.            <DIR>  12-24-90 11:03a   ..           <DIR>  12-24-90 11:03a
ADDITEM.PRG    111  1-11-91 10:36a   ARTICLES.DBF  2988  1-23-91  6:07p
ARTILIST.PRG  1706  1-11-91 10:35a   MAGFILE.DBF     86  1-23-91  3:10p
ARTINEW.PRG    404  1-11-91 10:32a   AUTHOR.NDX    3076  1-23-91  6:07p
DATES.PRG     2106  4-03-90 11:51a   FULLSCRN.PRG    14  1-09-91  4:12p
LISTALL.PRG    117  1-11-91 10:35a   LISTITEM.PRG   119  1-11-91 10:36a
PCI.EXE     267588  4-03-90 10:21p   PCI.HLP     181776  4-02-90  9:40p
PCI.MSG      15559  4-03-90  7:59p   PCILOGON.PRG   1669  4-03-90 11:55a
READ.ME       2211  4-04-90  7:34a   SUBJECT.NDX    3076  1-23-91  6:07p
TITLE.NDX     3076  1-23-91  6:07p   VENDOR.DOC     5989  1-12-91  2:09p

491583 bytes in 20 files.
6213632 bytes remaining.
1>
```

● This display shows a typical *SR-Info* DIR listing

CREATING INDEX FILES

```
ARTINEW.PRG                    PC-Info 3.10 WRITE  (Press Alt-H for Help)

....+....1....+....2....+....3....+....4....+....5....+....6....+....7....+....8
SELECT 1◄
USE ARTICLES◄
WINDOW 15,30,20,70◄
CLS◄
? "Indexing ARTICLES file"◄
?◄
? "Indexing on AUTHOR/TITLE/SUBJECT"◄
INDEX ON AUTHOR+TITLE+SUBJECT TO AUTHOR◄
? "Indexing on TITLE/SUBJECT/AUTHOR"◄
INDEX ON TITLE+SUBJECT+AUTHOR TO TITLE◄
? "Indexing on SUBJECT/TITLE/AUTHOR"◄
INDEX ON SUBJECT+TITLE+AUTHOR TO SUBJECT◄
CLS◄
? "ARTICLES file now indexed"◄
? "Press any key to continue"◄
WAIT◄
CLS◄
WINDOW◄
```

● Here you can see a sample subroutine that creates index files

then put it into practice. The example databases and programs will be included on the *SuperDisk,* although you can type them in if you wish (it's an excellent way to learn).

This month, we start off with the basic scheme of data files, records and fields, and take a first look at *SR-Info's* programming language. Happy developing!

DESIGNING A DATABASE

There are many different database packages and programming languages around, but at heart they almost all use the same underlying method of storing data, based on 'files', 'records' and 'fields'. We'll look at this in more detail later, but basically a data file contains a set of data records, each record consisting of a set of individual data items, or fields. An example might be a file of personnel records, where each record contained data fields for an employee's name, address, staff number, pay rate and so on. Each record in the file has exactly the same list of fields as all the others, and this is called the record layout. Only the actual data varies from record to record, for example 'Smith, Jones' and so on in a name field.

Understanding how to organise data in this way will enable you to adapt quickly to almost any database package. The organisation process consists of two stages: first you collect the details of all the data items you want to record, and second you assemble those items together to form a record structure for your database. A 'relational' system (which we'll deal with later) will have more than one data file, and you'll have to decide which file to store each piece of information in.

This initial process, of collecting record structure for ARTICLES, type the following, pressing the [Return] key at the end of each line:

```
SELECT 2
USE ARTICLES
LIST STRUCTURE
```

This will produce the following display:

```
1>SELECT 2
2>USE ARTICLES
2>LIST STRUCTURE
Data file:      ARTICLES.DBF
Number of records:     29
File number: #2
Field  Name  Type  Width  Dec
1      MAGAZINE    C      3
2      ISSUE       N      3
3      PAGE        N      3
4      TITLE       C     25
5      AUTHOR      C     15
6      SUBJECT     C      3
7      DATEREF     C      6
8      OPINION     C     25
9      LENGTH      N      2
** Record Length **       86
2>
```

Notice that you didn't have to type the .DBF on the end of USE ARTICLES – *SR-Info* assumes that for you. Also notice that the command **SELECT 2** changes the prompt. This is because *SR-Info* has 10 work areas, and you can have a different data file open in each one. SELECT switches between work areas, and program commands work on the currently SELECTED area. That's how you build relational database applications which work on more than one data file. The third command, **LIST STRUCTURE**, displays the record structure of the current file. If at this point you key **SELECT 1** and follow it with **LIST STRUCTURE**, you will get an error message, because there is currently no data file open in work area 1.

Looking at the structure list for ARTICLES.DBF, we see that all the fields are either C (Character) or N

STARTING UP IN SR-INFO

1 If you have a hard-disk system, *SR-Info* should be installed within a directory called PCINFO. Move to that directory (using the MS-DOS command, CHDIR or CD), and then key PCI [ENTER]. After a few moments, the *SR-Info* identification screen will appear: you are ready to enter *SR-Info*, so press F10 to continue (as directed on that screen).

2 If you have a dual-diskette system, the installation procedure should have left you with two diskettes which you have labelled 'Info FILES' and 'Info LOAD'. Place 'Info FILES' into drive A and 'Info LOAD' into drive B, and then ensure that the current drive is A (and the current directory is the root). Commence loading by keying B:PCI [ENTER]. After a few moments, the *SR-Info* identification screen will appear: you are ready to enter *SR-Info*, so press F10 to continue (as directed on that screen). You may remove the 'Info LOAD' diskette from drive B, as it is only needed during the actual start-up.

Do not attempt to shorten the process by combining the 'LOAD' disk's contents onto the 'FILES' diskette, because (unless you use high density) you will not have sufficient room for database expansion and program development on the 'FILES' disk.

3 If you have a single-diskette system, the installation procedure should have left you with two diskettes which you have labelled 'Info FILES' and 'Info LOAD'. Place 'Info LOAD' into your drive. Commence loading by keying B:PCI [Enter]. After a few moments, the *SR-Info* identification screen will appear.

Remove the 'Info LOAD' diskette from the drive (it is only needed during the actual start-up), and insert the 'Info FILES' diskette. You are now ready to enter *SR-Info*, so press F10 to continue (as directed on the screen).

Become familiar with the start-up procedure above which is applicable to you – you will use it every time you wish to enter *SR-Info* throughout this series.

LISTING AUTHOR SEQUENCE

```
   4  BANKS          MARTIN BANKS              OP
  29  DENNIS         TONE DIALLING
  24  HARDAKER       BEGINNERS' WORKSHOP       PR
   7  HARDAKER       GRAPHIC DETAIL            DB
  21  HARDAKER       REMOTE COMMUNICATIONS     BK
  26  HEY            PROGRAMMERS' WORKSHOP     PR
  23  HEY            SUPERDISK SLICE TUTORIAL  TUT
   8  KELLY          GRAND ENTRANCE            HW
  17  MINSON         AFTER HOURS               ENT
  12  MULLEN         SHAREWARE SCENE           SH
  27  PATIENT        HELP SCREEN
  14  PATIENT        SAYING IT LIKE IT IS      AUD
  22  PATIENT        STEVE PATIENT
  10  PATIENT        TAKE A LETTER             WP
  28  SOLOMON        WISDOM OF SOLOMON         OP
  16  STEPHENS       PAUL STEPHENS             OP
   5  STEPHENS       SHARING WITHOUT TEARS     MET
  15  WILLIAMS       BASIC EQUIPMENT           PR
  11  WILLIAMS       FINESSE FINERY            DTP
  19  WILLIAMS       ON COURSE                 DTP
  13  WILLIAMS       PIN-POINT PRINTING        HW
  20  WILLIAMS       SHEDDING NEW LIGHT        HW
  25  WILLIAMS       SIMONS' TOOLBOX           UT
   6  WOODWARD       CHEQUE BOOK               ACC
1>
```

● The display shows the tail-end of the Database in AUTHOR sequence

EDITING THE DATABASE

```
#1 ARTICLES.DBF                                  EDIT Record    14
                                                                Page 1

 REC:  prev <PgUp>  next   <PgDn>  delete  ^U        PAGE:  prev ^K  next ^L
 FILE: top  ^<Home> botton ^<End>        DELETE: char <Del> to end of field ^Y
 APPEND MODE: begin ^<PgDn> exit <PgUp>      EXIT: with save <End>  no save ^Q

MAGAZINE..... PCW
ISSUE..... 52
PAGE..... 147
TITLE..... SAYING IT LIKE IT IS
AUTHOR..... PATIENT
SUBJECT..... AUD
DATEREF.....
OPINION.....
LENGTH..... 2
```

● Using the EDIT command on a Database record

together the individual data items, is part of what is widely termed 'Systems Analysis'. The things you need to know are: what is the data item called, what is its size, and what type of data is it?

Let's take one of the data items in our example system, a database to store details of magazine articles. We know we want to store the title of each article, so that's the first part (we'll call it the data item TITLE). Next we have to decide what size the item will be. What we really mean is 'maximum size', since the computer will reserve a 'box' of the specified number of characters for each article title, and we won't be able to store a title that's longer. We've guessed that 25 characters will be enough for most titles (we can always abbreviate), so that's the length settled.

Finally, what *type* of data is the title of an article? This is where we become a bit technical. A data item's type tells the computer how to store it, and what kinds of things can be done with it. The two most widely-used types are 'alphanumeric' (text containing any mixture of letters and numbers) and 'numeric' (a number). In most database packages you can only perform arithmetic on data items stored in numeric format. Our article title field will need to hold free-format text (for example '99 ways to improve your programming' or 'Lotus 1-2-3 Review'), so we define its type as alphanumeric.

Our field definition is now complete – field name TITLE, size 25 characters, type alphanumeric, contents 'the title of the article'. Now we just have to repeat the process for all the other items we want to store. Good developers' theory says that at this stage you should work independently of the database package – record the real life attributes of the data, without reference to the way you'll have (Numeric) type. Character type is the equivalent of alphanumeric, and is used for general text such as names and addresses. Numeric is *SR-Info's* only number format (other languages have a variety of different size and decimal options) – it behaves like a floating-point or 'real' number in a language such as C, in that you can do division and multiplication and get results that include a decimal fraction.

The other data type available in *SR-Info* is L (Logical), which holds a simple 'Yes/No' value. Logical fields can be used to make *SR-Info* programs more concise.

The right-hand column of the listing shows the field's width, or size. For the character fields, this is straightforward – if it says 25 (as for TITLE), then each record will contain exactly 25 characters for that field, with spaces added to the right-hand end (called 'padding') where necessary. If you try to type more than 25 characters, the data will be 'truncated', that is characters will be lost from the right-hand end.

For the numeric fields, the width is more complex. To decide how wide to make a numeric field, imagine the largest number you want to store in it, including any decimal point. Say you need to store up to 99999.99, then the field width would be eight, with a 'dec' size of two – five integer digits, a decimal point, and two decimal digits. As with character fields, numerics always occupy the same amount of space, this time with leading zeros on the left-hand side. Logical fields always occupy one character.

SO FAR, SO GOOD

This month's *SuperDisk* contains a database, index files, and a rudimentary program for handling that database called ARTILIST.PRG. We will build on this in coming months.

***SR-Info* has a very simple text editor which will allow you to view, create and change programs like ARTILIST.PRG: Type**

`WRITE ARTILIST` **[Enter]**

The extension here is PRG, so you do not need to specify it. Instructions for getting on with the job are available by pressing [ALT] [H]: note that [END] will accept any changes you make – and gives the opportunity to specify a different name for the new version of the program: [CTRL] [Q] will let you quit without making any changes.

An interesting feature of this editor is [ALT] [F], which provides easy-to-read indentation for *SR-Info* programs.

WHAT NEXT ?

You can execute ARTILIST.PRG by keying DO ARTILIST [Enter]; you can investigate its inner workings by looking at the code with the editor. Many commands are the same as those in languages you may know, like BASIC. Learn more about *SR-Info's* commands and structures by quitting the WRITE, and then keying HELP [ENTER]: the on-line help system will give you details about most of the facets of this language. Help on a particular subject or command can be got by keying:

`HELP <subject>` **[Enter]**

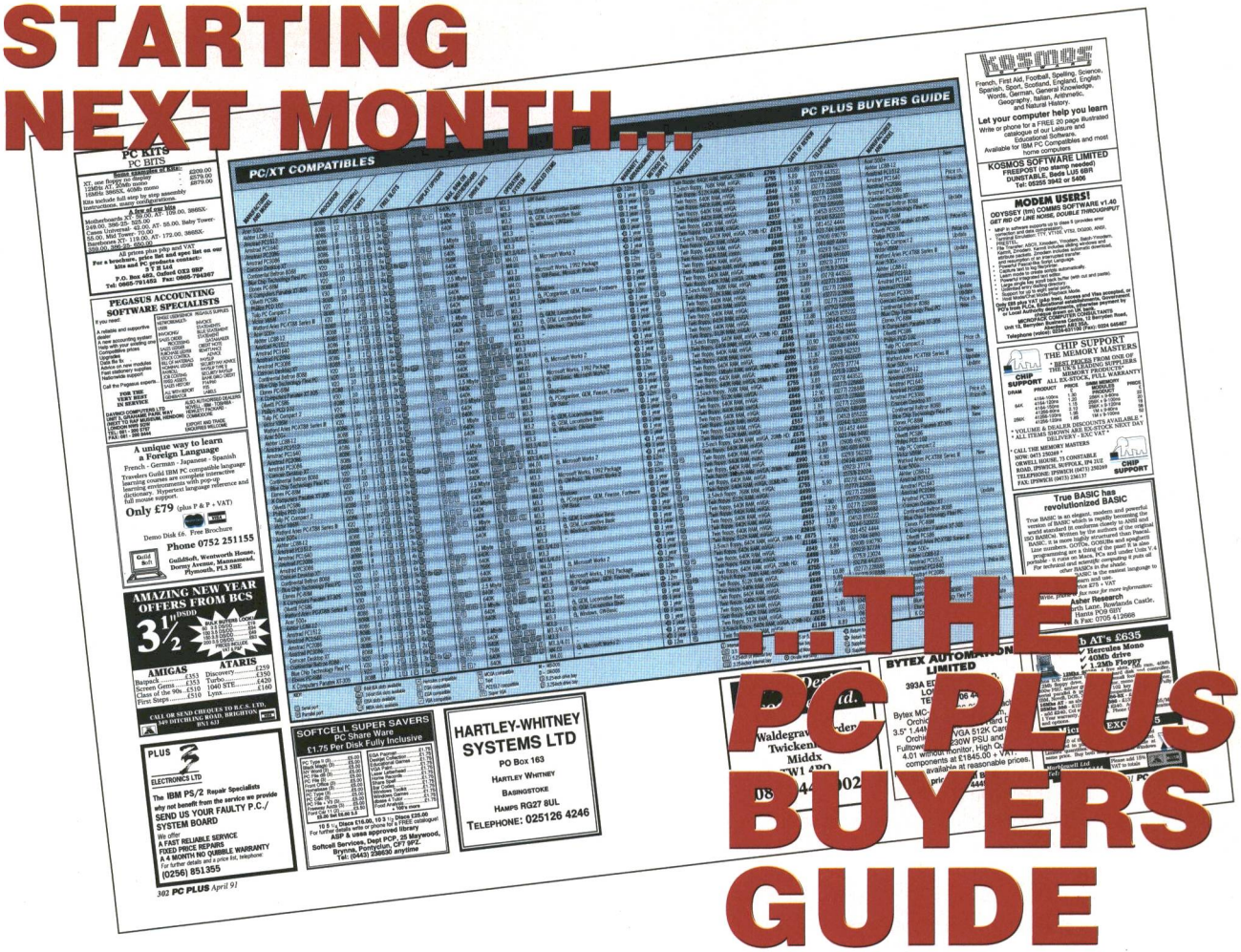
Next month we will be looking at the steps by which ARTILIST.PRG came to be; we will study thoroughly the command structures (such as DO CASE); we will think again about supportive databases – the MAGFILE.DBF mentioned earlier, for example. And we will look into why this is a relational database application.

Shortly, we shall take a look at the rich repertoire of functions and calculations available in the database language.

CREATING A DATABASE

Now it's time to create a database record structure from scratch. As well as a file of article details, our system will also have a file of magazine detail records, so that we can look at a

STARTING NEXT MONTH...



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YES, from our April issue, PC PLUS will feature an extra section – the *PC PLUS Buyers Guide*, Britain's biggest monthly guide to PC hardware and software, with listings of over 900 products, complete with prices, principal features, hardware compatibility and contact telephone numbers. This will form an instant reference to the U.K. PC Market, updated monthly to keep you up to date with any changes in prices and specifications.

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The *PC PLUS Buyers Guide* will make PC PLUS even bigger – 32 extra pages to add to our regular package of product reviews, industry news and comment, practical advice and guidance, plus of course the *SuperDisk*.

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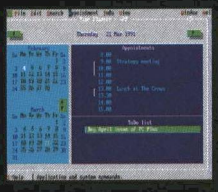

● ***SIDEKICK 2.0*** – **Borland popularised the TSR with the original *SideKick*** personal organiser program. We look at the latest incarnation of this leading-edge program.



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VARIETY OF FORMATS

```
today's date in the default format is:  03011991
today's date in format #1 is:  910301
today's date in format #2 is:  03/01/91
today's date in format #3 is:  March 1, 1991
today's date in format #4 is:  Friday, March 1, 1991
today's date in format #5 is:  March 31, 1991
today's date in format #6 is:   1-Mar-1991
today's date in format #8 is:  19910301
today's date in format #9 is:  19910331
ONLY    3228.00  days left in the 20th century

Enter a legal date in format MMDDYYYY
Enter 01011900 to quit
```

● There are a great variety of DATE formats within *SR-Info*

THE ARTILIST PROGRAM

```
MAGAZINE ARTICLE LIBRARY                                  31 RECORDS

** AUTHOR  SEQUENCE        1. RE-INDEX FILES
   SUBJECT SEQUENCE        2. LIST ALL ITEMS
   TITLE   SEQUENCE        3. LIST CHOSEN ITEM
                           4. CHOOSE NEW SEQUENCE
                           5. ADD NEW ITEM
                           6. EXIT PROGRAM

                    Indexing ARTICLES file

                    Indexing on AUTHOR/TITLE/SUBJECT
                         31 RECORDS READ
                         31 RECORDS INDEXED
                    Indexing on TITLE/SUBJECT/AUTHOR
```

● FUNC1 – Exercising function 1 of our program in a window

to modify them to fit into the computer's way of doing things. In practice though most developers do take the computer into account.

A good example of this is in size – we may know that some article titles are going to be much longer than 25 characters, but to reserve, say, 100 characters for each title would eat up more disk space than we can spare, so we've cut it back.

STRUCTURING

Once we've made a list of all the data items we're going to store, it's time to assemble them into a record structure. At this stage we're only dealing with a single-file (or 'flat-file') database, so this process really consists of just placing them one after the other (once we get into multi-file relational systems things get more complex, but that comes later!). Even at this level though, there are some points to watch out for.

The most important of these concerns 'key field' and 'indexes'. In most database applications, you'll want to be able to find a particular record quickly, without having to search laboriously through all the others. Databases let you do this by specifying that certain data fields are to be indexed.

When a field is indexed, the database keeps a separate (highly structured) list of all the values stored in that field, and the location of the record to which each value relates. When you specify a value, the computer can go directly to the record you want.

In our example system, we've got data items which identify the magazine name, its issue number, and the title of the article – three 'key fields' which we will probably want to use as a route for directly accessing records. If your record layout doesn't have at least one key field, think again – you may have to invent one (for example a serial number or code), otherwise you'll have no way of accessing records directly.

Finally, why do you think our 'magazine' data item is only three characters long? The answer is that it doesn't hold the full name, only a reference code, used to relate it to the second data file in our system. More of that next month!

magazine and find all the articles printed in it. So we need to create a new file, called MAGFILE.DBF. In *SR-Info* this is done using the CREATE command.

CREATE works as if it were a program itself, making it easy to set up field names, type width and 'dec' (number of numeric characters that are to the right of the decimal point) for each field. This structure is permanently recorded inside the database itself so that each program can 'know' which fields are within the database. Type the following (with [Return] at the end of each line):

```
SELECT 1
CREATE MAGFILE
MAGAZINE C 3 0
FULLNAME C 25 0
```

Complete the operation by pressing the [END] key. You now have a file called MAGFILE.DBF (confirm this with LIST FILES), but there are no records yet in this database. By the way, it does not matter what file type (1, 2 or 3) you assign to a database when you choose to END it.

The record structure we've created is very simple, but as we'll discover later, it's easy to add more fields later on – a major advantage of this type of database package over conventional programming languages such as C, Pascal and Basic.

INDEXING

Now it's time to create some indexes for our articles file. Type the following:

```
SELECT 2
INDEX ON AUTHOR+TITLE+SUBJECT TO AUTHOR
```

This creates a file called AUTHOR.NDX, made up of keys incorporating information from those three fields. Note that if you had coded

```
INDEX ON AUTHOR TO AUTHOR
```

this would have done the job – with a smaller index file, too – but this index would be sorted by author only.

You're not limited to one index per database – you can create a number of them, and *SR-Info* will keep them all up to date – provided you remember to include their names every time you USE the database file.

Our application uses three index files for the ARTICLES database, so when we open the database we use the following commands:

```
SELECT 1
USE ARTICLES
SET INDEX TO AUTHOR, TITLE, SUBJECT
```

You can specify up to seven index names when you open a database.

To see some programs working with these files, type

```
DO ARTILIST
```

Then to look at the programs themselves, type

```
WRITE ARTILIST
```

Our last command this month is QUIT, which will bring you back to MS-DOS when you have finished your session with *SR-Info*. Next month we'll look at more indexes and begin some real *SR-Info* programming.

SR-INFO COMMAND SUMMARY

For further details, simply type HELP

[#] is the current record number in the active file

[@] specifies row & column in SAY and GET structures

[=] sets a memory variable's value

[?] displays a variable on next screen or printer line

[??] displays a variable in current screen or printer line

ACCEPT waits for the user to key data into a variable

APPEND adds a record to the database

AVERAGE calculates and displays the average of a particular numeric field within many or all records

BOX draws an oblong on the screen using line graphic characters

BREAK exits prematurely from a DO WHILE or REPEAT structure

BROWSE views and edits database records, many at a time

CANCEL exits from a program prematurely

CHAIN finishes the current program and starts another

CLEAR closes all files and discards memory variables

CLEAR KEYBOARD flushes extra keystrokes from the keyboard queue

CLOSE 'deselects' the selected file

COLOR sets the attribute bytes within a screen oblong

COMPILE converts an *SR-Info* command file (with a PRG extension) into the faster CPL format

CONTINUE repeats the last LOCATE command

COPY copies selected records from one database file to another

COPY FILE is similar to MS-DOS command COPY

COPY STRUCTURE creates a new database with the same structure as the current one

COUNT tallies selected records from the current database

CREATE aids in the building of a new database structure

CURSOR moves the cursor to a specified position on the screen

DELAY causes a short delay within a program

DELETE removes a particular database record (or group of records)

DELETE FILE is similar to MS-DOS command DEL

DIM defines a memory variable to be a matrix (or table)

DIR is similar to the MS-DOS command

DISPLAY shows a particular database record (or group of records) in a columnar (report) format

DO compiles-and-executes a named PRG file (program)

DO CASE is a structure for multiple decisions

DO WHILE is a structure for conditional looping

EDIT amends a record within the selected database

EJECT advances the printer to the top of the next page

ERASE removes specific rows of the current screen

FILES is a structure for associating files with other drives and directories

FIND locates a record in a database via the current index

FLUSH updates the selected database

GLOBAL retains the named memory variables even during a CHAIN

GO moves to a particular record within the database

IF is a structure for conditional control

INDEX creates an index file

INPUT waits for a user to enter input to a memory variable

LIMIT defines the scope (range) of other commands so that only a chosen selection of records from the database is seen

LIST shows the records in the selected database

LIST FILES gives a list of the names of all database files

LIST MEMORY lists the current memory variables

LIST STRUCTURE lists the structure of the selected file, and the number of records in it

LOCATE searches the selected database for a record meeting a particular condition

LOOP repeats from the top of the current DO WHILE structure

MINIMUM reports the record in the database with the minimum numeric value for a particular field

MODIFY permits modification of the structure of the database

ON ERROR provides commands to be executed if an error occurs within a program

ON ESCAPE provides commands to be executed if a user presses [ESC] while in a program

ON FIELD controls the processing of data entered and displayed during the READ or BROWSE screens

PACK removes permanently any deleted records within the database

PERFORM executes a PROCEDURE (elsewhere in the same program)

POST matches file records against the database, and updates it

QUIT close all data files and exit *SR-Info* – back to MS-DOS

READ activates a customised screen, permitting the user to key information into variables

RECALL reactivates a deleted record

REINDEX rebuilds all currently-open index files

RELEASE 'forgets' memory variables

RENAME is similar to MS-DOS command REN

RENAME FIELD renames a field within a database structure – without disturbing the database itself

REPEAT defines a code structure to be repeated a certain number of times

REPLACE changes values of fields within selected records of the database

RESTORE brings back SAVEd memory variables (from a disk file)

RETURN ends a DO subroutine structure

RUN executes MS-DOS commands and programs from within *SR-Info*

SAVE records memory variables into a disk file

SCOPE restricts the effect of all other commands to the database records with a particular key value

SCREEN saves and swaps screen images (up to four being remembered)

SCROLL moves a portion of the screen up or down one row

SEEK is a simple alternative to the more complex FIND command

SELECT specifies a database file number (for USE, and for switching between files subsequently)

SET commands affect various conditions, each documented in HELP

SKIP moves the record pointer ahead or back in the database

SORT creates a new file by sorting records from the database

STATUS displays information about the current state of play

STORE puts a value into a memory variable

SUM calculates and displays the sum of a particular numeric field within many or all records of a database

TEXT sends text blocks to the screen or the printer

TOTAL summarises records from the database, creating a new file

USE opens a selected database

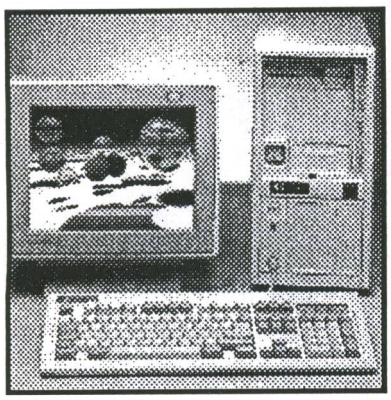
WAIT stops execution, awaiting a keystroke

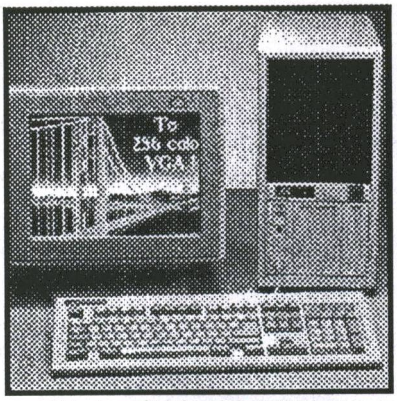
WINDOW defines a relevant portion of the screen as the area for display

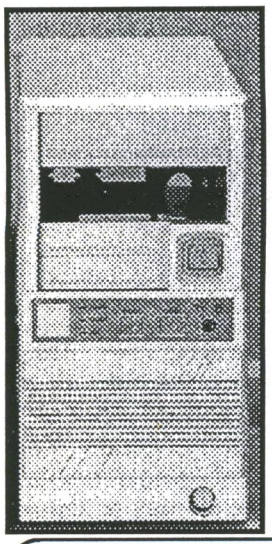
WRITE starts the *SR-Info* text editor

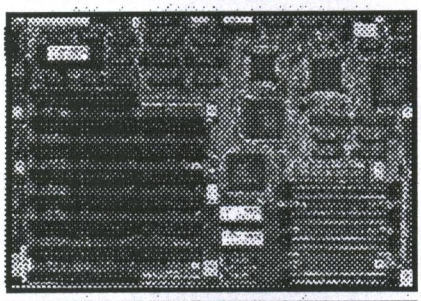
ZAP eradicates a database

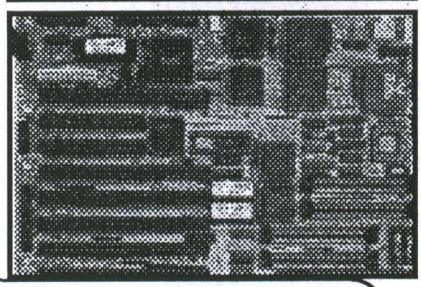
Breaking The Price Barrier











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6041 FORD TEST DRIVE.....Driving Simulator (1)
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6045 VGA MAHJONG.....Classic Card Game
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7005 SCREEN WRITE.....Scriptwriters wordprocessor (1)
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7019 ESL WRITER.....For students (2)
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8002 HOME BUDGET.....Home finance (1)
8003 FAST BUCKS.....Personal finance (2)
8004 TIME & MONEY.....Personal and small business accounts (1)
8006 LEDGERMASTER.....Latest Accounts Package (HD4)
8007 MR BILL.....Professional billing system (2)
8008 CHECKMATE GL.....A full accounts business package (2)
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8023 ULTIMATE SALES PROG.....Sales + invoicing + stock etc (HD2)
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8028 PAGE FINANCIAL CTRL.....Accounts clone (3)

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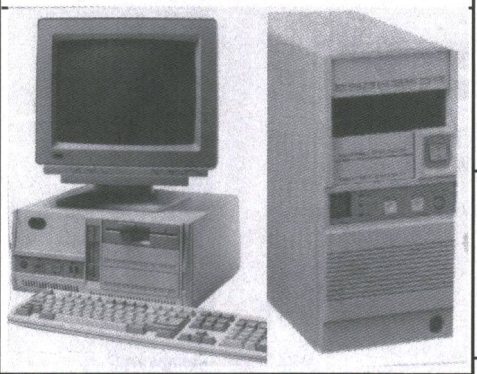

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Chipset: Headland with AMI BIOS
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Expansion: 512K up to 1, 2, 4, 8 Mbyte (SIPP RAM Type)
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MB-386-25A 80386-25Mhz CPU
Chipset: C&T Neat Chipset with AMI BIOS
Expansion: 1, 2, 4, 8 16 Mbyte (On-board using SIPPS)
Slots: 5 x 16 bits, 3 x 8 bits
Features: SHADOW RAM (System & Video) Page Interleave etc
Price: £450 with 1Mbyte RAM

MB-386-25B 80386-25Mhz CPU
Chipset: C&T or Opt: Neat Chipset with AMI BIOS
Expansion: 512K 1, 2, 4, 8 Mbyte (On-board using SIPPS)
Slots: 6 x 16 bits, 2 x 8 bits
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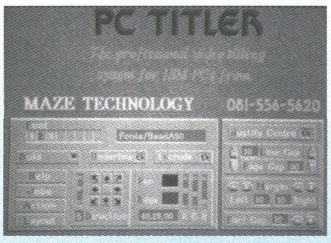

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WORK THROUGH

Simon Williams shows how to mailmerge using TopCopy Professional *from any database screen*

IN DEPTH

TopCopy is the budget word processing package from Toplevel Computing. There are two versions, *TopCopy Plus* and *TopCopy Professional.* There is one unique feature of all the *TopCopy* family of word processors, which comes in very handy when putting together letters for a mailmerge. They will run as TSRs (Terminate and Stay Resident programs), with another application running directly underneath. As well as having your word processor instantly available, you can use the TSR feature to mailmerge with data from virtually any database.

TopCopy can capture any area of the underlying screen. So, if *TopCopy* is running as a TSR, and a database is running beneath it, the data displayed on the screen by the database can be captured. It's just a matter of ensuring that the correct fields in the database records appear on the screen in the right place.

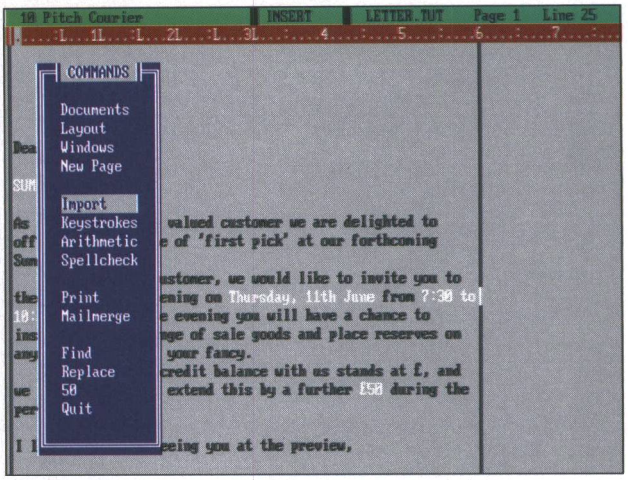
Once captured, the information from the database record is easily incorporated into a mailmerged document – as detailed in the walk-through opposite. Furthermore, *TopCopy* will automatically reformat the letter or document, depending on the contents of the fields on the screen. For this work-through the *AtLast* database was used, though any other database that will run with *TopCopy* present would work as well.

The only drawback with this system is that you have to move from record to record in the underlying database by hand. This is no problem if you're only going to do it on an occasional basis but it is a drawback if there are regular, large mailouts to be done.

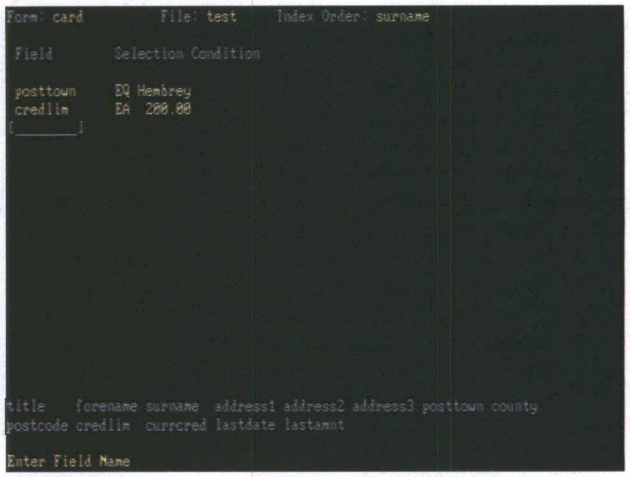
TopCopy has no way of controlling the underlying program through its own macro system, so you can't leave the mailmerge process to itself – you must be on-hand. There are ways around this. For example, some shell programs (like WordPerfects' *Office*) will capture keystroke sequences from any package and play them back in response to a single command. Alternatively, it would be possible to use a keyboard automator, like *ProKey*, to insert strings of keypresses into the keyboard buffer and automate the process, but both possibilities are outside the scope of this tutorial.

In *Windows 3*, a similar technique could be employed using the *Windows* clipboard, any *Windows*-compatible word processor and the *Windows Recorder*. This can be made to record and play back any pre-defined set of keystrokes and mouse movements, could perform a similar function.

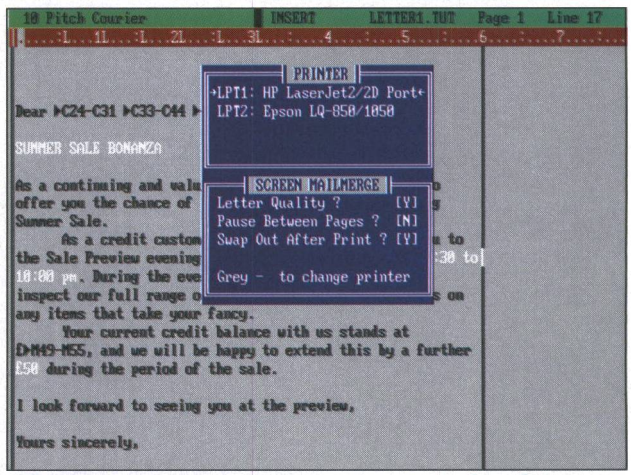
Toplevel Computing can be reached on (0453) 753955.



1 Create the document you wish to print, leaving gaps for the imported data. These will be filled in during the mailmerge. This example is a letter from a supplier to its customers telling of a forthcoming sale. The cursor should be placed where you want the first piece of data from the database to be inserted. Select Import from the main *TC Pro* menu.

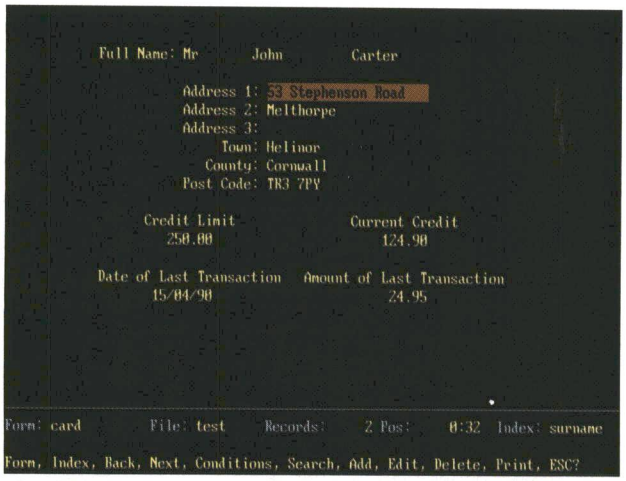


4 Set up the database to display just the records you want merged. In this example, letters are required for those living in Hembrey with a credit rating of 200 or over. In *AtLast* make the selection by defining conditions for the contents of specific fields within each record. The 'posttown' field must equal (EQ) 'Hembrey' and the 'credlim' field must be equal or after (EA) 200.

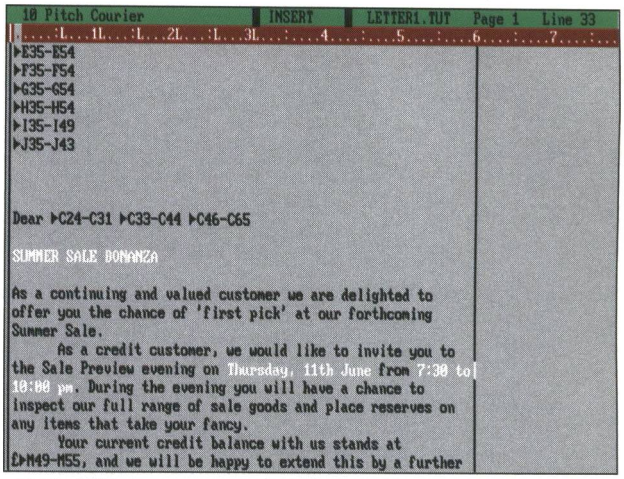


7 If you need to feed single sheets into a printer, then the Pause Between Pages option should show 'Y'. 'Swap Out After Print' automatically switches out of *TC Pro* to the database screen after printing each letter. This enables you to move straight on to the next record. Press [Return] after completing the selector to start the printout.

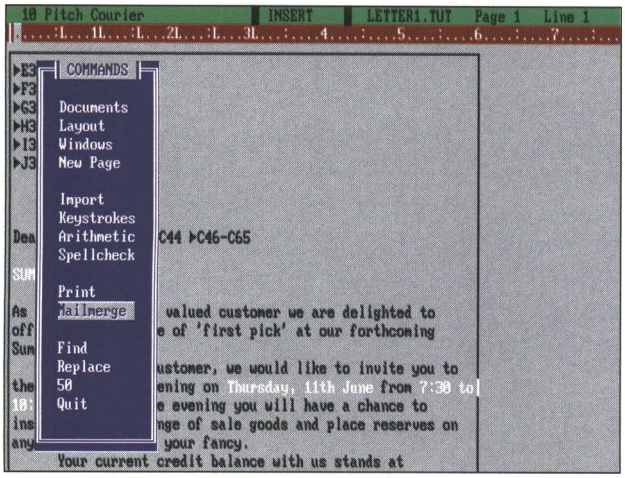
TOP COPY PRO



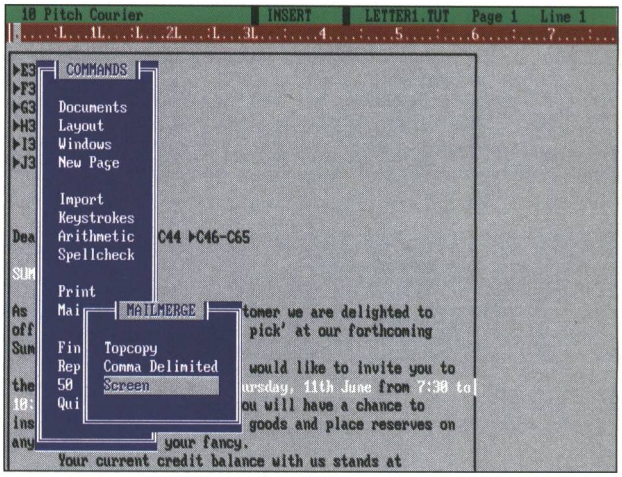
2 Tell *TC Pro* where to find the data for the mailmerge document on the underlying screen – in this case the start and end of fields from a *PC AtLast* record. The co-ordinates are obtained by positioning the cursor at the start of each field and pressing [F10]. Use the cursor keys to highlight the full width of the field and press [Ctrl][M] to complete the import.



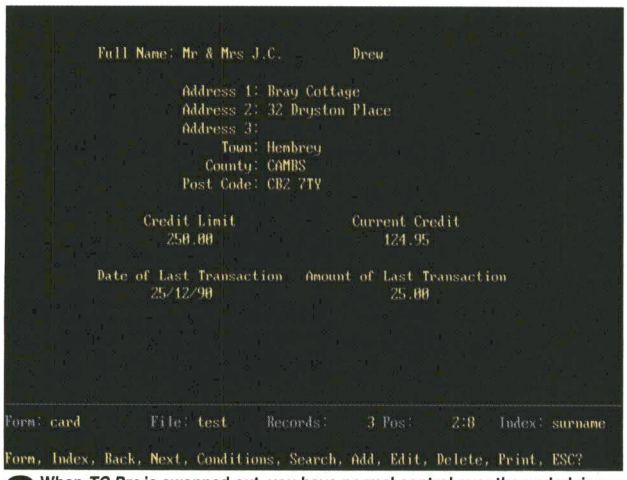
3 The *TC Pro* screen reappears with a pair of co-ordinates inserted into the document. The small black triangles indicate that these are mailmerge co-ordinates and not to be printed literally in the text. Repeat the process for each piece of data you want to capture. The letter can still be edited and saved to disk as with a normal document.



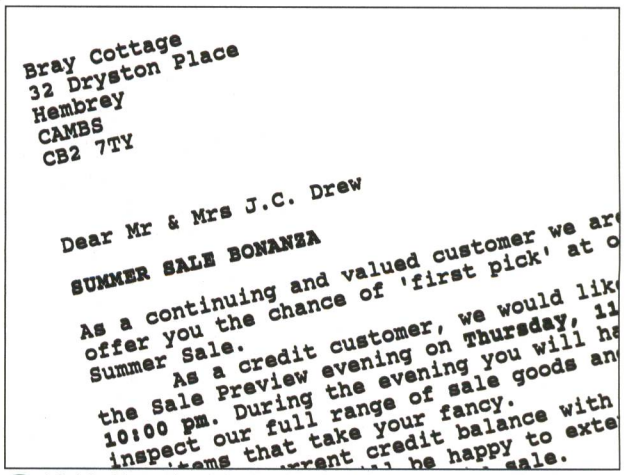
5 Once the correct fields have been defined in the *AtLast program*, you are going to have to return to the record display and view the first matching record found in the datafile. Now you to have to switch back to the *TC Pro* screen using the hot keys. Once there, simply select Mailmerge from the *TC Pro* main menu, as shown in the picture above.



6 You then need to select Screen from the Mailmerge sub-menu. Next you will come to the Printer and mailmerge selectors as shown in the following screen. Select by number the printer you will be using to print the mail merge. If you are using continuous stationery or a laser printer which feeds single sheets automatically you should leave the 'Pause Between Pages ?' option at 'N'.



8 When *TC Pro* is swapped out, you have normal control over the underlying program. You can move backwards or forwards through the records, change the search conditions or even load a different datafile. As long as the layout of the database screen remains the same, *TC Pro* still takes the correct information from the record screen and incorporates it into the letter.



9 A finished letter shows the data imported into the form letter. Note that the data is properly formatted and blank entries, like the third line of the address, are omitted from the print out. The text is reformatted to allow for different credit balances in the body of the text. This is all done automatically by *TC Pro* during the mailmerge as you would expect.

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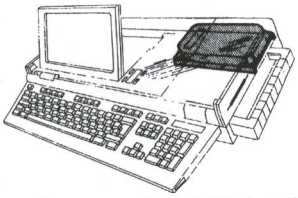

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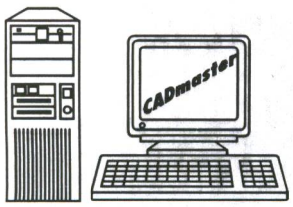

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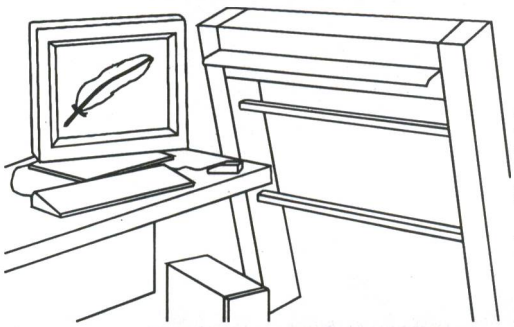

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DATA RECOVERY WITH *LOTUS 1-2-3*

In the first of a new series Steve Patient looks at some common but annoying problems associated with well known software products. This month we focus on some spreadsheeting life savers.

By one of those strange laws of computing, a *Lotus 1-2-3* spreadsheet's likelihood of corruption or damage is directly proportional to its value to the organisation. At the same time, experience has shown that the more important a spreadsheet is to an organisation the less likely the user is to back it up on a regular basis.

When things do go wrong spreadsheet files prove much harder to recover than word processor or database files since they contain a great deal more than just ASCII data. In fact, they are complex modelling systems which often hold thousands of interacting cell formulae. Even a simple case of cell corruption can have a domino effect on the model's integrity.

The problem of data corruption is particularly acute with *1-2-3* release 3.1. This uses three-dimensional spreadsheets – and it isn't at all unusual to come across users with single files of up to sixty worksheets, all linked together. The whole logic structure can collapse like a house of cards if just one of the sheets is damaged. Of course, regular backups are the best way of avoiding disasters, but what do you do if the worst happens?

TOOLS OF THE TRADE

The first thing is to make sure you have the software tools on hand to tackle the problems. The two most useful ones are the *Norton Utilities*, a general data recovery tool, and *Rescue Plus,* which is designed to combat the both common and esoteric *Lotus* spreadsheet corruption problems.

The first golden rule of data recovery is to back up the disk containing the damaged file. Recovery techniques aren't always reversible, and the first attempt at restoring data may not work. So, with floppy disks use the DISKCOPY command to make a second disk whenever possible. With hard disks write important files to diskette, or use a tape backup system. DISKCOPY ensures that you get more than one chance to recover the data. A hard disk backup ensures that you won't lose anything else trying to save the first file.

In dealing with damaged Lotus files, there are at least nine different problems which commonly arise; we will deal with these one at a time.

1 DIRECTORY LISTING SHOWS A SPREADSHEET, BUT IT WON'T LOAD

You may encounter several possible error messages, but the most common is 'Part Of File Missing'. In any event, you should first check the file size using the DIR command. If the file displays a size of 0 bytes, then skip to section two. Otherwise, you should first try to copy the file on to another disk using the DOS COPY command.

If you can perform this operation without any problems then it's only your file format that has become corrupted, and it stands a good chance of being recovered automatically using Spectrum's *Rescue Plus*, or a reasonable chance of being pieced together with the *Norton Utilities 5.0 FILEFIX* program. This will deal with .WK1 and .WRK format files, but has limitations (see table comparison). If you run into error messages when copying, then try the suggestions in section 4.

2 A FILE DISPLAYS A SIZE OF ZERO BYTES

This happens when the file saving process is interrupted by a power cut/spike or by removing the disk from a drive before the saving process has finished. Any recovery will depend on how much data was actually saved before the interruption occurred. First run CHKDSK on the disk with the /F paramter (Fix). You should get a message that lost clusters were found and a prompt: 'Fix (Y/N)?' Answer 'Y'. Then you get a directory listing again. You should see one or more files that have 'CHK' for an extension. Rename these files to give them the proper *1-2-3* or *Symphony* extension.

If any of these new files contain spreadsheet data, *Rescue Plus* should now be able to recover them, and even *Norton Utilities* can have a go, but it will probably only give you fragmented data. If this technique doesn't work, then the disk data has probably become disconnected from the file.

3 FILE MISSING ITS DATA IS DISCONNECTED

First make sure that none of the software you're using can change attributes and create hidden files. Use *Norton Utilities* to view the disk – it will show hidden files as well. When a file is truly missing, or it's data is not connected with it, that usually means the directory is damaged. In most cases, the data that was actually part of the file still exists out on disk somewhere.

First, map the disk and then view the unallocated sectors to see if they are part of the missing file. This is done using the *Norton Utilities*. It's often rather tricky to determine whether or not a sector contains spreadsheet information. Look out for labels that were contained in the worksheet.

When you find an unallocated sector that contains labels from your missing worksheet, assume that all contiguous unallocated sectors before and after it are part of the file. Make a list of all the sectors that you think were part of the missing file.

The next step is to form a file from these sectors. Trick *Norton Utilities* into doing this. Delete a file from the directory that you don't care about or make a dummy file and delete that. Then follow the directions in *Norton Utilities* to unerase the deleted file selecting the option to manually select sectors for inclusion. Select all the sectors from the list you compiled and save the file. You will now have a readable file.

Don't worry about mixing up the order of the sectors or including ones that don't contain pertinent data. The *Rescue Plus* software will automatically

THE UTILITIES PUT TO THE TEST

The table shows the results of tests run on corrupted files, erased files, lost passwords and fragmented disks using *Norton Utilities* and *Rescue Plus*. The object of the exercise was to recover a workable spreadsheet complete with its data and @Functions and labels as quickly and as accurately as possible.

***Rescue Plus* is also capable of recovering files which have been erased and fragmented so that a file is not irretrievably lost if the user has overwritten it with a blank spreadsheet. The program can also recover data which has been intentionally erased.**

For further help with your Lotus spreadsheet files you can contact either Lotus Development (on 0784-450923) or The Lotus User Group (on 0753-841686)

Lotus Version	*Rescue Plus*	*Norton Utilities*
Support		
1-2-3 Release 1A	Yes	Yes
1-2-3 Release 2.0/2.1	Yes	Yes
1-2-3 Release 2.2	Yes	No
1-2-3 Release 3.x	Yes	No
Symphony	Yes	Yes

● Shown above is the specific support for spreadsheet file formats offered by recovery utilites

Recovery Capabilities:	*Rescue Plus*	*Norton Utilities*
Corrupted Files	Yes	Partial
Erased Files	Yes	No
Fragmented Files	Yes	No
Password Protected Files	Yes	No
Password Recovery	Yes	No
Preview & Decode Files	Yes	No
Any Size File	Yes	No
Speed (110Kb File)	42 secs	2 Mins 15 secs

find and recover all the usable spreadsheet data contained in the new file. Unfortunately, you usually lose your formulae, but at least you can recover the data in the damaged file.

4 DATA ERROR WHILE READING A FILE

When copying a file or loading it into *1-2-3* or *Symphony*, things start out well, but then you get the message 'Data Error Reading Drive a:' (or whatever drive it is). This means that one of the sectors in your file has a read error. It can also occur when files on a disk have become cross-linked.

Running CHKDSK will confirm any cross linking. The *Rescue Plus* software should still be able to automatically recover a *1-2-3* or *Symphony* file with a read error.

5 CROSS-LINKED FILES

When CHKDSK returns a message that files on your disk are cross-linked it means that certain data sectors have been allocated to more than one file. If the files are on a diskette, copy all of these files to another diskette (including the ones created using CHKDSK). Recover any of these files that will not load into *1-2-3* or *Symphony* with *Rescue Plus* or *Norton Utilities* (make sure you rename the files created by CHKDSK as spreadsheet files).

Unfortunately, recovered files are like pieces of a puzzle. But by loading them into *1-2-3* or *Symphony*, you should be able to tell which ones go together. To get back the originals, simply use the Lotus /File Copy Combine option to fit the pieces together. (Refer to your *1-2-3* or *Symphony* manual for precise details of the operation).

6 ACCIDENTAL ERASURE OF A FILE

The first thing you should do after accidentally erasing a file is to stop working on the disk immediately. If you save any new files to the disk involved, your chances of getting back the deleted file diminish drastically. The *Norton Utility* UNERASE facility is highly recommended for recovering an erased file.

7 ACCIDENTAL REPLACEMENT OF A FILE

When you type 'Y' to replace a file when saving in *1-2-3* or *Symphony*, the first thing that happens is the old file is deleted. Next, the new file is saved (usually straight over the old file). If the new file is the same size or bigger than the old file, you're out of luck.

If however, you accidentally saved a smaller file or a blank file, you should be able to get something back. You will find what is left of the old file on disk right after the end of the new file data. Follow the procedure in section three and have a copy of the *Norton Utilities* to hand.

8 UNREADABLE DISK / DATA ERROR WHEN READING THE DRIVE

This usually means track zero has been damaged. Track zero is where the boot sector, root directory, and FAT (File Allocation Table) are located.

Without going into the technicalities, this area is where MS-DOS keeps track of file names and where it connects a file to it's data. There is usually a good chance that the rest of the disk data is intact. There are methods to reformat track zero. But even if you can make the disk readable again, there is no way of knowing how the sectors of disk data were organised into files before.

If you know what kinds of files were saved and what the file data looks like, some disk viewing and experimenting as described in section three might yield some results.

Using the *Norton Utilities* Editor it's possible to view disk sectors until you work out how things go together, an extremely long-winded and difficult task. Then you can use the same program to form files from sector lists. This is just about a do-it-yourself option for a floppy disk, however if your hard disk is affected in this way it's more serious. It's better to leave this kind of heavy duty recovery work to the experts. We suggest you contact Dr Alan Solomon of The IBM PC User Group (0442) 877877.

9 LOST PASSWORD ON A LOTUS FILE OR WINDOW

Rescue Plus has a utility which will recover lost passwords in either *Lotus 1-2-3* or *Symphony*. This problem is fairly uncommon as from time to time disgruntled employees will leave a company after first password-protecting vital files.

The Lotus User Group also has a free public domain utility on its bulletin board system which will recover passwords from *Symphony* 'Windows'. You can dial in to the board at any time on 0753-857453 (1200/2400 baud). There is no charge for the service. ●

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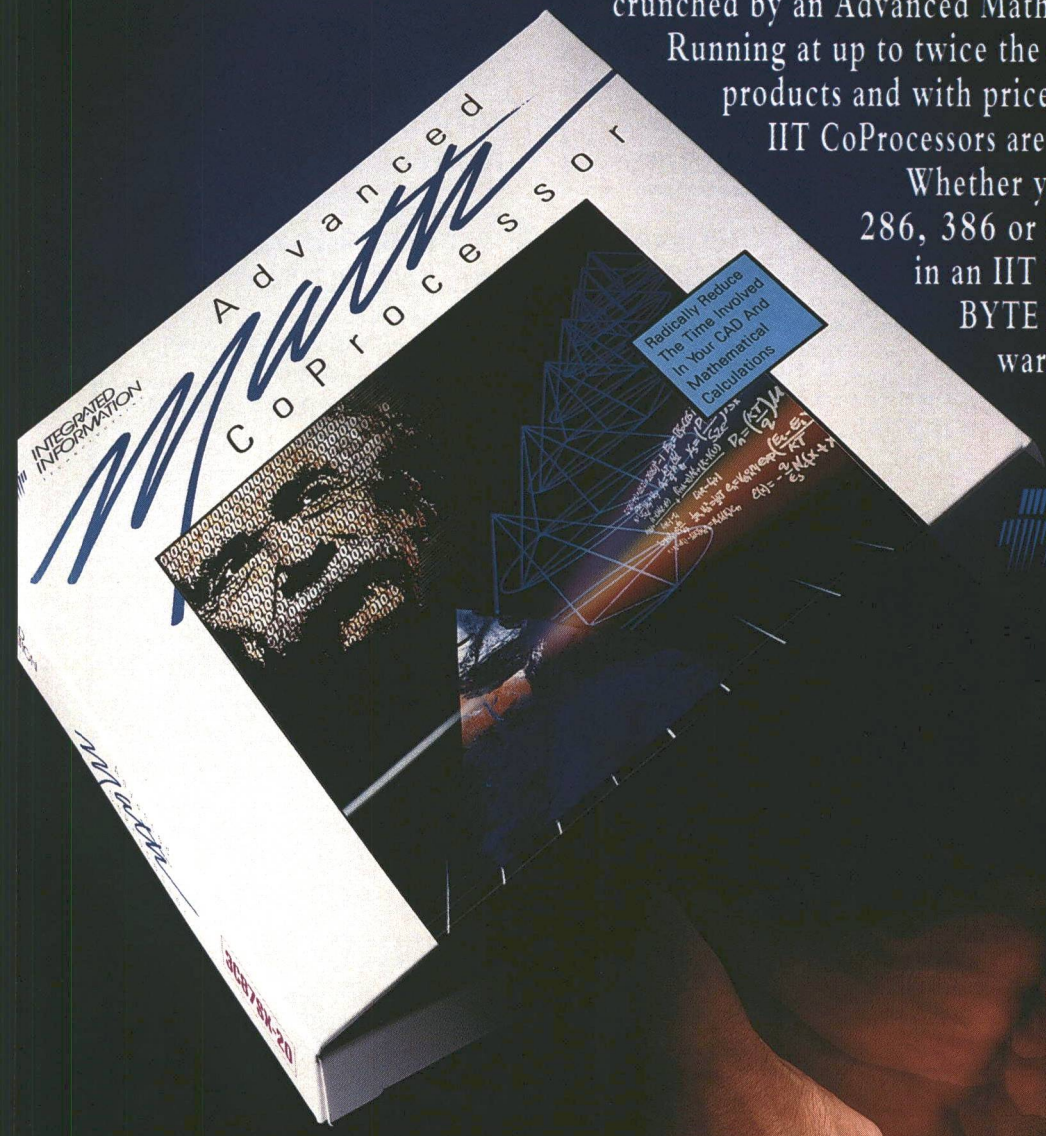

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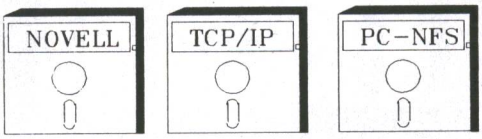

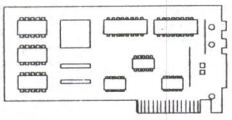

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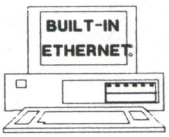

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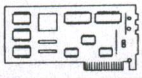

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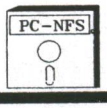

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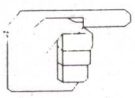

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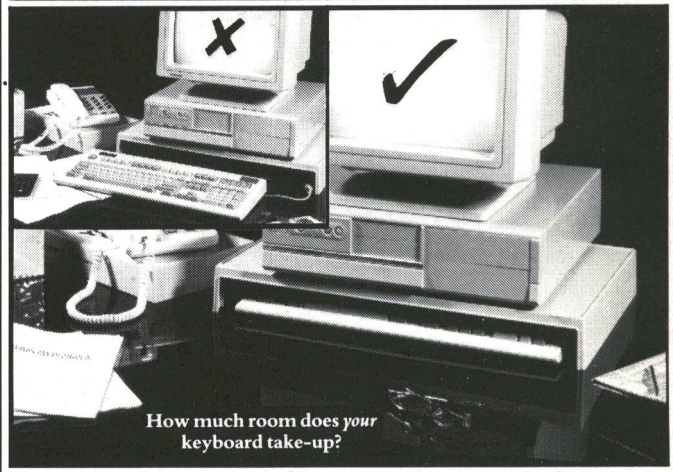

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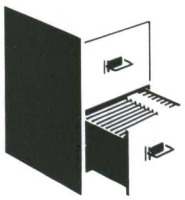



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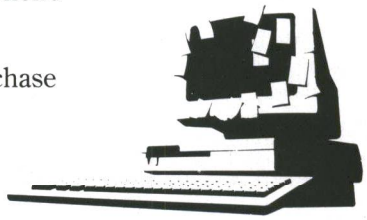

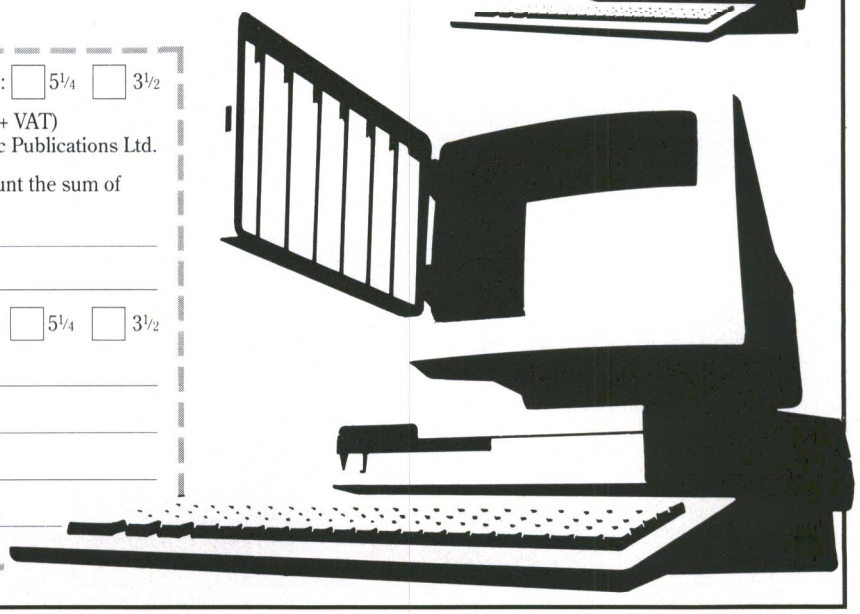

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BEGINNERS' WORKSHOP

In this month's episode of our series for newcomers to the PC, Mike Hardaker looks at alternative ways of copying files using MS-DOS.

This month, we'll be looking at the alternatives to the COPY command. MS-DOS also includes a set of programs which can make certain special copying jobs a lot easier.

DISKCOPY

As its name implies, this utility is used for duplicating entire disks. It is a very simple program which saves most of the time and effort involved in copying the contents of one disk to another using only the simple COPY command.

DISKCOPY's major limitation is that it will only copy one disk onto another disk which has the same format or potentially the same format. In other words, you can DISKCOPY a 360K floppy to another 360K floppy, a 720K to a 720K and so on. You can also copy a Double Density disk onto a High Density disk – but the resulting disk will be formatted to the lower capacity of the original disk.

If you have two floppy disks with the same 'form factor' (which is computer speak for its physical size) and potential formatted capacity, DISKCOPY is simplicity itself. With the MS-DOS DISKCOPY utility in your current directory or path you type

```
DISKCOPY A: B: [Enter]
```

You will then be prompted to insert the 'Source Diskette' (the floppy from which you want to copy) in drive A and the 'Target Diskette' (that to which you want to copy) in drive B. Your PC then gets on with the task of duplicating the disk in your A-drive. If you only have one floppy disk drive, just enter

```
DISKCOPY A: A:
```

and you will be prompted to insert the source and target disks alternately: you may have to insert each disk several times if they're larger than 360K.

In 99 percent of cases, DISKCOPY produces an exact replica of the first disk. This includes any formatting information (so you don't need to FORMAT the target disk first, unless you're using MS-DOS 3.1 or earlier), the directory structure and any hidden files such as the IO.SYS and DOS.SYS files which are part of a 'system' disk.

Some copy-protection mechanisms can fool DISKCOPY, however, so don't think you can make a pirate version of the old *Lotus 1-2-3* key disk with DISKCOPY – the copy will work, but the duplicate key disk won't.

XCOPY

XCOPY is short for eXtended COPY and is a utility which first appeared with MS-DOS 3.20. As its name suggests, it is a beefed-up version of COPY.The beefing-up involves the inclusion of various extra facilities, which are useful in certain special situations. Mostly, however, XCOPY is very similar to good old COPY (the exception is the ability to copy to or from 'reserved devices' – you can't XCOPY CON to create a file, for example, or XCOPY to PRN if you want to print something).

XCOPY is at its most useful when copying multiple files, particularly if they aren't all in the same directory. With COPY, if you want to copy all the files in your \WP directory including those in the \WP\FILES and \WP\LETTERS sub-directories, you have first to create the relevant subdirectories on the target disk or directory and then copy the files over directory by directory.

With XCOPY, it's possible to copy files which are in a subdirectory, without having to go through all this palaver. Returning to the imagined situation of a \WP directory with subdirectories, let's say we want to copy all the files to the A drive. With XCOPY it's simply a question of typing:

```
XCOPY \WP A: /S [Enter]
```

The **/S** switch (a parameter added to a command to alter its function) means 'include the subdirectories'. We could have added other switches too (see *The Switches* on page 272).

BACKUP/RESTORE

Backups are essential. Magnetic media (such as floppy and hard disks) are surprisingly easy to corrupt – and if you don't have a backup copy of your files an accident could be expensive.

Although you can copy all your files to floppy disks using the COPY

```
C:\DOS>diskcopy a: b:

Insert SOURCE diskette in drive A:

Insert TARGET diskette in drive B:

Press any key when ready . . .

Copying 80 tracks
15 Sectors/Track, 2 Side(s)
^C

C:\DOS>
```

● The MS-DOS DISKCOPY routine guides you through the copying process, clearly prompting for source and target disks before proceeding

```
C:\DOS>xcopy \wp a: /s

Reading source file(s)...
\WP\1ST.TXT
\WP\1ST.COM
\WP\LETTERS\2ND.TXT
\WP\LETTERS\3RD.TXT
\WP\FILES\2ND.FIL
\WP\FILES\3RD.FIL
       6 File(s) copied

C:\DOS>
```

● XCOPY makes copying entire directories easy. It even displays each file and its location on screen while it works

command, this can be extremely time-consuming (especially if you have a large hard disk). It is also possible that some files will not fit tidily on to a single floppy disk – graphics files are often bigger than the 360K a typical floppy will hold, for example.

Although XCOPY helps with the complex directory structures involved in a typical (well-arranged) hard disk, it doesn't have anything to cope with very large files.

The solution is the MS-DOS BACKUP utility. Like DISKCOPY and XCOPY this is an external command, so you have to be able to get at it from your current directory or path. BACKUP streams the data from one disk to one or more others, retaining the directory information. Furthermore, since it deals with the data at a very low level, it is happy to spread one file over two or more floppies. This gets over the large file problem, and also makes the most efficient use of your disk – each floppy is crammed full of data to its total potential capacity.

The simplest way to use BACKUP is when you want to create a security copy of an entire hard disk. First get sufficient formatted floppy disks to hold the entire contents of your hard drive (if you have MS-DOS version 4 then BACKUP will format the disks for you 'on the fly' but earlier versions demand pre-formatted disks). Then type:

`BACKUP C:\ A: /S` [Enter]

This backs up files from the root directory of the C drive to the A drive, with the **/S** switch making sure that all the subdirectories are copied over too (just like XCOPY).

You can also back up individual directories and files, which can save you a lot of floppy disks since you only copy the files you really need (and not the program files and MS-DOS files which you already have on the floppies that came with the packages). To backup the \WP directory we were using (together with subdirectories) you would type:

`BACKUP C:\WP A: /S` [Enter]

Like XCOPY, BACKUP has a wide selection of switches which can be used to tailor its operation. The key ones are:

/M – which only backs up those files which have been modified since you last did a backup – another useful space-and time-saver.
/A – which adds extra files to a backup disk created earlier – this is useful if you perform incremental backups every day.
/D:dd-mm-yy – works the same way as the **/D** switch in XCOPY.
/T:hh-mm-ss – is similar to the **/D:** switch, but only backs up files created after a specified time (in the hh-mm-ss format). If you perform incremental backups more than once a day this avoids unnecessary duplication. Users of IBM's PC-DOS should be aware that this option is not supported on that version of the operating system.

BACKUP does not save files in the standard format, so you cannot get files from your backup disk back on to the hard disk by using COPY. Instead, you use RESTORE.

RESTORE is used in much the same way as BACKUP (except in reverse). To restore the files we made with the first, and second simple backups would involve typing

`RESTORE A: C:\ /S` [Enter]. Then,

`RESTORE A: C:\WP /S` [Enter]

Again, there is a range of switches available, the most important being:

/B:dd-mm-yy – which restores files backed up before a specified date.
/A:dd-mm-yy – which restores files backed up after a specified date.
/N – which restores only those files which no longer exist on the target disk.

The key thing to look out for when using BACKUP and RESTORE is that you backup and restore using the same version of MS-DOS. If you BACKUP with 3.2 you won't be able to RESTORE with 3.3, for example. Therefore, if you're upgrading your operating system you will have to boot your PC using your original operating system (from floppy) in order to restore any files you have on backup disks. ●

THE SWITCHES

/E – means to include empty subdirectories too – it only works in conjunction with /S. So if we had a subdirectory called \BACKUPS which contained no files, it would still create the subdirectory.
/P – produces a prompt, a message asking if you want to create each file as its turn comes up.
/V – is used to verify each file after it is written – checking that the target file is the same as the source and that no errors have crept in during the copying process.
/D:dd-mm-yy – only copies those files which have been created (or modified) after a specified date (in dd-mm-yy format). If you haven't got your COUNTRY command specified properly in CONFIG.SYS, the day format may default to the American mm-dd-yy.
/W – Makes XCOPY wait until you have pressed a key before it starts copying – handy if you meant to replace a floppy disk with another. There are also other switches but these are less commonly used.

Most of the time, it's easier to use COPY than XCOPY – COPY is what is known as an MS-DOS internal command, which means it's available whenever you can see the MS-DOS prompt (it is built into COMMAND.COM, which is loaded into RAM when you start the PC and stays there all the time). XCOPY, on the other hand, is a utility program that comes with MS-DOS, a separate program that runs like any other application. It's therefore usually known as an External Command. This means you must have XCOPY in your current directory or path to use it.

```
C:\DOS>backup c:\wp a: /s

Insert backup diskette 01 in drive A:

Warning! Files in the target drive
A:\ root directory will be erased
Strike any key when ready
```

● The importance of backing up your work can never be overstressed. The MS-DOS BACKUP and RESTORE options aim to speed up a tedious task

HELP US TO HELP YOU

Why not take this opportunity to ask all those niggling questions to which you have been unable to find a satisfactory answer.

There's space here for three but if your list is longer, please write them on a separate sheet. Answers will either be incorporated into future articles or answered on this page.

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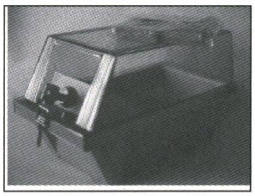

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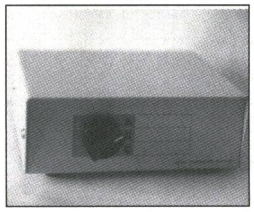

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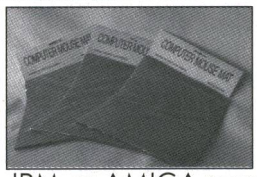

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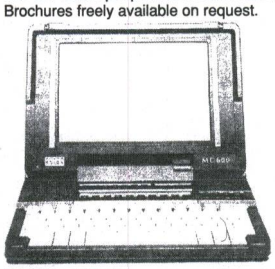

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SIMON'S TOOLBOX

Common major traumas include divorce, bereavement, moving house and reformatting your hard disk, as Simon Williams discovers this month.

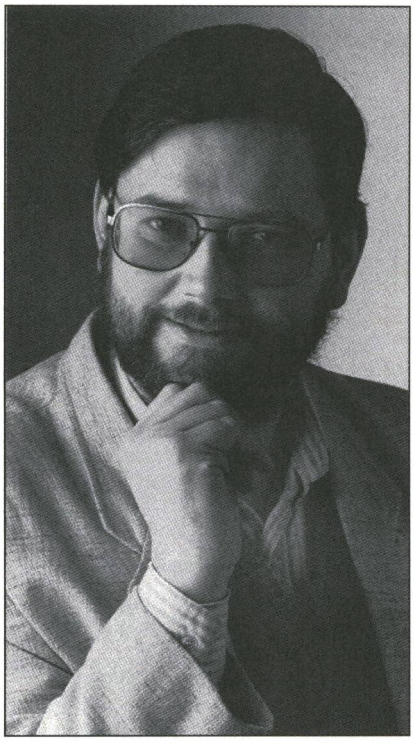
Writing in early January, I have strong memories of the Christmas break. The turkey was good, from the roast, through the sandwiches to the turkey tikka. But most thoughts focus on a long overdue revamp of my PC. I have a 25MHz 386 system. The Machine is in a compact desktop case, but still has room for five devices: three 5.25 slots and two 3.5s. At Christmas I decided to add a small 3.5-inch 20 Mbyte hard drive to the 70 Mbyte 5.25-inch device already in there. In the process I reformatted the 70 Mbyte drive under MS-DOS so that the hard disk could be accessed as one continuous drive. Although this meant losing 10 Mbyte of usable disk space, it should solve any problems with *Windows 3 SmartDrive.*

I struggled for some time trying to install both MS-DOS and DR-DOS on the system, but finally concluded there's no easy way to install two DOSs on a PC (unless anyone knows of a utility that will do it). During the reformat I searched out *SpinRite II*, a handy utility which optimises the interleave of a hard drive, among other activities. Interleave is one of those mysterious hard drive attributes which most people leave to their dealers to set up. What it actually does is determine the number of rotations of the disk platter that take place between reading or writing two consecutive sectors.

With an interleave of one, the sectors are numbered consecutively all around the platter, 1 to 17. The choice of 17 sectors isn't coincidence by the way. Because 17 is a prime number you can number sectors consecutively, or every second sector, or every third, all the way up to every 17. Get the interleave wrong and your disk could take 17 times as long to reach a sector as it should. *SpinRite II* measures the existing interleave and also determines what it could be. What's more, it will swap the sectors on your drive around to achieve the optimum interleave, and without disturbing the data. Although you are only likely to use *SpinRite II* once on each drive, it really is essential if you're to get the best from your drive.

LIGHTNING UP TIME

Once the installation of the new drive was complete, and I'd reinstalled the



backups of all my essential bits and pieces (bar my desktop publishing files which I'd inadvertently lost), I came back to disk cacheing. I could now re-install *SmartDrive*.

However, Dick Slater from DAC Easy had been in touch after my last moan about caches and asked me to try *Lightning 5.5*. This is a cache which can use normal, expanded and extended memory, claims to be over seven times faster than *SmartDrive* on some benchmarks and has no trouble at all cacheing *Windows 3*.

I have to agree with him on most points, although I've done no comparative speed tests. It does work happily in all my various environments and reduces the number of disk accesses under *Windows,* which was my main worry. As a bonus, it comes with a built-in utility called *Disk Watch,* which shows all disk accesses as a single character in the top right-hand corner of the screen, colour coded to indicate read, write or format operations – very handy.

When Steve Patient reviewed *Lightning* (PC PLUS 42), he mentioned that the program trapped the [Ctrl][Alt][Del] sequence so that there would be no disk writes pending when the PC was reset. This is true, but it's the key sequence that is trapped, not the interrupt itself. Using the software reset *ColdBoot* (PC PLUS 41), as I do to switch between environments, still causes problems. Fortunately, you can switch *Lightning* off, forcing any pending writes, before resetting. *Lightning* therefore receives the official PC PLUS Seal of Approval, which

LIGHTNING – GOES LIKE THE CLAPPERS

```
Lightning help page 3          PgUp/PgDn = previous/first page    Esc = exit

Control commands

L U             unloads Lightning
L ?             asks whether Lightning is installed
L S             shows statistics
L Z             clears statistics
L M=n           limits Lightning to read requests of n or fewer sectors
L R=n           sets read-ahead count
L T=0.5         set write delay to ½ second (0 turns write delay off)
L LIGHT OFF     turns the Disk Watch(tm) off
L LIGHT ON      turns the Disk Watch on
L LIGHT 70 ON   sets the color attribute for Read requests
L LOCK          locks all data currently in cache
L UNLOCK        unlocks any locked data
L BACK OFF      stops background writes
L FAST386 OFF   stops using 80386 speedup
L FAST386 ON    uses 80386 speedup
L HELP          displays this message
```

● Some of the many options which make *Lightning* such a flexible cache

means I'll continue to use it only until I can find something better.

BETTER THAN YOUR BIOS

There's a certain place in my heart for utilities which require no input from me, other than loading them. One such is *SpeedScr*, again a *SuperDisk* offering (PC PLUS 35). This is a rewrite of the BIOS video routines which can speed text screen updates by up to 6 times. It appears to agree with just about everything, though it may not give this kind of speed improvement on every machine. It depends on the efficiency of the video routines already in your BIOS.

DECOMISSIONING BLUES

A departure from my normal recommendations, if I may. I don't believe I'm the only PC user who needs to de-install software from time to time. As a reviewer, I'm prepared to admit that I do it more than most, but there are plenty of other people who are employed to test software for companies. There are those who upgrade from one version of a program to another and those who move on from one program to a more suitable rival. All of them need to remove the files created by the old application, but how do they do it?

I know of very few software companies which give any thought to the de-installation of their software. As far as they're concerned it's treacherous to consider removing a product once installed. With the advent of larger and more complex applications, which need to put fingers into the most intimate regions of a PC system there are likely to be files stored anonymously in many sub-directories. With environments like *Windows,* hidden changes are often made to existing files, too.

What is needed is some kind of log of modified files. The kind of utility I have in mind would be a TSR (Terminate and Stay Resident) program, monitoring disk access and logging the names of files run, copied and changed. It would be hot-key controlled so you could turn it on and off before and after installation and should save its log to a named file. The user would then have a chance of removing the right set of files when de-installing that application.

This system still doesn't cope with data files created by applications, but in most cases these are visible to the application that created them and are stored in a known sub-directory. I suspect that some virus monitors may be adapted for this kind of use – I'll be conducting a few experiments over the next few months.

SAY YES TO A.T.M.

It seems we may at last be getting a coherent scaleable font system for the PC with the advent of *Adobe Type Manager.* This font driver rationalises your typefaces and provides properly scaled and smoothed fonts on screen and on your printer. It doesn't have to be a PostScript laser printer either. *ATM* works just as happily – though more slowly – with a 9-pin dot-matrix, as it does with a laser.

The key advantage over other font systems for the PC in general and *Windows 3* in particular, is that *ATM* creates fonts 'on the fly'. This means that when you call up Times Bold Italic in 27 point the font is immediately scaled mathematically from an outline. Nothing new in that – PostScript has been doing it for years. The difference is that *ATM* creates the fonts quickly enough to use them on-screen as well as on the printer. You need never see those really chunky scaled bitmaps on a *Windows 3* screen again.

As a final word in its favour, the manual explains clearly and succinctly how to remove all relevant files from your *Windows 3* system, if you ever need to de-install the package.

ATM is set to become one of two standards for fonts under *Windows 3*, the other being Microsoft's *TruType*. *TruType* looks almost certain to be included in the new release of *Windows,* due in early summer this year, but if Adobe can get enough *ATM* sites working, Microsoft may still consider *ATM for Windows* at some point.

SCREEN PEACE VS ATM

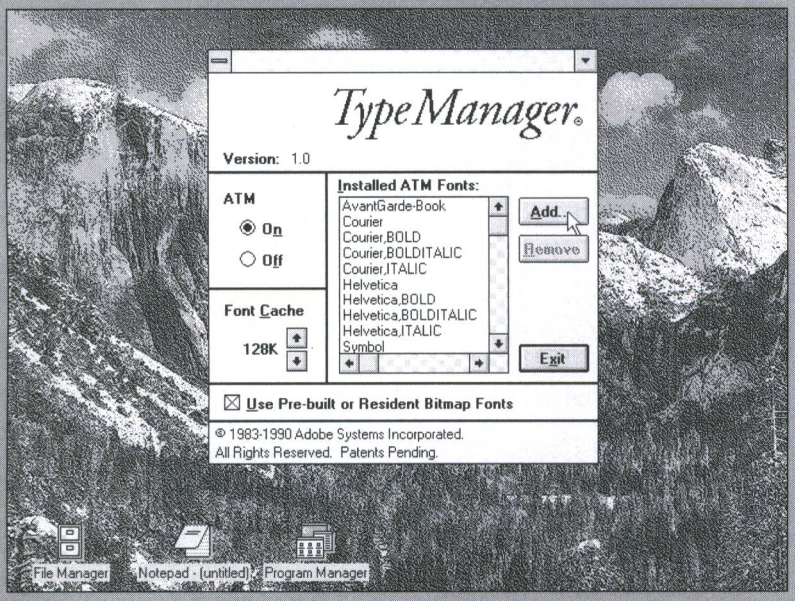
A possible clash has come to light between *ScreenPeace*, mentioned in PC PLUS 53, and *Adobe Type Manager.* One reader had trouble getting *ATM* to recognise extra Type 1 fonts – install more than eight and the first ones start to disappear. Another had filing problems which disappeared when he removed *ScreenPeace.* Its author isn't easily contactable, so we'll have to wait for further reports, but if you have a copy, and *ATM*, bear these problems in mind.

RUBBING IT OUT

I build up an ever-increasing stock of floppy disks with obscure bits of evaluation and pre-release software on them. The squirrel in me shouts 'Don't wipe them, you'll need them one day', but every few months I sift through and reclaim the real no-hopers.

Once selected, I find it worthwhile to scrub the disks electronically with *BulkEras,* the disk eraser which is supplied with *Copy II PC*. This routine cleans all formatting marks and data from a floppy, so that you are, in effect, restarting the disk's life with a clean slate. This is well worth doing if you regularly re-use disks which come from a number of sources. ●

ADOBE TYPE MANAGER – FONT MANAGEMENT



● Even the fonts in the *Adobe Type Manager* control panel seem improved!

PC PLUS PRODUCT INFORMATION

SpinRite II ● £89
Software Paradise .....(0222) 887521

Lightning 5.5 ● £69
DAC Easy 081-780 2400

ColdBoot ● *SuperDisk 41*

SpeedScr ● *SuperDisk 35*

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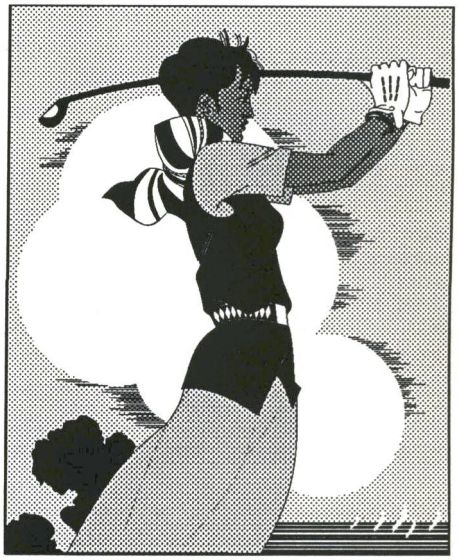

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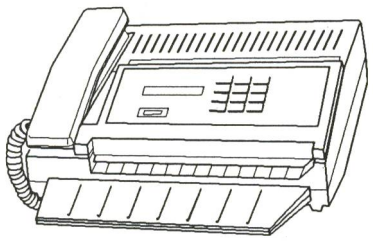

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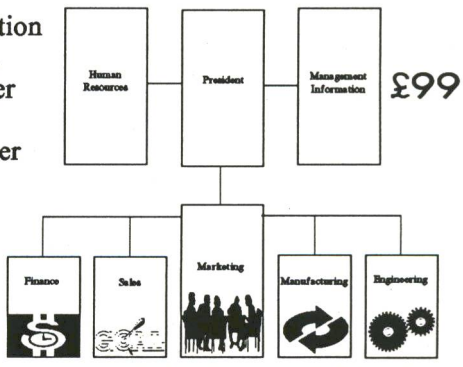

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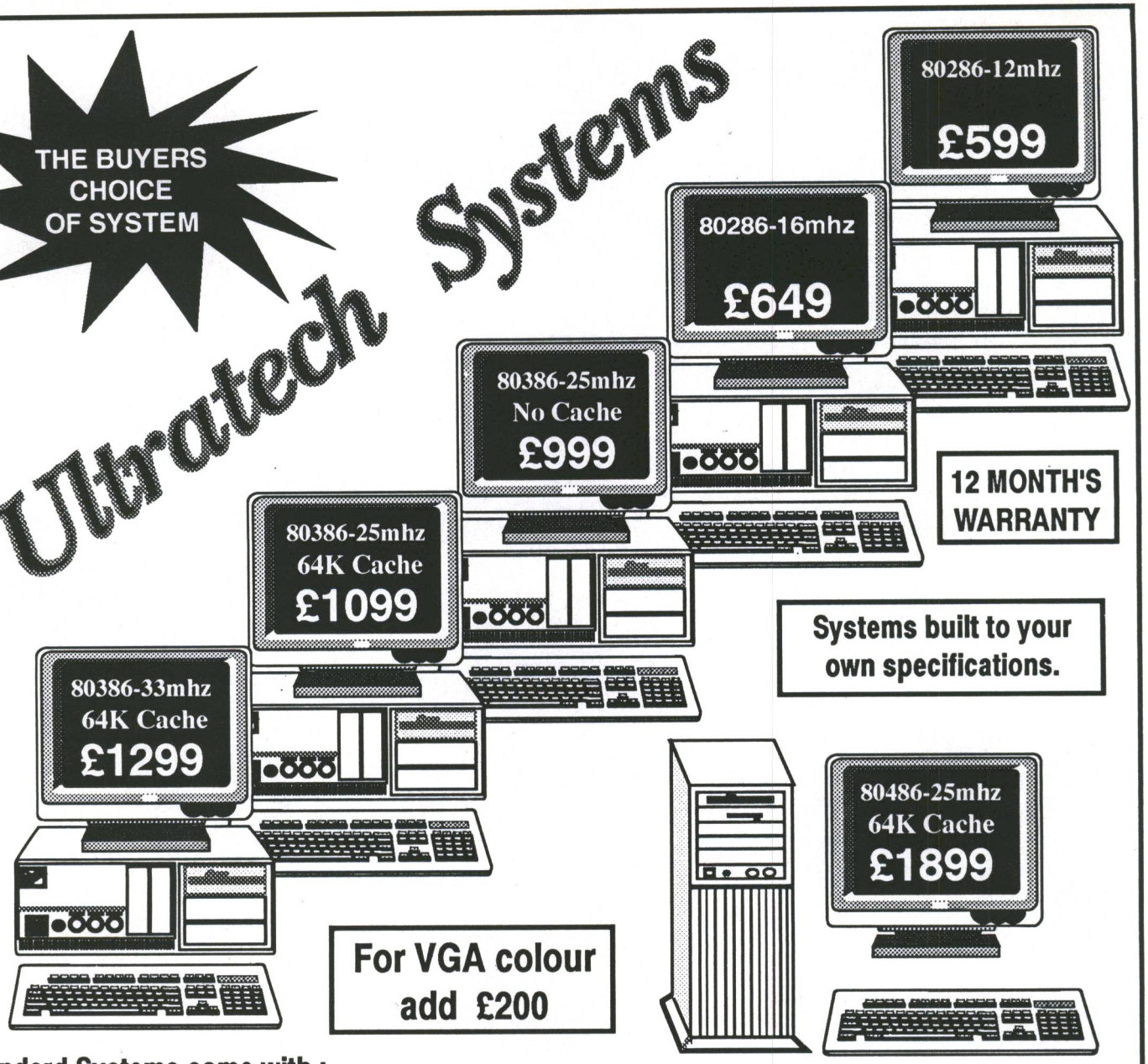

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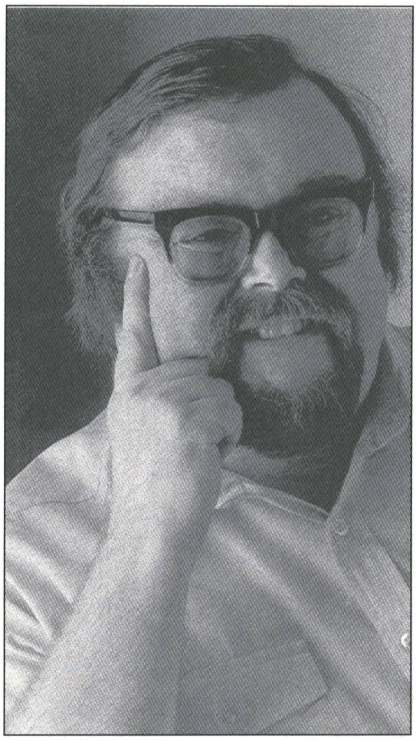
Wilf Hey looks at readers' recursions in different languages, and examines the architecture of a pop-up program.



The typical computer user lives by the maxim, 'if in doubt, press a few keys; if in trouble, ask a colleague; if in deep problems, refer to the instructions'. Well-prepared programs will have their normal behaviour fully described in the documentation; but considerate program designers also provide for the perversities of human behaviour.

Pundits (obviously in sales) have invented the term 'user-friendliness' – a fictional concept that is used to describe the program, function or routine that copes with human actions, whether logical or emotional. I am on a personal crusade to implement more useful computer jargon – the term that applies to the vast majority of programming is user-belligerence.

If you think I am being unfair, consider (but don't experiment with) the MS-DOS command, RECOVER – it defaults to a mode in which it will destroy all the subdirectories of your disk. And this from such a helpful-sounding command.

Sure, I know that much software operates perfectly adequately when run in accordance with the rulebook. But are you not more impressed with the odd program that compensates for the intuitive act of a frustrated user to panic and start pressing keys like F1 and ESC? And doesn't it charm you to find that supplying `/?` as a parameter to a forgettable program reminds you on screen what it is and how it's used ?

STANDING BY

In MS-DOS – as in every operating system I know – there is a cunning plugboard-type arrangement, making it rather easy to intercept execution of machine code at certain points, and redirect control to somewhere else. This technique is used for several purposes:

1. CONFIG.SYS can specify DEVICE drivers (ANSI.SYS is one) that are little programs in themselves, patched into the system at those points where they can access data and be accessed themselves.

2. You may find a program that modifies how a software interrupt works – it will typically cut the link (called a vector) from the interrupt to its usual code, and splice the new section of code between them. *Help Screen* in this issue has a tiny program using this method to make the extra keys (F11, F12 and so on) available.

3. Some programs (usually called TSRs) when executed, set up a routine in memory, and wire it into a software interrupt – for example, the keystroke interrupt. When a keystroke is made, this routine tests if it was its own particular 'hot key': if not, 'normal programming will be resumed', as they say. If that stroke is the hot key, the routine keeps control, and effectively becomes the master program in memory – until it returns control at the interrupt vector.

TSR stands for Terminate and Stay Resident. This refers to the particular way such a program 'finished' after it was executed (probably from a batch file or the command line). A special interrupt is provided to terminate the program, but it warns the powers-that-be not to clear it out of memory. The program is then finished and its code lies dormant but ready at any moment to be awoken by its specified hot key. A TSR program – that is, a program of type 3 – is usually called a pop-up, because it often appears as a little window popping up on the screen over the 'real' application program, disappearing at a keystroke. The *VAT Calculator* on the *SuperDisk* this month is an example of this in action.

Slightly different is *Timebar* – the source of which appears on the *SuperDisk* (in the PC PLUS WORKSHOP directory). This routine is started from the command line, but it does two special things:

1. it starts its own routine – this is the actual countdown

2. it sets itself up to be reactivated periodically before it terminates

Note that to save memory it also

FOREIGN OPERATING SYSTEMS

T J Ross of London writes with his strong recommendation for *4DOS* – which was featured not so long ago on *SuperDisk* – as a replacement (sort of) for COMMAND.COM. He is, I am afraid, preaching to the converted when he speaks to me about this excellent tool. My only beef with it is that it works too well. I have to load up COMMAND.COM, with different CONFIG.SYS and so on, to test out peculiarities that people sometimes report. *4DOS* is available from Shareware Publising (0297 24089) for evaluation, if you didn't get it on *SuperDisk*.

Is there anybody else out there who is willing to sing out the praises of other operating systems – DR DOS, for example?

checks whether it already exists – if so it reactivates the 'old' copy.

A common strategy for a TSR to take is as follows:

1. The program is divided into two parts: the resident portion, and the disposable (transient) portion. When executed from the command line (or from a batch), the disposable part is given control.

2. The disposable part intercepts the required interrupts, and redirects the vectors toward addresses in the resident portion of its code.

3. The disposable part specifies how much of the program has to remain resident (that is, the length of the resident part), and then goes to the TSR interrupt to finish.

There are lots of minor things to consider. For example, the disposable part must not let interrupts get in while it is working its little changes – that would be equivalent to doing a rewiring job with the mains still switched on! (See *Installing A TSR)*

Mike King (Tollerton, York) suggests a couple of projects that could be built as simple TSRs:

1. A program that allows you to highlight a part of the screen – a box, say – that will then be printed.

2. A program that allows you to highlight a part of the screen, save it, and then paste all or part of it onto a later screen.

I would restrict these to text screens if I were you, graphic modes are a little ambitious at this stage. Any takers? The best will be published on the *SuperDisk* and paid for as regular shorties. At this stage, you probably won't have a good idea how to build such a TSR (unless you have more experience).

Next month we will go further into the technical details, and discuss doing it in other languages than Assembler. Think about the differences there would have to be between one of the above TSRs, and the more complicated *Timebar* model you have before you.

RECURSION REOCCURS

There are a lot of programmers and languages out there with opinions about recursion, the main topic in issue 52 – excellent work all round! I provided a problem (quite well-known, by the way) where you halve a number if it is even, or triple and add one if it is odd; the new number is treated the same way, until the value one is reached.

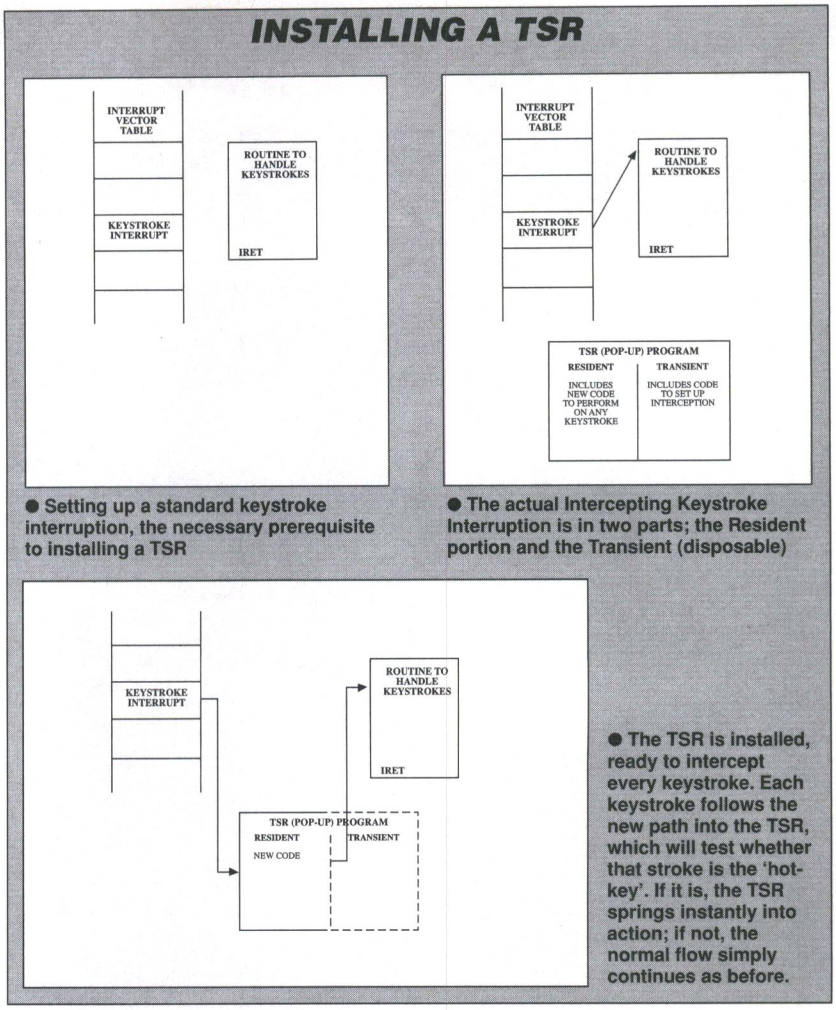
Though nobody commented directly on this, it was probably obvious that as soon as you produce a power of two (1024 for example), the end is in sight. Also note that whenever you go UP (by the triple-plus-one half of the function), the next recourse will go DOWN (since it's bound to be an even number). Though I challenged you only to write the recursive function to do this (in your favourite language), I received several letters and programs from people showing that it could be written iteratively (by repetition instead of recursion). This was pointed out by R Dawson (Redhill) using *GWBasic* (by the way, please call me Wilf – not Mr Hey – I'll think you're addressing my dad). Others who solved the problem without recursion were B Penny (Peterborough) and H Cohen (Leamington Spa), using generic *Basic*.

J P Lehmann (Massy, France) using *Turbo C*, and B Raveendran (West Croydon) using *QuickBasic*, both demonstrated that the Twelve Days of Christmas could be solved both iteratively and recursively. In fact, it is a very limited class of problems that cannot be solved quite easily by iterative methods (using a WHILE loop, typically). A book I can recommend, *Algorithms in C* (R Sedgewick, Addison-Wesley 657 pages, £21.95 hardback) shows how to convert between iterative and recursive formats. D Oliveira (Harston, Cambs) pointed out interesting problems relevant to use of recursion. This technique eats stacks of space, and often operates slowly.

On the other hand, I was taken to task (by Graham Telfer of Bradford) for apparently being overly coy about the various uses of recursion. As he points out, several languages are conceptually based on the phenomenon. He mentions LISP, LOGO and PROLOG – but he could have added HELP, SNOBOL and FORTH to that list – anybody out there know these three oddities? Speaking of which (languages I mean – not oddities), R A Wood of Preston sent me a solution in the aforementioned PROLOG.

SIMPLE BUT IMPRACTICAL

Some found that the simple recursive problem I posed was easily programmed, but impractical with even quite small numbers. The number 27, when fed to the function, causes a recursion 'depth' of 112, quite enough to exhaust the meagre default stack provided by most implementations of C. A Urquhart (Fife) and D Chaffe (Scunthorpe) found that they could accommodate higher numbers using `/F` (to specify a larger stack) with *Microsoft C*. Mr F Landeg found the *QuickBasic* stack size of 10K was sufficient for fairly large numbers. 410011 (which generates 448 calls!) was the largest number that did not blow his stack;



● Setting up a standard keystroke interruption, the necessary prerequisite to installing a TSR

● The actual Intercepting Keystroke Interruption is in two parts; the Resident portion and the Transient (disposable)

● The TSR is installed, ready to intercept every keystroke. Each keystroke follows the new path into the TSR, which will test whether that stroke is the 'hot-key'. If it is, the TSR springs instantly into action; if not, the normal flow simply continues as before.

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113383 was the smallest number that caused problems for him.

A J Davison (Carshalton) found that 'CLEAR,,3000' allows his *GWBasic* to accommodate 245 calls before falling over. 'Madbill' Gunn (Dunfermline) wrote about his experiments using *Zortech C*, which is immune to stack problems. In the numbers to 65535, he reports that the maximum call depth was 340 (for 52527) and the maximum number actually seen (by the triple-plus-one function) is 593,279,152 (which appears for 60975). He traced through the working of his recursive solution, and asked the rueful question, 'How can a one-liner need so much commenting ?'

B Beesley (Eastleigh) insists that his *Turbo Pascal* solution – tested up to 2,147,483,647 – causes a maximum of 588 recursions (namely for 713,829,138). Who am I to argue?

R Bowden-Dan (Greenwich) – a PCW owner with a PC on order – found his *Mallard Basic* crashes out after 118 iterations. He commented on the strong repetition of sequences after printing out the numbers generated by several different starting points (for example, 31, 41, 47, 54 and 55). This was also pointed out by R A Stevenson (using LOGO!), who graphed some of the results with a *GWBasic* program.

H G Trevor (London) found that he got stack overflow for *QuickBasic* when he started with *703*; this program occupied 20K, but his next effort – the same program in *Modula2* – took only 4.5K. S Hutchings (London) independently confirmed this, with his version that works with numbers up to 65535 (that is the maximum word-length integer).

H Glynn (Whitley Bay), who also produced a solution in *Modula2*, commented that it is surprising how many people (and who!) are scared of recursion. Mr Glynn, by the way, feels slightly guilty about using the ODD() function in *Modula2* (which tells whether a number is odd or even), but A Morrison (Glasgow) had no qualms about using the same function in *Turbo Pascal*. J Stewart (Aberdeen) and M Cawley (Deeside) also used *Turbo Pascal* for their solutions. J Bartholomew (Bo'ness) used *Turbo C*, and P Matthews (Alvaston, Derby) submitted a C solution that he claimed was 'simple to understand':

```
wilfs_fn (n )
long n ;
{
itcnt++;
while (n-1) return wilfs_fn
((n&1) ? (3*n+1) : (n/2));
}
```

The nub of the solution from J A Marples (Sheffield) uses a similar construct – this time in DBXL:

```
num =
IIF(MOD(num,2)=0,num/2,num*3+1)
```

C Clegg (Basingstoke) ingeniously added two more routines – recursive, of course – to his C solution. These are times() and divide(), to scale numbers input so that there is no theoretical limit to the size of number that his program is able to accept!

But the solution that intrigued me most was that of Dr N Backhouse (Helsby, Cheshire), a mathematician who enhanced his *GWBasic* version with two interesting features. For any number input, his program will report both the highest number generated on the way to one, and a factor he calls the 'degree of oddness': namely the number of calls divided by the log (base 2) of the original number. (This log will actually be the theoretical 'least' number of calls). So 32 will have an 'oddness' of 1, and 27 an 'oddness' of 23.3444.

For those who care to accept challenges I have a new one, involving this same function – but you'll have to think carefully – or spend hours over a hot computer – to get a solution.

What is the least number that has 25,093 as part of its sequence when fed into the function? ●

Write with questions, suggestions or comments to:

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TURBO C

J Bartholomew of Bo'ness offers the following bit of *Turbo C* code to accomplish a flush of the keyboard queue (January's *Workshop*):

```
while kbhit() getch();
```

Further, he provides a faster way to do this, when your time is critical. This works a different way altogether, actually resetting queue pointers; the operating system then does not even see the keystrokes it put into the queue itself. I would, however, add two warnings here. Firstly, this makes the code non-portable. Secondly it also will not work at all with certain programs (and TSRs) that monkey around with the keyboard queue. The trouble is, you see, there is absolutely no guarantee that the queue is at the addresses noted, although under normal circumstances it is there.

```
void clrkeybuf(void)
{
int far *bufhead, far *buftail;

bufhead=MK_FP(0x0000,0x041A);
buftail=MK_FP()x000,0X041C);
*buftail = *bufhead;
}
```

CHALLENGE

Another little challenge. If you express any square (4, 25 or 121 for example) as a binary number, you always seem to find ZERO as the 'b1' bit (second from the right – 'b0' being the rightmost):

decimal binary
4 0000 0100
25 0001 1001
121 0111 1001

Is this always true? Can you demonstrate why it is true, or provide a square for which it is false? Send your answers in to me. A small prize will be donated to the first five correct replies received.

WE HAVE SOME WINNERS!

To date I have received only two correct identifications of TAMAM SHUD, though I expect more when last issue is published (still future to me!) and you get my extra clue. The contest is closed as of 1st February (before you read this) so I shall tell you the answer: TAMAM SHUD (Arabic for Good Luck) are the closing words of the Rubaiyat of Omar Khayyam. 891.551 is its library accession number – indeed a literary clue. Only two correct answers (so far) – Terry Ward of Cheadle, and B.Mason of Ross-on-Wye. Does this mean that programmers are on the whole an unromantic lot? Maybe we should take a poll of computer widows. I shall announce winners and prizes next time.

A PERSONAL RECOMMENDATION

Graham Telfer, who wrote to me recently, would join in my endorsement of a very special book – essentially a playful exploration of maths, art, music and biogenetics starring paradox and recursion – *Godel, Escher, Bach: an Eternal Golden Braid* (D Hofstadter, Penguin books 777 pages £12.95 paperback). This book won its author a well-deserved Pulitzer prize and is a must for every mathematician, philosopher, music-lover and reader of Lewis Carroll.

Graham also recommends *Turtle Geometry* (Abelson and diSessa), about LOGO. I have no further details of this book yet, but if it can be mentioned in the same breath as G.E.B. it must be pretty good!

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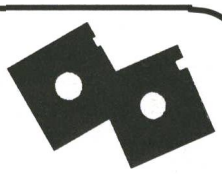

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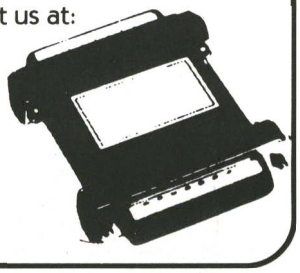

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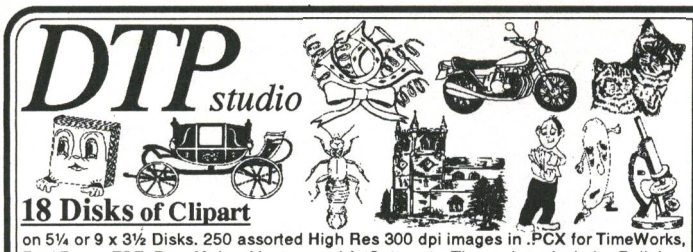

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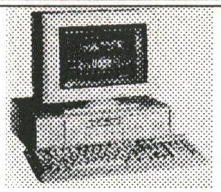

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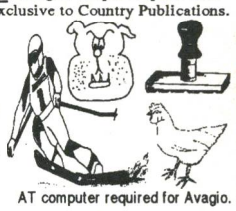

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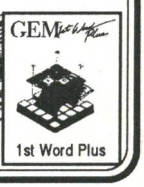

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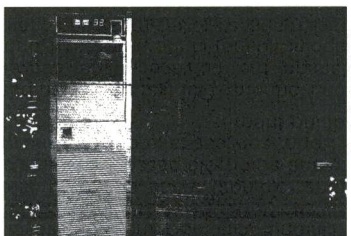

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TONE DIALLING

Tony Dennis explains why Fidonet can be a bit of a dog, offers a few hints on CIX and tells you when not to take up an offer of a free modem.

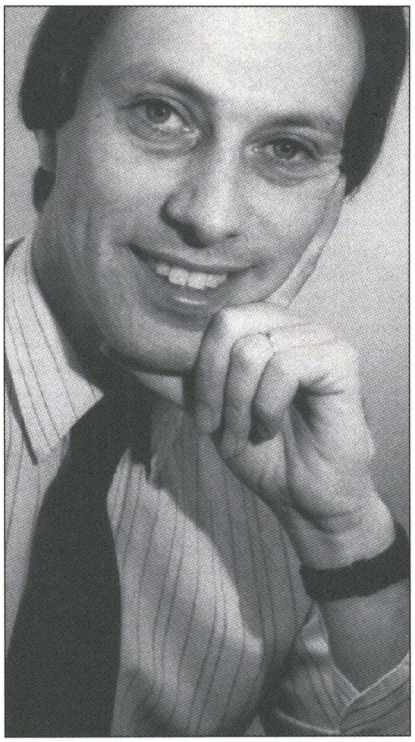
I received a letter from Dylan Smith in response to my previous scribblings. He claims the reason why many UK bulletin boards are going over to Remote Access software (as I mentioned previously) is because it costs a measly £25 to register. The program is actually shareware, written by Continental Software, an Australian outfit. Anyone interested can download a copy from Dylan's board, Int, which is on (0491) 875104.

Dylan also complained I haven't been mentioning Fidonet enough, although I have been rattling on about the rival system, Interlink. Well, here I am putting the record straight. Fidonet enables callers to one particular bulletin board to pass a message on to someone accessing another board anywhere else in the world. In fact, there are Fidonet boards all over the UK, Europe and the USA. What happens, is that late at night a Fidonet system with a message for a foreign board calls up that country's central system. This board then phones its counterpart in foreign countries and, hey presto, your message gets passed along the chain.

HERE FIDO! HERE BOY!

Interestingly, a variety of different bulletin board programs can participate in Fidonet – including TBBS, QBBS and Remote Access. One of the problems with publicising Fidonet is that the person in charge keeps on changing. Anyway the UK co-ordinator for Fidonet is currently David Rance who runs ICHTHUS (Reading) on (0734) 461466. Why not give it a try?

Did you know that CIX started out life as a Fidonet board, although it now uses Unix-based conferencing software from Canada? Actually CIX is going from strength to strength, so much so that it is often difficult to get on to the system. Therefore I thought it apt to print all of CIX's data numbers to increase your chances of getting on first try. The main numbers are: – 081-390 1244 and 081-390 5252 which provide 40 lines. However, 081-390 9800 is the latest addition to the list with a Dataflex Hexacom modem on the other end. Additionally, 081-390 1255 is good for those with Courier HST modems; and 081-390 9787 is good for owners of Hayes Ultras. All of these last numbers



offer high speeds (9600 bps and above).

CIX gives callers the chance to participate in an electronic discussion. The system is divided up into areas of interest which you can 'join'. Somebody kicks off with an initial comment – everybody reads it and a few then add their own comments.

Now for a couple of little tips on getting the best out of CIX. If you want to skip the welcoming screen every time you log on, type 'qix' rather than 'cix'. And secondly, when the system asks you the question 'More?', simply type [Q] rather than [N] for No.

CHEAP AND NASTY

After a great deal of correspondence with one reader on Prestel I decided that some cheap modems are well worth avoiding. He had an early example which supported the split 1200/75 baud (V23 standard) normally associated with viewdata systems like Prestel.

Unfortunately, IBM PCs don't support split baud rates – so the modem needs to have a buffer. Cheap modems like his don't have data buffers. Luckily some comms packages, notably Messiter's *Trans-Send,* get around the split baud rate in software.

But this reader still wasn't happy, because after getting on Prestel he wanted to access bulletin boards. And the vast majority of boards don't support V23. But you don't need V23 any more for Prestel, because it supports V22 which offers a normal 1200/1200 baud rate. And V22 modems (which are good for bulletin boards) are rapidly dropping in price. Basically, a V23 modem without a data buffer is a waste of space.

Having only just changed London over from 01 to 071 and 081, BT has now realised that it could still be running out of numbers to hand out to new customers. So it is proposing to add another digit (1) after the zero in everybody's telephone number. Thus, the Edinburgh number would become 0131, instead of 031. Don't order any more headed stationery.

But why should BT need to make such a change? Well, looming on the horizon in 1992 is something called the personal communications network (PCNs). This has nothing whatsoever to do with PCs – it is cellular telephones for the masses. Four big consortia are currently hard at work building nationwide PCNs. The technology is very similar to the existing mobile telephone systems – Vodafone and Cellnet. However with PCNs the size of each cell will be very much smaller. And just like the Royal Mail which has a postbox at the end of your road, the PCN operators will have transmitter/receivers installed on most street corners. Thus the cells can be tiny.

The PCNs are going to be all digital, so sending data over the network at 9600 bps will be quite feasible. Unfortunately, standard modems don't work too well over cellular telephone systems. The problem is that standard modems use a 'carrier tone' to signal their presence to each other. If that tone disappears for a brief moment, both modems drop the line. On systems like Cellnet and Vodafone this can happen quite easily, which is why you can't just plug an ordinary modem into a cellular handset. The same problem will probably apply to the new PCNs, but for the moment we'll just have to wait and see. ●

Please send your snippets to me c/o of PC PLUS editorial or on Telecom Gold (76:MTR007); or Prestel (919993843) or to Tonyd on CIX.

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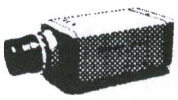

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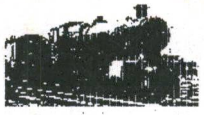

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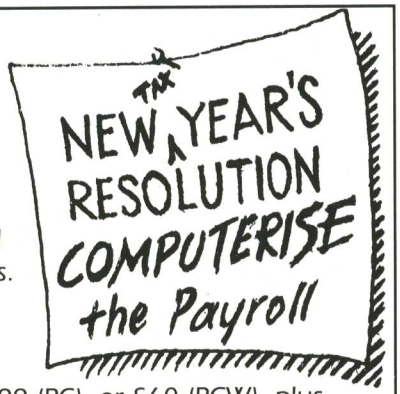

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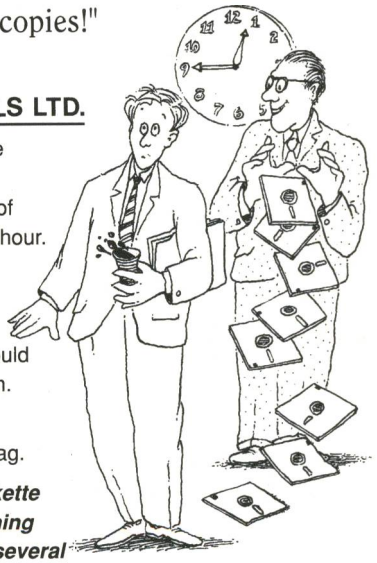

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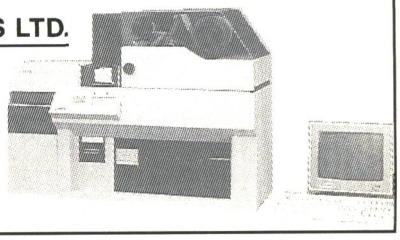

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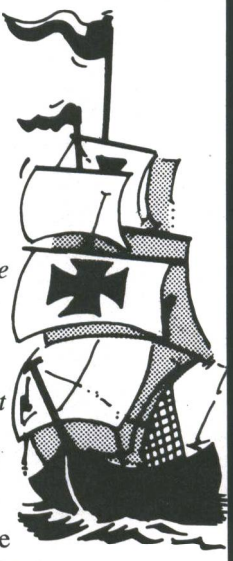

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And now, on with the show; first the caveats. Although we can't offer these free tips on a personal basis we will try to acknowledge letters that arrive with an SAE. We also can't accept phone calls.

We want your input. If you're a newcomer to the world of PCs then you may need a helping hand over the rough parts – feel free to ask. All questions welcome, the answers are usually relevant to many others.

The experts among you can use these pages to pass on a little learning. Perhaps even to show off a little. See your name in print and gain some fame all in exchange for a few lines of hard won wisdom. There are going to be tricks you've learned to use that make your life easier. Let others know the problems and the solutions – they're often solutions to other problems as well.

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This symbol indicates a query or a tip from someone just starting out with the PC. Either someone for whom all computing is new or perhaps a reader moving up from a different machine. Either way it should be self explanatory.


This is the hackers' haunt. Nothing is too technical for this section. Some may find it more baffling than enlightening but it offers something to get your teeth into.


Just because you use your PC every day doesn't mean you're not ocassionally going to be baffled. This is the heading for tips on batch files, pop-ups and utilities.


Danger area! Some of these tips can lead to tears before bedtime. Handle them with extreme caution and remember, PC PLUS can't be held responsible for any data loss or other damage – you have been warned!


This indicates a letter concerning the *SuperDisk*. Advice on using the programs and new twists to old favourites. Special *Help Screen* listings are now also featured on the disk.

DAISY DO



Amstrad has informed me that it does not make a daisywheel printer suitable for use with the PC1512. I want one in order to produce genuine letter-quality printing. Can you tell me if there is a daisywheel printer sold by another manufacturer that I could use with my PC1512?
Anthony Neville
Chatham

Any daisywheel printer designed for use with a PC will work with the PC1512. A variety are available from most computer retailers or via mail order.

These printers seem to be going out of fashion. They lack speed, have reliability problems and are very noisy. They have no graphics capability and changing typefaces is rather a fussy process.

On the bright side, they produce nice letters and cope with multipart forms. The legal profession uses daisywheel printout for legal documents, though most others who need good print quality have gone over to laser printers or ink-jet printers. Inkjets cost about the same, they're more flexible and the printout is nearly as good, though they won't produce multi-part forms. We are reviewing ink-jet printers next month.

Juki and Brother still make daisywheel printers, but they're expensive – over £300. Most word processors support Juki, Brother or the Diablo 630, the last of which is something of a standard, though no longer made. Also occasionally supported are Reed typewriters with a serial or parallel interface. Avoid second hand serial daisywheel printers unless they come with a cable and the original manual – they are often very hard to set up otherwise.

POUND FOR POUND



I use an Amstrad PC1640 with an Epson FX86 printer. My computer will not print the pound sign to the screen. Also, the ['] and [@] symbols are transposed. How can I get these symbols to display correctly?
M E MacSorley
West Worthing

To get the pound sign to display on the screen (and the appropriate national date and time format) requires that COUNTRY.SYS is run with the correct parameter – this is the international dialling code for that country. For the UK this would be like so:

```
COUNTRY=044
```

This line should be in your CONFIG.SYS file and the program COUNTRY.SYS should be in the root directory. More information is usually included with MS-DOS versions from 3.3, like so:

```
COUNTRY=044,437,C:\DOS\COUNTRY.SYS
```

This tells MS-DOS to run COUNTRY.SYS using code page 437 (for the UK) and to find the COUNTRY.SYS program in the sub-directory C:\DOS.

The problem with the transposed keys is different. You have a UK keyboard but MS-DOS thinks it's a US keyboard. This is due to the lack of a keyboard driver. The program used to tell MS-DOS which keyboard you are using is KEYB (in MS-DOS versions 3.3 and above). It takes a two letter parameter, like so:

```
KEYB UK,437,C:DOS\KEYBOARD.SYS
```

This line should appear in your AUTOEXEC.BAT file. The code page number and path are optional.

You can switch to the default US layout by pressing [Ctrl][Alt][F1] and back again to the currently defined layout by pressing [Ctrl][Alt][F2]. I'm not sure why you'd want to do this to yourself but it's a sure way to wind up colleagues.

TRAVELLING MAN



If you do a lot of travelling, but can't afford a portable, a useful thing to carry is a boot disk (5.25 and 3.5-inch) with a minimum working environment on it. I have *PC-Write* on mine and simply borrow a PC wherever I happen to be – there's usually one around.
Chris O'Neill
London

IT'S MAGIC



Looking at a recent *SuperDisk* with *PCTools* I noticed that unused sectors had PC PLUS written all over them. How can this be?

Wilf Hey, the *SuperDisk* editor, doesn't trust the ordinary FORMAT program to

288

completely wipe a disk. So, to ensure that the PC PLUS master *SuperDisk* is nice to know he uses his own format program. This writes PC PLUS to every sector rather than the more familiar (but boring) endless strings of F6H. He also has an alternative wheel in prototype development.

MORE TREES

Using the File Find batch file in the *Help Screen Collection* book I discovered a way to show a tree of the current disk drive using a batch file.

```
ECHO OFF
ECHO.
ECHO TREE.BAT - SHOW ALL
ECHO DIRECTORIES ON DISK
ECHO.
ECHO READING DISK PLEASE WAIT
CHKDSK /V| FIND "Directory"| MORE
```

This batch file needs to be able to find CHKDSK, FIND and MORE.
Miles Parfitt

It's surprising just how much information *CHKDSK* generates in verbose mode – and it's surprising how many different uses people make of the information.

Out of interest see *AND AGAIN* on page 298 for a different approach.

FAT FEATURE

I have an ITT PC and use the Norton *Speed Disk* which optimises the hard disk. Recently it refused to work due to an error reading 'FAT 1'. I was going to correct it using *Norton Utilities* by comparing it to FAT 2. Is there an easier way to correct it and is correcting it manually advisable?
Rahul Fernandez

There is no way to correct a damaged FAT (File Allocation Table) except manually. Two copies of the FAT are held, one following straight on from the other, after the reserved sectors near the beginning of the disk. All the information required to find it is in the BIOS Parameter Block (BPB) in the Boot Sector, which is sector 0 on any disk. The BPB is at offset 0BH.

The number of Reserved sectors is held at offset 0EH of the BPB. The total size of the two FATs – in bytes – is held at offset 16H. The usual technique is to copy a good sector from the undamaged FAT over the corresponding sector of the damaged one. A program like *Norton Utilities* or *PC Tools* makes this easy, but for brave souls DEBUG will suffice (practise on an unwanted floppy disk first).

Although MS-DOS will automatically use the second copy of the FAT if the first is damaged it has no way of repairing the original version. On floppy disks it makes sense to simply copy all the files to a new disk and reformat the old disk if the FAT is damaged. On a hard disk do a back up (just in case) before repairing the FAT.

DON'T HANG UP

My new Quattro SB2422 modem (attached to an IBM PS/2 model 80) is not working. I am using the *Windows 3* TERMINAL utility but cannot log on to any bulletin board, I just receive an aborted message, as per the screen dump below.

```
ATQ0V1E1S0=0
OK
ATDT9,,081,390,1255
CONNECT 1200

(HST) Type 'cix' to login:
```

(Aborted!)

Any help would be appreciated
G. Searley
Leicester

Dowty technical support was rather bemused by this one. However, the gist of a rather weird conversation is that Dowty thinks your modem thinks it isn't connected – even though it is.

In the above example you're dialling OK, the modem at the other end picks you up and you get the CIX sign on message. It all goes wrong when you try to communicate with the other system. Dowty technical thinks your modem is not initialising correctly and doesn't believe it can actually send anything (all right, I know that's anthropomorphising). When you try to send anything it just gives up. Dowty suggest changing the first line to read:

```
ATQ0V1E1S0=0&C1
```

If that doesn't work it's down to calling Dowty on (0635) 33009 for a debugging session. I found the folk at Dowty technical support very helpful but they do have a tendency to answer in strings of TLAs (three letter acronyms).

FOREVER MORE

Before transferring a spreadsheet from *VP Planner* to *Lotus 1-2-3* make sure it contains no date or time stamp formulae (@NOW). In my experience these result in a repeating formula in *1-2-3* which fills memory and stops the load taking place. Wipe out the @NOW in the *VP-Planner* sheet and re-instate it after the transfer.
David Walton
Crowland
Lincs

Has anyone else noticed any similar incompatibility problems?

CLEAR WINDOWS

On the subject of *Windows*, could you recommend a language that allows you to write applications that would run under *Windows 3*? At the moment I use *QuickBASIC*, but I have a working knowledge of C and would, if absolutely necessary, take the plunge.
P S Buttar
Hong Kong

You'll probably have to take the plunge. By design *Windows* is accessed via C function calls. Microsoft develop programs in C and/or Assembler. Programming directly

TEXTSHEETS

I find it handy to be able to load a file of current directory information into *SuperCalc* 5. In the batch file I use to load *SuperCalc5* I include the line:

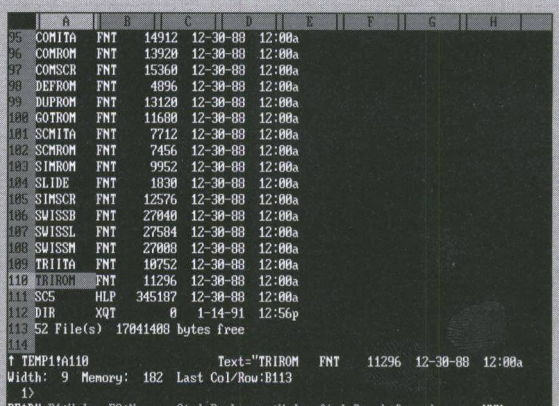
```
DIR *.CAL > DIR.XQT
```

When *SuperCalc* is subsequently loaded I read in the resulting file with the command:

```
/X,DIR
```

By filtering the directory information in various ways before it hits the file this technique is easily adapted to various needs.
Robin Levett
Haslington
Cheshire

Interesting this, but odd. What you're doing is redirecting the screen output (the listing) to a file and giving the file an *SC5* macro filetype. Then you try to run it. What's odd is that a directory listing retains its formatting when it's imported in this way – none of the other ASCII files I tried the trick on did so, they were all horribly mangled. I spoke to the product manager at Computer Associates, who handle *SC5*, and he is now somewhat bemused. However, he did point out that a better way to import a text file is with the Import Text option. This will pull in any ASCII text file and retain the original layout – much the best way to add a large amount of text to a spreadsheet.



	A	B	C	D	E	F	G	H
95	COMITA	FNT	14912	12-30-88	12:00a			
96	COMROM	FNT	13920	12-30-88	12:00a			
97	COMSCR	FNT	15360	12-30-88	12:00a			
98	DEFROM	FNT	4896	12-30-88	12:00a			
99	DUPROM	FNT	13120	12-30-88	12:00a			
100	GOTROM	FNT	11680	12-30-88	12:00a			
101	SCMITA	FNT	7712	12-30-88	12:00a			
102	SCMROM	FNT	7456	12-30-88	12:00a			
103	SIMROM	FNT	9952	12-30-88	12:00a			
104	SLIDE	FNT	1830	12-30-88	12:00a			
105	SIMSCR	FNT	12576	12-30-88	12:00a			
106	SWISSB	FNT	27040	12-30-88	12:00a			
107	SWISSL	FNT	27584	12-30-88	12:00a			
108	SWISSM	FNT	27008	12-30-88	12:00a			
109	TRIITA	FNT	10752	12-30-88	12:00a			
110	TRIROM	FNT	11296	12-30-88	12:00a			
111	SC5	HLP	345187	12-30-88	12:00a			
112	DIR	XQT	0	1-14-91	12:56p			
113	52 File(s)	17041408 bytes free						
114								

↑ TEMP1!A110 Text="TRIROM FNT 11296 12-30-88 12:00a
Width: 9 Memory: 182 Last Col/Row:B113
1>
READY F1:Help F3:Names Ctrl-Backspace:Undo Ctrl-Break:Cancel NUM

● Load any text into a *SC5* spreadsheet with the /IT option

TOTAL WIPEOUT



If you want to clean formatted disk with a label, subdirectories and files it's often so much fuss that FORMAT is used instead. The RECOVER utility offers a method of cleaning a disk down fast.

```
ECHO OFF
CLS
FOR %%D IN (A: a: B: b:) DO IF %1==%%D GOTO CL
IF NOT %1==%%D GOTO END
:CL
ECHO | RECOVER %1 > NUL
DEL %1FILE*.* > NUL
:END
```

Type in the batch file and call it DELFLOP.BAT. To use it call it up with the name of the drive containing the floppy disk to be cleaned.

```
DELFLOP A:
```

This batch file works only on the A: and B: drives for security.

George Verbeke
Belgium

Neat and to the point this one. However, RECOVER is a dangerous utility. Without a filename as a parameter it proceeds to find as many files as it can and assign them a new filename in the root directory. Once it's used up all the entries in root any further files on the disk are simply lost. If you accidentally let it loose on your hard disk you lose everything after the first 512 files.

This batch file uses that effect to get rid of sub-directories (which are effectively no more than a special kind of file entry) on a floppy disk. Once there are no more files in subdirectories the batch file goes on to delete all the newly created files. It works a treat and in our tests took just a few seconds to completely clear down an old *SuperDisk*.

This short batch file has several nice features. The first is the assignment of a specific command line parameter (the name of the disk drive) to a variable and the conditional jump based on that variable in the line:

```
FOR %%D IN (A: a: B: b:) DO IF %1==%%D GOTO CL
```

The bit before the DO checks for either an upper or lower case version of the floppy drive names and if it's there assigns it to %%D. Then, if %%D has a value equal to the input parameter (the input was a valid floppy drive name) the batch file jumps to the main routine.

The line that invokes RECOVER begins with ECHO I. This has the effect of feeding a carriage return into the RECOVER utility, which asks for one in order to continue. You can use the same trick to feed any required input into a utility, a 'Y' or even a complete phrase. Finally, redirecting the output from the utilities to NUL keeps the screen clean.

DISKMATE



FORM.BAT is a simple batch program which simplifies the job of selecting the right disk format type. In theory this is unnecessary but I have a knack for forgetting the correct parameters. The batch file offers the choice of eight format types or a return to DOS.

As written, it assumes that it is in the root directory, along with FORMALL.COM, and that drive A is 1.2 Mbyte and drive B is 1.44 Mbyte. If any of these conditions aren't true you'll need to edit FORM.BAT. For example, if your second drive is a 720K then make the line:

```
IF ERRORLEVEL=50 GOTO NO2
```

into

```
IF ERRORLEVEL=50 GOTO END
```

FORMALLA.COM is a modified version of the menu program Adding ANSI escape sequences for a coloured menu.

```
ECHO OFF
ECHO This batch file assumes a computer with
ECHO Drive A = 5," High density (1.2 Mb)
ECHO Drive B = 3+" High density (1.44 Mb)
ECHO If these parameters aren't correct, exit from the utility
ECHO and edit FORM.BAT until it is suitable for your machine.
ECHO If you use ANSI.SYS, change the first line after ":START"
ECHO from FORMALL to FORMALLA
:START
FORMALL
IF ERRORLEVEL=57 GOTO END
IF ERRORLEVEL=56 GOTO No8
IF ERRORLEVEL=55 GOTO No7
IF ERRORLEVEL=54 GOTO No6
IF ERRORLEVEL=53 GOTO No5
IF ERRORLEVEL=52 GOTO No4
IF ERRORLEVEL=51 GOTO No3
IF ERRORLEVEL=50 GOTO No2
IF ERRORLEVEL=49 GOTO No1
GOTO END
:NO8
Format A: /S
Goto Start
:NO7
Format B: /S
Goto Start
:NO6
Format A: /4 /S
Goto Start
:NO5
Format B: /T:80 /N:9 /S
Goto Start
:NO4
Format A:
Goto Start
:NO3
Format B:
Goto Start
:NO2
Format A: /4
Goto Start
:NO1
Format B: /T:80 /N:9
Goto Start
:End
```



Marcus L Rowland
London

This is a Really Useful Utility, and easily modified to suit any machine. FORM is written for MS-DOS 3.3 or MS-DOS 4. PC users with MS-DOS 3.2 can't normally format high density 3.5-inch disks so it would make sense to disable that option by making :NO3 and :NO7 simply jump straight to the :END label (or to an explanatory message first).

The FORMALL and FORMALLA programs we've put on the *SuperDisk*, but all they're doing is printing the menu and then picking up a keystroke to return as an ERRORLEVEL. If you want to do this yourself in other batch files this little debug file will do the same job. Printing a menu is easily done using ECHO commands in the batch file.

```
RCX
8
NERRORS.COM
A
MOV AH,8
INT 21
MOV AH,4C
INT 21

W
Q
```

To use this script type it in and save it as an ASCII file called ERRORS.BUG (just text, no formatting codes) and feed it into debug like so:

```
DEBUG < ERRORS.BUG
```

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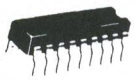

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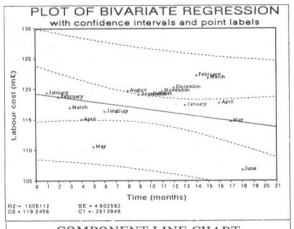

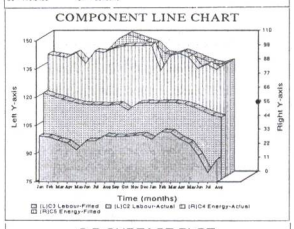

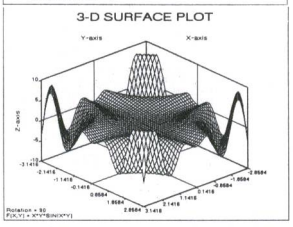

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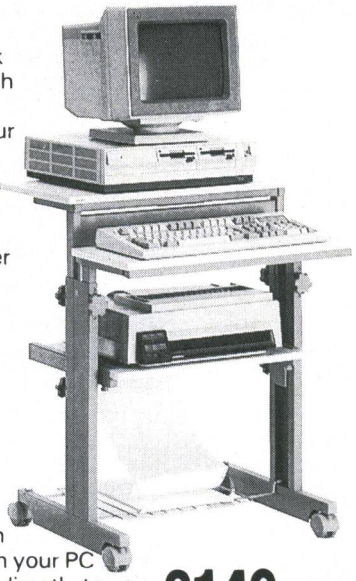

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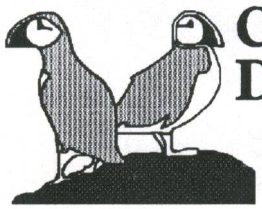

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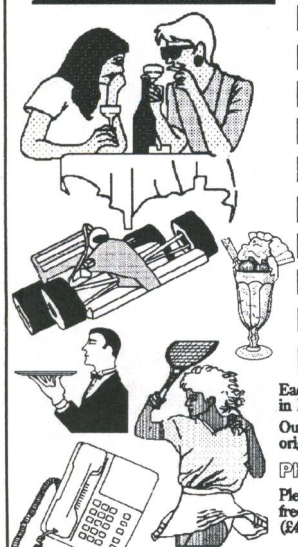

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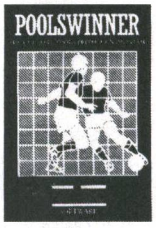

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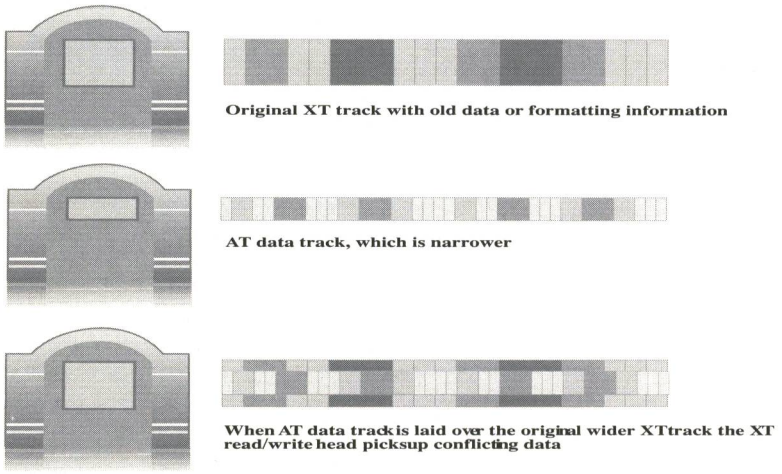
FLOPPY DATA

I'm having problems transferring my *Sage Accounts* data from my AT 1.2 Mbyte floppy disk drive to my XT (360K disk drive). I've tried several backup programs but, though the data verifies all right on the AT, the XT reports data damage when I try to restore the data. This is almost always at track 35. What is the problem and what is the solution?
P Layton
Norfolk

Problems like this are usually caused by differences in track width between the 1.2 Mbyte disk drive and the 360K disk drive. A 1.2 Mbyte drive writes 80 tracks per side to a disk, and these tracks are narrower than the 40 track 360K drives. When the 1.2 Mbyte drive writes to a disk formatted to 360k it still writes narrower tracks. This can result in the 360K drive picking up conflicting information.

Depending on the drives concerned the process occasionally works without problems. To transfer data to the XT it's best to work with disks freshly formatted on the AT and only read on the XT. To transfer data the other way format the disk on the XT and only read it on the AT.

In this case you're nearly getting away with it. Assuming you're working as above the problem is probably due to one or other of the drives getting slightly out of alignment. Try to restore the AT disks to a different XT to determine which drive is giving the trouble.



● Different sized read/write heads on 1.2 Mbyte and 360K drives can cause problems

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for *Windows* is so complex that without the *Windows* Software Development Kit (the SDK), it simply isn't currently a practical proposition. The SDK includes all the technical information on the hundreds of *Windows* function calls, and *Windows*-based utilities that enable program development. Deciding to program *Windows* applications isn't a decision to take lightly.

One way to make life easier is to use an application builder. One such is *Actor* for *Windows* from The Whitewater Group (from Neow – (0628) 668334 – in the UK).

Although you don't have to use the *Microsoft C* compiler it's recommended – and it will make your life easier. The SDK costs around £400. If you really want to continue then contact Microsoft on (0734) 391123 for current information.

Out of interest you would also need a second kit, called the Device Driver Kit, for developing device drivers that will run under *Windows 3*.

DRIVE SELECT

Can you please let me know how I can add an extra floppy drive to my Tandon 6004a. When I tried to add a drive to the existing 360K drive all I could get was an error message – it wouldn't read the disk. I have been told that the cable is a special one and that it only works with Tandon floppy disk drives.

I also have a Western Digital drive controller (WD 1002A F004) and would like to use it to run a 720K and a 1.2 Mbyte drive. Can I use the Tandon cable? How do I make a cable for the external floppy drive socket?
L W High
Chigwell

Tandon assures me that there is nothing odd about its floppy drive ribbon cables and its drives are just the same as everyone else's. The problem you're experiencing is due to both floppies using the same drive select line. Floppy drive cables either have a twisted section or they don't. If they do then both drives are set to drive one. If the cable is untwisted then the second drive must use line two. A jumper on top of the drive near the cable connector attached to one pair of a double row of pins – usually four pairs – decides this. Move it to the next row and try again – some trial and error is necessary.

Your other card (now discontinued, incidentally) supports up to four drives as an option – it depends whether or not it came fully populated with the appropriate chips. You can use the same ribbon cable. The external connector is wired as per the original IBM. You need a 37-way IDC ribbon connector for the socket end and an appropriate 34-way connector for the other end (which type depends on what drive you use).

It will support either a 360K drive or a 720K drive but not a high-density device – the data transfer rate is too low. At the card end the cable must be offset so that line 34 goes to pin 37 – the cable is offset by three pins.

INCOMPATIBLE

I have upgraded from an Amstrad PC1640 to an Amstrad 2386, but disliked the white on black default screen. So I copied the NVR program from the PC1640 to change it to yellow on blue, only to be told, 'This program will only run on an Amstrad PC'. Stupid me.

I do understand that the same effect might be achieved with ANSI.SYS, but I could not get this to work either. Can you help me out?
A J Cope
Bognor Regis

NVR.EXE is used to change the values in the Non Volatile RAM on the Amstrad PC1512 and PC1640. This holds time and date, various items of system information, joystick value translation codes, RAM disk size and startup screen attributes – among other things (in fact I never knew there was so much in it). The NVR itself is an Amstrad special on those two machines – there simply isn't an equivalent to it on the other Amstrad PCs so the NVR program finds nothing to work on.

However, to set the screen attributes using ANSI.SYS first put the line:

```
DEVICE=C:\ANSI.SYS
```

in your CONFIG.SYS file, giving the full path to it if it isn't in the root directory. Next, add the line:

```
PROMPT=$e[1;33;44m
```

to your AUTOEXEC.BAT file. If there is already a PROMPT command just add the bit after the equals sign above to the end of it. That will change the display attributes to yellow on blue.

FONT OF WISDOM

I'm using *Artline* with an Amstrad 2286 PC and a Starscript laser printer. Can you please tell me how to use the 35 resident fonts (those in the laser printer) with *Artline?*
Chris Cowell
Swansea

The short answer is to tell *Artline* to print text using the Resident attribute rather than the default Vector attribute.

Normally, *Artline* sends everything to the printer as graphic information, making no use of the printer's resident fonts. Changing this setup can make printing dramatically faster for documents with a high text content. Use the Options menu to change these settings. You must then use the PostScript printing option, not the Output one, when printing.

However, if you want to use different fonts (for example a Wild West font) you need new display fonts. Adobe is the supplier of genuine PostScript fonts while Bitstream is the main alternative (The Fontware package with *Artline* actually comes from this company).

New Bitstream fonts are available from many mail order companies for around £20 per font – slightly dearer from your local

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computer software retailer. You could also buy genuine Adobe PostScript fonts. Digital Research doesn't deal in fonts itself.

PostScript clones from Bitstream will have slightly different names but their internal identification numbers will be the same as those from Adobe. The font conversion utility is used to generate display font outlines from the font outlines of either supplier, changing them to the internal format *Artline* uses.

SAVE AND PROSPER



While experimenting with various combinations of TSR (Terminate and Stay Resident) programs I came up with a good way to save valuable RAM. A program that stays resident under MS-DOS keeps a complete copy of the current environment. In most cases this is wasted space. Save that space by following these three steps:

1/ Clear out existing variables PATH and COMSPEC by starting with the lines:

```
PATH=
COMSPEC=
```

Be sure to reset them when you've loaded the last TSR.

2/ Load up the TSRs in your AUTOEXEC.BAT file before you set any environment variables.

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FITTING KEYS



It's common to find that the F11 and F12 keys on the extended AT keyboard don't work – especially when such keyboards are used on the XT. The following is a tiny TSR (Terminate and Stay Resident) program that I've been using.

```
RCX
A8
NF11F12.COM
A
POP DS
LES DX,[24]
CS:MOV [183],DX
CS:MOV [185],ES
MOV Wo[24],136
MOV [26],CS
LES DX,[58]
CS:MOV [18D],DX
CS:MOV [18F],ES
MOV Wo[58],187
MOV [5A],CS
MOV DX,1A8
INT 27
PUSH AX
IN AL,60
MOV,AH,D
CMP AL,57
JZ 145
MOV AH,E
CMP AL,58
JNZ 181
PUSH BX
PUSH DS
MOV BX,40
MOV DS,BX
MOV AL,[17]
TEST AL,3
JZ 155
OR AL,2
OR AL,1
SUB AH,2
SHL AL,1
TEST AL,10
JZ 157
MOV AL,FF
MOV BX,[1C]
MOV [BX],AX
ADD BX,2
CMP BX,[82]
JB 175
MOV BX,[80]
CMP BX,[1A]
JZ 17F
MOV [1C],BX
POP DS
POP BX
POP AX
JMP 0:0
CMP AH,2
JB 191
JMP 0:0
PUSHF
CS:CALL FAR [18D]
PUSHF
CMP AL,FF
JNZ 1A4
CMP AH,0
JZ 1A4
XOR AX,80FF
POPF
RETF 2

W
Q
```

All it does is make these two keys return a scan code. Once they do that utilities that detect keypresses (like KEYBECHO) recognise them. They can also be used with ANSI.SYS – I use them to invoke my disk head parking program and my menu program.




```
PROMPT
$e[0,133;"AUTO ";13p
PROMPT $e[0,134;"PARK ";13p
```

Moreover, I have found that *WordPerfect* now recognises these keys as well on my Hyundai XT.

C Van Dijk
Amersfoort
Netherlands

This DEBUG script becomes a little TSR program once assembled. For those who don't feel up to typing it in you'll find the program F11F12.COM in the MAGAZINE sub directory of the *SuperDisk*. It should be loaded like any other TSR and before any menuing programs.

For those interested in how it does the trick it appears that the Interrupt used to process information from the keyboard – Interrupt 16 – has two separate calling methods available. The second method expects to find an enhanced keyboard but MS-DOS itself doesn't make any use of it. The TSR traps the Interrupts and forces the PC to use the second method. This gives you a whole raft of extra keypresses. In the following table (courtesy of our *SuperDisk* editor) the existing scan codes are shown in brackets while the new ones stand alone.

40 NEW KEYSTROKES

On the numeric key pad:

key	normal	shift	CTRL	ALT
+	(43)	(43)	0;144	0;78
–	(45)	(45)	0;142	0;74
*	(42)	(42)	0;150	0;55
/	(47)	(47)	0;149	0;164
.	(0;83)	(46)	0;147	
0	(0;82)	(48)	0;146	
2	(0;80)	(50)	0;145	
5	0;76	(53)	0;143	
8	(0;72)	(56)	0;141	
ENTER	(13)	(13)	(10)	0;166

key	normal	shift	CTRL	ALT
F11	0;133	0;135	0;137	0;139
F12	0;134	0;136	0;138	0;140
Up arrow	(0;72)	(0;56)	0;141	0;152
Down arrow	(0;80)	(0;50)	(0;145)	0;160
Left arrow	(0;75)	(0;52)	(0;115)	0;155
Right arrow	(0;77)	(0;54)	(0;116)	0;157
INS	(0;82)	(0;48)	0;146	0;162
DEL	(0;83)	(0;46)	0;147	0;163
TAB	(9)	(0;15)	0;148	0;165
HOME	(0;71)	(0;55)	(0;119)	0;151
END	(0;79)	(0;49)	(0;117)	0;159
PgUP	(0;73)	(0;57)	(0;132)	0;153
PgDOWN	(0;81)	(0;51)	(0;118)	0;161

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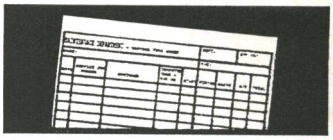

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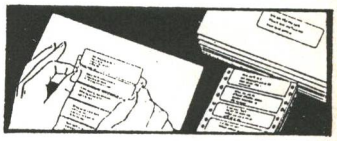

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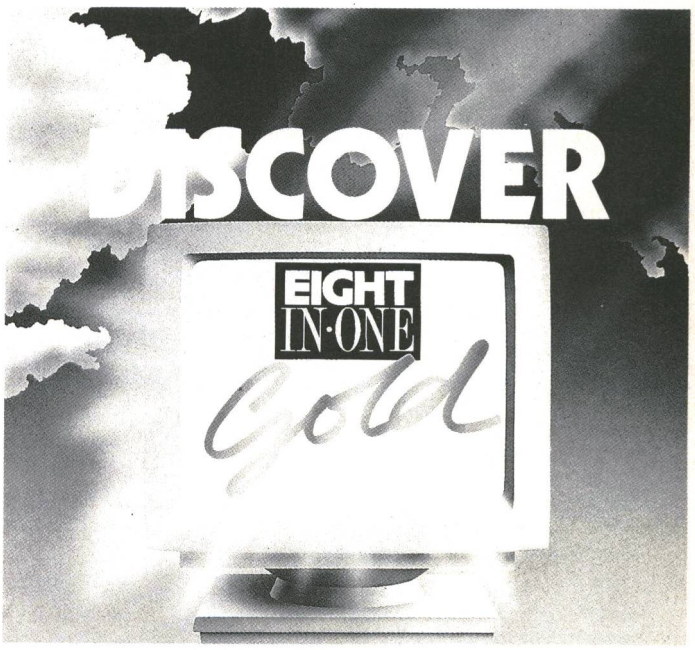

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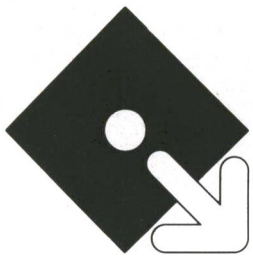

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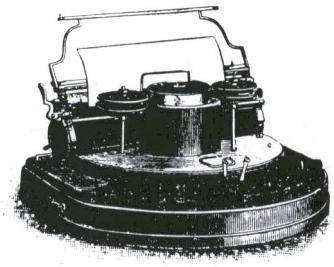

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3/ Keep TSRs in the root directory with a short name, since the path to them is part of the environment.

Beware of mucking about with TSRs, keep a boot disk handy. Keep a copy of your original AUTOEXEC.BAT file too.
Mike Williams
Loughborough

The advice concerning an emergency boot disk is sound, whether you're using a floppy-only system or a hard disk. It's surprising how easy it is to find yourself locked out of a hard disk system. A clean boot disk is useful as a debugging aid when things go wrong with a complex setup. It's also useful when your hard disk fails to boot. Make your disk a minimum installation, so it won't cause problems of its own.

ZIPPETTY DO DA

If you're going to use the PKZIP – u parameter (to update a ZIP file) you need at least as much free disk space as the original file. If you're intending to update after using a zipped program you need enough space for the unzipped files as well.
Richard Cole
Wimbourne

CHAIN GANG

I've never experienced any problems with my original 10 Mbyte 640K IBM XT but I'd like some advice on whether I'm about to have one. I run CHKDSK every couple of months as space gets tight on my hard disk. For the last few months I've been getting the response:

```
ERRORS FOUND F PARAMETER NOT SPECIFIED

CORRECTIONS WILL NOT BE WRITTEN TO DISK

3 LOST CLUSTERS FOUND IN 3 CHAINS

CONVERT LOST CHAINS TO CLUSTERS?
```

This doesn't cause any noticeable errors. Whatever option I take it then goes on to check the disk. Removing programs from the hard disk doesn't change the message. Can I continue to ignore this?
Roy Dowsett
Tunbridge Wells

Yes you can, though it isn't advisable. Disk errors should always be corrected as soon as possible. Lost clusters aren't serious, it simply means that the space is unavailable for file storage (though perhaps that is serious on a 10 Mbyte disk). Run CHKDSK with the /F parameter, like so:

```
CHKDSK /F
```

Now, when it asks if you want to convert the chains to a file answer 'y'. CHKDSK will create files in the root directory called FILE0001.CHK through FILE0003.CHK (one for each lost chain). If they contain nothing, delete them to reclaim the space.

For an interesting and informative report on your hard disk try:

```
CHKDSK /V > REPORT
```

You can load the file REPORT into any text editor or word processor for perusal.

Probably more useful is to use CHKDSK to see how fragmented the files on your hard disk are. To do this providing a file specification, *.* will do. So, the command

```
CHKDSK *.*
```

will report on every file that has non-contiguous sectors – which simply means that it's broken up and spread over different parts of the disk. If a lot of files are fragmented your hard disk will seem slower.

AND AGAIN

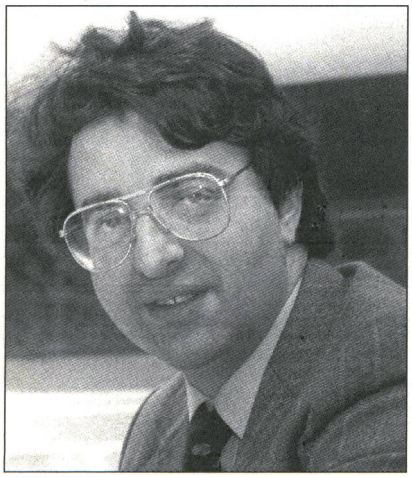
A simple batch file will tell you which files have a problem with cross linked clusters. Call it COPYNUL.BAT.

```
COPY C:\*.* NUL
COPY C:\DOS\*.* NUL
COPY ....
```

and so on for every directory and sub-directory on your hard disk. When you run it every file will be copied to the

WISDOM OF SOLOMON

Dr Alan Solomon spreads a few rumours about MS-DOS 5, explains why he carries three computers and admits just what it is he does in his spare time.



I'm hearing very interesting rumours about MS-DOS 5. Apparently, it will do everything that DR-DOS 5 currently does, and a fair bit besides. It will load into high memory, leaving 625K of main memory to work inside. It will work with the main network operating systems, and with *Windows*, of course. There will be a full screen and command line editor, as well as a number of other utilities that you currently need to get from a third party.

One of the nicest features, I hear, is a delete tracking system, which will make it possible to undelete accidentally deleted files reliably, even if the file were fragmented. The delete tracker will keep tabs on which parts of the disk were used by that file, and only after you have re-used the directory entry or disk space will it be impossible to recover the data.

This should not, of course, be used as a substitute for a good restorable backup, but it certainly will prove very convenient for many people.

MEMORY MATTERS

Memory has become ridiculously cheap. In case you hadn't noticed, the street price is down to about £30 per megabyte, and may even fall further. It now makes sense to buy any machine with at least 2, and probably 4 Mbyte as standard, as the cost of opening up the machine and messing about inside, is probably greater than the marginal cost of the extra memory.

I'm assuming here, of course, that you're already buying 386SX or 386 computers. There's no real excuse for not doing so – I recently bought 386SX machines with 2 Mbyte, floppy, monitor and keyboard for under £600, from Solidisk. A lot of future (and present) software runs very much better on the 386 architecture than on a 286, irrespective of clock rates. *Windows 3* is a prime example of this.

TRAVELLING LIGHT

I seem to be coming down in favour of having three computers with me when I travel. I carry the NEC in my briefcase, for writing. The NEC is a two-kilo non-DOS machine (it cost about £250 four years ago, and you can't buy them any more), with a built-in word processor and comms package. It runs off AA batteries and I get about 20 hours per set, which gives me a running cost of a few pence per hour; also I can carry a spare set of batteries, and you can get AA batteries anywhere. The drawback is that it doesn't have a floppy drive, and only stores some 28K of data. This is enough for a day's writing, but then I need to put it all somewhere. So I carry a notebook PC with a hard and floppy disk, and this usually goes in my luggage. I download the contents of the NEC at night into the PC, and the NEC is ready for the next day's work. I can also use the PC for any heavier jobs that need doing, such as diskette copying, or a quick program.

My DIP pocket PC is partly used as a personal organiser; it has an address book and a diary built in. But I also use it for programming; I keep Debug on it, and I use the assembler/disassembler in that. With the DIP and a couple of pocket sized manuals, I have all I need to do virus analysis anywhere when I have an odd hour or two.

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HELP SCREEN

NUL device until you hit the one with the problem.
Alf Whyte
Ballingcollig
Co. Cork

Well, yes, but I've got 93 directories – today. They keep changing.
However, you can generate a directory listing with the command

```
TREE > TREELIST
```

It didn't take a minute to pull this into *Protext* and write a macro to make it over into the desired form. Hey presto, instant batch file. I expect you can do the same in your favourite word processor.

GOING BACK



Please tell me how to print the backspace character to screen in *GWBASIC*. I used to be able to do

```
PRINT CHR$(8)
```

in BBC basic to move the cursor back but all I get on the PC is one of IBM's extended character set.
Pete Rushton
Fetcham

`PRINT CHR$()` isn't very consistent. Not only doesn't backspace work but `CHR$(13)` produces a carriage return and a line feed.

The command you need is LOCATE, as used in this code fragment:

```
10 PRINT "Using Locate"
20 PRINT "AAAAAA";
30 CUR.POS=POS(0)
40 LOCATE,CUR.POS-1
50 PRINT "B"
```

`POS(0)` picks up the current cursor position and LOCATE uses this value to move it back one.

LOCATE will take five parameters in all. In order these are:
column, row, cursor, start and stop. The first two are self explanatory. Cursor is either 0 or 1 and determines whether the cursor is visible. Start and stop define the number of scan lines used to display the cursor, and hence it's size.

```
LOCATE 1,1,1,0,7
```

puts the cursor in the top left hand corner, it's visible and the full height of a CGA character cell. This works in all Microsoft BASICs.

PLAYING THE BLUES



After spilling coffee into the keyboard of my Tandon AT compatible PC I began getting an error reported when I booted up. This was:
[26:14]
I tried another keyboard but this also produced the same error. What do these mean and what can I do to get my keyboard – or any other keyboard – working properly on my PC?
Stephen Beecham
Leicester

Tandon technical help tells me that these are keyboard error codes returned by the POST (Power On Self Test). The first one simply means that a key is found stuck down when the machine is first turned on (inevitable if you take sugar in your coffee). The second one means that there is a fault in the connection to the keyboard. From what you say both these faults seem to be intermittent.

The best way to clean out the sticky coffee is to run the keyboard under the tap for a while or soak it in clean water – no soap or any other cleaning agent, though. I've done this myself and it won't hurt anything. However it's vitally important to make sure that you don't try to use the keyboard again until it's dried out thoroughly – put it in the airing cupboard for a day or so.

The connection fault with the other keyboard is more difficult. Take the keyboard apart to check the cable continuity with a multi-meter, clean the pins and check the attachments internally in the keyboard. If those are all right then you're left with a damaged keyboard connector on the motherboard (unlikely in this case) or a more exotic fault in the keyboard. Either of these will require expert attention.

HELP SCREEN

The PC PLUS Fact Panel Guide

These days there's no such thing as a 'standard' PC – instead we've got a range of different disk sizes, graphics adaptors and hardware add-ons, such as mice, modems and memory boards. This makes the claim that a piece of software 'Runs on IBM Compatibles' a bit meaningless, so we're introducing a fact panel on all our reviews which shows exactly what hardware you need to run the program, and what optional equipment the program can make use of. The fact panel has four sections, as follows:

1. Display types.

This section shows the type(s) of screen display supported by the program. Remember that your PC's display type is determined by its combination of display adaptor and monitor, so for example a PC1640 will have a Hercules, CGA or EGA display depending on the MD, CD or ECD monitor in use.
The icons are as follows:

[T] 80x25 character text-only – runs on any IBM-compatible PC.
[H] Displays Hercules monochrome graphics on Hercules-compatible machines.
[C] Displays Colour Graphics Adaptor (CGA) quality graphics on CGA, EGA and VGA machines.
[E] Displays Enhanced Graphics Adaptor (EGA) quality text/graphics on EGA and VGA machines.
[V] Displays Video graphics Array (VGA) quality text/graphics on VGA machines only.
[M] Displays Multi-Colour Graphics Array (MCGA) grapics on MCGA machines.
[15] Displays PC1512 16-colour graphics on the PC1512 only.
[Y] Displays Tandy Graphics Adaptor graphics on Tandy compatible machines.
[G] GEM [W] *WIndows*

Windows and GEM are both Graphical User Interfaces, which adjust automatically to make the best use of [H] [C] [E] and [V] displays. Other types may also be supported. You may need to buy Windows or GEM separately.

Programs with just a [T] work on all IBM-compatible PCs, since all types of display adaptor support a standard text-only mode, which includes the 'IBM graphics character set' – the boxes, lines and funny faces used by many programs. Monochrome systems may interpret colour text codes (or 'attributes') as flashing, underline etc.

Other icons refer to 'all points addressable' graphics displays, used in business graphics (e.g. *Lotus*-style spreadsheets), painting and drawing programs, desktop publishers, games and others.

A program may have more than one icon – for example, [H] [C] means that the software works with both Hercules and CGA adaptors.

2. Issue Disks

This tells you what type of floppy disk the software is supplied on.

5.25", 360K floppy, or 1.2Mbyte if marked '1.2'.
3.5", 720K floppy, or 1.4 Mbyte if marked '1.4'. One icon means only available on that disk type (though check with your dealer)
both types supplied as standard
or 5.25 /3.5 choice – see price for details.

3. Minimum Hardware requirements

Items in this section are mandatory – either the program won't run at all without them, or would be unuseable in practice.The icons are:

Single floppy
Twin floppy
Hard disk
80286 processor chip
80386 processor chip
Mouse
Joystick
Matrix printer
Laser printer (Note 1)
Telephone line and modem
Minimum free RAM, after MS-DOS and any resident programs are loaded.
Expanded Memory Specification (EMS) card (see Note 2)
Maths co-processor chip (e.g. 8087 for standard PCs, 80287 for ATs and so forth)

4. Other hardware supported

These Items are not mandatory, but the program can make use of them. The icons are the same as those used in the minimum hardware section.

Notes: 1. Most laser printers will emulate Epson FX series matrix printers, so will work in basic mode with a matrix-only program. A laser driver indicates support for special fonts and high-resolution graphics. Always double check that your particular model of matrix or laser printer is supported.
2. There are various EMS standards around, the most popular being LIM EMS version 4.0. Check that your type is supported by the program.

OUR VALUE VERDICTS

Product fact boxes also contain verdict ratings, in the range 0 - 5, covering four areas of the product – Range of Features, Overall Speed, Ease of use and Documentation – plus an overall Value verdict..

These ratings are made in the context of the program's price and intended position in the market, so a £25 filer which provides good sorting facilities might get a Range of Features rating of 4, while a £600 bells-and-whistles database which couldn't import text data might be marked down to three. The overall value verdict is made on the same basis. It is quite possible for a very expensive product to be excellent value for money because it really does do the job well, while a very cheap product might be poor value because it is too lacking in features to do anything at all.

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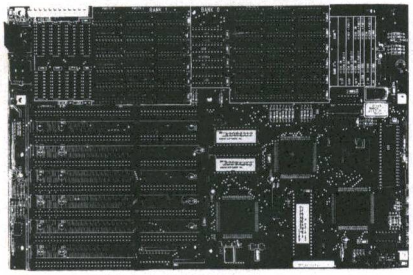

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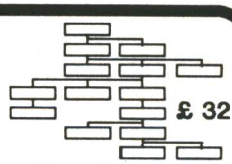

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3. Include your full name, address and daytime telephone number on the disk (as a little file, perhaps!), on its label, on your letter and on any other (non-disk) documentation. Naturally, your address and phone number are kept confidential.

4. The smaller the program, the better; SHORTIES should ideally be up to 6K in length, so would usually have to be written in assembly language.

5. The more original the program, the more likely it will be of interest to PC PLUS readers.

6. Be considerate to users without your particular configuration: if possible make use of CGA as well as VGA/EGA displays; If you must include a mouse make it optional. Remember that different processors go at different rates, so try to tailor for speed in games!

Attractive screens enhance your program considerably; but it is best to make things visible for MDA (monochrome) users: see if you can avoid dependency on colours and on non-text modes. If at all possible, you should consider making any arcade-type sound effects optional.

7. We can correct spelling and syntax in your .DOC, but not within your program! Please check out as much as possible every detail. Sadly, we have to turn down many otherwise good programs because of little faults. Of course, make sure displays and text are not offensive.

8. Your covering letter should contain the following statement – and the letter should be signed:

'The program [insert its name] enclosed is completely my own work, and has not been accepted, nor is under consideration, for publication by any other magazine, book or software publisher.'

You must not send it to any other publisher without first writing to us withdrawing it. If we decide to use your program, we will contract with you for 'first world serial rights' – meaning we get to publish it in PC PLUS first: it will still remain yours to sell or give away as you wish.

If you enclose the appropriate return postage and packaging, We will send your work back to you: if we decide not to keep it for *SuperDisk,* you can be assured that we will not even keep a copy – that is your right alone.

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If your copy of the *SuperDisk* doesn't load, returning the error message 'Not ready error reading drive A', or something similar, return the disk (within the cover date month) along with your name and address to:

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F1 FOR HELP

Some users of monochrome systems have reported various problems – not always the same symptoms – with recent *SuperDisks:*

- **Sometimes the F1 choice (to list the documentation of programs) does not work.**
- ***TOWNQUEST* ('TWNQST') on the January 1991 *SuperDisk* (52) halts with messages like 'illegal function on line xx'.**

Both these problems seem to be solved by loading the *CGA2* emulator before running *SuperDisk*. We suggested this may enhance monochrome screen displays with TWNQST at the time, but it seems with some systems, it is not only desirable – it is necessary! *CGA2* is re-published this month on the current *SuperDisk* in the \PCPLUS\UTILS directory. It will be loaded automatically with the current *SuperDisk*, but you may wish to move it onto your system disk for use with earlier programs.

SINGLE DISKETTE?

If you have a single disk drive on your PC and no hard disk, you will have found that expanding zipped files from the *SuperDisk* is impractical, sometimes requiring forty or more disk swaps; if you press a key too soon at any point, you have to start again!

From now on, when possible, we will offer you a way around this – but it requires you to create a RAMDISK on your system: this makes part of your memory (while power is supplied) work as if it is a little C-drive. On some versions of MS-DOS it is called VDISK (V for 'virtual'): you should find on your system or utilities disk a file called RAMDISK.SYS or VDISK.SYS: you will need this on your boot disk, and a new line in your CONFIG.SYS to tell the system that you wish part of the memory set aside for it. Details differ from system to system, so please consult your MS-DOS manual.

For example, *Microsoft 3.30* users would have a line in CONFIG.SYS which would assign 320K bytes for the virtual disk:

```
DEVICE=A:\VDISK.SYS 320
```

FOR DIRECT ASSISTANCE TELEPHONE

THE *SUPERDISK* HOTLINE

(0297) 24566

(2pm to 5pm each week day)

For further assistance or to make submissions to the *SuperDisk*, please write to:
***SuperDisk* Editor, PC PLUS, Beauford Court, 30 Monmouth Street, BATH, BA1 2BW**

SUPERDISK PROBLEMS?

1. Don't panic! If the disk doesn't work at all, or one of the programs blanks your screen and then nothing happens, you need have no fear of a virus: the *SuperDisk* is fully vetted against all known virus programs, and guaranteed by an expert in the field.

2. Check the instructions carefully, and consult the icons printed with each program description to be sure that the program will function with your processor. (Note that sometimes using a program with the wrong display adaptor can cause problems that require a 'reboot'). Some applications need the ANSI.SYS driver: if peculiar sequences of characters – especially square brackets – appear, instead of expected displays, try installing ANSI.SYS, as detailed in the panel (right).

3. If the *SuperDisk* appears damaged, or clearly does not function as it should, send it to PC Wise, the company which does our disk duplication; the address is opposite, and also on the sleeve of the *SuperDisk*. Note that you must do this within the calendar month, as PC Wise does not keep a back stock.

4. If you have technical questions or difficulties that do not appear to be caused by damage to the disk, you can get assistance from the SUPERDISK HOTLINE. If, for any reason, you are unable to get through, please write to our Bath office (address above), including as much detail about your own PC as possible and describe the problem carefully.

QUESTION AND ANSI

Some *SuperDisk* programs need ANSI.SYS installed as a driver to aid displays or keyboard control. This must be specified when you originally 'boot' your system by a command in your CONFIG.SYS file. An easy way to arrange this is as follows:

1. Find ANSI.SYS (possibly in a subdirectory called DOS) and copy it into the root directory of your startup disk (hard or floppy).

2. Add the line DEVICE=ANSI.SYS to the CONFIG.SYS file in the same (root) directory; if there is no such file, create one, with this line. (You can use any ASCII editor to do this: RPED or EDLIN are just fine).

3. Reboot your PC

HOW TO USE THE SUPERDISK

Above all the *SuperDisk* is designed to be easy to use. With this in mind its programs are designed to run on most IBM-compatible PCs.

For those with little PC experience we have compiled this short guide to the use of DOS and importing programs.

1. 'Boot' your computer in the usual way. Make sure that *SuperDisk* is not in your 'A' drive when you do this, or your PC will simply report the presence of a non-system disk.

2. Create a copy of the *SuperDisk*. The best command to do this is XCOPY (using the /S option, to copy all the subdirectories); consult your DOS manual for more details of the options for this command on your particular configuration. If you have no hard disk, you may have to load XCOPY from the system disk on 'A' drive with the /W option (to 'wait' after being loaded), and then put the *SuperDisk* into drive 'A'. After creating the copy, keep the original *SuperDisk* safe and unaltered.

3. The *SuperDisk* is designed to be run by typing PCPLUS [Enter] while in the root directory of drive 'A'. This will give you an introduction to the programs on the *SuperDisk* and directions on how to make use of them.

The *SuperDisk* is organised into subdirectories for convenient copying of individual programs – you may want to move some of these to your hard disk, system disk or other regularly-used storage place: subdirectories are named UTILS, GAMES, SHORTIES and often some other distinct name. Executable programs normally have an extension name .COM or .EXE; executable batch files are .BAT. Script files for DEBUG are .BUG, and (GW)BASIC programs end in .BAS. Most of these will be accompanied by a .DOC (for 'document') file with the same first name. Files with other surnames are usually data or reference used by the associated program, and should not be ignored!

You may care to examine many of these files yourself: in particular, .BAT, .BUG and (of course) .DOC files are composed of ASCII text, which can be viewed by several methods:

(a) `TYPE | MORE` to see one screen at a time

(b) `COPY [filename] PRN` to print the file

(c) `PRINT [filename]` to buffer-print the documentation file

(d) load it into a word processor (as an ASCII file, or in *WordStar* terms, a 'non-document' file)

We want the *SuperDisk* to serve you; we have designed it so that most programs run on the majority of PCs and PC compatibles. Since a good percentage of PC users now have CGA and EGA adaptors, permitting more sophisticated and colourful displays, we will not restrict the *SuperDisk* to text-only programs. Although some programs may not work on your monitor, others will. Check the icons to see whether they will run on your configuration.

Other factors we consider before including a program on *SuperDisk* are: memory size; DOS version; peripherals (hard disk, mouse, diskettes); language and application.

We have decided not to include GEM/BASIC2 programs in the future as these are usable by only a small part of our PC community. We shall likely be adding shortly a section for occasional GWBASIC programs.

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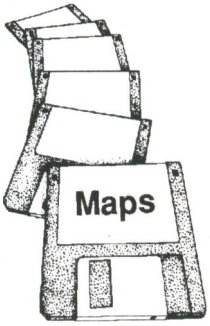

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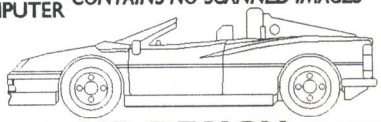

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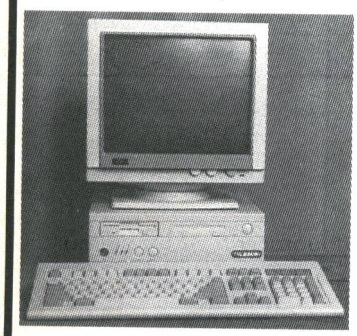

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SLANGING MATCH

Here's some more of that PC Rhyming Slang, with bumper bundles of 20 recycled *SuperDisks* (many with write-enable notches) going to this month's contributors.

First up is Nabil Asaad of Harrogate, with:

Pirate Disk – Virus Risk
EMS – Awful Mess
Backup Copies – Waste of Floppies
Windows User – Born a loser
SuperDisk – A collection of useful and entertaining software that comes free with Britain's number one computer magazine (grovel grovel, hint hint).

(Yes Nabil, you've got the hang of this rhyming slang – excellent! P.S. No you can't have a 3.5-inch subscription, it's 20 second-hand SuperDisks *as we said in the rules!)*

And our second contributor, Mike Williams of Leicester, has sent us these (incidentally, Mike, can you send us your address, because we've – ahem – lost it!).

Full Page Scanner – Pass the Spanner
Z88 – 3 years too late
Cheap hard disk – Bytes at risk
LCD – Hard to see
CP/M – older than GEM
Martin Banks – No more, thanks

(hang on a minute – Martin Banks... What a cheek! Memo to 'ain't misbehavin' competitions department – sort out a batch of notchless disks and Red Star 'em to Leicester.)

(That's enough Rhyming Slang for this month – keep 'em coming in – Ed)

HIDDEN MESSAGES



At first glance this is a picture of some football players, minus the obligatory Gazza but otherwise unremarkable. However, beneath the surface lurks the clear winner in our *Wacky (or should it be Tacky?) Publicity Stunt of the Month* competition, for these players are from Aldershot FC, and local memory manufacturers Datrontech has agreed to advertise on their jockstraps.

There's no need for us to supply any humourous remarks, since Datrontech's press release has done that for us. 'Aldershot need all the support they can get', the company's MD, Steve King, is alleged to have said, while the press release reveals that the club ordered 21 large jockstraps and one small model – 'the identity of the latter's recipient is a closely guarded secret' it confides, tongue firmly in cheek no doubt. 'With the players' software thus protected', it goes on, 'they managed to pull off a shock 0 – 0 draw against West Ham in the cup.'

Well, full marks to Datrontech for having had the balls to send that one in (oops – it just slipped out, honest!), although we fail to see exactly how they expect their adverts to gain any further exposure. Perhaps the lads themselves will be moved to make additional purchases of memory expansion modules as a result of the message's weekly airing in the dressing room. Anyone wishing to contact Datrontech (for whatever reason) can do so on (0252) 313155.

AVAILABLE RESOURCE

Strictly non-joking time now. We've received a letter from Paula Savage of Gravesend, Kent, asking if we know of anyone who employs people to work from home on PC-related tasks.

Paula was involved in a road accident last year, and is consequently unable to get around – but as she points out in her letter, while her legs may not properly, her hands and brain most certainly do.

Paula owns an Amstrad PC1640, and has experience of Word Processing, Desktop Publishing and databases. She's also learning Turbo Pascal, and would be interested in any computer-related work, from mailing lists to programming. She's also willing to consider charity work for just the cost of materials (paper, disks and so on) consumed.

Anyone who has a (genuine) offer of work can contact Paula on (0474) 324278.

PC PLUS

is looking for a

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PC PLUS is looking for a PC journalist to join our team here in Bath. We're looking for someone with a good knowledge of the PC world – PC hardware and peripherals, MS-DOS, PC applications – who is able to write product reviews, news and background features. A track record on a PC magazine is preferred, and we're interested in hearing from people at staff writer level, and also from those who feel capable of an early move to a more senior position. Starting salary to £17K depending on experience.

To apply, write to Paul Stephens at PC PLUS, 30, Monmouth St., BATH BA1 2BW.

WINNERS WINNERS WINNERS

Yes, it's the well-behaved PC PLUS competitions department here, with the results of issue 53's Sygnos LCD monitor competition.

The lucky winner is Mr C J Morgans of Abbeymeade, Gloucester, who will be receiving his new screen together with a copy of Microsoft's *Windows 3* graphical user interface.

And the answers to the five brain-teasing questions were:

1. Douglas Cobb (page 172)
2. *Thinx* (page 112)
3. Ants (page 169)
4. Logitech's *Finesse 3.1* (page 132)
5. Liquid Crystal Shutter (page 184)

WHAT NO NEXT MONTH BOX?

Details of next month's magazine, including our all-new 32-page *PC PLUS Buyers Guide*, can be found on page 245.

OOPS!

Last month we tested the TY-1415 super VGA monitor from Factotum. We gave this top-of-the-range model a value rating of four out of five, but unfortunately didn't publish the correct phone number for you to contact the company. To set matters straight, the correct number is (0635) 524404. Our apologies to all concerned and we're very sorry for any inconvenience caused.

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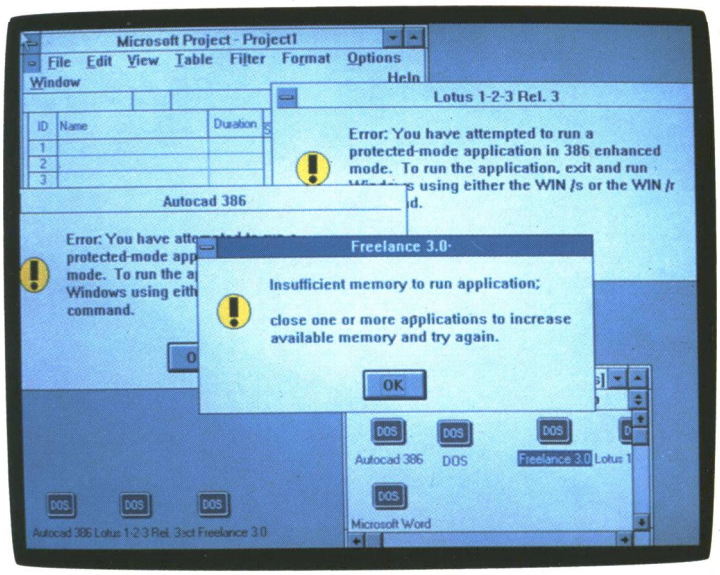
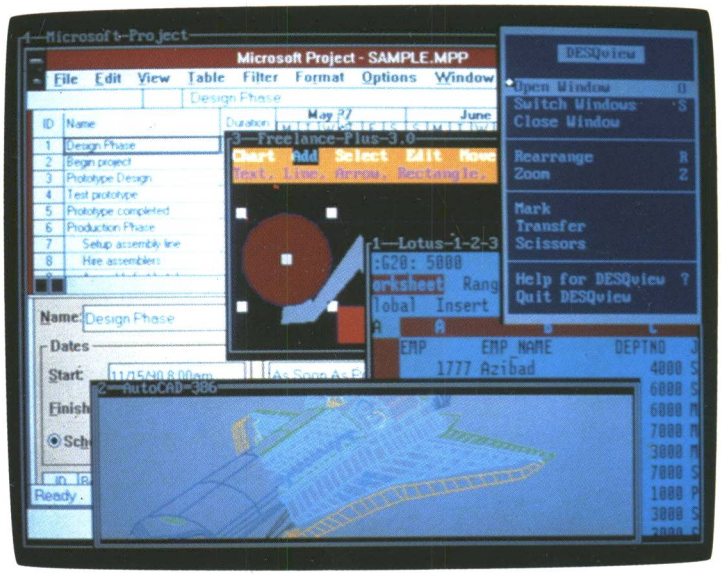


Windows 3.0. The multitasking, windowing environment.



DESQview 386 2.3. The multitasking, windowing environment.

Are you still using MS-DOS programs on your PC?

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The new DESQview 2.3 and DESQview 386 2.3 let you use your favourite DOS and DOS-extended programs in windows side-by-side on 80286, 80386 and i486 PCs. As you can see above, you can even run Windows programs within DESQview 386. So the next time you get error messages like the ones at the left in Windows, remember how the same set of programs look running in DESQview.

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This comparison was made using a system like the one you might run: Both shots show an ALR FlexCache 33/386 running DOS 3.3 with VGA display adaptor, Novell NetWare v3.01 Rev. A, with IPX/SPX v3.01 Rev A, Microsoft Mouse 7.00, and Microsoft SMARTDrive v3.03 disk cache. Buffers were set to 20. For the Windows screen, we ran Microsoft Windows 3 HIMEM.SYS and EMM386.SYS. For the DESQview screen, we ran QEMM 386 v5.1.

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