

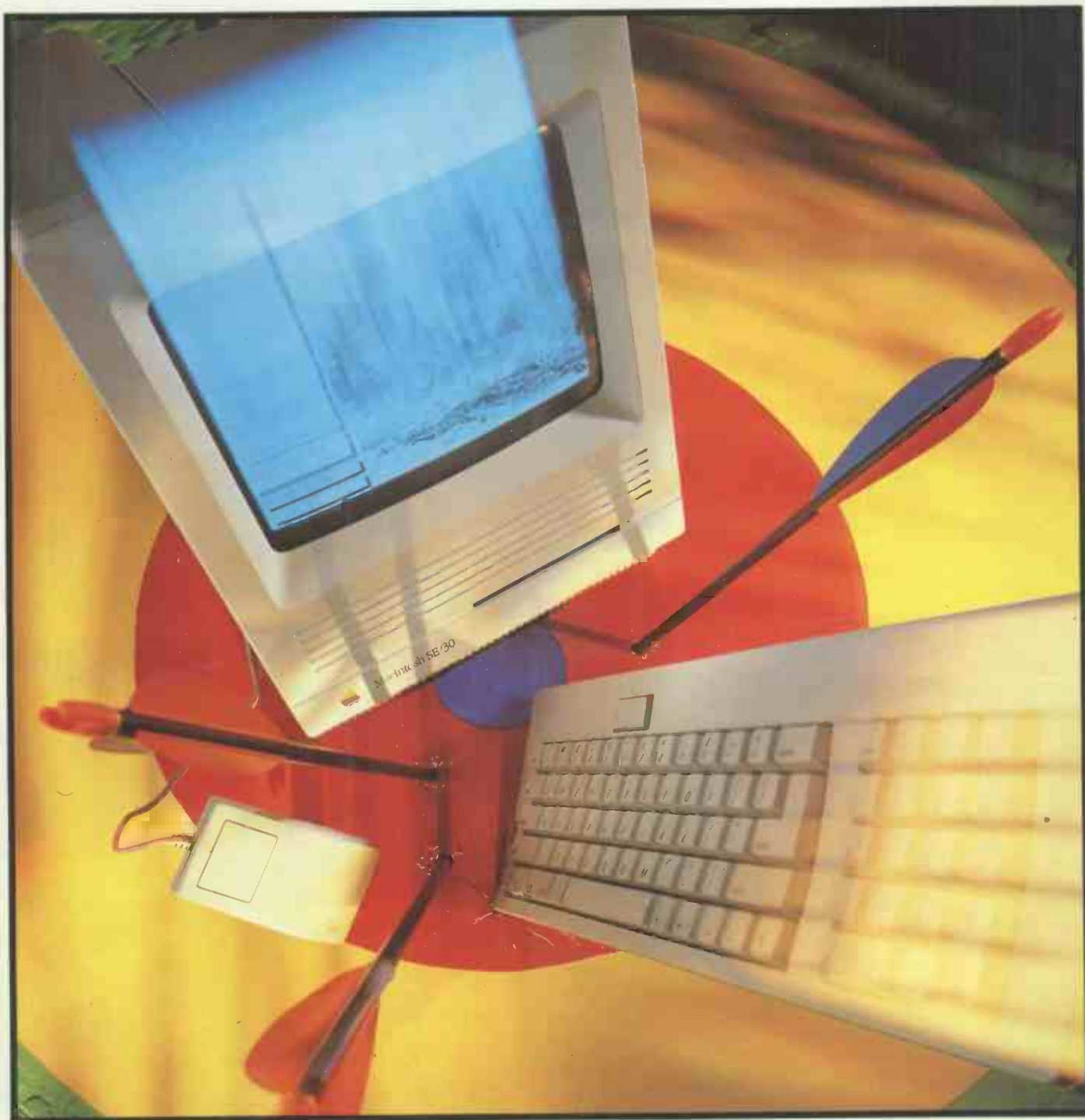
Personal Computer World

US\$ 3.50/Ir £1.76/BFr 127/Lire 5500/DKr 31.00

February 1989 £1.30

BRITAIN'S BIGGEST COMPUTER MAGAZINE

Agenda's key to
pocket computing



Exclusive: Apple on target with the Mac SE/30

CompuStar 20MHz 286 • Samna Ami WP for Windows • Mathematica • Better laser printing

Why walk whe



Sprint® is fast. It scrolls fast, edits fast, switches between files fast, offers fast shortcuts and proves that the slow way is no way. Sprint never wastes your time.

“Auto-Save” means you’ll never lose your work when you Sprint!

Forgetting to “Save” is a fact of life as are power outages, and it used to be that a power outage could wipe out everything you’ve done. Not any more. Your work is always safe when you Sprint.

Sprint’s “Auto-Save” automatically saves your words *as you type*, so if the lights do go out, you may be in deep darkness but not deep trouble.

* Customer satisfaction is our main concern; if within 60 days of purchase this product does not perform in accordance with our claims, call our customer service department, and we will arrange a refund.

Sprint’s Auto-Save is more than “insurance,” it’s also invisible. You know it’s there, but it does its job without interrupting yours.

Your writing is better and your spelling is perfect when you Sprint!

If your Spelling’s not too *hott*, you get help there too with a 100,000-word speller that can check your spelling *as you type*.

Sprint also gives you a 220,000-word synonym list that lets you pick the right word every time.

If you’ve never used a word processor, you need Sprint

If you’ve *never* used a word processor, Sprint is the quick-study, fast-track entry to high-performance word processing. It’s easy, so you learn fast.

Amongst other contemporary features, there’s automatic saving and spell-checking, along with on-line Help, which you’ll rarely need.

If you’ve ever used a word processor, you need Sprint

If you’ve *ever* used a word processor like WordStar®, WordPerfect®, Microsoft® Word, Multi-Mate®, SideKick® or EMACS, you can be productive immediately with Sprint because we’re *giving* you Alternative User Interfaces compatible with the command procedures of all six of these *free* with Sprint. Six different ways you can feel completely at home on Day One with Sprint.

Sprint understands files from many other word processors

When you move to Sprint, you can bring your files with you because Sprint understands and exchanges files with a variety of word processors. Sprint comes with conversions for WordStar, WordPerfect, Microsoft Word, MultiMate, and DisplayWrite® 4 (DCA RFT). It’s a kind of peaceful

All Borland products are trademarks or registered trademarks of Borland International, Inc. Other brand and product names are trademarks of their respective holders. Copyright © 1988 Borland International, Inc. BI 1241 UK.

You have a head start when you Sprint!

	Sprint 1.0	WordPerfect 4.2	MS Word 4.0	WordStar 4.0	MultiMate Adv. 1.0
Maximum file size	Disk	Disk	Disk	4MB	128K
Mail Merge	Yes	Yes	Yes	Yes	Yes
Thesaurus (integrated)	Yes	Yes	Yes	Yes	Yes
Windows Open (maximum)	6	1	8	1	1
Files Open (maximum)	24	2	8	1	1
Cross-Reference (dynamic)	Yes	No	No	No	No
Indexing Options	7	1	3	3	No
Snaking Columns (chg # on same page)	Yes	Yes	Not same pg.	No	Yes
Parallel Columns	Yes	Yes	Yes	Yes	Yes
H-P LaserJet Support	Full	Full	Full	Partial	Full
PostScript Support	Full	Text	Full	No	Text
Mouse Support (integrated)	Yes	No	Yes	No	No
AutoSave (without interruption)	Yes	No	No	No	No
User Interface					
Define Shortcuts Dynamically	Yes	No	No	No	No
Run Alternative User Interface	Yes	No	No	No	No
Verify spelling as you type	Yes	No	No	No	No
Fully programmable macro language	Yes	No	No	No	No
Suggested List Price	£199.95	£425	£395	£399	£495

n you can *Sprint*?

electronic co-existence. Your investment in non-Sprint files is completely protected. They're easily imported and exported by Sprint—and for good measure—given a fresh, new contemporary look.

You can change nothing or change everything with *Sprint*

You can use Sprint *as is* and be very happy with the way everything works—or you can easily customize Sprint to do everything *your way*.

It's a completely *customizable* word processor that, for example, lets you re-define keys, delete menu items, make your own short-cuts, invent your own menus and use Sprint's online help facility to create your own quick reference cards.

You're given the customizing power to avoid pop-up menus altogether—if that's the way you like to work. Sprint can be

See how fast you can *Sprint*!

	Save File ¹	Top to Bottom ²	Go To Line 1500	Search & Replace ³	Find Unique Word
<i>Sprint 1.0</i>	5.9	.1	.1	1.6	3.3
WordPerfect 4.2	41.1	5.3	5.4	6.6	6.2
WordStar 4.0	4.4	4.6	4.7	17.1	13.8
MS Word 4.0	9.7	.1	N/A	4.6	7.0

Tests were performed on a Multitech 286 AT (8 MHz), 640K RAM. ¹file size 103K. ²1636 lines. ³14 occurrences. Times shown are in seconds. (Benchmark details available upon request.)

completely function-key-driven and while Sprint's function key assignments are logically defined, they're easy to alter.

The Age of Customization is here—led by Sprint.

There are 7 different ways you can *Sprint* in your office

Gone are the problem days when you hired someone new who said "I know WordStar, but not WordPerfect"—which is the one you sort of standardized on, or

you call in Temps who know a word processor, but not *your* word processor—because all you do now is hand them Sprint.

The odds are pretty good they'll know either Sprint, WordStar, MicroSoft Word, WordPerfect, MultiMate, SideKick or EMACS, and they'll be productive right away.

You avoid any training costs—and there's no training costs like *no* training costs.

Sprint Feature Highlights

- Automatically saves without interrupting your work
- Completely customizable
- Spelling correction with 100,000-word dictionary; verify as you type option
- Sophisticated formatting capabilities

Sprint Also Features:

- File management
- Files open: up to 24 at once
- Footnotes and endnotes automatically
- Glossary
- Headers and footers (multiple line)
- Help: context-sensitive plus topic index
- Hyphenation
- Import and export files: ASCII with line breaks, DisplayWrite 4 (DCA RFT), Microsoft Word, MultiMate, WordPerfect, WordStar

- Indexing
- Kerning and ligatures automatically
- Keyboard customizable
- Line drawing
- Macros
- Mail merge
- Mouse support (integrated)
- Multiple columns
- On-screen bolding, centering, and underlining
- Page numbers automatically
- Preview to screen
- Paragraph numbering
- Placemarks
- Sorting
- Split screen: up to six windows
- Style sheets
- Superscripts/subscripts
- Quick reference card (dynamic)
- Thesaurus: 220,000 synonyms
- Widow/orphan control



60-Day Money-back Guarantee*

For the Dealer nearest you
Call (0734) 320022



You turn professional when you Sprint.

Ease into the future with *Sprint* today

Sprint works with today's hardware and will work with tomorrow's. Anywhere from an 8088 PC through a 386.

It's already a major success story in Europe; it's the #1 selling word processor in France (and everyone knows, 50 million Frenchmen can't be wrong!) Sprint is proof that the world *did* need another word processor.

Sprint is so sophisticated, it's simple. It won't terrify a beginner; it's a familiar face to many experienced word processor

users who can now get much better, faster results *without having to learn a new program.*

It's so flexible, businesses can standardize on Sprint without losing a thing or having to re-train.

It's so powerful that "power users" will never be hungry for power again because they can customize to their hearts' content.

And it's a remarkable value at £199.95 instead of the £300, £400 £500 some companies

want—and for a limited time only, we throw in Alternative User Interfaces compatible with the command procedures of WordStar, MultiMate, Microsoft Word, WordPerfect, SideKick and EMACS. All this for an introductory price of only £199.95 suggested retail.

Sprint. It's the word processor you'd expect from Borland and the value you'd expect from Borland. It's time to *Sprint* on the fast track.

Chapter Heading

Scalable Font

Box Drawing

Section Heading

Automatic Bulleted List

PostScript® Graphics

Automatic Numbered List

Automatic Table-Referencing

Footnote Capability

Page Footing

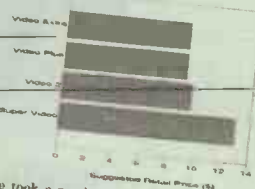
Section 5

SALES AND MARKETING PLAN

During the last few years our market share has increased, despite increased competition. To maintain our widening lead, we will soon be announcing Oceanic Music's "Video 2" which is visually and technically superior to all other market entries and priced below all but the cheapest entries. The new product will be announced in New York's World Trade Center (see page 14).

5.1 New Pricing for Video 2

Video 2 will be priced competitively. Its price will be 10% below the top selling competition, Super Video, but slightly more than two other similar products. Video 2 is clearly a better product than all of its competition. The following charts compare competitive prices:¹



We took a random sampling² of one hundred consumers in each of our four sales regions. We then averaged the numbers to get the maximum price point (see Table 5.1). The suggested price for Video 2 is below all maximum price points.

Region	Maximum Price Point	Margin
Northeast	\$21.99/tape	9.50
South	\$23.49/tape	11.00
Midwest	\$24.99/tape	12.30
West	\$25.24/tape	10.75

1. The prices indicated are all manufacturer's suggested retail prices as of Jan 1, 1989.
2. The poll was conducted by our Market Research Group. The complete results of the poll are listed in Appendix A.

5.2 Marketing Tools

In order to maintain an increasing market share with Video 2, we need to arrange the following sales pieces/promotions:

■ **New Product Collateral.** We will send new sales literature about Video 2 to all the major music chains and music stores along with free demo tapes. The literature should include the following:

1. **Identification of the new improvements.** Describe Video 2's new features in detail.
2. **Uses for the product.** The recommended uses and benefits of Video 2 need to be spelled out clearly. (This will also be incorporated into a featured piece for the *Monthly Bulletin to Music Chains*.) List benefits to the consumer as well as a price comparison against other similar products.
3. **In-store marketing of product.** Show how Video 2's new display rack will fit neatly at the end of an aisle or as part of an existing shelf display. Dealers will be able to order the product on extended terms, and return sales of Video 2 do not exceed their sales of the original Video 1.

■ **Trial Offer.** The new, improved Video 2 will be available initially as a "Take the Video 2 Test" offer.

■ **New Co-op Advertising Program.** This new program will emphasize the new, collaborative policy of the company, and the new product line.

Personal Computer World



APPLE MAC SE/30

128

The Mac is back. In this exclusive review Guy Swarbrick reveals the cuddly computer's latest launch, marking a leap in power and functionality.

Cover photography by Chris Bell

FEATURES AND REVIEWS

HI-GRADE 386

134

Most PCs pass through several hands before arriving with the end user. But one enterprising dealership is short-circuiting the process by building its own PCs from basic components. Guy Kewney takes the lid off the Hi-Grade 386 — and is pleasantly surprised.

MATHEMATICA

140

Maths and computers go together in most people's minds, yet very few programs exist for the serious mathematician. Jack Weber adds the pluses and minuses of this new package for the Apple Mac, and sums it up.



WELLS AMERICAN COMPUSTAR

144

Hardware innovation in the DOS world is rare, but Wells American seems to have busted the boredom barrier with its highly configurable CompuStar. On taking the modular but mammoth machine apart, Rupert Goodwins is much impressed.

SAMNA AMI

150

Ami is Samna's attempt at breaking into the market for powerful Windows word processors. Bearing in mind the serious lack of such packages, Manek Dubash peers through the frame. Can Samna clean up in the world of Windows?



AGENDA

154

Has the Psion Organiser met its match? Andy Redfern gives this idiosyncratic but strong competitor in the hand-held market the thumbs — and fingers — up.

PICTURE THIS

158

For those who design or draw, and for anyone who needs *really* high resolution, even VGA just won't do. Nick Hampshire takes a tour around the software, hardware and other components needed for the future of display technology.

Founder Angelo Zgorelec Editor Derek Cohen Production Editor Lauraine Danker Sub Editor Tom Saul Technical Editor Andy Redfern Technical Writer Guy Swarbrick Editorial Assistant Chris Cain Consultant Editors David Tebbutt, Dick Pountain Art Director Martyn J Rowbotham Art Editor Gwynne Davies Publishing Director Mike Agate Publisher David Mankin Publishing Manager Jan Pitt Production Controller Simon Maggs Production Manager Jim Hewlings Production Assistant Ros Hall Group Advertisement Manager Moira Thomson Advertisement Manager Nick Ascough Deputy Advertisement Manager Krystyna Gorczynska Senior Sales Executive Mary de Sausmarez Sales Executives Caroline Deakin, Fay Callow, Sarah Metcalfe, Julia Olmer, Timothy King, Marcin Miller

REGULARS

NEWSPRINT 100

In his customary style, our regular newshound Guy Kewney takes a sideways look at Presentation Manager and asks who needs EISA.

WEST COAST 117

Tim Bjarin digs under the surface of IBM's recent change of heart regarding MCA licences — but what on earth is President-elect George Bush doing in his column?

BANKS' STATEMENT 122

Is the computer industry in danger of substituting image for content — indeed, Martin Banks has a sly suspicion it may have done so already.

LETTERS 125

More hints and tips for WordPerfect version 5 users, and more uses for old bandwraps.

FROM THE TOP 190

Derek Cohen's views on the problems of OS/2 have provoked reactions from readers. This month he replies, then mulls over the potential of networking the PCW office.

PURSUIITS 195

NUMBERS COUNT: Mike Mudge looks at generating, storing and analysing Lucas Sequences.

LEISURE LINES: More brainstretchers courtesy of JJ Clessa.

CAT AND MOUSE: Kate Charlesworth's cunning feline hacker.

BIBLIOFILE: Books on the diverse methods and applications of computer graphics form the backbone of this month's reviews.

SCREENPLAY: Despite his misgivings, Chris Cain finds wallowing in arcadian nostalgia is no hardship.

SPECIAL INTERESTS 203

THE MAC FACTOR: The Mac's position in the education market is the theme for this month's column, along with news of the latest software packages.

ST USER STACK: The recent Atari Christmas Show is grist for Marvey Mills this month. In particular, he finds a program designed to forecast pools results especially captivating.

SMALL-SCALE COMPUTING: Now almost a classic, the Z88 is still spawning software. Guy Swarbrick opens up some of the latest packages.

AMIGA NOTEPAD: From the 12th Commodore Christmas Show, Chris Cain reports on a BBC Micro emulator for the Amiga, on desktop video and on icons.

PROGRAMMING 210

PROGRAM FILE: Can you meet the file comparison challenge? Andy Redfern offers a prize for the best program and looks at the latest slew of new books. Readers' programs include a picture-dissolving algorithm and new ways of boosting your batch files.

BSI: Communications problems, detection of data overflows by C compilers and an appeal for compiler test suites are among the items on offer.

SUBSET: David Barrow looks at techniques for sorting and bit-flipping.

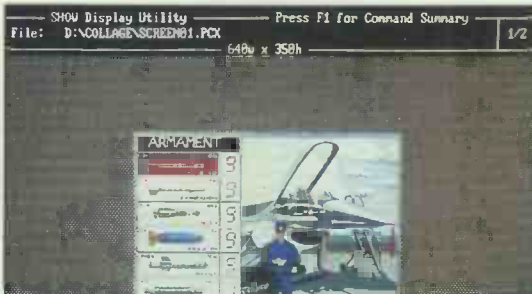
DIRECTORY

As well as the regular bulletin board listings, Gerald Janes examines the Data Protection Act and its implications for sysops. Rupert Steele focuses on groups for power users, and Transaction File lists the best private deals around.

CHIPCHAT

All the news that's fit for libel.

FEATURES AND REVIEWS



SCREEN GRABBERS 164

With PCs processing ever more diverse types of information, so the need to integrate it all has increased, with the incorporation of graphics being foremost. Ed Brown looks at six packages designed to convert screen images into files.

A FIST FULL OF MICROS 168

The humble telephone acquires a new use, it seems, almost every day. Tony Dennis goes to the other end of the line and looks at the computer technology which is allowing people to play multi-user games using just an ordinary phone.

LASER LINES 174

Once the laser printer bug bites, it is difficult to shake off. Yet the upgrade path from the common or garden dot matrix to the latest in high-tech page printers is not always as smooth as it appears. Kathy Lang plants some signposts to guide you along the way.

ORACLE 178

One of the biggest names in mainframe databases is bidding fair to occupy the same position in the world of personal computing. Oracle for the PC includes many of the features — including SQL — that made it so attractive to the corporate mainframe user. Mike Liardet takes a wander round this semi-legendary software.



CHANGING ROOMS 184

In the third of his series, David Tebbutt lends an ear to Xerox EuroPARC's Austin Henderson, who is looking at methods of moulding computer systems to the people who have to use them. The humble photocopier can, it seems, teach systems designers a lesson or two.

Personal Computer World Subscription Enquiries Marie Riley Subscription Rates UK £15, Europe £25, Overseas £60 Subscription and back issues address: 32-34 Broadwick Street, London W1A 2HG, tel: (01) 439 4242 Advertising address 32-34 Broadwick Street, London W1A 2HG, tel: (01) 927 9016 Editorial address 32-34 Broadwick Street, London W1A 2HG, tel: (01) 439 4242. All departments Telex: 23918 VNUG — No material may be reproduced in whole or in part without written consent from the copyright holders © VNU Business Publications 1989. Typeset by Phase Communications, Pioneer House, 44/48 Clerkenwell Road, London EC1. Printed by Chase Web Offset, St Austell, Cornwall. Distributed by Comag Ltd, Tavistock Road, West Drayton, Middlesex, tel: (0895) 444055

COMPUTER SOFTWARE

U . K . s B E S T S E R V I C E

MAINTENANCE

Our maintenance contracts provide you with worry free computing. We guarantee to have a qualified engineer examining your hardware fault, on your premises, within 8 working hours of your call. What's more, if your hardware requires workshop attention we offer a further guarantee to replace the offending item while this work is carried out. As with all our services we guarantee the BEST service and the LOWEST prices.

We also contract equipment not originally supplied by us and we offer emergency call outs on non contracted products on an hourly basis.

CALL NOW for an immediate quotation on our direct service line - 0 4 8 0 4 9 5 5 6 6

TRAINING

We offer introductory and advanced level training programmes at your premises on a wide range of products some of which are listed below.

PEGASUS ACCOUNTS, WORDSTAR, WORDPERFECT, WORD, DBASE, RBASE, SMART, LOTUS 123, SUPERCALC, VENTURA, ALDUS, MSDOS, NOVELL, XENIX

Prices are from 195 pounds per day Call today to discuss your requirement with our training manager.

XENIX MULTIUSER

ISC supply the well proven Xenix operating system to transform your PC AT or 386 computer in to a powerful Multiuser/Multitasking system. Each additional user only requires a simple terminal to access the main system.

SCO XENIX System V 286	595
SCO XENIX System V 386	695
Pegasus Xenix Senior Accounting	POA
Xenix Smart System	1195
Spreadsheet, Wordprocessing, Database	
Wyse 60 Terminal	475
Chase AT-4 Terminal Controller	550
Chase AT-8 Terminal Controller	795

DTP

ISC now offer a full range of equipment to fulfill your desktop publishing requirements.

SOFTWARE

Ventura publisher v2	595
Aldus pagemaker v3	495
Publishers paintbrush	125
Canon 1x-12F Scanner	895
Genius A4 display	925
NEC Monograph display	1250
QMS postscript laser	3195

PEGASUS ACCOUNTING

TWO YEARS FREE SUPPORT ON ALL PEGASUS SOFTWARE

Over 4000 modules supplied to date by ISC

PEGASUS SINGLE USER v2

Multi company with 8 module integration The standard for more than 50% of computerised businesses in the UK

PEGASUS SENIOR v3

The Single Terminal Version of Senior. Runs on all IBM compatible micros

PEGASUS SENIOR v3

The multi terminal version of Senior Runs on Novell and IBM PC LAN networks, available for 1-4, 6-9 or 10+ users

PEGASUS XENIX SENIOR

The Multiuser version of Senior for Xenix systems. Available for 1-4, 5-9 and 10+ users.

ELITE DATABASE

Comprehensive Database with the ability to integrate with Pegasus Single user and Senior files, for special applications.

PEGLINK BATCH INVOICING

Integrates with Pegasus allowing batch processing or sales and purchase transactions

WORK INVOICING SINGLE USER

Integrates with Pegasus for complex invoicing and repeat billing

SUPPORT CONTRACT (Per Module)

We will support your Pegasus system for 2 YEARS even if you bought the product elsewhere!

Also Available: Upgrades from single to multi user full data upgrade service available

STATIONERY

Prices are per 500, minimum order 1000 for FREE delivery in U.K.

2 Part Statements	25
3 Part Statements	26
2 Part Invoices	29
3 Part Invoices	35
4 Part Invoices	44
Security Payslips	20
Payslips	20
Remittance Advice	19
Bank Giro	15
P14/P60	35
P35	35
Statement Envelopes	35
Payslip Envelopes	22

All above are for use with PEGASUS accounts.

Call for FREE sample sets

NETWORK

ISC fully support the industry standard network adapters: Ethernet, Token-Ring, and G Net. This allows us to supply you with the most suitable system for your requirements. Each PC in your network requires a Workstation Adapter Card, which connects to the Network cabling. The central Fileserver PC also needs an Adapter Card, which for maximum performance can be a high speed 16-bit card.

ETHERNET - High Speed, Best Value - 180m Max Length

Novell Workstation Adapter Card	275
Micom Workstation Adapter Card	295
Micom Fileserver Adapter Card	599
3Com+Fileserver Adapter Card	675

TOKEN-RING - High Speed, - IBM Standard

Workstation Adapter Card	425
High Speed Fileserver Card	499
8-Station Wiring Hub	495
4-Station Wiring Hub	245

G/NET - Medium Speed - 1200m Max Length

G/NET Workstation Adapter Card	299
--------------------------------	-----

NOVELL NETWARE

Netware is the market leading network operating system, and offers the following benefits.

HIGHEST PERFORMANCE COMPLETE RELIABILITY FROM 2 TO 100 USERS EASY TO OPERATE

NETWARE operates on a central Fileserver machine, which contains all the shared programs, data and printers. The workstations then connect to the Fileserver via the network, to access the shared information. The Fileserver normally needs to be a high performance system with a large capacity Hard Disk Drive.

NETWARE can be operated either dedicated or non-dedicated, requiring at least 2Mb of Ram in the Server. For optimum performance and reliability we recommend the use of a dedicated Server

ELS NETWORK 2.0a 495
For 286 and 386 Servers
Server is used as a workstation
Maximum of 4 users.

ELS NETWORK 2.12 1095
Server can be used as a workstation. Maximum of 8 users.

NETWARE 2.12 2095
For 286 and 386 Servers.
Requires 2Mb of Ram.
Server can be used as a workstation.
Maximum of 100 users.

SFT NETWORK v2.12 3345
For 286 and 386 Servers.
Requires 2Mb of Ram.
Offers disk mirroring, duplexing, transaction tracking for the utmost reliability.

SATURDAY OPENING

OPEN 10AM TO 4PM.

CALL US NOW

ISC GUARANTEE

IF YOU PROVIDE A CURRENTLY ADVERTISED LOWER PRICE WITHIN 7 DAYS, THE DIFFERENCE WILL BE REFUNDED.

Price guarantee applicable to mail order only.

HEAD OFFICE: FORRESTER HOUSE, BRAMLEY ROAD, ST. IVES

COMPUTER SYSTEMS

U. K. s L O W E S T P R I C E

ISC
ARE NOW
PROUD TO BE
ISC COMPUTERS
PLC

COMPUTERS

COMPAQ

AUTHORISED



We offer UNBIASED, EXPERT advice on 10 complete ranges of Computer systems, all of the examples listed below include the following items:-

Monitor Printer Port. Communication Port
MsDos Enhanced KB Full Test

COMPAQ

Please call for quotations on:
Deskpro 286/12, 3865, 386/25
Portable II, III, SLT, 386

APRICOT	Ram	Mhz	MONO	WHITE	VGA
Xen-i 286/30mb	1mb	10	1530	1615	2125
Xen-i 386/45mb	1mb	16	2635	2720	2805
Tower 386/50mb	2mb	16	n/a	3485	3655
Tower 386/100mb	2mb	16	n/a	4335	4505

Choice of internal 1.2mb/5.25 or 1.44mb/3.5 floppy

TANDON	Ram	Mhz	MONO	EGA	VGA
PCA 20 Plus	1mb	10	1430	1725	1830
PCA 40 Plus	1mb	10	1595	1895	1995
Target 20 Plus	1mb	10	1495	1795	1895
Target 40 Plus	1mb	10	1675	1995	2075

Optional 8 Mhz processor on all Tandons, reduce quoted prices by 150 pounds.

AMSTRAD 1640 (640k)	MONO	CGA	EGA
1640 Single Drive	550	670	795
1640 Dual Drive	645	765	890
1640 20Mb Hard disk	885	1005	1130

FREE 1 YEAR ON-SITE MAINTENANCE ON 1640 MODELS

	MONO	EGA	VGA
2086 Single Drive	599	749	849
2086 Dual Drive	749	899	999
2086 30Mb Hard disk	999	1149	1249

TOSHIBA PORTABLES		SRP	ISC
T1100+	8088 TWIN 640	1295	975
T1200	8088 20MB 1MB	2395	1795
T1600	80286 20MB 1MB	3195	2450
T3200	80286 40MB 1MB	3995	2995
T5100	80386 40MB 2MB	4595	3450
T5200	80386 100MB 1MB	6395	5095

high quality, high performance portables.

MISSION	CPU Mhz	Ram	Drive	MONO
Flexcache	80386	20 2MB	150MB	5695

TULIP	Chip	Ram	Mhz	MONO	EGA
PC2-TWIN	V20	640	9.5		
PC2-20MB	V20	640	9.5		
AT2-20MB	80286	640	12		
AT2-40MB	80286	640	12		

CALL

Small footprint, high grade EEC manufacture
Chosen by ISC for our own staff

IBM PS2	Chip	Ram	Mhz	Fixed	MONO
M30-021	8086	640	8	20mb	1615
M30-286	80286	1MB	10	20mb	1775
M50Z	80286	1MB	10	60mb	2450
M70-F61	80386	2MB	16	60mb	3325

CALL FOR OTHER SPECS & MONITORS

PRINTERS

80 Column=A4 Size
132 Column=Wide Listing
HD=Heavy Duty
TF=Tractor feed



EPSON	Market Leader	SRP	ISC
LX800	80c/150cps/35nlq/TF	279	195
FX800	80c/240cps/40nlq/TF	459	321
FX850	80c/264cps/54nlq/TF	459	321
LQ500	80c/150cps/50nlq/24 Pin	399	279
LQ850	80c/220cps/75nlq/24 Pin	639	447
FX1000	132c/240cps/40nlq/TF	599	419
FX1050	132c/264cps/54nlq/TF	599	419
EX1000	132c/300cps/50nlq/TF	829	580
LQ1050	132c/220cps/73nlq/24 Pin/TF	849	594
LQ2550	132c/400cps/133nlq/24 Pin/TF	1299	909
SQ2500	132c/540cps/180nlq/JetLink	1349	944
DFX5000	132c/533cps/80nlq/HD	1699	1189

NEC	24 Pln Printers	SRP	ISC
P2200	80c/168cps/56nlq/TF	395	277
P5XL	132c/264cps/86nlq/Col	995	697
P9XL	132c/384cps/86nlq/Col	1295	907
P6+	80c/265cps/90nlq/TF/80K Buf	649	454
P7+	132c/265cps/90nlq/TF/80K Buf	839	587

JUKI	High Quality Daisywheels	SRP	ISC
6100	15cps	395	275
6200	30cps	565	395
6300	45cps	895	625

LASER	Silent Fast & DTP	SRP	ISC
EPSON GQ3500	6ppm	1799	1395
Brother HL8	8ppm SPECIAL	2195	1535
HP LaserJet II	8ppm	2249	1630
Canon Series 2	8ppm (Excl. Toner)	2095	1495
Canon LBP-811T	8ppm D Bin	2695	1885
Canon LBP-811R	8ppm D Bin Duplex	3100	2170
Kyocera F1000	10ppm	2320	1855
QMS PS810+	8ppm Postscript	3995	3195
Panasonic P4450	10ppm	2100	1750
HP Deskjet	4ppm	799	599

SPECIAL	Dual Mode Printers	SRP	ISC
HP Rugged Writer	480cps/240nlq	1290	903
Panasonic 1081	80c/120cps/28nlq/TF	245	159
Canon A55	156c/180cps/45nlq/TF/HD	535	375
NEC Spinwriter 8800		1195	975

Call for FUJITSU STAR OKI BROTHER
NEWBURY M-TALLY

**ELS 2 NETWORK
FOR 8 USERS
NOW AVAILABLE**

SOFTWARE



PEGASUS SINGLE USER v2	160
PEGASUS SENIOR v3	POA
PEGASUS MULTIUSER v3	POA
SAGE ACCOUNTANT	120
SAGE ACCOUNTANT PLUS	150
SAGE FINANCIAL CONTROLLER	210
SAGE PAYROLL 2	110
DBASE IV	395
DELTA V	375
DATAEASE	465
WORDSTAR PROFESSIONAL v.5	213
WORDSTAR 2000 rel. 3	256
MS WORD 4	245
WORDPERFECT v.5	249
MULTIMATE ADVANTAGE II	299
LOTUS MANUSCRIPT v2	249
LOTUS 123 v2	249
LOTUS SYMPHONY v2	359
LOTUS AGENDA	225
SUPERCALC 5	225
MICROSOFT EXCEL	245
QUATTRO	120
SMART SYSTEM v3	388
ABILITY PLUS	123
VENTURA PUBLISHER v2	595
ALDUS PAGEMAKER v3	495
PC PAINTBRUSH	45
GEM PRESENTATION TEAM v3	259
LOTUS FREELANCE PLUS	295
NORTON ADVANCED UTILITIES	85

5000 other titles available, please call for prices.

NETWORK VERSIONS

	POA
PEGASUS NETWORK SENIOR	550
WORDPERFECT NETWORK	325
SUPERCALC LAN PACK (3 USER)	795
DBASE IV LANPACK (5 USER)	895
LOTUS 1-2-3 NETWORK	275
SMART SYSTEM EXTRA USER	

Many other products available, please call for details

EXPANSION

PC XT 256Kb Ram Card	179
PC XT 384Kb Ram Card	189
APRICOT PC 256Kb Ram Card	129
APRICOT PC 512Kb Ram Card	149
PC AT 1MB Extended Ram Card	395
PC AT 1MB Expanded Ram Card	450
8087-2 Maths Coprocessor	149
80287-8 Maths Coprocessor	209
80387-16 Maths Coprocessor	399
20Mb Hard Disk Card	295
60Mb Internal Tape Streamer	550
60Mb External Tape Streamer	695
MICROSOFT MOUSE	125
NEC MULTISYNC Monitor	495
PHILIPS VGA Monitor and Card	650

Prices shown exclude VAT & delivery, and are liable to change without notice. Products listed are subject to availability.

HOTLINE: 0480 300530

F A X 0 4 8 0 4 9 4 0 5 2

C A M B R I D G E S H I R E P E 1 7 4 W S



COMPUTERS PLC

GOLF PORTABLE



Small by design – Big in Business

The **GOUPIL GOLF** brings new dimensions to 286 computing. Its unique full-size flat screen with VGA resolution, combined with the latest 'state of the art' technology offers you true portability, yet all the power of a desktop system.

No matter where you are or what you are doing: whether you work at home, on site or simply need the flexibility of a portable CAD/Graphics Workstation.

The freedom is yours with the **GOUPIL GOLF**.

- 80286 high-performance processor.
- Full-size VGA resolution flat screen.
- High speed 40 megabyte fixed disk drive.



The **GOUPIL GOLF** with 14" colour monitor.

- 1.44 megabyte 3.5" floppy disk drive.
- Up to 4.6 megabytes of RAM on the motherboard.
- Integral display interface for standard monitors.
- Integral mouse interface.
- Integral serial and parallel interfaces.
- 2 PC-compatible expansion slots.
- Facility for 80287 maths co-processor.

No other portable can match it at the price. £3475.

The **GOUPIL GOLF** – More than par for the course.



GOUPIL

Simply Superlative

COMPUMART

WATFORD (0923) 55633

YOU WILL NOT FIND BETTER PRICES!

but if you do, we'll try to match them.

IBM

System Units	
Model 302 x 720k disks, 640k, 8MHz	£611.00
Model 30 720k & 20Mb disks, 640k, 8MHz	£5892.00
Model 50 1.44Mb & 20Mb disks, 1Mb, 10MHz	£1356.00
Model 60 1.44Mb & 44Mb disks, 1Mb, 10MHz	£2099.00
Model 60 1.44Mb & 70Mb disks, 1Mb, 10MHz	£2189.00
Model 50z 061 1.44Mb & 60Mb disks, 1Mb, 10MHz NEW	£1816.00
Model 70-F61 1.44Mb & 60Mb disks, 2Mb, 16MHz NEW	£2593.00
Model 70-121 1.44Mb & 120Mb disks, 2Mb, 20MHz NEW	£3169.00
Model 70-A21 1.44Mb & 120Mb disks, 2Mb, 25MHz	£3984.00
Model 80-041 1.44Mb & 44Mb disks, 1Mb, 16MHz	£2743.00
Model 80-071 1.44Mb & 70Mb disks, 1Mb, 16MHz	£2984.00
Model 80-111 1.44Mb & 115Mb disks, 2Mb, 20MHz	£3474.00
Model 80-311 1.44Mb & 314Mb disks, 2Mb, 20MHz	£4496.00
Keyboard & Displays	
PS/2 Enhanced Keyboard	£128.00
8503 Monochrome Display, 12"	£136.00
8512 Colour Display, 14"	£343.00
8513 Colour Display, 12"	£396.00
8514 Colour Disp. 16", 256 col's	£818.00
8514/A High Resolution 1024 x 768 adaptor	£567.00

TOSHIBA

Lap Held & Options	
T1100 720k disk, 25bk	£call
T1000 720k disk, 512k	£call
T1100 + 2 x 720k disks, 640k, SuperTwist LCD display	£call
T1200 FB 2 x 720 disks, 1024k	£call
T1200 720k & 20Mb disks, 1024k	£call
T1600 80286 720k disk and 20Mb	£call
T3100/FF 2 x 720k disks, 640k, 8MHz	£call
T3100/20 720k and 20Mb disks, 640k, 8MHz	£call
T3200 720k and 40Mb disks, 1Mb, 12MHz	£call
T5100 1.44Mb and 40Mb disks, 2Mb, 16MHz	£call
T5200 1.44Mb and 100Mb disks, 2Mb 20MHz	£call
External 5 1/4" 360k diskette drive & AC adaptor	£call
External 5 1/4" 1.2Mb diskette drive & AC adaptor	£call

All Toshiba portables include DOS, an owner's manual, and have clock/calendar and parallel, serial, RGB, and external 5.25" disk ports.

MISCELLANEOUS

Monitors	
Hitachi 12" EGA Monitor	£352.00
Hitachi 14" EGA Monitor	£367.00
Hitachi Multi 560 Multiscan	£457.00
Hitachi Auto 480 14" VGA	£431.00
Quad EGA Enhanced 14" Col	£358.00
NEC Multisynch II	£472.00
Controller Cards	
Paradise EGA Autoswitch	£279.00
Paradise VGA Plus	£279.00
Quad EGA + Short Board	£149.00
Quad VGA board	£283.00
Mice	
Microsoft Serial Mouse	£99.00
Microsoft Bus Mouse	£119.00

COMPAQ

Portables	
Portable II Model 2 8MHz, 2 x 360k disks, 256k	£call*
Portable II Model 4 8MHz, 360k & 20Mb disks, 640k	£call*
Portable III Model 20 12MHz, 1.2Mb & 20Mb disks, 640k	£call*
Portable III Model 40 12MHz, 1.2Mb & 40Mb disks, 640k	£call*
Portable 386 Model 40 20MHz, 1.2Mb & 40Mb disks	£call*
Portable 386 Model 100 20MHz, 1.2Mb & 100Mb disks	£call*
Deskpro (8086, 4.7-7.1MHz, Black)	
Model 1 360k disk, 128k	£call*
Model 3 360k & 20Mb disks, 640k	£call*
Deskpro 286 (80286, 8-12MHz, Beige)	
Model 1 1.2Mb disk, 256k	£call*
Model 20 1.2Mb & 20Mb disks, 640k	£call*
Model 40 1.2Mb & 40Mb disks, 640k	£call*
Deskpro 386 (80386, 16MHz, Beige)	
Model 40 16MHz, 1.2Mb & 40Mb disks, 1Mb	£call*
Deskpro 386 S (Compact) (80386, 16MHz, Beige)	
Model 1, 1.2Mb disk, 1Mb, VGA	£call*
Model 20, 1.2Mb & 20Mb disks, 1Mb, VGA NEW	£call*
Model 40, 1.2Mb & 40Mb disks, 1Mb, VGA NEW	£call*
Deskpro 386/20 (80386, 20 MHz, Beige)	
Model 60, 1.2Mb & 60Mb disks, 1Mb	£call*
Model 130 20MHz, 1.2Mb & 130Mb disks, 1Mb	£call*
Model 300 20MHz, 1.2Mb & 300Mb disks, 1Mb	£call*
Deskpro 386/25 (80386, 25 MHz, Beige)	
Model 110, 1.2Mb & 110Mb disks, 1Mb NEW	£call*
Model 300, 1.2Mb & 300 Mb disks, 1Mb NEW	£call*
Monitors	
Dual Mode green/amber	£call*
VGA Mono	£call*
VGA Colour display 286/386	£call*
VGA Adaptor	£call*
VDU Card	£call*
Compaq DOS 3.3	£call*

*Call us now for the best and most competitive prices available on all Compaq equipment and options

All system prices quoted include keyboard, but not monitor or monitor adaptor.

PRINTERS

Unless otherwise specified, all dot-matrix printers are sold with an IBM parallel interface, plotters with a serial interface as standard. Please note that you must order the interface or adaptor card separately for some Laser printers and most scanners.

DRAFT NLQ cps cps		
9-Pin Dot Matrix		
Fujitsu DX2100	220 44	£295.00
Epson LX800	180 25	£189.00
Epson FX800	200 35	£312.00
Epson EX800	250 50	£428.00
Fujitsu DX2200	220 44	£384.00
Epson FX1050	200 35	£419.00
Epson EX1000	250 50	£564.00
OTC 8505XL	850 400	£1492.00
24-Pin Dot Matrix		
NEC P2200	140 56	£309.00
Epson LQ500	150 50	£299.00
Fujitsu DL3300	240 60	£482.00
NEC P6 Plus	265 90	£441.00
Epson LQ850	220 73	£461.00
NEC P7 Plus	265 90	£570.00
Epson LQ 1050	220 73	£594.00
Epson LQ 2550	333 111	£883.00
Fujitsu DL3400	240 60	£561.00
Fujitsu DC2400	215 70*	£686.00
Fujitsu DL2600	240 80*	£918.00
Colour Dot Matrix		
Fujitsu DL2400C	215 70*	£771.00
Fujitsu DL2600C	288 96*	£1033.00

Laser		
Hewlett Packard LJII 8ppm		£1399.00
Apple Laserwriter NT Postscript		£2636.00
Apple Laserwriter NTX Postscript		£3596.00
Jetscript Card (Postscript for HP/II)		£1488.00

Plotters		
HP 7440A ColourPro A4, 8 pen		£746.00
HP 7475A A3, 6 pen plotter		£1347.00
HP 7550A A3, 8 pen plotter		£2859.00
HP 7570A Draftpro A1		£3746.00

CITIZEN PRINTERS

120D	120	N	£150.00
LSP100	150	N	£174.00
MSP10E	160	N	£199.00
MSP15E	160	W	£237.00
MSP40	200	N	£291.00
MSP45	200	W	£373.00
MSP50	250	N	£380.00
MSP55	250	W	£499.00
HQP40	200	N	£380.00
HQP45	200	W	£454.00
Overture 110+	10 p.p.m.		£1199.00

EX-DEMO

We hold a vast stock of good condition, working ex-rental and demonstration computer equipment, fully serviced by our engineers before sale. A few examples are listed of equipment currently on offer, there are more available. Give us a call for details and incredible prices on our full current stock.

Full IBM Genuine Systems from	£595.00
IBM System Units from	£395.00
Mono Monitors from	£40.00
Colour Monitors from	£90.00
Compaq Portables from	£345.00
Printers from	£100.00

A selection of secondary software items are also available. Please ring for details.

SOFTWARE

Word Processors	
Multimate Advantage II	£321.00
Displaywrite 4-inc. UK dictionary	£289.00
Wordperfect V5.0	£299.00
Wordstar Professional 4	£269.00
Wordstar 2000 R2	£302.00
Wordstar 2000 Plus	£367.00
Microsoft Word 4	£340.00
Financial Planning	
Lotus 1-2-3 version 2.01	£256.00
Lotus 1-2-3 v2.01 3.5"	£256.00
Supercalc 4 R1.1	£256.00
Graphics	
Lotus Freelance Plus	£256.00
VGN Concorde	£357.00
Storyboard Plus	£156.00
Harvard Graphics V2.1 (Dual media)	£292.00
Integrated Software	
Smart System 3.1	£451.00
Framework II	£357.00
Symphony v1.2	£357.00
Data Management	
dBASE III Plus v1.1	£386.00
Paradox	£373.00
DataEase V5.3	£429.00
Desk-Top Publishing	
XEROX Ventura Publisher v1.2, including GEM Desktop	£576.00
Aldus Page Maker-PC V3.0, (needs Microsoft Windows)	£556.00
Microsoft Windows V2.03	£55.00
Microsoft Windows 386 V2.03	£120.00

AMSTRAD

Word Processors	
8256	£299.00
8512	£379.00
9512	£439.00
Desktops	
PC1512 dual drive/mono	£464.00
PC1512 10MB/mono	£679.00
PC1512 20MB/mono	£679.00
PC1640 dual drive/mono	£549.00
PC1640 20MB/mono	£799.00
Options for 1640	
Enhanced colour monitor	Add. £250
Printers	
DMP3000	£149.00
DMP3160	£169.00
DMP4000	£299.00
DMP3250	£169.00
LQ3500	£299.00
LQ5000	£369.00
Portables	
PPC1512 single drive	£339.00
PPC1512 dual drive	£469.00
PPC1640 single drive	£439.00
PPC1640 dual drive	£559.00
AST	
Premium 286 20Mb inc. mono monitor	£1795.00
Premium 286 20Mb inc. EGA monitor	£1999.00
Premium 386 40Mb 20MHz inc. mono monitor	£3949.00
Premium 386 90Mb 20MHz inc. EGA monitor	£4549.00

All systems include 102-key, 1.2Mb floppy drive and controller, MS-DOS, GW-BASIC and Documentation, Hard disk machines include Disk Cache software.

Details given in this advertisement may be subject to change without notice, so:

Please ring us today for the latest prices

A Division of Computacenter Limited.

Prices exclude VAT & Delivery

ALL MAJOR CREDIT CARDS ACCEPTED

All prices are subject to C.W.O.

ATT peripherals

CORPORATION

SPECIALISTS IN EXPORT

★ TOSHIBA ★

TOSHIBA T1000	£595
TOSHIBA T1200FB	£1080
TOSHIBA T1200HB	£1735
TOSHIBA T1600	£2359
TOSHIBA T3100	£1949
TOSHIBA T3200	£2749
TOSHIBA T5100	£3179
TOSHIBA T5200/1	£4629

★ COMPAQ ★

COMPAQ 286 20Mb	£1445
COMPAQ 386S 40Mb	£2245
COMPAQ 386/20E 40Mb	£2749
COMPAQ 386/25 60Mb	£3399
COMPAQ VGA MONO MONITOR	£127
COMPAQ VGA COLOUR MONITOR	£322
COMPAQ SLT/286 20	£2460
COMPAQ SLT/286 40	£2820
COMPAQ DOS	£52

★ MONITORS + TERMINALS ★

NEC MULTISYNC II	£455
NEC MULTISYNC XL	£1520
WYSE 60	£395
WYSE 700	£549
TAXAN 780 VGA	£405
VEGA VGA CARD	£215

★ IBM ★

PS-2 MOD 30-002	£799
PS-2 MOD 502	£1875
PS-2 MOD 60-041	£2099
PS-2 MOD 70-121	£3255
PS-2 MOD 80-111	£3499
VGA MONO	£149
VGA COLOUR	£349

★ PRINTERS & PLOTTERS ★

HP DESKJET	£595
EPSON LX 800	£195
EPSON FX 850	£345
EPSON FX 1050	£425
EPSON EX 1000	£545
EPSON LQ 1050	£575
STAR LC-10	£179
STAR LC-10 C	£209
STAR LC-24-10	£279
NEC P6 & P7	£POA
ROLAND PLOTTERS, HP PLOTTERS, FU- JITSU, BROTHER ETC.	

★ APPLE ★

MACINTOSH II MONO	£3940.00
MACINTOSH II COLOUR	£4265.00
MACINTOSH SE 20 Mb	£2264.00
MACINTOSH PLUS 1Mb RAM	£1200.00
IMAGEWRITER II	£365
IMAGEWRITER LQ	£806

RING NOW: 01-739 4596

ATT
peripherals Corporation Ltd

(T1) INDUSTRIAL UNITS STANWAY STREET LONDON N1 6RY
TEL: 01-739 4596 Telex 895 1182 GECOMSG



CALLERS BY APPOINTMENT ONLY

ATT Corporation Ltd PRICE GUARANTEE

PROVIDE A WRITTEN LOWER QUOTATION FROM AN AUTHORISED DEALER WITHIN 7 DAYS OF PURCHASE AND THE DIFFERENCE WILL BE REFUNDED!

CALLERS BY APPOINTMENT ONLY "PRICES SUBJECT TO FLUCTUATION. VAT NOT INCLUDED"

SPECIALISTS IN EXPORT

★ LASER PRINTERS ★

EPSON LASER GQ 3500	£1200
HP LASERJET II (ON SITE MAINT)	£1339
HP LASERJET II (Dual Bin)	£2050
BROTHER HL8 (NO TONER)	£1580
CANON MK II REVERSIBLE	£1855
QUME SCRIPT 3Mb	£3500
PANASONIC KX P4450 (DUAL BIN)	£1450

SCANNERS

HP SCANNER	£1550
CANON SCANNER	£860
APPLE LASERWRITER NT	£2999
APPLE LASERWRITER NTX	£3885

★ LASER ACCESSORIES ★

HP 1Mb UPGRADE	£350
HP 2Mb UPGRADE	£795
TONER CARTRIDGE	POA
TONER CART. BUNDLE PACK	£59
GQ TONER	£18
HARD FONTS FROM	£99
SOFT FONTS	£165
MS MOUSE	£102
LOGI MOUSE	£69
SOFTWARE	
VENTURA (BY XEROX)	£590
PAGEMAKER V3	£525
TIMWORKS (DTP)	£85
WORDPERFECT	£245

★ NOVELL NETWORKS ★

ADV NETWORK 286 V2.11	£1795
NETWORK INTERFACE CARDS	
ARXNET	£195
ETHERNET	£280
GNET	£280
PRONET-4	£564
PRONET-10	£365
TOKEN RING	£POA
S NET	£175

★ APRICOT Q1 ★

★ NEW PRODUCT ★

XEN SPC 386 16MHz P/white	£1650
XEN S240 x 386 16MHz P/white	£2350
XEN Q1 3300 VGA P/white	£2150
XEN Q1 350 VGA P/white	£2550
XEN Q1 650 VGA P/white	£2950
XEN Q1 1660 VGA P/white	£3450
XEN Q1 660i VGA P/white	£4215
For colour add	£250

FLOOR STANDING SYSTEMS

XEN 386 50Mb VGA p/white	£3050
XEN 386 50Mb VGA colour	£3250
XEN 386 100Mb VGA p/white	£3845
XEN 386 100 Mb VGA colour	£3945

★ DESKTOP PUBLISHING ★

COMPUTER APRICOT XENS 386 30Mb
80386 SX 30Mb 16MHz 1.4 drive
1Mb Compat P/white Mono

LASER PRINTER — HEWLETT-PACKARD (SERIES II)

8 Pages per minute
300 DPI
512k RAM/4mb — S/P Ports
Including Cable & Toner + 12 months on-site maintenance

SOFTWARE

Ventura Publishing
Microsoft Word V4

★ **£3750** ★

All products carry full manufacturers warranty

RING NOW: 01-729 7033

ATT Corporation Ltd

(T1) INDUSTRIAL UNITS STANWAY STREET LONDON N1 6RY
TEL: 01-729 7033 Fax: 01-739 3273 Telex 895 1182 GECOMS G



BACKUP your troubles **£29.95** in your old **CLIP** bag!

CLIP — THE BACKUP PROGRAM STANDARD

The PROBLEM —

Your free backup utility is slow, difficult to use, and can only restore files into ready-made directories.

It does not record its progress — so you backup everything to be safe.

Or nothing because it's such a bore.

CLIP has the longest track record of all backup programs and an enviable reputation for reliable service. Purchasers of 1000+ copies of CLIP include British Telecom, Philips and Ashton-Tate. B.P. Exploration have a worldwide licence. Only the best will do for back-up.

The SOLUTION —

CLIP keeps a log of its backups, so you can afford to be selective.

It maintains a menu of your customised commands, so you do not have to stop and think. It is fast, and it compresses data.

Result — fewer disks, less time, less effort, no worry, greater security.

- ★ High-speed data compression
- ★ Execute by highly visual Menu or by command line entry
- ★ On-line help at every point
- ★ Can select new files only
- ★ Multiple wildcard select, include or exclude basis.
- ★ Save to any media-floppy, hardcard Bernoulli etc
- ★ Save to remote/network drive
- ★ Restores directories + files
- ★ Recovery after media errors
- ★ Log of all backup operations

For an experimental period, CLIP 4.0L is offered at £29.95, (The previous advertised price was £67.85). Order now and prove that the trial price is the right one for you and us.

Available for PC/XT/AT and compatibles, PCDOS/MSDOS. Price includes VAT and UK postage. c.w.o.



KEELE CODES LTD

University of Keele, Keele, Staffordshire ST5 5BG, UK Tel: (0782) 629221 Telex: 36113



Almo Computer Systems

Proprietors: Mr. A.P. Bailey & Mrs M.H. Goble

0730 68877

New Year LASER SPECIAL: CANON SERIES II £1299 / PANASONIC KXP 4450 £1390

EPSON DOT MATRIX PRINTERS

LX800	(150/25cps)	£204
FX850	(240/40cps)	£328
FX1050	(240/40cps)	£428
LQ500	(150/50cps) 24 PIN	£285
LQ850	(220/73cps) 24 PIN	£471
LQ1050	(220/73cps) 24 PIN	£607
LQ2500+	(270/90cps)	£750
SQ2500	(270/90cps) P/S	£965
EX800	(300/50cps)	£448
EX1000	(300/50cps)	£593

JIUKI DAISYWHEEL PRINTERS

6200	(30cps) P	£307
6300	(40cps) P/S/IBM	£573
6500	(60cps) P	£737
7100	(24 PIN H/DUTY)	£446

OTC VERY HIGH SPEED D.M.P.

850XL	(850cps)P&S	£1471
2160	(600 lines per min)	£2979

NEC 24 PIN HEAD PRINTERS

P2200	(168/56) P	£273
P660+	(265/90) P * NEW *	£448
P760+	(265/90) P * NEW *	£579
P960XL	(384/128) P 136	£734

BROTHER DAISYWHEEL PRINTERS

HR20	(20cps)P/S	£320
HR40	(40cps) P/S	£716

Ask about BROTHER DMP's tool!

OKI MICROLINE DOT MATRIX

182	(120/60cps) P/I	£199
192	(240/33cps) P/I	£310
193	(240/33cps) P/I	£389
292	(300/100cps) Col	£443
293	(300/100cps) Col	£591
294	(400/100cps) Col	£810
390	(270/90cps)	£443
391	(270/90cps)	£584
393	(450/120cps) Col	£884

Ask about the new 320/321 series!

STAR DOT MATRIX PRINTERS

LC10	(120/30)	£180
LC10 Col	(120/30)	£208
LC24/10	(170/53) 24 PIN	£277
NR15	(240/60)	£413
ND15	(180/45)	£344
NB15	(300/100) 24 PIN	£676
NB24/10	(216/72) 24 PIN	£455
NB24/15	(216/72) 24 PIN	£551

P=Parallel, S=Serial, I=IBM, Col=Colour

LASER PRINTERS

Brother HL-8 Laser	£1616
Canon Series II *Incl*Toner	£1299
Canon Series IIT *Incl*Toner	£1739
Canon Series IIR *Incl*Toner	£1906
Citizen Overture 110 P&S	£1243
Epson GQ3500 (Std 1)	£1135
Hewlett Packard Series II	£1439
NEC LC866 LED	£2097
OKI Laserline 6	£1295
Panasonic KXP4450	£1390
Qume Crystal Print WP	£812
Qume Crystal Print Series II	£1074
Qume LaserTen +	£1915
Star Laser 8	£1353

POSTSCRIPT LASERS

NEC LC890 LED(P / Script)	£3147
QMS PS810 (P / Script)	£2903
Qume Script(Ten (P / Script)	£3076

CANON INK JET PRINTERS

BJ130 (220/110) BubbleJet	£632
---------------------------	------

DICONIX PORTABLE INK JET

Portable Ink Jet Batt/Main	£277
----------------------------	------

Ask about Hewlett-Packard Ink-Jets!

CITIZEN PRINTERS

120D	(120/25) P	£120
180E	(150/30) P * NEW *	£153
MSP15E	(160/40) P 136	£200
MSP40	(240/50) P	£287
MSP45	(240/50) P 136	£368
MSP50	(300/60) P	£375
MSP55	(300/60) P 136	£495
HQP40	(200/66)P&S 24 PIN	£375
HQP45	* Special * 24 PIN	£349
Premier 35 (35) P 136 Daisy		£401

SEIKOSHA DOT MATRIX

SP 180AI (100cps) P	£132
SP 1200 (120cps) P	£147
SL 80AI (135 cps) P 24 PIN	£250
MP1300 (300cps) P	£332
MP5300 (300cps) P 132	£443

ROLAND PLOTTERS

DXY1100 A3 Flat Bed	£620
DXY1200 A3 Flat Bed	£854
DXY1300 A3 Flat Bed	£1010
DPX2200 A2 Flat Bed	£2496
DPX3300 A1 Flat Bed	£3276
GRX 300 A1 Roll Feed	£3354
GRX 400 A0 Roll Feed	£4524

CANON BJ130 / NEW PANASONIC KXP 1124 24 PIN / H-P PLOTTERS / NEC P960XL

Access/Visa/Applecard accepted. All prices are exclusive of VAT. Telephone to confirm prices for other printers and accessories.

Prices correct at time of going to press. Cables from £20 extra. Carriage Printers £8, Laserprinters £15.

Terms cash with order - Mail order only

Phone (0730) 68877 16a College Street, Petersfield, Hampshire. GU31 4AD

E. & O.E.

LOWEST PRICES!

ORDER THE LATEST VERSIONS DIRECT FROM THE U.S.

- Fast Air Delivery To Your Door In 3-5 Days!
- No Extra Or Hidden Charges!
- Call Your Order In On Our Direct Freefone Hotline To Our U.S. Warehouse — Charge To Visa, MasterCard, Access or American Express!
- Customer Service Via Our Freefone Lines — Call The Number Below!
- All Countries Welcome!
- Save Up To 50% On Latest U.S. Software!
- Direct Ordering From Our Huge Range Of Latest U.S. Versions — It's Fast And Easy!
- New! Lower Carriage Cost! Carriage By Air Express Just £9 For Entire Order, Regardless Of Size!
- All Packages Are Brand New - Direct From The Publisher With Full Documentation!

**BUY AT
AMERICAN
PRICES**



VENTURA 2.0

NEW! Finally after years of development. Now with over 250 help menus. Short cuts that simplify selecting and building page designs. You can now import text and graphics from over 500 programs. Greatly improved over 1.1 Special £333

DESQVIEW 2.2

Bringing new power to DOS! A multitasking, multi-windowing software environment that gives you faster access to all of your programs. Desqview runs with more software than any other windowing environment. The most powerful operating environment on the market New Version £53

GOSCRIP

You've heard rumors and YES they are true. This powerful program turns your laser or dot matrix printer into a PostScript printer. 13 High quality Bitstream fonts - scale and rotate. Run - don't walk - run to your phone to order this program. £113

CLARION PROFESSIONAL DEVELOPER

The hottest program in the states. In one session you can design your application, prototype it, create source code, and compile and test. All in just a few hours. Don't miss this advanced programming tool £321

WORD PERFECT 5.0

This is the one you've been waiting for - it's in stock and ready for shipping. Word processing at it's best. Specifically designed to work with the leading graphics programs. The perfect word processor. £163

NORTON UTILITIES ADVANCED EDITION VERSION 4.5

Norton Advanced includes all the power you are used to in Norton Utilities, plus a wish list of technical features, functions and enhancements. The Norton Disk Doctor finds and fixes most disk errors. It also includes two invaluable books, the Norton Disk Companion and the Norton Troubleshooter. The advanced edition, a total solution that's perfect for everyone - from novice to expert New Version £54

FREEFONE

TELEPHONE:

0800 89 1073

DIAL EXACTLY AS SHOWN

**RING THE U.S. DIRECT AT NO COST
9 AM - 12 MIDNIGHT, LONDON TIME**

**FOR INFORMATION AND ORDERS
DIAL THE PHONE NUMBER ABOVE**

**EXACTLY AS SHOWN FROM ANY U.K. PHONE
— IT WILL RING THROUGH DIRECT TO OUR
U.S. WAREHOUSE AT NO CHARGE TO YOU —
CALL TODAY.**

SPREAD SHEETS

MS Excel 2.0 £215
MS Multiplan 3.04 £93
PFS Professional Plan 1.02 £45
Plan Perfect 3.0 £132

MULTI-TASKING

Desqview 2.2 NEW £53
MS Windows 286 2.1 £50
MS Windows 386 2.1 £90
MS Windows Tool Kit 286 2.1 £225
SCO Xenix/286 Base Operating System £281
SCO Xenix/386 Base Operating System £323

GRAPHICS

Deluxe Paint II *New Premium Pack* £45
Designer 1.3 NEW £280
Gem III Draw Plus 2.0 £113
Gem III Graph £113
Gem III Word Chart £79
Graph In The Box 2.0 £49
Harvard Graphics 2.1 £183
Harvard Graphics Business Symbols £43
Harvard Quick Charts £41
MS Flight Simulator 3.0 £29
PC Paintbrush Plus 1.5 £56
PFS First Pub Business Symbols £20
Printmaster Plus £25
Printshop £29
Publishers Paintbrush 1.52 £106
Stat-Graphics £288
VP Graphix 1.0 £47
Windows Draw! W/Clip Art 1.04 £127

INTEGRATED

Ability Plus 1.01 NEW £99
Enable O.A. NEW £266
MS Works 1.05 NEW £72
PFS 1st Choice 3.0 NEW £67
Q & A 3.0 £132
Smart System 3.1 *Multuser Ready* £295

INFORMATION MANAGEMENT

Clarion Personal Developer £73
Clarion Professional Developer £321
Harvard Total Project Mgr. III NEW £270

COMMUNICATIONS

Carbon Copy Plus 5.0 £78
Crosstalk Mark IV 1.0 £84

DESKTOP PUBLISHING

Fontasy 3.0 NEW £46
Gem Artline NEW £176
Gem Desktop Publisher 2.0 £113
Gem III Desktop 3.0 £26
GoScript £113
Newsmaster II £31
Newsroom Professional £34
Page Perfect £164
Pagemaker 3.0 £356
PFS First Publisher 2.0 £54
Timeworks Publish It £79
Ventura Publishing 2.0 £333

DATA BASE

Clipper . . . Sum '87 . . . Latest Version £279
Data Perfect 2.0 £194
DataEase £291
DB-XL Diamond 1.2 £83
Foxbase 386 2.1 Dev. Kit £198
Foxbase Multuser 2.1 Dev. Kit £198
Foxbase Plus 2.1 Dev. Kit £137
Genifer 2.0 £170
Lotus Agenda £183
R Base for DOS 2.11 £296
Rapid File 1.2 £126
Revelation Adv 1.1 Development £317
Revelation Adv Run Time £68

WORD PROCESSING

Displaywrite 4 1.0 £200
Framework III 1.0 NEW £294
Gem 1st Word Plus 2.0 £81
Grandview £114
MS Word 4.0 £152
Multimate Advantage II 1.0 £193
PFS Professional Write 2.0 £76
Q & A Write 1.01 £77
Right Writer 2.1 £38
Word Perfect 5.0 £163
Wordstar 2000+ Personal 3.0 £170
Wordstar Professional 5.0 NEW £166

UTILITIES

Bookmark 1.2 £41
Brooklyn Bridge w/Cable 2.0 £56
Carousel 2.0 £34
Copy II PC 5.0 £18
Copywrite £45
Cruise Control 3.02 £27
Desklink 2.0 NEW £67
Disk Optimizer 4.0 NEW £30
Disk Technician Advanced NEW £72
Fastback Plus 2.01 NEW £71
Gofer £31
Laplink Plus 1.35 £54
Mace Utilities 4.1 £37
Memory Mate 3.0 £30
MS Learning PC DOS 1.01 £26
Norton Advanced Edition 4.5 £54
Norton Commander 2.0 NEW £34
Norton Editor 1.0 £29
Norton Utilities 4.5 NEW £37
1 Dir Plus £35
PC Tool Deluxe 4.3 £29
QEMM 386 £21
QEMM 50/60 £21
Sideways 3.2 £30
Smartkey 5.2 £28
SQZ Plus 1.10 £41
Unlock Masterkey £37
Word Perfect Library 2.0 £54
X-Tree 2.14 £28
X-Tree Professional 1.0 £50

- PHONES OPEN 9 AM-12 MIDNIGHT, LONDON TIME
- MAIL & FAX ORDERS ACCEPTED
- CREDIT CARDS NOT DEBITED UNTIL DISPATCH
- PRICES SUBJECT TO CHANGE
- DEFECTIVE GOODS REPLACED QUICKLY & CHEERFULLY — CALL OUR FREEFONE LINE FOR ASSISTANCE

- RETURN AUTHORIZATION REQUIRED — CALL OUR FREEFONE LINE
- VAT NOT INCLUDED

IF THE PACKAGE YOU WANT IS NOT LISTED CALL FOR OUR LOW, LOW PRICE QUOTE: ALL SOFTWARE IS FOR IBM OR COMPATIBLE MACHINES

**U.S.
EXPRESS
TECHNOLOGY**

7850 E. Evans, Scottsdale, Arizona USA 85260
24 HR. FAX 010 1 602 998-8913
OFFICES 010 1 602 998-8894
"EXPORTERS TO THE WORLD"

OPTIMUM TECHNOLOGY

MORE THAN JUST LOWER PRICES!



OPTIMUM

WORD PROCESSORS

Gem 1st Word Plus	£165
Grammatik-III (Grammar Chk)	£89
Manuscript Rel.2	£279
Multimate Advantage-II (UK)	£279
MS Word V4 (UK)	£249
PFS: Professional Write V2	£245
O & A Write	£149
Sage PC-Write	£89
Samna AMI	ECALL
Smart Word Processor	£195
Sprint - Borland (UK)	£169
Volkswriter-3	£169
WordCraft 3.0	£349
WordPerfect V5 NEW! (UK)	£239
WordPerfect V5 Network	£395
WordPerfect Library	£89
WordPerfect Office Network	£345
Wordstar Prof V5 NEW! (UK)	£209
Wordstar 2000+Rel.3 (UK)	£249

DATABASES

Agenda (Lotus) NEW!	£249
ACT! NEW!	£395
Cardbox Plus V4 NEW!	£295
DataEase	£489
DataFlex	£545
DataPerfect	£349
db XL Diamond V1.2	£124
dBASE-4 NEW! (UK)	£395
dBASE-4 Developers Ed.	£695
Clipper - Summer '87	£369
Delta-V	£395
FoxBase+ V2.1 NEW! (UK)	£295
FoxBase+ 386 (UK)	£495
FoxBase+ Multi-User (UK)	£495
FoxBase+ Developers Ed.	£595
Gofer NEW!	£95
IZE - Persoft	£225
Paradox V2 (UK)	£295
Paradox 386 (UK)	£445
PFS: Professional File	£195
O & A V3 NEW!	£245
O & A 386	£245
Rapidfile V1.2	£245
rBase System-5	£395
Reference File	£95
Retrieve-III/IV - Sage	£189/£239
Smart Database	£295

SPREADSHEETS

Borland Quattro NEW!	£169
MS Excel (UK)	£295
Logistix	£89
Lotus 1-2-3 (UK)	£259
Lotus HAL	£98
Lotus Metro	£65
SeeMORE for 1-2-3 NEW!	£89
MS Multiplan	£139
PFS: Professional Plan	£189
PlanPerfect	£295
Smart Spreadsheet	£229
Supercalc-5 NEW! (UK)	£229

INTEGRATED PACKAGES

Enable V2 NEW!	£425
Framework-III (UK) NEW!	£349
Logistix	£89
MS Works	£135
Open Access-II Plus NEW!	£379
Smart System (Free Spell Chk)	£389
Symphony (UK)	£345
Psion Xchange	£245

MISCELLANEOUS

ACT! NEW! (UK)	£395
Autoroute NEW!	£124
Battery-Watch NEW!	£29
Brooklyn Bridge V2	£95
CopyII PC V5 NEW!	£47
CopyII PC Deluxe Option Bd	£95
DeskLink V2 NEW!	£129
DESView	£89
DESView Companions	£89
DESView OEMM	£44
Eureka (Borland)	£115
Fastback Plus	£139
Flight Simulator V3 NEW!	£39
Gofer - Text Retrieval	£95
Grammatik-III (Grammar Chk)	£95
Hard Disk Optimiser V1.5	£47
Lap-Link V2	£89
Lap-Link Plus	£99
DeskLink V2 NEW!	£129
MAC-Link	£99
MS Project V4	£249
MS Windows/286	£75/£75
MS Windows 386	£149
Norton Utilities V4.5 NEW!	£69
Norton Advanced V4.5 NEW!	£99
Norton Commander V2 NEW!	£55
Norton Editor	£87
Norton Guides	£87
Available for Assembler, C, Pascal & Basic	
Norton Guides OS/2	£87
PC Tools Deluxe V5 NEW!	£89
Sideways V3.2	£43
SideKick	£49
SideKick Plus	£115
WordPerfect Library	£89
Xtree	£47
Xtree Professional	£95

DTP

Aldus PageMaker V3 (UK)	£545
Byline - Ashton Tate	£179
Finesse	£95
Linotype PostScript Fonts	ECALL
PageAbility	£175
PagePerfect (IMS)	£295
PC Publishers Paintbrush	£195
PC Publishers Typefoundry	£295
PFS: First Publisher	£124
TimeWorks inc GEM-3	£109
Ventura XEROX V2 NEW!	£545

MICE & SCANNERS

Logitech Scanman NEW!	£195
Logimouse C7+ RS232	£79
Logimouse Bus	£89
Logimouse Hi Rez Bus	£119
Logimouse See-Thru	£95
Logimouse PS/2+ (2 button)	£79
MS Mouse - Standard	£119
MS Mouse - Windows	£145
MS Mouse - EasyCad	£159

MS MICE AVAILABLE IN RS232 SERIAL OR BUS

PROGRAMMING

BORLAND:	
Assembler Debugger NEW!	£115
Turbo Basic	£57
Basic Editor Toolbox	£57
Basic Database Toolbox	£57
Turbo CV2.0 NEW!	£79
Turbo C Prof. NEW!	£179
Turbo Pascal V5 NEW!	£79
Turbo Pascal Prof. NEW!	£179
Turbo Pascal Tutor	£57
Pascal Graphics T'box	£57
Pascal Database T'box	£57
Pascal Editor T'box	£57
Pascal Games T'box	£57
Pascal Numerical T'box	£57
Turbo Prolog V2.0	£89
Prolog Toolbox	£57
MICROSOFT:	
C V5.1 NEW! £10 carr	£249
Quick-C	£75
Quick-Basic	£75
Cobol	£449
Fortran	£295
Macro-Assembler V5.1	£99
Lisp	£185
Pascal	£229
PROSPERO:	
ProFortran-66	£295
ProFortran-77	£295
ProPascal	£86
PC Pascal	£86
PC Fortran	£113

DTP/GRAPHICS

Ashton-Tate MasterGraphics	£345
Autosketch	£75
Davrelle	£395
DesignCad-2D	£269
DesignCad-3D	£369
Draw Applause NEW!	£445
GEM - see Gem Section...	
Harvard Graphics V2.1	£349
Harvard Utilities Pak	£195
Harvard Utilities Available Separately	
Lotus Freelance Plus	£279
Lotus Graphwriter-II	£345
PC Paintbrush Plus	£118
PC Publishers Paintbrush	£195
PC Publishers Typefoundry	£295
PFS: First Graphics	£119
TurboCad	£95

GEM

Optimum - Gem Authorised!	
Gem Artline NEW!	£445
Gem Desktop Publisher	£295
Gem Draw Plus	£163
Gem 1st Word Plus	£145
Gem Font Editor	£95
Gem Graph	£145
Gem Presentation Team	£345
Gem Scan	£95
Gem WordChart	£124

PROJECT

Harvard Total Project-II	£490
Microsoft Project	£249
MS Project Network 5-user	£995
Quick Schedule Plus	£74
SuperProject Plus	£349
SuperProject Expert	£495
Time-Line - Symanic	£395

DATA MANAGEMENT

ACT!	£395
Agenda - Lotus	£249
Grandview - Symanic	£249
IZE - Persoft	£249
SPSS/PC+ Data Analysis	£545

All SPSS products available

SAGE

Accountant	£129
Accountant Plus	£169
Bookkeeper	£89
Chit-Chat	£79
Desk-Set	£69
Financial Controller	£225
Payroll-2	£139
PC-Planner-II	£89
PC-Write	£89
Retrieve-III	£189
Retrieve-IV	£239

POWER-UP

Calendar Creator Plus	£49
DOS Director	£39
Financial Reporter	£49
Forms File	£59
Forms Finisher	£69
Grid Designer	£49
Keyboard Master	£49
Labels Unlimited	£49
Org Plus	£74
Present It	£74
Quick Schedule Plus	£74
Sign Designer	£39

GRAPHICS BOARDS

Hercules Graphics Plus	£179
Hercules InColor	£249
Hercules Color	£129
Orchid VGA	£269
Orchid Designer VGA	£295
Vega EGA	£129
Vega VGA	£279
Vega Fastwrite VGA	£329
Vega VRAM VGA	£475
Wonder EGA	£195
Wonder VIP VGA	£295

OPTIMUM TECHNOLOGY LTD

Rowlandson House, 289-293 Ballards Lane, Finchley
London N12 8NP ENGLAND

Sales Desk: Phone 01-446 2223 Fax 01-446 2224
Telex 923729 (ROLAND-G)

LISTED BELOW IS JUST A SELECTION
FROM OUR WIDE RANGE OF PRODUCTS
(from legitimate UK sources - NO 'GREY' IMPORTS!)

FEBRUARY'S OPTIMUM CHOICE

COMMS SOFTWARE

Carbon Copy Plus V5 (each)	£145
Chit-Chat - Sage	£79
Crosstalk-4	£139
Crosstalk-16 V3.62UK	£99
DataTalk	£129
DeskLink V2 NEW!	£129
Lap-Link V2	£89
Lap-Link Plus	£99
Mirror-11 V3.6.12UK	£69
Multicom Plus	£245
PC Anywhere V3	£114
SmartTerm - various.	ECALL
Remote-2	£124
Smartcom-III	£149
Transporter	£169

SPECIAL PRODUCTS

British Telecom CF9 Fax	£895
Dowty Telex	£849
HP Jetscript PostScript	£1745
Postscript upgrade for HP Series-II	
JT-FAX Fax Card	£289
TD400 Teletext Receiver	£179

DICONIX (KODAK)

Award winning portable/silent printers from Kodak
Available in serial or parallel versions.

Diconix 150 (portable A4, NLO etc)	£295
Diconix 300 (desktop A4, NLO etc)	£395
Diconix 300W (wide carriage etc)	£495

INTEL

Optimum - Intel Authorised
We supply genuine Intel parts of superb quality - they all come with a five year warranty. All RAM in our Intel boards are also Intel.
Intel - not the cheapest - but certainly the best!

Maths Co-Processors	
8087	£93
8087-1/2	£179/£129
80287-6/8	£139/£195
80287-10	£279
80387-16/-20	£345/£545
80387-25	£795
80387-5X	£395

Above Board Plus	
Above Board Plus 512K	£445
Above Board Plus 2MB	£1245
2MB Piggyback Card	£1245
6MB Piggyback Card	£2445

Inboard 386 PC-AT	
INBOARD 386/AT 1MB	£1295
INBOARD 386/PC 1MB	£749

Please phone for memory expansion of the Inboard 386.

COMMS HARDWARE

Please phone/write for advice/datapaks on all your communications needs.

MODEMS SELECTION: All our modems are Auto-Dial & Auto-Answer and have BABT approval. Most modems are Hayes compatible. All modems are BABT approved.

Baud Rates are: V21=300/300
V23=1200/75 V22=1200/1200
V22bis=2400/2400.
MNP=Error-Correction. MNP provides automatic constant transparent error-free data even when in 'Terminal' mode.

We supply a wide range of modems including the full range from Tricom/Racal/Steebek/Dacom/PC etc etc.

MODEM CABLES: IBM-PC £15 IBM-AT £23

AMSTRAD:	
MC2400 Internal	£195
SM2400	£249

DACOM:	
Unity Gold V21/22/23 Int.	
Unity Quad V22bis/22/23/21 Int & Soft	£569
MNP 2424 V22bis/22 MNP-4	
QUAD PLUS V22bis/22/23/21 MNP-5	£569

DATAFLEX:	
Stradcom V22/21 Internal	£169
Pocket Stradcom V21/22	£195
Biscom V22bis/V22 Internal	£239
Biscom MCA (PS/2)	£489
Quadcom V22bis/22/21/23 Internal	£289

DOWTY:	
Trio V22/21/23	£495
Quattro int or ext V22bis/22/23/21+MNP	£589
QuattroCard + V29/22bis/22/21/23/MNP-5	£695
TraillBlaser 18000 Baud!	£1245

HAYES:	
Smartmodem 1200 V22/21/23	£395
Smartmodem 1200B V22/21/23	£395
Smartmodem 2400 V22bis/22	£595
SmartCom-III Software	£149

MIRACOM:	
WS4000 V21/23	£129
WS3000 V22/21/23	£289
WS3000 V22bis/22/21/23	£395
KEYCARD 3000 V22-11/23 Internal	£289
KEYCARD 3000 V22bis/22/21/23 Int	£395
COURIER 2400e V22bis MNP-5	£645
COURIER HST 17,000 Baud MNP-5	£945

PACE:	
Linnet V21/23	£139
Linnet Card V21/23	£145
Linnet 1200 V22/21/23	£229
Series-4 2123S V21/23	£259
Series-4 1200S V22/21/23	£349
Series-4 2400S V22bis/22/21/23	£429
E.C.U. Error Corr. Unit MNP-4	£149

PC COMMUNICATIONS:	
Breakout 2400(X)	
V22bis/22/21/23	£795
Mass Breakout 2400	£1145

TRICOM:	
4B/24 V22bis/22/21/23 MNP-4	£645
4B/24 V22bis/22/21/23 MNP-5	£689
24/12 V22/21/23 MNP-4	£545
24/12 V22/21/23 MNP-5	£595
TORNADO 19,000V22bis/22 MNP-5	£1295

FREE ANALOGUE LCD 'FLOPPY CLOCK'!

The 'limited edition' Optimum Floppy Desk Clock - an analogue display LCD clock - quartz precision and a unique design. Why 'floppy'? You will find out!.....

(One per customer, orders over £60+VAT, while stocks last!)

TD400 TELETEXT CARD - £179! - (RRP £279!)

For the price of a cheap modem you can receive free data! Quantity purchasing has allowed us to reduce the price of this unique product from £279 to £179! No costly phone bills - no expensive 'Reuters' feed. Simply install the card in the 8-bit slot of your PC, plug in an antenna and get rapid access to the vast range of free CEEFAX and ORACLE data - even use it within your other applications. Please phone for details.

NORTON COMMANDER V2.0 - NEW!

InfoWorld called it "tops in its class.. a new level of convenience for MS-DOS users."

PC BUSINESS WORLD said "The Norton Commander V2.0 is a near-perfect product and stands out as the base all-around DOS

shell in the market. The product is loaded with features, is extremely powerful, and yet it remains very easy to learn and use. If you find yourself spending too much time struggling with file management, this is the product to buy."

JT-FAX from Quadram - £289!

A fax card at a break-through price. It won the PC Magazine's Editors Choice - they said "Simple to use, works well and best of all is easy on the budget".

The JT-Fax creates full Group-III facsimile capability in PC's. It takes your document right from your disk or scanner, or even lets you 'print' from most word processors, spreadsheets and other software. Then it transmits them. It can merge text and graphics files, so you can add your letterhead and signature to fax correspondence.

The JT-FAX also has advanced features like phone directory, scheduling, transaction log and broadcast. Incoming documents can be displayed on screen, printed on a dot matrix or laser printer, stored as graphics files or re-transmitted...Please phone for leaflet.

DICONIX PRINTERS

"A pleasure to use" BYTE. "Virtual silence is one of joys of using a Diconix... An advanced ink-jet printer at a bargain price." PC-USER

GEM ARTLINE - NEW!

As last months PCW (Jan '89) put it "All criticism aside, there is nothing in the PC market to touch it." PC USER had similar words: "A very significant graphics package ... Graphics to rival the MAC ... probably the most exciting graphics program yet seen to run under DOS". Artline does not use bit-mapping so its resolution is dependant only on the resolution of the output device. A package for the serious professional user!

MIRACOM PRICES DOWN!

Quality modems at budget prices! - the WS4000 at £129! - the WS3000 Professional V22bis 2400/2400 at only £395!

FREE SHORTFORM CATALOGUE DATAPAKS AND ADVICE.

on products of interest. Simply write or phone for advice or data.

YES!

PLEASE RUSH ME:

The following good(s):

A FREE Datapak on:

A FREE Shortform Catalogue

I enclose £

inc carriage, then VAT.

Access Card No.



Name:

Address:

Phone No:

UK Carriage: Standard carriage for single items usually £5+VAT - Certain larger or fragile items have a £10+VAT charge (e.g. modems, dBASE, Excel, Symphony, MS'C, etc).

An Express service for more urgent items is available at £10+VAT. Export Carriage: Please contact us. No VAT is charged if we send direct.

Please Note: All goods are for IBM-PC and 100% compatibles - software is in 5.25" format unless otherwise ordered. Prices/specifications liable to change without notice. Please telephone before collecting goods.

The above is just a sample of goods that we supply - please phone or write to enquire about other items. Ask for a copy of our latest shortform catalogue. All our products are from legitimate UK sources - NO 'GREY' IMPORTS!
We welcome official PLC, Govt, Educational, Local Authority orders etc.
Proforma Invoices available on request.
All prices are ex-carriage and VAT.

SUPER LABELLER

**NEW VERSION 3
MORE FEATURES
ADDED**
Please Call for Details

Fast . . . Flexible . . . Efficient . . . THE PROFESSIONAL LABELLING SYSTEM

PRINTING

- UNRIVALLED printing facilities are provided offering TOTAL FLEXIBILITY. These include:
 - PRINT A SINGLE LABEL ANY NUMBER OF TIMES
 - PRINT GROUPS OF LABELS USING "WILDCARDS" ANY NUMBER OF TIMES
 - PRINT GROUPS OF LABELS SPECIFYING THE NUMBER TO PRINT FOR EACH LABEL
 - PRINT ACCORDING TO SEARCH CRITERIA ANY NUMBER OF TIMES
 - PRINT ANY LINES OF THE LABELS IN ANY ORDER
 - IGNORE ANY LINES OF THE LABEL
 - PRINT ONTO ANY SIZE LABEL
 - ANY NUMBER ACROSS THE WEB
 - ANY MARGIN SPACE AND GAP SETTINGS
 - ANY TYPESTYLE YOUR PRINTER IS CAPABLE OF (INCLUDING COLOUR)
 - PAUSE PRINTING BETWEEN EACH LABEL
 - DIFFERENT TYPESTYLES AND BARCODES MAY BE MIXED ON THE SAME LINE WITHOUT EFFECTING ACROSS THE WEB PRINTING
 - PRINTOUTS CAN BE AS LABELS, A COLUMNISED LIST OR COMPRESSED (SCRUNCHED) FORMAT USING ANY LINES OF THE LABEL IN ANY ORDER.
 - OUTPUT CAN BE SENT TO A FILE, ANY PRINTER OR SCREEN.
- A UNIQUE feature to SUPER LABELLER is the REQUEST command. This allows text to be merged into a label or text file "LIVE" from the keyboard while printing.

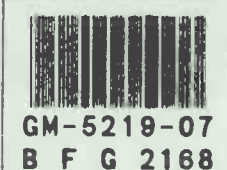
BAR CODES

BAR CODES are offered as an option and once again offers TOTAL FLEXIBILITY.

BAR CODE formats can be defined EASILY in a FEW MINUTES and stored on disc for use at any time. An UNLIMITED number of different BAR CODE standards can be created or indeed your own system can be designed.

BAR CODES are printed using the graphic capabilities of your printer and may be positioned anywhere on the label freely mixed in with normal text, WITHOUT effecting across the web printing.

The BAR CODE RATIO is user definable, to give a magnification effect.



Price now includes ready made Bar Code Drivers for producing:
EAN8 1TF
EAN13 CODE 39
UPC 2 OF 5
CODABAR.
Others are being added regularly
Please Phone for up to date details.

MAIL MERGE

As well as addressing your envelopes, SUPER LABELLER incorporates a comprehensive MAIL MERGE facility which will accept ANY standard text file. You can merge in:

- ANY LINES OF A LABEL, ANY NUMBER OF TIMES IN ANY ORDER.
- DAYS, DATES AND TIMES.
- PRE-SET MESSAGES (16).
- SERIAL NUMBERS (2).
- PRINTER CONTROL CODES (UNLIMITED).
- BAR CODES (UNLIMITED).

In fact ALL the advanced features available for use on a label are also available to use with MAIL MERGE.

ANY number of copies of the text file can be specified and output can be sent to the SCREEN, PRINTER or FILE.

Labels for merging can be selected by "WILDCARDS", INDIVIDUALLY or by GROUP allowing for UNLIMITED CATEGORISATION.

Furthermore the advanced SEARCHING FACILITIES allow selected data to be found and merged according to virtually UNLIMITED criteria.



SERIAL NUMBERING

SERIAL NUMBERING is an important feature of SUPER LABELLER and this facility is TOTALLY CONFIGURABLE.

There are TWO INDEPENDENT SERIAL NUMBERS associated with each label file and each can individually be set to have its own characteristics.

- START AT ANY NUMBER
- ANY NUMBER BASE
- ANY INCREMENT (+ or -)
- ANY NUMBER OF LABELS WITH THE SAME NUMBER
- FORMATTED TO ANY NUMBER OF DIGITS BETWEEN 2 AND 12
- LAST NUMBERS SAVED WITH FILE

0012345

ABC00001

00ABC11

FILES

Each group of labels are stored together in a common file and there may be as many files as will fit on your disc.

ANY file can hold up to TEN THOUSAND labels, all held automatically in SORTED ORDER by name.

Typically, even with TEN THOUSAND labels in a file, SEARCHING and SORTING takes no more than a FEW SECONDS.

A new file can be set up in SECONDS and requires NO COMPLEX CONFIGURATION. Indeed you only need to specify the maximum characters required per label and the name you wish to call your file.

FILE IMPORT
SUPER LABELLER has comprehensive file import capabilities allowing for the import of data for files held as:

- ★ STANDARD ASCII
- ★ COMMA DELIMITED
- ★ COMMA QUOTE DELIMITED
- ★ BLANK LINE DELIMITED

Labels can be named and categorised MANUALLY or AUTOMATICALLY.

SEARCHING

SUPER LABELLER incorporates an ADVANCED ENGLISH TEXT SEARCH feature allowing for multiple AND OR and NOT (AVOID) operations. Below is an ACTUAL EXAMPLE of this facility to demonstrate the power.

IGNORE CASE

PLEASE FIND HOUSE ON LINES 1, 2
OR FIND BUNGALOW ON LINE 1
BUT AVOID FLAT ON ALL LINES
AND FIND LONDON ON LINES 1, 6, 8
BUT AVOID CHELSEA AND AVOID ISLINGTON

This can be used both for SELECTIVE PRINTING of labels and MAILMERGE. Furthermore this can be combined with the "WILDCARD" feature to allow UNLIMITED CATEGORISING.

LABEL EDITING

A BARRAGE of editing facilities are available to SUPER LABELLER to ease data entry and modification. It includes features that would compare favourably with many word processors as well as DEDICATED FUNCTIONS designed specifically for use with labels. The list includes:

- VISIT A LABEL - Allows you, while editing, to quickly visit another label (for example to view the contents or to cut and paste) and then return to the original.
- COPY CURSER - AN EXTREMELY USEFUL aid to editing which allows a secondary cursor to move freely anywhere on the screen and "pick-up" characters as though they had been typed. This keeps TYPING TO A MINIMUM by avoiding the need to retype duplicated words or sentences.
- IT is also used to pick up graphic characters to be used for drawing.
- FIND AND REPLACE TEXT - This can be performed by scanning both FORWARD and BACKWARD through the labels.
- CHANGE SIZE OF LABEL - The size of the label can be changed at ANY TIME from within the editor at a key stroke.
- EXPANSION KEYS - The ten function keys can be set so a single keypress "EXPANDS" into a WORD or SENTENCE again to minimise typing.
- QUICK SHOT - Allows the current label being edited to be printed to see instant results.

EMBEDDED COMMANDS

SUPER LABELLER offers many special features by allowing COMMANDS to be embedded within a label or text file. This offers print time facilities of UNRIVALLED FLEXIBILITY. For instance:

- TWO INDIVIDUAL SERIAL NUMBERS
- DATE AND DAY STAMPING
- TIME STAMPING
- REQUEST TEXT FROM KEYBOARD DURING PRINTING
- BAR CODES
- MERGE PRE-DEFINED TEXT
- PRINTER CONTROL CODES

COMPLETE control over the printer is allowed by USER DEFINABLE PRINT CODES. Furthermore, the COMMANDS for each printer function can have any name you choose. This allows customisation of any special facilities your printer provides. If your printer supports colour you could create COMMANDS such as RED, GREEN, BLUE and so on.

IMPORTANT

SUPER LABELLER is the culmination of TWO AND A HALF YEARS of producing FAST, EASY TO USE, SPECIALIST LABELLING SOFTWARE.

First time users are guided through the program with PULL DOWN MENUS and EXTENSIVE HELP.

Experienced operators have the UNPRECEDENTED opportunity to leave the menu system and PROGRAM DIRECTLY using the powerful MASS-FORTH operating system, allowing new commands to be created at will.

DRAWING UTILITY

All printable characters are available for use on a label and selection of the required graphics character comes from an EASY TO USE PULL DOWN GRAPHICS CHARACTER WINDOW.

The cursor keys are used to "DRAW" your designs. This feature can also be used to obtain FOREIGN CHARACTERS that are not normally available from the keyboard.



FREEPOST (PCW FEB)
53 DEREHAM ROAD
NORWICH
NR2 4BR
TEL: (0603) 630768

NO STAMP REQUIRED

SUPER LABELLER V3

£49.99
+ 7.50 VAT

SUPER LABELLER V3
INCLUDING BAR
CODE UTILITY

£99.99
+ 15.00 VAT

24 HOUR ORDERING SERVICE



CORPORATE DEALS
AVAILABLE INCLUDING:
INSTALLATION (PLUS
SOFTWARE CUSTOMISATION IF
REQUIRED) PRODUCT
SUPPORT AND TUITION

PRICES FROM
£295.00

MAIN TRADE DISTRIBUTOR
M.D.P. Ltd.
37 Gt. Pulteney Street
Bath BA2 4DA
Tel: 0225 60491 Fax 0225 69775

AVAILABLE FOR
ALL PC's AND COMPATIBLES
USING DOS-3 OR ABOVE

TOSHIBA PORTABLES

T5200: 20MHz 386 100MB
 T5100: 16MHz 386 40MB
 T3200: 12MHz 286 40MB
 T3100e: 12MHz 286 20MB
 T1600: 12MHz 286 20MB
 T1200HB: 10MHz 8086 20MB
 T1200FB: 10MHz 8086 2x720k
 T1000: 4.77MHz 8088 720k
 CALL FOR BEST TOSHIBA PRICES

AST COMPUTERS

286 10MHz 1MB Ram 40MB HD 28ms 1,499
 286 10MHz 1MB Ram 20MB HD 65ms 1,399
 386 20MHz 1MB Ram 40MB HD 28ms 2,295
 386 20MHz 2MB Ram 90MB HD 18ms 2,895
 All AST's include 14" FST Mono
 Monitor, ser/par, MS DOS 3.3

TANDON COMPUTERS

PCA20: 8MHz 286 1,160
 PCA40 PLUS 10MHz 286 1,445
 PCA20 PLUS 10MHz 286 1,299
 TARGET 20 PLUS 10MHz 286 1,390
 TARGET 40 PLUS 10MHz 286
 PAC 286 1.2 10MHz 286 1,345
 386 16MHz 40MB HD 2,099
 386 20MHz 40MB HD 2,750
 All Tandon's include 14" Mono
 Monitor, MD DOS 3.3 MS Windows

MONITORS & ADAPTORS

NEC Multisync II 454
 Sony CPD 1402E Multiscan 540
 Taxan Multiscan 770 489
 Video 7 Vega VGA 199
 ATI VIP VGA Card 199

DOT MATRIX PRINTERS

Epson LQ2550 895
 Epson LQ1050 578
 Epson LQ850 450
 Epson LQ500 279
 Epson FX1050 408
 Epson FX850 313
 Epson LX800 179
 NEC P6 Plus 454
 NEC P7 Plus 587
 Star LC10 185
 Star LC24-10 289
 DICONIX 150 portable 279

LASER PRINTERS

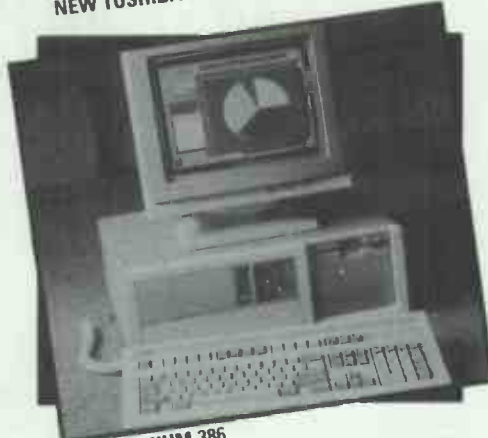
HP DESKJET 575
 *HP Laseejet II 1,399
 *Panasonic KXP 4450 1,499
 *Star Laserprinter 8 1,399
 Toshiba Pagelaser 12 1,745
 Canon LBP8 II 1,399
 (*inc. 1 year on-site warranty)

MEMORY BOARDS

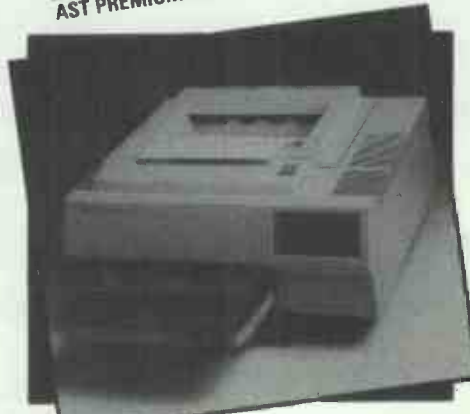
Intel Above board 286 2MB RAM 625
 AST Rampage 286 2MB RAM 695
 AST Rampage/2 (xt) 2MB RAM 575
 Micron 2MB RAM 286/386 749



NEW TOSHIBA T1600



AST PREMIUM 386



HP LASERJET II



INTEL ABOVE BOARD 286 2MB RAM 625

TOP SOFTWARE

Dbase 4	350
Lotus 1-2-3	260
Lotus Agenda	220
MS Excel	260
MS Windows 2	65
MS Windows 286	65
MS Windows 386	99
MS Word 4	260
Nortons Advanced Utilities v4.5	75
Nortons Utilities v4.5	50
Pagemaker v3	475
Ventura Publisher v2 (UK)	545
Word Perfect v5	229
Wordstar Professional v5	210

BORLAND SOFTWARE

Turbo C v2	65
Turbo Pascal v5	65
Turbo Basic v1.1	42
Turbo Prolog v2	65
Turbo Pascal Professional	139
Turbo C Professional	139
Turbo Pascal developers library	155
SPRINT	135
Sidekick PLUS	89
Quattro	89
Reflex	65

Pascal, Basic, Prolog toolbox's PHONE!

MOUSE DEVICES

Microsoft Mouse (bus/serial)	95
MSC PC Mouse (bus/serial)	89
Logitech Mouse (bus/serial)	65

DISK DRIVES

Seagate ST225 20MB HD 65ms	155
Seagate ST251 40MB HD 40ms	255
Seagate ST251-1 40MD HD 28ms	295
Seagate ST4096 80MBHD 28ms	495
3.5" 1.44MB floppy drive	99
3.5" 720k floppy drive	89
1.2MB 5.25" FLOPPY	75
360k 5.25" floppy	65
WDXT-GEN	45
WD1002A-WX1	60
WD1003-WAH	89
WD1003-WA2	99
WD1007-WAH ESDI 1:1 interleave	175
WD1007-WA2 ESDI 1:1 interleave	195

COMMUNICATIONS

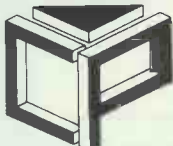
Pace Linnett v21,23	119
Pace Linnett V21,22,23	189
Pace series 4 v21,22,23	310
Pace series 4 v21,22,23,22bis	379
Amstrad SM2400 external	235
Amstrad MC2400 internal	185
Dowty Quattro	575
Stradcom Pocket	165
Tricom 4824 MNP	575

INTEL CO-PROCESSORS

8087 5MHz	95
8087 8MHz	125
80287 6MHz	135
80287 8MHz	185
80287 10MHz	225
80387 16MHz	305
80387 20MHz	435
80387 25MHz	595

Prices are subject to alteration. Goods subject to availability

COMPUTER
PRECISION



Official orders are accepted from GOVERNMENT & EDUCATIONAL AUTHORITIES & PLC's price exclude VAT.
 EXPORT enquiries welcome

Comprehensive services include: Consultancy, Demonstrations & Hotline Support



01-226 3043

Telex 268048 EXTLDN FAX 01-226 7948



COMPUTER
PRECISION



COMPUTER PRECISION LIMITED, 271 UPPER STREET, ISLINGTON, LONDON N1 2UQ

**GOVERNMENT,
EDUCATIONAL &
OVERSEAS ORDERS
WELCOME**

**RSC
LIMITED**

**ALL PRICES
EXCLUDE VAT
FREE DELIVERY
(UK MAINLAND)**

All prices subject to change without notice.

LATEST AMSTRAD PRICES · LATEST AMSTRAD PRICES · LATEST AMSTRAD PRICES · LATEST AMSTRAD PRICES

AMSTRAD PC 2086



THE RSC PRICE PROMISE
RSC will beat any currently advertised
and in stock price on the Amstrad PC2000 series

SD=Single Drive DD=Double Drive HD=Hard Disk All systems come with monitors. 12MD=12" Mono display 14CD=14" Colour display 12HRCD=12" High resolution colour display.

The 2086 is the first of Amstrad's new range of machines aimed at the higher end of the PC/XT market, using the Microsoft MS-DOS 3.3 operating system. The PC2086 also features Microsoft Windows.

SPECIFICATIONS

- 8Mhz 8086 CPU ● parity checked RAM ● 720K 3.5" Disk Drive ● 30Mb hard disk option
 - VGA compatible with full EGA/VGA/Hercules compatibility ● 3 expansion slots
 - Built in adapter for 5.25" or 3.5" disk drives or tape streamer.
- | | | | | | |
|----------------------|------|----------------------|-------|--------------------|-------|
| PC2086 SD12MD..... | £599 | PC2086 DB12MD..... | £749 | PC2086 HD12MD..... | £999 |
| PC2086 SD14CD..... | £749 | PC2086 DD14CD..... | £899 | PC2086 HD14CD..... | £1149 |
| PC2086 12HRCD..... | £849 | PC2086 DD12HRCD..... | £999 | PC2086 12HRCD..... | £1249 |
| PC2086 SD14HRCD..... | £949 | PC2086 DD14HRCD..... | £1099 | PC2086 14HRCD..... | £1349 |

RSC'S OWN COMBINATIONS (inc. Western Digital Hard Cards).

Amstrad 2086 SD12 MD + 32Mb H/Card..	£815.00	Amstrad 2086 SD12HRCD + 32Mb H/Card..	£1060.00	Amstrad 2086 DD12MD + 32Mb H/Card..	£960.00	Amstrad 2086 DD12HRCD + 32Mb H/Card..	£1200.00
Amstrad 2086 SD14CD + 32Mb H/Card..	£960.00	Amstrad 2086 SD14HRCD + 32Mb H/Card..	£1150.00	Amstrad 2086 DD14CD + 32Mb H/Card..	£1110.00	Amstrad 2086 DD14HRCD + 32Mb H/Card..	£1300.00

EDUCATIONAL, CORPORATE, OR VOLUME PURCHASERS PLEASE CALL FOR ASSISTANCE.

AMSTRAD PCW RANGE

PCW8256 offers a high resolution monitor, a full QUERTY keyboard and near letter quality dot-matrix printer with lacoscript and CP/M+ operating system.

RSC Price.....£325.00

PCW8512 same as above but with 512KRAM and a 1MB second disk drive.

RSC Price.....£415.00

AMSTRAD PCW9512

- Daisywheel printer with exchangeable daisywheels.
- 512K RAM and paper white high resolution monitor.
- Restyled case with PC type keyboard.
- Lacoscript 2 - Lacospell - Lacomail.

RSC Price.....£439.00

AMSTRAD PC1512

- 1512 RAM main memory
- Comes complete with mouse and gem software
- Complete IBM PC software compatibility with microsoft MSDOS 3.2 and Digital.

Amstrad PC1512 SD Mono.....£390.00

Amstrad PC1512 DD Mono.....£480.00

Amstrad PC1512 SD Colour.....£490.00

Amstrad PC1512 DD Colour.....£575.00

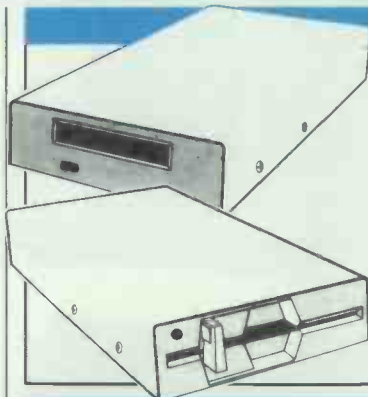
Free with every PC1512 4 US gold games and ability package.

In stream with our policy to not only remain competitive in our pricing - RSC is giving with every purchase of a PC1512 or PC1640 (regardless of what is already bundled) - Lifetree Volkswriter deluxe (a powerful word processor).

ALL AT NO EXTRA COST



PC 2086 ADD-ONS



RSC-TS40E External 40 Mb Tape Streamer for the PC 2086. Features include: Super Slim Compact Design, Power taken direct from computer terminal. Uses Industry Standard Data Cartridges. Includes Management Software.....£269.00
CDC2000 40 Mb Data Cartridges (for above).....£18.00

RSC-FD16 External 5 1/4" 360k Disk Drive for the PC 2086. Draws power direct from computer terminal.....£89.00

CA23 2086 Monitor Extension.....£8.50

CA24 2086 Keyboard Extension (6 feet).....£5.50

CA25 2086 Mouse Extension (6 feet).....£7.50

AMSTRAD PC1640

The PC1640 is an advanced professional computer that offers outstanding value for money:
640K RAM of main memory
Choice of one or two 360K 5.25" floppy drives or one floppy drives with 20MB hard drive.

Runs at twice the speed of many competitors.

Amstrad PC1640 SD/MD Mono.....£490.00

Amstrad PC1640 DD/MD Mono.....£569.00

Amstrad PC1640 SD/CD Colour.....£580.00

Amstrad PC1640 DD/CD Colour.....£665.00

Amstrad PC1640 SD/ECD Enhanced.....£678.00

Amstrad PC1640 DD/ECD Enhanced.....£755.00

GENUINE AMSTRAD HARD DISK MACHINES

Amstrad PC1640 HD20/MD Mono.....£865.00

Amstrad PC1640 HD20/CD Colour.....£995.00

Amstrad PC1640 HD20/ECD Enhanced.....£1135.00

RSC'S OWN COMBINATIONS

PC1512 SD Mono + 32MB Card.....£625.00

PC1512 SD Colour + 32MB Card.....£720.00

PC1512 DD Mono + 32MB Card.....£710.00

PC1512 DD Colour + 32MB Card.....£805.00

PC1640 SD/MD Mono + 32MB Card.....£725.00

PC1640 DD/MD Mono + 32MB Card.....£790.00

PC1640 SD/CD Colour + 32MB Card.....£810.00

PC1640 DD/CD Colour + 32MB Card.....£895.00

PC1640 SD/ECD + 32MB Card.....£915.00

PC1640 DD/ECD + 32MB Card.....£990.00

ALL PRICES EXCLUDE VAT

Telephone: (0923) 243301

(24 HOURS)

FLOPPY DRIVES FOR 1512/1640

Amstrad FD3 Second Disk Drive for 1640/1512.. £130.00
 RSC FD6 3.5" Second Drive for PC 1640/1512.. £89.00
 RSC FD10 External 3.5" Drive for PC 1640/1512 £89.00

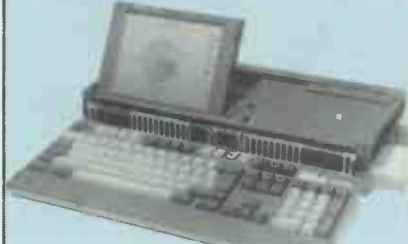
AMSTRAD PORTABLES

NEW PORTABLE PC

Free box of 3.5" disks

Amstrad PPC640 Portable power at a take away price.

PPC512S single disk.....£385.00
 PPC512D Double disk.....£475.00



PPC640S Single disk with modem.....£450.00
 PPC640D Double Disk with modem.....£565.00
 FDS second disk drive for PPC.....£115.00

EPSON

Handling simple text. 8088, 10/4.7MHZ. MSDOS 3.2, (inc diagnostics) 640KRAM, 1x2D hard disk, 1x 360K floppy disk 5 slots, mono monitor and adapter, PC AX keyboard small footprint.



New Epson PCe.....£940.00
 Epson PCeSD (No monitor/No Card).....£599.00

EPSON AT RANGE

New Epson PC HD AX2.....£1195.00
 80286, 12/10/8 Mhz, MS-DOS 3.2, 640K RAM 1x20MB Hard disk, 1x 1.2 MB floppy disk 4 slots EGA adapter - no monitor supplied PC AX Keyboard, small footprint (PCXT)
 PCAX2SD (No monitor/No card).....£929.00



NEW EPSON PC AX
 80286, 12/10/8 Mhz, MS-DOS 3.2, 640K RAM 1x40MB or 1x80 MB hard disk, 1x1.2 MB floppy disk 9 slots, no video adapter or display supplied. AX Keyboard, optional floor stand.
 40MB.....£1549.00
 80MB.....£1949.00
 PC AX SD (No monitor/No Card).....£1225.00

ALL PRICES EXCLUDE VAT

KEYBOARD STORAGE DRAWER



RSC-E21A Keyboard Storage Drawer Steel and Plastic Construction. PC keyboard locates in the tray and can be slid out of site when not in use. Saves space on your desk and protects from dirt and dust.

CPU and monitor can stack on top. **£27.00**

EPSON PORTABLES

Built to expand - where ever you want. The PC portable offers a range of built in parts, accepting a wide selection of peripherals. The AT style keyboard. Designed for easy, efficient use, and compatible with every PC in the Epson range. V30 processor, 640K RAM, 720K 3.5" disk drives, LCD screen, mains adapter and batteries.



Epson portable double floppy.....£935.00
 Epson portable 20MB H/D 1 floppy.....£1549.00

SAMSUNG

All Samsung machines include 12 months on site warranty free of charge.

Model SPG3000/2
 8088-2 processor, selectable clock speed 4.77/8 Mhz, 7 slots, 640K RAM, RS232 and printer port, Hercules compatible and CGA video driver card, real time clock, 84 key AT style keyboard, twin 360K floppy disk drives, MS-DOS 3.2 and GW Basic included.....£539.00
 MODEL SPC3000/3
 As above, with 1x 360K floppy disk and 1x 20MB hard disk.....£769.00



Model MFC6000/1
 80286 processor, selectable clock speed 6/10Mhz, expansion slots, 1MB RAM, RS232 and printer port Hercules compatible and CGA video card, real time clock, 102 key extended keyboard, single 1.2 MB floppy disk drive, MS-DOS 3.2 and GW included.....£999.00
 MODEL MFC6000/2
 As above, with 1x 1.2 MB floppy disk and 1x 20MB hard disk.....£1249.00

Z88 COMPACT POWERFUL

By Sinclair - A true portable.....£235.00
 Z88 Accessories held in stock.

PHILIPS SYSTEMS



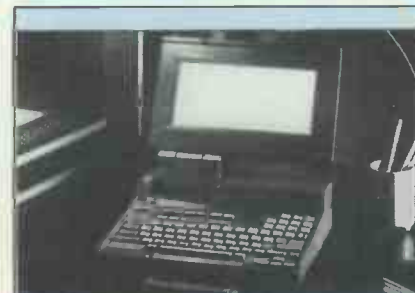
PHILIPS NMS 9100
 NMS 9110 Mono system.
 2x 720k 3.5" floppy disk with mono monitor.....£545.00
 NMS 9115 EGA system
 20MB one 3.5" floppy disk, 20 MB hard disk...£1075.00

ZENITH PORTABLES



superSPORT
 80C88 XT compatible, 640k RAM, 720K 3.5" floppy disk CGA LCD screen, laplink, carry case, mains adapter/charger
 Model 20 20MB hard disk.....£1835.00
 Model 2 2x 720K floppy disk.....£975.00
 SuperSPORT 286
 80C286, AT compatible, 1MB RAM, 1.4MB 3.5" floppy disk, CGA LCD screen, mains charger/adapter, 4Ahr clip on battery.
 20MB hard disk.....£2495.00
 40MB hard disk.....£2750.00
 TurboSPORT 386
 Portable PC/AT 80386 (12Mhz)
 2MB RAM 40MB hard disk.....£3875.00

SHARP LAPTOPS

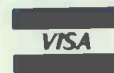


PC4501A single drive.....£575.00
 PC4502 Double drive.....£745.00
 PC4521 20MB hard disk.....£1395.00

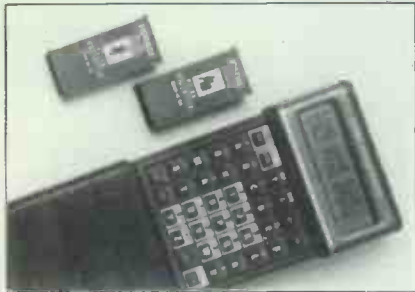


RSC Limited, 75 Queens Road, Watford, WD1 2QN
 Fax: (0923) 37946 Telex: 265871 MON REF G. REF CJJ128

Callers welcome



PSION ORGANISER II



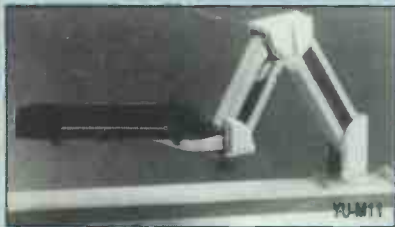
Organiser II XP £105.00
Psion Printer £169.00

ALL ACCESSORIES IN STOCK

COMPUTER ADD ONS

Intel 8087-2 8Mhz maths co-processor £135.00
Intel 80287-8 Math co-processor £185.00
64K DRAM chips (9 to make 64K) POA
256K DRAM chips (9 to make 256K) POA
Serial card £26.00
Parallel card £26.00
Serial Parallel card £59.00
MGA card £59.00
EGA card £149.00
VGA card £189.00
NECV30 replacement for 8086 £26.00

RSC-M11 Monitor mover



- With tray tilting - +15o
- Heavy duty
- Height variable 0-40cm
- Max load 60KG
- Span 15-51cm
- Desk clamp

£89.00

COMPUTER ACCESSORIES

EV165A Everex AT 3MB RAM expansion card only £145.00
EV154 Everex PC/XT 2 Mb expansion card only £120.00
EV173 Everex PC/XT 1MB multifunction EMS card £175.00
(unpopulated/2 serial/1 par/1 comm port)
EV173A Everex AT 1MB multifunction EMS card £169.00
(unpopulated/2 ser/1 par port)

WESTERN DIGITAL FILECARDS



Western Digital filecards represent the inexpensive and reliable method of upgrading your PC. Simple to install with a low power consumption the filecards come complete with the Xtree file management software, speedread and a one year warranty.

21MB RSC PRICE £195.00
32MB RSC PRICE £245.00

ALL PRICES EXCLUDE VAT

cipher 1525



CIPHER DATA BACKUP

Avert data disaster - backup with Cipher. holds 25MB on a single cartridge. save/restore rate 1MB/minute. External - self powered.

Cipher 1525 (for Amstrad PC) £275.00
Cipher 5210 (for other PC) £375.00
3M DC600A data cartridge £26.00

CMS FILE CARD

32MB - 28MS access time. For AT Computers
SPECIAL OFFER £295.00

COMMUNICATION

AMSTRAD V21/V23 Internal Card Modem £95.00
(Includes datatalk software)

★★ NEW MC2400 CARD MODEM ★★

Amstrad's new 3/4 length card modem.

- V21, V22, V22BIS, V23
- Hayes compatible
- Auto Answer/dial
- 5.25/3.5 media

Mirror II software included, the best in Comms software all this for £165.00

AMSTRAD SM2400 External Modem

This new high spec. Quad. standard modem is the latest addition to Amstrads stable of high quality modems.

- V21, V22, V22BIS, V23
- Bellinkle repression
- AC1 progress monitoring
- Hayes compatible
- Auto answer, with automatic rate detection
- Auto pulse & tone dialling & baud rate selection
- Full duplex with V23
- RS232 (V2) host interface.

RCS Price £225.00

Dowdy Quad speed Multi function modem £599.00
Miracle WS4000 V21/V23 £156.00
Sage Chit Chat software £69.00
Sage Chit Chat pack £182.00
(includes Chit Chat software and Linnet modem)
Linnet V21/V23 Auto £129.00
Dialup personal software £65.00

★★ STOP LOOKING ★★ ★★ RSC HAVE THE ANSWER ★★

C-FAX SR1 by Communicate.

Installing this card, you can simply turn your PC into a fax machine allowing you to send any file (including graphics) to any group 3 fax machine. The Communicate SR1 will even receive messages in background mode, alerting you when a message has been received.

This impressive device boasts many features - timed and batch transmission, save messages to disk, activity log reports, multi addressing, password protection and batch transmission.

BT Approved £495.00

NEC NEFAX 2

This new addition to NECs range is not only a fax but also a phone, answering machine and copier all in one. A twenty-four hour desk top communications centre for your office or home. £1145.00

CANON FAX 110

- Paper sizes to A4
- 26 Numbers Autodial
- 5 sheet auto feeder
- built in telephone
- fine made button
- 1 Year on site maintenance free!!!
- photocopy facility



RSC Special Offer £999.00

MONITORS

NEC Multisync II Best seller 3000x6000 res £459.00
Nec Multisync Plus 15" £695.00
NEC Multisync GS £169.00
Taxan multivision 770 14" colour £499.00
Taxan 764 EGA Colour £425.00
Taxan KX123 high res green £199.00
Samsung MD1257 12" mono £89.00
Samsung CD1469W 14" Colour £229.00
Samsung 14" multisync £399.00
Samsung EGA & CGA CM4531 £325.00

DOT MATRIX PRINTERS

EPSON

Epson LX800 150cps/150cps £185.00
Epson EX1000 300cps/50nlq 136col £565.00
Epson FX850 80 col 9 pin - New In £329.00
Epson FX1050 132 col 9 pin - New In £415.00
Epson LQ500 24 pin/80col/150cps/50nlq £295.00
Epson LQ850 24 pin/132col/220cps/73nlq £445.00
Epson LQ1050 24 pin/132col/220cps/73nlq £570.00



Epson LQ2550 24 pPin/136col/333cps/111nlq
8K buffer/colour £925.00
Epson DFX5000 136col/533cps/Heavy duty £1295.00

THE
star
PRINTERS FOR BUSINESS

Star NX15 120cps/30nlq/136 col £289.00
Star LC10 144cps/36nlq T/F £185.00
Star LC10C 144cps 36NLQ T/F £215.00
Star NB24-10 24 Pin 216cps/72nlq 80 col £475.00
Star NB25-15 24 Pin 216cps/72nlq 136 col £565.00
Star NB15 same as above but 300 cps £695.00

Telephone: (0923) 243301
(24 HOURS)



Star LC24-10 The latest 24 Pin printer
170cps/57nlq/80col/4k buffer £289.00

NEC

Latest 24 pin introduction - a sure winner Print rate - 168cps/56nlq Paper handling - unique front feed flows insertion without removing already installed continuous stationary. Graphic - 360 x 360 dpi



RSC PRICE £275.00

NEW THIS MONTH



The Fantastic Panasonic KX P1124

- 80 Column 24 pin multimode printer
- 160 cps/53 cps NLQ at 10 cpi
- 192 cps/63 cps NLQ at 12 cpi
- Front panel feature selection - no dips switches
- Front, rear and bottom feed
- 10, 12, 15, 17, 20 cpi + proportional

RSC SPECIAL PRICE £289.00

PANASONIC

Panasonic KX-P1081 80 Col 120cps/24nlq.....	£139.00
Panasonic KX-P1592 132 Col 180cps/38nlq.....	£365.00
Panasonic KX-P1595 136 Col 240cps/51nlq.....	£445.00
Panasonic KX-P1082 80 Col 160 cps.....	£185.00
Panasonic KX-P1083 80 Col 240cps.....	£298.00

PANASONIC KX-P1540..... £469.00

CITIZEN RANGE

120D.....	£135.00	MSP40.....	£299.00
LSPI00.....	£165.00	MSP55.....	£495.00
MSP15E.....	£225.00	HQP45.....	£465.00
MSP50.....	£385.00	HQP40.....	£385.00

NEC NOW AVAILABLE

P6 + 24 pin 80 column.....	£475.00
P7 + 24 Pin 132 column.....	£599.00

Both come complete with;

- 20 in - built fonts
- 265 cps draft
- In Built tractor feed
- 80K buffer
- 90 cps nlq

ALL PRICES EXCLUDE VAT

AMSTRAD

New Amstrad LQ5000 24 pin printer

- Heavy duty
- High resolution
- Epson compatible control codes
- IBM Compatible graphics character set
- Over 100 typeface combinations
- In built tractor and friction feeds
- 288 cps draft
- 96 nlq

RSC PRICE.....	£360.00
DMP4000 136 col 200cps.....	£275.00
LQ3500 24pin/160 cps.....	£285.00

NEWAMSTRAD DMP3250

160cps/40nlq/80 col/T/F - Parr/serr.....	£165.00
--	---------

DAISYWHEEL PRINTERS

SCOOP!!

JUKI 6200 + Sheet Feeder £469

Juki 6200 30 cps.....	£325.00
Juki 6300 40 cps.....	£640.00
Juki 6500 60 cps.....	£995.00
Brother twinwriter.....	£875.00
Brother HR20.....	£327.00
Brother HR40.....	£785.00
Citizen Premier 35.....	£425.00

LASER PRINTERS

Panasonic LASER PRINTER KX-P4450



For exceptional speed, features and price, you can't beat the Panasonic laser printer. It offers a speed of 11 pages a minute - the fastest in its class. Plus a wide variety of internal fonts. Convenient paper handling, and more. The Panasonic printer is powered by a Panasonic engine. Compare it to any other printer. You'll find that for your demanding business, Panasonic is the easy choice for sophisticated users

- Prints 11 pages a minute
- Two A4 Size 250 sheet cassettes as standard
- 300 DPI resolution
- Five popular printer emulations for compatibility with popular software.
- Standard RS232 serial and centronics parallel ports
- standard 512kRAM with optional memory expansion to 1.5 MB
- Convenient front panel controls with 15 character LCD display for messages.
- 500 page per month duty cycle
- Optional font cards for print style flexibility.

RSC price £1595.00

Brother HL8 (8ppm).....	£1569.00
Star Laser 8.....	£1450.00
Canon LBP - 8 MKII New Low price.....	£1395.00
Canon Laser LBP8 II dual bin.....	£2195.00
Canon Laser LBP8 II duplex printing.....	£2650.00

CANON LBP - 8 Mark II

FEATURES:

- 300 dpi, 8 pages/minute Laser printer
- 200 sheet paper cassette
- 512K RAM (expandable to 1.5Mb)
- Parallel and RS232 interfaces
- Packaged with 'Printility' software for HP Laserjet, HP 7475, Epson and IBM emulation.

Canon LBP-8 Mark II.....	£1395.00
Canon LBP-8 HR w/ Dual Bin & Duplex... (Pin 2 sides)	£2195.00

FOR ALL LASER ACCESSORIES

i.e. Fonts - Memory Expansions - Toner Cartridges
PLEASE CALL

EPSON GQ3500

Provides a full range of typefaces, graphic styles and quality letter fonts, plus the widest selection of options from Bold Gothic print to classic Times Roman. The GQ3500 gives you more opportunity than ever before to explore exciting new presentation techniques. 6 ppm / 640K RAM.

Now comes with 2 FREE font cards and HP ID Card
EPSON GQ3500 with 1 year on-site maintenance - £1295

HP LASER JET II SERIES

"The" industry standard with no emulation needed. Prints up to 8 pages per minute quiet 50 Dba. The corporate choice RSC

PRICE.....	£1445
1 MB memory upgrade 33443.....	£345.00
2MB Memory upgrade 33444.....	£699.00
4MB Memory upgrade 33445.....	£1395.00
Toner cartridge.....	£75.00
Soft fonts (disk based).....	£165.00
Font cartridges.....	POA

INK JET PRINTERS

Canon Bubblejet BJ10-130.....	£725.00
Hewlett Packard Deskjet.....	£655.00
Hewlett Packard Paintjet.....	£795.00
Epson SQ2500 Inkjet.....	£875.00
Diconix Portable Inkjet.....	£275.00

**FOR SHEETFEEDERS AND ALL
PRINTER ACCESSORIES
PLEASE CALL - ALL KEPT IN
STOCK - FAR TOO MANY
TO LIST**

DICONIX

Epson/IBM compatible - portable printer 150 cps/50nlq.
Tractor/friction, battery/mains. weight - under 4lbs.

RSC PRICE £285.00

KD PRINTER STAND

TPS-25 K D printer stand for 80 column printers. Paper feeds from underneath and the dial adjustable paper feed palte guides the paper onto the collection rack for neat stacking. Sturdy steel and plastic construction with space saving design.



80 col.....	£25.00
132 col.....	£29.00



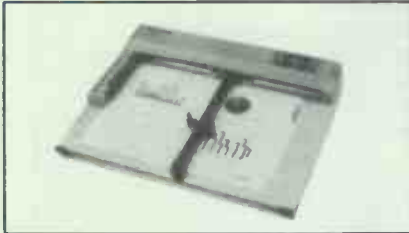
RSC Limited, 75 Queens Road, Watford, WD1 2QN
Fax: (0923) 37946 Telex: 265871 MON REF G. REF CU128

Callers welcome

VISA

PLOTTERS

ROLAND PLOTTERS



DXF-880A	£565.00
DXF-1100	£635.00
DXF-1200	£885.00
DXF-1300	£1035.00
DXF-2200	£2625.00
DXF-3300	£3650.00

OFFICIAL ROLAND PLOTTER ACCESSORIES DISTRIBUTOR
All lines are available now - please ring for details.

NEW EPSON SCANNERS

For:	
Epson EX800/1000	£139.00
Epson LQ2500	£169.00
Epson LQ2550	£169.00



GM 2000 PLUS

105mm Scanning width with 200 or 400 dpi switchable. Includes Dr. Halo III Software. £179.00

DATA SWITCHES

A range of high quality data switches in centronics or rs232 interface. rotary type with durable steel cases.

RSC DSC-1 (Par)	
(2 device T switch 3 female connections)	£24.00
RSC DSC-2 (par)	
(4 device T switch 5 female connections)	£32.00
RSC DSR-1 (ser)	
(2 device T switch - 3 female connections)	£20.00
RSC DSR-2 (ser)	
(4 device T switch - 5 female connections)	£30.00

PARALLEL BUFFERED DATA SWITCHES

● self test function	● printer ready function
● buffer ram status function	● reset function
● copy function	● buffer ready indicator
RSCPB64 (one in - one out 64K)	£90.00
RSCPB64-2 (1/2 in- 2/1 out 64K)	£125.00
RSCPB256 (one in one out)	£145.00
RSCPB256-2 (1/2 in 2/1 out)	£175.00

RSC-E22A



Specially designed to hold your detachable keyboard. Snugly mounts under any desktop.

£18.00

COPY HOLDERS



RSC - H33 (Desktop)	£12.00
RSC - H32 (Deskclomp)	£12.00

Wide column version & H32-H34 £15.00
(132 col) What every work station ought to have. No more looking down - or finding important drofts. They can be positioned at almost any angle.

4 way mains distribution socket



With built-in Arrester to give protection from mainsborne spikes and surges	£15.00
Surge Protected Plug	£9.50

RIBBONS

PRINTER	QTY 2	QTY 5	QTY 10
Amstrad			
DMP3000/3160	£4.30	£3.90	£3.50
DMP4000	£7.80	£7.60	£7.25
LQ3500	£5.00	£4.75	£4.50
LQ5000	£8.50	£8.00	£7.50
Citizen			
T200	£3.30	£3.15	£3.00
MSP15E	£6.50	£6.25	£6.00
MSP50	£5.00	£4.75	£4.50
Panasonic			
1080/1081/1082/1592	£3.90	£3.50	£3.25
1595	£9.00	£8.50	£8.00
KXP3131, Juki 6200, MP26/40	£4.30	£3.90	£3.50
Epson			
LX80/LX86	£5.00	£4.50	£4.00
FX1000	£7.00	£6.50	£6.00
LQ500/LQ800/LQ850	£6.00	£5.50	£5.00
LQ1000/LQ1050	£11.00	£10.50	£10.00
LQ2500/LQ2500+	£9.00	£9.50	£9.00
LQ2500 Colour	£21.00	£20.00	£19.00
LQ2550 Fabric	£12.50	£12.00	£11.50
LQ2550 Colour Fabric	£20.50	£19.50	£18.50
LQ2550 Film	£10.00	£9.50	£9.00
FX800/LX800	£4.30	£3.90	£3.50
FX800/LX800 Colour	£6.00	£5.50	£5.00
EX800/EX1000	£8.00	£7.50	£7.00
EX800/EX1000 Colour	£16.50	£16.00	£15.50
DFX5000 Fabric	£24.00	£23.00	£22.00
6100 (S/S)	£3.00	£2.75	£2.50
6100 (M/S)	£4.00	£3.75	£3.50
6200	£4.30	£3.90	£3.50
NEC			
P2200	£6.00	£5.75	£5.50
P6	£8.30	£8.00	£7.50
P7	£9.50	£9.00	£8.50
P6+ & P7+ Fabric	£7.50	£7.25	£7.00
P6+ & P7+ Colour	£13.50	£12.50	£11.50
P6+ & P7+ Multistrike	£9.50	£9.00	£8.50
Star			
LC10 Black	£4.00	£4.50	£4.00
LC10 Colour	£6.00	£5.75	£5.50
LC24-10	£5.00	£4.75	£4.50
NX15/ND15/NR15	£8.00	£7.50	£7.00
NB24-10	£6.00	£5.75	£5.00
NB24-15/NB15	£8.00	£7.50	£7.00

BLANK DISKS

TDK.	Per box	5 or more
M20 DS/DD	£11.00	£10.00
M2HD DS/HD (1.5MB HD)	£20.00	£18.00
MF2DD DS/DD (3.5" 135 TPI)	£20.00	£18.00
MF2HD DS/HD (3.5"HD)	£40.00	£35.00

RSC's OWN BRAND Fully guaranteed

RSC RM2D DS/DD (for PC1512/1640)	£9.00	£8.00
RSC RM0D (96TPI)	£11.00	£10.00
RSC RHD (1.2MB)	£18.00	£16.00
RSC DS/DD (135TPI) (3.5")	£18.00	£16.00
RSC DS/HD (1.6MB) (3.5")	£32.00	£30.00

FOR QUANTITY DISCOUNT PLEASE RING

PC SOFTWARE (3.5" VERSIONS AVAILABLE ON REQUEST)

CLASSIC RANGE

Lotus 1-2-3 V2.1	£265.00
Lotus Symphony V2	£375.00
dBose IV Plus	£385.00
Supercalc 5	£230.00
Wordstar 2000 V3	£269.00
Framework III	£385.00
Wordstar Professional V5	£235.00
Word Perfect V5	£249.00
Microsoft Word V4	£269.00
Smart System	£395.00
Paradox II	£295.00
Microsoft works	£117.00
Lotus Manuscript	£259.00
Lotus Report writer	£75.00
Microsoft Excel	£315.00

DATABASES

Sage retrieve VIII	£125.00
TAS+	£74.00
TAS Developer	£175.00
VP Info	£62.00
Superbase personal	£35.00
Superbase personal II	£66.00
Superbase Professional	£155.00
Superbase 4 (+free mouse)	£345.00
Masterfile PC	£470.00
DBXL Diamond version	£82.00
Infomaster (By Amstrad for all pcs)	£52.00
Timeworks Data Manager Professional	£50.00
Foxbase Plus	£249.00

INTEGRATED PACKAGES

First choice	£110.00
Psion PC4	£49.00
Logistix	£62.00
First Framework	£63.00
Ability Plus	£112.00

PC ACCOUNTS

Sage Bookkeeper	£66.00
Sage Accountant	£100.00
Sage Accountant Plus	£138.00
Sage Payroll II	£103.00
Sage financial controller	£208.00
MAP Integrated Accounts	£96.00
MAP Complete Accounts	£230.00
MAP Payroll	£55.00

Telephone: (0923)243301
(24 HOURS)

SPREADSHEETS

Sage PC Planner II	£69.00
Crocker III	£49.00
Multiplan	£125.00
Sideways (TURNS ROWS INTO COLUMNS)	£38.00
VP Planner	£61.00
VP Planner Plus	£94.00
Quattro	£94.00
Supercalc 3.21 (By Amstrad for all PCs)	£55.00
Words and figures	£59.00
Javelin PLUS	£210.00

WORDPROCESSING

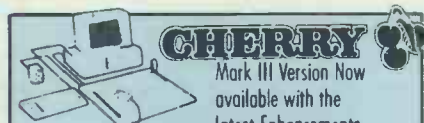
New Word II	£65.00
Word Perfect Personal	£129.00
Gem 1st Word Plus	£50.00
Wordstar Express (By Amstrad for all PCs)	£55.00
Top copy plus	£75.00
Volkswriter Deluxe	£25.00
Volkswriter 3	£89.00
Total Word	£299.00

WORD PERFECT VERSION 5

Best selling word processor which has the ability to integrate text and graphics. Comes complete with a 115,000 word speller.

RSC PRICE.....£249.00

GRAPHICS



Mark III Version Now available with the latest Enhancements

Standard configuration

The CHERRY DIGITISER is a convenient and easy to use device for controlling a screen cursor, or entering drawing data into your computer. Suitable wherever a picture is worth 1000 words, from precision mechanical or electrical design and education, through to drawing cartoons. The CHERRY digitiser allows you to quickly produce and alter your ideas. A high specification device, with an A3 working area, 0.1 MM resolution and 0.5MM accuracy.

IDEAL WITH GENERIC CADD £429.00

GENERIC CADD 3.0

by Robotechnic Software

Computer Aided Drafting & Design gives you true CAD capabilities at speeds faster than most other systems - Basic packages support most mouse pointers - graphic cards plotters and digitisers. Add modules to your own requirements making this program one of the finest and best valued packages today.

GENERIC CADD - LEVEL 1	£45.00
GENERIC CADD - LEVEL 2	£85.00
GENERIC CADD - LEVEL 3	£175.00

GENERIC ADD-ONS

Generic Autoconvert	£45.00
Generic Auto Dimensioning	£45.00
Generic Dotplot	£45.00
Generic Drafting Enhancements 1	£45.00
Generic Drafting Enhancements 2	£45.00
Generic Pen Plot	£45.00

Gem Draw Plus (Amstrad)	£66.00
Gem Graph (Amstrad)	£66.00
Gem Graph (for all PC's)	£165.00
Gem Draw Plus (for all PC's)	£165.00
Freelance Plus	£289.00
Graphwriter II	£299.00
PC Deluxe Paint II	£69.00
VP Graphics	£66.00
Turbo Cad	£73.00
Autosketch	£55.00

ELECTRONIC ARTS PC DELUXE PAINT II

An introduction to the world of computer generated art. Enables you to create colourful graphics in a fraction of the time it would normally take.

RSC PRICE - £69.00

PROGRAM DEVELOPMENT

Gem Programmer Toolkit	£137.00
Quick Basic Compiler	£65.00
Quick C	£65.00
Turbo Assembler & Debugger	£95.00
Turbo Basic	£42.00
Turbo Basic Database Toolbox	£42.00
Turbo Basic Editor Toolbox	£42.00
Turbo C (Version 1.5)	£42.00
Turbo C (Version 2.0)	£75.00
Turbo Eureka	£65.00
Turbo Pascal (Version 4)	£42.00
Turbo Pascal (Version 5)	£75.00
Turbo Pascal Database Toolbox	£42.00
Turbo Pascal Editor Toolbox	£42.00
Turbo Pascal Graphics Toolbox	£42.00
Turbo Pascal Tutor	£28.00
Turbo Pascal Developer Library	£189.00
Turbo Prolog	£42.00
VP Expert	£67.00
Zorland C	£26.00
Zorland C Powerpack	£52.00
Learning DOS (Microsoft)	£26.00
DB Fast Compiler	£59.00

GENERAL UTILITIES

Norton Utilities	£50.00
Gem Word Chart (Amstrad)	£67.00
Gem Font Editor (Amstrad)	£67.00
Portex	£73.00
Microsoft windows	£59.00
VP Expert	£67.00
Copy II PC	£25.00
Norton Commander	£39.00
PC Tools Deluxe	£40.00
PC Copy II Option Board Deluxe	£73.00
MASS Super Labeller	£32.00
File Rescue Plus	£18.00
Borland Reflex	£39.00
Borland Sidekick	£39.00
Borland Sidekick Plus	£149.00
Time Slip	£49.00
Time Slip Plus	£109.00
XTREE Pro	£75.00
Autoroute (Digital Mapping)	£110.00

LINK MASTER

Transfers files from 5.25 to 3.5 or vice-versa
RSC Price £18.00

DESKTOP PUBLISHING

Rank Xerox Ventura Publisher	£499.00
Fleet St. Editor V2	£65.00
Fleet ST. Editor V3	£110.00
Fantasy	£49.00
PFS First Publisher	£79.00
Gem Desktop Pub	£194.00
Page Ability	£135.00
Handy Scanner	£245.00
Handy Scanner & Fleet St. Editor	£299.00
HP Scanner desktop scanner	£1695.00

Authorised Rank Xerox Dealer

VENTURA PUBLISHER
ORIGINAL
RSC Special - £499.00

TIMEWORKS

DESKTOP PUBLISHER

Full featured desktop publishing program with graphics, word processing and page layout. easy to use and learn. Designed to have you up and running in less than one hour.

RSC PRICE.....£77.00

Finesse
By Advanced Memory Systems

Finesse version 1.1 inc GEM & Fontware	£67.00
AMS Mouse Inc driver software	£55.00
AMS Microscan Inc Driver Software	£189.00
DTP Solution 1 Inc Finesse and AMS Mouse	£115.00
DTP Solution 2 Inc Finesse and AMS Microscan	£258.00
DTP Solution 3 Inc Finesse, AMS Mouse & Microscan	£289.00

MICE

Microsoft Mouse & Menus	£95.00
Microsoft Mouse & Windows	£105.00
Microsoft Mouse & Easy CAD	£125.00

(The above are available with either serial or bus interface)

Genius Mouse - Serial mouse with mat, mouse holder and software	£39.00
Logitech C7 Mouse	£77.00
Logitech Collectors Clear Mouse	£89.00

NETWORK AND NETWORK

Local Area Network (LAN) by AMSTRAD

An area where computer "mystics" have reigned for too long. As in other spheres of computing Amstrad have designed this network to be simple, practical and easy to install.

The starter pack has all the hardware to configure a three workstation LAN.

Amstrad starter pack	£360.00
Supercalc 4 LAN (by Amstrad for all PC's)	£175.00
Accountsmaster LAN (by Amstrad for all PC's)	£269.00
Wordstar AMS LAN (by Amstrad for all PC's)	£175.00

SAGE MAINLAN NETWORK

2 User Network System	£359.00
Single Station Extension Packs	£179.00

NETWORK SOFTWARE

Sage Financial Controller (Network)	£488.00
Sage Accountant Plus (Network)	£314.00
Sage Retrieve IV (Network)	£250.00
Lifetree Volkswriter 3 (Network)	£159.00

**RSC ARE AUTHORISED DEALERS
FOR NOVEL NETWORKS**

RSC Limited, 75 Queens Road, Waford, WD1 2QN
Fax: (0923) 37946 Telex: 265871 MON REF G. REF C1128

Callers welcome

VISA

DIMENSION computers l.t.d.

40/50 High Street
Leicester LE1 5YN
Tel: (0533)
517479/21874

THE MIDLAND'S LARGEST COMPUTER STORE

SMALL FOOTPRINT AKHTER PC100 RANGE

British-built to a high specification, AKHTER PLC offer quality PC/XT compatibles at extremely competitive prices. Standard features include: * 8088 Processor 4.77/10MHz * 640K Ram * 4 Expansion Slots * Sturdy Metal Case with Heavy Duty Power Supply Unit * Real Time Clock/Calendar * AT Layout Keyboard * Serial and Parallel Ports * Dark Tint Non-Glare Screens on both Mono and EGA * Fan as standard on all models * MS DOS & GW Basic

	Mono	EGA
Single Drive	£499.00	£799.00
Dual Drive	£599.00	£899.00
S/D 20Mb	£699.00	£999.00
S/D 30Mb	£729.00	£1029.00
S/D 40Mb	£799.00	£1099.00
D/D with 21Mb Hard Card*	£819.00	£1119.00
D/D with 32Mb Hard Card*	£839.00	£1139.00

* 3 1/2" DRIVE OPTION

Dual drive systems can be fitted with 1 x 3 1/2" and 1 x 5 1/4" drives at no extra cost.

All models include Spreadsheet, Wordprocessor and Database software.

DICONIX

PORTABLE INK JET PRINTER

* 150cps Draft/50cps NLQ * Under 4lb weight
* Friction/Tractor Feed Battery and Mains £259.00

LIMITED OFFER

CITIZEN HOP45 24 PIN WIDE CARRIAGE PRINTER

Features include: * 200cps Draft/66cps LQ * Friction/Tractor Feed * 24K Buffer * 2 Year Guarantee * Mode Select Panel * 200 million Character Print Head Life. Our normal price £449.00 OFFER PRICE £329.00*

* Available only while present stocks last

AMSTRAD OFFER

* Amstrad PC1640 Dual Drive Mono/EGA
* Choice of STAR LC10 Standard carriage or DMP4000 Wide Carriage Printer

* Accountmaster Integrated Accounts	
* Supercalc 3.1 Spreadsheet	
* Wordstar Wordprocessor	
Mono with STAR LC10 Printer	£649.00
Mono with DMP4000 Printer	£749.00
EGA with STAR LC10 Printer	£1029.00
EGA with DMP4000 Printer	£1129.00

COMMODORE PC1 PROMOTIONAL OFFER

Unbeatably priced PC/XT compatibles, including extremely compact base unit, detachable keyboard and monitor.

* 8088/4.77MHz Processor * 512K Ram
* Serial and Parallel Ports * MSDOS 3.2 and GW Basic
PC1 Mono £299.00 PC1 CGA Colour £449.00
External PC1 3 1/2" 720K Drive. £99.00 External PC1 5 1/4" Drive. £99.00

AMSTRAD MODEMS

* Hayes Compatible * Auto Dial/Auto Answer
* V21, V22, V22 bis, V23 * Supports Prestel and Telecom Gold * Background Answer Mode * Includes Mirror 11 Software * SM2400 Includes Speed Buffer

MC2400 Internal	£159.00
SM2400 External	£229.00

2 Way Centronics Printer Switch Box	£27.50
3 Way Centronics Printer Switch Box	£34.50
4 Way Centronics Printer Switch Box	£39.50
Centronics to Centronics Cables for above	£8.50

SCHNEIDER EURO PC RANGE

* Compact console with built-in 3 1/2" 720K Drive
* 8088-1 CPU 4.77/7.16/9.54MHz * 512K RAM
* Serial, Parallel & Mouse Ports * MS-DOS 3.3, GW Basic & MICROSOFT WORKS Software.

Euro PC Mono	£375.00
Euro PC Colour	£519.00
3 1/2" or 5 1/4" External 2nd Drive	£109.00
20Mb External Hard Drive	£279.00

TOWER AT RANGE	S/D	D/D	20Mb
Tower 512K Mono	£739.00	£829.00	£1059.00
Tower 512K CGA	£919.00	£1059.00	£1199.00
Tower 1Mb Mono	£829.00	£919.00	£1149.00
Tower 1Mb EGA	£1059.00	£1099.00	£1379.00

AUTHORISED AMSTRAD DEALER AMSTRAD PC RANGE

PC1640 models include Spreadsheet, Wordprocessor and Database software.
PC1512 models include Ability Software Suite and 4 US Gold games.

PC1512 Single Drive Mono	£375.00
PC1512 Dual Drive Mono	£479.00
PC1512 Single Drive Colour	£479.00
PC1512 Dual Drive Colour	£559.00
PC1640 Single Drive Mono	£479.00
PC1640 Dual Drive Mono	£559.00
PC1640 20Mb Mono	£749.00
PC1640 Single Drive Colour	£589.00
PC1640 Dual Drive Colour	£659.00
PC1640 20Mb Colour	£849.00
PC1640 Single Drive ECD	£679.00
PC1640 Dual Drive ECD	£749.00
PC1640 20Mb ECD	£939.00

AMSTRAD PLUS WESTERN DIGITAL HARD CARDS

	20Mb	30Mb	40Mb
PC1512 S/D Mono	£579.00	£599.00	£629.00
PC1512 D/D Mono	£659.00	£679.00	£709.00
PC1512 S/D Col	£659.00	£679.00	£709.00
PC1512 D/D Col	£749.00	£769.00	£799.00
PC1640 S/D Mono	£679.00	£699.00	£729.00
PC1640 D/D Mono	£749.00	£769.00	£799.00
PC1640 S/D Col	£769.00	£789.00	£819.00
PC1640 D/D Col	£839.00	£859.00	£889.00
PC1640 S/D ECD	£869.00	£889.00	£919.00
PC1640 D/D ECD	£939.00	£959.00	£989.00

AMSTRAD SYSTEMS WITH SEAGATE HARD DISCS

	20Mb	30Mb	40Mb
PC1512 S/D Mono	£575.00	£599.00	£669.00
PC1512 S/D Colour	£675.00	£689.00	£759.00
PC1640 S/D Mono	£679.00	£699.00	£775.00
PC1640 S/D Colour	£789.00	£799.00	£869.00
PC1640 S/D ECD	£869.00	£889.00	£969.00

THE NEW AMSTRAD PC2086

* 256 Colour Paradise VGA * 720K 3 1/2" Drive with External 5 1/4" Port * 640K 8 MHz CPU * AT Enhanced Keyboard
* Includes Mouse, MSDOS 3.3 and Microsoft Windows

	S/D	D/D	30 Mb
12" Mono	£569.00	£709.00	£949.00
14" Colour	£709.00	£849.00	£1089.00
12" High Res	£799.00	£949.00	£1179.00
14" High Res	£899.00	£1039.00	£1279.00

AMSTRAD PC2086 WITH TANDON HARD DISC

	20Mb	30Mb	40Mb
12" Mono	£929.00	£949.00	£999.00
14" Colour	£1069.00	£1089.00	£1139.00
12" High Res	£1159.00	£1179.00	£1229.00
14" High Res	£1259.00	£1279.00	£1329.00

The above prices include FREE AMSTRAD DMP3250 PRINTER

PROTECT IT!!

WITH CYPHER 1525-CT TAPE STREAMER

- * Specially designed for Amstrad PC1512/1640 range
- * 25 Mb storage capacity, with larger disc back-up on multiple cartridges
- * 1 Mb per minute Save/Restore rate
- * Menu-driven software
- * Save/Restore Specific Files, Directories or Entire Disc

Cypher 1525	£269.00
Cartridges	£25.00

ALL PRINTERS INCLUDE PC PRINTER LEAD

AMSTRAD DMP3250, 80 col, 160 cps, 40 nlq	£169.95
AMSTRAD DMP4000, 136 col, 200 cps, 50 nlq	£249.00
AMSTRAD DMP4000 with supercalc 3.1	£279.00
AMSTRAD LQ3500, 80 col, 160 cps, 60 lq, 24 pin	£249.00
AMSTRAD LQ3500, with supercalc 3.1	£279.00
AMSTRAD LQ5000, 136 col, 288 cps, 96 lq, 24 pin	£349.00
EPSON LX800, 80 col, 160 cps, 25 nlq	£169.00
EPSON EX800, 80 col, 300 cps, 50 nlq	£429.00
EPSON EX1000, 136 col, 300 cps, 50 nlq	£565.00
EPSON FX850, 80 col, 240 cps, 48 nlq	£312.00
EPSON FX1050, 136 col, 240 cps, 48 nlq	£408.00
EPSON LQ500, 80 col, 150 cps, 50 lq, 24 pin	£271.00
EPSON LQ850, 80 col, 180 cps, 60 lq, 24 pin	£448.00
EPSON LQ1050, 136 col, 180 cps, 60 lq, 24 pin	£578.00
EPSON LQ2550, 136 col, 333 cps, 100 lq, 24 pin	£885.00
EPSON SQ2500, 136 col, 540 cps, 180 lq, Ink Jet	£919.00
EPSON DFX5000, 136 col, 533 cps, 80 nlq	£1158.00
CITIZEN 120D, 80 col, 120 cps, 25 nlq	£129.00
CITIZEN 180E, 80 col, 150 cps, 50 nlq	£159.00
CITIZEN MSP15e, 136 col, 160 cps, 40 nlq	£199.00
CITIZEN MSP40, 80 col, 240 cps, 50 nlq	£289.00
CITIZEN MSP45, 136 col, 240 cps, 50 nlq	£367.00
CITIZEN MSP50, 80 col, 300 cps, 60 nlq	£375.00
CITIZEN MSP55, 136 col, 300 cps, 60 nlq	£489.00
CITIZEN HOP40, 80 col, 200 cps, 66 nlq, 24 pin	£375.00
CITIZEN HOP45, 132 col, 200 cps, 66 nlq, 24 pin	£329.00
STAR LC10, 80 col, 120 cps, 25 nlq	£169.00
STAR LC10 Colour, 80 col, 120 cps, 25 nlq	£219.00
STAR LC24-10, 80 col, 170 cps, 57 lq, 24 pin	£299.00
STAR NX15, 136 col, 120 cps, 30 nlq	£279.00
STAR NR15, 136 col, 240 cps, 60 nlq	£429.00
STAR ND15, 136 col, 180 cps, 45 nlq	£339.00
STAR NB24-10, 80 col, 216 cps, 72 nlq, 24 pin	£449.00
STAR NB24-15, 136 col, 300 cps, 100 nlq	£549.00
NEC 2200 Pinwriter, 80 col, 168 cps, 56 lq, 24 pin	£269.00
NEC P6+, 80 col, 265 cps, 90 lq, 24 pin	£445.00
NEC P7+, 136 col, 265 cps, 90 lq, 24 pin	£575.00
DAISYWHEELS	
CITIZEN PREMIER 35, 35 cps	£399.00
BROTHER HR20	£329.00
BROTHER HR40	£729.00
JUKI 6200	£349.00

ROLAND DXY-1000 SERIES

Low cost, high performance plotters

ROLAND DXY-1100	£639.00
ROLAND DXY-1200	£875.00
ROLAND DXY-1300	£1039.00

MONITORS

Amstrad PC12MD VGA	£149.00
Amstrad PC14CD VGA	£279.00
Amstrad PC12HRCV VGA	£379.00
Amstrad PC14HRCV VGA	£469.00
NEC Multisync II	£449.00
Ferguson M206 Mono	£59.00

GENIUS GM-6000 MOUSE

For PC/XT or AT Desktop or Portables.

Includes * Dr. Halo III & Menu Maker Software * Mouse Mat * Mouse Pocket * 9-25 Pin Adaptor £37.95

DISC DRIVE UNITS

5 1/4" Internal 360K	£74.95
3 1/2" Internal 720K	£99.00
3 1/2" External 720K with Cable Adaptor	£115.00
5 1/4" External 360K with Cables for PC2086	£99.00

OPEN 6 DAYS A WEEK - PERSONAL CALLERS WELCOME
EDUCATIONAL, GOVERNMENT AND PLC ORDERS ACCEPTED
PRICES NEGOTIABLE ON QUANTITY ORDERS - PLEASE PHONE
ALL PRICES EXCLUDE VAT
PLEASE ADD £5.00 TOWARDS CARRIAGE & PACKING ON ANY ORDER

ALL ITEMS SUBJECT TO AVAILABILITY
ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE
DIMENSION COMPUTERS LTD.

40/50 HIGH STREET, LEICESTER

SALES DESK Tel: (0533) 517479/21874

Fax: (0533) 511638

PCW 2

NETWORKS

TRANSNET 1000 STARTER KIT

Includes:

- * 2 x 1MHz Network Cards
- * Cabling
- * Fixing Tools & Connectors
- * Manuals **£349.00**

TRANSNET 3000 STARTER KIT

Includes:

- * 2 x 10MHz Ethernet Cards
- * Cabling
- * Connectors & Manuals **£449.00**

Both kits support up to 255 users, include free IBM or Novelle Network Emulator.

Additional Boards:

- Transnet 1000 (Station) **£149.00**
- Transnet 1000 (Server) **£169.00**
- Transnet 3000 **£249.00**

SAMPLE NETWORK HARDWARE CONFIGURATION

3 USER MONO SYSTEM

- 1 x Euro Tower AT 1Mb Ram 10MHz CPU
- 2 x Euro PC 512K 9.54MHz CPU
- 3 x 10MHz Ethernet Cards
- IBM or Novelle Network Emulator
- Cables, Connectors and Manuals **£2499.00**

IBM PC LAN

- Network Manager Software **£99.00**

APRICOT T60

- Wyse Compatible Terminals **£369.00**

AMSTRAD NETWORK

- 3 Network Starter Pack **£359.00**

SEAGATE HARD DISC SYSTEMS

The world's most popular hard disc unit, now available in simple to fit kit form. Suitable for the Amstrad PC1512, 1640 and most PC/XT compatibles.

- Seagate ST225, 20Mb, 65ms **£199.00**
- Seagate ST238R, 30Mb, 65ms **£229.00**
- Seagate ST251*, 40Mb, 40ms **£299.00**

All kits are supplied complete with Hard Disc unit, Controller, Fixing Brackets and Installation Instructions, plus Full One-Year Warranty.

MINISCRIBE HARD DISCS

Low power consumption, 3 $\frac{1}{2}$ " drives in 5 $\frac{1}{4}$ " frame. Complete with cables and fixing brackets.

- Miniscribe 8425 20Mb 68ms **£195.00**
- Miniscribe 8438 30Mb 40ms **£219.00**
- Miniscribe 8450 40Mb 46ms **£259.00**
- Miniscribe 3675 60Mb 61ms (5 $\frac{1}{4}$ ") **£299.00**

MINISCRIBE HARD CARDS

- Miniscribe 20Mb **£229.00**
- Miniscribe 30Mb **£239.00**

HI-Q FILE CARD

with WESTERN DIGITAL Drive and Controller

- HI-Q 20Mb 65ms **£189.00**
- HI-Q 30 Mb 65ms **£219.00**
- HI-Q 40 Mb 70ms **£249.00**

WESTERN DIGITAL HARD CARDS

Suitable for Single or Dual Drive PC/XT. Offering a high quality, low price hard disc system. Fast, quiet operation, takes just five minutes to install. Supplied formatted and tested, with XTREE and SPEEDREAD Software.

- 21Mb **£195.00**
- 32Mb **£239.00**

IMAGE SCANNERS

CANON IX-1Z

- * 300 x 300 DPI Resolution
- * 12 seconds per page speed
- Includes Interface and Cables for PC/XT **£849.00**

PANASONIC FX-RS505

- * 400 x 400 DPI Resolution
- * 3msec per line speed
- Includes Software (OCR), Interface and Cables for PC/XT **£899.00**

GD IMAGE 4002

HP LASERJET 11 POSTSCRIPT UPGRADE

- With IBM PC/XT AT Upgrade Card
- * Adobe Postscript compatible RIPS Controller with processing speeds up to ten times faster than standard lasers
- * 2 Mb memory * 35 POSTSCRIPT Fonts
- Simple installation **£1595.00**

TANDON

- TARGET 20 PLUS (10MHz) 20Mb H/Disc **£1349.00**
- TARGET 40 PLUS (10MHz) 40Mb H/Disc **£1525.00**
- PCA PLUS (10MHz) 1.2Mb Disc **£929.00**
- PCA 20 PLUS (10MHz) 20Mb H/Disc **£1049.00**
- PCA 40 PLUS (10MHz) 40Mb H/Disc **£1155.00**
- PCA 70 PLUS (10MHz) 70Mb H/Disc **£1319.00**
- 386/16-40 (16MHz) 40Mb Hard Disc **£2099.00**
- 386/20-40 (20MHz) 40Mb Hard Disc **£2759.00**
- 386/20-70 (20MHz) 70Mb Hard Disc **£3049.00**
- 386/20-110 (20MHz) 110Mb Hard Disc **£3269.00**
- PAC 286 PLUS (10MHz) **£879.00**
- PAC 286 1.2 PLUS (10MHz) 1.2Mb Disc **£969.00**
- 30Mb Data Pac for PAC Range **£169.00**

Above prices include Mono Monitor, Keyboard, MS DOS, Windows, and GW Basic.

MONITOR OPTIONS (add to Mono System Prices)

- Mono VGA **£155.00**
- EGA **£287.00**
- VGA **£349.00**

THE NEW APRICOT Qi RANGE

Features include:

- * Fully IBM OS/2 and PS/2 Compatible
- * Built-in Ethernet Network Board
- * 4 MCA Expansion Slots
- 14" Mono or Colour VGA Monitors
- * 1.44Mb 3 $\frac{1}{2}$ " Disc Drive
- * 80386-SX CPU (300 series)
- * 80386 cache CPU (600 series)
- * Qi t Models include built-in 40Mb Tape Streamer

	Mono	Colour
Qi 310, 16MHz, 1Mb RAM	£1969	£2215
Qi 330, 16MHz, 1Mb RAM, 30Mb H/D	£2229	£2475
Qi 330t, 16MHz, 1Mb RAM, 30Mb H/D	£2640	£2889
Qi 350i, 16MHz, 2Mb RAM, 47Mb H/D	£2640	£2889
Qi 350it, 16MHz, 2Mb RAM, 47Mb H/D	£3049	£3299
Qi 650, 20MHz, 1Mb RAM, 47Mb H/D	£3049	£3299
Qi 650t, 20MHz, 1Mb RAM, 47Mb H/D	£3466	£3715
Qi 660, 25MHz, 1Mb RAM, 65Mb H/D	£3549	£3799
Qi 660t, 25MHz, 1Mb RAM, 65Mb H/D	£3959	£4210
Qi 660i, 25MHz, 1Mb RAM, 118Mb H/D	£4375	£4619
Qi 660it, 25MHz, 1Mb RAM, 118Mb H/D	£4789	£5035

IBM

- PS/2 Model 30-002 D/D **POA**
- PS/2 Model 30-021 20Mb **POA**
- PS/2 Model 50-021 20Mb **POA**
- PS/2 Model 50Z-061 60Mb **POA**
- PS/2 Model 70-F61 60Mb **POA**
- PS/2 Model 70-121 120Mb **POA**
- PS/2 Model 70-A21 120Mb **POA**
- PS/2 Model 80-041 40Mb **POA**
- PS/2 Model 80-071 70Mb **POA**
- PS/2 Model 80-111 115Mb **POA**
- Enhanced Keyboard UK
- 8503 Mono Monitor 12" **POA**
- 8502 Colour Monitor 14" **POA**
- 8513 Colour Monitor 12" **POA**
- 8514 Colour Monitor 16" **POA**
- 8514/A Adaptor* **POA**

BT APPROVED GROUP III FAX CARD

For PC/XT or AT with hard disc.

- * Send and Receive Group 111 Fax messages to and from any Group 111 Fax machine.
- * Prepares messages with most major software.
- * Runs in background mode **£349.00**

PC HAND SCANNER

- Digitises Photographs, Illustrations, Signatures.
- For use within ALL major WP and DTP packages, plus CFAx. Scans in Real Time images 2 $\frac{1}{2}$ " x 10" at 200 DPI Resolution **£169.00**
- CFAx plus PC HAND SCANNER **£499.00**

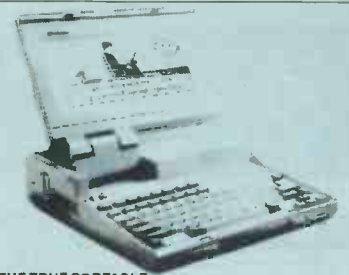
ARCHIVE XL 40Mb TAPE STREAMER

A compact storage system suitable for most PC/XT and AT compatibles offering high capacity and performance at an extremely competitive price. Includes QICStream Utility Software.

- Internal (fits into 5 $\frac{1}{4}$ " drive slot) **£279.00**
- External **£399.00**

LASER PRINTERS

- HP Laserjet 11" 8ppm 512K **£1395.00**
- Canon LPB-11 8ppm 512K 3 Emulations **£1395.00**
- Canon LPB-11T Dual Bin **£1790.00**
- Canon LPB-11R Dual Bin Full Duplex **£1985.00**
- Epson GQ3500* 6ppm 640K **£1089.00**
- Panasonic P4450 11ppm 512K Dual Bin **£1519.00**
- Brother HL8" 8ppm 512K 5 Emulations **£1479.00**
- Star LP8" 8ppm 1Mb 4 Emulations **£1390.00**
- Qume Scripten Postscript 3Mb 35 Fonts **£3199.00**
- * with one year free on-site maintenance



SHARP — THE TRUE PORTABLE

- * Excellent Back-lit Supertwist Screen, with 640 x 200 Resolution. Useable in almost any lighting conditions.
 - * Rechargeable Battery Cell plus Mains Adaptor.
 - * True IBM compatibility.
 - * Serial, Parallel and 5 $\frac{1}{4}$ " External Drive Ports.
 - * True Portable Size (12" x 14" x 3") and Weight (12.6 lbs).
 - * Excellent Documentation.
 - PC4501A Single Drive **£569**
 - PC4501A Dual Drive **£669**
 - PC4502 Dual Drive with numeric keypad **£739**
 - PC4521* Single Drive with 20Mb Hard Disc **£1399**
- * Very civilised laptop — excellent compatibility, documentation and value for money — PC User, Feb '88

ZENITH PORTABLES

supersPORT

- * 80C88 (4.77/8MHz) CPU * 640K RAM
- * Clip-on 2.5 Ahr Battery & Mains Adaptor/Charger
- * 3 Card 8 Bit Expansion Chassis
- * Connectors for External Floppy Drive & Monitors * Optional Modem
- Model ZFE 184-1 2 x 720K Drives **£949**
- Model ZWE 184-2 20Mb Hard Disc **£1799**

supersPORT 286

- * 80C286 (6/12MHz) CPU * 1Mb RAM
- * Zero Wait State * Optional Modem
- * Clip-on 4 Ahr Battery and Universal Voltage Mains Adaptor/Charger * 3 Card 8 bit Expansion Chassis * External Floppy and Monitor Connectors * MS-DOS
- * OS/2 Compatible
- Model ZWE 200-02 20Mb Hard Disc ... **£2395**
- Model ZWE 200-04 40Mb Hard Disc ... **£2995**

turbosPORT 386

- * 80386 CPU * Zero Wait State * 2Mb RAM
- Removable Battery and Mains Adaptor/Charger * 3 Card 8 bit Expansion Chassis
- * Optional Modem * OS/2 Compatible
- * MS-DOS * Detachable Keyboard
- ZTC 3034-EB 40Mb Hard Disc **£3795**

AMSTRAD PORTABLE RANGE

- PPC512S Single Drive **£365.00**
 - PPC640S Single Drive with Modem **£479.00**
 - PPC512D Dual Drive **£459.00**
 - PPC640D Dual Drive with Modem **£569.00**
 - PPC640D with Ferguson 12" Monitor **£619.00**
- All models include ORGANISER software suite.

VIDI-PC VIDED DIGITISER

- * Captures images from any composite video output, including video camera, recorder or Scart TV
- * Prints in 320 x 200 res. Upgradeable to 640 x 200
- * Compatible with most desktop publishing packages, including Timeworks DTP, and all GEM applications.
- * Digitises in 16 shades * Powerful software allows enlargement, reduction and windows. Software and connecting cable included **£99.00**

TIMEWORKS DTP

- Extremely powerful yet simple to use desktop publishing package. Represents a breakthrough in low price DTP software.
- Including the new GEM Version 3 **£75.00**
- * Supports the major facilities of Ventura plus a few more — Desktop Publishing, March '88
- * Excellent value for money and highly recommended — PC with the Amstrad. April '88
- VIDI-PC PLUS TIMEWORKS DTP OFFER
- Package price, including GEM V.3 **£159.00**

GD IMAGE 4008 LASER

- * Adobe Postscript Compatible
- * HP Laser jet 11 Emulation
- * 2Mb Memory * 35 POSTSCRIPT Fonts
- * High Speed RIPS Controller **£2995.00**

Chipboards

PC INTERFACE CARDS

OVER 100 DIFFERENT IBM PC COMPATIBLE INTERFACE CARDS IN STOCK

SERIAL & PARALLEL

PARALLEL PRINTER PORT LPT1/LPT2	19
SERIAL COM1/COM2 SELECTABLE	19
TWIN SERIAL COM1/2/3/4	39
SERIAL/PARALLEL	39
TWIN SERIAL/PARALLEL	49
SERIAL/PARALLEL/GAME	49
TWIN SERIAL/PARALLEL/GAME	59
SERIAL/PARALLEL/GAME/CLOCK	59
TWIN SERIAL/PARALLEL/GAME/CLOCK	69

MULTI-SERIAL

4 PORT SERIAL RS-232	99
8 PORT SERIAL RS-232	199

RS-422

SINGLE PORT RS-422	59
DUAL PORT RS-422	69
4 PORT RS-422	299
8 PORT RS-422	549

Above prices apply to PC/XT compatible cards. Please call for prices of PC/AT versions.

CLOCK/CALENDAR

CLOCK/CALENDAR	24
CLOCK/SERIAL RS-232	35

MEMORY

XT EXPANSION TO 512K OR 640K	37
XT 384K MULTIFUNCTION	79
AT 128K CARD (512K TO 640K)	37
2MB XT EMS EXPANDED	99
2MB AT LIM EMS V4/EXTENDED	139
2MB ENHANCED "EEMS"	139
3MB AT EXTENDED	129
3MB AT MULTIFUNCTION	159
32 BIT 2MB 386 MEMORY CARD	149

Memory board prices exclude DRAM memory chips. For chip prices, please call.

GRAPHICS

MONO GRAPHICS/PR (HERCULES)	49
MONO GRAPHICS (HERCULES PLUS)	119
COLOUR GRAPHICS/PRINTER (CGA)	49
MONO/COLOUR (HERCULES+CGA)	69
AUTOSWITCH EGA	149
VGA	199

ANALOGUE/DIGITAL

8 BIT AD/DA + DIO + TIMER	162
12 BIT AD/DA	95
12 BIT AD/DA + DIO + TIMER	229
HIGH SPEED 12 BIT AD/DA WITH DMA, IRQ, DIO + TIMER	595
14 BIT AD/DA	175
14 BIT AD/DA + DIO + TIMER	349

INDUSTRIAL CONTROL

16 CH OPTO-ISOLATED DIG. INPUT	119
16 CH RELAY OUTPUT	149
16 CH OPTO INPUT/RELAY OUTPUT	219
16 CH AMPLIFIER & MULTIPLEXER	245
8 CH SSR DRIVER CARD (W/4 SSR)	139

DIGITAL I/O

8255 DIGITAL I/O (48 LINES)	57
8255 DIGITAL I/O (192 LINES)	237

IEEE 488

IEEE-488 CARD	149
IEEE-488 CARD WITH DMA, (NI & IBM IEEE CARD COMPATIBLE)	179

3270 COMMUNICATIONS

3270 BI-SYNC EMULATION CARD	99
SDLC ADAPTER	185

EPROM/PAL PROGRAMMERS

16K-512K EPROM WRITER	89
4-GANG 16K-512K EPROM WRITER	179
16K-1024K EPROM, CMOS EPROM & EEPROM WRITER	189
4-GANG 16K-1024K EPROM WRITER	249
8-GANG 16K-1024K EPROM WRITER	399
PAL PROGRAMMER	349
UNIVERSAL DEVICE PROGRAMMER & TESTER	499

INTERFACE CONVERTERS

SERIAL TO PARALLEL	45
PARALLEL TO SERIAL	45
RS-232/RS-422	69
RS-232/RS-485	89
RS-232/20MA CURRENT LOOP	79

MISCELLANEOUS

PROTOTYPING BOARD	69
EXTENDER CARD + 3 SLOT BOARD	77
PC BAR CODE READER SYSTEM	279

NEXT MORNING DELIVERY

Goods supplied against official orders from Government Departments, Educational Establishments and substantial commercial concerns.

Prices exclude carriage and VAT. Prices subject to change without notice.

Overnight courier service: £5.

12 months warranty on all products.

Chipboards Limited, 1 The Square,
Lightwater, near Woking, Surrey GU18 5SS



(0276) 51441



SAJANKA COMPUTERS LIMITED HOTLINE: 01-571 9933



SYSTEMS

AMSTRAD	
PC 1640 SDMD	£440.00
PC 1640 DDMD	£585.00
PC 1640 DDGD	£710.00
PC 1640 20Mb/Mono	£870.00
PC 1640 20Mb/Col	£970.00
PC 1640 SD/ECD	£760.00
PC 1640 DD/ECD	£850.00
PC 1640 20Mb/ECD	£1070.00
PC 1640 20Mb/Mono	£890.00
PPC 640 DD/Int. Modem	£535.00
PPC 512 DD	£490.00
HYUNDAI PC'S	
Super-16 SD/Mono 640K/Graphics Card GW Basic/MS DOS	£480.00
Super-16 DD/Mono/640K	£550.00
Super-16 30Mb HD/Mono/640K	£830.00
The Hyundai range of computers come with 84 key keyboards.	
OLIVETTI	
M240 2X386K	£770.00
M240 386K-20Mb	£1200.00
M240 720K-20Mb	£1200.00
Mono Monitor	£180.00
Any other Please Call	
MISSION	
PC2 640K/20Mb/5.45" Amber Mon	£1290.00
286 SF30/512K/30Mb/1.2Mb Floppy	£1960.00
Apricot	
Xen-i-286/30Mb EGA Mon S/W	£2359.00
Xen-i-386/30Mb Mono Green	£2399.00
Paper White	£2900.00
Xen-i-386/45Mb/Mono Green	£2999.00
EGA Monitor	£3399.00
Xen-i-385/50Mb Tower System/EGA Monitor/10 Exp. Slots	£3799.00
Xen-i-386/100Mb Tower System/10 Exp. Slots/Green Monitor	£4450.00
Above with EGA Monitor	£4900.00
Xen-i-286 DD/EGA Monitor S/W	£1999.00
EPSON	
PCAX2 Single Floppy Mono	£970.00
PCAX2 20Mb HD + EGA Board Mono	£1299.00
PCAX4 40Mb HD Mono	£1560.00
PCAX2 20Mb HD (Allows VGA Board)	£1099.00
PCAX8 80Mb HD Mono	£1950.00

ZENITH COMPUTERS

Zenith Computers	
Z-159 5.25" 1Mb RAM DOS 3.220Mb HD	£1295.00
Z-248 80286 512K RAM 5.25" FD 20Mb HD	£1800.00
FOR ANY OTHER PLEASE CALL	
LAPTOP RANGE PCs	
Tandy Laptop 1400LT DD 640K Ram	£890.00
Epson PC Laptop/DD/CGA Comp	£1112.00
Sharp 4502 DD	£830.00
Zenith	
Z-183 3.5" FD DOS 3.2 LCD Monitor	£1500.00
Supersport 286 20Mb	Call

LASER PRINTERS

Tandy LT1400 8PPM	£1170.00
Fujitsu Luna Laser	£4299.00
HP Laser Jet II	£1400.00
HP Laser Jet IID	£2080.00
Canon LBP II	£1455.00
Canon LBP-IIIT	£1840.00
Canon LBP-IIIR	£2050.00
Citizen Overture 110+	£1160.00
Star Laser 8	£1490.00
Epson GQ3500	£1258.00
Kyocera F-1000	£1780.00
AST TURBO POSTSCRIPT	£2600.00

LASER PRINTER ACCESSORIES

1Mb Expansion for Series II	£250.00
2Mb Expansion for Series II	£499.00
HP Postscript Upgrade	£1550.00
F-Font Cartridge 14.4 Med.	£110.00
4-in-1 Font Cartridge	
Courier 10/12 Letter Gothic/prestige elite	£150.00
123 Font Cartridge (landscape/portrait) (Best for spreadsheets gives 12 pitch to 30 pitch Landscape/Portrait)	£120.00

DOT MATRIX PRINTERS

Amstrad	
LQ 3500	£280.00
DMP 4000	£280.00
DMP 3150	£179.00
LQ 500KID	£360.00
Epson LX800	£170.00
NEC 2200	£269.00
Toshiba P341E	£610.00
Panasonic KXP1081	£199.00
Please call for others.	

MISCELLANEOUS

Everex Backup Sub System	£810.00
60Mb 72in	
Everex Graphics Cards	
Graphics Deluxe	£128.00
Graphics Plus	£89.00
Streaming Tape (PS2) Controller	£290.00
EGA Card 16 Colours 640*480 Pixels	£395.00

UPGRADES

20Mb Miniscribe Hard Card	£190.00
30Mb Miniscribe Hard Card	£220.00
20Mb Seagate HD Kit for XTS	£250.00
4Mb RAM Expansion Card W/O RAM	£110.00
Racer (Replaces 8088 for 80286 Proc)	£220.00

COMPONENTS

D-RAM CHIPS	
41256-10	
41256-12 Large quantities	
4164-10 Available	
4164-12	
4164-12	
NEC V20 C20.00 (For Amstrad PCs. Increases the average	
NEC V30 C25.00 speed of processing)	
MATHS CO-PROCESSOR	
8087-8MHz	£99.00
8087-10MHz	£148.00
80287-8MHz	£158.00
80287-10MHz	£27.00
80387-16MHz	£299.00
EPROM	
27256-2	Call
2764-25	
SOFTWARES	
Smart Integrated V3	£380.00
Smart Wp/Multuser	£467.00
Microsoft Word V.1	£299.00
DBase II (Amstrad PC)	£87.00
Lotus 123	£205.00
SuperCalc IV	£190.00
DBase III	£290.00
Wordstar 2000 rel 3	£199.00
UNINTERRUPTIBLE POWER SUPPLY	
Power Lab 400W	£399.00
Power Lab 800W	£550.00
Power Lab 1200W	£850.00
MONITORS	
NEC Multisync GS	£149.00
NEC Multisync II	£449.00



SAJANKA COMPUTERS LTD

4A, RANELAGH ROAD, SOUTHALL, MIDDLESEX, UB1 1DQ
TLX: 915286 GOGONG FAX: (01) 843 1894 TEL: 01-571 9933

IGNORE THE REST – WE ARE THE VERY BEST

PiCCADILLY MICROS

THE AMSTRAD RANGE

AMSTRAD PC1640

Twin Floppy Disk
640K RAM, Mono Monitor,
Keyboard, Mouse, MS DOS **£599.00**

AMSTRAD PC1640

20Mb Hard Disk, 640K RAM,
Keyboard, Mouse, Enhanced Colour
Monitor, MS DOS **£1099.00**

AMSTRAD PC2086

Twin 720K Disk Drives, 640K RAM,
Mono Monitor, Keyboard,
MS DOS, Windows. **£749.00**

AMSTRAD PC2086

30Mb Hard Disk, 640K RAM,
720K Drive, VGA Colour Monitor,
Keyboard, MS DOS, Windows **£1249.00**

PLUS ALL OTHER MODELS

ALTOS

State of the Art Unix/Xenix,
Multiuser systems. **BEST PRICES!**

EXTRA DISCOUNT GIVEN ON ALL EDUCATION SALES

OLIVETTI PERSONAL COMPUTERS

OLIVETTI M200

20Mb Hard Disk, 640K RAM,
Mono Monitor, Keyboard,
MS DOS **£999.00**

★ SPECIAL ★ M240 ★ SPECIAL ★

20Mb Hard Disk, 640K RAM,
EGA Mono Monitor, Keyboard,
5.25" and 23.5" Floppy Drive,
MS DOS **£1499.00**

OLIVETTI M290

40Mb Hard Disk, 2Mb RAM,
EGA Mono Monitor, Keyboard,
1.2Mb Floppy, 12MHz Clock Speed,
MS DOS **£2250.00**

★ SPECIAL OLIVETTI M380C SPECIAL ★

★ 60Mb Hard Disk, 1Mb RAM, ★
★ VGA Mono Graphics, Keyboard, ★
★ 16MHz, 3.5" or 5.25" Floppy, ★
★ 80386, MS DOS **£2499.00** ★

WE SUPPLY EVERYONE FROM LEADING UK COMPANIES, GOVERNMENT DEPARTMENTS, EDUCATIONAL ESTABLISHMENTS, LOCAL AUTHORITIES, THE COMPUTER TRADE TO SMALL BUSINESSES AND THE PRIVATE INDIVIDUAL – ANYWHERE IN THE WORLD!

CALL US NOW – IN YOUR AREA!



EDINBURGH	031 556 9903
NEWCASTLE	091 276 6887
MANCHESTER	061 228 7965
NOTTINGHAM	0602 583716
BIRMINGHAM	021 643 5072
LONDON	01 481 3929
BRISTOL	0272 273665

EXTRA DISCOUNT GIVEN ON ALL EDUCATION SALES

PRINTERS/LASER PRINTERS

All Epson Printers	25% Discount
All Brother Printers	20% Discount
All NEC Printers	25% Discount
All Toshiba Printers/Lasers	P.O.A.
HP/Roland/Calcomp Plotters	
Minimum	20% Discount
All Hewlett Packard Lasers	25% Discount
All Amstrad Printers	P.O.A.

PLUS MOST OTHER MAKES

SOFTWARE

All IBM Compatible Software at High discounts, including:

Lotus 123	£259.00
DBase III+	£339.00
MS Word	£269.00
Smart Software	£399.00
Wordstar Professional	£215.00

ACCOUNTS SOFTWARE

Multisoft Microsystems	£349.00
Multisoft Systems MS DOS	£295.00
Xenix	£445.00
Tetraplan Professional	£290.00
Pegasus Accounts	£190.00

PER MODULE

PiCCADILLY MICROS

Opus. TECHNOLOGY

OPUS PC III

Twin Floppy Disk Drives, 768K RAM,
Mono Hercules Graphics
Keyboard **£695.00**

OPUS PC IV

20Mb Hard Disk, 640K RAM,
EGA Colour Monitor, Keyboard **£969.00**

OPUS PC V

30Mb Hard Disk, 1Mb RAM,
80286 Mono Hercules Monitor,
Keyboard **£1199.00**

OPUS PC VI

60Mb Hard Disk, 1Mb RAM 80286,
12MHz, VGA Colour Monitor,
Keyboard **£1950.00**

OPUS PC VII

70Mb Hard Disk, 4Mb RAM, 80386,
20MHz, VGA Colour Monitor,
Keyboard **£3575.00**
Spacemaker Desk and Chair **£149.00**
MS DOS 3-2 **£60.00**

EXTRA DISCOUNT GIVEN ON ALL EDUCATION SALES

PORTABLE COMPUTERS

TOSHIBA T1000

Single 3½" Drive, Supertwist, Screen

TOSHIBA T1200

20Mb Hard Disk, Backlit Screen

TOSHIBA T1600

20Mb Hard Disk, 80286, Battery

TOSHIBA T3100E

20Mb Hard Disk 80286, Gas Plasma

TOSHIBA T5100

40Mb Hard Disk, 80386, Gas Plasma

ZENITH 286 SUPERSPORT

20Mb Hard Disk, 80286,
Battery Back-Up **£2395.00**

NOVELLE NETWORK

Leading Suppliers throughout the UK
Choice of Comms Boards, G/Net, Ethernet
and Token rings.

PHONE FOR BEST PRICES

Piccadilly Micros, 9 Grosvenor Terrace, Broad Street, Birmingham B15 1AU. Telephone: 021 643 5072. Telefax: 021 643 9379

A subsidiary of Micro Marketing Ltd.

All prices exclude VAT and Carriage. Piccadilly Micros reserve the right to vary prices without prior notice.

★ 12 months warranty ★ Software training available ★ Next day delivery available
★ On site maintenance contracts available ★ Finance plans available

olivetti

AMSTRAD

Epson

Opus.

TOSHIBA

ZENITH

ALTOS
COMPUTER SYSTEMS



Goto Computers

Progress Business Centre, Whittle Parkway Bath Road, Slough, Berks SL1 6DQ

AMPLE FREE PARKING OUTSIDE DOOR

COMPUTERS	£
AST Premium 286 10MHz 20mg Mod 120 1mg	1350
AST Premium 286 10MHz 40mg Mod 140 1mg	1495
AST Premium 386 20MHz Model 340 40Mb 1mg	2285
AST Premium 386 Model 3150 150mg NEW	3525
AST Premium 386-300 1.2FD No HD	1750
AST Premium 386-3150 ESDI Cont 2mg No Mon 3	3100
AST Premium 386-3320 320mg HD 16ms 2mg No Mon	3995
Acer AT 40mg HD(28ms) 640k KB Mono Monitor	1600
Amstrad PC1640 30MgHC Bundle 2x FD Software	1240
Amstrad PC1640 HDECD NEW PRICE	985
Amstrad PC2086 30mg HD 720kD 12" mono mon	980
Amstrad PC2086 30mg HD 720kD 14" VGA	1230
Amstrad PC2086 720kD 12" SD Mono	580
Amstrad PC2286 40mg HD 1mg RAM 14" VGA	1685
Amstrad PC2386 65Mb HD 4mg RAM 14" VGA	2995
Blue Chip XT Small FP 30mg HD DOS Green Mon	875
Blue Chip PC Popular 286 40mg HD 12MHz 640k	1150
Epson PCAX40 HDD 80286 12MHz 40mg 28ms	1350
Epson PCAX80 HDD 80286 12MHz 80mg 28ms	1800
Epson PCe HDD 10MHz 640k 20Mb 5 slots	855
Opus PC VI Turbo 286 1mg RAM 12MHz 60Mb	1875
Opus PCIII Turbo 10MHz XT 30mgHD 1mg	815
Opus PC7 VGA 386 20MHz 4mg RAM 70mgHD 22ms	3465
Opus PCV 10MHz 30mg HD 1Mb RAM PS Amber	1120
Samsung MFC6000/2 286 1mg RAM 20mg HD 1YOSW	1145
Samsung SPC3000/3 640k 20mg HD HiRes 1y OSW	740
Samsung SPC3002 20Mb EGA 640k 1 yr OSW	1065
Schneider Tower AT 12" Mono Mon + MS Works	799
Tandon 386-16 40mbHD 1.2FD 1mg RAM Mono	1905
Tandon 386-20 110Mb HD 64K cache 1.2 FD	3450
Tandon 386-20 40Mb HD 1.2FD 1mg RAM Mono	2825
Tandon 386-20 70mg HD 1.2FD 1mg RAM Mono	3100
Tandon 386/20-DP 20MHz 30mg DataPac	3200
Tandon PAC286 Plus 10MHz 1.2FD 1mg 30m PAC	1140
Tandon PCA20+20mgHD 1mgRAM 10MHz Mon/DOS	1048
Tandon PCA40+ 40mg HD 1mg RAM 10MHz Mon/DOS	1199
Tandon PCA70+70mgHD 1mgRAM 10MHz Mon/DOS	1330
Tandon Target 20 PLUS 20mg HD 10MHz Mon/DOS	1275
Tandon Target 40 PLUS 40mg HD 10MHz Mon-DOS	1485
Tandon VGA colour add 499 VGA Mono	
Vanilla 286 12.5MHz 40mg HD 1mg EGA Mon	1199
Zenith SupersPort 286 ZWE 200-02 20mg	2210
Zenith SupersPort 286 ZWE 200-04 40mg	2700
Zenith SupersPort 286 ZWE 184-2 20mg	1725
Zenith TurbosPort 386 ZTC 2030-EB 40mg	3450

MONITORS/ADAPTORS	£
Citizen CCM-104 PS/2 1024 x 768 DTP VGA	485
Hitachi 560 Multiscan	360
Interquadram Multiscan to 800 x 600 14"	345
Logitech Graphics Subsystem EGA & mn Crd Mouse	499
NEC EGA PLUS card 640 x 480col 752 x 410 Mono	160
NEC MVA1024 card max 640 x 480 PGA EGA	650
NEC Monograph 16" White 1024 x 1024 + Board	975
NEC Multisync 11" max 800 x 560 14" VGA	429
NEC Multisync GS 14" paper white m720 x 480	141
NEC Multisync Plus 15" FST max 1024 x 788	640
NEC Multisync XL 20" max 1024 x 768	1350
Philips CM9053 EGA 850x350 NEW	318
Samsung MA751 FST TTL Paper White 14"	80
Tandon 14" VGA	350
Tandon Paper 14" Mono White Phosphor	150
Taxan SV 780 VGA 14" IBM/PS/2 NEW	375
Taxan Viking Card + Cable	1495
VEGA Fastwrite VGA NEW exceeds VGA	250
VEGA VGA EGA CGA MDA Hercules etc NEW	178
Wyse 550 Mono VGA NEW	150
Wyse 60 Terminal + Keyboard green/amber/white	350
Wyse 700 Graphics Subsystem 1280 x 800 + card	525
Wyse WY-120 UNIX Terminal	315

STORAGE	£
All Drives Come With Controller/Cables	
Citizen 1.44 3.5" drive 360/720/1.44 Kit	102
Citizen 720k 3.5" drive 5.25" Frame AT	80
Citizen 720k 3.5" drive 5.25" Frame XT	72
Cypher 1525 20mg Tape Streamer Amstrad	240
Cypher 5210 XT/AT Streamer 25mg Other PCs	310
Cypher 5400 60mg fast 14min backup EXT	475
Ideal Hardware 64Mb Hard Card 28ms XT	370
Ideal Hardware HC100 100Mb Hard Card 18ms	1225
Miniscribe 8425 30mg +WDWX1 XT Control 68ms	195
Miniscribe 3053 40Mb +WDWX1 XT Control 28ms	365
Miniscribe 3085 70mg +WDWX1 XT Control 22ms	575
Miniscribe 32meg Hardcard 1.5 slot 65ms	215
Miniscribe 3650 40mg +WDWX1 Control 65ms	218
Miniscribe 3675 75.8 HH Kit NEW	475
Miniscribe 40mg Hardcard 40ms	260
Miniscribe 6085 70mg + WDWX1 XT Control 28ms	420
Miniscribe 8425 20mg +WDWX1 XT Control 68ms	185
Miniscribe 8450 40mg +WDWX1 XT Control 40ms	240
Seagate 32mg Hard Card 40ms	240
Seagate 40Mb Hard Card	320
Seagate ST 251-0 40Mb 40ms	245
Seagate ST125 21Mb 3.5" HD 28/40ms + Frame/kit	202
Seagate ST125-1 21mb 3.5HH 28ms + Frame/kit	251
Seagate ST138R 32Mb 28/40ms 3.5" NEW	188
Seagate ST225 HH 20mg Kit XT 65ms	185
Seagate ST238R HH 30mg 65ms RLL	175
Seagate ST251-1 40Mb Kit XT 28ms	289
Seagate ST277R 62Mb RLL HH Kit 40ms	335
Seagate ST4096 144Mb Formatted + Card	420
Tandon Personal Data PAC 30mg Winchester	205

ADD-ON BOARDS/MICE ETC	£
ASR Rampage 2Mb AT	665
Everex Mini Magic Memory Card XT/AT Ok	60
Everex Multifunction AT 1mg RAM Ok	160
IRMA 2 IBM 3278/79 Terminal Emulation	765
IRMA Print Serial	795
IRMACOM APA Emulates IBM 3179 col Graph WS	1005
IRMAremote X.25 Multidrop Gateway 3278/79	1335
Intel Above Board 286 512k XT or AT	288
Intel Inboard 386/AT 1Mb Piggyback Card	395
Intelligent Print Sharer 2 way	93
Logitech BUS Mouse NEW + Software	49
Logitech C7 Mouse PC/XT/AT + Software	49
Microsoft BUS or Serial + Software	87
Orchid JET 386 16MHz 3x AT speed	450
Orchid Tiny Turbo 286 gives PC/XT AT power	225
Polaroid Palette Plus EGA Slides/Prints E	1925
Tecmar Microram M80 Memory Mul/Funct PS/2	175

PLOTTERS/DIGITISERS	£
AST Turboscan + Software & Interface	955
Canon 1X-12 Image Scanner + OCR t.21 S/ware	1095
Cherry A3 Graphics Tablet Mk III	415
Hewlett-Packard 7475A A3/4 6 Pen	999
Hewlett-Packard DraftPro 7575 A1A4 Serial	4250
Hewlett-Packard ScanJet + PC/PS2 IF + OCR S/W	1480
Hewlett-Packard HP7550 A3 8p + Draw Gallery	2664
Hewlett-Packard SketchPro Graphics Tablet	475
Logitech Scanman 200dpi 102 x 280mm Brd + s/w	185
Panasonic FXR 505 + Software & Interface	905
Roland 880A A3 8pen	550
Roland DPX-3300 A1 8 pen SYA350 640kb 1YOSM	3625
Roland DPX2200 A2 8 pen SYA350 640kb 1YOSM	2620
Roland DXY 1100 A3 8 pen 42cm/sec	615
Roland DXY 1200 + elecStat pen/Hlr/Digital	845
Roland DXY 1300 + 1mg Buffer adj Pen speed	999
Roland GRX300 A1 paper move 60cm/s 1YOSM	3325
Roland GRX400 as above but AO 1YOSM	4400
Summasketch Pro 18x12 Graphics Tablet NEW	520

GOTO DISKS (10 in BOX) 100% CERTIFIED	£
Goto 3.50" DS DD 135tpi	12.25
Goto 5.25" DS 1.6mg High Density	14.25
Goto 5.25" DS DD 48tpi	6.50
Goto 5.25" DS DD 96tpi	8.00

THIS MONTH'S SPECIAL



HEWLETT PACKARD

£2395 + VAT

LASERJET SERIES IID

- ★ Double sided page printing
- ★ High resolution text and graphics
- ★ Prints up to 8 pages per minute
- ★ 24 fonts
- ★ Expandable memory and fonts
- ★ Two paper trays for volume printing
- ★ Envelope feeder
- ★ Extensive software support
- ★ 1 year on-site warranty
- ★ Free Times Roman and Helvetica cartridge

The LaserJet IID is never lost for words and always changing sides. But it won't let you down.

PROCESSORS/RAM CHIPS	£
Intel 80287-10	189
Intel 80287-6	115
Intel 80287-8	164
Intel 80387-16	310
Intel 80387-20	435
Intel 8087-5	77
Intel 8087-8 (Compaq/Amstrad/Olivetti)	108
NEC V20 (for 8088) NEC V30 (for 8086) 8MHz	11

COMMUNICATIONS	£
Amstrad SM2400 External Modem v22bis NEW	230
Amstrad Satellite Dish incl Converter NEW	299
BT CF9 FAX Grp 2/3 voice contact/copier	868
Canon 110 FAX 110 FAX/copier/Exec phone	1040
Carbon Copy Plus 5.1	Call
Crosstalk Mk4	62
Datatak V3.27/Smartcomm 111 Soft/w each	70
Desk-Link 2.0 Links 2PCs via serial ports	95
Dowty FAX card for PC + software	765
Hayes 2400 Smartmodem V22bis Internal	515
Interquadram JT Fax board incl software	280
Laplank + cable portable to PC and VV	62
Miracle Keycard 2400 V22bis + Datatak	348



Goto Computers LTD

7 Progress Business Park
Whittle Parkway,
Bath Road, Slough, Berks

Please supply the following goods:

.....
.....
.....

I wish to pay by:

ACCESS
 VISA
 AMEX
 DINERS
 CHEQUE
 COMPANY

ENCL ORDER

My Credit Card number is:

.....
.....
.....

Name on Card

Address

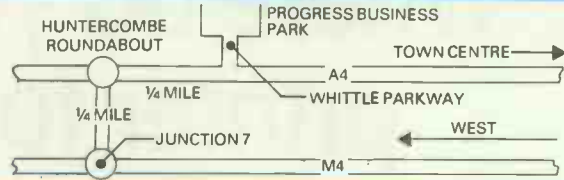
Phone No

★ FREE DELIVERY UK MAINLAND

★ ASK ABOUT OUR 3 CHEQUES OVER 3 MONTHS SCHEME



Tele-Sales:
06286 68081
Telex: 0753 878632
Fax Orders: 06286 65611



DOT MATRIX PRINTERS — 24 PIN/INK JETS

Amstrad LQ5000di 96LQ/288cps	350
Brother 3524 LQ108/HS432/360 56kb 136col NEW	1150
Brother M-1724 72NLQ/216cps P/S	488
Brother M-4018 67LQ/100NLQ 480 FT	1050
Brother M2518 50LQ/75NLQ/360 18p PP	660
Brother M4018XL Barcode Printer PP 48kb	1320
Diconex 300 Ink Jet Desk Top 40-410cps NEW	399
Epson LQ1050 73CQ/220c 8kb 132col	562
Epson LQ2550 24p colour std HiSpeed NEW	880
Epson LQ500 24p 50LQ/150cps FT (SFAdd70)	267
Epson LQ850 73LQ/220cps 8kb 80col	425
Epson SQ2500 Inkjet 180NLQ/540 Dual I/F	875
HP Deskjet 120LQ/240cps 300dpi 80col 1YW	559
HP PaintJet Color Graphics 4min pp NEW	745
HP ThinkJet 150cps 1Kb	316
NEC P6PLUS 90LQ/265 FT 80kb Ppark 80col	429
NEC P7PLUS 90LQ/265 FT 80kb Ppark 136col	543
NEC Pinwriter P2260 56LQ/168cps 80c	265
Panasonic KX-P1124 63LQ/193cps 5 fonts NEW	325
Panasonic KXT1540 80LQ/240cps PS FT 80c	419
Star LC24-10 57LQ/170cps 8NLQ fonts NEW	265
Star NB24-10 72LQ/216 80col + sheetfeeder	432
Star NB 24-15 72LQ/216 132col + sheetfeeder	525

DAISYWHEEL PRINTERS

Brother HR40 incl SSF + Tractor	680
Juki 6200 30cps 132 col IBM & Diablo	349
Juki 6300 40cps 132col IBM & Diablo	575
Juki 6500 60cps 132col IBM & Diablo	675

LASER PRINTERS

AST Turbolaser Postscript 3mg RAM 1y OSM	2498
Brother HL-8 5 Fonts 8ppm LCD 1YR OSM	1475
Brother HL8/QS with Postscript Emulator NEW	3789
Citizen Overture 106 smallest Desktop NEW	1195
Citizen Overture 112 12ppm NEW	1750
Epson GQ-3500 6ppm+HP Emulation 12month OSW	1105
GoScript Postscript Emulator	195
HP JetScript Adobe Postscript 35Fts 3meg	1630
HP Jetscript upgrade LJ 11 to Postscript	1830
HP Series II memory upgrade 2Mb	615
Hewlett-Packard Laserjet II 1 year OSW	1342
Hewlett-Packard Laserjet 11D dual bin NEW	2395
Kyocera F-1000 10ppm 512k	1699
Kyocera F-3000 Dual Bin 18ppm 1.5/3.5Mb	4889
OKI NEW Laserline 6 ELITE P	1295
Qlivetti Olympia HP/Db 1.5Mb 9RF 1yr OSW	1495
Panasonic KX-P4450 11ppm Dual Bin 1yr OSW	1455
QMS Colourscript 100 Ver 49 Postscript NEW	19150
QMS PS 810 Postscript to 8ppm 35 typefaces	2750
Qume Crystal Print II 6ppm	1080
Qume Crystal Print WP 6ppm Diablo 128k NEW	865
Qume ScripTen 10ppm HP Em 35 Res fonts 3mg RAM	2999
Ricoh LP 4081-R1 Dual Interface 8res fonts	2200
Star Laserprinter 8 1meg RAM 12mOSW	1399

NETWORK SYSTEMS

Achter PC100 Four-user Unix V3 System	3995
Amstrad AMSNOS 3-node netwk + I/face + S/ware	360
Cubix 3386 Unix 4/16Mb NEW	11600
Ethernet Novell Workstation Card	260
Harvard Graphics LAN(5user) NEW	945
Novell Advanced Netware 2.12	1395
Novell ELS and Ethernet cards 4 user starter	1750
Novel Fileserver Card (16bit)	660
Paradox LAN Version 6 User	375
QuadEthernet 2 users Novell 286 Master Kit	2265
Sage MainLAN Netblos 2-Station StartPack	380
SCO XENIX System 5 Multi-user System	Call
Wordperfect V Network (Add £130 each Str)	595
dBase IV LAN PC	385

SPREADSHEETS/INTEGRATED

Ability Plus	105
Borland Quattro NEW Generation S/Sheet	99
Framework III now supports Prestel NEW	280
Funk Allways 123 spreadsheet publisher	163
Funk Sideways for 123 ver 3.2	29
Lotus 123 Rel 2.01 upgrade to Rel 3.30	236
Lotus Agenda	199
Lotus HAL	77
Lotus Metro Ver 1.1 NEW	49
Lotus Symphony 2.0 Faster/TextEdit/SpellCh	326
Microsoft Excel	232
Microsoft Works NEW	106
Open Access II V2 NEW	312
Planperfect V3	189
Q & A Symantec V3 NEW	185
Smart System 3.1 LAN Ready V3.10+ S/Chk	370
Supercalc 5 NEW 3D Spreadsheets	265

SOFTWARE — UTILITIES

Ashton Tate dBase Programmers Utilis2 NEW	70
Borland Eureka The Solver+	52
Borland Sidekick Plus NEW	103
Borland Superkey/Lightning each	41
Borland Turbo Basic/Turbo C V1.5 each	41
Borland Turbo C	41
Borland Turbo Pascal Developers Library	153
Borland Turbo Pascal Ver 4.0	41
Borland Turbo Prolog 2.0 NEW	41
Calendar Creator Plus NEW	33
Copy II PC	24
Cruise Control Dimmer/Cursor Speed V3.02	33
DS Backup + Hard Disk Backup	55
Desqview Quarterdeck 2.01	65
Developers Toolkit for C (Dual) Migent NEW	305
Fastback Plus V2.01 NEW	80
HOT v4.0 Menu Management System	103
Lattice C V3.2 Lattice Corp	203
MACE Utilities + V4.1 NEW	52
Microsoft C Compiler Ver 5.1 NEW	230
Microsoft Cobol Compiler V5.0	330
Microsoft Fortran V 4.01	210
Microsoft Macro Assembler V 5.0 NEW	78
Microsoft Quick C	60
Microsoft Quickbasic V4	51
Microsoft Windows 386	102
Microsoft Windows ver 2	54
Norton Advanced Utilities Speed Disk etc +	55
Norton Commander Ver 2.0 hard disk org	40
PC Tools Centre Point NEW	173
PC Tools Deluxe Ver 4.3 NEW	35
Printer Genius Manages Printer Use	58
The Brooklyn Bridge 5.25" to 3.5" Transfer	65
XtremePRO NEW ASCII editor 7 x faster etc	60

SOFTWARE-DATABASES

Ashton Tate dBase IV NEW	360
Borland Reflex V1.1	59
Clipper dBase compiler Summer 87	275
Comsoft Delta V Relational NEW	330
Datebase	290
Foxbase Plus 2.1 NEW	230
Lotus Agenda	210
Paradox Rel 2.0	250
Persoft Ize NEW	225
Rbase System 5 Microrim	315
Sentinel Dataperfect	230

ACCOUNTING PACKAGES

Pegasus Single User	165
Sage Accountant Plus	130
Sage Financial Controller V3.3 NEW	192
Sage Payroll 2	93
Tetra Plan Chameleon 32 bit system	2725

DESKTOP PUBLISHING

Aldus Pagemaker Ver 3.0 (Templates/Style S)	456
Ashton Tate Byline NEW	139
Fontasy 3.0 NEW	48
GEM Desktop Publisher/Desktop v3.0	210
PFS First Publisher V2.0 NEW	63
Print Shop Banners Bulletins etc	32
Ventura V 2.0 Xerox NEW	485

DOT MATRIX PRINTERS — 9 PIN

Brother 1209 168cps NEW	190
Citizen 180E 30NLQ/175cps 4 Res Fonts NEW	260
Epson DFX5000 9 pin 80NLQ/533HS/400 draft	1140
Epson EX800 50NLQ/300cps 80col	422
Epson EX1000 50NLQ/300cps 136col	545
Epson FX1050 54NLQ/264cps 2NLQ Fonts PPark	396
Epson FX850 54NLQ/264cps 2NLQ Fonts PPark	298
Epson LX800 150cps	172
OKI Microline 320 6NLQ/300cps 80col NEW	440
Panasonic 1595 51NLQ/240cps P&S 132col	408
Panasonic KX-P1081 24NLQ/120cps 80col	132
Panasonic KX-P1592 38NLQ/180cps 132col	292
Star LC-10 DMP 120cps color version	205
Star LC-10 30NLQ/120 8 Res Fonts (6 Front)	180

GRAPHS/MATHS/CAD/STATS/PROJECT ETC

Ashton Tate Chart-Master	152
Ashton Tate Draw Applause V2.01 Slides etc	385
Autocad 2.9 Basic	275
Autosketch (Draws Measures Scales etc)	49
Boeing-Graph 3D ver 4.0	152
Delux Paint II	54
Design CAD 3D NEW	245
FastCAD V2.05 2D CAD NEW	1045
Financial & Statistics Library STSC NEW	155
First Graphics SPC NEW	108
Flight Simulator 3.0 New now with Jet A/C	41
GEM Draw Plus/Desktop V3.0 NEW	143
Harvard Graphics Business Symbols over 300	92
Harvard Presentation Graphics V 2.1	214
Harvard Total Project Management II	365
Lotus Freelance Plus 3.0 NEW	315
Lotus Graphwriter II Easy with 123/Symph	265
Lotus Measure (Scientific)	295
Mastergraphics Ashton Tate Presentation	305
MathCad 2.0 Maths Scratchpad	242
MathPlan Sentinal Software	225
MicroGrafx Designer	370
Microsoft Chart V3 NEW	178
Microsoft Project 4	228
Office Graphics Office Solutions	40
PC Paintbrush Plus	62
Permaster Advance Rel 2 Project Planning	Call
Picture Perfect NEW Computer Support Grp	195
Publishers Palnbrush 1.52	160
Sign Designer Create High Quality Signs	33
Statgraphics Ver 2.6	410
Superproject Expert NEW	460
Systat	380
Timeslips Plus Time/Expense Recording	138
Timeworks	72
TurboCAD 3D CAD System NEW	Call
TurboCAD V 1.5 Entry Level CAD system	70
What's Best Commercial Linear Programming	395

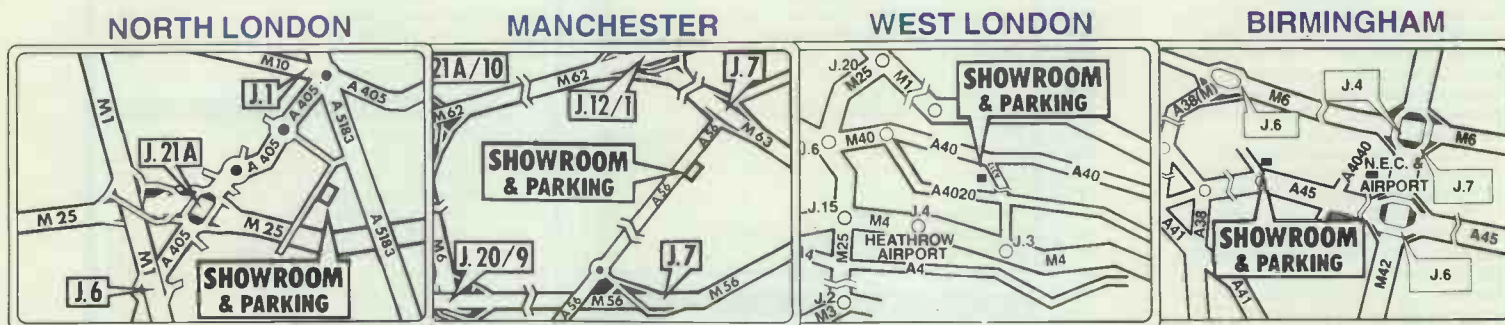
WORDPROCESSORS

Borland Sprint v1.0 NEW	140
DisplayWrite 4	250
Lotus Manuscript v2.0	228
Microsoft Word 4.0 + Pageview	230
Multimate Advantage II	240
Samna Word 4	240
Wordperfect Ver 5.0	222
Wordstar Professional Ver 5.0 NEW	220

ORDERS TAKEN FROM UK GOVERNMENT BODIES — EDUCATIONAL ESTABLISHMENTS
— ESTABLISHED COMPANIES
EXPORT ORDERS UNDERTAKEN — LEASING AND H.P. ARRANGEMENTS —
PRICES SUBJECT TO CHANGE WITHOUT NOTICE — GOODS SUBJECT TO AVAILABILITY

OPEN 9.00AM TO 5.30PM MON THRU FRIDAY — CLOSED SATURDAY
WE MOVE SERVICE NOT BOXES — Please add VAT to all prices

Where do you buy a colour printer for £229 at 3.15 on Saturday afternoon?



NORTH LONDON
99 PARK STREET LANE
BRICKET WOOD
ST. ALBANS, HERTS
(0727) 72790

MANCHESTER
85 WASHWAY ROAD
(OPPOSITE IBM)
MANCHESTER
061-962 0780

WEST LONDON
304 KINGSHILL AVENUE
(off Uxbridge Road)
HAYES, MIDDLESEX
01-841 8744

BIRMINGHAM
1046-1048 COVENTRY RD
HEYMILLS, BIRMINGHAM
021-772 5212

SHOWROOM OPENING HOURS: Monday-Friday 9am-6pm Saturday 10am-5pm

COMPUTER

FX EXPRESS

STAR LC-10 COLOUR

The star of the printer world. Already its topping the hit parades. For the money no other printer offers so much. 80 column multifont printer with 8 resident fonts and paper parking. 144cps draft and 36cps in NLQ quality. Parallel or Commodore interface versions available. £229.00
Black only version£199.00

not to mention

32Mb FILECARD

Need more hard disk storage on your PC? Fit a 32Mb hard disk on a card in a spare slot and carry on computing! Can operate as drive C: or D: on your PC to give a full 32Mb of extra storage. Access times 65ms. Includes free Xtree disk organiser software. £229.00

LOTUS 1-2-3

The market leading Spreadsheet, and now with more power. Easier to use, with increased calculating capability, and more flexible graphics. New Version 2.01 can read all other Lotus files. £245.00

MATHS CO-PROCESSORS

Fed up with waiting for your spreadsheet or database to run. Zip up the speed of your PC with a maths co-processor. Available for 8088, 286 & 386 machines at speeds from 5MHz to 25MHz. They can even make your Amstrad go faster. Prices from £99

HEWLETT PACKARD LASERJET SII

The quality of Hewlett Packard Lasers make them very popular. 8 page per minute, with the first copy out in 13 seconds. Works with all popular software at 300 dots per inch. Now with 12 months on-site maintenance at no extra cost, although we know from our large number of satisfied customers that you won't be needing it. £1499.00

EPSON FX850 and FX1050

The world's longest running printer series. These 9 pin workhorses will go on and on. Now with 10% more speed to give 264cps in draft and a smart 54cps in correspondence quality. The FX1050 can deliver up to 272 characters per line in condensed print. Single button switching between continuous and single sheet paper feeding. Print buffer for up to 4 pages.
FX850£339.00 FX1050£439.00

WORD PERFECT (Version 5)

Its NEW, but it works just like the previous popular Version 4.2. Many new features like Desk Top Publishing functions, and even more print fonts. Word Perfect is again asserting why it is the most popular WP package on the market. £219.00

We're there because you're there.

FOR FULL PRICE LIST PLEASE CALL
EXPORT & TRADE ENQUIRIES WELCOME
TELEPHONE & MAIL ORDERS WELCOME



CALL 0727 37451



MICRO-COMPUTERS, PERIPHERALS
SOFTWARE, SALES & SUPPORT
CREDIT CARDS NOT DEBITED UNTIL DESPATCH

OPENING IN 1989: LEEDS, NEWCASTLE, GLASGOW, BRISTOL & SOUTH LONDON

COMPUTER



EXPRESS

ATARI 520ST-FM 1Mb £299

plus V.A.T.

With SUPER PACK of over £450 worth of FREE software

MEGA ST2

Serious computing with unlimited expandability. 68000 processor running at 8MHz, built-in 720K floppy drive. Midi ports with 3 programmable sound channels, Mouse, GEM. Choice of Monitors. High resolution Mono Monitor.....£828
Medium resolution Colour Monitor.....£999

ATARI PCs

Full IBM compatibility at unbelievably low prices!
8088 based PC 20 Mb with EGA mono monitor.....£559
80286 based AT 60 Mb Hard Disk with EGA mono monitor.....£1589
80386 with 60 Mb Hard Disk and VGA Multisynch monitor.....£2999

ATARI LASER PRINTER

8 pages per minute in 300 dots per inch resolution at a price not be missed.....£1085

ATARI 1040ST-FM

All the brilliance of the Atari with 1Mb of RAM and 1Mb double sided disk drive.....£399

EPSON LX800

This latest offering from Epson zips along at 150cps in draft and 25cps in NLO. Comes complete with Parallel Esc-P or IBM Parallel interface as standard, plus top mounted tractor feed. Good clear typeface, and 80 column wide.....£192

NEC P2200

At last a 24 pin printer you can afford, and with NEC's renowned reliability. This little baby cruises along at 168cps in high speed, 140cps in standard and a really nippy 56cps in Letter Quality mode. This printer should be on every discerning buyers list. NEC P2200.....£289
Cut Sheet Feed.....£65

TIMEWORKS

The latest in low-cost DTP. An excellent package for anyone wanting to make a start in DTP for a very modest sum. Timeworks is very popular, and has good telephone support from the manufacturer.

IBM.....£89
Atari.....£89

PANASONIC 1081

At this price who can ignore this little winner. 120cps draft and 30cps in NLO makes it everybody's favorite.....£143

AMSTRAD 2086

Amstrad's new range available from stock at Computer Express NOW! This weeks super deal
Amstrad 2086 30mb Hard Disk 12" Colour Monitor....£1119
Amstrad 2086 Single Drive 14" High Res VGA Colour.....£939

AMSTRAD 1640

Still excellent value for money. 8MHz 8086 chip, 640K RAM, Mouse, GEM, MS-DOS. For extra value fit a 32Mb FileCard and get a hard disk performance at a lower cost! This weeks special - 20 Mb Hard Disk ECD Monitor....£939
Single drive Mono Monitor.....£479

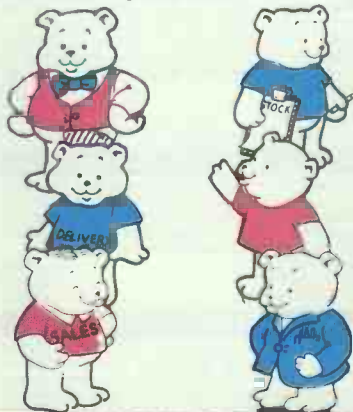
EURO PC

The ideal IBM PC clone for Christmas. Superfast 8088 processor, 512K RAM, full size keyboard, 3.5" Floppy drive. Parallel, Serial, mouse/joystick ports. One expansion card slot and ports for hard disk expansion. Comes complete with 12 months Warranty but this machine is so reliable you will not use it. Christmas bundle with Microsoft Works and GW Basic. With 12" Mono Monitor.....£399

With 14" Colour Monitor.....£549

STAR LC-10

For the money no other printer offers so much. 80 column, multifont printer with 8 resident fonts and paper parking. 144cps draft and 36cps in NLO quality. Parallel or Commodore interface versions available.....£209
Colour version printing 7 colours.....£239



AFTER SALES SERVICE

Don't worry - when you buy from Computer Express you receive our no quibble 28 day Customer Assurance Warranty. We also give you the full Manufacturer's warranty. Also, we are always ready to help. New software, product developments, hints and wrinkles - call us for friendly advice and encouragement.

ENORMOUS STOCKS

Enormous stocks of Atan and Amiga Hardware and Software for speedy despatch from our own vast International warehouse in St. Albans.

TECHNICAL BACK-UP

Highest possible standard of service from the Computer Express technical department. Any problems, just give us a call.

FAST DELIVERY

Straight from stock to the customer by means of our super-reliable, ultra-efficient delivery service. Computer Express won't keep you waiting.

SUPER PRICES

Call us for a copy of price list or an on-the-spot quotation - no obligation.

COMMODORE AMIGA 500

£319

plus V.A.T.

GAMES SOFTWARE

Afterburner.....	Call
Carrier Command.....	Atari Amiga £21
Corruption.....	Atari Amiga £23
Dagas Elite.....	Atari Amiga £23
Daley Thompson.....	Amiga £19
Dragon Ninja.....	Call
Dungeon Master.....	Atari £19
F16 Falcon.....	Call
Flight Simulator 3 IBM.....	Atari Amiga £39
Garfield.....	Amiga £21
Interceptor.....	Amiga £23
Manace.....	Amiga £17
Operation Wolf.....	Atari Amiga £18
Starglider 2.....	Atari Amiga £19
Star Ray.....	Atari £16
Star Ray.....	Amiga £23
STOS Game Creator.....	Atari £26
Super Hang-on.....	Atari £19
Thunderblade.....	Call
U.M.S.....	Atari £23
Virus.....	Atari Amiga £19
Where Time Stood Still.....	Atari £16

Plus a full range of all popular software at low prices.

MINI-GENLOCK

Link your Amiga computer to your digital recorder.....£99

MIDI for the AMIGA

Call for details of our range of Midi equipment and software.

AMIGA EMULATOR

64 Emulator - allows use of most applications from C64.....£56
Access 64 - allows you to transfer files and use C64.....£49

AMIGA GRAPHICS SOFTWARE

Deluxe Photo Lab - onicolour paint system.....£56
Photon Paint - the latest word in paint packages.....£49

CAMMERON FLAT BED SCANNER

A4 flat bed scanner for the Amiga, Atari, and the IBM...£590

HP DESKJET

Laser quality at a low-low price. Print resolution of 300dpi for both multiple font text and full page graphics. Can be used like a normal printer with print speeds of 240cps in draft and 120cps in true LQ. Built-in cut sheet feeder and 16k buffer. The IBM version is a snip at.....£659
Atari version.....£659

AMS MICROSCAN

Now there's a scanner you can afford to go with DTP software. 4" wide scan for pictures and text.....£229

All goods guaranteed. Official Purchase orders accepted from Government, Local Authorities, Universities and PLC's. All prices exclusive of VAT and subject to change without notice. Delivery charges extra. No returns or repairs accepted without Returns Authorisation Number (obtainable from our Technical Support Department)
Defective dead-on-arrival merchandise repaired or replaced immediately at our carriage expense. Carriage on warranty repairs is paid by the customer. Non-defective credit returns subject to a 15% restocking fee. Technical support available Monday to Friday. Export and trade enquiries welcome.

FOR FULL PRICE LIST PLEASE CALL
EXPORT & TRADE ENQUIRIES WELCOME
TELEPHONE & MAIL ORDERS WELCOME



CALL 0727 37451



MICRO-COMPUTERS, PERIPHERALS
SOFTWARE, SALES & SUPPORT
CREDIT CARDS NOT DEBITED UNTIL DESPATCH

HEAD OFFICE

NORTH LONDON
MANCHESTER
WEST LONDON
BIRMINGHAM

• CAXTON CENTRE • PORTERS WOOD • ST ALBANS • HERTS • AL3 6XT • (0727) 37451
• 99 PARK STREET LANE • BRICKET WOOD • ST ALBANS • HERTS • AL2 2JA • (0727) 72790
• 85 WASHWAY ROAD (A56) • SALE • MANCHESTER • M33 1TQ • 061 962 0780
• 304 KINGSHILL AVE • HAYES • MIDDLESEX. 01-841 8744
• 1046-1048 COVENTRY ROAD (A45) • HEYMILLS • BIRMINGHAM. 021-772 5212

SHOWROOM OPENING HOURS: Monday-Friday 9am-6pm Saturday 10am-5pm

showroom
a
near you

COMPUTER

EXPRESS



ST ALBANS • HEAD OFFICE

BLEAT THESE PRICES

GRAPHWRITER II

Automate your chart making with Graphwriter. Links directly to 1-2-3, and lets you print up to 100 charts in one print run with the highest resolution. Can be used on dot matrix, lasers, plotters, colour printers, and film recorders. Go on, spoil your audience, treat them to charts from Graphwriter. £299.00

VEGA VGA

Bring the full capability of IBM PS/2 graphics to any IBM compatible PC. This card gives VGA resolution of 640x480 as well as 800x600 with a choice of 16 colours. And it runs at up to 400 times faster than current EGA boards. Operates with most quality monitors. £259.00

AST RAMPAGE

Take your LOTUS 1-2-3 to the limit with Rampage. Up to 2Mb of expanded memory available for PCs, ATs, PS/2 or can be used as extended memory on 286 machines. £250.00 plus chips

MULTIMATE ADVANTAGE II

This is the number 2 choice in professional WP. Quick, efficient and loaded with features. Difficult to better or even match. £279.00

MICROSOFT WORD 5

Make professional output an everyday event! The advanced features of Word 5, like style sheets and PageView help to speed you through both large and small jobs. On-line tutorial and "undo" command makes it ideal for first time users. 130,000 word spell checker and Thesaurus. Supports almost every printer or laser. £239

MICROSOFT EXCEL

A new generation spreadsheet for high performance PCs. Combines a powerful spreadsheet with a fast flexible database and extraordinary business graphics (44 different charts). Intelligent recalculation, linked worksheets, and a full array of auditing tools make Excel stand out from the other spreadsheets. Don't just take our word for it - trade-up from your current spreadsheet to Excel for just... £195.00

VENTURA

The professionals DTP! Produces quality documents easier and faster. Contains Style Sheet and can import files from AutoCad, GEM, Lotus etc. Full WYSIWYG with drop down menus. £499.00

dbASE IV

At last it's here! The new version of the UK's most popular Database software. Lots of new features to make all its competitors obsolete (so Ashton Tate hope!). Call for a fact sheet and early delivery. £329.00

ALDUS PAGEMAKER

Pushing Ventura hard for the number one DTP slot PageMaker now offers support for long documents, automatic text flow, 20 style sheets, support for spot colour, bitstream custom font generator, and near typeset quality output. £499.00

SMART SYSTEM

The trouble with integrated packages is that they tend to do one thing at most very well, and all the others not so well as a dedicated package. Smart is the only integrated system in which all of its components (WP, Spreadsheet, Database, Graphics, Communications, Diary) are competent to stand on their own against the competition. The best-selling integrated package. FREE Spell-checker. £399.00

SUPERCALC 5

The new, improved alternative to Lotus 1-2-3 and its clones. Many new features make this one worth considering. They say it is everything Lotus should have been. Easy to use and quick, good graphics, it may be number two, but it tries harder! £209.99

WORDSTAR PROFESSIONAL VERSION 5

The original mass-market WP package still continues to out-sell nearly everything in sight. WordStar addicts just can't seem to get enough. This is the latest incarnation of the eternal package! £219.00

BORLAND QUATTRO

If you're shopping at this price-level, why buy anything else. Borland has always broken the industry mould in matters of price/performance, and this quality spreadsheet does everything more expensive offerings do, at half the price. £129.00

MICE FROM MICROSOFT & LOGITECH

If you need a mouse the Microsoft bus or serial version are the ones for you! Now with free software giving you a choice of Mouse Menu and Paintbrush, or Windows and Paintbrush, or EasyCad. £99.00 to £129.00
Choice of Logitech Mice to fit on the Serial Port or in a Bus Slot. Logimouse C7 Serial - This 3 button opto-mechanical mouse comes complete with software and LogiMenu. £79.00

All goods guaranteed. Official Purchase orders accepted from Government, Local Authorities, Universities and PLC's. All prices exclusive of VAT and subject to change without notice. Delivery charges extra. No returns or repairs accepted without Returns Authorisation Number (obtainable from our Technical Support Department). Defective dead-on arrival merchandise repaired or replaced immediately at our carriage expense. Carriage on warranty repairs is paid by the customer. Non-defective credit returns subject to a 15% restocking fee. Technical support available Monday to Friday. Export and trade enquiries welcome

FOR FULL PRICE LIST PLEASE CALL
EXPORT & TRADE ENQUIRIES WELCOME
TELEPHONE & MAIL ORDERS WELCOME

AMSTRAD 2000 Series

NEW 2086 range available from stock NOW!
Single Drive 12" Mono. £539 Single Drive 14" Colour. £669
Single Drive 12" Colour VGA. £759 Single Drive 14" Colour VGA. £669
Twin Drive 12" Mono. £679 Twin Drive 14" Colour. £809
Twin Drive 12" Colour VGA. £899 Twin Drive 14" Colour VGA. £899
30Mb Hard Disk 12" Mono. £899 30Mb Hard Disk 14" Colour. £1029
30Mb Hard Disk 12" Col VGA. £1119 30Mb Hard Disk 14" Col VGA. £1209
See the main advert for 286 and 386 prices.

SPECIAL PCAX2 EGA OFFER

At last! A fast (12MHz) AT compatible machine at a price you can afford. This Special Offer comes bundled with MS-DOS, Keyboard, 14in EGA Colour Monitor and 20mb base unit. All you need in footprint size. £1399.00
For those who require more storage we have the Epson AX40 with a 40Mb hard disk at a special price of. £1899.00



EPSON AX40

A 80286 chip machine which is AT compatible. New 12MHz processor speed. A fast 28 msec 40 Mb hard disk. 6 expansion slots ready for memory expansion when OS/2 seriously arrives. Comes with EGA card and 14in monitor. £1899.00

SHARP PORTABLES

This is the range that is going to give overpriced Toshiba a run for their money. The Laptop 4500 series offers excellent value and 4 hour battery life, while the hard disk 7221 remains tied to the mains. All sport excellent back-lit SuperTwist LCD screens. The 4500's are 8088 turbo based with 3.5in floppies, while the 80286 7221 has a 20Mb hard disk and a single 5.25in floppy.
PC-4501. £594
PC-4502. £758
PC-452120Mb. £1399.00
PC-722120Mb AT compatible. £2099.00

AMSTRAD 1640

New LOWER prices giving even better value for money. 8MHz 8086 chip, 640k RAM, Mouse, GEM, MS-DOS, and a choice of Hercules Mono, full colour, or Enhanced Colour Display. For extra value buy a single drive version and fit a 32Mb FileCard! We will still offer the best prices around on all Amstrad kit.

Single Floppy ECD. £669
Single Floppy Mono. £479.00
20mb Hard Disk ECD. £939.00

AMSTRAD PPC PORTABLE

At last! Amstrad is attacking the portable market, where until now the over-priced Japanese have romped. This sturdy little beast comes in four versions. Take it anywhere. The modem versions are especially good value. There is now an external 20 or 30 Mb hard disk for these portable to give them full desk-top power (ask for details). PPC512K Single 3.5in Floppy. £384.00
PPC512K Double Floppy. £489.00
PPC640K Single Floppy Modem. £489.00
PPC640K Double Floppy Modem. £599.00

32Mb FILECARD

Need more hard disk storage on your PC? Fit a 32Mb hard disk on a card in a spare slot and carry on computing! Can operate as drive C: or D: on your PC to give a full 32Mb of extra storage. Access times 65m sec. Includes free Xtree disk organiser software. £239.99



AST ADD-IN BOARDS

The real Rolls Royce of cards to upgrade all PC's Memory, EGA, extra ports, go faster boards, \$250, \$270 and all the popular cards. Call us first whatever you need.

TANDON PCA 20 PLUS

Latest version of the successful PCA 10MHz 80286 machine. Standard 1Mb of memory, RGB output and 1.2 Mb floppy drive. Choice of monitor.
EGA. £1599.00 Mono. £1399.00

COMPUTER EXPRESS GOLD

On-site equipment maintenance and hot-line software support available for all items. We can almost be your resident computer expert. Let us build a scheme to suit your particular requirements. Ask for details when placing your order.

HP DESKJET

Laser quality at a low-low price. Print resolution of 300dpi for both multiple font text and full page graphics. Can be used like a normal printer with print speeds of 240cps in draft and 120cps in true LQ. Built in cut sheet feeder and 16k buffer. £659.00

EPSON LQ2550 PLUS

Impressive but not expensive when you consider all its features, this true letter quality speeds through printing (400cps draft, 133cps LQ). You won't find a printer to beat this one. 24 pin printing, 132 column with built-in tractor feed, 360dpi graphics, upto 5 copy multipart stationery printing. Colour as standard. 7 resident fonts including a script for very personal letters. £711.00

STAR LC24-10

This super value 24pin printer comes with 8 resident fonts, all selectable from the front panel. 80 column, 170cps in draft and 57cps in exceptional letter quality, with quiet print button. Paper parking and push tractor feed makes paper handling easy. Uses Epson LQ800 and LQ1500 software drivers. £299.00

PANASONIC KX-4450 LASER PRINTER

The new faster laser printer. A speedy 11 pages per minute throughput with your first copy out in less than 9 seconds. 22 resident fonts, 300 dpi, dual 250 sheet paper trays to accommodate both plain and headed paper, easy front panel control of all features. Emulates LaserJet, IBM Proprinter, Epson FX, and Diablo 630. Serial and parallel port as standard. Free 12months on-site Warranty. £1599.00

NEC P2200

At last! 24 pin quality that anybody can afford, with NEC's renowned reliability to match. This little baby cruises along at 168cps in high speed, 140cps in standard and a really nippy 56cps in 24 pin letter quality mode. This printer should be on any discriminating buyers list. NEC P2200. £289.00
Cut Sheet Feeder. £65.00

BROTHER DAISYWHEEL PRINTERS

Letters look so much more professional when produced on a daisywheel printer. Brother is the best name in daisywheels. Speeds from 20 cps through to 40 cps with the HR40 having a cut sheet feeder as standard. The HR40 can also handle 136 column wide spreadsheets. Your Managing Director will just love his super smart letters.
HR20. £379 HR40. £895

EPSON LQ850 and LQ1050

These new 24 pin winners from Epson are the latest hot movers in the market. At speeds of 220cps draft and 73cps in 24 pin letter quality mode, they're on everybody's short list. This is one buy you won't regret. Remember, they have a built-in tractor feed as well.
LQ850. £449.00 LQ1050. £579.00

KYOCERA F1000 & F1200

High specification lasers which give more value for your money, 36 resident fonts, 10 pages per minute, 1.5Mb of RAM on the F1200 for full page graphics, Bar Code generator, excellent HP emulation, and Prescribe page description language to give complete control of output quality.
F1000. £1949.00 F1200. £2499.00

COMPUTER EXPRESS GOLD

Let us help you make best use of your PC and software with our low cost training services. We train by the half day, day or week - and on your premises at very little extra cost. All popular packages covered. From £105.00

AMS MICROSCAN

Now there's a scanner you can afford to go with your DTP software. 4" wide scan for pictures and text. £229.00

HEWLETT PACKARD SCANJET

Flat bed A4 scanner with 300 dpi resolution, 13% to 200% scaling and 16 levels of grey. Comes complete with Scanning Gallery software to manipulate images, and Centronics interface kit. Ask us about character recognition software for the Scanner. £1499.00

ROLAND PLOTTERS

A3, A2 and A1 plotters at prices substantially below the market leaders. They can be driven by software configured for HP plotters.
A3 Flatbed (DXY-1100). £659.00
A3 Flatbed (DXY-1200). £899.00
A3 with 1Mb Memory (DXY-1300). £1049.00
A2 Flatbed (DPX-2200). £2799.00
A1 Flatbed (DPX-3300). £3599.00

showroom
near you

HEAD OFFICE
NORTH LONDON
MANCHESTER
WEST LONDON
BIRMINGHAM

CALL 0727 37451
• CAXTON CENTRE • PORTERS WOOD • ST ALBANS • HERTS • AL3 6XT • (0727) 37451
• 99 PARK STREET LANE • BRICKET WOOD • ST ALBANS • HERTS • AL2 2JA • (0727) 72790
• 85 WASHWAY ROAD (A56) • SALE • MANCHESTER • M33 1TQ • 061-973 2513
• 304 KINGSHILL AVE • HAYES • MIDDLESEX. 01-841 8744
• 1046-1048 COVENTRY ROAD (A45) • HEYMILLS • BIRMINGHAM. 021-772 5212

SHOWROOM OPENING HOURS: Monday-Friday 9am-6pm Saturday 10am-5pm



MICRO-COMPUTERS, PERIPHERALS
SOFTWARE, SALES & SUPPORT
CREDIT CARDS NOT DEBITED UNTIL DESPATCH

CHECK OUR PRICES FIRST

OLIVETTI
NOW IN

AMSTRAD

	MONO	COL	EGD
PC 1640 DD	499	579	669
PC 1640 HD20	699	799	899
PC 1512 DD	479	609	

HARD DISK UPGRADES

	699	799	899
PC 1640 30MB	699	799	899
PC 1640 40MB	749	849	949
PC 1640 60MB	829	929	1029
PC 1640 3.5", 30MB	769	559	969
PC 1512 20MB	579	699	

NEW PC 2086 SERIES

	MONO	CGA	12" HRC
PC 2086 SD	569	709	799
PC 2086 DD	669	809	899
PC 2086 HD30	899	1029	1119
PC 2806 SD+30MB	769	909	999

ADD £90 for 14" HRC TO 12" HRC PRICE

OPUS TECHNOLOGY

	MONO	EGA
PC 3 768K 30MB	769	999
PC 3 1024K 30MB	819	1079
PC 4 768K 20MB	699	885
PC 5 1024K 30MB	1125	1349
PC 7 2MB 70MB VGA		3150

HARD DISKS

MINISCRIBE M84525 20 MB 65MS XT KIT	185
MINISCRIBE M8438 30MB 65MS XT KIT	195
MINISCRIBE M8450 40MB XT KIT	249
MINISCRIBE M3053 40MB 28MS XT KIT	375
MICROPOLIS 70MB	425
SEAGATE ST 251-0 40MB 40MS XT KIT	279
SEAGATE ST 251-1 28MB 28MS XT KIT	335
SEAGATE ST 277R 60MB 40MS XT KIT	345
FOR AT KIT ADD £50 • DEDUCT £35 BARE DRIVE	

HARD CARDS

WESTERN DIGITAL 20MB 65MS	195
MINISCRIBE M8438 30MB 65MS	199
MINISCRIBE M8425F 30MB 40MS	239
WESTERN DIGITAL 30MB 65MS	205
MINISCRIBE M8450 40MB 40MS	269
WESTERN DIGITAL 40MB 65MS	259
RODINE 60MB 28MS	415
CONNOR PERIPHERAL 40MB 17MS	525

MONITORS & ADAPTORS

12" HYUNDAI MONO/HERCULES AMBER	59
14" SAMSUNG MONO/HERCULES AMBER	85
14" SAMSUNG CGA	149
14" SAMSUNG EGA	269
14" SAMSUNG VGA MULTISCAN	299
14" NEC MULTISYNC GS	145
14" NEC MULTI SYNC II	429
PARADISE EGA CARD	109
VIDEO 7 VEGA VGA CARD	189
ORCHID DESIGNER VGA	239
GENOVA VGA	299

MICE

LOGITECH BUS/SERIAL	59
GENIUS GM6+	39
MICROSOFT BUS MOUSE	85
LOGITECH SCANMAN	139
AMS SCANNER	199

CARRIAGE—NEXT DAY DELIVERY

HARDWARE £10 FIRST BOX £5 THEREAFTER
SOFTWARE £10 COURIER £5 1st CLASS POST
CONSUMABLES £1 (depends on weight)

TERMS

PRICES ARE CWOICREDIT CARDS, ARE SUBJECT TO CHANGE,
& EXCLUDE VAT OFFICIAL ORDERS ACCEPTED FROM SCHOOLS, COLLEGES,
GOVERNMENT DEPTS, LOCAL AUTHORITIES & SUBSTANTIAL PLC'S. PLEASE
RING FOR THE CURRENT PRICES PRIOR TO ORDERING.

PACKARD BELL

	MONO	EGA	VGA
PB 500 10MHZ 30MB	739	1025	1125
AT 286 12MHZ 40MB	1235	1485	1595

INCLUDES ON SITE MAINTENANCE

TANDON

	MONO	EGA	VGA
PCA PLUS 10MHZ 20MB			
TARGET PLUS 10MHZ 40MB			
386-20 20MHZ 70MB			

CALL FOR BEST PRICES

AST

	MONO	EGA	VGA/VIDEO 7
PREMIUM 286 10MHZ 1MB			
MODEL 120 20MB 65MS	132	1595	1550
MODEL 140 40MB 28MS	1465	1739	1689
MODEL 170 70MB 28MS	1589	1859	1799

	MONO	EGA	VGA/VIDEO 7
PREMIUM 386 20MHZ 2MB			
• MODEL 340 40MB 28MS	2399	2650	CALL
MODEL 390 90MB 18MS	2789	3055	CALL
MODEL 3150 150MB 18MS	3449	3725	CALL

• 1MB RAM ONLY

Please note VGA systems do not use AST Screens & Cards

IMPORTANT SAFETY NOTICE

EPSON • STAR • NEC PRINTERS
Ours are NOT imported models,
and have 240 volt power supply
NOT 220 volts
BEWARE OF CHEAPER IMPORTED MODELS

TAPE STREAMERS

ARCHIVE XL 40MB XT/AT 1MB/MIN INTERNAL	259
ARCHIVE XL 40MB XT 1MB/MIN EXTERNAL	359
ARCHIVE CARDS EXTRA	59
• IDENTICA 60MB XT/AT 5.25MB/MIN INTERNAL	499
• IDENTICA 60MB XT/AT 5.25MB/MIN EXTERNAL	539
IRWIN 40MB AT 5.25MB/MIN INTERNAL	339
IRWIN 40MB AT 5.25MB/MIN EXTERNAL	399
EVEREX	
• INCLUDE TAPE	

IC'S & BOARDS

INTEL ABOVE BOARD AT 512K	289
ZUCKER BOARD AT EMS BOARD OK 1MB	289
ORCHID 286-8 MIKE ACCELERATOR BOARD	199
ORCHID 286-12 MHZ ACCELERATOR BOARD	349
(requires 8088 Processor)	
AST RAMPAGE AT 512K (EEMS)	339

PRINTERS/FAX/LASERS

CITIZEN 120D 80 COL 9 PIN	115
CITIZEN HQP45 136 COL 24 PIN	325
EPSON LX800 80 COL 9 PIN	169
EPSON LQ500 80 COL 24 PIN	279
NEC P2200 80 COL 24 PIN & SHEET FEED	279
STAR LC10 80 COL 9PIN	179
STAR LC10 COLOUR 80 COL 9 PIN	209
STAR LC24 10 80 COL 24 PIN	279
CANON LBP II LASER + TONER	1399
EPSON GQ3500 LASER + HP	1125
HP DESKJET	549
HP LASERJET II	1349
QUME XTAL PRINT II + HP	1099
QMS PS 810 POSTSCRIPT + TONER	2750

AKHTER

	MONO	EGA
PC 100 8088 10MHZ DD	549	789
PC 100 8088 10MHZ 30MB	659	909
PC 200 80286 10MHZ 40MB	1399	1625
AT 3000 80386 16MHZ 40MB	2475	2599

SBC

	MONO	EGA
XT V40 8MHZ 30MB	769	1015
AT 80286 10MHZ 40MB	1199	1549
386 80386 16MHZ 40MB	2475	2719

ZENITH PORTABLES

SUPERSPORT DD	985
SUPERSPORT 20MB	1799
SUPERSPORT 286	2795
TURBOSPORT 386 40MB	3499

EPSON PC

	MONO	EGA	VGA
PCE 640K 10MHZ 20MB	849	1115	1199
PAX2 640K 12MHZ 20MB	1249	1499	1599

SOFTWARE (UK VERSIONS)

AMS FINESSE + SCANNER	249
AT DBASE 4	345
BORLAND PARADOX 2	245
BORLAND C V5.0 PROFESSIONAL	139
BORLAND SIDEKICK +	89
BORLAND SPRINT	115
BORLAND QUALTRO	129
C.P. PTOOLS DE-LUXE	29
ELECTRIC TIMEWORKS	79
INFORMIX SMART SYSTEM + SPELLER	369
MIGENT ABILITY +	109
MEGATECH TAS +	69
MEGATECH TAS PROFESSIONAL	339
MEGATECH TAS ACCOUNTS LEVEL 3	745
MICROSOFT WORD 4 + PAGE VIEW	279
PINK TURBO CAD 3D	99
WORD PERFECT V5	219
XTREE PROFESSIONAL	49
WORDTECH DBXL DIAMOND	69
WORDTECH QUICKSILVER COMPLIER	195
WORDTECH DBXL LAN	195
VENTURA V2.0	569

IMPORTANT SOFTWARE NOTICE

Ours are genuine U.K. versions only!
BEWARE OF IMPORTS!

NETWORKS

AMSNOS 3 USER (CORVUS BASED) 1 MBIT-SEC KIT	325
DNA 3 USER (COVELL LOCKING) 1 MBIT-SEC	379
NOVELL ELS ETHERNET 4 USER 10 MBIT-SEC KIT	1575
NOVELL ADVANCED ETHERNET 4 USER 10 MBIT-SEC KIT	2650

We specialise in Ethernet/Novell networks, please call
Richard or Anthony on 0772 732281 for further information.

SALES ORDER HOTLINE ONLY

0772 721920

SALES AND GENERAL ENQUIRIES

0772 732281

LONDON SHOWROOM

01-375-2567

Fax Number 0772 721165

R.T.M. SYSTEMS

- UNIT 16, RIVERSWAY MANAGED WORKSHOPS, CHAIN CAUL WAY, ASHTON, PRESTON PR2 2YL
- THE DAVENANT CENTRE, 179 WHITECHAPEL ROAD LONDON E1 VISITORS WELCOME - BUT BY APPOINTMENT



ZORTECH

T · E · C · H · N · O · L · O · G · Y

C DEBUGGER £49.95

Zortech's Debugger is the most sophisticated source level debugger now available. Because it is fully compatible with Codeview you can use it to debug Zortech or Microsoft programs.

Single step through source in one window while watching the variables (inc. automatics) change value in another window. You can even alter variables dynamically while the program executes.

Much better than Codeview, and full of advanced features like dual monitor, EMS memory and Mouse support. Call for data sheet.

C VIDEO £199.95

Learn C Now! When you buy our C Course the first lesson you learn is in economics. You will save yourself or your company hundreds of pounds in seminar tuition fees.

You get ten one hour tapes containing 36 lessons ranging from the beginners introduction through to more advanced features.

Great for learning C! Any compiler and any operating system. Complete with 365 page workbook (additional copies available at £19.95) and free Zortech C compiler – Call for data sheet.



HELP!

TECHNICAL HOTLINES

All our products are covered by an extensive FREE technical support hotline which is open five days a week from 9.00 till 5.00 (EST)

USA HOTLINE
617-646 6703
Fax: 617-648-0603

OUTSIDE USA
44-423-501552 (England)
Fax: 617-648-9340 (England)

C COMPILER £49.95

The most advanced C compiler money can buy. No junk – just pure performance.

Magazines are too embarrassed to print our optimized benchmark results – they don't want to upset the big guys!



BOTH FOR £89.95

The 600 page manual comes with a great introductory section and lots of solid technical data and examples. Fully compatible with Codeview and the new Zortech C Debugger. You get over 400 functions and the Flash Graphics package with drivers for Hercules, CGA, EGA and VGA – the fastest graphics library available! Context Sensitive Help, an advanced editor/environment, make, touch, five memory models, linker & librarian. Library Source only £49.95 – Call for data sheet.

ZC/TC/MSC TOOLKITS from £29.95

Please state which compiler you have.

COMMS – £69.95

Full Communications library with support for up to 8 ports, Xmodem, Kermit, ANSI, VT52, VT100, up to 38,400 baud, etc. 120 page manual.

BTREE – £49.95

A database function library for C, complete with example program and over 50 functions. Easy to use with 92 page manual.

WINDOWS – £39.95

Enhance your application with easy to use multiple text windows. Full demo program including 90 page manual.

PROSCREEN – £39.95

Generates C source code for your application from screens that you draw. Too many features to list.

HOTKEY – £39.95

Write memory resident applications with this TSR function toolkit. Includes example progs.

SUPERTEXT – £39.95

WordStar compatible wordprocessor with full source code and 256 page manual. Over 150 functions.

CHESS – £29.95

Learn to write Chess games with this toolkit (contains full source). Also includes Backgammon and 150 page manual.

Please request full data sheets.



C++ COMPILER £99.95

This is the world's only true C++ compiler for MS-DOS machines – there is no choice. Not to be confused with 'translators' which are slow, expensive, inefficient and not real C++ compilers.

More people use Zortech's C++ than any other C++ on any operating system. Zortech strives to ensure full compatibility with AT&T C++.

Zortech C++ contains all the features of Zortech C including the C compiler itself at no extra cost. Everything is in one neat package. Compatible with Codeview and the new Zortech Debugger. C++ Library Source only £99.95 – Call for data sheet.



BYTE

1988 1988 WINNER

C++ TOOLS £69.95

Zortech's toolkit of base C++ classes covering a wide range of common programming tasks such as bit vectors, singly and doubly linked lists, dynamic and virtual arrays, binary search tree, hash table, BCD maths, time/date/clock, directory lists, filenames, interrupt and critical error handlers, string editing, text windows and editing.

The 450 page manual also acts as a C++ tutorial which introduces the C programmer to the world of C++. Call for data sheet.

BOOKS

C Primer (Sams) – £19.95
Advanced C Primer (Sams) – £19.95
C++ (Stroustrup) – £19.95
Oops & C++ (Wiener) – £19.95



ORDER HOTLINE
01-316 7777
VISA/ACCESS

All prices exclusive of VAT and post & packing.

EGA is standard with the PC2 from Atari...

So is just about everything else, and all for as little as £679



If you are considering the purchase of an IBM compatible computer, then look no further. Not only is the Atari PC2 IBM compatible but it comes with all the extras as standard. EGA, Hercules, CGA & MDA emulations are all there as is the mouse. The system comes with MS DOS 3.2 as well as GEM Desktop, Paint & Write and BASIC. There are only two decisions you need to make. Do you buy a Colour or monochrome display? Do you need a hard disk system? Far as little as £549 + VAT you have every thing you need including a mono EGA display.

And we offer the top-of-the-range PC2 with 30MB disk and EGA colour screen at a super-value £859. You could search all year and not find that performance - and that quality - at these prices.

EPSON PRINTERS

The best products at the best prices

LX800 80 col, 180cps, 30cps NLQ	£165
FX850 80 col, 264cps, 54cps NLQ	£322
FX1050 132 col version of above	£419
LQ500 80 col 24 pin, 180cps, 60cps LQ	£295
LQ850 80 col 24 pin, 264cps, 88cps LQ	£461
LQ1050 132 col version of LQ850	£594
LQ2550 132 col 24 pin, 400cps, 133cps LQ	£909
SQ2500 132 col, silent, 540cps, 198cps LQ	£944

Hewlett-Packard Lasers and Printers

HP LaserJet series II	£1399
HP LaserJet II D twin bin	£2099
HP DeskJet Printer	£599
HP PaintJet Colour printer	£699
HP Plotters	
HP 7440 A4, 8 pen plotter	£749
HP 7475 A3, 6 pen plotter	£1099

SCS carry the full range of HP accessories and can provide full support on all items.

THE SCS CUSTOMER CONFIDENCE PACKAGE

With every piece of equipment you buy from SCS - and PC2 systems are no exception - you get a full 12 month warranty - full UK support, including our technical support hot line - immediate delivery ex stock - and our assurance of ongoing consumables availability for as long as there's a demand.

You also have the peace of mind of our 7 day no-quibble money-back guarantee. If you're unhappy with the product - for whatever reason - return it in as-new condition within 7 days of receipt and we'll pay back all you paid us. With no questions asked.

SCS maintenance contracts are available from £70 p.a. Our in-house workshop handles any repairs - both under warranty and later on - but with Atari's fabled reliability we don't anticipate that you'll be giving us much to do!

At SCS we specialise in a strictly limited range of 'name' products - of which the Atari PC2 systems are one. Because we specialise we're knowledgeable about the products we sell. We know what we're talking about and we can give you intelligent, relevant, helpful advice.



ATARI PC2 Pricing

Atari PC2, 30MB, EGA Screen £859
512kb, Dos 3.2, Basic, Gem, Mouse

Atari PC2, 30MB, EGA Mono Screen £679
512kb, Dos 3.2, Basic, Gem, Mouse

Atari PC2, 2 x 360KB d/d, EGA mono £549
512kb, screen, Dos 3.2, Basic, Gem, Mouse

Upgrades

Upgrade to 640kb £59
Upgrade to 40MB disk £115
Upgrade to 720kb 3.5in d/d £95

Other configurations on request

ATARI PC2 SPECIFICATION

- IBM Compatible
- 4.77/8 Mhz 8088 processor
- Optional maths co-processor
- 512kb or 640kb main memory
- MSDOS 3.2 with GWBASIC
- GEM Desktop, GEM Write, GEM Paint
- Mouse
- Full EGA graphics 640 x 350 (16 cols) and CGA/MDA & Hercules compatible
- Choice of autoswitch EGA and CGA colour screen or autoswitch MDA/CGA/EGA high resolution monochrome screen
- mouse port
- Parallel and serial ports
- Dual voltage 115/240 volt
- 4 expansion slots
- 30MB Hard Disk (optional 40MB) or twin diskette version
- 12 months warranty

We offer you the convenience of mail order purchase, but we'd also be pleased to see you in person at our Berkshire showroom should you prefer to deal face-to-face (we're open Mon. to Fri. 9 - 5.00; Sat. 9 - noon).

Put us to the test.

Place your order by phone on



07357 5455



(24 hour sales line)

SCS Computer Sales plc, 20a Horseshoe Park, Pangbourne, Berks. RG8 7JW
Tel: 07357 5455 Fax: 07357 3527

ORDERING INFORMATION

Quantities of all items are limited and prices subject to change without notice. We accept VISA, ACCESS and personal and company cheques (subject to clearance).

All prices are exclusive of VAT and freight, handling and insurance

All goods carry a money back guarantee if we are notified within 7 days of receipt that you wish to return them.

All orders are subject to our terms and conditions which are available on request.

How is SCS able to offer EPSON's high quality, high performance PCs and peripherals at such amazing prices? I'll tell you.

Firstly we deal *direct* where possible.

Secondly we're big enough to buy in volume. That gives us real bargaining muscle which we're not afraid to use. And it produces price benefits we're happy to pass on to you.

Although we trade by mail order, you're always welcome to visit our Berkshire showroom. And you're safe in with SCS, too. We offer a no-hassle money-back guarantee on everything we sell. If you're not completely satisfied, return in as-new condition within 7 days of receipt and we'll refund your payment in full with no questions asked. How many computer retail outlets will do that for you?

Try us. You'll find us great people to do business with. Big enough to give amazing value... but never too big to care.

EPSON PCe

The high speed high resolution XT compatible.

- 4.77/10 Mhz 8088 processor
- 640KB Ram, 5 expansion slots
- 1 x serial, 2 x parallel ports
- 102 key AT style keyboard, DOS 3.2
- Choice of Twin disk or fast 35ms Hard disk configurations
- High resolution hercules adaptor & monochrome display as standard

Epson PCe, 2 x 360KB drives, Hercules card	£699
Epson PCe, 20MB standard system (one parallel port only)	£899
Epson PCe, 20MB ST125 (35ms) Seagate	£899
Epson PCe, 30MB ST238 Seagate	£949
Colour screen instead of mono system for an extra	£120
EGA and screen instead of mono system for an extra	£260

EPSON PCAX2

The super fast, small footprint AT compatible. When speed really counts or you just need the power of a 80286 processor, then there is no better value than the EPSON PCAX2

- High speed 8/12 processor
- 1.2MB Disk Drive + Ultra Fast 40 ms 20MB Hard Disk
- Choice of monitor adaptor, Mono, CGA/EGA or Auto switch EGA
- 640 KB Ram, 6 expansion slots. Serial/Parallel ports
- Full 102 key AT style keyboard and DOS 3.2

Epson PCAX2 12Mhz, EGA card (excl screen)	£1149
Epson PCAX2 12Mhz, Auto-switch Mono/CGA/EGA (excl screen)	£1229
Epson PCAX2 40MB Seagate (28ms) FGA card (excl screen)	£1449
For mono display add	£99
For EGA screen add	£296
For Multi-Sync colour screen add	£349
For VGA add	£399

See SCS upgrades for additional disk drives, hard disks

Totally Portable Computers from Zenith

The Zenith lap top range offers unrivalled portable computing. All models have rechargeable battery and AC operation as well as full size, crystal clear back-lit LCD displays that have to be seen to be believed. There is a Zenith portable to suit almost every need from the super value 20MB Zenith 184 to the super fast TurboSport 386.

All models come with serial, parallel & external RGB ports.



SCS - The Epson PC Specialists, There is no alternative



EPSON PCAX2 40/80MB

This AT Compatible is the key to easy expansion. For the power of a network server the Epson PCAX2/40/80 delivers the goods.

- 6/8/12 MHZ 80286
- 1.2MB Disk Drive + choice of very fast 28 ms hard disk (40MB or 80MB)
- 640 KB Ram expandable to a massive 15.5MB
- 9 expansion slots. Serial/Parallel ports
- Full 102 key AT style keyboard DOS 3.2

Epson PCAX2, 40MB 28ms(excl screen and adaptor)	£1589
Epson PCAX2, 80MB 28ms(excl screen and adaptor)	£1895
Hercules card and screen	£149
EGA card and screen	£365
Auto switch EGA card and screen	£399
VGA card plus multisync monitor	£549

See SCS upgrades for additional disk drives, hard disks

ZENITH data systems
AUTHORISED DEALER

Zenith SuperSport 184 4.77/8Mhz, 1x720KB, 1x20MB

£1789
This best selling XT portable comes complete with a smart carry case & Laplink s/w + cable to transfer data between the Z184 and almost any other computer.

Zenith Supersport 286, 6/12Mhz PCAT in a 14lb box. This is the model that leads the field in the high speed portable AT market. If you need the power this is the unit.

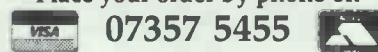
1 x 720KB + 20MB H/D, 1MB	£2349
1 x 720KB + 40MB H/D, 1MB	£2895

SCS - the EPSON PC specialists offer you...

- The widest range of EPSON PCs in the UK
 - Expert advice from Britain's leading EPSON PC specialists
 - Fast delivery *ex stock*
 - Systems configured for you by EPSON qualified engineers
 - Hot line support... full technical back-up... on-site maintenance agreements
 - Ongoing consumables availability
 - Mail order convenience
- ... all for amazing value-for-money prices.

Put us to the test.

Place your order by phone on



07357 5455

(24 hour sales line)

Opening times: Mon-Fri; 9.0-5.30; Sat; 9.0-12 noon
or send the coupon for our comprehensive Fact Pack.

Post to:
SCS Computer Sales plc, 20a Horseshoe Park,
Pangbourne, Berks. RG8 7JW
Tel: 07357 5455 Fax: 07357 3527

Yes, I'd like to find out more about the SCS product range and service.

Please rush me a copy of your Fact Pack.

Name _____

Position _____ 11/01/P

Company _____

Address _____

Post Code _____

Tel.: _____ Extn. _____

COMPUTER **SCS** SALES
plc

The SCS Computer Warehouse

The best value products from all over the world delivered to your door



£249

EPSON P80 PORTABLE PRINTER

- Serial i/f
- Battery/AC operation
- 45 cps
- Serial interface
- Weighs only 1.1kg

£79

80 COL PRINTER COPAL SC1200

- Quick tear off
- 120 cps draft printing
- Epson Graphics (Quad density)
- Parallel Interface
- Push tractor feeder as standard

£99

136 COL PRINTER CENTRONICS HPC 156

A fast flexible printer from the Centronics printer Corporation of America.

- 9 pin dot matrix, Parallel i/f
- Paper size up to A3
- 180 cps draft mode
- 34 cps NLQ
- IBM & Epson emulation
- High resolution graphics
- Tractor feeder & short tear off

£199

SHARP PC7000 PORTABLE COMPUTER

IBM compatible. Very Portable

- Fast 80C86 7.37 Mhz processor
- 384 KB Ram expandable to 704KB
- Twin 360KB 5 1/4" D/D
- Back-lit Supertwist LCD display
- Serial & Parallel ports
- Full size keyboard

£399

At SCS we deal in a carefully selected range of products. And we stock them . . . so we can normally despatch within 24 hours of receipt of order.

Our policy of holding large stocks helps to keep our prices low, too. We go out on a limb and buy in volume – so we're able to negotiate terrific deals. You then benefit through fast delivery and great prices.

And as we specialise in a selective range of products our people are knowledgeable on everything we offer. When you phone us you'll get intelligent, helpful advice . . . followed up by first class support after you've bought.

Put us to the test.

Place your order by phone on
07357 5455
(24 hour sales line)

Opening times: Mon-Fri; 9.0-5.30; Sat; 9.0-12 noon

SCS Computer Sales plc, 20a Horseshoe Park,
Pangbourne, Berks. RG8 7JW
Tel: 07357 5455 Fax: 07357 3527

ORDERING INFORMATION

Quantities of all items are limited and prices subject to change without notice. We accept VISA, ACCESS and personal and company cheques (subject to clearance). All prices are exclusive of VAT and freight, handling and insurance. All goods carry a money back guarantee if we are notified within 7 days of receipt that you wish to return them. All orders are subject to our terms and conditions which are available on request.

FACIT A4 PLOTTER

The Facit 4550 offers the best value of any other A4 plotter. It is Hewlett Packard compatible, so it will work with all the industry standard software. It has 6 pens so you can use it to further enhance the details by the imaginative use of colour. Turn your data into information with the Facit 4550 from SCS - the exclusive distributors.

- HP 7475 emulation
- 6 pen cartridge
- Choice of ball point, ceramic or fibre pens
- Parallel & Serial interface

THE BEST VALUE A4 PLOTTER IN THE UK - ONLY FROM SCS.



£59

GENIUS MOUSE

Genius Dyna Mouse 6000. More sensitive . . . Higher resolution.

- 350-1050 dpi resolution
- Microsoft and PC Mouse compatible
- Serial I/F • Three buttons
- FREE Dr Halo graphics package, Mouse pocket, Menu maker, 9 pin - 25 pin adaptor



£159

GENIUS SCANNER

Genius GS2000 Scanner. A partner to Desk Top Publishing. With this hand scanner you can scan and store graphics, pictures and text directly into your computer. The GS 2000 comes with everything you could need.

- 105mm scan width • 200dpi resolution
- Switchable half tone/line scanning
- Includes all necessary scanner software plus FREE Dr Halo III graphics software

COMPUTER UPGRADES

Let SCS bring your computer to life with one of these upgrades, suitable for almost any IBM compatible

- EGA Colour Display & Adapter£365
- A superb .31mm dot pitch. Enhanced colour display (CGA/EGA auto switch) together with a switchable EGA card giving MDA/CGA/EGA output.
- 5 1/4" 360KB Diskette drive£89
- 3 1/2" 720KB Diskette drive£99
- 3 1/2" 1.44MB Diskette drive for use under Dos 3.3 or above£135
- 60 MB Western Digital internal tape streamer & s/w ...£299
- Seagate 225 20MB Hard Disk + W/D controller and kit£189
- Seagate 230 30MB Hard Disk + W/D controller and kit£229
- Monochrome amber screen, TTL with tilt & swivel£105
- Monochrome green screen, TTL with tilt & swivel£99
- Colour Display (Medium Res)£189
- Epson CX23 modem suitable for almost all PCs£39

PRINTER ACCESSORIES

SCS carry the full range of accessories for all the products we sell, Cut Sheet Feeders; Ribbons, Cables, Interfaces, etc. Call for full details.



For a Laser Printer with these features you'd expect to pay double



The 1.75 MB, high performance CENTRONICS Laser PP8 with full HP LJ + compatibility from SCS costs an amazing £895. It'd be cheap at twice the price.

CENTRONIC reliability

It's made by the respected American CENTRONICS Corporation – and is powered by the robust and proven Sharp heavy duty laser engine. Reliability is the last of your worries. Self-diagnostics permit rapid repair – and SCS provides a full 12 month on-site warranty as standard.

8 pages per minute

It prints 8 pages per minute – that's over 700 cps. And with resolution of 300 dpi – 90,000 dots per square inch – it delivers print quality of a high order.

1.75 MB memory

It features a memory of no less than 1.75 MB as standard – permitting superb full-page graphics and advanced desk top publishing, as well as word processing, with additional memory for downloadable fonts.

HP, Epson, Diablo and IBM compatible

One model is fully HP laserJet+ compatible . . . the other is compatible with Epson FX80, Diablo 630 and IBM Graphics Printer/Proprinter *. Your choice of either a serial or parallel interface . A wide range of Font Cards is available, as well as the complete set of HP LaserJet+ downloadable font discs for even greater print creativity, plus our own special range of many other downloadable fonts.

Paper jams eliminated

It handles paper sizes up to 10.0 x 14.3 inches, and straight-through paper path virtually eliminates jams. Paper input tray capacity is 100, and there's a manual bypass facility for labels, transparencies, envelopes and stock cards.

Easy to use

Its easy-to-use LED control panel gives fingertip command of number of copies, paper size, type style and printer self-test. Remaining life of consumables is displayed – as is the total of prints made.

Economical operation

It is surprisingly economical to run, too. Each toner cartridge prints 5000 pages, developer life is 30,000 sheets and each OPC belt lasts for 15,000 sheets. SCS hold all consumables in stock and promise to do so as long as there's demand.

Only £895

And it costs an incredible £895 . . . repeat £895! . . . including a consumables starter pack.

Add-ons alone for other machines to boost their memory to 1.75 MB could set you back between £300 and £500 which would be in addition to a basic cost well above £895.

Delivery ex stock

The final bonus is immediate delivery ex stock. Phone in your order today and your PP8 will be delivered tomorrow.

**With additional font card.*

SCS - the exclusive PP8 distributor

Put us to the test.

Place your order by phone on

 **07357 5455** 

(24 hour sales line)

Opening times: Mon-Fri; 9.0-5.30; Sat; 9.0-12 noon or send the coupon for our comprehensive Fact Pack.

Post to:
SCS Computer Sales plc, 20a Horseshoe Park,
Pangbourne, Berks. RG8 7JW
Tel: 07357 5455 Fax: 07357 3527

Yes, I'd like to find out more about the SCS product range and service.
Please rush me a copy of your Fact Pack.

Name _____

Position _____ 11/01/E

Company _____

Address _____

Post Code _____

Tel.: _____ Extn. _____



ORDERING INFORMATION

Quantities of all items are limited and prices subject to change without notice. We accept VISA, ACCESS and personal and company cheques (subject to clearance). All prices are exclusive of VAT and freight, handling and insurance. All goods carry a money back guarantee if we are notified within 7 days of receipt that you wish to return them. All orders are subject to our terms and conditions which are available on request.

JILUTECH

· S Y S T E M S ·

EVEREX TAPE STREAMERS

	Our Price	RRP
Everex 40Mb Internal package	£450	£895
Everex 40Mb External package	£480	£995
Everex 60Mb External package	£599	£1395
Everex 125Mb External package	£1150	£1895
Everex 60Mb External PS/2 package	£1050	£1695
Everex 125Mb External PS/2 package	£1150	£1895
Package — Tape Drive/controller/Everex software/manuals/cables Data Cartridge		
External Everex Tape Streamers can be shared between PCs, XTs, ATs and PS/2s using additional controller cards.		

EVEREX MULTIFUNCTION AND GRAPHICS KITS

Everex Magic I/O (XT/AT use)	£80	£95
Everex Multifunction EMS (XT/AT use)	£159	£235
Everex Mono Monitor with Everex adapter	£198	£399
Everex EGA Monitor with Everex adapter	£398	£599
Samsung VGA Monitor with Everex adapter	£498	£799

INTEL MATHS CO-PROCESSORS

Intel 8087-5MHz	£75
Intel 8087-8MHz	£105
Intel 8087-10MHz	£160
Intel 80287-6MHz	£109
Intel 80287-8MHz	£164
Intel 80287-10MHz	£190
Intel 80387-16MHz	£320
Intel 80387-20MHz	£420
Intel 80387-25MHz	£550
Intel 80387-SX (for use in Compaq 386 machines)	£420
64k Dram (all speeds)	POA
256k Dram (all speeds)	POA
1Mb Dram (all speeds)	POA

IRWIN TAPE STREAMERS

TSI 120 Irwin Internal 20Mb for XT/AT	£259
TSI 125 Irwin Internal 20Mb for AT	£279
TSI 225P Irwin Internal 20Mb for PS/2	£299
TSI 245P Irwin Internal 40Mb for PS/2	£359
TSI 265P Irwin Internal 64Mb for PS/2	£399
TSE 425 Irwin External 20Mb for AT	£340
TSE 465 Irwin External 64Mb for AT	£470
TSE 725 Irwin External 20Mb for AT. Self powered	£340
TSE 745 Irwin External 40Mb for AT. Self powered	£405
TSE 765 Irwin External 64Mb for AT. Self powered	£495

EVEREX MEMORY BOARDS

	Our Price	RRP
Everex Mini Magic Card (XT/AT use) fills out base memory to 640k	£70	£95
Everex Maxi Magic EMS (XT/AT use) up to 2Mb of EMS memory (LIM 4)	£99	£190
Everex RAM 3000 Deluxe (AT use) up to 3Mb EMS and/or Extended (LIM 4)	£130	£260
Everex RAM 10000 (AT use) up to 10Mb EMS and/or Extended (LIM 4)	£198	£299
Everex RAM II 2000 (PS/2 use) 2Mb EMS and/or Extended (LIM 4)	£259	£320
Everex RAM II 4000 (PS/2 use) 2 or 4Mb EMS and/or Extended (LIM 4)	£299	£495

HARD DISK DRIVES

Seagate 20Mb ST225 package	£175
Seagate 30Mb ST238 package	£190
Seagate 40Mb ST251 40ms package	£285
Seagate 40Mb ST251 28ms package	£318
Seagate 80Mb ST4096 28ms Drive	£470
Seagate 20Mb ST125 package	£190
Seagate 30Mb ST138 package	£215
Miniscribe 30Mb Hard Card	£215
External 20Mb Hard Disk package	£355
External 40Mb Hard Disk package	£455

Sony Floppy Disk Drives also available

PANASONIC PRINTERS

KX-P1081 120cps Dot Matrix Printer	£140
KX-P1592 180cps Dot Matrix Printer	£285
KX-P1595 240cps Dot Matrix Printer	£370
KX-P1540 240cps 24-pin Dot Matrix Printer	£415
KX-P3151 22cps Daisy Wheel Printer	£370
KX-P4450 Laser Printer	£1470

SPECIAL OFFERS

Miniscribe 30Mb Hard Card	£215
RAM 10000 with 2Mb of onboard RAM	£520
DC600A Data Cartridges box of 5	£75
KX-P4450 Panasonic Laser Printer	£1470

If you require a product which is not mentioned above please call as we have an extensive range of products to offer.

Carriage and VAT not included.

**RESEARCH HOUSE, FRASER ROAD, GREENFORD
MIDDX. UB6 7AQ
TELEPHONE: 01-991 5044. FAX: 01-991 2653**

A good deal more than the best prices for Business Software

FOR THE PC

Word Processing

MicroSoft Word 4	£215
MultiMate Advantage II	£235
WordStar 2000+	£210
Lotus Manuscript	£220
Wordstar Professional	£180
WordPerfect 5	£220
WordPerfect Library	£90
DisplayWrite 4	£249

Desktop Publishing

Ventura 2	£450
PageMaker III	£375
GEM DTP	£230

Graphics

ChartMaster	£160
Freelance+	£240
DiagramMaster	£168
Harvard Graphics	£210
MicroSoft Chart	£195
PC PaintBox	£75
Publishers PaintBrush	£155
Design CADD 3	£225
GEM PresentationTeam	£245

Databases

DBase 4	£330
FoxBase Plus	£230
Paradox 2	£355
RBase System for DOS	£305
Reflex I.1	£60
Clipper 87	£280
QuickSilver	£245
Revelation	£520

Project Management

Harvard Total PM II	£275
MicroSoft Project 4	£265
SuperProject Plus	£260

Productivity

Eureka	£70
Sideways	£40

Spreadsheets/Integrated Packages

Symphony	£330
FrameWork 3	£280
Lotus 1-2-3	£215
Paradox 2	£280

LotusHal	£85
SuperCalc 4	£215
Excell 2	£230
Smart v3.05	£360
Quattro	£65

Communications

SmartCom	£70
CrossTalk XVI	£80
CarbonCopy Plus	£109
DataTalk	£100

Desktop Environments

MicroSoft Windows 2	£60
MicroSoft Windows 386	£110
SideKick	£54
PC Mouse	£80
MicroSoft Mouse v6	£115

Statistics

SPSS PC+	£525
StatGraphics 2.6	£430
Systat	£400

Languages/Utilities

Norton Utilities	£50
FastBack Plus	£85
Lattice C	£190
Mase Utilities	£85
MicroSoft Fortran 4	£205

QuickBasic	£55
Turbo Basic	£50
Turbo Pascal	£50
MicroSoft C Compiler	£230
Cobol Compiler V	£225
MS Macro Assembler	£80

FOR THE MAC

MicroSoft Word 4	£170
WordPerfect	£179
dBase Mac	£263
4th Dimension	£520
Filemaker 4	£175
Excell I.5	£170
Works I.1	£145
CricketDraw	£150
CricketGraph	£100
MacDraw II	£240
MacProject II	£280
Quark Xpress 2	£535
PageMaker 3	£330
Illustrator 88	£270
Aldus Freehand	£270
Image Studio	£285

This is only a Selection from our vast range of Business Software for the PC and Macintosh. Please telephone for a quote or delivery details on these and any other items you require.

... and the Best Prices in Britain for DISKETTES

	1-4 boxes	5-10 boxes	11+ boxes
Maxell 5¼" DS/DD in Boxes of 10 Price per Box of 10	£9.50	£9.00	£8.00
Maxell 5¼" DS/HD in Boxes of 10 Price per Box of 10	CALL - SPECIAL PRICE		
Maxell 3½" DS/DD in Boxes of 10 Price per Box of 10	£11.50	£10.00	£9.00
Maxell 3½" DS/HD in Boxes of 10 Price per Box of 10	CALL - SPECIAL PRICE		
Fuji 3½" DS/DD Rainbow Colour Disks Price per Box of 10	£13.00	£11.50	£10.50

All prices exclude VAT and are correct at time of going to press. Add £15 per order for guaranteed Next Day delivery by Data Post or £2.50 per unit for delivery by insured parcel post. Payment may be made by Visa/Access, cheque or approved corporate account. International orders are welcome, free of VAT. Add £4 per unit for postage and insurance.



CAMELOT COMPUTING

Suite 100, Oxford House, 2 Cheapside, Reading RG1 7AA
Telephone: Reading (0734) 571988/393916/591500
Fax: Reading (0734) 391792

**When it comes
to price
we get to the
point!**

**CALL OUR ENGINEERS
NOW FOR ADVICE ON
PRINTER SELECTION**

AMSTRAD
Appointed Dealer

**SAGE
ACCOUNT
SPECIALISTS**

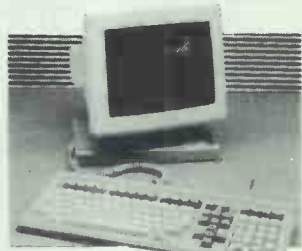


PC 2086
Single drive 12" MONO £599.00
Twin drive 12" MONO £749.00
30MB H/DISK 12" MONO £999.00

PC 2286
Twin drive 12" MONO £999.00
40MB H/DISK 12" MONO £1349.00

PC 2386
65MB H/Disk 12" MONO £2649.00

FALCO TERMINALS



Call for competitive prices from £399.
★ Multiple Host Connect - up to 4 ports and 6 windows.
★ Multiple emulations incl. IBM & DEC.
★ 6 concurrent virtual terminals.
★ Up to 15 pages of screen memory.
Dealer Enquiries welcome

OTHER PRINTERS

EPSON LX800	£210
EPSON FX850	£345
EPSON FX1050	£449
EPSON LQ500	£295
EPSON LQ850	£495
EPSON LQ1050	£635
STAR LC10	£195
STAR LC24-10	£295
DICONIX 150 Ptbl	£350
PANASONIC KX-P1081	£169

OKI

OKI MICROLINE 300 SERIES
Printers for the Serious Business User
24 Pin and 9 Pin Models



★ Paper parking with super paper handling
★ 80 and 136 Column versions
★ Heavy-duty construction
★ Full Operator panel
★ 270 cps High Speed Draft (24 Pin) ★ 300 cps @ 10 cpi (9 Pin)
★ 90 cps Elite Letter Quality (24 Pin) ★ 300 cps @ 10 cpi (9 Pin)

Retail Price
from **£525**

**CALL FOR
COMPETITIVE QUOTE**

**MICRO
GENERAL**

**OFFER VERY
FAVOURABLE TERMS
FOR
DEALER CUSTOMERS**

Other OKI Models available:

Microline 182 - Reliable listing printer	From £269
Microline 192/193 - Fast, dual mode 9 pin	From £419
Microline 292/293 - 18 pin Colour 100 cps NLQ	From £599
Microline 294 - 18 pin Colour 400 cps Draft	£1095

OKI LASERLINE 6 ELITE

★ HP Series 11 Compatible
★ 6 Pages per minute
★ Optional Fonts & Memory Cards.



SPECIAL PRICE FOR OUR LASER
with D.T.P. Software £1550 + VAT
(Including 12 month's on-site maintenance.)

LOW PRICE LASER TONER CARTRIDGES AVAILABLE
Phone for details

Delivery charge £9 + VAT on printers
& computers

Plus PRINTER BUFFERS • DISKS • CABLES • RIBBONS • SWITCHES etc

NEW RELEASE...STOP PRESS...

JUMBO 40MB Tape Drive. One Drive for all P.C.'s

External	Prices	Internal
FROM £449		FROM £325

OKI
OFFICIAL
APPOINTED
DISTRIBUTOR

AMSTRAD
Appointed Dealer

ORDERS ▶ ADVICE ▶



07357-4466

CALL US NOW FOR

- PRINT SAMPLES
- DEMONSTRATIONS
- FREE CATALOGUE ON REQUEST

DEALER ENQUIRIES WELCOME ▶▶▶

OPEN 9 - 5.30
MON - FRI
9 - 12 SAT

**MICRO
GENERAL**

**Specialists in MICRO
and PRINTER technology**

Unit 25 Horseshoe Park,
Pangbourne, Reading RG8 7JW

ALL PRICES EXCLUDE VAT & CARRIAGE. Prices subject to change without notice

THE BUS STOPS HERE!

CompuStar: PS/2 and PC/AT Compatibility.

Ask any computer expert about what type of system you should buy nowadays and you'll likely get a "pass the bus" response. Something like — "Well, uh, the PC/AT* bus is your best buy but, then again, the new PS/2* bus may become the next industry standard." Great advice, right? If trying to decide on a microprocessor weren't tough enough, now you're expected to pick a bus, too.

RELAX, NOW THERE'S COMPUSTAR®.

The all new CompuStar from Wells American not only lets you interchange microprocessors, you can also mix and match buses — a PC/AT bus, a PS/2 bus or... both. As your computing needs change, simply snap in a new processor or add an extra bus. You'll never again have to worry about buying the *wrong* computer system!

FOUR COMPLETE SYSTEMS IN ONE.

The CompuStar can be configured with any of four microprocessors — an 8086, an 80286, an 80386SX, or an 80386. The processor and up to 16 megabytes of user memory have all been combined, using the latest VLSI technology, on a single, plug-in CPU module. Plus, any time during the first year of ownership, CompuStar users can "trade-in" the CPU module they initially selected toward the purchase of any of the other more powerful modules. *Nobody* but Wells American gives you this kind of value.

A CONVERTIBLE BUS? YOU'RE KIDDING!

No, we're not. In fact, it may well be the most practical microcomputer innovation ever. Say you've selected an AT compatible CompuStar and later want to add PS/2 compatibility. No problem! Snap in a PS/2 Bus and Adapter Module and you can use *both* buses in the same system. Likewise, if you've selected a PS/2 compatible CompuStar and decide you want to add an AT bus, just snap in an AT Bus Module. Depending on configuration, the CompuStar can have up to 13 bus expansion slots — all AT slots, all PS/2 slots or a "split-bus" of AT and PS/2 slots. No matter which bus becomes the next industry "standard," you'll have peace of mind knowing your investment in a CompuStar will be protected.

The CompuStar is also easily expanded. That's because there are seven CompuStar disk/tape compartments — six accessible from the front and an additional full-height bay inside. All this in a sleek, compact tower design that will leave *more* room on your desktop than any of the so-called "desktop" models.

A NEW IDEA FROM AN OLD COMPANY.

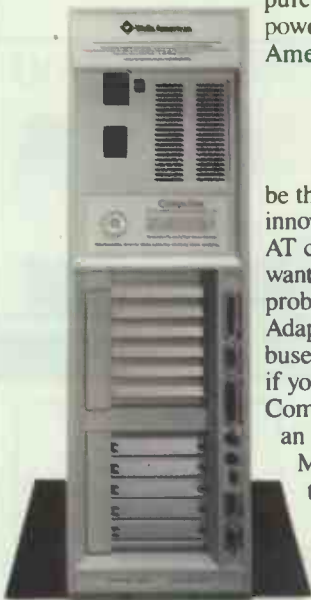
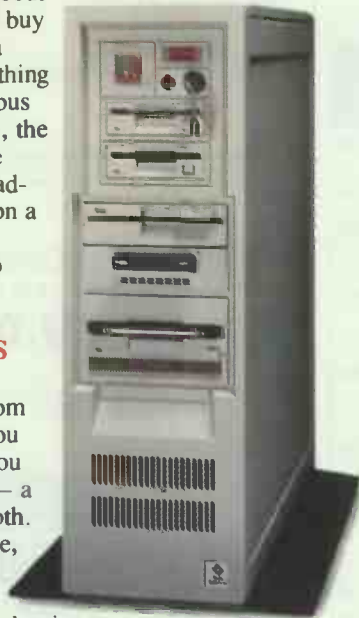
The CompuStar® Multi-Processor, Convertible Bus Microcomputer. It's no surprise that our engineers invented it. After all, we've been making microcomputers longer than anyone else... even longer than IBM! And if that kind of experience doesn't impress you, CompuStar's service programmes surely will. You can select an optional overnight module swap-out plan or on-site service from a reputable UK maintenance firm with more than 70 trained engineers dispatched throughout the UK. And, of course, every CompuStar carries a full one-year factory warranty.

FINALLY, AFFORDABLE TECHNOLOGY.

Think all this technology sounds expensive? It's not. Thanks to CompuStar's modular architecture, you pay only for the technology you need — and *only* when you need it.

Plus, there is a wide variety of CompuStar display, tape and disk options including a one gigabyte erasable optical disk. You can choose a factory pre-configured CompuStar or custom design one yourself. Just unlock the front panel and literally "snap-in" a bus, CPU, memory or disk module in a matter of seconds. It's system flexibility never before available... at *any* price.

While one of our competitors (we won't mention any names) threatens you with "missing the bus," most simply *pass* the bus. Our new CompuStar, however, *eliminates* the bus problem altogether. Not to mention the processor problem. Even the expansion problem. Prove it to yourself. Call today about our 31-day trial offer. Oh, and by the way, the next time anyone asks, tell 'em you know where the bus stops.



Wells American.

Wells American International, Ltd.
Victoria House, Desborough St.

High Wycombe, Bucks., HP11 2NF
TEL: (0494) 26211 • FAX (0494) 459540

WAREHOUSE PRICES **plus**



Our new Lancashire Warehouse & Offices

You may now collect from the warehouse. Alternatively we are happy to deliver. Charges for 1 off inc insurance.

Accessories £3 + VAT
 80col Printer/Hood/Shredder £8 + VAT
 132col Printer/Fax/PC £10 + VAT
 Laser Printer £15 + VAT
 Copyboard £35 + VAT
 Call for Quantity Delivery Charges.

NEW LOW PRICE

EPSON PRINTERS

We stock the full range plus Accessories and can supply at warehouse prices with **FULL 12 MONTH WARRANTY!** You can't go wrong!

OUR PRICE

Model	Specification		1 Off	3 Off	sheet feed
LX800	180cps, 25NLQ Friction & Tractor Parallel, 80col 9pin	£279	£159	£155	£65
FX 850	264cps, 45NLQ Friction & Tractor Parallel, 80col 9pin	£459	£289	£285	£75
FX 1050	264cps, 45NLQ Friction & Tractor Parallel, 132col 9pin	£599	£389	£385	£88
LQ 800	180cps, 60LQ Friction, Parallel 80col, 24pin	£625	£269	£265	£135
LQ 850	264cps, 88LQ Friction & Tractor Dual Interface 80col 24pin	£659	£409	£390	£75
LQ 1050	264cps, 88LQ Friction & Tractor Dual Interface 132col 24pin	£849	£549	£514	£88
LQ 500	150cps, 50LQ Friction & Tractor Parallel Interface 80col 24pin	£399	£272	£268	£65
EX 800	300cps, 50NLQ Friction & Tractor Dual Interface 80col Colour option 9pin	£629	£369	£360	£134
EX 1000	300cps, 50NLQ Friction & Tractor Dual Interface, 132col Colour option 9pin	£829	£489	£475	£175
SQ 2500	540cps, 180NLQ Friction, Dual Interface 132col InkJet	£1349	£849	£830	£299
LQ2550	400cps, LQ133 8k buffer 24pin Col standard, Dual Interface, High Res 360 x 360 graphics	£1299	£902	£852	-
LQ 2500+	24 pin, 132 col, 270cps, 90LQ Friction Tractor, 8k buffer, Dual Interface, colour option	£1049	£689	£650	-

DATA SWITCH

	1 off	3 off	10 off
2 way	£24.00	£17.00	£15.00
3 way	£30.00	£27.00	£20.00
4 way	£40.00	£35.00	£28.00
X over	£45.00	£40.00	£34.00

PRINTER CABLES

	1 Off	3 Off	10 Off
IBM/Parallel	£7.95	£4.95	£3.95
2M, Core, Shielded			
Parallel/Parallel	£4.95	£3.95	£3.50

PRINTER STANDS

Wire Printer Stand suitable 80col Printer



	1 off	3 off	10 off
	£9.50	£6.50	£5.50

DISK STORAGE

	1 off	3 off	12 off
DS100 L	£8.36	£7.99	£5.99
100-5/4			
DS 80	£9.50	£8.99	£6.75
80-3/3 1/2			
DS 40	£6.75	£6.05	£5.29
40-3/3 1/2"			

NEW PRODUCTS EVERY WEEK

Our buyers are constantly searching for new Hi-Tech/low cost bargains. **WATCH THIS SPACE!**

THE Star

LC10 & LC COLOUR

- Low cost 9 pin 10" Printer
- 144 cps Draft, 36cps NLQ
- Centronics Interface
- 4K Buffer
- Automatic single sheet load push tractor. Paper parking standard



	1 OFF	3 OFF
MONO	£159	£155
COLOUR	£189	£185

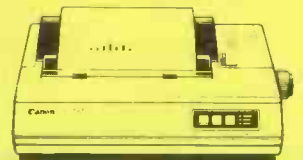
We have negotiated an extremely large volume purchase of the above machines (all units carry the Eurobadge NX1000 model no) Special Prices incl 2 Month Warranty

Canon CANON PW 1080A

MRP £349.00 OUR PRICE FROM

- 80 col
- 160cps
- 27 NLQ
- Friction & Tractor
- 4 character styles printable on same line
- Super and Subscript available
- 12 month warranty

£129.00



OUR PRICE EACH

MRP	1 OFF	3 OFF	10 OFF	RIBBONS
£349	£149	£145	£129	£2.83 each

DAISYWHEEL PRINTER

TRIUMPH ADLER 2000

FROM £99
 SHEET FEED £60
 TRACTOR FEED £75

OUR PRICE EACH

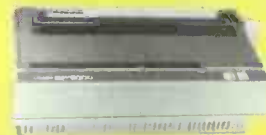
	1 Off	3 Off	10 Off
Printer Only	£169	£139	£125
Sheet Feed Only	£60	£60	£60
Tractor Feed Only	£75	£75	£75
Printer with Sheetfeed	£139	£109	£99
Sheetfeed	+ £60 + £60 + £60		



20cps Diablo 630 Compat, 1.5K buffer, paper width 14 1/8" 10, 12, 15 pitch, PS, Graphics Parallel Interface Correctable Ribbons £2.90ea.

JUKI 6000 MRP £199 OUR PRICE FROM £55.00

- 80 col width
- 10 cps
- 10, 12 or 15 PITCH
- WIDE CHOICE OF PRINTWHEELS
- Friction Feed
- Choice of interface RS 232 or Commodore
- 90 day warranty



MRP	1 Off	3 Off	10 Off
£199	£85	£75	£55

ACOUSTIC PRINTER HOODS

TOP QUALITY SILENCER

- Solid wood construction
- Smoked perspex lid
- Gas strut closures
- Dense foam soundproofing
- Rear and base paper feed

Inner dimensions front to back (base) 17" (top) 6" side to side 25" base to top 15 1/2"
OUR PRICE £59.95
 Made to sell at much higher price



While stocks last

CROWN COMPUTER WAREHOUSE



Part of Bascrown Ltd Trading in Computer Peripherals since 1984



VOLUME DISCOUNT

All goods are brand new and boxed with manuals etc. All with warranty. (Return to base). All prices exclusive of VAT and carriage (see panel for charges). Goods can be despatched same day with payment by credit card, or site of official Govt, Education, PLC order or on receipt of personal or company cheque.
All goods subject to remaining unsold.

TOSHIBA TF-222

FAX

BT APPROVED



- COMPACT DESIGN
- AUTO CUTTER
- 16 LEVELS GREY SCALE
- POLLING
- ID & ACTIVITY REPORT
- G3 & G2

MRP £1695
Our Price

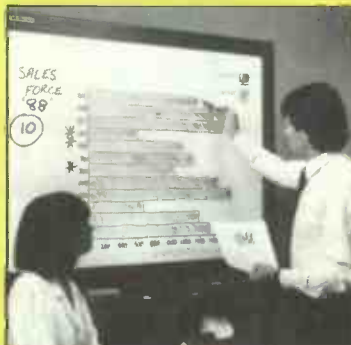
£795

Quantity Discounts available

FUJITSU

COPYBOARD

● IDEAL FOR ALL MEETINGS



Allows you to make colour pen-written presentations then at the touch of a button produce A4 instant copies of your presentation for your audience (1-99 copies). Up to 4 pages can be scrolled and copies produced. Plus 5th page can be used as projector screen. Writing area 35" x 49" per page.

MRP £2,450.00
While our stocks last

£799.00

FINANCE
AVAILABLE

- ELIMINATE NOTE TAKING
 - ENSURE 100% AUDIENCE ATTENTION
 - IDEAL SCHOOLS, COLLEGES, COMPANIES
 - MAINTENANCE CONTRACT AVAILABLE
- 12 MONTHS WARRANTY

SANYO

PERSONAL SHREDDERS

FROM **£120**

- High Speed Personal Shredders
- Auto Start/Stop Function
- Includes Receive box
- Very Compact
- 520 Model shreds up to 10 sheets at a time
- 220 up to 2 sheets at a time

OUR PRICE 220 MODEL

1 OFF 3 OFF
£129 £120

OUR PRICE 520 MODEL

1 OFF 3 OFF
£149 £140



GENICOM CENTRONICS PAGEPRINTER 8

LASER PRINTER

MRP £1,745 OUR PRICE FROM **£770**



- 8 Pages per minute 300 x 300 DPI
- Courier 10 Standard Font (others available)
- Parallel or Serial Interface (please specify)
- Emulates Diablo 630, Epson FX100
- Emulates IBM with card fitted
- Straight Paper Path (avoids jams)
- Includes consumable starter pack
- Brand New, boxed with manuals and manufacturers warranty (12 months)
- Additional ON SITE 12 MONTH MAINTENANCE CONTRACT AVAILABLE Add £150.
- Standard Printer has 256k (adequate for word processing)

OUR PRICE EACH
1 Off 3 Off 10 Off
£795 £770 P.O.A.
Additional Font Cards £70 each
Additional Toner £37 each

FOR HP LASERJET +
EMULATION. TOTAL MEMORY
1.75Mb
Add only **£50.00**

MONITORS THOMSON 12"

- Green, IBM Comp, High Resolution **£59**
- Colour Med Res requires adaptor for IBM **£115**
- Colour, High Res IBM PC, AT, XC Comp **£145**

MONITOR STAND

Tilt & Swivel.
Turn 360° For
14" monitor.
RRP £29.95
Our Price
£9.95



HYUNDAI

IBM XT COMPATIBLE PLUS

- 8080 16bit
- GW Basic
- Speed 4.77MHz
- 6 slots
- MS DOS 3.2
- 512K RAM
- 360K FDD
- Choice of colour or mono
- Hercules adaptor card
- Parallel & RS232 ports
- Choice of 2x360K drives or 1x360K drive plus 20MHD
- 90 day warranty

TWIN DRIVE
MONO **£399.00**

TWIN DRIVE
COLOUR **£499.00**



20Mb
Mono **£599.00**

20Mb
Colour **£699.00**

JUKI 6000 DAISYWHEEL PRINTER

For complete IBM
compatible Word
Processor including
FREE CABLE
ADD ONLY

£75

TO YOUR CHOICE OF
HYUNDAI XT

0704 895 815

10
LINES

FAX 0704 895854
Fax or post your official order to
FREEPOST CROWN
COMPUTER WAREHOUSE
Burscough, Lancs L40 4AB

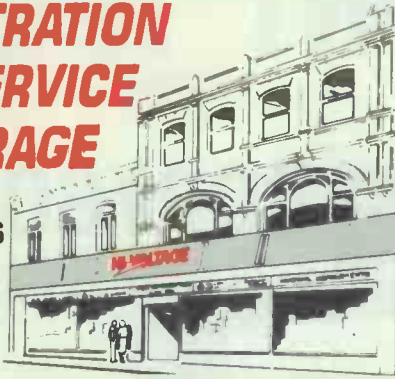


VISA



**OVER 10,000 sq. ft. OF SHOWROOM,
DEMONSTRATION
AREAS, SERVICE
AND STORAGE**

**EST. 1982
ALL PRODUCTS
FULLY
GUARANTEED
AND HOT LINE
SUPPORT.**



HI VO

London's Largest

**LONDON'S LARGEST SPECIALIST
AMSTRAD DEALER**

We are an official Amstrad Service Centre

AMSTRAD PC1640

Single Drive Mono Monitor	£474	20Mb Mono Monitor	£759
Single Drive Colour Monitor	£569	20Mb Colour Monitor	£854
Single Drive EGA Monitor	£664	20Mb EGA Monitor	£949
Dual Drive Mono Monitor	£569	SPECIAL OFFER Take out a 1 year on site service contract on any PC1512, PC1640 or PCW for only £29	
Dual Drive Colour Monitor	£664		
Dual Drive EGA Monitor	£759		

NEW AMSTRAD PC2086

Single Drive 12" Mono Monitor	£589	Dual Drive 12" High Res. Col. Monitor	£989
Single Drive 14" Colour Monitor	£739	Dual Drive 14" High Res. Col. Monitor	£1089
Single Drive 12" High Res. Col. Monitor ..	£839	30MB 12" Mono Monitor	£989
Single Drive 14" High Res. Col. Monitor ..	£939	30MB 14" Colour Monitor	£1139
Dual Drive 12" Mono Monitor	£739	30MB 12" High Res. Col. Monitor	£1239
Dual Drive 14" Colour Monitor	£889	30MB 14" High Res. Col. Monitor	£1339

NEW AMSTRAD PC2286

PC2286D/D 12" Mono Monitor	£989
PC2286D/D 14" Colour Monitor	£1139
PC2286D/D 12" High Res. Col. Monitor	£1239
PC2286D/D 14" High Res. Col. Monitor	£1339
PC2286 40Mb 12" Mono Monitor	£1339
PC2286 40Mb 14" Colour Monitor	£1489
PC2286 40Mb 12" High Res. Col. Monitor	£1589
PC2286 40Mb 14" High Res. Col. Monitor	£1689

AMSTRAD PC1512

Single Drive Mono Monitor	£375
Single Drive Colour Monitor	£474
Dual Drive Mono Monitor	£474
Dual Drive Colour Monitor	£569

AMSTRAD PPC PORTABLE PC'S

PPC 512S S/D	£366
PPC 512D D/D	£458
PPC 640S S/D inc Modem	£449
PPC 640D D/D inc Modem	£558

PC COMPATIBLES

EPSON - New Versions

PCE	£874
PCAX2	£1169
PCAX40	£1495
PCAX80	£1869

OLIVETTI

M240 20MB	£979
M380 40MB	£1995

SBC

FD Mono	£589
HD 30MB Mono	£849
AT 40MB Mono	£1199

TANDON

MONO	EGA
PCA 20+	£1099 £1429
PCA 40+	£1249 £1559
PCA 70+	£1399 £1739
TARGET 20+	£1449 £1749

TOSHIBA

T1000	£629
T1100+	£1029
T1200FB	£1199
T1200HB	£1899
T3100E	£2149
T1600	£2549
T3200	£2989
T5100	£3499

ZENITH

Super Sport 20MB	£1834
Turbo Sport 386 40MB	£3869

NEW ADVENT PC'S - OUTSTANDING VALUE

ADVENT XT10

- 30 Megabyte Hard Disk
- 360K 5 1/4" Floppy Disk
- 640K Memory
- 10 MHz CPU
- Parallel Port
- Serial Port
- 8 Expansion Slots
- Hercules High Resolution Display Card
- High Resolution Mono Monitor
- MS DOS 3.21 + GW Basic
- Real Time Battery Backed Clock/Calendar

FREE 1 year on site maintenance

£795
£995

(WITH EGA COLOUR MONITOR + CARD)

ADVENT XT 15 TURBO

Incredible 15MHz processor speed + 1MB of RAM. Other specifications as per Advent XT 10.
With 14" Amber FST Mono Monitor
With 14" EGA Colour Monitor

£995

£1195

ADVENT AT12+

- 40 MB Hard Disk
- 1.2 MB 5 1/4" Floppy Disk
- 1 MB Memory
- 12 MHz CPU
- 2 x Parallel Ports
- 2 x Serial Ports
- 102 Key Enhanced AT Keybd
- 8 Expansion Slots
- Hercules High Resolution Display Card
- High Res. Mono Monitor
- MS DOS 3.3 + GW Basic
- Real Time Battery Backed Clock/Calendar

FREE 1 year on site maintenance

£1249
£1449

(WITH EGA COLOUR MONITOR + CARD)

ADVENT AT 20/26

20MHz clock speed. Neat 286. Faster than a 386/16 (Landmark speed test 26.7 MHz). Other specifications as Advent AT 12+.
With 14" Amber FST Mono Monitor
With 14" EGA Colour Monitor

£1595

£1895

HARD DISKS

21 Mb Hard Card	£194
32 Mb Hard Card	£238
30 Mb Disk + Cont.	£199
40 Mb Disk 40MS	£309

MONITORS

NEC Multisync GS	£159
NEC Multisync II	£449
TAXAN 770 M/sync	£469
VEGA EGA Board	£189
ORCHID VGA Board	£229
ADVENT 14"	
FST AMBER	£99
ADVENT 14"	
FST PAPER WHITE	£115
ADVENT 14" EGA	£299
ADVENT 14"	
MULTISYNC	£369

MODEMS

AMSTRAD MC2400	£164
AMSTRAD SM2400	£224
ADWY QUATRO	£529
MIRACOM WS4000	£109
STRADCOM	£138

CO-PROCESSORS

8087-3 5MHz	£79
8087-2 8MHz	£115
8087-1 10MHz	£159
80287-6 6MHz	£119
80287-8 8MHz	£175
80287-10 10MHz	£199
80387-16 16MHz	£329

DOT MATRIX PRINTERS

Amstrad DMP4000 NLQ	
132 col 200cps	£255
Amstrad LQ3500 di 24 pin	£269
Amstrad LQ5000 di	£355
Citizen LSP10	£109
Citizen 120D	£129
Citizen 180E NLQ IBM	£159
Citizen MSP15E	£215
Citizen MSP40	£289
Citizen MSP45	£369
Citizen MSP50	£379
Citizen MSP55	£479
Citizen HQP40	£379
Citizen HQP45	£335

Epson LX800 NLQ (150cps)	£169
Epson FX850 NLQ	£297
Epson FX1050 NLQ 132 col	£397
Epson EX800 NLQ 300cps	£459
Epson EX1000 NLQ	
132 col 300cps	£499
Epson LQ500 NLQ 24 pin	£499
Epson LQ850 NLQ 24 pin	£424
Epson LQ1050 NLQ 132 col	
180cps 24 pin	£559
Epson LQ2550	£919
Epson DFX5000	£1159
Hewlett Packard Deskjet	£589
Micro P MP 135+	£139
NEC P2200 inc. sheet feed	£271
NEC P6 +	£469

NEC P7+24 pin	£579
Panasonic KXP1081	£138
Panasonic KXP1124	£359
Panasonic KXP1540	£459
Star LC10 NLQ inc I/F	£175
Star LC10 colour version	£229
Star LC24-10 24 pin	£288
Star NX15 NLQ 132 col	£289
Star ND15 NLQ 132 col 180cps	£359
Star NR15 NLQ 132 col	£429
Star NB24-10 NLQ	
80 col 24 pin	£429
Star NB24-15 NLQ	
132 Col. 24 Pin	£545
Star NB15 NLQ	
132 Col. inc sheet feed	£619

DAISYWHEEL PRINTERS

Brother HR20	£326
Brother HR40	£759
Citizen Premier 35	£399
Juki 6200	£319

All popular Interfaces, cables, etc. available from stock. Custom cables made to order. Let our experts match your computer to the printer of your choice. Printers - All models parallel-centronics interface Serial RS232C available at same or slightly higher prices.

VOLTAGE

Computer Shop

FREE DELIVERY
on any order
UK Mainland

ACCESSORIES

Copy Holders	
Desktop Copy Holder	£12.95
Desktop Mounted Copy Holder	£17.95
Keyboard Draws	
Metal Keyboard Draw	£19.25
Wooden Keyboard Draw	£24.95
Screen Filters (Anti-Glare)	
12" Mono Filter	£9.95
14" Mono Filter	£10.95
14" Colour Filter	£11.95
Acoustic Hoods	
Acoustic Hood, 80 column	£69
Acoustic Hood, 132 column	£79
Printer Stand With paper holder	£16.95
GPU Stand	£11.95
Miscellaneous	
IBM Keyboard Extension Cable	£4.95
IBM Monitor Extension Cable	£4.95
5 1/4" Disk Cleaning Kit	£6.95
3 1/2" Disk Cleaning Kit	£6.95
Mousemat	£3.99
Keyboard Cleaning Kit	£6.99

SOFTWARE

Ability Plus	£129
Dbase III+	£318
D Base 1V	£369
Excel	£238
Fontasy	£48
Framework III	£328
GEM DTP V111	£259
Lotus Agenda	£229
Lotus 123 V2.1	£264
Microsoft Mouse	£89
Multimate Advantage II	£278
Pagemaker V.3	£489
Paradox II	£279
Quattro	£128
Sage Accountant	£99
Sage Accountant + Sage Book Keeper	£125
Sage Financial Controller	£65
Sage Payroll II	£205
Sage PC Write	£102
Sage Retrieve III	£69
Sidekick + Smart inc Sp Chk	£124
Supercalc V	£89
Symphony V2	£388
Ventura	£208
Publisher V1.2	£359
Windows	£599
Word V4.0	£55
Wordperfect V.5	£238
Wordstar	£218
2000+Rel.3	£227
Wordstar Prof. V.5	£198

LASER PRINTERS

Prices from only **£1149**

THE UK'S LARGEST RANGE OF LASER PRINTERS ON DEMONSTRATION

Are you confused by the variety of lasers available? No problem! Visit our showroom and compare before you buy. Off the shelf delivery on most models.



Canon LBP-8 II

Epson GQ-3500



AST TURBO (Postscript) 8PPM	£2698*
BROTHER HL-8 8PPM	£1529*
BROTHER HL-8 QS (Postscript) 8PPM	£3798*
CANON LBP8-II 8PPM	£1379
CANON LBP8-II T 8PPM	£1999
CANON LBP8-II R 8PPM	£2199
CITIZEN OVERTURE 110+ 10PPM	£1295*
EPSON GQ3500 6PPM	£1149*
HEWLETT PACKARD LASERJET II 8PPM	£1399*
H. P. LASERJET II D 8PPM	£2299*
KYOCERA F1000 10PPM	£1589
KYOCERA F1200 10PPM	£2599
M./TALLY MT905 6PPM	£1159*
OKI LASERLINE 6 ELITE 6PPM	£1329
PANASONIC KXP 4450	£1498*
QMS PS810 (Postscript) 8PPM	£2949
QUME CRYSTALPRINT II 6PPM	£1149
QUME SCRIPTEN 10PPM	£3099*
STAR LP-8 8PPM	£1379*

All Lasers marked with * includes 12 months on-site maintenance.

ATARI PC3 RANGE

PC3 Dual Drive 640K Mono Monitor	£585
PC3 Dual Drive 640K EGA Monitor	£789
PC3 HD 30Mb 640K Mono Monitor	£869
PC3 HD 30Mb 640K EGA Monitor	£1099

ALL ATARI'S COMPLETE WITH MSDOS GW BASIC, GEM, EGA STARTUP, GEM EGA DESKTOP, GEM PAINT AND GEM WRITE.

LONDON'S AMIGA CENTRE

Hi-Voltage are the Amiga experts. As Commodore's largest computer store we are proud to give the world's most advanced computer pride of place in our showroom. We stock the most comprehensive range of peripherals and software including colour printers, as they become available. New items are arriving every day so contact us now!

AMIGA A500 PRICES FROM **£339**

INCLUDING FREE MODULATOR
NOW IN STOCK

AMIGA B2000 IN STOCK

Standard versions from **£995** IBM Compatible version from **£1395**

LARGE RANGE OF DISCOUNTED
AMIGA SOFTWARE.

FULL RANGE OF CBM 64C/128D
COMPUTERS AND PERIPHERALS IN STOCK

EXPORT CUSTOMERS SUPPLIED TAX FREE - ASK FOR EXPORT LIST

Official orders welcomed from PLC's government and education establishments

ALL PRICES EXCLUDE VAT

OPEN MON-SAT 9AM-5.30PM

HI VOLTAGE

PLOTTERS

ROLAND	HP
DXY1100 £619	7440A £729
DXY1200 £859	7475 £1089
DXY1300 £1019	7550 £2849
DPX 2200 £2589	7570 £2849

SPECIAL OFFERS ON COMPUTERS

Olivetti M240	
20MB Mono	£979
Olivetti M380	
40MB Mono	£1995
Archimedes A440	
Colour	£2189

ARCHIMEDES

A310 Base	£835
A310 Colour	£1055
A310 M Base	£895
A310 M Colour	£1115
A440 Colour	£2189

SPECIAL OFFER ON DISKS

Prices per box of 10	
3.5" Bulk DS/DD	£15
3.5" Verbatim DS/DD	£19
3.5" Sony DS/DD	£19
5.25" Bulk DS/DD 48tpi	£8
5.25" Media Life DS/DD (inc library box) 48tpi	£11
5.25" 3m DS/DD 48tpi	£16
5.25" Dysan 1.6mb	£22

Free post and packing on disks

Largest range of floppy disks and printer ribbons available in London over the counter.

London's largest range of games and software. Thousands of titles in stock.



Mail Order + Export Hot Line Phone **01-686 6362**

SAME DAY DELIVERY CALL FOR DETAILS



DELIVERY FREE OF CHARGE UK MAINLAND

Send off or order by phone quoting your Access, Visa No. Phone 01-686 6362. Immediate despatch on receipt of order or cheque clearance. Or Telex your order on: 946240 Attn 19001335. EXPORT CUSTOMERS SUPPLIED TAX FREE.



Dept. PCW, 53-59 High Street, Croydon, Surrey CR0 1QD. Fax: 01-681 8939. Tel: 01-686 6362

Prices correct at copy date. Subject to change without notice due to currency fluctuations etc. E. & O. E.

ARKEL COMPUTER SERVICES LTD

7A Mill Hill Road, Market Harborough, Leics. Tel: (0858) 32495
 ☆ Visit our new showroom at 23 Adam & Eve St., Market Harborough.
 Tel: (0858) 66580 ☆

The Caring PC Specialists

☆ 20 Free Software Packages with each Hard Disk Computer

ARKEL SMASH THE PRICE BARRIER!!

AMSTRAD PC's

Now at New Low Prices



PPC512D **£480**
 PPC640D **£575**

AMSTRAD 2086

Now in stock Telephone for prices

PC 1640 32Mb ECD **£ 899**

for other PC 1640's Telephone for prices.

All hard disk models fitted with Seagate drives AND cooling fans.



ATARI PC3

640K, MOUSE,
 MS-DOS 3.2,
 GW-BASIC, GEM,
 GEM WRITE, etc.

30 MB EGA £899

INCREDIBLE VALUE
 ONLY FROM ARKEL

AUTUMN SPECIALS

Miniscribe 32Mb
 Hard Card

£225

Timeworks Lite
 DTP only

£39

Supercalc 3.1

£39

Cannon 1080A
 Printer

£149

Citizen 120D

£119

NEC P2200
 + Sheet Feeder

£299

3 1/2" Disk Drive

£85

5 1/4" Disk Drive
 (inc Amstrad
 fitting kit)

£69

Integrated 7 +

£49

25 Floppies

£15

Amstrad
 DMP 4000

£249

Special offers
 each week.

Telephone for
 latest details.

Carriage £10 for first
 item, £5 for others.
 UK orders add VAT
 at 15%

AKHTER As Supplied to Open University and DTI

PC 1000 640K, 8 expansion slots. DOS 3.3, GW-Basic,
 RS232 & parallel. PC 100 Small Footprint. Same price
 as PC 1000.

	Mono	EGA
DD	£599	£859
32Mb	£699	£969
40Mb	£779	£1049
64Mb	£899	£1169

Telephone for Akhter AT
 systems

Akhter AT3000 80386 32bit
 Please telephone

PACKARD BELL

PB 500 TURBO: 640K, 10MHz,
 MS-DOS 3.3, GW-Basic, bundled
 software

	Mono	CGA	EGA
with Free 12 Month's on site maintenance	DD	£619	£749
	20Mb	£719	£849
	32Mb	£749	£879
	40Mb	£829	£959
	64Mb	£949	£1079
		£1079	£1199

PB286-10 8/10 MHz

1.2Mb floppy
 enhanced keyboard.

	Mono	Colour	EGA
20Mb	£1199	£1329	£1469
40Mb	£1309	£1439	£1579

Disc drives up to 240Mb - Tel.

OTHER COMPUTERS

Commodore PC 10/20
 SCSI Drive AT-style
 keyboard.
 Telephone for prices.

Hyundai PC 10 MHz
 Same price as
 Akhter PC 1000

OPUS PC3 - Telephone

SBC computers - Tel.
 ATARI PC2 AND PC3 - Tel.

PRINTERS

Full range of printers:

Epson
 Amstrad
 Brother *TELEPHONE*
 NEC *FOR*
 Panasonic *LATEST*
 Canon *LOW*
 Citizen *PRICES*
 Micro P
 Star

Free cable with printers
 over £200.

SOFTWARE

Full software list inc:

LOTUS SAGE
 ASHTON TATE PEGASUS
 DIGITAL (GEM) MICROSOFT
 Multimate Supercalc
 Smart Ventura
 Wordstar Ability
 WordPerfect Clipper
 Generic Cadd
 Auto Route etc.

Telephone for DESK TOP
 PUBLISHING and Lasers

Help us to raise £10,000 for the Leprosy Mission.
 Every purchase aids that cause.

PRICES CORRECT AT TIME OF GOING TO PRESS.

- * Software Development
- * Hardware Supplies
- * CAD Systems
- * Networks
- * Labelling & Barcode Systems

AKIN COMPUTER SERVICES

44 Grymes Dyke Way
Stanway
Colchester
Essex CO3 5QT
Tel: 0206 560248

LOWEST PRICES * PROFESSIONAL SUPPORT
SOFTWARE DESIGN & DEVELOPMENT

Phone ACS on 0206 560248/330582 for our latest prices

Tandon

PCX 20	£750	PAC 286 (30Mb)	£1195
PCA 20	£1045	PAC 286 + (30Mb)	£1245
PCA 20 +	£1095	386/16-SF	£1775
PCA 40 +	£1195	386/16-40	£1955
PCA 70 +	£1395	386/20-40	£2545
Target 20	£1195	386/20-70	£2795
Target 20 +	£1295	386/20-110	£2995
Target 40 +	£1495	386/20-DP	£3195

EGA Colour add £285 VGA Colour add £355



SBC XT-SD	£569	SBC AT-20	£1295
SBC XT-20	£895	SBC AT-40	£1345
CGA Colour add	£175	EGA Colour add	£325

SBC DLP System - comprises of:
SBC AT-40 Computer, SBC AX530 72 line A4 monitor,
SBC LP6 Laser Printer, 500 W UPS and mouse £3995
SBC/DNA PC Network (emulates Novell file/record locking)
2 user starter kit £295 4 user start kit £595

All SBC prices include 12 months on-site maintenance

ALL PRICES EXCLUDE VAT & DELIVERY

Please phone for prices on a range of computer peripherals

ACS 0206 560248/330582

TX

Rich fax 007

£699

100 number autodial

auto redial; send later

20 second transmission

The fax

- + telephone
- + answering machine
- + copier
- + (no faxline needed)
- + auto dial/redial/timer
- + text, drawings, photos

= **NEC Nefax 2** £995

BABT approved

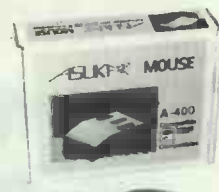
NEC SHARP Canon RICOH

TX

Telefax

SHOWROOM
67 YORK STREET LONDON W1
01.706 1553/4800 FAX 01.706 1560

ALL TRADE NAME & PRODUCT NAME ARE THE PROPERTY OF THE IR RESPECTIVE OWNERS. PRICES & CONDITIONS SUBJECT TO AVAILABILITY & TO CHANGE WITHOUT NOTICE. PRICES EXCLUDE VAT.



ASUKA MOUSE

A-400 MOUSE SYSTEM
MOUSE COMPATIBLE

£35

A-800 MICROSOFT & MOUSE
SYSTEM MOUSE COMPATIBLE

£45



DB Series-Universal 256k Printer Buffer

- * Memory expandable from 256k to 1Mb
- * I/O ports: two to two
- * Interface capability parallel to parallel serial to serial, parallel to serial and serial to parallel
- * Channel select: software code, auto scanning and manual.

P.O.A.



Only £24

Centronic Cable Booster

- * Extend any centronic cable by twice its length by simply connecting booster mid-way between two cables

4 WAY AUTO PRINTER SHARER NOW ONLY £89



SPEC: MP401 4 way Auto-switch with 25 way D type parallel I/O suitable for IBM and Compatible machines.

Other products available now with new low prices:

Mechanical			
2 way 25D type	£33	2 way Centronics	£39
3 way 25D type	£39	3 way Centronics	£55
4 way 25D type	£48	4 way Centronics	£65
2 way X over 25D	£49	2 way X over 36C	£69
Auto-switch Parallel		Buffers	
MP401 4 way	£89	PB64 64k Ram	P.O.A.
MP801 8 way	£132	PB256 256k Ram	P.O.A.
Auto-switch Serial		Line Convertors	
MS401 4 way	£99	Parallel to Serial	£69
MS801 8 way	£149	Serial to Parallel	£69

CABLES (Cables can be made to your requirements)

2M 25 way back to back	£9.65	2M IBM Centronic Printer lead	£12.86
Mains adaptor			
9v, 500Ma, DC, BS415	£6.95		
9v, 500 Ma, AC, BS415	£6.49		

To order, please send cheques but add £6 P&P plus VAT
Dealer and export enquiries welcome

BRIGDEN TECHNOLOGY

0322 331984

UNIT 24 ERITH BUSINESS CENTRE, ERITH HIGH ST
ERITH, KENT DA8 1QY

We cannot publish
all our product prices
here — please call for details

COMPSTAND

0243 771786
FAX 0243 785878

SPECIAL OFFER
M240 with 640Kb RAM, 20Mb hard
disk, 360Kb (5.25") or 720Kb
(3.5") diskette drive,
monochrome monitor,
Keyboard, MS-DOS 3.3

£1045.00

OLIVETTI

M380 Compact We can offer truly
competitive prices
on these superb
80386 systems.

OPTIONS of green, amber, paper white,
EGA or VGA monitors are available.
All systems supplied with 102-key
enhanced keyboard and MS-DOS 3.3.
All equipment is covered by a 12-month
Warranty.

CALL NOW FOR BEST PRICES

TANDON — NEW LOWER PRICES

Mono-chrome	EGA	VGA	VGA	PAC 1.2
£882	Colour	Colour	Mono	PAC 1.2 Plus
£937	£1170	£1243	£1039	Data Pac 30Mb
£992	£1225	£1298	£1094	PCX20
£1048	£1280	£1353	£1149	Target 20
£1158	£1336	£1408	£1204	Target 20 Plus
£1324	£1446	£1519	£1315	Target 40 Plus
£827	£1612	£1684	£1480	PCX20 does not include MS Windows
£882	£1115	£1188	£984	PCX20 does not include MS Windows
	£1170	£1243	£1039	PCX20 does not include MS Windows

Mono-chrome	EGA	VGA	VGA
£915	Colour	Colour	Mono
£970	£1203	£1276	£1072
£171	£1258	£1331	£1127
£750	£1038	£1111	£907
£1220	£1508	£1581	£1377
£1335	£1623	£1696	£1492
£1505	£1793	£1866	£1662

- PCA Plus
- PCA20
- PCA20 Plus
- PCA40 Plus
- PCA70 Plus
- PAC
- PAC Plus

All Tandon systems are supplied with 102-key enhanced keyboard, green or amber monitor, MS-DOS 3.3, GW Basic and MS Windows.

ZENITH PORTABLES

XT Compatible, 640kb RAM, CGA LCD Screen:	£985.00
Supersport, 2 x 720kb floppy disks	£1790.00
Supersport, 20Mb Hard Disk	£2895.00
AT Compatible, 1Mb RAM,	£3195.00
Supersport 286, 20Mb Hard Disk	
Supersport 286, 40Mb Hard Disk	
80386 2Mb RAM,	
Turbosport 386, 40Mb Hard Disk	£3515.00

TOSHIBA PORTABLES

- T1200 + FB
- T1200 + HB
- T1600
- T3100/20
- T3200
- T5100

APRICOT	£1075.00
XEN-SPC 80386 SX 30Mb	£1695.00
XEN-S240X 80386 SX 44Mb	£2295.00
Qi 330 80386 SX (16MHz) 47Mb	£1695.00
Qi 650 80386 (20MHz) 47Mb	£2730.00
Qi 660 80386 (25MHz) 65Mb	£3165.00

All the above systems include VGA paper-white monitors, keyboards, MS-DOS 3.3 & GW-Basic. For VGA colour monitor add £210

ALL AMSTRAD MACHINES AVAILABLE. PRICES ON APPLICATION.

TERMINALS

- Wyse WY30
- Wyse WY50
- Wyse WY60
- Wyse WY85
- Wyse WY99GT
- Wyse WY120
- Wyse WY350 (colour)

£224.00
£294.00
£357.00
£338.00
£415.00
£316.00
£597.00

Networking • Multi-user
Systems • On-site
Maintenance
Contracts

STOP PRESS
SPECIAL OFFER:
TOSHIBA T3100/20
£1695

LASER PRINTERS
 Qume Crystalprint WP 6ppm
 Qume Crystalprint Series II 6ppm
 Epson GQ3500 6ppm
 HP Laserjet Series II 8ppm
 HP Laserjet Series II NEW
 Canon LBP 811T 8ppm
 Canon HL8 8ppm
 Brother HL8 8ppm
 Star! LP8 8ppm
 Olivetti P9208 8ppm
 Panasonic 4450 11ppm
 Texas Instruments 2106 6ppm Postscript
 Olivetti PG303 8ppm Postscript
 Qume Scripten 10ppm Postscript

£749.00
 £1065.00
 £1075.00
 £1343.00
 £1995.00
 £1885.00
 £1535.00
 £1355.00
 £1285.00
 £1675.00
 £2635.00
 £2765.00
 £3295.00

Selection of ex-demonstration equipment available. Education • Dealers and Export Enquiries welcome.

STAR PRINTERS
 LC1080 column
 LC10 Colour
 ND10
 NR10
 LC24/10
 NB24/10
 NX15 132 column
 ND15
 NR15
 NB24/15
 NB15

£165.00
 £209.00
 £295.00
 £350.00
 £279.00
 £429.00
 £270.00
 £335.00
 £392.00
 £515.00
 £630.00

EPSON PRINTERS
 LX800 80 Column
 FX850
 EX800
 LQ850
 FX1050 132 Column
 EX1000
 LQ1050
 LQ2500 Plus
 LQ2550
 DFX5000
 SQ2500

NEC PRINTERS
 P2200
 P6 Plus
 P7 Plus
 P960XL
 Spinwriter 8800
HEWLETT PACKARD PRINTERS
 HP Thinkjet
 HP Quietjet (80 col)
 HP Quietjet Plus (132 col)
 HP Paintjet
 HP DeskJet

£265.00
 £435.00
 £560.00
 £735.00
 £799.00

ALL HP PRICES INCLUDE ONE YEAR ON-SITE WARRANTY

BROTHER PRINTERS — FULL RANGE — £CALL

UPGRADES AND ADD-ONS
 30Mb Seagate Hardcard (40ms)
 MS Mouse (Bus or Serial)
 Logitech Serial Mouse
 Logitech Bus Mouse
 Mosaic 64K Printer Buffer Plug
 Novell Networking
 We are open for business from 8.30am to 6pm Monday to Friday and 9am to 12 noon Saturdays.

£229.00
 £85.00
 £59.00
 £85.00
 £119.00
 £Call

PLOTTERS & SCANNERS
 HP7440A
 HP7475A
 HP7505A
 HP7570A
 Roland 880A
 Roland 880A
 Roland DXY1100 New
 Roland DXY1200 New
 Roland DXY1300 New
 Olivetti PS102 Scanner
 HP Scanjet
 Interface for Scanjet

MODEMS
 Miracom WS4000
 Miracom WS3000 V22
 Miracom WS3000 V22/bis
 Miracom Keypad 3000 V22
 Miracom Keypad 3000 V22/bis
 Miracom Courier H.S.T.

£95.00
 £199.00
 £295.00
 £199.00
 £299.00
 £687.00

SOFTWARE — ALL SOFTWARE GUARANTEED LATEST UK VERSION

DATABASE:
 Lotus Agenda
 Database IV NEW
 Paradox 2
 Release System 1.11
 Rapidfile
 Foxbase + Vers. 2.10 NEW
 Wordstar Professional 5 NEW
WORD PROCESSORS:
 Wordstar Advantage II
 Multimate V5
 Word IV
 Wordperfect V5
 Wordstar 2000+ Rel.3

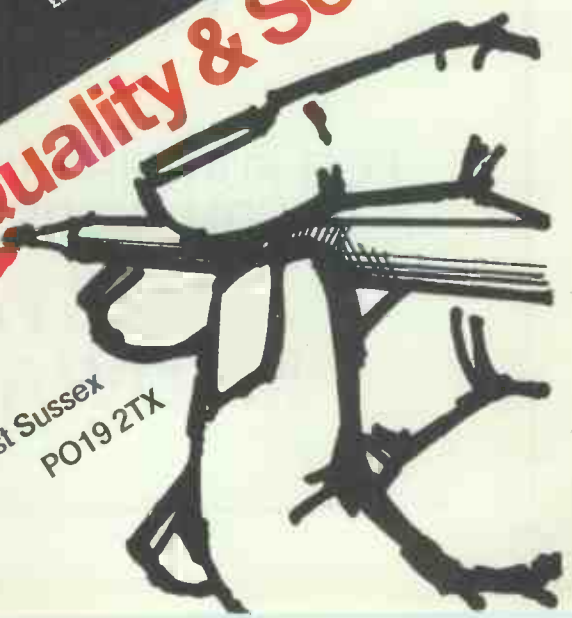
SPREADSHEETS:
 Lotus 123
 Multiplan
 Supercalc 5
OTHERS:
 Lotus Symphony
 Smart
 Superproject Expert
 Microsoft Excel

£235.00
 £105.00
 £195.00
 £329.00
 £364.00
 £395.00
 £221.00

£255.00
 £80.00
 £445.00
 £545.00
 £235.00
 £99.00

£545.00

10% For Price, Quality & Service
COMPSTAND LTD
 Terminus Road
 Chichester
 West Sussex
 PO19 2TX



SOUTH EAST COMPUTER & OFFICE ENVIRONMENTS EXHIBITION

**MARCH 25th to 28th
1989**

**CHATHAM HISTORIC
DOCKYARD
CHATHAM KENT**

**FOR FURTHER INFORMATION AND A BOOKING
FORM TO RESERVE A STAND CONTACT**

**INVICTA EXHIBITIONS
MEDWAY (0634) 241072**

THE NEW Vig I – FASTEST XT EVER

LOWEST PRICES YET

Mono XT compatible

£789 + VAT

Colour EGA XT compatible

£979 + VAT

Colour VGA XT compatible

£1199 + VAT



**12MHzXT
15MHzalso
available**

FREE
★ MS DOS 3.3

**MS-DOS 4.01
available now only
£49.00 + VAT extra.**

All systems are complete and ready to use, no extras required – includes hard disk, MS-DOS, monitor and many many extras. The Vig I incorporates the very latest technology making it one of the fastest IBM XT compatibles in the market and at a price that leaves all the others behind. The standard model runs at an incredible 12MHz. A 15MHz version which runs faster than an IBM AT is also available.

Full specification of the Vig I

VIG I HD30M – Monochrome System

■ Fully IBM XT Compatible ■ Superfast NEC V20 Processor with 8087 socket ■ 4.77/12 MHz switchable ■ 640K Ram Expandable to 1Mb ■ 30MB Fast Winchester Hard Disc ■ 360K Floppy Drive or 720K 3.5" (option for both available) ■ Mono graphics Hercules compatible card ■ High Resolution flat screen Amber Monitor ■ Enhanced 102 Keyboard ■ Real Time Clock ■ 1 Parallel and 1 Serial Port (option for 2nd port) ■ 8 expansion slots (5 free) ■ 200 watt power supply ■ New compact case ■ MS-DOS® 3.30 with GW Basic ■ Games Port ■ Norton SI (V4.00) test: 4.6

VIG I HD40E – EGA system.

■ Same spec as the Vig I HD40M but with colour EGA card and high resolution 14" (.31 dot pitch) EGA colour monitor.

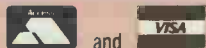
Vig I HD40V – VGA system.

■ Same spec as the VIG I HD40M but with colour VGA card and high resolution 14" (.31 dot pitch) MULTISCAN colour monitor. The VGA card features an incredible resolution of 800 × 600 with hardware zoom upgradable to 1024 × 768.

■ Vig I SDM: Single Floppy Monochrome System only £549.00 + VAT ■ Vig I DDM: Double Floppy Monochrome System only £599.00 + VAT ■ For the 15MHz version please add an extra £99.00 + VAT

All the above Viglen PCs are ready to use and have specifications of the highest standard which include the following: ■ New compact FCC (essential US requirement) approved case (smaller than standard footprint size only 1.6 sq ft in area) capable of accepting 8 drives (1 internally 3.5") ■ Japanese Drives (not Taiwanese) ■ All keyboards are high quality FCC approved with superior click type keys. 102 key keyboard is standard though 84 key keyboard can be supplied as an alternative ■ Very high quality certified 200 watt power supply designed to meet full UL/CSA safety standards ■ 12 months warranty with option for on-site maintenance ■ Full manuals ■ Technical Support second to none ■ The Viglen PCs are guaranteed to run all software that runs on the equivalent IBM PC/XT/AT such as DOS, Lotus, DBase, Wordstar, Autocad, Novell, Xenix, Sams, Sims, Corinth and all others. Specific requirements of disc drive and Winchester combinations can be supplied. Viglen also supply a full range of peripherals such as Monitors, Floppy Drives, Winchester, Tape Streamers, Add on cards, Network Cards, Co-processors, Mouse and many others at incredible prices. Please call.

GENEROUS DISCOUNTS available to education, public sector and Plc companies



SHOWROOM OPEN

MONDAYS TO FRIDAYS 9.30 TO 5.30PM
SATURDAYS 10 AM TO 2 PM

Prices correct at time of going to press and subject to availability. All trademarks acknowledged MS-DOS® and OS/2 are registered trademarks of Microsoft Corporation. IBM, PC, XT, AT, PS/2 are trademarks of International Business Machines Corporation.

Viglen

14th Successful Year

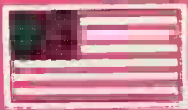
Viglen Ltd., Unit 7 Trumplers Way,
Hanwell, London W7 2QA Telephone: 01 843 9903.
Telex: 919 304 VIGLEN G. Fax: 01-574 5126



SALES HOTLINE
01 843 9903

HOW TO ORDER

Simply 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 plus 15% VAT. Credit card holders may order by telephone on our sales hotline 01 843 9903 (8 lines). Allow 7-10 days for delivery. Personal callers welcome to our showroom. Official orders from Education Establishments, Government departments and Plc Companies accepted.



CALL THE U.S.A. FREE!



- Fast air delivery to your door in 3-5 days!
- No extra or hidden charges!
- Call your order in on our direct FreeFone Hotline to our U.S. warehouse — charge to Visa or MasterCard!
- Customer service via our FreeFone lines — call the number below!
- All countries welcome!
- Save up to 50% on the latest U.S. software!

- Direct ordering from our huge range of latest U.S. versions — it's fast and easy!
- New! Lower carriage cost! Carriage by Air Express for just £9 for entire software order, regardless of size!
- All packages are brand new — direct from the publisher with full documentation!

LAP TOP COMPUTERS

NEC Multispeed EL-2	£998	Sharp 4502	£739	Toshiba T-1200 HB w/20MB HD	£1498
NEC Multispeed E2-2 w/20MB HD	£1388	Sharp 4521 w/20MB HD	£1299	Toshiba T-3200 w/40MB HD	£2188
Sharp 4501	£540	Toshiba T-1000	£558	Toshiba T-5100 w/40MB HD	£2988

DISK DRIVES

MN3053-AT-MFM	£394	MN8425-XT-MFM	£171	ST251-0-XT-MFM	£266
MN3053-XT-MFM	£368	MN8438-XT-RLL	£239	ST251-01-XT-MFM	£326
MN3650-AT-MFM	£242	MN9380-AT-1to1 INT.	£1478	ST251-1-AT-MFM	£361
MN3650-XT-MFM	£239	ST225-XT-MFM	£163	ST4096-AT-MFM	£457
MN6085-AT-MFM	£671	ST238-XT-RLL	£157	ST4096-XT-MFM	£489
MN6085-XT-MFM	£641	ST251-0-AT-MFM	£278		

SOFTWARE

Accounting

ACCPAC BPI G/A, A/R, A/P	£204
ACCPAC Plus 5.0 G/L, A/R, A/P	£347
ACCPAC Plus 5.0 I/C, O/E, R/I	£303
Bedford Accounting	£112
DAC*Easy 3.0	£45
Managing Your Money 4.0	£95

C.A.D.

AutoCAD 9.0 w/ADE3	£1822
DesignCAD 3D	£121
Generic CADD 3.0	£41
Generic Dot Plot	£23

Communications

Carbon Copy Plus 5.0	£76
Crosstalk Mark IV	£85
Crosstalk XVI 3.61	£76
Desklink 2.0	£77
Mirror II (Crosstalk Clone)	£25
PC Anywhere II	£51
Relay Gold	£112

Database

Clipper Summer '87	£278
dBase III+ 1.1	£280
dBXL Diamond	£66
Foxbase Plus 2.0-Single	£135
Nutshell	£108
Nutshell Plus	£205
Paradox 2.0	£234
PC File Plus 2.0	£34
Q & A 3.0	£162
Reflex	£68

Desktop Publishing

First Publisher 2.0	£49
Fontasy	£25
Gem Desktop Publisher	£138
Newsmaster II	£30
Newsroom Pro	£35
Pagemaker 3.0	£357
Publisher's Paintbrush	£128
Ventura 1.1	£374

Graphics — Business

Chartmaster	£182
Graph-in-the-Box	£43
Harvard Graphics 2.1	£180
Lotus Graphwriter II	£286
MS Chart 3.0	£190
VP Graphics	£46

Integrated

First Choice	£59
Framework III	£377
Integrated-7+ (Symphony Clone)	£77
Lotus Symphony	£315
MS Works	£91

Mice

Logimouse C7 Plus (Ser. or Bus)	£55
Logimouse w/CADD	£86
Logimouse w/Paint	£65
Logimouse w/Publish	£77
MS Mouse w/EasyCAD	£90
MS Mouse w/Paint	£76
MS Mouse w/Windows/Paint	£103
PC Mouse w/Paint (Ser)	£72

Painting

Dr. Halo III	£25
Formtools	£45
Formwörx	£65
Gem 3/Draw Plus	£142
Lotus Freelance Plus	£257
MS Windows Draw	£155
PC Paint Plus	£48
PC Paintbrush Plus	£54
Print Shop	£27
Printmaster Plus	£22

Programming

Brief Editor 2.0	£181
IBM Personal Editor-II	£86
MS "C" Compiler 5.1	£216
MS Fortran 4.1	£198
MS Macro Assembler 5.1	£70
MS Quick C	£48

Programming (continued)

MS Quickbasic 4.0	£48
MS Windows Development Kit	£286
Turbo C/Basic/PACSAL/PROLOG	£49
Turbo Toolboxes	£49
VP Expert	£74

Project Management

Harvard Total Proj_Mgr	£236
MS Project 4.0	£242
Project Manager Workbench—Adv.	£634
Project Manager Workbench—Std.	£434
Superproject Plus	£208
Timeline 3.0	£222
Timeline Graphics	£95

Spreadsheet

Lotus 1-2-3 2.01-3.5*	£248
Lotus 1-2-3 2.01-5.25*	£218
Lotus Hal	£68
Lotus Reportwriter	£51
Lucid 3D	£74
MS Excel	£213
MS Multiplan 3.0	£89
Quattro	£103
Supercalc IV	£179
Twin Advanced	£103
Twin Classic (1-2-3 Clone)	£29
VP Planner	£36
VP Planner Plus	£81

Utilities

Copy II PC	£13
Copywrite	£29
Cruise*Control	£34
Desqview 2	£60
Direct Access 4.1	£42
Disk Optimizer 4.0	£30
Disk Technician Plus	£58
Double DOS	£34
Extended Memory Manager	£28
Fastback*Plus	£63
Fastbak 5.14	£65

Utilities (continued)

H/Test H/Format	£39
IBM Fixed Disk Organizer	£34
Le Menu	£34
Lotus Agenda	£196
Lotus Metro	£43
Mace Utility	£35
MS DOS 3.3	£77
MS Windows 2.03	£48
Norton Advanced Utilities	£54
Norton-Commander 2.0	£32
Norton Utilities 4.0	£39
Noteworthy	£48
One Dir Plus	£35
Pathfinder 4.0	£34

Word Processing

Displaywrite IV	£213
Easy Extra	£40
Grammatk III	£41
Lotus Manuscript	£274
MS Word 4.0	£148
Multimate Advantage II	£184
PC Write 2.71	£68
Rightwrite 2.2	£35
Sprint	£91
Volkswriter III	£142
Webster's Writer	£45
Wordperfect 5.0-3.5*	£204
Wordperfect 5.0-5.25*	£185
Wordperfect Executive	£97
Wordperfect Library	£51
Wordperfect Network Station	£74
Wordperfect Network	£303

**Other Titles Available
Call for Pricing!**



Ordering Information: We ship anywhere. Quantities of all items are limited, prices subject to change without notice. Not responsible for typographical errors. We do not guarantee compatibility. We accept Visa and MasterCard, personal and company checks and money orders. Extra charge for C.O.D., air shipment or other special handling. 20% restocking fee plus freight on all refused or returned items. All returns require RMA number. All sales final. Allow 14 days for delivery.
Quick Shipping: All in-stock items will be on the way to you within 48 hours.
All items replaced or repaired at our discretion.
All trademarks acknowledged.

FreeFone
0800 89 1870
Product Information &
Customer Service
010 1617 341 4171

No Extra Charge for Credit Card Orders
Corporate & Educational Discounts Available

IRIS
PRODUCTS, INC.

P.O. Box 57, Stoughton, MA 02072 USA

THE NEW Vig II ELITE

THE AT COMPATIBLE
WITH THE
BUILT IN FUTURE

LOWEST PRICES YET

Mono AT compatible

£1299 + VAT

Colour

EGA AT compatible

£1499 + VAT

Colour

VGA AT compatible

£1749 + VAT

12MHzOWS
= 15MHz
16MHzOWS
version also
available.

FREE

- ★ Mouse with holder and pad
- ★ Windows
- ★ MS DOS 3.3

MS-DOS 4.01
available now only
£49.00 + VAT extra.

Fully OS/2 compatible

All systems are complete and ready to use, no extras required – includes hard disk, MS-DOS, monitor and many many extras.

The new Vig II Elite uses the very latest NEAT (New Enhanced AT) technology chip set giving it many advanced features such as: ■ Up to 8Mbytes of memory can be fitted directly on motherboard. ■ Extended or Expanded (latest EMS LIM 4 standard) memory. ■ Programmable to run at 0 or 1 wait state. ■ Selectable bus speed. ■ Optimised for OS/2 by speeding the switching between protected and real mode. ■ Easily upgradeable to run even faster by replacement of few plug in components.

Full specification of the Vig II Elite:

VIG II HD40M – Monochrome System.

■ Fully IBM AT Compatible ■ Intel 80286 Processor with 80287 co-processor socket ■ 8/12MHz switchable 0 or 1 wait state ■ 1024K Ram. 640K Main Memory + 384K Ram Disc ■ Upgradeable internally to 8MB ■ 40MB fast Winchester Hard Disc ■ 1.2MB 5.25" Floppy Drive as standard or 1.44MB 3.5" (option for both) ■ Mono graphics Hercules compatible card ■ High resolution 14" Amber monitor ■ Enhanced 102 Keyboard ■ Real Time Clock with battery backup ■ Latest BIOS capable of handling OS2 Compatible Drives and with SETUP in BIOS ■ 2 Parallel, 2 Serial and 1 Games Port ■ 8 Expansion slots (5 free) ■ 200 watt power supply ■ New compact case ■ Mouse and Microsoft Windows ■ Latest MS-DOS 3.30 with GWBASIC ■ Norton SI (V4.0) test: 13.60.

VIG II HD40E – EGA system.

■ Same spec as the Vig II HD40M but with colour EGA card and high resolution 14" (.31 dot pitch) EGA colour monitor.

VIG II HD40V – VGA system.

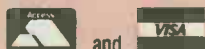
■ Same spec as the VIG II HD40M but with colour VGA card and high resolution 14" (.31 dot pitch) MULTISCAN colour monitor. The VGA card features an incredible resolution of 800 × 600 with hardware zoom upgradable to 1024 × 768.

The 16MHz models have the same specification as the 12 MHz model above except that the speed is 8/16 MHz switchable.

For 2MB of RAM please add £399 + VAT ■ For 4MB of RAM please add £999 + VAT ■ For 16MHz version please add £299 + VAT ■ For MS-DOS 4.01 instead of 3.3 please add £49 + VAT

All the above Viglen PCs are ready for use and have specifications of the highest standard which include the following: ■ New compact FCC (essential US requirement) approved case (smaller than standard footprint size only 1.6 sq ft in area) capable of accepting 8 drives (1 internally 3.5") ■ Japanese Drives (not Taiwanese) ■ All keyboards are high quality FCC approved with superior click type keys. 102 key keyboard is standard though 84 key keyboard can be supplied as an alternative ■ Very high quality certified 200 watt power supply designed to meet full UL/CSA safety standards ■ 12 months warranty with option for on-site maintenance ■ Full manuals ■ Technical Support second to none ■ The Viglen PCs are guaranteed to run all software that runs on the equivalent IBM PC/XT/AT such as DOS, Lotus, DBase, Wordstar, Autocad, Novell, Xenix, Sams, Sims, Corinth and all others. Specific requirements of disc drive and Winchester combinations can be supplied. Viglen also supply a full range of peripherals such as Monitors, Floppy Drives, Winchester, Tape Streamers, Add on cards, Network Cards, Co-processors. Mouse and many others at incredible prices. Please call.

GENEROUS DISCOUNTS available to education, public sector and Plc companies



and

SHOWROOM OPEN
MONDAYS TO FRIDAYS 9.30 TO 5.30PM
SATURDAYS 10AM TO 2PM

Prices correct at time of going to press and subject to availability. All trademarks acknowledged MS-DOS® and OS/2 are registered trademarks of Microsoft Corporation. IBM, PC, XT, AT, PS/2 are trademarks of International Business Machines Corporation.

Viglen

14th Successful Year

Viglen Ltd., Unit 7 Trumpers Way,
Hanwell, London W7 2QA Telephone: 01 843 9903.
Telex: 919 304 VIGLEN G. Fax: 01-574 5126



SALES HOTLINE
01 843 9903

HOW TO ORDER

Simply 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 plus 15% VAT. Credit card holders may order by telephone on our sales hotline 01 843 9903 (8 lines). Allow 7-10 days for delivery. Personal callers welcome to our showroom. Official orders from Education Establishments, Government departments and Plc Companies accepted.

TOSHIBA

Portable Computers



Personal System/2

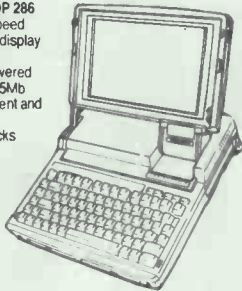


- T100 PORTABLE PC**
- Lightweight, small size
 - MS-DOS in Rom
 - Integral modem option
 - 512KB RAM extendible to 1.2Mb
 - Weighs only 6-4lbs
 - Affordable price



- T1200 HB PORTABLE DESKTOP PC**
- 80C286 CPU AT 12MHz speed
 - Backlit supertwist display
 - 20Mb hard disk/battery powered or two 720KB floppy disk drives
 - 1Mb RAM
 - Resume mode
 - Removable battery pack

- NEW T1600 PORTABLE DESKTOP 286**
- 80C286 CPU AT 12MHz speed
 - Shaded Backlit Supertwist display with EGA mode
 - 20Mb hard disk/battery powered
 - 1Mb RAM extendible up to 5Mb
 - Max tune power management and Resume mode
 - Two removable battery packs



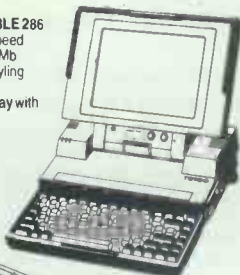
- T3100/20 DESKTOP PORTABLE AT**
- 80286 CPU power
 - Small size and slimline styling
 - Built-in 20Mb hard disk
 - Gas plasma display
 - 640KB RAM expandable to 2.6Mb



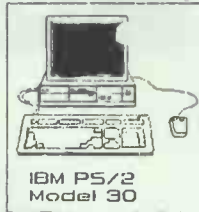
- T3200 DESKTOP PORTABLE 286**
- 80286 CPU AT 12MHz speed
 - Two IBM expansion slots
 - Full keyboard with keypad
 - Built-in 40Mb hard disk
 - Shaded gas plasma display with EGA mode
 - 1Mb RAM extendible to 4Mb



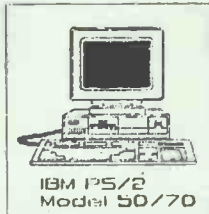
- T5100 DESKTOP PORTABLE 286**
- 80286 CPU AT 16MHz speed
 - 2Mb RAM extendible to 4Mb
 - Small size and slimline styling
 - Built-in 40Mb hard disk
 - Shaded gas plasma display with EGA mode



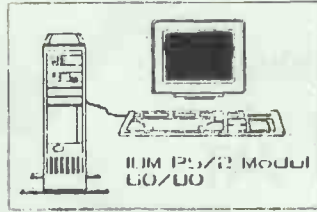
- NEW T5200 DESKTOP PORTABLE 386**
- 80386 CPU AT 20MHz speed
 - 2Mb RAM extendible up to 8Mb
 - Shaded gas plasma display with VGA mode
 - Two IBM expansion slots
 - Full keyboard with keypad
 - Built-in 40Mb or 100Mb hard disk



- IBM MODEL 30 DESKTOP 8086**
- IBM PS2 30-002
 - 2*720K 640K RAM 8Mhz
 - IBM PS2 30-021 720K FD
 - 20mb 640K RAM 8Mhz



- IBM MODEL 50 DESKTOP 80286**
- IBM PS2 50 1.44 FD
 - 20Mb 1Mb RAM 10Mhz
 - IBM PS2 50Z 1.44 FD
 - 60Mb 1Mb RAM 10Mhz



- IBM MODEL 60 FLOORSTANDING 80286**
- IBM PS 60-041 1.44 FD
 - 44Mb 1Mb RAM 10Mhz
 - IBM PS2 60-071 1.44 FD
 - 70Mb 1Mb RAM 10Mhz

- MODEL 70 DESKTOP 80386**
- IBM PS2 70-F61 1.44FD
 - 60Mb 2Mb RAM 16Mhz
 - IBM PS2 70-121 1.44FD
 - 120Mb 2Mb RAM 20Mhz
 - IBM PS2 70-A21 1.44FD
 - 120Mb 2Mb RAM 25Mhz

- IBM MODEL 80 FLOORSTANDING 80386**
- IBM PS2 80-041 1.44 FD
 - 44Mb 1Mb RAM 16Mhz
 - IBM PS2 80-071 1.44 FD
 - 70Mb 2Mb RAM 16 Mhz
 - IBM PS2 80-111 1.44 FD
 - 115Mb 2Mb RAM 20Mhz
 - IBM PS2 80-311 1.44 FD
 - 314Mb 2Mb RAM 20Mhz



- IBM PC DESKTOP 80286**
- IBM XT286 1.2 FD
 - 20Mb 640Mb RAM 6Mhz
 - IBM ATX 1.2 FD
 - 30Mb 512K RAM 8Mhz



ONLY A FEW LEFT. PLEASE CALL FOR SPECIAL PRICES

£

PLEASE CALL FOR OUR BEST PRICES

VOICE
01-200 5757
FAX
01-200 8444

WEEKENDS CALL
0836 280861

NEW MODELS IN

WE ARE DAVINCI COMPUTERS. WE HAVE BEEN ESTABLISHED FOR TEN YEARS.

We specialise in IBM and Toshiba Computers and we are authorised agents for both. We offer you the very best deals around and fast delivery anywhere.

All our systems are tested before despatch ensuring a working system on delivery.

We are also able to supply and install Network Systems and we can handle most special applications for your business.

Government, Educational and PLC companies, orders welcome. We can deal with Export enquiries.

Call our sales team now or fax us with your enquiries for immediate attention.

All available with DOS 3.3/DOS 4.00/05.2
Extended Keyboard, Mono display 3503 or
VGA colour 8512/8513/8514 displays

DAVINCI
COMPUTERS

Unit 3, Grahame Park Way
(Next to RAF Museum, Hendon)
London NW9 5QY.
United Kingdom.
Telephone: 01-200 5757 (5 Lines)
Fax: 01-200 8444

IBM
AUTHORISED DEALER
PERSONAL
COMPUTERS

IBM
AUTHORISED DEALER
TOKEN RING

TOSHIBA
AUTHORISED
DEALER



PEGASUS

THE NEW Vig III – WITH 64K CACHE

LOWEST PRICES YET

Mono 386 AT compatible

£2485 + VAT

Colour

EGA 386 AT compatible

£2795 + VAT

Colour

VGA 386 AT compatible

£2995 + VAT

Fully OS/2 compatible



All systems are complete and ready to use, no extras required – includes hard disk, MS-DOS, monitor and many many extras. The new Vig III Cache uses the very latest state-of-the-art design technology to make it one of the highest performance 386 computers in the market ■ To achieve this it incorporates the following advanced features; ■ 64K Static Cache memory with average of 85% hit rate ■ 32 bit AMI Bios saves on shadow RAM and much faster ■ Built in video BIOS selectable to give a very high performance video display * Norton SI test = 23.2 ■ Landmark test = 30MHz.

Full specification of the Vig III Cache 64K

VIG III HD40M – Monochrome System.

■ Fully IBM AT compatible using Intel 32 bit 80386 processor ■ Socket for 80387 ■ 8/20MHz 0 wait state with 64K fast 25ns Cache RAM ■ 2MB of memory upgradeable to 16MB ■ EMS driver supplied ■ 40MB very fast (less than 28 ms) Japanese Hard Disc Drive ■ 1.2MB 5.25" floppy drive as standard or 1.44MB 3.5" (option for both) ■ Mono graphics Hercules compatible card ■ High resolution 14" Amber monitor (option for paper white) ■ Enhanced 102 Keyboard ■ Real Time Clock with battery backup ■ Latest American AMI 32bit BIOS ■ 2 Parallel, 2 Serial and 1 Games Port ■ 200 watt power supply ■ Mouse and Microsoft Windows ■ MS-DOS 3.30 with GWBASIC (option for MS-DOS 4.01)

VIG III HD40E – EGA system.

■ Same spec as the Vig III HD40M but with colour EGA card and high resolution 14" (.31 dot pitch) EGA colour monitor.

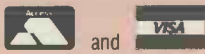
Vig III HD40V – VGA system.

■ Same spec as the VIG III HD40M but with colour VGA card and high resolution 14" (.31 dot pitch) MULTISCAN colour monitor. The VGA card features an incredible resolution of 800 × 600 with hardware zoom upgradeable to 1024 × 768.

■ For 4MB of RAM instead of 2MB please add £599 + VAT ■ For MS-DOS 4.01 instead of 3.30 please add £49 + VAT

All the above Viglen PCs are ready to use and have specifications of the highest standard which include the following: ■ New compact FCC (essential US requirement) approved case (smaller than standard footprint size only 1.6 sq ft in area) capable of accepting 5 drives (1 internally 3.5") ■ Japanese Drives (not Taiwanese) ■ All keyboards are high quality FCC approved with superior click type keys. 102 key keyboard is standard though 84 key keyboard can be supplied as an alternative ■ Very high quality certified 200 watt power supply designed to meet full UL/CSA safety standards ■ 12 months warranty with option for on-site maintenance ■ Full manuals ■ Technical Support second to none ■ The Viglen PCs are guaranteed to run all software that runs on the equivalent IBM PC/XT/AT such as DOS, Lotus, DBase, Wordstar, Autocad, Novell, Xenix, Sams, Sims, Corinth and all others. Specific requirements of disc drive and Winchester combinations can be supplied. Viglen also supply a full range of peripherals such as Monitors, Floppy Drives, Winchesters, Tape Streamers, Add on cards, Network Cards, Co-processors. Mouse and many others at incredible prices. Please call.

GENEROUS DISCOUNTS available to education, public sector and Plc companies



SHOWROOM OPEN

MONDAYS TO FRIDAYS 9.30 TO 5.30PM
SATURDAYS 10AM TO 2PM

Prices correct at time of going to press and subject to availability. All trademarks acknowledged MS-DOS® and OS/2 are registered trademarks of Microsoft Corporation. IBM, PC, XT, AT, PS/2 are trademarks of International Business Machines Corporation.

Viglen

14th Successful Year

Viglen Ltd., Unit 7 Trumpers Way,
Hanwell, London W7 2QA Telephone: 01 843 9903.
Telex: 919 304 VIGLEN G. Fax: 01-574 5126



SALES HOTLINE
01 843 9903

HOW TO ORDER

Simply 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 plus 15% VAT. Credit card holders may order by telephone on our sales hotline 01 843 9903 (8 lines). Allow 7-10 days for delivery. Personal callers welcome to our showroom. Official orders from Education Establishments, Government departments and Plc Companies accepted.



THE MOUSE COMPANY

Suppliers of only the highest quality pointing devices



Genius Mouse

New Genius mouse packages consisting of three button GM-6 mouse, featuring Mouse Systems and Microsoft compatibility. With programmable resolution (22 to 800dpi).

Software consists of Menu Maker, Menu Library and Dr Halo III professional graphics application. Also included are a free mouse pad and mouse pocket.

G-M 6 Plus (with Software selectable Microsoft or M.S. mode) £45.00
GM-6000 (with Hardware selectable Microsoft or M.S. mode) £52.00

Microsoft

Option of bus or serial in the following packages:

Mouse, PC Paintbrush and expert menu utility £119
Mouse, Microsoft Windows & PC Paintbrush £144
Mouse, Easy Cadd 2D (CAD Package) £159

Logitech

C7 Plus Package, with C7 mouse, Logimenu (allows creation of custom menus), Point Editor (text editor) and Click (automatic configuration application.) £68.95

Series 2 Mouse, for PS2 Computers, with Plus software £68.95

Hi-Rez Mouse, offers increased resolution, supplied with Plus package software. Bus version only. £91.63

Mouse Systems (M.S.C.)

PC Mouse Plus, optical mouse featuring resolution up to 2000cpi available as serial or bus. £94.71

PS Mouse, optical mouse for PS2 machines. £62.25

Omnimouse, two button opto-mechanical mouse, featuring 100% Microsoft compatibility. £54.60

Accessories

AT Adapter 25 to 9 pin D Type £4.90
Serial Card Adds a second serial port for a mouse, modem, printer etc. £19.80
Mouse Mat Reversible "polyester - foam" mat. A high quality black mat that improves mouse tracking. £4.90

All prices exclude VAT, orders under £100 please add £2 postage and packing.

Discounts

Orders over £200 - 3%, over £400 - 5%. Official orders accepted, larger quantity and scheduled order discount on application.

For a full price list or further details of a specific product please call 091-514 4118.



The Mouse Company

MARI House
Deptford Terrace
Sunderland SR4 6DD
Tel: 091-514 4118 (5 lines)
Fax: 091-510 9446

SYNKRO CONCEPTS

ADDS A NEW DIMENSION

Competitive Prices, Excellent Service . . . That's One Concept

TAPE BACK-UPS

— 60Mb Int. Wangtek.....£469
— 60Mb Ext. Wangtek.....£549
— 125Mb Ext Wangtek.....£659
Sub Systems — Tape drive/Controller/
Software/Manuals/Cartridge
— 40Mb Int alloy.....£279
For the XT
— 40Mb Int. alloy.....£279
For the AT
Alloy uses the existing floppy
Interface

NETWORKS

— Starter Kits for 2 Station Networks
from as low as£550
Various throughputs from 1Mbit/s to
10Mbit/sec.
Novell NE1000 Compatible
Multiuse Management or Marketing
Software can be supplied with your
Network.

HARD DISC DRIVES

— 20Mb. ST225 Kit.....£175
— 30Mb. ST238 Kit.....£189
— 40Mb. ST251, 40Ms
Drive only£260
— 40Mb, ST251, 28ms
Drive only£315
— 80Mb, ST4096 25ms, MFM.....£460
— 110Mb, Brand, 25ms, RLL.....£800
Kit — Drive/WD Controller/Cables
Fitting kit/Instructions
Other Capacities are also available.

MEMORY AND MULTI-FUNCTION BOARDS

— Suntek 2Mb for the XT.....£100
— Suntek 2Mb for the AT.....£120
Fill out base Memory/
EMS LIM 4.0
— 3Mb Ext/EMS AT board£129
— 10Mb Ext/EMS AT board£229
PS/2 Memory boards are also available.
— Do ALL Multi-function£175
1Mb-LIM 4.0, Parallel, serial, Game
Ports, with 2Mb piggyback board

GRAPHIC CARDS

— Hercules/MDA/CGA.....£89
— Hercules/MDA/CGA/EGA.....£129
— High Resolution EGA.....£169
Adaptors from
— VGA.....£179
Other makes can be obtained on
request.

MONITORS

Including Tilt & Swivel base
— Mono Monitors.....£89
White, Green and Amber
— EGA Monitors.....£319
— VGA Monitors.....£349

MEMORY CHIPS

64k Dram..... please call
256k-150ns..... please call
256k-120ns..... please call
Math Co-processors are also available

Prices are exclusive of VAT & Carriage
A wide range of software pack-
ages are available on request

ALL PRODUCTS CARRY ONE YEAR WARRANTY
ON-SITE CONSULTANCY SERVICE
Quantity Discounts, Educational & Government Body Discounts.
CALL US NOW ON
(01) 847 0538

SYNKRO CONCEPTS
164 Carlyle Road, South Ealing
London W5 4BJ. Fax: (01) 847 4091

INTRODUCING THE VIG PORTABLE RANGE WITH GAS PLASMA SCREEN



One parallel, two serial ports, Ext CGA/MGA monitor port and composite. Five slots, two free (1 x 16 bit - 1 x 8 bit).



Specially designed firm rubber handle making carrying easy on your hand.



5½ inch 1.2 MB external floppy allowing easy data transfer from 5½ to 3½" floppy and vice-versa.



Comes complete with carrying case.

12 MHz 0 wait state and fully OS/2 compatible

Comes complete with MS.DOS 3.30

102 key enhanced keyboard with click type keyswitch.

New high resolution 640 x 400 gas plasma display.



£1799 + VAT

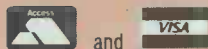
complete 12 MHz 80286 AT compatible

Standard model comes with one 1.44MB floppy drive and one 20MB first (28ms) hard disk.

The VIG II HD 20 Portable PC Specification

■ Fully IBM AT compatible. ■ Intel 80286 processor with socket for 80287. ■ NEAT specification. ■ Real time clock. ■ 8/12 MHz switchable. ■ 1MB RAM expandable to 8MB on board (extended or expanded LIM 4 standard). ■ 20MB fast Winchester hard drive. ■ 1.44 MB floppy drive. ■ 1 external 1.2MB floppy drive. ■ CGA/MGA compatible card with 640 x 400 gas plasma display. ■ CGA/MGA monitor port and composite port. ■ Hercules compatible. ■ 720 x 400 visible by special design screen control programme. ■ 102 key enhanced keyboard. ■ 2 serial and 1 parallel port. ■ 5 expansion slots, 2 free (one 8 bit and one 16 bit). ■ 200 watt power supply. ■ MS.DOS 3.30 with GW basic. ■ Carrying case with shoulder strap. All the above Viglen PCs are ready for use and have specifications of the highest standard which include the following: ■ 12 months warranty with option for on-site maintenance ■ Full manuals ■ Technical Support second to none ■ The Viglen PCs are guaranteed to run all software that runs on the equivalent IBM PC/XT/AT such as DOS, Lotus, DBase, Wordstar, Autocad, Novell, Xenix, Sams, Sims, Corinth and all others. Specific requirements of disc drive and Winchester combinations can be supplied. Viglen also supply a full range of peripherals such as Monitors, Floppy Drives, Winchester, Tape Streamers, Add on cards, Network Cards, Co-processors. Mouse and many others at incredible prices. Please call.

GENEROUS DISCOUNTS available to education, public sector and Plc companies



and

SHOWROOM OPEN
MONDAYS TO FRIDAYS 9.30 TO 5.30PM
SATURDAYS 10AM TO 2PM

Prices correct at time of going to press and subject to availability. All trademarks acknowledged MS-DOS® and OS/2 are registered trademarks of Microsoft Corporation. IBM, PC, XT, AT, PS/2 are trademarks of International Business Machines Corporation.

Viglen

14th Successful Year

Viglen Ltd., Unit 7 Trumpers Way,
Hanwell, London W7 2QA Telephone: 01 843 9903.
Telex: 919 304 VIGLEN G. Fax: 01-574 5126



SALES HOTLINE
01 843 9903

HOW TO ORDER

Simply 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 plus 15% VAT. Credit card holders may order by telephone on our sales hotline 01 843 9903 (8 lines). Allow 7-10 days for delivery. Personal callers welcome to our showroom. Official orders from Education Establishments, Government departments and Plc Companies accepted.

The Complete Dongle Range for all your Software Protection Needs



- ★ Serial, Parallel or Internal Bus
- ★ Deal directly with the people who created the product.
- ★ Great value at around £24



Further information direct from:

Data Encryption Systems Ltd
West Buckland, Wellington
Somerset TA21 9LE
Telephone: (0823) 474561
Fax: (0823) 473309

SERIES 3000 SUPERMICROS



Two models and wide range of options including fast interfacing combined with incredible number crunching capabilities.

U-MICRO

U - MICRO continues its tradition of high performance, open architecture Supermicros, with the new Series 3000.

- 68020/68881 processors 20 or 25 MHz, 1-8MB RAM, 20-600MB Wini SCSI.
- Clock, printer port, 4-20 serial ports.
- High speed parallel -IO and A/D, D/A options.
- Industry Standard OS-MIRAGE, OS/9, CP/M.
- Transputer expansion options (- 8-64 T800 up to 256 MB RAM) for supercomputer number crunching power.

Send for details NOW !

OEM and VAR enquiries welcome



U-Microcomputers Ltd
12 Chetham Court, Calver Road, Winwick Quay, Warrington, Cheshire, WA2 8RF
Telephone 0925 54117 Telex 629279 UMICRO G Fax 0925 416749



AND NOW, SOMETHING EXTRA FROM ELONEX.

Model	CPU Speed	Main Board Memory	Hard Disk Drive	Floppy Disk Drive	Serial/Parallel Ports	Free Slots	Mono System	EGA Colour System	VGA Colour System
PC-88C Compact	V20 10MHz	640K	20MB (65mS)	360K/ 720K	1/1	2	£775	£1075	£1125
PC-88S	V20 10MHz	640K	20MB (65mS)	360K/ 720K	1/1	4	£825	£1125	£1175
PC-286C Compact	80286 10 MHz	640K	20MB (65mS)	1.2MB/ 1.44MB	2/1	4	£1095	£1395	£1445
PC-286S	80286 12 MHz	640K	40MB (40mS)	1.2MB/ 1.44MB	2/1	5	£1275	£1575	£1625
PC-386S	80386 20MHz	1MB (max 8MB)	44MB (28mS)	1.2MB/ 1.44MB	2/1	5	£2395	£2695	£2745

Authorised supplier of NOVELL and SCO XENIX.

NO EXTRAS.

When you buy a system from Elonex you won't get any nasty surprises. All the prices quoted above are for complete systems, with a keyboard, monitor, mouse, MS-DOS 3.3, GW BASIC, GEM/3 (1st Word Plus, Paint), and a full set of manuals. All backed by a 12 month Warranty, and our Technical Hotline Support.

We are regular suppliers to universities, colleges, and local and government authorities. We also have a

team of specialists ready to advise on Networked and Multi-user systems.

If you would like to know more, please drop in to one of our showrooms. Alternatively give us a ring, or fill in the coupon below and we'll send you our latest information pack.

Elonex (UK) Ltd, Rays House, North Circular Road, London NW10 7XB.
Telex 94017759 ELNX G, Fax 01-965 3246

Tel 01-965 3225

Elonex (UK) Ltd, 7-9 Campus Road, Bradford Science Park, Bradford,
West Yorkshire BD7 1HR. Fax (0274) 307294.

Tel (0274) 307226

ALL PRICES ARE EXCLUSIVE OF CARRIAGE AND VAT.

Please send me your latest information pack. C06

Name Position

Company Name

Address

Tel No.



Harness the power

ADVANCE 386—32 MHz



NEAT 286—25 MHz*



NEXT 286—16 MHz*



PRO-PAL 10 MHz Laptop



a new generation
for a new market



"The Company"

NTS Plc is a major PC Manufacturer with years of experience and a true commitment to customer service and support.

NTS deals directly with you the customer and in doing so maximises your opportunity to buy the best products without using unnecessary middlemen. We design and manufacture our computer systems, so who better to advise you about every aspect of their operation. Our head office in Edinburgh is responsible for the manufacturing cycle of the entire range of products, and this level of control enables us to give complete customer satisfaction. NTS Plc is now recognised as a leader in new PC technology and is constantly succeeding in giving customers real benefits in terms of versatile features and performance, far better than other products in the market place.

In fact NTS gives you "Tomorrows Technology Today" and by continual investment in research and development is constantly achieving new goals. Looking back over 1988, products attracted a considerable volume of interest and NTS probably had more published reviews in the British Computer Press than any other computer manufacturer. 1989 marks the very successful launch of an entirely new range designed and manufactured without compromise to meet today's demanding performance and reliability criteria.

"The Benefits"

By choosing NTS Computers you are getting the most up to date technology possible from a company with probably more quality control experience than any other.

All products come with an exceptional standard of built-in quality and documentation to enable users to take full advantage of their computer. NTS's philosophy has always been to allow the customer an upgrade path with all products, no other company treats the protection of your investment with such commitment. Again NTS feel that service and support should not be entrusted to anyone else and throughout the long life of your computer you may call our NTS technical Hotline for free advice.

You will find that your call receives considerable attention and that you are speaking to people with first hand knowledge about every aspect of your system.

In the unlikely event that a hardware fault develops you are only a phone call away from a qualified engineer who, if need be, will visit you personally to check your system. Our NTS on-site maintenance package is designed to give you a quick call out response and effective service agreement without any extra charges. It's a wonderful service and support package which guarantees you complete peace of mind and constant uninterrupted use of your system, that's real value for money.



"The Products"

NTS has been a startling success story over the past three years and the company now boasts a large share of the total UK market. Such success is not easy to achieve unless you have very high standards and exceptional products. The NTS philosophy has always been to "engineer for perfection" even if the impossible is not achievable we claim to do what few other manufacturers have accomplished in giving our customers the fastest, most cost effective compatible microcomputers available. The new NEXT 286 has an unrivalled specification and is probably the fastest computer in its class world wide.

The NEAT 286 also has commanding performance at a previously unimaginable price for its specification. The ADVANCE 386 is faster, better built and offers greater versatility than any other comparable product with more power and standard features. In fact, looking at all our products we pack in more added value and features than anyone else.

"Standard Features"

All NTS Systems feature:

► VGA-16 Card (MDA, HGC, CGA, EGA, VGA compatible) ► Paper White tilt and swivel analogue monitor (colour optional) ► 2 serial ports ► 1 parallel port ► 1.2Mb and 1.44Mb floppy drives as standard ► 65Mb fast access hard disk drive and controller ► 1MB Ram on motherboard expandable to 10Mb ► 102 keys enhanced keyboard ► Cordless infra red mouse ► NTS Customer services diskette ► DR DOS 3.34 and GEM desktop ► Lifetime telephone Hotline support ► 12 months on-site maintenance agreement ► 60 Hours continuous burn-in prior to dispatch

(Not applicable to PRO-PAL and NEXT models)

NEXT 286-16 MHz*

80286 micro processor running at 12MHz, 'O' WS equal to 16MHz, compact system with Hercules Amber display, operating system, software, AT compatible, 65Mb fast access hard disk/controller. Benchmarks: Norton SI 15.3; Landmark 16.1 MHz*; Mips 1.4

Hercules Mono System **£1,299**
VGA Mono System **£1,449**
VGA Colour System **£1,649**

NEAT 286-25 MHz*

80286 micro processor running at 20MHz, 'O' WS equal to 26.7MHz, compact VGA system with turbo features, complete package with monitor, operating system, software, AT compatible, fitted 65Mb fast access hard disk/controller. Benchmarks: Norton SI 23.0; Landmark 26.7 MHz*; Mips 2.15

VGA Mono System **£1,899**
VGA Colour System **£2,099**

ADVANCE 386-32 MHz

80386 micro processor running at 25MHz, 'O' WS equal to 32.1MHz, compact VGA system with turbo features, complete package with monitor, operating system, software, AT compatible and 32 bit compatible. 65Mb fast access hard disk. Benchmarks: Norton SI 27; Landmark 32.1 MHz*; Mips 3.25

VGA Mono System **£2,495**
VGA Colour System **£2,695**

PRO-PAL 10 MHz Laptop

NEC V20 processor running at 10.00MHz, light weight of only 6Kg, complete with backlit supertwist display, 2 X 720K 3.5" disc drives, Serial and parallel ports, rechargeable Lead Acid battery (20 hours life), separate AC mains adaptor, operating system, carrying case and accessories.

System price complete **£749**

UPGRADE OPTIONS
80287 COPROCESSOR **£195**
80387 COPROCESSOR **£425**
40MB TAPE STREAMER **£695**

(Prices exclude VAT and carriage. Specifications subject to change without prior notification)



COMPUTER GROUP PLC

Tomorrow's Technology Today

SALES CALL

01-538 2023

031-555 0655

NTS CONTRACT—DEALERS AND CORPORATE CUSTOMERS MAY QUALIFY FOR SPECIAL PRICING—CALL FOR DETAILS

To NTS Group PLC, 56 Marsh Wall, West India Dock, Isle of Dogs, London E14 9UE

I WANT TO HARNESS THE POWER—PLEASE SEND ME YOUR NEW PRODUCT RANGE INFORMATION.

Name:

Address:

.....Postcode

Tel No: Fax:

No other PC can put o

Advent PC XT-10 Turbo

The Advent PC XT-10 Turbo is the latest version of the PC-II range, 25,000 of which have been sold in the past two years. Now supplied with 10 MHz clock speed, 30Mb hard disk and 640K RAM. MS-DOS 3.21 and GW Basic are supplied free as is preconfiguration and on-site maintenance.

With 14" Amber FST Monochrome monitor **£795**
 With 14" EGA Colour monitor **£995**

Single, Twin floppy and larger Capacity Hard Disk Models plus choice of monitors available.



The
Adv
P

PC XT COMPARISON CHART

	ADVENT PC XT-10	OPUS PC IV	OPUS PC III	AMSTRAD PC 1640	EPSON PCe
EGA Monitor	Yes 14"	Yes 14"	Yes 14"	Yes 14"	Extra
Hard Disk	30Mb	20Mb	30Mb	20Mb	20Mb
Keyboard	102 Key	84 Key	102 Key	84 Key	101 Key
Processor Speed	10 MHz	10 MHz	10 MHz	8 MHz	10 MHz
Expansion Slots	8	3	8	3	5
Drive Apertures	4	2	3	2	2
MS-DOS	Inc. Free	Extra	Extra	Inc. Free	Inc. Free
GW-BASIC	Inc. Free	£60.00	£60.00	Basic 2	£95.00
12 Months on-site Maintenance	Inc. Free	Extra	Extra	Extra	Extra
Floppy Disk	1 x 360K	1 x 360K	1 x 360K	1 x 360K	1 x 360K
System Memory	640K	768K	1024K	640K	640K
Parallel Port	Yes	Yes	Yes	Yes	Yes
Serial Port	Yes	Yes	Yes	Yes	Yes
Maths Co-processor Socket	Yes	No	Yes	Yes	Yes
Full size XT Style Case	Yes	No	No	No	No
Keyboard Lock	Yes	Yes	Yes	No	No
Rec Retail Price	£995	£995	£1395	£1249	£1179

Just Released Advent XT-15 Turbo

Incredible 15 MHz processor speed plus 1 Megabyte of RAM and mouse. Other specifications as per Advent XT-10 Turbo.

With 14" Amber FST Monochrome monitor **£995** With 14" EGA Colour monitor **£1195**

Advent Monitor Range



Monochrome FST Monitors

14" Amber **£99**
 14" Paper White **£115**

Colour Monitors

14" Hi-res EGA **£299**
 14" Hi-res EGA +
 EGA Card **£399**
 14" Hi-res Multisync
 TTL+ Analog. **£369**

All models supplied with
 Tilt and Swivel Base.



The Advent Advantages

Advent Computers offer the best value-for-money in the PC market, primarily because we sell direct but with a lot more advantages besides. Built using top quality components you are assured of excellent reliability coupled with superb performance. And, all Advent computers make extensive use of surface mounted ASIC chips and other leading edge technology. The unbeatable combination of highest quality product, lowest possible prices and an unrivalled commitment to customer care and service, ensure that Advent are destined to become one of the best-selling PC ranges on the market.

Service and Technical Support

12 Months On-Site Maintenance Contract*

From the time you receive your PC, it is covered by an on-site service contract. In the unlikely event of equipment failure a phone call will bring an engineer to your premises to get the system back up and running. *Complete PC's, UK Mainland Only.

Hotline Support

As an Advent customer you can make full use of our FREE Technical Support Hotline. This is manned by our experienced software and hardware specialists during working hours.

12 Months Warranty

A full 12 months warranty is supplied on all equipment for both parts and labour.

... such a clever display

New Advent PC's

EGA
40 Mb 12 MHz
£7449

Advent PC AT-12+

The Advent AT-12+ is one of the fastest AT Compatible PC's available today. Main features include 12 MHz zero wait-state processor (Land mark speed test 16 MHz), 40 megabyte hard disk, 102 key AT Enhanced keyboard, MS-DOS 3.3 and GW Basic. Standard memory is 1 Megabyte which can be expanded to 4 Megabytes. All units are fully configured and ready to use and include FREE 1 year on-site maintenance contract.

With 14" Amber FST Monochrome monitor **£1249**

With 14" EGA Colour monitor

£1449

PC AT COMPARISON CHART

	ADVENT PC AT-12+	OPUS PC V	DELL 200	EPSON PCAX2	TANDON PCA 20+
EGA Monitor	Yes 14"	Yes 14"	Yes 14"	Extra	Yes 14"
Hard Disk	40Mb	30Mb	40Mb	20Mb	20Mb
AT Style Keyboard	Yes	Yes	Yes	Yes	Yes
Processor Speed	12 MHz	10 MHz	12.5 MHz	12 MHz	10 MHz
Expansion Slots	8	8	6	6	8
Drive Apertures	4	3	4	3	3
MS-DOS	Inc. Free	Extra	Extra	Inc. Free	Inc. Free
GW-BASIC	Inc. Free	£60.00	£65.00	Extra £95	Inc. Free
12 Months on-site Maintenance	Inc. Free	Extra	Inc. Free	Extra	Extra
Floppy Disk	1 x 1.2Mb	1 x 1.2Mb	1 x 1.2Mb	1 x 1.2Mb	1 x 1.2Mb
Standard System Memory	1Mb	1Mb	640K	640K	1Mb
Max Memory on Mother Board	4Mb	1Mb	4.6Mb	640K	1Mb
Parallel Port	2	1	1	1	1
Serial Port	2	1	2	1	1
Maths Co-processor Socket	Yes	Yes	Yes	Yes	Yes
Keyboard Lock	Yes	Yes	Yes	No	Yes
Rec Retail Price	£1449	£1695	£1899	£1699	£2235

Just Released Advent AT20/26 20MHz Clock Speed

Uses NEAT 286 Chip Set – faster than many 80386 PC's. (Landmark Speed test 26.7MHz) Includes mouse. Other specifications as per AT12+.

With 14" Amber FST Monochrome monitor **£1595** With 14" EGA Colour monitor **£1895**

Pre-Delivery Configuring and Testing

Advent Computers are despatched only after full testing and burn-in is carried out. We also configure them with any additional peripherals that have been fitted.

30 Day Money Back Guarantee

If you are not entirely satisfied with your Advent Computer we will happily issue a full refund on its return in original condition during the first 30 days.

Buy Direct – Four Options

Credit Card Hotline and Product Information **01-688 2654**

Use your VISA or ACCESS Card for rapid off the shelf delivery of your new Advent PC. Our sales consultants will be pleased to answer any queries you may have.

Free Demonstration **01-681 3022**

Phone to book a demonstration of the Advent PC in our showroom. Comparisons with other popular brands can be arranged.

Corporate Customers **01-681 0772**

Phone straight through to our Corporate Sales department to discuss your requirements. Bulk orders and special models are just some of the options we can offer.

Mail Order

Fill in the coupon quoting your credit card details or enclosing a cheque. PLC's, Government departments and Educational Establishments may send in Official orders.

Delivery: Securicor delivery PC's £15 + VAT, monitors £8 + VAT.

Export Enquiries Welcome.

All prices are exclusive of VAT

E & OE. Subject to changes without notice. Please call before ordering.



To: Vision Technology Ltd., 53-59 High Street, Croydon, Surrey CR0 1OD
I wish to order _____

I enclose cheque/PO for £ _____ Inc VAT and carriage
or charge my Access/Visa No: _____ Exp. date _____

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Name _____ Signature _____

Address _____

Postcode _____

Tel No _____



All trademarks acknowledged.

WARNING

DO NOT PAY MORE THAN YOU NEED
Ring us for your best possible prices NOW!
you won't regret it

PC 1640 and PPC 640
phone for lowest price



**DTP PRICE
BREAKTHROUGH**
10 systems sold in first week

PRICES Because the Computing Marketplace is so volatile at present we have decided to stop publishing our prices until further notice (with certain 'special' exceptions). Please phone to check availability and prices which are:— **TOO LOW TO PRINT!**

REEVES VALUE
JUST A FEW EXAMPLES OF
OUR LOW LOW PRICES

SOFTWARE

A SELECTION OF
TITLES — MANY
THOUSANDS AVAILABLE

HARDWARE

WORDPROCESSORS

Wordstar 1512	£29
Sage PC Write	£61
Tasword PC	£15
Tasprint	£15
Taspell	£23
Wordperfect VS	P.O.A.
Gem First Word Plus	£47
Gem Write	£59
Protext	£33
Top Copy Plus	£68
Lotus Manuscript	P.O.A.
Wordstar Express	£49
Multimate Advantage II	P.O.A.
Microsoft Word IV	P.O.A.
Wordstar Professional 4	P.O.A.
Wordstar 2000 + Release 3	P.O.A.
Kuma Word	£55

UTILITIES & PROGRAM DEVELOPMENT

Borland Turbo Pascal V4.0	£39
Turbo C V1.5	£39
Turbo Basic	£39
Turbo Tutor	£23
Turbo Editor Toolbox	£39
Borland Sidekick +	P.O.A.
Microsoft Quick Basic V4	£52
Microsoft Quick C	£56
Microsoft Macro Assembler	£79
Microsoft Basic Compiler	£199
Microsoft C Compiler	£225
Sage Self Teach Tutorials	£17
Mass Labeller	£19
Mass Super Labeller	£28
Kuma Kroget	£45
Kuma Comm 2	£45
Kuma Minstrel	£25
Stockmarket	£24
Iankey Two Finger Typing	£13
Iankey Crash Course Typing	£13
Dega (D Base add-on for 1, 2, 3)	£72
File Rescue +	£15
Linkmaster	£15

DESKTOP PUBLISHING

Fontasy	£43
Fleet St. Editor	£62
Gem D.T.P.	£177
Newsroom	£23
PageAbility	£118
Timeworks D.T.P.	P.O.A.
Ventura Publisher VI. 1	£399
Ventura Publisher VI. 2	P.O.A.
Certificate Maker	£16
FINESSE — The new force in D.T.P.	
Finesse VI. 1	£59
A.M.S. Mouse	£49
A.M.S. Microscan	£79
D.T.P. Solution 1	£109
D.T.P. Solution 2	£239
D.T.P. Solution 3	£269

DESIGN & GRAPHICS

Autosketch	£48
Turbo CAD	£60
Generic Cadd No. 1/2/3	P.O.A.
Generic Cadd Add-ons	£42
Autocad Basic	£269
Microsoft Windows	£47
Kuma Graph 2	£45
Gem Draw +	£59
Gem Graph	£59
Gem Scan	£69

SPREADSHEETS

Lotus 1-2-3	P.O.A.
Supercalc 3.1	£29
Supercalc 3.21	£49
Supercalc 4	P.O.A.
Borland Quattro	£49
Vp Planner	£102
Kuma K Spread II	£52
Sage PC Planner	£64
Microsoft Excel	P.O.A.
Microsoft Multiplan	£103
Mosaic Twin Classic	£34

ACCOUNTING SOFTWARE

MAP ACCOUNTS — THE PROFESSIONAL'S CHOICE	
Map Integrated Accounts	£93
Map Complete Accounts	£196
Map Jobcosting	£66
Map Payroll	£52
Map Database Links	£66
Map Net 2	£229
Map Net 3	£349
Additional Stations	£109
Map Net 2 + Complete Accounts	£599
Map Net 3 + Complete Accounts	£699

INTEGRATED PACKAGES

Ability +	£103
Mini Office Professional	£24
Pision PC Four	£45
Framework II	P.O.A.
P.F.S. First Choice	£105
Smart	P.O.A.
Lotus Symphony	P.O.A.
Mosaic Integrated 7	£75

Eastfacts Accounting	£179
Eastfacts Payroll	£79
Sage Bookkeeper	£64
Sage Accountant	£96
Sage Accountant +	£124
Sage Financial Controller	£195
Sage Payroll II	£96
Sage Net	£212
Extension Pack	£105
Sage Accountant + Network	£295
Sage Financial Controller Network	£442
MultiSoft Microsystems	£299
Microsystems Stock Control	£79
Amsoft Accounts Master	£109
Amsoft Paymaster	£35
Computer Associates AccPac + (The best)	P.O.A.

DATABASES

TAS +	£52
TAS + Developers	£142
TAS + Multi User	£249
Sage Retrieve	£59
PC Promise	£61
PC Promise (Full)	£129
Superbase Personal	£57
Superbase Professional	£147
Masterfile PC	£41
DBXL	£76
Db Fast Compiler	£55
DBase IV	P.O.A.
Rapidfile	P.O.A.
Paradox V2.0	£256
Kuma Data	£45

VERTICAL MARKET ACCOUNTS PACKAGES

Blyth Motor Trader	£99
Blyth Rentals	£99
Blyth Retailers	£99
Blyth Professionals	£99

COMPUTERS

AMSTRAD PC1512

Amstrad PC1512 SD Mono	£
Amstrad PC1512 DD Mono	£
Amstrad PC1512 SD Colour	£
Amstrad PC1512 DD Colour	£
PC1512 Range includes Ability and Four U.S. Gold games	£

AMSTRAD PC1640

Amstrad PC1640 SD/MD Mono	£
Amstrad PC1640 HD20/MB Mono	£
Amstrad PC1640 SD/CD Colour	£
Amstrad PC1640 DD/CD Colour	£
Amstrad PC1640 HD20/CD Colour	£
Amstrad PC1640 SD/ECD Enhanced	£
Amstrad PC1640 DD/ECD Enhanced	£
Amstrad PC1640 HD20/ECD Enhanced	£

Miniscribe 60Mb Integral Hard Disc	£
Miniscribe 32Mb Hard Card	£
Western Digital 32Mb Hard Card	£
Segate 20Mb Integral Hard Disc	£
NEWI 49Mb XT Hard Card 35ml secs	£
3.5" Drive formatted to 720K	£
Cifer 25Mb Tape Streamer	£
Cartridges for Cifer 25Mb	£
8087-2 Maths Co-Processor	£
NEC V30	£
Everex 2Mb Memory Board	£
3.3 meg. 5.25" Floppy Disc Drive	£
6.6 meg. 5.25" Floppy Disc Drive	£

THE AMSTRAD PORTABLE RANGE

PPC 5125 720K 3 1/2" Drive	£
PPC 6405 720K 3 1/2" Drive with Modem	£
PPC 512D Double 720K 3 1/2" Drives	£
PPC 640D Double 720K 3 1/2" Drives with Modem	£
All include PPC Organiser Software	£

IMPORTANT NEWS FOR ALL HARD DISC PURCHASERS!

You receive FREE a selection of software titles including spreadsheet, comms & database plus a further selection of demonstration packages including Map, Sage, Intuitive, Eastfacts etc. There is also a host of games and graphic demonstrations as well as a PC tutor to help you learn about your PC.
All hard discs and cards are formatted, tested and loaded with free software... ready to go!

YOU CAN'T GO WRONG WITH SAMSUNG

AT LAST — THE OBVIOUS CHOICE. IN OUR OPINION A REAL PC FOR AMSTRAD PRICES — ALL WITH 12 MONTHS ON-SITE MAINTENANCE — FREE!

Everybody who has visited us to compare a SAMSUNG with an Amstrad has bought the SAMSUNG. Phone us or call in to find out why.

XT and AT Base machines
SPC 3000/2 (XT PC 640K DD)
SPC 3000/3 (XT PC 640K SD & 20Mb HD)
MFC 6000/1 (AT PC 1Mb RAM SD 1.2Mb)
MFC 6000/2 (AT PC 1Mb RAM SD & 20Mb HD)

A wide range of monitors
GREEN, AMBER, CGA, EGA and PAPERWHITE
ALSO AVAILABLE SEPARATELY.
Custom-build your SAMSUNG system to meet your exact requirements. Ask about our 7-Day Trial with no-quibble refund if you're not delighted with your SAMSUNG.

AMSTRAD SYSTEMS WITH 20Mb/30Mb HARD CARD

PC1512 Single Drive Mono	£
PC1512 Dual Drive Mono	£
PC1512 Single Drive Colour	£
PC1512 Dual Drive Colour	£
PC1640 Single Drive Mono	£
PC1640 Dual Drive Mono	£
PC1640 Single Drive Colour	£
PC1640 Dual Drive Colour	£
PC1640 Single Drive ECD	£
PC1640 Dual Drive ECD	£



AMSTRAD WITH 20/30/40 OR 60Mb HARD DISC

PC1512 Single Drive Mono	£
PC1512 Single Drive Colour	£
PC1640 Single Drive Mono	£
PC1640 Single Drive Colour	£
PC1640 Single Drive ECD	£

HARD DISC DRIVES/CARDS

Tandon 20Mb Integral Hard Disc	£
Tandon 20Mb Hard Card	£
Miniscribe 30Mb Integral Hard Disc	£
Miniscribe 40Mb Integral Hard Disc	£

PRINTERS

DOT MATRIX

Brother 1109	Star LC10
Brother 1209	Star NX15
Brother 1409	Star ND10
Brother 1709	Star ND15
Brother 1724	Star NR10
Brother 2518	Star NR15
Brother 4018	Star NB24/10
Brother Twinlifter	Star NB24/15
Citizen 120D	Star NB15
Citizen MSP10E	Panasonic KXP1081
Citizen MSP15E	Panasonic KXP1082
Citizen MSP40	Panasonic KXP1083
Citizen MSP45	Panasonic KXP1592
Citizen MSP50	Panasonic KXP1595
Citizen MSP55	Panasonic KXP1540
Citizen HQP40	
Citizen HQP45	
NEC P2200	
NEC P7	
NEC P9	

DAISYWHEELS

Brother HR20	£
Brother HR40	£
Panasonic KXP3131u	£
Panasonic KXP3151u	£

LASER PRINTERS

Epson LQ3500	£
Canon Laser LBP mkII	£
Hewlett Packard Laser Jet II	£
Brother HL8	£
Citizen Overture	£
Star Laserprinter 8	£

All prices plus delivery and V.A.T.
We NEVER debit your Credit Card until goods are despatched
OPEN 6 DAYS A WEEK — CALLERS ALWAYS WELCOME

HEWLETT PACKARD LASERJET II
8 pages per minute
1st page out in 13 seconds
300 dots per inch
£1499

MITSUBISHI 3 1/2" DRIVE
Including cable adaptor and full documentation
External **£99**
Internal **£75**
Compatible with SD & DD PC's

8087 — 2 MATHS CO-PROCESSOR
Speed up your PC (on certain applications) by up to 5 times
Ideal for spreadsheets
£105

WESTERN DIGITAL 32mb FILECARD
£235.00
Includes free Xtree and Speedread

ATD ACCELERATOR CARD
Turns your Amstrad PC into a 12Mhz 286 machine. No Amstrad user should miss this!
£299.00

HiQ 21mb HARDCARD
High quality card with Western Digital Drive and Controller.
Excellent value at **£199.00** inc. free software

AMSTRAD DMP 4000
Wide bodied printer 200 c.p.s. draft 50 n.l.q. while stocks last
£199.00

STAR LASER PRINTER 8
300 dots per inch
8 pages a minute
12 months on-site
£1399

MINISCRIBE 32mb HARDCARD
£225 including free software
Just plug in and go!

REEVES

BUSINESS COMPUTING
Northampton: Unit 1, Pennard Close, Brackmills, Northampton.
Tel: (0604) 766433 Fax: (0604) 701887

TOP PRESS · STOP PRESS · STOP PRESS · STOP PRESS · STOP PRESS

CALL US NOW TO SECURE YOUR
AMSTRAD PORTABLE HARD DISK

Please send me the following items — (Remember to add 15% VAT to all prices)

Qty	Product	Price	Name
			Address
TOTAL			Postcode
			Tel No
			Card Expiry Date

All goods sold subject to our standard terms and conditions a copy of which is available on request.
I enclose (please tick) cheque/p.o. or Access Visa card
All prices subject to change without notice



UP TO THREE DAYS COMPUTER TRAINING FROM £49.00

SAVE TIME AND MONEY

The importance placed on computers as everyday productivity tools has greatly increased the need to use those tools effectively. With traditional "classroom" methods, staff training is expensive in terms of both time and money, with key staff often out of the office for days.

Now there is the Intouch Tutorials' way to train your staff, ensuring optimum productivity without the associated costs.

AUDIO BASED TRAINING

Using professionally composed and recorded audio cassettes, Intouch Tutorials, Australia's leading computer training company, have

produced an effective and highly successful method of training you and your staff.

By taking you through the keyboard, step by step and allowing you time to carry out structured exercises, Intouch's audio based systems allow you to work at your own pace. By explaining the functions of the software you are learning, clearly and succinctly, they guide you through from novice to expert in much the same way as courses costing eight times as much. What's more, problems such as time away from the office or being held back by slow pupils are avoided.

DISK BASED TRAINING

Using Intouch's unique concurrent windowing techniques, these disk based systems allow you to run the tutorial at the same time as the actual application being taught.

Not only does this award-winning software make training easier, it makes it quicker and more responsive to individual's needs by acting almost as an on-line tutor.

Although memory resident, these systems are not memory hungry and as such will not effect the performance of your computer.



Intouch Tutorials Limited, Infolink House, Oaklands Business Centre, Oaklands Park, Wokingham, Berkshire. RG11 2FD. Tel: 0734-772911

ORDER FORM

Please complete and return this coupon for details on the Intouch range:

Please send me a free demonstration pack Please contact me I would like to order the following tutorial systems:

Disk Based

	Unit Price	Qty. (Enter)
PC-MS DOS (Ver 2.0-3.3)	£49.00	
Lotus 1-2-3 (Ver 2)	£49.00	
dBase III+	£49.00	
Microsoft WORD 3	£49.00	
Microsoft WORD 4	£49.00	
WordStar 4	£49.00	
WordPerfect 5	£49.00	
Multimate Advantage II	£49.00	
Open Access II	£49.00	
Open Access II Plus	£49.00	

Audio Based

PC-MS DOS (Ver 2.0-3.3)	£69.00	
Lotus 1-2-3 (Ver 2)	£69.00	
dBase III+	£69.00	
Microsoft WORD 3	£69.00	
WordStar 3	£69.00	
Multimate 3	£69.00	
Multimate Advantage II	£69.00	
WordPerfect 4.2	£69.00	

WordPerfect 5	£69.00	
DisplayWrite 3	£69.00	
DisplayWrite 4	£69.00	
Ventura Publisher (Ver 1.0-1.1)	£99.00	

Advanced Disk Based

PC DOS/Basic & Assembly Lang	£59.00	
Lotus 1-2-3	£79.00	
dBase III+	£79.00	
Turbo Pascal 4	£79.00	

Please supply these products on 3.5"/5.25" discs (delete as appropriate)

Name: _____

Position: _____

Company: _____

Address: _____

Post Code _____

Tel. No. _____

Return coupon to:

Intouch Tutorials Limited, Infolink House, Oaklands Business Centre, Oaklands Park, Wokingham, Berkshire. RG11 2FD. Tel: 0734-772911

**FREE DEMO
PACK**

QUALITY

PRODUCTS
DELIVERY
SERVICE AND SUPPORT

Tandon

FULL RANGE OF
88/286/386
MACHINES
FROM
£999

CALL FOR DETAILS

intel

AS INTEL
AUTHORISED
DEALERS,
WE CAN SUPPLY
ALL INTEL
PRODUCTS

CALL FOR DETAILS

AKL

NETWORKING
PRODUCTS
FROM
£125 PER PC
- HARD AND
SOFTWARE

CALL FOR DETAILS

ALSO AVAILABLE:
PRINTERS
SOFTWARE
CONSULTANCY
SECURITY
SYSTEMS

JTAC

150 Balmoral Road, Northampton NN2 6JZ
Tel: (0604) 791999 Fax: (0604) 791888
TERMS C.W.O.

ALL EQUIPMENT TESTED PRIOR TO DELIVERY.

OPTIONAL

GOLD SERVICE

INSTALLATION BY
QUALIFIED ENGINEERS
PRICES QUOTED EXCLUDE VAT AND CARRIAGE

The new Cherry Graphic Tablet Mk. 3 takes off so fast, only the latest Drivers can keep up.

The new Graphic Tablet Mk. 3 has double the Transmission Speed.

It accepts Transmissions from the Host Computer which allows Configuration and Control of the Tablet.

- The Mk 3 is ready configured for use with Summagraphics® MM Series drivers. ● Excellent sketch response is attainable. ● High co-ordinate transmission speed is available for fast data formats.
- The full duplex capability and the defined command set allows the Tablet to be directly controlled by transmitting commands from the computer. ● The host computer may control transmission by Xon (DC1) and Xoff (DC3) as well as the existing hardware control RTS and CTS. ● Point, Stream, Switched Stream or Request Mode can be chosen. ● Baud rates are selectable.
- The Tablet performs self-diagnostics when requested by the host computer.
- 7 data formats can be selected. ● Packed Binary 3 and ASCII 3 permit the use of latest Software Drivers.

Send today for further technical details
or contact one of the following Distributors:

S. K. Micro Systems Ltd, Letchworth, Herts. Contact: Mr Noel May Tel.: 0462-679331
Kingsland Data Services Ltd, Erdington, Birmingham Contact: Mr John Blyth Tel.: 021-384-8080
P.M.S. (Instruments) Ltd, Maidenhead, Berks. Contact: Mr Bill Webb Tel.: 0628-38036
Environmental Equipment Limited, Nantwich, Cheshire. Contact: Mr Roger Hill Tel.: 0270-626605
Tekdata Ltd, Disk Drive Division, Burslem, Stoke-On-Trent Tel.: 0782-577677 (Trade only)

Summagraphics is the registered trademark of the Summagraphics Corporation.
* IBM is the registered trademark of the IBM Corporation.

CHERRY



New Generation Graphic Tablets.

Cherry Electrical Products Ltd, Coldharbour Lane, Harpenden, Herts, AL5 4UN, Phone: (05827) 63100, Telex: 826012, Telefax: (05827) 68883

THE LONDON COMPUTER COMPANY LTD

Hardware, Software, Peripherals, Computer Solutions
Available 5 days a week at the edge of the city of London!

HARDWARE

XTs (Mono/EGA prices - phone for VGA)

AKHTER PC1000 30MB	£649	£899
OPUS PC4 768K 20MB	£699	£885
PACKARD BELL PB500	£725	£1015
SBC XT 30MB	£769	£1015
OPUS PC3 1024K, 30MB	£819	£1079
EPSON PCE 640K 20MB	£829	£1099
AMSTRAD PC2066 HD30	£899	£1119
AT 286		
OPUS PC5 1024K 30MB	£1125	£1349
EPSON PCA2 640K 20MB	£1159	£1499
SBC AT 40MB	£1199	£1549
PACKARD BELL PB286 40MB 12MHz	£1235	£1485
OPUS PC5 1024K, 40MB	£1350	£1575
AKHTER AT 2000	£1425	£1679
AT 386		
SBC 386 40MB	£1799	£2049
PACKARD BELL PB386 20MHz 40MB	£2249	£2499
AKHTER AT 3000 386, TOWER 40MB	£2450	£2725
OPUS PC7 20MHz 70MB		SEE SPECIAL OFFER!

PHONE FOR EXTRA SPECIAL PRICES ON-

• AST • TANDON • OLIVETTI AND OTHER HARDWARE

WE HAVE SO MUCH TO OFFER!

- CONSULTANCY SERVICE AVAILABLE
- QUANTITY DISCOUNTS GIVEN
- ONE YEAR'S PARTS AND LABOUR WARRANTY ON ALL PRODUCTS
- QUOTES FAXED TO YOU WITHIN 1 HOUR
- ALL PRICES EXCLUSIVE OF CARRIAGE & VAT

SPECIAL OFFER

The new OPUS PC 7 is now available: Intel 80386, switchable 6/20 MHz with 64K-25ns cache memory, Fast 22ms 70MB voice coil hard disk, 4MB system memory expandable to 16MB, 14" VGA 800x600 pixel multiscan monitor.

The PC7 is a truly advanced file server, base unit for D.T.P. or C.A.D. or just a very fast machine for those with a heavy computing workload.

We include Quarterdeck's Desqview and QEMM. This allows today, all that a certain new operating system is promising some time in the indeterminate future.

The Price? Only £3299!

THE LONDON COMPUTER COMPANY LTD
THE DAVENANT CENTRE
179-181 WHITECHAPEL ROAD
LONDON E1 1DW

ZENITH LAPTOPS - CALL PRINTERS/FAX/ETC.

STAR LC10	£179
STAR LC 24/10	£279
BROTHER HR20	£319
NEC P7+	£559
HP DESKJET	£569
QUME CRYSTAL PRINT II	£1069
HP LASERJET II	£1349
HP SCAN JET	£1150
BT CF9 FAX	£875
14" SAMSUNG VGA MULTISYNC MONITOR	£299
14" NEC MULTISYNC 11 MONITOR	£429

MOST OTHERS, PLEASE CALL NETWORKS - PLEASE CALL DTP - PLEASE CALL SOFTWARE FROM PC TOOLS DE LUXE TO VENTURA 2.0 WE CAN SUPPLY MOST SOFTWARE AT BEST PRICES, OFTEN SAME OR NEXT DAY!



TELEPHONE

01-247-4076

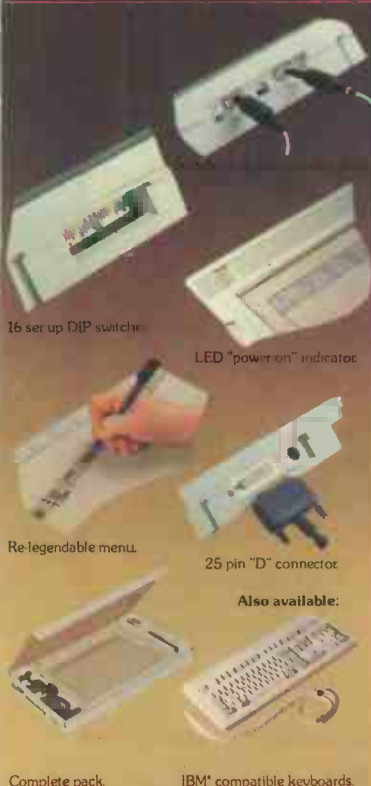
01-375-2567

0860-221-496

(MOBILE PHONE)



The Features.



16 ser up DIP switch

LED "power on" indicator

Re-legendable menu.

25 pin "D" connector

Also available:

Complete pack.

IBM compatible keyboards.

01 866 7182

OPUS

OPUS III Mono, 768K RAM, twin 360K FLOPPY.....	729
OPUS III Mono, 1024K RAM, 360K FLOPPY, 30MB HD.....	939
OPUS III EGA, 768K RAM, twin 360K FLOPPY.....	979
OPUS III EGA, 1024K RAM, 360K FLOPPY, 30MB HD.....	1219

OPUS IV XT COMP 20MB HD, 360K FLOPPY, EGA.....	959
OPUS V AT COMP 30MB HD, 1.2MB FLOPPY, MONO.....	1269
OPUS V AT COMP 30MB HD, 1.2MB FLOPPY, EGA.....	1549

AMSTRAD PC

1640 SD + MONO.....	475
1640 DD + MONO.....	585
1640 HD + MONO.....	839
1640 SD + COLOUR.....	609
1640 DD + COLOUR.....	729
1640 HD + COLOUR.....	980
1640 SD + ECD.....	755
1640 DD + ECD.....	865
1640 HD + ECD.....	1115
2086 SD 12" HD.....	569
2086 DD 12" HD.....	669
2086 HD 12" HD.....	884
2086 SD 14" CD.....	699
2086 DD 14" CD.....	799
2086 HD 14" CD.....	1019
2086 SD 12" HRCD.....	779
2086 DD 12" HRCD.....	889
2086 HD 12" HRCD.....	1119
2086 SD 12" HRCD.....	869
2086 DD 14" HRCD.....	979
2086 HD 14" HRCD.....	1199

COMMODORE

PC1 SD MONO.....	302
PC1 SD COLOUR.....	399
PC10 SD MONO.....	515
PC10 SD COLOUR.....	644
PC10 SD ECD.....	775
PC10 DD MONO.....	623
PC10 DD COLOUR.....	754
PC10 DD ECD.....	899
PC20 HD MONO.....	889
PC20 HD COLOUR.....	1009
PC20 HD ECD.....	1159

All prices exclusive of VAT and Delivery

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

4 STARLING CLOSE PINNER MIDDLESEX HA5 3PH 01 866 7182

Canure



SOFTWARE

SPREADSHEETS	
SUPER CALC V (NEW).....	POA
EXCEL.....	299
EXCEL (+ MOUSE).....	375
LOTUS 1-2-3.....	299
DESKTOP PUBLISHING	
FINESSE + MOUSE.....	150
GEM DESKTOP.....	299
VENTURA.....	610
WORDCRAFT ELITE.....	619
PAGEMAKER V3.....	629
WORD PROCESSING	
WORDSTAR 2000.....	309
WORDCRAFT V3.....	319
WORDPERFECT V5.....	299
SUPERWRITER.....	179
MICROSOFT WORD with PAGEVIEW (NEW).....	320
AMSTRAD SOFTWARE	
WORDSTAR EXPRESS.....	69
SUPERCALC III.....	69
INFOMASTER.....	69
DATABASE MANAGEMENT	
PARADOX 2.....	299
FOXBASE PLUS.....	220
FOXBASE PLUS 386.....	320
D BASE III PLUS.....	365
PROGRAMMING LANGUAGES	
MICROSOFT C.....	279
MICROSOFT ASSEMBLER.....	99
RM COBOL.....	449
WINDOW PRODUCTS	
WINDOWS.....	75
WINDOWS 386.....	135
WINDOWS PROG TOOLKIT.....	330

PRINTERS

AMSTRAD DMF3250.....	169
AMSTRAD DMF4000.....	309
CITIZEN 1200.....	150
CITIZEN MSP-10E.....	230
CITIZEN MSP-15E.....	226
CITIZEN HQP-40.....	390
CITIZEN MSP-45.....	375
MICRO P MP135.....	144
MICRO P MP201.....	324

FEBRUARY SPECIALS

MODEM MANIA

DOHTY QUATTRO	579
DACOM 2424 (anp)	399

LASER BOHANZA

QUME CrystalPrint HP	695
QUME CrystalPrint II	1220

CABLES DATA SWITCHES

PRINTER BUFFERS

CALL FOR BEST PRICES

CALL US FOR ALL YOUR COMPUTER REQUIREMENTS

ALSO AVAILABLE NOW

AKHTER XT/AT PC's
AMSTRAD 1512
AMSTRAD PPC/PCW
AMSTRAD 2286
AMSTRAD 2386

SALES OFFICE OPEN MON-FRI

9am - 5.30pm

VISA-ACCESS-CASH-CHEQUE

ORDER BY PHONE OR POST

PERSONAL COMPUTERS

TANDON		AMSTRAD		MONO	COLOUR	ECD	
PCA 20	£1099	PC1640 SD		£459	£579	£699	
PCA 20+	£1279	PC1640 DD		£559	£649	£759	
PCA 40+	£1399	PC1640 HD 30Mb		£699	£819	£939	
PCA 70+	£1599	PC1640 HD 40Mb		£849	£899	£999	
		PC1640 HD 60Mb		£899	£949	£999	
TANDON TARGET		PC2086		12"MD	14" CD	12" HR	14" HR
Target +	£1199	PC2086 SD		£559	£689	£789	£889
Target 20+	£1299	PC2086 DD		£679	£799	£899	£999
Target 40+	£1499	PC2086 HD40		£799	£899	£999	£1099
TANDON PAC		Amlga 500+ Free Modulator					
PAC 286	£1349	Philips 8833 Monitor		£225			
PAC 286+	£1449						
PAC 286 1.2	£1499						
PAC 286+ 1.2	£1599						
OPUS		SHARP PORTABLES		AMSTRAD PORTABLES			
PC3 DD	£699	PC 4501 ASD		£369	PPC 512S	£369	
PC3 HD30	£799	PC 4502 DDD		£819	PPC 640S	£469	
PC4 HD20	£959	PC 4521 HD20		£1429	PPC 512D	£489	
PC5 AT	£1299				PPC 640D	£579	

"FREE BLANK DISCS WITH EVERY PC"

PRINTERS		PANASONIC		STORAGE	
EPSON		KXP 1081	£135	HARD DISC KITS	
LX800	£179	KXP 1592	£275	Miniscribe 20Mb	£185
LQ500	£299	KXP 1595	£325	Miniscribe 20Mb	£209
FX850	£329	KXP 1540 Laser	£1495	Miniscribe 30Mb	£249
FX1050	£429	KXP 4450	£1499	Miniscribe 40Mb	£199
LQ850	£469	AMSTRAD		Kyocera 20Mb	£229
LQ1050	£619	DMP 3250	£160	Kyocera 30Mb	
GQ3500	£1295	DMP 4000	£259	HARDCARDS	
		LQ 3500	£269	Western Digital 20Mb	£225
		LQ 5000	£337	Carriage - Next day delivery: Computers £10, Printers £8, Hard Discs £7. All prices exclude VAT and carriage - Goods subject to availability and change. Visitors welcome!	
		CITIZEN			
		120D	£129		
		180E	£159		
		LSP 100	£159		
		MSP 40	£299		
		MSP 50	£349		
		HQP 45	£329		
		110 + Laser	£1229		

"FREE CABLE WITH EVERY PRINTER"

DON'T JOIN MATRIX!

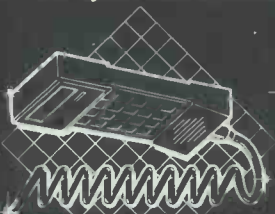
If you don't have a modem...

Matrix is the newest system to hit the Multi-User Communications market in years, and access to it will cost you less than 50 pence a week.

Join the worlds most interesting people on the system that will allow you to share your views and ideas on any subject.

One years subscription, including unlimited access to a wide range of services, costs just £24.95.

Contact us NOW for your FREE information pack.



MATRIX
COMMUNICATION SYSTEMS
LIMITED

4th Floor · Cross Keys House · 39-41 Moorfields
Liverpool L2 2BL · Telephone: 051-236 7978



**PORTABLE
QUALITY**



NOW 40MHz Performance (LANDMARK)

XT 10MHz 360KB+20MB	£1195
AT-1 12MHz 1.2MB+20MB	£1695
AT386-16 16MHz 1.2MB+20MB	£2495
AT386-25 25MHz 1.2MB+20MB	£2995
40MB + £200	80MB + £600
	DOS3.3 + £60
	MONOEGA + £100

Carriage £25

12 Months Warranty on all systems + 14 day money back guarantee if not delighted.

All prices exclude VAT

SLASHTWO LTD
Blaenavon House
Mamhilad Park Estate
Pontypool Gwent NP4 0HZ
Tel: 0495 762353
Fax: 0495 552453

Prices may be subject to alteration due to the current volatility of the memory market.

UNIVERSAL 200 DPI FLATBED SCANNER

The **Print Technik** Universal scanner with built in Thermal Printer scans an A4 page in 11 seconds using up to 16 quasi tones (half tones using dither patterns).
For IBM PC/XT/AT, Models 25/30 and compatibles, includes short interface card and utility software. Saves images in: .IMG, .TIF & .PCX formats **£449**
For ATARI ST/AMIGA 500 & 2000 – scans an A4 page in 11 seconds includes comprehensive software package – Interfaces directly to Printer Port – (Atari version: Supports Atari Laser printer and includes GDOS Driver for the Thermal Printer – Also supports nearly all ATARI File Formats) **£395**



NEW! – 400 DPI HANDY SCANNER FROM DFI

We offer two types of hand Scanners for **IBM PC/XT/AT, Model 25/30** and compatibles – each package includes a short interface card, **SCAN** utility software and **FREE HALO DPE** (Desktop Publishing Editor)

HS-3000: 100, 200, 300 & 400 DPI user selectable – 32 quasi tones (half tones using dither patterns) – Ideal for OCR.

£169

HS-2000: 200 DPI – 16 quasi tones – otherwise as HS-3000

£139

**CARETS BY HAND OCR SOFTWARE FOR HANDY SCANNERS
 CAN CONVERT AN A4 PAGE OF TEXT TO ASCII – PHONE FOR DETAILS NOW!**

INTRAL PRO LASER EII – LASER PRINTER

.8ppm, 1 Mbyte memory, RS232/Parallel as standard, 27 Fonts built in, Small Footprint. Many downloadable Fonts available (can also use HP Laserjet Font Cartridge) Emulations: HP Laser Jet+, IBM Proprinter, Qume Sprint11, Epson FX80, Diablo 630 and NEC Spinwriter.

£CALL



DTK produce a variety of high quality interface cards and Mother Boards. We stock a selection of popular cards at reasonable prices as shown below:–

DTK AT Hard/Floppy Controller	£77	Turbo XT 640K, 20MB Hard Disk, Mono Keyboard, Par/Ser incl DOS	£759
DTK Floppy Controller	£21	AT 640K, 20MB Hard Disk, Mono, Keyboard Par/Ser, incl DOS	£999
DTK AT/XT 360K, 720K, 1.2M, 1.44M Floppy Controller	£34	RPTI-1000 Trans-Net LAN Cad (Incl. Server)	£95
DTK RS232 Single Port	£16	WITTY C400 Mouse (PC Mouse compat.)	£25
DTK RS232 Dual Port	£23	Sunshine Eprom Programmer 27/87 to 1Mbit	£99
DTK Printer Card	£13	200W AT Power Supply	£54
DTK 10Mhz XT Turbo Mother Board	£65	10ft long RS232 or Printer Cable	£6
DTK 10Mhz Multi XT Turbo, Herc./CGA, Par/Ser, Floppy, Clock & Games Port includes case & power supply	£299	102 Key XT/AT Enhanced Keyboard (Alps switches)	£41
		Flycom 8 Port Serial Card (with cables)	£140
		Flycom 8255 I/O Card (48 I/O Lines & Timers)	£42



FABER ELECTRONICS LTD.
 Unit 2, Clive Way (off Colonial Way)
 Watford WD2 4PX



Telephone: 0923 242910 (24Hrs)/37216

Fax: 0923 36810/0923 818501 Tlx: 8951720 Merent G

DELIVERY FREE

VAT EXCLUDED

TECHNOMATIC

Techno House, 468 Church Lane, London NW9 8TQ Tel: 01-205 9558 Fax: 01-205 0190

305 Edgware Road, London W2 Tel: 01-723 0233, 01-402 0444. Telex 922800

Meta-Dyne



★ High Performance
★ Fast Speed ★ Low Cost

386 AT SYSTEM: incorporates Intel iSBC386 motherboard

- ★ 80386-16 MHz CPU ★ 2.5Mb 32bit hi speed RAM
- ★ 80387 Co Processor Socket ★ 20/40Mb or larger capacity
- ★ 1.2Mb floppy drive ★ 8 Expansion slots
- ★ 12" Hi Res Green Screen Monitor,
- ★ 101 Key enhanced keyboard ★ 1 parallel & 1 Serial Port
- ★ Real Time Clock + battery backup
- ★ Hercules Compatible MGA with parallel port
- ★ MS-DOS 3.3 & GW BASIC

2.5Mb RAM system + 20Mb HD £1699

2.5Mb RAM system + 40Mb HD £1875 8.5Mb RAM system £3755

LOCAL AREA NETWORKS

RPTI-NET Short Card Network Adaptors

★ Easy to instal ★ Easy to use ★ Low Cost

These easy to instal and use LAN adaptors offer complete solution for networking on PC/XT/AT/PS2-30 and compatibles at budget prices. You will be surprised at the simplicity with which the network can be installed and simple menu driven software enable even a novice to have a system up and running in no time.

- ★ On-board CPU and LAN processor
- ★ Peripherals like hard drives, printers, modems etc can be shared
- ★ Built-in extensive password security system for privileged access
- ★ File & Record Locking features as standard
- ★ No need for a dedicated file server
- ★ Inter-network messages can be sent and received
- ★ Optional ROMs for PC LAN and Novell Netware compatibility
- ★ Optional utilities for E-Mail, Remote Boot, Screen Monitor

RPTI-1000
1 Mbits/sec data rate
R1000-001 Std Adaptor
(includes Network OS, User manual and 3m cable) **£129(b)**

R1000-003 Starter Kit
(includes complete kit for setting up a 3 station evaluation network) **£375(a)**

We can also offer Advanced Trans Net 10 Mbits/ Sec intelligent network adaptors. Please write for details.

RPTI-3000
10Mbits/sec Ethernet based system
R3000-001 Std Adaptor (includes manual) **£189(b)**

R3000-2 Cluster Kit
(includes Network OS, cables and accessories for 3 station network) **£24(c)**

R3000-3 Starter Kit
(includes complete kit for 3 stations) **£575(a)**

Genius Scanner

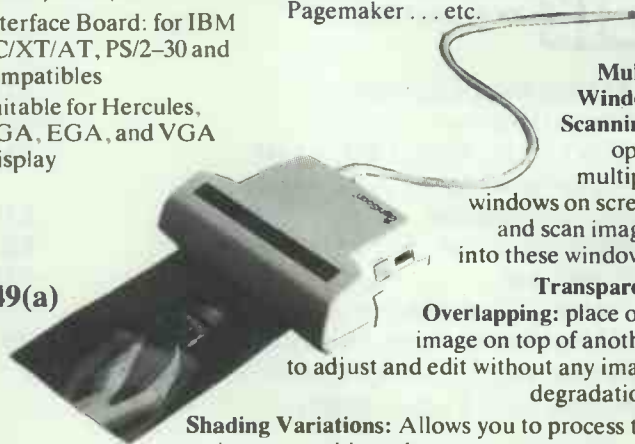
Free Genius Scanner Utility and Dr Halo III Software

- ★ Read width: 105mm
- ★ Pixel Density: 200dpi (8 dots/mm) Horizontal, 256/512/840 dots per line
- ★ Adjustable switches for Brightness and Contrast
- ★ Gray Scales: Black & White, 16 Scales
- ★ Interface Board: for IBM PC/XT/AT, PS/2-30 and compatibles
- ★ Suitable for Hercules, CGA, EGA, and VGA Display

OCR Supported: scan the text images to OCR format and use OCR software to convert the images to text files.

Extensive supports for image format: images created can be transferred to Dr Halo III, MS Windows, GEM, Ventura, Pagemaker ... etc.

£149(a)



Multi-Window Scanning: open multiple windows on screen and scan images into these windows.

Transparent Overlapping: place one image on top of another to adjust and edit without any image degradation.

Shading Variations: Allows you to process the image to achieve the appearance you want.

AMSTRAD PCs

We are obtaining limited supplies of Amstrad's new PC2086 system. Rush your orders to avoid disappointment.

PC2086 VGA SD12MD	£599(2×a)
PC2086 VGA DD12MD	£749(2×a)
PC2086 VGA HD12MD	£999(2×a)
PC1640 ECD with SD & 32Mb Card	£990(2×a)
PC1640 MM with SD & 32Mb Card	£720(2×a)
PC1640 HD/ECD	£1120(2×a)
PC1640 DD/ECD	£899(2×a)
PC1640 DD/MM	£609(2×a)
PPC 512D 2×3.5" Drives	£519(a)
PPC 640DD 2×3.5"+ Int. Modem	£619(a)
MC2400 2400 Baud internal modem	£179(b)

CO-PROCESSORS

8087-5	£75(b)	80287-6	£120(b)
8087-8	£105(b)	80287-8	£190(b)
8087-10	£160(b)	80287-10	£220(b)
80387-16	£325(b)	80387-20	£430(b)

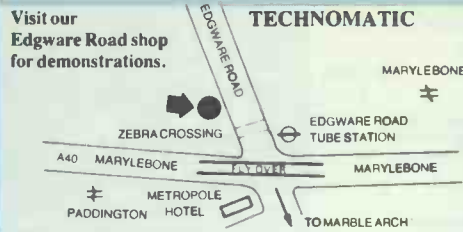
PROCESSORS

V20-5 (8088)	£10(d)	V30-5 (8086)	£10(d)
V20-8	£12(d)	V30-8	£12(d)
		V30-10	£20(d)
80386-25MHz			£420(b)

POINTING DEVICES

MicroSoft Mouse (bus or Serial)	£99(b)
Microsoft PS2 Mouse	£149(b)
Genius GM6+ Mouse	£35(b)
Genius GM6000 (2 or 3 button operation)	£55(b)
Genius GM-U2 (PS2 or Serial, Port)	£61(b)
Logimouse (AT serial)	£69(b)
Logimouse PC/AT Adaptor	£4(d)
RB2/CAD5 Tracker ball (MS Mouse compatible)	£169(b)
High Quality Mouse Mat	£4(d)

MAIL ORDER & RETAIL
 echno House
 68 Church Lane
 London NW9 8TQ
 Tel: 01-205 9558 Telex 922800
 Fax: 01-205 0190
 West End Branch
 105 Edgware Road, London W2
 Tel: 01-723 0233, 01-402 0444



For fast delivery telephone
 your order on 01-205 9558
 using VISA/Access Card



Orders welcome from
 government depts &
 educational establishments

All prices ex VAT.
 Prices are subject to
 change without notice
 Please add carriage
 (a) £8.00 (Courier)
 (b) £2.50
 (c) £1.50
 (d) £1.00

INTERFACE CARDS

AT/XT CARDS

Display Cards (All Short)

Monochrome Graphics Card
 Includes parallel port
 £37(d)

Colour Graphics Card
 Includes parallel port & comp video
 £37(d)

480 Autoswitch EGA
 256K RAM 640 x 480
 Automote sensing for EGA/CGA/MGA
 monitors, various drivers
 £129(b)

Super EGA 256K RAM, 800 x 600
 80 x 65 line DTP, various drivers, switch for
 CGA/Mono
 £169(b)

EGA Card 256K, RAM 132col EGA Text
 PGA, Smart Autoemulation, various drivers
 £199(b)

Prisma EGAMAX 860 Card
 256 RAM, 800 x 600
 80 x 66 Line DTP, 132 col text, split screen,
 various drivers
 £299(b)

Video Seven VGA Card
 £249(b)

Parallel Printer Port (LPT1)
 £12(d)

Games Port
 £15(d)

8255 I/O Card
 £59(c)

IEEE 488 Card
 £149(b)

12bit AD/DA Card
 £95(c)

XT CARDS

Super Multi Display I/O Card
 CGA/MGA, 2 FD Controller
 Parallel/Serial/Games Port,
 Clock/calendar + battery
 £99(b)

Multi I/O Card 2 FD Controller
 £49(c)

Parallel/Serial Ports, Clock/Calendar + battery
 £49(c)

Floppy Controller Card (2 drives)
 £27(d)

Floppy Controller Card (4 drives)
 £37(d)

I/O Card
 1 parallel/1 serial ports
 £39(d)

Async Serial Card
 1 port fitted/2nd opt
 £26(d)

COM 2 Card
 £22(d)

Real Time Clock/Calendar + battery
 £24(d)

Memory Expansion Card
 (256/384/512K) OK
 £39(c)

AT CARDS

Hard/Floppy Drive Controller
 £139(b)

Floppy Controller 2 floppies
 £27(d)

Hard Drive Controller
 £95(c)

Hard/Floppy Drive Controller
 £139(b)

RLL Hard Drive Controller
 £129(b)

128K RAM Card OK
 £37(d)

2.5Mb Multifunction Card OK
 1 Parallel (LPT1 or 2) + 1 Serial
 (COM1 or 2) ports
 £99(b)

2Mb EMS Card OK
 £129(b)

Dual I/O Card
 1 Parallel/1 Serial/1 opt serial
 £49(c)

Multi Serial Card for Xenix
 4 RS232 Ports
 £149(b)

MODEMS

Miracle Modems

WS4000 £129(a) WS3000 V22 £349(a)
 WS3000 V22bis £405(a) KeyCard V21/23 £239(a)
 KeyCard V22 £339(a) Keycard V22bis £385(a)

Pace Modems

Linnet £139(a) Series Four 2123S £239(a)
 Modem Data Lead £14(d)
 Series Four 2400S £439(a) Series Four 1200S £339(a)

DOT MATRIX RANGE

EPSON

LX800	£179(a)	FX1050	£419(a)	EX800	£429(a)
FX850	£319(a)	EX1000	£579(a)	LQ500	£285(a)
LQ850	£439(a)	LQ1050	£599(a)	LQ2550	£995(a)

DFX5000 Heavy Duty Line Printer £1249(2x)

MONITORS

Monochrome Composite Input

Philips 7502 Green 12"	£72(a)
Philips 7752 14" Green flat screen	£85(a)

Monochrome TTL Input

Philips 7513 12" Green	£75(a)
Samsung MD1258G 12" Amber T/S	£95(a)
VM1400 14" Amber T/S	£115(a)

EGA (tilt and swivel stand included)

EGA 14" Monitor	£289(a)
Taxan SV770+ Multisync	£449(a)
NEC Multisync II 14"	£485(a)
NEC GS Mono MultiSync 14"	£169(a)
NEC 1402 MultiSync II 14"	£459(a)
NEC MultiSync Xcel 20"	£1379(a)

RGB

Philips 8833 14"	£219(a)
Taxan SuperVision 620 12"	£269(a)
Taxan SuperVision 625 12"	£319(a)

WINCHESTER & FLOPPY DRIVES

Seagate ST225 20Mb 65ms	£165(b)
Seagate ST238 30Mb + Kit (XT)	£229(a)
Seagate ST251 40MB (Fast 28ms)	£369(b)
Seagate ST251 40Mb (40ms)	£309(b)
Hitachi DC521 40Mb (24ms)	£399(b)
Fuji file card	£259(a)
WD WX1 Controller + Cables (XT)	£49(c)
Hard Drive Cable set (XTorAT)	£12(c)
5.25" 360K 48TPI DS Drive	£79(b)
5.25" 1.2Mb Drive	£95(b)
3.5" 720K Drive with 5.25" kit	£89(b)
3.5" 1.4Mb Drive with 5.25" kit	£99(b)

EPROM PROGRAMMER

The EPROM Writer card is suitable for PC, XT & AT machines. It is a short card with an external Textool ZIF socket which is housed in a metal case. Controlled by menu based software, it requires at least 256K of free Ram.
 Eproms supported:- 2716, 2732(A), 2764(A), 27128(A), 27256(A) & 27512(A). £90.00(a)

DIGITISING TABLET GT-1212

- ★ Low cost digitising tablet compatible with PC/XT/AT/PS-2.
- ★ Will work with most CAD systems incl AutoCAD, VersaCAD etc and MS Windows.
- ★ Allows tracing & free hand drawing using 4 button puck.
- ★ Fully compatible with MS & PC mouse
- ★ 12" x 12" drawing area.
- ★ 1000 lines/in resolution, ±0.01" Accuracy
- ★ RS232 interface, switch selectable baud rate 150/19200.
- ★ Tablet fitted with adjustable flip stand
- ★ Software includes AutoCAD menufile and template, Genius MenuMaker/Library Dr Halo III professional graphics package
- ★ Full specification on request £375(a)

PRINTERS & PLOTTERS

★★SPECIAL OFFER★★
 Epson FX 1000 £365(a)
 Offer valid whilst current stocks last

STAR

Star LC10	£179(a)	Star LC10 Col	£229(a)
Star LC24-10	£299(a)		
Nat Panasonic KXP1081	£145(a)		

DAISY WHEEL PRINTERS

Brother HR20 (Dual I/face)	£329(a)
Integrex Inkjet Colour Printer	£515(a)

LASER PRINTERS

Epson GQ3500	£1249(a)
(includes 12 months on site warranty)	£1349(a)
Canon LBP8-II	£1579(a)
PC parallel Printer lead (2m)	£9(d)

PLOTTERS

Authorised ROLAND STOCKISTS

DXY880	£575(a)	DXY1200	£945(a)
DXY1100	£675(a)	DXY1300	£1125(a)
Hitachi 672XD A3 Four Colour Plotter	£499(a)		

BUFFERS/SHARERS/CONVERTERS

TSB 256 Auto Sharer/Buffer

256K buffer with 3 input ports. Each port scanned automatically every 10 secs until data found. PAUSE, COPY and RESET Facilities. Full spec on request. £169(a)

Smart Printer Buffers

Facilities include: COPY upto 265 copies PAUSE, RESET, Self-Test.

For serial: X-on/X-off, ETX/ACK or DTR/DTS protocols independently selectable baud rate for each port

PP256 256K Parallel buffer	£169(b)
SS256 256K Serial buffer	£189(b)

Parallel Multi-Spoolers

Allows connecting 2 printers to 2 or 4 computers
 Buffer allows quick dumping of data to free the computers

COPY allows upto 999 copies, SELF-TEST, PAUSE, CLEAR

MS422 4computers/2printers 512K buffer	£299(b)
MS223 2computers/2 printers 256 K buffer	£199(b)

Auto switching Printer Sharers

Allows 2, 4 or 8 computers to share 1 printer
 Auto Self Test, READY and BUSY indicators

	Parallel	Serial
2 input/1 output	£49	£49(c)
4 input/1 output	£59	£69(c)
8 input/1 output	£85	£85(c)

Both parallel and serial sharers fitted with 25 way D Connectors

Serial/Parallel/Serial Converters

Compact economical converters which support X-on/X-off, ETX/ACK, DTR/DSR protocols

C-PS Parallel/Serial converter	£35(c)
C-SP Serial Parallel converter	£35(c)

Add £49 to above prices for units with 64K buffer

Manual Printer Sharers:

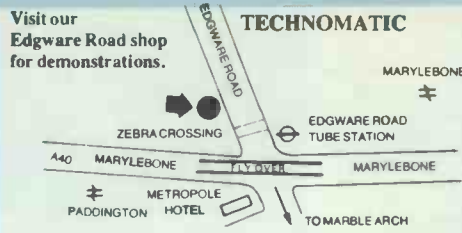
(All lines are switched).

	Parallel	Serial
2 computers to one printer	£25(c)	£25(c)
3 computers to one printer	£39(c)	£39(c)
4 computers to one printer	£45(c)	£45(c)
2 computers to 1 or 2 printers	£49(c)	£49(c)

Cable sets for above sharers available for all popular computers

Detailed Catalogue on
 Printer Sharers available

MAIL ORDER & RETAIL
Techno House
 468 Church Lane
 London NW9 8TQ
 Tel: 01-205 9558 Telex 922800
 Fax: 01-205 0190
West End Branch
 305 Edgware Road, London W2
 Tel: 01-723 0233, 01-402 0444



For fast delivery telephone your order on 01-205 9558 using VISA/Access Card



Orders welcome from government depts & educational establishments

All prices ex VAT. Prices are subject to change without notice. Please add carriage (a) £8.00 (Courier) (b) £2.50 (c) £1.50 (d) £1.00

BUSINESS SOFTWARE

INTEGRATED PACKAGES

Smart System v3.1	£379(a)
Symphony Ver 2.0	£369(a)
Open Access II v2.0	£325(a)
Ability Plus	£115(c)
MS Works	£115(c)
Lotus 123 Ver 2.01	£249(a)

WORD PROCESSORS

MS Word v4.0	£265(a)
Multimate Advantage II	£290(a)
Word Perfect v5.0	£225(a)
Sprint	£155(a)
Manuscript	£255(a)
Wordstar Professional Ver 5	£195(a)

DATABASES

dBase IV	£395(a)
DBXL - Diamond - NEW - Rapidfile	£99(b)
Clipper - summer 87	£175(a)
Paradox II	£399(a)
DataPerfect	£310(a)
	£330(a)

SPREADSHEETS

MS Excel - NEW - Logistix	£249(a)
Supercalc 4 - Free Utilities - QUATTRO	£69(c)
Lotus 1-2-3 v2.01	£199(b)
Silverado - Database add-in for 1-2-3 for SC4	£109(b)
	£249(b)
	£149(b)
	£139(b)

LOTUS RANGE

AGENDA - NEW - HAL	£245(b)
Freelance Plus	£85(c)
Metro - Desktop Organiser -	£275(b)
	£60(c)

DESKTOP PUBLISHING

Finesse	£79(b)
---------	--------

Page-Maker v3.0	£509(a)
Ventura Publisher v1.2	£499(a)
Page-Setter	£189(b)
Timeworks	£109(b)

UTILITIES

Calendar Creator Plus	£49(d)
Computer Checkup	£32(d)
Copy II PC	£35(c)
DOS Director	£39(d)
Fastback v5.14	£95(c)
Fastback Plus	£125(c)
Forms on File	£59(d)
Labels Unlimited	£49(d)
Learning DOS	£24(c)
Norton Utilities v4.0	£49(c)
Norton Adv. Utils.	£79(b)
Norton Commander	£36(c)
PC Tools Deluxe	£79(b)
Printing Press	£49(d)
Quick Schedule Plus	£74(d)
Widespread	£39(d)
Xtree v2.0	£44(c)
Xtree Pro	£79(c)
File Rescue Plus	£20(d)
Forms Finisher	£69(d)

BORLAND SOFTWARE

QUATTRO	£119(b)
Turbo C v1.5	£47(b)
Turbo Basic	£47(b)
Turbo Basic Database Toolbox	£47(b)
Turbo Prolog	£47(b)
Turbo Prolog Toolbox	£47(b)
Turbo Pascal v5.0	£85(b)
Turbo Pascal Professional	£170(a)
All Pascal v4.0 Toolboxes available	£50(b)
Pascal v4.0 Developers Library	£189(b)
Eureka! The Solver	£70(b)
Sidekick	£42.50(b)
Sidekick Plus	£132(b)
SuperKey	£42.50(b)
Reflex Workshop	£42.50(b)
Reflex Database Manager	£75(b)

Full Borland range in stock.

LANGUAGES & O.S.

MS Quick C v1.0	£65(b)
MS Quick Basic v4.0	£57(c)
MS Basic V.6	£220(a)
MS C Compiler v5.1	£239(a)
MS Cobol Compiler v2.2	£370(a)
MS Fortran v4.1	£235(a)
MS Macro Assembler v5.1	£90(b)
MS Windows 2.03	£69(c)
MS Windows/386	£130(b)
MS Windows/286	£72(c)
Zortech Power Pack	£50(c)
RM/Fortran 77 - inc. Forte - Concurrent DOS/386	£300(a)
BBC Basic (86)	£335(a)
	£95(b)

PROFESSIONAL CAD

Autosketch	£59(d)
AutoCAD basic v9	£300(a)
AutoCAD ADE I & 3 v2.6	£2500(a)
AutoCAD complete - Education -	£500(a)
DesignCAD	£195(b)
DesignCAD 3D	£245(b)

ACCOUNTING

Book Keeper	£80(b)
Accountant	£105(b)
Accountant Plus	£145(b)
Financial Controller	£225(b)
Payroll II	£125(b)

GEM

Wordchart	£125(c)
Comm	£45(c)
Draw Plus	£140(c)
Desktop Publisher	£185(c)
First Word Plus	£140(c)
Graph	£140(c)
Scan	£49(c)

MISCELLANEOUS

Flight Simulator v3.0	£40(c)
-----------------------	--------

BOOKS

(No VAT £2.50 P&P)

1-2-3 For Business	£18.45
1-2-3 Tips Tricks & Traps 2nd	£18.45
80286/80287 Progs Ref Man	£17.00
8087 Applics. & Programming	£19.10
ABC of Wordperfect 5	£16.95
ABC's of 1-2-3	£16.95
ABC's of Autocad	£20.95
Advanced C Techniques & Applc	£19.95
Advanced MS DOS (Microsoft)	£19.95
Advanced Ventura	£21.95
C Programming Language 2 Ed	£24.95
C The Complete Reference	£21.95
DOS Complete Reference	£21.95
DOS Power Tools	£34.95
DOS Programmers Reference	£19.95
IBM PC-DOS Handbook	£18.95
Inside Autocad V 2.6 REL9	£32.45
Inside Autosketch	£15.00
Inside Xerox Ventura Publisher	£18.45
Lotus Agenda	£12.95
Mastering 1-2-3 2nd Ed	£19.95
Mastering Autocad 2nd Ed	£28.95
Mastering Framework II	£22.95
Mastering Supercalc 4	£17.95
Mastering Symphony 4th Edition	£24.95
Mastering Ventura	£21.95
Mastering Wordperfect 5	£19.95
Mastering dBASE III Plus	£19.95
Microsoft Word 3rd Ed.	£8.95
MS Word Made Easy 3rd Ed	£19.95
MS-DOS Encyclopedia to 3.2	£95.00
MS-DOS Users Guide 3rd Ed	£20.95
Multiplan Made Easy	£19.95
Networking IBM PC 2nd Ed	£18.45
Occam 2 Reference Manual	£15.95
PC Magazine DOS Power Tools	£39.95
Peter Norton's DOS Guide	£17.35
Postscript Language Ref. Man	£21.95
Power of Turbo Prolog	£12.00
RS232 Solutions	£17.95
Smart Tips, Trick & Traps	£22.45
Turbo C Complete Reference	£24.95
Turbo Pascal Complete Refer.	£21.95
Understanding dBASE III Plus	£19.95
Understanding UNIX 2nd Ed	£19.45
UNIX - The Book	£8.95
UNIX Of The IBM PC	£6.95
UNIX The Complete Reference	£22.95
Using 1-2-3 Special Edition	£13.95
Using Excel	£19.95
Using Multimate Advant 2nd Ed	£18.45
Using Pagemaker on the IBM	£22.95
Using Quattro Prof Spreadsheet	£21.95
Using Sidekick Plus	£21.95
Using Smart	£21.45
Using Wordperfect 5	£19.95
Using Wordperfect W/Book & Disc	£27.45
Ventura Tips & Tricks	£18.95
Wordperfect Advanced Technqs.	£17.95
Wordperfect Tips/Tricks/Traps	£16.95
Wordstar 4.0 Made Easy	£16.95
dBASE III Plus Hand Book 2nd Ed	£19.95

GENIUS MOUSE

A range to suit all requirements and offering good value for money. Fully compatible with Microsoft Mouse.

All packages include the following:

- ★ Menu Maker Program
- ★ Comprehensive menu Library
- ★ Dr Halo III Pro. Graphics & Slide Show
- ★ Mouse mat & cutting pad
- ★ Plastic Mouse pocket



Type:	GM6+	GM6000	GM-U2
Res:	22-200	22-700	22-700
Interface:	RS232	RS232	PS2 Port/RS232
Price:	£35(b)	£55(b)	£61(b)

COMPACT PRINTER SHARER

Compact Two Way Switch 2 computers to 1 printer or 2 printers to 1 computer Attaches to the side of a computer or a printer **£23(c)**



DISCS & CARTRIDGES

5.25" DISCS (In packs of 10)

3M 744 48TPI SSDD	£6.50(d)
3M 745 48TPI DSDD	£8.00(d)
3M 747 96TPI DSDD	£11.00(d)
3M 1.6M HD for AT	£16.00(d)
Dysan 48TPI SSDD	£8.50(d)
Dysan 48TPI DSDD	£11.00(d)
Dysan 96TPI DSDD	£14.00(d)
Dysan 1.6Mb HD for AT	£16.00(d)



3.5" DISCS (In packs of 10)

3M 135TPI DS	£15(d)
3M 135TPI HD for PS/2	£36(d)
JVC 135TPI DS	£16(d)
Sony 135TPI HD for PS/2	£40(d)

BULK DISCS

50 discs are supplied in lockable disc storage box

5.25" 48TPI DSDD (incl sleeves)	£36(b)
3.5" 135TPI DS	£60(b)

CARTRIDGES

DC1000	£12(d)	DC300XLP	£16.50(d)
DC600A	£18.50(d)	DC2000	£15(d)

Mehta i

Assembler & Eprom Emulator **£995(a)**

Seeing is Believing



Everex is about to unleash new technology with the Step series of personal computers.

The flagship of the range, the Everex Step 386/25, is the fastest 80386 based personal computer available.

What makes this computer so unnervingly fast? Everex are the first to bring mainframe memory management technology to the personal computer.

We call it AMMA – Advanced Memory Management Architecture.

Whatever you call it, Everex Step computers are simply ahead of the rest.

See their Power on stand 483

at the



Compaq Deskpro 386/25	5.5 MIPS
IBM Model 70 (25MHz)	5.7 MIPS
Everex STEP 386/25	6.1 MIPS

Source: "Power Meter MIPS Version 1.2. The Database Group"

Everex Systems (UK) Limited
72 Capitol Way, Edgware Road
Colindale NW9 0EW
Telephone 01-205 0607
Freephone 0800 010110

EVEREX
COMPUTER SYSTEMS DIVISION

SPECIAL OFFERS

AMSTRAD COMPUTERS

PC2086 SD 12MD	£559.00	PC1512SD MM	£364.00
PC2086 SD 14CD	£709.00	PC1512SD CM	£489.00
PC2086 SD 12HRCD	£809.00	PC1512DD MM	£479.00
PC2086 SD 14HRCD	£909.00	PC1512DD CM	£594.00
PC2086 DD 12MD	£709.00	PC1640SD MD	£464.00
PC2086 DD 14CD	£859.00	PC1640SD CD	£594.00
PC2086 DD 12HRCD	£959.00	PC1640SDECD	£719.00
PC2086 DD 14HRCD	£1059.00	PC1640DD MD	£564.00
PC2086 HD30 12MD	£959.00	PC1640DD CD	£689.00
PC2086 HD30 14CD	£1109.00	PC1640DDECD	£799.00
PC2086 HD30 12HRCD	£1209.00	PC1640HD20 MD	£799.00
PC2086 HD30 14HRCD	£1309.00	PC1640HD20 CD	£919.00
		PC1640HD20 ECD	£1049.00
PPC 512SD	£369.00	PCW 8256	£329.00
PPC 512DD	£469.00	PCW 8512	£399.00
PPC 640SD	£469.00	PCW 9512	£439.00
PPC 640DD	£564.00		

PRINTERS

Star LC10	£169.00	Star LC24-10	£269.00
Star LC10 Colour	£214.00	Star NB24-10	£454.00
Star ND10	£289.00	Star NB24-15	£549.00
Star NR10	£359.00	Star NB15	£674.00
Star NX15	£274.00	NEC P2200	£269.00
Star ND15	£344.00	NEC P6+	£449.00
Star NR15	£414.00	NEC P7+	£579.00
Citizen 120D	£119.00	NEC P9 XL	£734.00
Panasonic KXP1081	£139.00	EPSON LX 800	£174.00
		EPSON LQ 500	£284.00

ACORN ARCHIMEDES

A305 Entry	£629.00	A310M Entry	£784.00
A305 Mono	£679.00	A310M Mono	£834.00
A305 Colour	£804.00	A310M Colour	£959.00
A310 Entry	£729.00	A440 Entry	£2119.00
A310 Mono	£784.00	A440 Mono	£2174.00
A310 Colour	£909.00	A440 Colour	£2299.00

MONITORS

NEC Multisync II	£449.00	Philips 8833	£219.00
NEC Multisync GS	£159.00	Philips 8852	£249.00
NEC Multisync Plus	£634.00	Taxan 770 M/Sync	£499.00
NEC Multisync XL	£1499.00		

UPGRADES

Western Digital Filecards:	20Mb	£209.00
	32Mb	£239.00
Amstrad Accelerator Card:		£289.00
(Increases speed from 8MHz to 12MHz)		



01-650 9152

Phone for other prices

Please add £6 delivery charge + 15% VAT to all orders

To: VMS Enterprises Ltd, Unit 1, Bouverie Lodge
4 Rectory Road, Beckenham, Kent BR3 1TU.

I wish to order _____

I enclose cheque/PO for £ _____ inc VAT
or charge my Access/Visa No: _____ Exp. date: _____

--	--	--	--	--	--	--	--	--	--	--	--

Name _____

Signature _____

Address _____

Postcode _____ Tel No: _____



ORGANISER II

Datapaks.
Organiser/Accessories.



Cables.
Printers, Cases, Books

OBASE. £69.95 Obase allows you to create databases on your Organiser II. Files can be created with field types i.e. text, numeric and date. Each field also has a field name. Printer formats can be set up including printing on Fax paper and labels. Data from this program can be exported ready for import into Dbase or Archive. If you want to send your files directly to Dbase II or III without using import, a separate program is available price. £39.95

MAIL LIST. £34.95 You can now store details on your Organiser and print directly onto Labels, or down-load your data to a PC compatible program. Each record includes Name, Telephone number, Address, Town, County, Post Code, Country, Account number, contact, details, reference, telex and fax number. The file can be ordered under name and data can be transferred to and from Transforms PC Mail List program at £39.95.

STOCK CONTROL. £34.95 Our stock control program stores the following details, Stock number, Bar code number or Reference, Quantity, Buying price, Selling Price and Description. The bar code reader can be used to quickly search for a stock item or you can search using stock number or description. Total option allows you to quickly total the value of stock. Data can easily be transferred to and from Transform's PC Stock control program, available for £39.95.

BANK/CASH ACCOUNT. £34.95 This program allows you to keep records of an unlimited number of bank accounts. Features include monthly, bi-monthly, quarterly and annual, analysis both on screen and printer, bank details include bank manager, phone number, account number etc. Money can be transferred between both cash and bank accounts, all accounts can be analysed under user defined codes, cash accounts handle expenses and VAT.

TIME BASE. £34.95 If you have to keep a track of time whether it be at work or play this program is for you. For Solicitors or accountants who want to record time spent on contracts, service men who have to fill in time sheets, phone callers, time and motion studies through to Joggers who want to monitor their progress. Program prints a complete log of times or invoice, if used for contract work.

PSION.XCHANGE XCHANGE SINGLE USER £295 XCHANGE MULTIUSER £695
QL to PC program supplied FREE

ORGANISER.		32K Datapak	£34.95
Organiser XP	£139.50	64K Datapak	£59.95
Organiser CM	£99.50	128K Datapak	£99.95
		32K Rampak	£54.95

SOFTWARE.		ORGANISER ACCESSORIES.	
Organiser Mail List	£34.95	Coms Link	£59.95
PC Mail List	£39.95	Mains Adaptor	£12.95
Organiser Stock Control	£34.95	Bar Code Reader	£143.75
PC Stock Control	£39.95	Magnetic Card Reader	£109.25
OBASE	£69.95	Formatter	£44.95
Organiser to Dbase	£39.95	Centronics Interface	£39.95
Bank/Cash Account	£34.95		
Time-Base	£34.95	CABLES.	
Organiser Developer	£57.45	Printer Link	£12.95
Finance Pack	£29.95	BBC Link	£12.95
Spelling Checker	£29.95	Macintosh Link	£12.95
Maths Pack	29.95	Modem Link	£12.95
Formulator	£29.95		
Spreadsheet	£39.95	PRINTERS. new	
Diary Link	£12.95	Psion Printer	£224.25
Travel Pack	£39.95	Psion Printer & Card Swipe	£281.25
Travel System	£199.95	Leather Printer Case	£39.95
PC System	£199.45	Printer Brief Case	£16.00
Cubsofts FN Key	£49.95	4 Rolls Thermal Paper	£5.99
Widgets Filemaster	£44.95		
Data Organiser Harvester	£34.95	CASE.	
Finger Organiser Harvester	£34.95	Leather Fax Case	£69.95
Letter Organiser Harvester	£34.95	Organiser Leather Case	£12.95
Informed Organiser	£34.95	Nylon Case	£10.95
SuperChip Harvester	£99.95	Printer Brief Case	£16.00
Portfolio	£49.50		
Pure Finance	£49.50	BOOKS.	
		Programming Your Organiser	£9.95
		Programming Your Organiser II	£14.95

DATAPAKS.			
8K Datapak	£12.95		
16K Datapak	£19.95		



Transform Ltd



7c Station Approach, Hayes, Kent BR2 7EQ

TEL: 01 462 4666

AVOCET OFFICE AUTOMATION LTD

"COMPUTER SOLUTIONS"

AVOCET OFFICE AUTOMATION is a franchise network providing Local and National solutions at sensible prices. Our experienced professional staff will provide you with assistance in a variety of specialist areas.

COMPLETE SOLUTION

ACCOUNTING SYSTEMS
WORD PROCESSING SYSTEMS
DESK TOP PUBLISHING
C.A.D. SYSTEMS

MULTI-USER & NETWORK SOLUTIONS

CONCURRENT DOS
XENIX
MAINLAN
NOVELL NETWORK

EXAMPLE OF AN ACCOUNTING SOLUTION

HARDWARE

Opus 20Mb hard disc
Canon 80 col. Printer

SOFTWARE

MS DOS 3.3
AMIS MANAGEMENT INFORMATION SYSTEM
● Sales Ledger ● Sales Invoicing
● Purchase Ledger ● Nominal Ledger
● Stock Control
Wordprocessing, Database, Spreadsheet Communications
Graphics

SUNDRIES

Listing Paper, Diskettes, Invoice Stationery,
Statement Stationery
System Price

£1499

EXAMPLE OF A NETWORK SOLUTION

THREE USER STARTER SYSTEM

FILESERVER

80286 10MHz cpu
30Mb Hard Disk
Monochrome Monitor

WORKSTATION ONE

8088 10MHz cpu
20Mb Hard Disk
Monochrome Monitor

WORKSTATION TWO

8088 10MHz cpu
20Mb Hard Disk
Monochrome Monitor

NETWORKING COMPONENTS

Mainlan Starter Kit
Mainlan Extension
System Price

£3299

"PLUG IN AND GO"

All the systems come formatted and configured ready to use
FREE SOFTWARE SUPPORT ON ALL SYSTEMS

OPUS DISTRIBUTORS

We stock the full range of Opus computers! All orders are despatched the same day!
All machines are covered by a 2 year warranty!
Good Prices available

SPECIAL PROMOTIONS

PC III 30Mb HD Mono **£850** PC IV 20Mb HD Mono **£699** PC V 80286 30Mb HD Mono **£1199**
PC 7 20MHz 80386 70Mb HD/4Mb RAM Now Available

UNIT 9, FAIRBAIRN ROAD, LIVINGSTON

BIRMINGHAM
EDINBURGH
ABERDEEN

0506 417332

COREL DRAW!

DOES IT ALL



Superb Freehand Drawing & Incredible Text Control on ALL Popular Printers!

■ Easy, Powerful User Interface

- Microsoft Windows, running on all ATs and 386s, with 640k RAM
- Simplified menu & toolbox design
- Macros enable repetitive operations to be easily accessible
- Hundreds of useful samples & clipart
- Thorough documentation & tutorial

■ Lightning Speed

- Superior architecture results in amazing speed even with large drawings

■ Superb Freehand Drawing

- Draw Bezier curves quickly and easily
- Fast & Powerful curve editing

■ Calligraphic Pen Shapes

- Gives your curves a human touch by allowing custom pen shapes & angles

■ Powerful Bitmap Support

- Rotate, skew, stretch, scale, crop, color & position any bitmap

■ Autotrace to Quickly Create Artwork

- Automatically traces bitmaps, including scanned images to easily create your own editable artwork

■ Over 50 Precision Fonts In Any Size

- COREL's top quality typefaces (including 35 that match those in PostScript printers) are included for both screen & printer. You see EXACTLY what you get, even when your text is skewed, rotated, or magnified
- Laserjet, Paintjet, & Postscript printers are fully supported
- Easy typeface selection with font shapes visible during font selection
- Full international character set

■ Interactive Kerning

- Characters can be dragged until you see the exact spacing you want
- Individual characters can have different attributes within a text string including typeface, point size, angle etc.

■ Fit Text to a Curve

- Text can easily be snapped to any curve including circles, rectangles, or even other text

■ Fit Text to a Space

- Interactive letter, word and line spacing

■ Edit Lettershapes

- Start with any font you want, then create your own custom lettering

■ Special Effects for Postscript Printers

- Over 50 stunning textures including Fractal and Escher effects for filling any object
- Linear or radial fountain fills for any object including text
- Extensive halftone screening for all objects including bitmaps & text

■ Excellent Connectivity

- Import Lotus PIC, PCX, TIFF, Illustrator, GDF, CGM
- Export displayable EPS, Windows Metafile for use in page layout software
- Use with all Windows supported input and output devices including slidemakers, tablets, monitors, Videoshow etc.

■ Dazzling, Low Cost Color Output

- With CORELDRAW and a £995 Hewlett Packard Paintjet printer, you can create inexpensive but impressive color presentations
- Full PANTONE® and CMYK color support for color separations and color matched output devices

■ Unlimited HOTLINE Support

- COREL experts are keen to help!



The IMAGE Connection

9 Northam Business Centre, Northam, Southampton SO1 1RP Tel: (0703) 330908

* Pantone Inc's check-standard trademark for color reproduction & color reproduction materials, **Available on 5.25" or 3.5" disks; Microsoft WINDOWS not included.

CORELDRAW!
ORDER NOW £345

AMSTRAD NETWORK.

LIKE HAVING

EVERYBODY WORKING

ON THE

SAME COMPUTER.



Networking brings your PC's much closer together. It enables them to share and swap data.

So your operators can get instant access to any of the information stored in each others' computers.

IT INCREASES EFFICIENCY.

Without networking, data has to be endlessly duplicated in order to be used by more than one person.

But data shared means time saved. Especially when dealing with another department.

Networking also means your computer operators need just one printer to serve more than one PC.

IT SAVES YOU MONEY.

Obviously, networking will save you money because you'll be using the same software and peripherals for all your PC's. In fact the Amstrad Network package connects 3 PC's (Amstrads or other industry standard compatibles).

And as you'd expect, Amstrad's price represents a huge saving on similar networking packages.

MULTI-USER SOFTWARE.

In order to help you with spreadsheets, wordprocessing and accounts, Amstrad has developed a range of network compatible software that includes Supercalc 4 LAN, Wordstar AMS - LAN, and Accountsmaster - LAN.

Our prices start from as little as £199 plus VAT.

And what's more, (or rather less), it takes just fifteen minutes to install the Network.

The Amstrad Network. At **£399** + VAT, nobody comes close.

Please send me further information on the Amstrad Network and Multi-user Software.

Name _____

Company _____

Address _____

Postcode _____ Tel _____

THE AMSTRAD NETWORK

Amstrad plc, PO Box 462, Brentwood, Essex CM14 4EF.
Telephone: (0277) 262326.



Recommended retail prices including VAT - Network £458.85, Multi-User Software from £228.85 correct at 1.1.89 but may change without notice. Products subject to availability. Software subject to licence. Amstrad is a registered trademark of Amstrad plc. All rights reserved.

AMSTRAD SOFTWARE. AFFORDABLE SOLUTIONS.

SLOUGH COMPUTERS



TANDON

SPECIAL DEALS ON
THE TANDON RANGE!
RING FOR THE VERY LATEST PRICES

Come in and see the superb new
KX-P4450 laser from Panasonic.
Two tray feeding, 11 page/min and top
quality with on-site warranty at **£1695**



PANASONIC

CANON LASER SPECIAL OFFER
THE NEW CANON LBP-811 (SX ENGINE)
AVAILABLE FOR A LIMITED PERIOD
ONLY AT **£1399**

A quality range of PC's and AT's
at very attractive prices.

PCIV TURBO 20MB XT. An entry
level compact system
at £799 EGA £979

PC 111 TURBO 30MB. A
professional, expandable XT.
from £939

PC V TURBO 30MB. A super fast
AT at £1269. EGA £1499

**PC 7 TURBO CACHE 386
70MB.** State-of-the-art 20MHz
4MB 386 colour VGA at £3595



OPUS TECHNOLOGY

FREE! With all standard Opus systems – Ability integrated database, word
processor and spreadsheet. Most Opus configurations are available from
stock. Warranty repairs done on a fast turn around right here – no sending
away! Dealer/consultant enquiries welcome

386/XT Power

The cheapest way to 386 power
exclusively from Slough
Computers.

We have put together a package
based on a PC III XT with all
branded product. The basic mono
system is featured below but a
variety of options are available to
order:

- ★ 16MHz 80386 card
- ★ 1Mb 32 bit RAM
- ★ 80387 option
- ★ 1 x 5 1/4" 360k drive
- ★ 1 x 3 1/2" drive
- ★ 60Mb hard disk
- ★ Partitioning software
- ★ Disk cacheing
- ★ Norton SI 16.2
- ★ MS DOS 3.3

All this from only **£1599**

BARGAIN!
EX DEMO DTP SYSTEM
ONLY £1999



ATARI DESKTOP PUBLISHING

New!

Atari have launched a range of
PC's. The hard disk system with
amber EGA compatible monitor
retails at only **£949**

Mega 4 ST Desk top publishing
system including 20Mb hard disk,
Atari Laser and Fleet Street
publisher only **£2999**



ATARI PC 2



MINISCRIBE HARD DISCS

VGA card & Monitor only £499

60MB HARD DISK KIT **£259**

32MB XT HARD CARD **£239**

40Mb 40ms hard card **£259**

MOUSE OFFERS FROM **£39**

COMMODORE PC60 386 RANGE AVAILABLE FROM £1799

SAVE DESK SPACE – 286 PORTABLES

**RING FOR DETAILS OF OUR NEW RANGE OF GAS PLASMA, HARD DISK
PORTABLES. PRICES START AT ONLY £1799.**

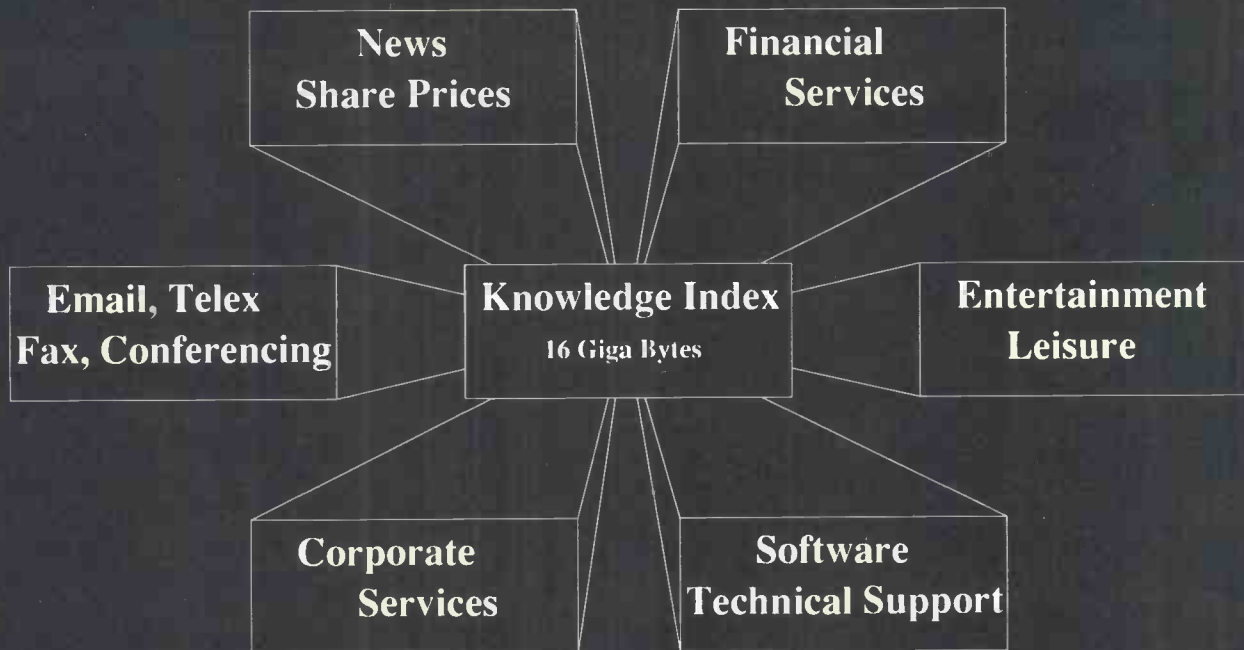
SEAL OF QUALITY

Our new reduced prices do
not mean any reduction in
our high levels of service
and customer care.

VAT and Carriage must be added to all prices. Telephone orders welcomed, Government, Educational discounts. All prices subject to change without notice.

245 High Street, Slough, Berks SL1 1BN. Tel: (0753) 21594/32753

Discover King Midas' Treasure



Global On Line Database

The worlds' most advanced on-line database, incorporating:

- A.I. based Human Access Language
- Multi access full featured windowing
- Supports virtually all computers
- Graphics emulation software downloadable
- High speed Communications V21,V22,V22bis,V29 MNP class 6 Bauds 300,1200,2400,9600,19200
- No registration, subscription or special service charges.

0898-345-090

Calls charged at 5p for 8 secs peak-rate & for 12 secs off peak

HARDWARE ORDER LINE TEL: (0934) 635228 (10 LINES)

	OUR PRICE
NETWORKS	
ETHERNET	
ETHERLINK	287.00
ETHERLINK PLUS	447.00
NOVELL	
ELS NETWORK	430.00
ADVANCED NETWORK (2.12)	1500.00
SFT V2.11	3250.00

COMPLETE SYSTEMS	
SYSTEM 1	
ADVANCED NETWORK 2.12 SFT	
4 WORKSTATIONS	
386 FILESERVER	6500.00
SYSTEM 2	
ADVANCED NETWORK 2.12	
4 WORKSTATIONS	
386 FILESERVER	5550.00
SYSTEM 3	
ELS II	
4 WORKSTATIONS	
386 FILESERVER	3900.00

	OUR PRICE
PLOTTERS AND SCANNERS	
AST TURBOSCAN	995.00
AST TURBOCAN (FLATBED)	1095.00
HP 7550	2999.00
HP 7440 A4 8PEN	799.00
ROLAND 885 A3 8PEN	995.00
ROLAND 990 A3 8PEN	1100.00

	OUR PRICE
DIGITISERS	
SUMMASKETCH 1201	365.00
SUMMASKETCH PROF. 181	198.00

	OUR PRICE
ADD-ON CARDS	
HERCULES MONO PLUS	149.00
HERCULES COLOUR	129.00
IN-COLOUR CARD	269.00
ORCHID TURBO EGA	499.00
TINY TURBO 286	399.00
JET 386	799.00
DESIGNER VGA	239.00
DESIGNER VGA 2	365.00
TWIN TURBO 12	349.00
J LASER 1 (CANON)	159.00
J LASER 2 (RICOH)	239.00
VEGA	275.00
VEGA DELUXE	325.00
VEGA VGA	299.00

	OUR PRICE
PRINTERS	
CITIZEN	
120 D (120/25)	135.00
180 D (180/25)	150.00
MSP 50 (300/60)	329.00
MSP 55 (300/60)	449.00
PREMIERE 35 (D/WHEEL)	469.00
OVERTURE 110 LASER	099.00
MSP 15	299.00

DICONIX	
150P INKSET PORTABLE	261.00
150P CARRYING CASE	24.00
INKSET PAPER (1000 sheets)	30.00

HEWLETT PACKARD	
HP LASERJET II	1399.00
1MB MEMORY BOARD	279.00
2MB MEMORY BOARD	555.00
4MB MEMORY BOARD	1132.00
TONER CARTRIDGE	78.00
FONT CARTRIDGE A/C/D/E/G	112.00
FONT CARTRIDGE B/F/J/L/M/N/P/Q/T	173.00

NEC	
P2200 80 COL COLOUR	259.00
P6+ (265/90 CPS)	400.00
P7+ (265/90 CPS)	525.00
P560 COLOUR	795.00
LC 850 LASER PRINTER	1095.00
P960XL (384/128 CPS)	899.00

OKI (MICROLINE)	
182 (120/60 CPS)	185.00
192+ (240/33 CPS)	280.00
193+ (240/33 CPS)	385.00

292 (300/100 CPS)	429.00
293 (300/100 CPS)	579.00
294 (400/100 CPS)	789.00
LASERLINE 6	1289.00
HP LASERJET PLUS MODULE	244.00
FONT CARTRIDGE	107.00

	OUR PRICE
COMPUTERS	
AST	
PREMIUM 286 14 M/B	1999.00
PREMIUM 286 80 M/B	1150.00
PREMIUM 286 90 M/B	1499.00
PREMIUM 286 120 M/B	1650.00
PREMIUM 286 170 M/B	2332.00
PREMIUM 386 340 M/B	2999.00
PREMIUM 386 390 M/B	4150.00

AHKTER	
XT (M) 20 M/B	889.00
XT (E) 20 M/B	1185.00
SMALL FOOTPRINT XT	
MONO	867.00
EGA	1173.00
286 (M) 20 M/B	1293.00
286 (M) 40 M/B	1723.00
386 (M) 20 M/B	2890.00

HYUNDAI	
XT (EGA) 30M	1062.00
FULL RANGE AVAILABLE	

SAMSUNG	
XT (M) 20 M/B	825.00
XT (M) 40 M/B	885.00
XT (E) 20 M/B	1123.00
XT (E) 40 M/B	1183.00
AT (5500) (M) 20 M/B	1209.00
AT (5500) (E) 20 M/B	1453.00
AT (5500) (M) 40 M/B	1273.00
AT (5500) (M) 40 M/B	1543.00
386 (5800) (M) 34 M/B	2593.00
386 (5800) (M) 40 M/B	2655.00
386 (5800) (M) 70 M/B	2713.00
386 (5800) (E) 34 M/B	2833.00
386 (5800) (E) 40 M/B	2895.00
386 (5800) (E) 70 M/B	2955.00

	OUR PRICE
LAPTOPS	
SHARP	
PC 4502 D/D 640K	886.00
PC 4521 20 M/B 640K	1395.00
PC 7202 D/D 640K AT	1499.00
PC 7221 20 M/B 640K AT	1599.00

THIB	
T1000	750.00
T1000/20	750.00
T1100 (112K)	850.00
T1100 PLUS (640K SV WLT)	999.00
T1200 (640K)	1799.00
T3100 (640K) 40 M/B	1850.00
T3200 (720K) 40 M/B	2899.00
T5100 (80386) 60 M/B	3329.00
T1000 CARRY CASE	31.00
T3100 2 M/B EXTENDED MEMORY	625.00
T3200 3 M/B MEMORY CARD	887.00
T5100 2 M/B MEMORY CARD	678.00

	OUR PRICE
MONITORS	
NEC	
MULTISYNC 11 (14")	424.00
MULTISYNC PLUS (15")	668.00
MULTISYNC XL (20")	1398.00

AMDEX	
V3IDA	90.00
V1280	599.00
V410 (AMBER/WHITE)	128.00
V410 (GREEN)	128.00
COLOUR 732	379.00
LASERDRIVE 1	499.00

PRINCETON GRAPHICS	
MAX 12E	137.00
HX 12	365.00
HX 12E	399.00
ULTRASYN	425.00

	OUR PRICE
PERIPHERALS	
KURTA	
PENMOUSE PLUS	145.00
SERIES 1 TABLET (12 x 12)	382.00
LOGITECH	
C7 BUS/SERIAL MOUSE	65.00
PUBLISHER MOUSE	98.00
HI-RES MOUSE	82.00

MICROSOFT	
SERIAL/BUS MOUSE (PC PAINTBRUSH)	95.00
MACH 10 WINDOWS/MOUSE	265.00

MINISCRIBE	
3053 40 M/B (28 hrs)	449.00
3650 40 M/B (65 hrs)	285.00

POLARIOD	
POLARIOD PALLETTE	1199.00
POLARIOD PALLETTE PLUS (EGA)	1799.00

	OUR PRICE
COMPUTER BOOKS	

INTERACTIVE TRAINING SOFTWARE
Interactive training courses are a natural and convenient way to learn about Computer Operation, Spreadsheets and Integrated Software, Database Management and Word Processing. Whether you're a new computer user or an experienced professional looking to refresh your skills, Interactive training is the most effective way learn.

DATABASE MANAGEMENT SYSTEMS	
TEACH YOURSELF DBASE II	65.00
DBASE III	65.00
TEACH YOURSELF DBASE III	65.00
TEACH YOURSELF DBASE III PLUS	65.00
DBASE III PLUS	65.00
HOW TO USE DBASE III PLUS	99.00
TEACH YOURSELF PARADOX	65.00
TEACH YOURSELF RBASE 5000	65.00

WORD PROCESSING	
TEACH YOURSELF DISPLAYWRITE 3	65.00
HOW TO USE DISPLAYWRITE 4	85.00
TEACH YOURSELF DISPLAYWRITE 4	65.00
TEACH YOURSELF WORDPERFECT	65.00
WORDPERFECT	65.00
HOW TO USE WORDPERFECT	85.00
TEACH YOURSELF WORDSTAR 3.3	65.00
TEACH YOURSELF WORDSTAR 2000 PLUS	65.00
TEACH YOURSELF WORDSTAR PROF.	65.00

SPREADSHEETS	
TEACH YOURSELF LOTUS 1-2-3	65.00
HOW TO USE LOTUS 1-2-3	85.00
LOTUS 1-2-3	65.00
ADVANCED 1-2-3	99.00
TEACH YOURSELF 1-2-3 MACROS	69.00
MANAGING WITH LOTUS 1-2-3	65.00
TEACH YOURSELF SUPERCALC 3	65.00
TEACH YOURSELF SUPERCALC 4	65.00
MULTIPLAN (PC/MAC)	65.00

INTEGRATED	
TEACH YOURSELF SYMPHONY	65.00
TEACH YOURSELF EXCEL (MAC)	65.00
TEACH YOURSELF JAZZ (MAC)	65.00
TEACH YOURSELF ENABLE	65.00

OPERATING SYSTEMS/COMPUTERS	
HOW TO USE YOUR PC (AT/XT)	43.00
HOW TO USE YOUR IBM PS/2	43.00
MAC COACH	65.00
PC INSTRUCTOR	46.00
PROFESSOR DOS	55.00
TEACH YOURSELF CP/M	43.00
TEACH YOURSELF DOS 3.2	43.00
HOW TO USE MS-DOS	85.00
SMART GUIDE FOR DOS	21.70
TUTORIAL SET	90.00
PROFESSOR PIXEL	55.00
HOW TO OPERATE IBM PS/2	85.00
HOW TO USE YOUR APPLE IIE	43.00

GENERAL	
INTRODUCTION TO BUSINESS SOFTWARE	43.00
INTRODUCTION TO WORD PROCESSING	43.00
INTRO TO DATABASE MANAGEMENT	43.00
TYPING INSTRUCTOR	46.00
TYPING TUTOR	43.00
ACCOUNTING	65.00
PROJECT MANAGEMENT	65.00
TEACH YOURSELF PROJECT MANAGEMENT	69.00
XEROX VENTURA PUBLISHER	149.00

HUNDREDS OF OTHER TITLES AVAILABLE.

EXPORT ENQUIRIES WELCOME. TRADE ENQUIRIES WELCOME.

ALL PRICES ARE C.W.O. OR CREDIT CARD AND SUBJECT TO OUR TERMS AND CONDITIONS. ACCEPTED AT OUR DISCRETION, AND BOUND BY OUR TERMS AND CONDITIONS.

ALL RETURNS MUST BE AUTHORISED BY TECHNICAL DEPARTMENT. NON VALID RETURNS SUBJECT TO 10% RESTOCKING CHARGE.

ALL SOFTWARE IS MANUFACTURERS WARRANTY ONLY. ALL PRICES EXCLUDE VAT & CARRIAGE WHERE APPLICABLE. PRICES CORRECT AT TIME OF GOING TO PRESS.

Training Installation Support

Soft Ware

AZTECH

SOFTWARE ORDER LINE TEL: (0934) 614242 (8 LINES)

	OUR PRICE
WORD PROCESSING	
PLAYWRITE 4.0	249.00
V1 FIRST WORD PLUS 2.0	94.00
AMMATIK III 2.0	32.00
ANDVIEW	112.00
GUS MANUSCRIPT 2.0	235.00
GUS REPORTWRITER 1.01	59.00
WORD 4.0	180.00
LTIMATE ADVANTAGE II 1.0	220.00
.S. PROFESSIONAL WRITE 2.0	90.00
A WRITE 1.01	82.00
ART SPELL CHECKER	53.00
RINT 1.0	84.00
RNADO 1.83	48.00
RNADO W/LIBRARY	62.00
LKSWRITER 3 1.0	120.00
LKSWRITER DELUX PLUS 1.0	50.00
LKSWRITER SCIENTIFIC	185.00
BSTER NEW WORLD THESAURUS 1.03	28.00
BSTER NEW WORLD WRITER 1.04	42.00
RDPERFECT 4.2	170.00
RDPERFECT 4.2 (3 1/2")	170.00
RDPERFECT 5.0	180.00
RDPERFECT 5.0 (3 1/2")	192.00
RDPERFECT EXECUTIVE 1.0	94.00
RDPERFECT LIBRARY 2.0	85.00
RDPERFECT OFFICE	185.00
RDSTAR 2000 PLUS LEGAL	250.00
RDSTAR 2000 PLUS PERSONAL 3.0	190.00
RDSTAR PROFESSIONAL 5.0	113.00

	OUR PRICE
COMMUNICATIONS	
OOKLYN BRIDGE W/CABLE	79.00
RBON COPY PLUS 5.0	82.00
OSSTALK MARK IV 1.0	95.00
OSSTALK MARK XVI 3.61	79.00
RROR II 3.6	49.00
HARTCOM II 3.0	70.00
HARTCOM III 1.0	115.00

	OUR PRICE
SPREAD SHEETS	
MBRIDGE ANALYSER 2.02	72.00
VELIN PLUS 2.01	118.00
TUS 1-2-3 (NON COPY PROJECT) 2.01	225.00
S EXCEL 2.0	235.00
\$ MULTIPLAN 3.04	100.00
TE-IT PLUS 1.00	49.00
F.S. PROFESSIONAL PLAN 1.02	50.00
AN PERFECT 3.0	134.00
JPERCALC 4 1.0	220.00
? PLANNER 1.37	48.00
? PLANNER PLUS 2.0	92.00

	OUR PRICE
PROJECT MANAGEMENT	
ARION PERSONAL DEVELOPER	85.00
ARION PROFESSIONAL DEVELOPER	325.00
ARVARD TOTAL PROJECT MANAGER II 2.01	248.00
S PROJECT 4.0	228.00
JPER PROJECT EXPERT 1.0	305.00
IMELINE 2.0	192.00
IMELINE 3.0	245.00
IMELINE GRAPHICS	83.00
AKE TWO MANAGER	56.00
P EXPERT 1.2	86.00

	OUR PRICE
DATA BASE	
LIPPER (SUM '87)	300.00
ORNERSTONE	44.00
ATA PERFECT 2.0	200.00
ATADBASE	349.00
IB-XL DIAMOND 1.2	80.00
OXBASE 386 2.10	215.00
OXBASE MULTIUSER 2.1	300.00
OXBASE PLUS 2.1	240.00
OXBASE RUNTIME MULTI-USER	265.00
OXBASE RUNTIME SINGLE-USER	180.00
ENIFER 2.0	145.00
ARADOX 2.0	279.00
ARADOX 386 2.0	389.00
F.S. PROFESSIONAL FILE 1.01	147.00
UATTRO 1.0	105.00
UICKSILVER DIAMOND 1.2	229.00
I. BASE CLOUT 3.02	139.00
I. BASE FOR DOS 2.1	320.00
APID FILE 1.2	132.00
REFLEX 1.14	69.00
REVELATION G-2	350.00
REVELATION ADV. BUMP DISC	184.00
REVELATION ADV. RUN TIME	85.00
REVELATION BUMP DISK	184.00

	OUR PRICE
GRAPHICS	
REVELATION RUN TIME	85.00
VP INFO 1.4	45.00

	OUR PRICE
GRAPHICS	
BOEING GRAPH 3D 4.0	155.00
CHARTMASTER	169.00
CLIP ART 1	16.00
CLIP ART 2	20.00
CLIP ART 3	16.00
DB GRAPHICS 1.0	136.00
DELUXE PAINT II	52.00
DESIGN CADD	CALL
DESIGNER 1.2	320.00
DIAGRAM MASTER 5.02	159.00
DRAFIX ONE PLUS	132.00
ENERGRAPHICS	229.00
GEM III DRAW PLUS 2.0	129.00
GEM III GRAPH	129.00
GEM III WORD CHART	85.00
GRAPH IN THE BOX 2.0	62.00
GRAPH PLUS 1.0	184.00
GRAPHICS EXPANDER 1	22.00
GRAPHICS LIBRARY 1	22.00
GRAPHICS LIBRARY 2	22.00
HARVARD GRAPHICS 2.1	215.00
HARVARD QUICK CHARTS	45.00
IN-A-VISION 1.23	210.00
LOTUS FREELANCE PLUS 2.0	254.00
LOTUS GRAPHWRITER II 1.0	258.00
LUCID 3D 2.0	72.00
MAP MASTER 6.01	173.00
MASTER PRESENTATION PACK	202.00
MATH CADD	182.00
MS CHART 3.0	190.00
PC LOGO 2.0	70.00
PC PAINTBRUSH PLUS 1.5	80.00
PRINTMASTER PLUS	27.00
PRINTSHOP	32.00
PRINTSHOP COMPANION	24.00
PRINTWORKS 1.05	34.00
PRINTWORKS FOR THE LASER 2.12	62.00
PUBLISHERS PAINTBRUSH 1.52	155.00
SIGN MASTER 5.11	115.00
VP GRAPHIX 1.0	55.00
WINDOWS DRAW (W/CLIP ART) 1.04	130.00

	OUR PRICE
INTEGRATED	
ABILITY 1.2	45.00
ABILITY PLUS 1.01	105.00
ENABLE 2.0	290.00
FRAMEWORK III 1.0	340.00
GEM COLLECTION	65.00
INTEGRATED 7	55.00
LOTUS SYMPHONY 2.0	350.00
MS WORKS 1.05	78.00
P.F.S. FIRST CHOICE 2.0	65.00
Q & A 3.0	161.00
SMART SYSTEM 3.1	345.00

	OUR PRICE
DESK TOP PUBLISHING	
BYLINE 1.0	125.00
FONTASY NEW VERNON 3.0	54.00
FIRST PUBLISHER BUSINESS SYMBOLS	24.00
FIRST PUBLISHER ART GALLERY 1.0	89.00
GEM DESKTOP PUBLISHER 2.0	122.00
NEWSMASTER II	45.00
NEWSROOM II	45.00
NEWSROOM	48.00
NEWSROOM PROFESSIONAL	56.00
PAGE PERFECT	209.00
PAGEMAKER 3.0	399.00
P.F.S. FIRST PUBLISHER 2.0	89.00
TIMWORKS	CALL
VENTURA PUBLISHING 2.0	399.00

	OUR PRICE
PERIPHERALS	
MS BUSS MOUSE	80.00
MS BUSS MOUSE W/CADD 1.0	98.00
MS BUSS MOUSE W/WINDOWS 2.0	105.00
MS SERIAL MOUSE	80.00

	OUR PRICE
UTILITIES	
BOOKMARK 1.2	47.00
COPY II PC 5.0	25.00
COPYWRITE	40.00
DB FAST	52.00
DESKLINK 2.0	75.00
DESQVIEW 2.01	69.00
DISK OPTIMIZER 4.0	39.00
DISK TECHNICIAN 1.0	89.00
DISK TECHNICIAN PLUS 2.0	109.00

	OUR PRICE
LANGUAGES	
DS BACKUP PLUS 1.10	37.00
EUREKA 1.0	77.00
FASTBACK 5.14	77.00
FASTBACK PLUS NEW VERSION 2.1	86.00
FELIX	95.00
FLASH	29.00
FLASHCARD (IBM)	122.00
FORMTOOL 2.01	45.00
FREEWAY ADVANCED	62.00
GOFER	37.00
LAPLINK PLUS 1.35	72.00
LAPLINK TRAVELLING SOFTWARE 2.05	65.00
LIGHTENING (NCP) 4.8	52.00
LOTUS HAL 1.0	81.00
LOTUS METRO 1.1	59.00
LOTUS AGENDA	210.00
MEMORY MATE 3.0	42.00
MS MACRO ASSEMBLER 5.1	86.00
MS WINDOWS 2.1	60.00
MS WINDOWS 386 2.10	100.00
MS WINDOWS (3 1/2") 2.03	57.00
MS WINDOWS TOOLKIT 2.1	255.00
NORTON ADVANCED EDITION 4.0	67.00
NORTON COMMANDER 2.0	36.00
NORTON EDITOR 1	34.00
NORTON UTILITIES 4.0	49.00
NOTEWORTHY 1.0	49.00
NUTSHELL 2.0	120.00
NUTSHELL PLUS 1.0	176.00
ONE DIR PLUS	42.00
PATHFINDER 4.0	42.00
PC ANYWHERE 2.14	62.00
PC FULLBACK	49.00
PC TOOL DELUXE 4.3	32.00
PIZZAZZ 2.0	35.00
QUICK CODE PLUS 1.0	105.00
QUICKEN 2.0	29.00
REMOTE 1.3	79.00
SEE MORE (LOTUS 1-2-3)	42.00
SEE MORE (SYMPHONY)	42.00
SIDEKICK (NCP) 1.5	45.00
SIDEKICK PLUS 1.0	97.00
SIDEWAYS 3.2	35.00
SMART NOTES 2.0	42.00
SMARTKEY 5.2	37.00
SQZ PLUS 1.10	49.00
SUPERKEY 1.16A	52.00
UNLOCK D PLUS	49.00
UNLOCK GAMEMASTER	25.00
UNLOCK MASTERKEY	84.00
X-TREE 2.14	30.00
X-TREE PROFESSIONAL 1.0	57.00

	OUR PRICE
LANGUAGES	
DOUBLE DOS 4.0	39.00
LATTICE C COMPILER 3.1	189.00
LETS C 4.0	39.00
MS BASIC COMPILER 3.0	142.00
MS C COMPILER	250.00
MS COBOL COMPILER 3.0	425.00
MS DOS 3.3 W/GW BASIC 3.3	76.00
MS FORTRAN COMPILER 4.1	233.00
MS QUICK BASIC (3 1/2") 4.0	64.00
MS QUICK BASIC (5 1/4") 4.0	54.00
MS QUICK C (3 1/2") 1.01	64.00
MS QUICK BASIC (5 1/4") 1.01	54.00
DOS II	39.00
RYAN McFARLAND COBOL	478.00
RYAN McFARLAND FORTRAN 2.4	304.00
TURBO BASIC 1.1	52.00
TURBO BASIC DATABASE TOOLBOX 1.0	52.00
TURBO BASIC EDITOR TOOLBOX 1.0	52.00
TURBO C 1.5	59.00
TURBO GAME WORKS 4.0	55.00
TURBO LIGHTENING 1.0	55.00
TURBO NUMERIC METHODS TOOLBOX 4.0	52.00
TURBO PASCAL 4.0	52.00
TURBO PASCAL DATABASE TOOLBOX 4.0	55.00
TURBO PASCAL DEVELOPMENT LIB 4.0	201.00
TURBO PASCAL EDITOR TOOLBOX 4.0	69.00
TURBO PROLOG 2.0	69.00
TURBO PROLOG TOOLBOX 1.0	54.00
TURBO TUTOR 4.0	39.00

	OUR PRICE
NETWORKING	
MS WORK NETWORK 4.0	200.00
MS WORK NETWORK NODE 4.0	100.00
PARADOX NETWORK 2.0	475.00
P.F.S. PROFESSIONAL LAN PACK 1.0	195.00
Q & A NETWORK NODES	140.00
R. BASE FOR DOS NETWORK 2.1	465.00
TOPS - IBM	90.00
WORD PERFECT NETWORK SERVER	270.00
WORD PERFECT ADDITIONAL USER	75.00

MEMBER OF FEDERATION OF CRAFTS AND COMMERCE.

WE ARE PLEASED TO ACCEPT THE FOLLOWING CREDIT CARDS:   

UNITS 1-3 B.W. ESTATES, OLDMIXON CRESCENT, WESTON-SUPER-MARE, AVON BS24 9AX. SEND A S.A.E. FOR A COMPLETE SOFTWARE LISTING.

Maintenance Sales Service

Head Office:
ETHIE CASTLE
ARBROATH
ANGUS DD11 5SP
SCOTLAND

HUGHES P C S

THE PORTABLE COMPUTER SPECIALISTS

All the power and more of desktops, for the Executive as well as many uses for portable diagnostics, on the factory floor and out and about for sales and promotions.



HUGHES MINI PORTABLE 88/286/386 CPU

- 1Mb RAM expandable
- LCD Supertwist backlit screens, 9", 10" or 11" 640 X 200 or 640 X 400 resolution, 3:1 or 4:1 contrast
- 5.25" 1.2Mb FD (3.5" 1.44Mb optional)
- 20/40Mb HD (65ms or 28ms)
- Clockspeeds 8088-4.77/8Mhz, 80286-8/13Mhz, 80386-8/20Mhz
- Legal BIOS
- Three free expansion slots (2 full, 1 half)
- 200W power supply, 100-240V auto-switching
- Serial/Parallel/Game and Video Port
- 86 key detachable keyboard (also language versions)
- Dimensions 40W x 24H x 20.7D (cm), Weight 10 Kgs inc.
- Portable carrying case
- Runs external colour monitor without disabling LCD screen

FROM ONLY £998 (Ex VAT)

Since being introduced to the UK market, HUGHES MINI PORTABLES have found a variety of uses in the home, in commerce and in industry. The three free user slots, two full and one half slot, allow for the insertion of interface boards enabling these versatile systems to be used for diagnostics, graphics, audit and sales display roles away from the Head Office, with direct contact being established through the public communications system. These compact and powerful systems are supplied to specifications tailored for your use.

**ALL SYSTEMS
FULLY IBM
COMPATIBLE**

INTRODUCING THE NEW HUGHES LAPTOP



- 80286 6/12Mhz
- 80287 coprocessor socket
- Real time clock/calendar
- Latest EMS driver programme
- Choice of screens: LCD/Paper White/Gas Plasma 640 x 200, 720 x 400, 640 x 400 res.
- 3.5" 1.44Mb FD
- 20/40Mb HD (65ms or 28ms)
- 12 VDC power, 90/260 VAC, full range battery backup
- Two internal expansion slots (1 full, 1 half)
- 95-key keyboard
- Dimensions 38W x 34D x 9H (cm), weight 16 lbs.
- Carrying case with shoulder strap
- 1200 baud rate modem
- External 5.25" 1.2Mb FDD available

FROM ONLY £1750 (Ex VAT)

Order by telephone using cheque or credit card:

01-236 5202 (South) or 02413 455 (North)
Fax—02413 477

All prices are exclusive of VAT and subject to availability and change without prior notice. Prices include carriage and a full 12 months parts/labour warranty.

E. & O. E. EXPORT AND EDUCATIONAL ORDERS WELCOME



USERS CLUB

THE INTERNATIONAL DISCOUNT CLUB
FOR USERS OF IBM™
AND ALL COMPATIBLE MICROCOMPUTERS

HUGE DISCOUNTS ON ALL COMPUTER PRODUCTS

RING NOW FOR YOUR CLUB CATALOGUE AND PRICE LIST

FREE

16 PAGE INTRODUCTION
AND GUIDE TO HARDWARE
SOFTWARE AND
COMPUTING TERMINOLOGY

FREE

36 PAGE INTRODUCTION
AND GUIDE TO
COMMUNICATIONS
MODEMS & ON-LINE
SERVICES

01-207 6777

NESS USERS CLUB LTD.
42A SHENLEY ROAD, BOREHAMWOOD,
HERTFORDSHIRE WD6 1DR

ATARI PC2 HD

- 512K RAM
- 30Mb H/DISK
- 4.77/8MHz
- MONO EGA
- MOUSE
- GEM



Atari PC2 HD industry standard IBM compatible desktop PC inc 512K RAM expandable to 640K, single 360K 5¼" floppy and 30Mb hard disk. Standard spec features hi-res mono, 720 x 348 amber EGA display, IBM style keyboard, parallel & RS232 ports and expansion slots. Supplied with mouse, GEM Write, Paint and Desktop plus MS-DOS 3.2 & GW BASIC.

£695^{+VAT}

Morgan Computer Co.

64-72 NEW OXFORD STREET, WC1. 01-255 2115
179 TOTTENHAM COURT ROAD, W1. 01-636 1138

THE VERTEX 286

"ANOTHER NAME FOR EXCELLENCE"

VORACIOUS PERFORMANCE
ANOREXIC PRICE

£1695
12MHz

£1895
20MHz



THE VERTEX-50LT

- 80286 8/12MHz 0 Wait State
- 640KB RAM Expandable to 2.6Mb
- 80287 Socket
- 640 x 400 2 Grey Scale Plasma Display compatible with Multisync EGA Monitor
- 1.44Mb 3.5" FDD
- 20Mb 3.5" HDD & Controller
- 1 Serial and 1 Parallel
- 120 Watt Power Supply
- 81 Key Keyboard and External Keyboard Port
- Carrying Bag with shoulder strap and Manual
- Weight approx. 6.4kg
- Dimensions 37 x 32 x 9cm

THE VERTEX-50LT .22EX

- 80286 20MHz 0 Wait State
- 1Mb RAM Expandable to 4Mb
- Support Ems 4.0 and 80287 Socket
- Page Interleaved Memory Controller
- 640 x 400 2 Grey Scale Plasma Display compatible with IBM, CGA, MGA, HGA, EGA
- 1.44Mb 3.5" FDD
- 20Mb 3.5" HDD and Controller
- 1 Parallel and 2 Serial Port (2nd optional)
- 1 Slot for Expansion Slot Box (option)
- 1 External Port for FDD (option)
- 120 Watt Power Supply
- 81 Key Keyboard and External Keyboard Port
- Carrying Bag with shoulder strap and Manual

OPTIONS: ● 4 Grey Scale Plasma Display ● 40Mb HDD ● 100Mb HDD ● External Slot Box
● External 5.25" 1.2Mb FDD ● Portable Modem ● Lan Card ●

THE PYRAMID GUARANTEE

We offer a no quibble, 30 day money back guarantee from placement of order.

★ LICENSED CREDIT BROKERS ★

PYRAMID MICRO SYSTEMS LIMITED, Bridge Mill, Holland Street
Salford M6 6EL. Fax: (061 745 8242) Telephone: 061 745 8240

THE BEST REASON FOR BUYING AN ATARI ST POOLS-SYSTEM!!™

MAIL ORDER ONLY TRADE WELCOME
INCORPORATING (POOLSBUSTER & POOLSPLANNER)
OTHERS CALL THEIR POOLS PROGRAMS ULTIMATE, WE CALL
OURS "THE" POOLS PROGRAM

There are still a couple of pools programs for the Atari ST that guarantee to you performance better than chance (?) or promise to you power? to forecast the pools the way you want. Others are asking you for disk for free demos while weeks are going by and you are missing your chance for a dividend. Nevertheless POOLS-SYSTEM still remains the only one in the market that delivers the goods. Let's have a look at some facts. Fact, user friendly and still the only one that does not require you to be some kind of a football expert or hot shot system analyser. Fact, POOLS-SYSTEM is the only one that performed even slightly during the difficult and unpredictable Australian season. Fact, 13/8/88, 4 aways out of the recommended first 6. 10 homes out of the recommended first 15. 20/8/88, start of the English season, the system trapped 9 out of the 14 score draws and all 4 no score draws. 27/8/88, 9 out of the 12 score draws and 3 out of the 6 no score draws. 4 homes out of the recommended first 6. 3/9/88, 6 homes out of the recommended first 7, 4 aways out of the recommended 6, 5 out of the 7 score draws and 2 out of the 3 no score draws. 40 correct results out of the 58 possible. Fact, all forecasted printouts available at any time for any checks. So do not waste your time with any other programs or systems. They are not going to entertain your hopes or wishes. And to top all the facts, we guarantee that POOLS-SYSTEM performs better than any other pools program in the market on any computer, because we guarantee to you that using the POOLSBUSTER in cooperation with POOLSPLANNER you are going to win the pools more than once a year. STOP PRESS!! what does the customer say: "I was very impressed with the general standard of the programs and their ease of use. I had a look around the program and worked out how to input the data without the use of the manual, which shows just how good the program structure is set out. To get to the point. The very first entry I did came up trumps with 2 lines of 21/22 points. It bought me a win of £11.80. Not bad for a first attempt. Thanks for an amazing program. Regards P.J.L.-Solihull. (Name and address withheld for obvious reasons.)

**POOLS SYSTEM (POOLSBUSTER + POOLSPLANNER)
COSTS £40.00 INCLUSIVE.**

APOLONIA SOFTWARE (TM) PRESENTS: *COMPUSHOP1* THE BEST
PRICES FOR THE ATARI ST AND THE AMIGA HARDWARE AND
SOFTWARE. JUST HAVE A LOOK AT SOME POST-XMAS PACKAGES:

Atari 1040 Games Pack

Atari 1040STFM + FREE games software worth
over £400 + Compushop1 Business Starter Pack
£459.00

as above + Pools System £469.00

Atari Mega ST DTP Pack

Mega ST4 + Mono Monitor + Laser Printer +
Fleet Street Publisher + Timeworks Desktop
Publisher + VIP Professional + Microsoft Write
+ Superbase Personal + First Word +
Megafile20 + Compushop1 Starter Kit
£2699.00

as above + Pools System £2710.00

Atari 1040 Business Pack

Atari 1040STFM + VIP Professional + Microsoft
Write + Superbase Personal + mouse mat + four
Compushop1 Starter Disks
£449.00

as above + Pools System £459.00

Atari 1040STFM as above + Mono Monitor:
£539.00

as above + Pools System £549.00

Atari 520 Superpack

Atari 520STFM + FREE £400 worth of software
+ one extra microswitch joystick + mouse mat +
Compushop1 Business Starter Pack
£349.00

as above + Pools System £359.00

Make cheques/Postal Orders payable to: Apolonia Software, and send to
"Apolonia Software, Dept CMCTR, South Bank Business Centre,
Unit 25(M), Thames House, 140 Battersea Park Road, London SW11 4NB.
Mail Order only. Speedy delivery. No hidden extras!



Apolonia Software

The company that cares! Phone 01-738 8400

APRICOT → IBM?



Were you using an APRICOT in the past? (Do you still have one?)

If you've changed to an IBM compatible you've probably had to leave a lot of programs and valuable data on the old machine.

APE (the Ansible Apricot Emulator) gives you full access to this material. It will run most Apricot software and datafiles on IBMs and clones: the 'Super' pack, dBase, Pegasus, Sage, Wordstar, etc.

(A bonus: If your compatible has a 3.5" disk drive you can go on using your old Apricot disks. Two-way data transfer is possible at last!)

The latest APE release includes an Apricot-style keyboard calculator; full AT compatibility; screen colour options; DOS-version checker; keyboard editor.

APE costs £86.25, inclusive of VAT, p&p and full support. Why pay for expensive upgrades when you already have everything you need?

(Incidentally, if you intend keeping your Apricot, we continue to operate a comprehensive Apricot service. PC, Xi, Xen, F Series or Portable. Ask for details.)

ANSIBLE INFORMATION

94 London Road
Reading, Berkshire, RG1 5AU. Tel: 0672 62576



'COMPUTEREYES' VIDEO IMAGE CAPTURE



COMPUTEREYES is a low cost, high resolution, professional image capture system which will digitise and store on disc images from any video source, including camera, video recorder, video disc and TV. Versions are available for:

PC and compatibles: half size board supports CGA, EGA, VGA and MCGA	£249
Apple IIe and II+ plug-in board, also IIc	£129
Apple IIgs	£148
Software for double hi-res and image processing	£29
Atari ST 640 x 400 in high resolution mode	£129
Commodore 64/128	£89
Atari 800/800XL/130	£79

(Prices exclude VAT and carriage at £3.45)

* Complete systems available including high quality b/w camera and connecting cable be provided to order

* COMPUTEREYES software is menu driven and modular, allowing personal customisation of programs. Disk file formats suit most DTP and graphics software.

* Applications include graphic art, pattern recognition, spatial measurements, desktop publishing, education, information technology, entertainment, etc.

Stem Computing

412 Perth Road, Dundee DD2 1JQ

CHINON DESKSCAN 2000 SETS THE AFFORDABLE SCANDARD

The latest optical technology from CHINON presents an elegantly simple flatbed image scanner, DESKSCAN 2000. The exclusively engineered lens system eliminates many unnecessary parts, making a very reliable low-power scanner. It does not require an internal light source; it adapts itself to normal room lighting conditions. Whether for Word Processing, Desktop publishing or other applications, DESKSCAN 2000 makes it easy for you to input almost ANYTHING into your computer.

- Scans Text or Images
- Versatile Software compatibility
- Adjusts automatically to room lighting
- Easy to Operate
- Compact & Lightweight
- 200 dpi resolution
- Flat Bed scanning
- Serial & Parallel interface

PRICE **£599** + VAT
SALES HOTLINE:

01-997 6750



FIRDATA LTD

RESEARCH HOUSE, FRASER ROAD, PERIVALE, MIDDX UB6 7AQ
TEL: 01-997 6750 FAX: 01-991 0252

M. S. D.

HARDWARE

APRICOT		ZENITH		COMPAQ	
XEN S PC/30Mb VGA P/W	£1758	Z 159 PC/XT DD Mono	£625	Deskpro 286/12 20Mb Mono	POA
XEN S 240X 44Mb VGA P/W	£2638	Z 159 PC/XT 20Mb Mono	£895	Deskpro 286/12 40Mb Mono	POA
XEN S 250/47Mb VGA P/W	£2158	Z 286 20Mb P/W	£1436	Deskpro 386S 20Mb inc VGA	POA
QI 330 VGA P/W	£2238	Supersport DD Port	£1116	New SLT 286 VGA 20Mb	POA
QI 350 VGA P/W	£2558	Supersport 20Mb Port	£2076	Deskpro 386/25MHz Mono	POA
QI 650 VGA P/W	£3038	Supersport 286 20Mb	£2556	Portable 2 Twin	POA
QI 660 VGA P/W	£3518	Supersport 386 40Mb	£3996	Portable 2 20Mb	POA
QI 6601 VGA P/W	£4318			Portable 3 20Mb	POA
OLIVETTI		TANDON		TOSHIBA	
Call for prices		Call for prices		Call for prices	
AMSTRAD		TULIP		EPSON	
Call for prices		Call for prices		Call for prices	

PRINTERS

EPSON		NEC		BROTHER	
LX800 9 Pin Dot Matrix	£195	P2200 9 Pin Dot Matrix	£275	2518 Dot Matrix	£716
FX850 9 Pin Dot Matrix	£321	P6+ 24 Pin	£454	4018 Dot Matrix	£1196
FX1050 9 Pin Dot Matrix	£419	P7+ 24 Pin	£587		
LQ1050 24 Pin	£594				
LQ2550 24 Pin	£909				
SQ2550 24 Pin	£944				
DFX500	£1189				

CALL FOR PRICES CITIZEN CALL FOR PRICES
CALL FOR PRICES H.PACKARD CALL FOR PRICES

MANY MORE AVAILABLE CALL FOR PRICES

SOFTWARE

(Including Free Telephone Support)

PEGASUS		PEGASUS STATIONERY	
Pegasus Single User	£160 per mod	Call for Free Sample Sets	
Pegasus Senior	POA		
Pegasus Xenix	POA		
SAGE		LOTUS	
Sage Accountant	£120	Lotus 1.2.3 Ver 2.01	£245
Sage Accountant Plus	£150	Lotus Agenda	£195
Sage Fin. Controller	£210	Lotus Symphony	£360
		Over 4000 titles available	
NOVELL		XENIX	
We offer unbiased, expert advice.		Xenix 286 and 386 operating systems available.	
Novell is the leading network, offering,		Full technical advice and support from qualified staff.	
high security			

For any further information contact, Joanne or Sadie on

TELEPHONE: 0604 790700

FAX: 0604 47424

MEDIA HOUSE, 78 TENTER ROAD, NORTHAMPTON NN3 1XG.

ALL PRICES ARE EXCLUSIVE OF VAT, AND ARE SUBJECT TO AVAILABILITY

Computers by Post

MAIL ORDER LEADERS SINCE 1982

LOWEST U.K. PRICES GUARANTEED

PRINTER RIBBONS

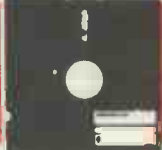
ACORN			
AP80	2+	6+	12+
AP100	£2.40	£2.20	£1.90
AMSTRAD			
8256/8512/LQ3500 MS	£4.00	£3.80	£3.60
8256/8512/LQ3500 FA	£3.30	£3.25	£3.10
8256/8512/LQ3500 Blue	£4.25	£3.95	£3.75
8256/8512/LQ3500 Red	£4.25	£3.95	£3.75
DMP 2000/3000/3160/3250	£2.40	£2.20	£2.00
DMP 4000	£3.85	£3.70	£3.40
PCW 9512 MS	£3.20	£3.00	£2.60
PCW 9512 FA	£3.70	£3.30	£2.90
ANADEX			
9500	£5.00	£4.45	£4.35
BROTHER			
HR5	£3.00	£2.80	£2.60
HR15/20/25/35/40 MS	£2.80	£2.65	£2.30
HR15/20/25/35/40 FA	£3.10	£2.70	£2.40
HR15/20/25/35/40 CO	£1.70	£1.60	£1.50
M1009/M1109/M1209	£3.10	£2.70	£2.50
M1409	£4.25	£4.05	£3.80
M1509/1709	£4.70	£4.25	£4.00
EP44	£2.90	£2.50	£2.30
C. ITOH			
8510	£3.55	£3.35	£3.10
CANON			
PJ1080 Black	£9.95	£9.75	£9.55
PJ1080 Colour	£13.95	£13.75	£13.55
PW1080/1156	£2.50	£2.40	£2.20
PW1080/1156 Blue	£3.40	£3.30	£3.20
PW1080/1156 Red	£3.40	£3.30	£3.20
CENTRONICS			
GLP 1/2	£3.10	£2.70	£2.50
CITIZEN			
1200/LSPI0	£3.25	£3.10	£2.90

HQP40	2+	6+	12+
HQP40	£8.50	£8.00	£7.40
LSPI00	£21.00	£19.00	£18.00
MSP10E/40/50	£3.25	£3.10	£2.90
MSP10E/40/50 Blue	£2.50	£2.10	£1.90
MSP10E/40/50 Red	£3.70	£3.00	£2.80
MSP15E/25/45/55	£3.30	£3.10	£2.80
PREMIERE 35 MS	£2.40	£2.25	£2.05
PREMIERE 35 FA	£2.75	£2.80	£2.60
COMMODORE			
MPS 801	£2.30	£2.15	£2.05
MPS 802 MS	£3.50	£2.70	£2.50
MPS 802 FA	£4.50	£4.30	£4.00
MPS 803	£3.10	£2.70	£2.50
MPS 1000	£2.35	£2.10	£1.90
DPS 1101 MS	£2.40	£2.30	£2.10
DPS 1101 CO	£1.60	£1.30	£1.20
DPS 1101 SS	£2.20	£1.70	£1.55
1516/1521/1526/4023 MS	£3.50	£2.70	£2.50
1516/1521/1526/4023 FA	£4.50	£4.30	£4.00
DAISYSTEP			
2000 MS	£2.60	£2.40	£2.20
2000 FA	£2.90	£2.80	£2.60
DIABLO			
HYTYPE II FA	£2.75	£2.65	£2.45
HYTYPE II MS	£2.35	£2.25	£2.05
EPSON			
LX800/FX800 FA	£2.50	£2.10	£1.90
LX800/FX800 Blue	£3.70	£3.00	£2.80
LX800/FX800 Red	£3.70	£3.00	£2.80
MX/FX/RX 80 FA	£2.50	£2.10	£1.90
MX/FX/RX 80 Blue	£3.70	£3.00	£2.80
MX/FX/RX 80 Red	£3.70	£3.00	£2.80
FX105/FX1000	£3.30	£3.10	£2.80
MX/FX/RX100	£3.30	£3.10	£2.80
LQ 1500	£2.85	£2.70	£2.50
LQ500/LQ800/LQ850	£3.25	£3.05	£2.80
LQ1000/LQ1050	£3.80	£3.60	£3.35
LQ2500/LQ2500+	£5.95	£5.75	£5.55
LX80/86/CX80	£2.35	£2.10	£1.90
EX800/EX1000	£4.70	£4.40	£4.00
SQ2500	£23.50		each
IBM			
PROPRINT XL	£8.45	£8.15	£7.95

PROPRINT 4201			
JUKI	2+	6+	12+
6100 SS	£1.75	£1.60	£1.50
6100 MS	£2.40	£2.30	£2.20
6100 CO	£1.60	£1.30	£1.20
6200/6300/6500 FA	£2.75	£2.65	£2.45
6200/6300/6500 MS	£2.35	£2.25	£2.05
2200/6000 CO	£2.90	£2.50	£2.30
5510 FA	£2.50	£2.10	£1.90
5510 B/R	£3.70	£3.00	£2.80
KAGA			
KP 810/910	£2.50	£2.40	£2.20
KP 810/910 Blue	£3.40	£3.30	£3.20
KP 810/910 Red	£3.40	£3.30	£3.20
MICRO P.			
MP135/480 FA	£4.50	£4.30	£4.00
MP135/480 MS	£3.50	£2.70	£2.50
MP165/200	£2.50	£2.10	£1.90
MP165/200 Blue	£3.70	£3.00	£2.80
MP165/200 Red	£3.70	£3.00	£2.80
MP40/26 FA	£2.75	£2.65	£2.45
MP40/26 MS	£2.35	£2.25	£2.05
M/TALLY			
MT80 MS	£3.50	£2.70	£2.50
MT80 FA	£4.50	£4.30	£4.00
MT85 FA	£4.20	£4.00	£3.80
NEC			
P17/26	£3.90	£3.60	£3.20
P37	£5.10	£4.90	£4.60
P5/P5XL/P9XL	£4.70	£4.40	£4.10
5500/7700 FA	£3.65	£3.50	£3.30
5500/7700 MS	£2.65	£2.50	£2.30
3500 FA	£3.60	£3.40	£3.20
3500 MS	£2.70	£2.55	£2.35
P2200	£5.90	£5.70	£5.50
OKI			
80/82	£1.20	£0.90	£0.80
182/183/192/193	£2.75	£2.55	£2.40
OKIMATE 20 Block	£6.60	£6.20	£6.00
OKIMATE 20 Colour	£7.00	£6.50	£6.20
PANASONIC			
KXP 1080/1/2/3	£3.95	£3.80	£3.60
KXP 1592/1595	£3.95	£3.80	£3.60
3131/3151 MS	£2.35	£2.25	£2.05
3131/3151 FA	£2.75	£2.65	£2.45

QUENDATA			
1120 MS	£2.60	£2.40	£2.20
1120 FA	£2.90	£2.80	£2.60
QUME			
Sprint 7/9 MS	£2.60	£2.40	£2.20
Sprint 7/9 FA	£2.90	£2.80	£2.60
IV MS	£2.60	£2.40	£2.20
IV FA	£2.90	£2.80	£2.60
RITEMAN			
INFORUNNER	£6.50	£6.30	£6.10
RICOH			
1300/1500 MS	£2.50	£2.40	£2.20
SEIKOSHA			
SP800/SP1000 MS	£4.00	£3.80	£3.60
SP800/SP1000 FA	£3.30	£3.25	£3.10
SP800/SP1000 Blue	£4.25	£3.95	£3.75
SP800/SP1000 Red	£4.25	£3.95	£3.75
GP50	£5.80	£5.50	£5.30
GP80	£2.40	£2.20	£1.90
GP100/250	£2.40	£2.20	£1.90
GP500/550	£2.30	£2.15	£2.05
BP5420	£7.95	£7.75	£7.55
CP700 Black	£12.00	each	
CP700 Colour	£16.00	each	
SHINWA			
CP80 MS	£3.50	£2.70	£2.50
CP80 FA	£4.50	£4.30	£4.00
SMITH CORONA			
D100/D200	£4.60	£4.20	£3.70
D300	£2.50	£2.40	£2.15
EL1000/TP1 FA	£5.70	£5.25	£4.95
EL1000/TP1 CO	£5.00	£4.70	£4.50
EL1000/TP1 MS	£12.50	£10.70	£9.95
Fastext 80	£11.70	£11.20	£10.90
SILVER REED			
EXP400/500/550 MS	£3.00	£2.85	£2.65
EXP400/500/550 CO	£2.80	£2.60	£2.40
STAR			
510/DP510/DP515	£1.20	£0.90	£0.80
GEMINI 1X/SG10/SG15	£1.20	£0.90	£0.80
LC10	£3.90	£3.70	£3.50
LC10 Colour	£6.50	£6.00	£5.50
LC2410	£6.50	£5.90	£5.50
NL10/ND10/NR10	£4.50	£4.25	£4.00
NB24-10	£6.50	£6.20	£6.00
NB24-15/NB-15	£7.00	£6.80	£6.60
NX15/ND15/NR15	£7.00	£6.80	£6.60
RADIX 10	£4.70	£4.30	£4.10
RADIX 15	£4.70	£4.30	£4.10
POWERTYPE MS	£2.35	£2.25	£2.05
POWERTYPE FA	£2.75	£2.65	£2.45
UCHIDA			
DWP/DWX305 FA	£2.90	£2.80	£2.60
DWP/DWX305 MS	£2.60	£2.40	£2.20

FLOPPY DISKS



5.25" BOXES OF 10 DISKS

JVC Inc Plastic Case				
MD-2D	D/size D/dens 40TR	£11.99	£11.50	£11.25
MD-2DD	D/size Q/dens 80TR	£15.99	£15.50	£15.25
MD-2DHD	D/size H/dens 1.6MB	£26.99	£25.99	£25.49
DYSAN				
MD-2D	D/size D/dens 40TR	£8.99	£8.50	£8.25
MD-2DD	D/size Q/dens 80TR	£10.50	£10.00	£9.75
MD-2HD	D/size H/dens 1.6MB	£16.50	£16.00	£14.95
MEMOREX Special offer per box of 25 disks				
MD-2D	D/size D/dens 40TR	£23.00	£21.00	£19.00
VERBATIM-DATALIFE				
MD550	D/size D/dens 40TR	£9.00	£8.50	£8.00
MD557	D/size Q/dens 80TR	£12.00	£11.20	£11.20
MD2HD	D/size H/dens 1.6MB	£17.50	£17.00	£16.50
3M				
MD2D	D/size D/dens 40TR	£9.99	£9.50	£9.25
MD2DD	D/size Q/dens 80TR	£13.50	£13.00	£12.50
MD2HD	D/size H/dens 1.6MB	£19.00	£18.50	£16.50
3.5" BOXES OF 10 DISKS				
SONY	S/size D/dens	£14.99	£14.00	£13.00
SONY/VERBATIM/DYSAN				
	D/size D/dens	£14.79	£14.00	£13.00
SONY HIGH DENSITY				
	1.4Mb	£33.00	£31.00	£29.00

3"			
CF2	5 Disks	£1.99 each	£9.95 pack
CF2	10 Disks	£1.79 each	£17.90 pack
CF2	20 Disks	£1.59 each	£31.80 pack

BULK DISKS

PRICE PER 10 DISKS				
5 1/4" SS/DD 40TR	20	50	100	250
	£8.00	£16.00	£30.00	£62.50
5 1/4" DS/DD 40TR	£8.40	£17.00	£31.00	£65.00
5 1/4" DS/DD 80TR	£10.60	£20.00	£37.00	£77.50
5 1/4" 1.6Mb	£34.60	£62.00	£116.00	£255.00
Life time guarantee. Disks include envelopes, labels, hub rings and write protect tabs.				
	10	20	50	100
3 1/2" DS/DD	£8.60	£16.40	40.00	73.00
Life time guarantee.				

DATA CARTRIDGES

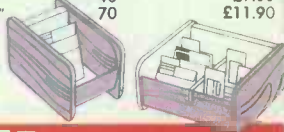
1+				
DC100A	£13.00	£12.00	£11.30	£10.50
DC1000	£13.00	£12.50	£11.50	£11.00
DC2000	£17.50	£16.00	£15.30	£14.40
DC3000XLP	£18.40	£17.00	£15.90	£15.00
DC600A	£19.70	£18.30	£17.00	£16.00
DC600XTD	£25.50	£23.90	£22.30	£20.90

DISK STORAGE

LOCKABLE DISK BOXES

MODEL	SIZE	CAPACITY	PRICE
DD40L	3 7/8"	40	£6.50
DD80	3 5/8"	80	£9.90
DD50	5 1/4"	50	£6.50
DD70	5 1/4"	70	£8.50
DD100	5 1/4"	100	£9.90
DBW31*	3 1/2"	40	£9.00
DBW51*	5 1/4"	70	£11.90

(*Wood with Oak veneer)



PRINTER STATIONARY

*PLAIN WHITE WITH MICRO-PERF EDGES				
SIZE	GSM	QUANTITY	1 BOX	PRICE 2 BOXES
11 x 9 1/2"	60	2000	£14.50	£14.00
11 x 9 1/2"	70	2000	£17.50	£16.50
11 x 9 1/2"	70	2000	£22.90	£20.75
EXACT A4*	90	1000	£15.20	£13.25
11 x 14 1/2"	60	2000	£20.00	£18.00
11 x 14 1/2"	70	2000	£22.00	£20.00
Diconix		250 Sheets	£4.90	
		2000 Sheets	£25	

ACCESSORIES

Copy Holders	
Desktop Copy Holder	£9.95
Desktop Mounted Copy Holder	£14.95
Keyboard Draws	
Metal Keyboard Draw	£17.95
Wooden Keyboard Draw	£21.95
Screen Filters (Anti-Glare)	
12" Mono Filter	£7.95
14" Mono Filter	£8.95
14" Colour Filter	£9.95
Acoustic Hoods	
Acoustic Hood, 80column	£59
Acoustic Hood, 132 column	£75
Printer Stand	
With paper holder	£14.95
CPU Stand	
	£9.95
Miscellaneous	
IBM Keyboard Extension Cable	£3.95
IBM Monitor Extension Cable	£3.95
5 1/4" Disk Cleaning Kit	£4.95
3 1/2" Disk Cleaning Kit	£5.95
Mousemat	£2.99
Keyboard Cleaning Kit	£4.99

TURN OVER FOR MORE PAGES PACKED WITH THE BEST COMPUTER PRICES IN THE UK PLUS MAIL ORDER DETAILS

Computers by Post

LOWEST U.K. PRICES GUARANTEED

MAIL ORDER LEADERS
SINCE 1982

PRINTERS

THIS MONTH'S SPECIAL OFFERS
NEC P2200 inc. sheet feed £259
Star NB15 inc. sheet feed £569
Epson LX800 £163

AMSTRAD LQ3500di £248 DMP4000 £228 LQ5000di £336	MSP15E £188 MSP40 £268 MSP45 £337 MSP55 £319 PREMIER 35 £368 HQP40 £337 HQP45 £323 DICONIX £257 EPSON LX800 £163 FX850 £284 EX800 £449 LQ850 £256 FX1050 £409 EX1000 inc Col. Kit £383 LQ1050 £489 LQ2550 £547 DFX5000 £858 £1098	SQ2500 £899 HEWLETT PACKARD THINKJET £308 QUIETJET £354 QUIETJET+ £424 DESKJET £548 PAINTJET £689 RUGGED WRITER £894 JUKI 6200 £325 6300 £577 MICRO-P MPI 35+ £114 NEC P2200 inc Sheet Fd £259 P6+ £424 P7+ £538 PANASONIC 1081 £128 1124 £319	1592 £279 1595 £369 1540 £418 KXP3151 £338 STAR LC10 £159 LC10 COLOUR £198 LC24/10 £259 NX15 £264 ND10 £278 ND15 £329 NR10 £344 NR15 £389 NB24-10 £424 NB24-15 £514 NB15 inc Sheet Fd £569	STAR LC10 £159 LC10 COLOUR £198 LC24/10 £259 NX15 £264 ND10 £278 ND15 £329 NR10 £344 NR15 £389 NB24-10 £424 NB24-15 £514 NB15 inc Sheet Fd £569
--	---	--	--	---

LASER PRINTERS

THIS MONTH'S SPECIAL OFFERS
Epson GQ 3500 £1099.00
HP Laser Jet II £1319.00

AST TURBO POSTSCRIPT 8PPM £2599 BROTHER HL-8 QS POSTSCRIPT 8PPM £3789 BROTHER HL-8 8PPM £1448 CANON LBP8-II 8PPM £1298 CANON LBP8-IIT 8PPM £1737 CANON LBP8-IIR 8PPM £1899 CITIZEN OVERTURE 106 6PPM £1139 CITIZEN OVERTURE 110+ 10PPM £1149 CITIZEN OVERTURE 112 12PPM £1769 EPSON GQ-3500 6PPM £1099 HEWLETT PACKARD LASERJET II 8PPM £1319 HP LASERJET II D 8PPM £2079 KYOCERA F-1000 10PPM £1579 KYOCERA F-1200 10PPM £2479 KYOCERA F-2200 10PPM £3389 KYOCERA F-3000 18PPM £3989 M/TALLY MT905 6PPM £1125 OKI LASERLINE 6 ELITE 6PPM £1278 PANASONIC KXP4450 10PPM £1448 QMS PS810+ POSTSCRIPT 8PPM £2769 QUME CRYSTAL PRINT WP 6PPM £811 QUME CRYSTAL PRINT II 6PPM £1064 QUME SCRIPT TEN POSTSCRIPT 10PPM £2989 STAR LP8 8PPM £1349

ALL LASERS MARKED WITH AN * INCLUDES ON-SITE MAINTENANCE

LASER PRINTER PERIPHERALS

CANON 1MB MEMORY £279 2MB MEMORY FROM £167 EPSON OPC DRUM £149 CLEANING KIT £79 FONTS FROM £119 2MB MEMORY £359	HEWLETT PACKARD SOFT FONTS FROM £159 FONTS FROM £85 1MB MEMORY £279 2MB MEMORY £558 JETSRIPT POSTSCRIPT UPGRADE £1479
--	---

Please call for details of any other Laser peripherals

SCANNERS

AST Turbo Scan inc. interface & software £949 CANON 1 x 12 Scanner inc. interface & OCR software £1097 Flatbed Scanner £739 Hewlett Packard HP Scan jet inc.	Interface & OCR software + 1 yr on-site maintenance £1472 PANASONIC FXRS 505 inc. interface & OCR software £895 TAXAN Flat bed Scanner inc. interface & software £949
---	---

MONITORS

AMSTRAD 12" paper white VGA £129 AMSTRAD 14" colour VGA £279 AMSTRAD 12" High Res. Colour VGA £379 AMSTRAD 14" High Res. Colour VGA £479 CITIZEN CGM 104 M/SYNC £498 COMMODORE 10845 CGA £209 NEC M/SYNC GS £139 NEC M/SYNC 14" II £428 NEC M/SYNC 15" + £628 NEC M/SYNC 20" XL £1359 PHILIPS 7153 Ahter Mono 12" £71 PHILIPS 8833 CGA 14" £214 PHILIPS 9053 EGA 14" £324 PHILIPS 9073 EGA 14" £394	PHILIPS 8873 M/SYNC 14" £449 SONY CPD1402 M/SYNC £529 TAXAN KX 123 Mono 12" £94 TAXAN 760 12" CGA £259 TAXAN 760 14" EGA £393 TAXAN 770 + 14" M/SYNC £429 TAXAN 870 + 14" M/SYNC £619 TAXAN 780 14" VGA £384 TAXAN 980 20" £1829 TAXAN 990 20" £1829 VIKING 1 £1495 SPECIAL OFFERS E71 14" FST AMBER £299 E14 14" FST PAPER WHITE £115 E324 14" EGA £299 E394 14" MULTISYNC £369
--	--

PLOTTERS

CALCOMP A4 COLOUR MASTER £3389 A4 PLOT MASTER £4129 1043 GTA £7339 1044 GTA £11,760 HEWLETT PACKARD 7440 A £707 7475 A £994 7550 A £2669 7570 A £2784 LINEARGRAPHICS PLOTMATE A4SM £475	ROLAND PLOTMATE A3M £629 DXY 1100 £589 DXY 1200 £839 DXY 1300 £989 DPX 2200 £2398 DPX 3300 £3198 GRX 300 £3199 GRX 400 £4395
---	---

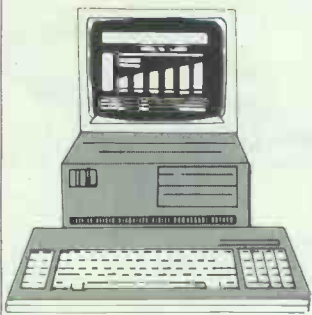
MODEMS

AMSTRAD/PACE INTERNAL V21/V23 inc SOFT £79 AMSTRAD MC2400 INTERNAL V21/V22/V22BIS/V23 + SOFT £158 SM2400 external V21/V22/V22BIS/V23 + SOFT £228 DATAFLEX STRADCOM INTERNAL V21/V22 + SOFT £138 STRADCOM POCKET MODEM £163 QUADCOM £238 DOWTY QUATTRO V21/V22/V22BIS/V23 £489 MIRACLE TECHNOLOGY WS 4000 V21/V23 £94	WS 4000 V21/V22/V23 £298 WS 3000 V21/V23 £199 WS 3000 V21/V22/V23 £198 WS 3000 V21/V22/V22BIS/V23 £294 KEYCARD 3000 V21/V23 £189 V21/V22/V23 £269 V21/V22/V22BIS/V23 £298 PACE LINET V21/V23 EXT £98 LINET INTERNAL V21/V23 + SOFT £98 SERIES 4 21235 V21/V23 £209 SERIES 4 12005 V21/V22/V23 £309 SERIES 4 24005 £378 SAGE Chit Chat Software £59
---	--

LASER PRINTER CONSUMABLES

TONER CARTRIDGES EPSON CG3500 £16.50 OKI LASERLINE 6 £16.50 HP LASERJETS £68.95 HP LASERJET MK II £68.95 QUME 2 PACK £89.00 CANON A1/A2 £68.95 CANON AB MK II £68.95 QMSK8 £68.95 CITIZEN OVERTURE £22.50 KYOCERA 2 PACK £69.00 PANASONIC KXP £32.00
--

COMPUTERS



AMSTRAD PCW8256 £314 PCW8512 £398 PCW9512 £429 PC1512 SDMD £369 PC1512 SDCD £461 PC1512 DDMD £461 PC1512 DDGD £554 PC1640 SDMD £479 PC1640 DDMD £554 PC1640 20MBMD £739 PC1640 SDGD £554 PC1640 DDGD £646 PC1640 20MBGD £831 PC1640 SDECD £646 PC1640 DDECD £739 PC1640 20MBECD £924 PC2086 SD1 2MD £594 PC2086 SD1 4CD £744 PC2086 SD1 2HRCD £844 PC2086 SD1 4HRCD £944 PC2086 DD1 2MD £739 PC2086 DD1 4CD £889 PC2086 DD1 2HRCD £989 PC2086 DD1 4HRCD £1089 PC2086 HD1 2MD £989 PC2086 HD1 4CD £1139 PC2086 HD1 2HRCD £1239 PC2086 HD1 4HRCD £1339 PC2286 DD1 2MD £985 PC2286 DD1 4CD £1135 PC2286 DD1 2HRCD £1235 PC2286 DD1 4HRCD £1335 PC2286 HD1 2MD £1335 PC2286 HD1 4CD £1485 PC2286 HD1 2HRCD £1585 PC2286 HD1 4HRCD £1685	APRICOT XENI 286/30 £1309 XENI 286/45 £1555 XENI 386/45 £2209 XENI 386/50 Tower £3029 XENI 386/100 tower £3849 Monitors for XENI range 12" Green Screen £163 14" paper white £245 14" VGA paper white £245 14" Colour VGA £489 Xeni 286 VGA card £245 APRICOT Qi 330 £2039 330i £2464 350i £2464 650 £2889 650i £3314 660i £3399 660i £3824 660i £4249 660i £4674 Monitors for Qi range 14" VGA paper white £245 14" VGA Colour £489 COMMODORE A500 inc Modulator £319 B2000 £975 EPSON PCE 20Mb Mono New Version £828 PC AX2 20Mb New Version £1155 PC AX40 40Mb New Version £1374 PC AX80 80Mb New Version £1849 TANDON PC A20+ Mono £1047 PC A20+ EGA £1335 PC A40+ Mono £1157 PC A40+ EGA £1445	PC A70+ Mono £1323 PC A70+ EGA £1611 TARGET 20+ Mono £1329 TARGET 20+ EGA £1610 TARGET 40+ Mono £1494 TARGET 40+ EGA £1779 386/16MHz 40MB Mono £2049 386/20MHz 40MB Mono £2689 386/20 EGA £3009 PORTABLE COMPUTERS AMSTRAD PPC512S £359 PPC512D £449 PPC640S £439 PPC640D £534 LINK MASTER TRANSFER £19 CAMBRIDGE88 £234 EPSON PC PORT £889 PC PORT 20MB £1445 SHARP4501A £568 4502 £738 4521 £1352 7221 £1898 TOSHIBA T1000 £595 T1100+ £969 T1200 FB £1079 T1200 HB £1734 T3100 E £1948 T1600 £2349 T3200 £2748 T5100 £3178 ZENITH SUPERSPORT FD £945 SUPERSPORT 20mb £1729 SUPERSPORT 286 20mb £2098 SUPERSPORT 286 40mb £2634 TURBOSPORT 386 40mb £3298
--	---	--

SPECIAL OFFERS
Amstrad PC1640 S/D ECD with Seagate 30Mb Hard Disk £949
Amstrad PC1640 S/D ECD with Seagate 40Mb Hard Disk £989
Archimedes A.440 Colour £2049
Olivetti M240 20Mb Mono £959
Olivetti M380 40Mb Mono £1949

FAX

BRITISH TELECOM CF9 £869 HS20 £1169 CANONFAX FAX110* £1044 FAX230 £1199 FAX350 £1449 FAX410 £1649 FAX730 £2359 C-FAXCARD SRI £499 DOWTY FAX CARD £744 NEFAX N2 £994 N18 £1669 N25 £3099 PANAFAX UF150 £1149 UF250 £1449 RICOH 7" £789 10" £1099 20" £1469 60" £1829 70" £2439 SANYO SANFAX100* £989 SHARP FO-80* £849 FO-150* £959 FO-210* £1269 Z30 PORT. PHOTO COPIER £679
--

*includes 1 yr on-site maintenance.

PORT SPECIALISTS
call for details

**PHONE FOR
DETAILS OF
AMIGA AND
APPLE
SOFTWARE**

**For Hardware orders
over £300 claim
your FREE Centronics
Printer Cable
Cleaning Kit**

**For Hardware orders
under £300
Centronics Printer
Cable available
for only £5**

SOFTWARE

ALL SOFTWARE UK SOURCED

INTEGRATED PACKAGES

ABILITY +	£109
FRAMEWORK III	£329
LOGISTIX	£59
MICROSOFT WORKS	£98
SMART INC SPELLCHECKER	£358
SYMPHONY V2.0	£359
SPREADSHEETS	
EXCEL	£229
LOTUS 123	£249
MULTIPLAN	£99
QUATTRO	£109
SAGE PC PLANNER II	£63
SUPERCALC 3.1	£39
SUPERCALC V	£197
VP PLANNER	£35

WORD PROCESSORS

LOTUS HAL	£70
LOTUS MANUSCRIPT	£249
MULTIMATE ADVANTAGE II	£254
MS WORD IV	£239
SAGE PC WRITE	£60
SPRINT	£118
WORD LIBRARY	£79
WORDPERFECT V.5	£211
WORDSTAR 2000 + RELEASE 3	£214
WORDSTAR PROFESSIONAL V5	£179
ACCOUNTS	
ACCTS MASTER Dual Drive	£29
SAGE ACCOUNTANT	£95
SAGE ACCOUNTANT +	£121
SAGE BOOKKEEPER	£63

SAGE FINANCIAL CONTROLLER	£184
SAGE PAYROLL II	£91
DATABASES DATA PERFECT	
DBASE IV	£344
FOXBASE + V.2	£249
LOTUS AGENDA	£219
PARADOX II	£243
SAGE RETRIEVE	£61
SAGE RETRIEVE III	£103
SUPERBASE IV	£258
DTP/GRAPHICS/CAD	
AUTOSKETCH	£44
BYLINE	£137
FONTASY	£39
FREELANCE +	£255
GENERIC CADD V3.0	£79

GEM DTP V3	£209
GRAPH WRITER II	£269
PAGEMAKER 3	£438
VENTURA V1.2	£495
LEISURE FLIGHT SIM.3	£33
MICE M/SOFT MOUSE	£84
NETWORKING	
AMSNET	£359
SAGE MAINLAN	£379
SAGE NET	£228
UTILITIES	
M/SOFT WINDOWS	£53
NORTON ADVANCED	£65
PC TOOLS	£34
SIDEKICK	£18
SIDEKICK PLUS	£87

PERIPHERALS

HARD DISKS

21Mb Hard Card	£188
32Mb Hard Card	£218
20Mb RLL 65ms	£179
20Mb MFM 35ms	£198
30Mb RLL 65ms	£185
30Mb RLL 35ms	£225
30Mb MFM 35ms	£248
40Mb RLL 65ms	£235
40Mb MFM 40ms	£279
40Mb MFM 28ms	£319
49Mb RLL 35ms	£339
60Mb RLL 65ms	£329

All Drives inc. Controller and Cables

FLOPPY DISKS

5 1/4" 360K XT	£75
5 1/4" 1.2Mb AT	£95
3 1/2" 720K	£85
3 1/2" 1.44Mb	£105
3 1/2"/5 1/4" Adaptor/Frame/ Cable	£18

DISK CONTROLLERS

XT 360K/720K Floppy Cont.	£49
XT 360K/1.2Mb/720K/1.44Mb Floppy Cont.	£79
AT 360K/1.2Mb/720K/1.44Mb Floppy Cont.	£79

MULTI I/O CARDS

(parallel/serial/FDC/Clock/Game) 360K/720K XT/AT	£47
---	-----

360K/720K/1.2Mb/1.44Mb XT	£69
360K/720K/1.2Mb/1.44Mb AT	£79

POWER SUPPLIES

150W PSU	£75
200W PSU	£105

MOTHER BOARDS

10MHz XT Board OK	
Pop up to 640K	£95
15MHz XT 0 Wait State Board OK	
pop up to 1Mb	£125
12MHz AT 0 Wait State Board OK	
pop up to 4Mb	£295
20MHz AT 0 Wait State Board OK	
pop up to 8Mb	£545

KEYBOARDS

84 Key Keyboard	£49
102 Key Keyboard	£75
Keyboard Extension Cable	£3.95

PRINTER CARDS

Parallel Printer Card	£20
Parallel/Serial Card.	£37
Serial Card	£25
Serial Card 4 Port	£99

DISPLAY ADAPTORS

Mono/Hercules/CGA Colour/Parallel Port	£49
Mono/Hercules/CGA Colour/Parallel Port with MS Compatible Bus Mouse	£79
EGA/Parallel Port/Auto Switch 640x480	£119

EGA/Parallel Port with MS Compatible Bus Mouse	£149
VEGA Deluxe EGA	£169
ORCHID EGA	£179
ORCHID VGA	£199

PROCESSORS

8087 5MHz	£74
8087 8MHz	£99
8087 10MHz	£147
80287 6MHz	£115
80287 8MHz	£158
80287 10MHz	£178
80387 16MHz	£304
80387 20MHz	£429

RAM EXPANSION

AST RAMPAGE (256K) pop up to 2Mb XT	£249
AST RAMPAGE 286 (512K) pop up to 2Mb AT	£345

INTEL

ABOVE BOARD 286 512K	£323
ABOVE BOARD 286 2Mb	£1217
ABOVE BOARD PLUS 512K	£405
ABOVE BOARD PLUS 2Mb	£1217
ABOVE BOARD 2 PLUS OK	£242
ABOVE BOARD 2 PLUS 512K	£405
ABOVE BOARD 2 PLUS 2Mb	£1217
INBOARD 386/AT OK	£780
INBOARD 386/AT 1Mb	£1239

PRINTER SWITCHBOX

1 in 2 out Parallel	£19
1 in 2 out Serial	£19
2 in 2 out x over Parallel	£29

Official orders welcomed from PLC's, government and education establishments. Minimum order value £30.00. Account terms 14 days from date of invoice

COLLECTION - Collection by prior arrangement from our London Warehouse. Call for details.

E & OE. All prices subject to change without notice. Please call before ordering.

COMPUTERS BY POST GUARANTEE If after buying any of the hardware or software in this advertisement, you find the same item offered from stock at a lower price locally to us within one week, we will refund the difference.

DELIVERY UK Mainland

SAME DAY DELIVERY CALL FOR DETAILS
Consumables: £1 + VAT P+P
Hardware: 4 working days £5 + VAT per box.
Next working day £10 + VAT per box.

Software: 4 working days £5 + VAT per order.
Next working day £10 + VAT per order.
Lasers/Fax: Next working day £15 + VAT.
Saturday delivery P.O.A. Immediate despatch on receipt of cleared payment normally five working days for cheque clearance.

All prices exclude VAT
CREDIT CARD HOT-LINE

01-760 0014

Enquiries 01-681 5966

TELEX: 01-760 9862 FAX: 01-760 9861

Computers by Post (PCW), 12 Sutton Lane,
Banstead, Surrey SM7 3QP. (collection see above)

To: Computers by Post, 12 Sutton Lane, Banstead, Surrey SM7 3QP. collection see above

I wish to order _____

My computer is _____

I enclose cheque/PO for £ _____ inc VAT

or charge my Access/Visa No: _____

Exp. date _____

Name _____

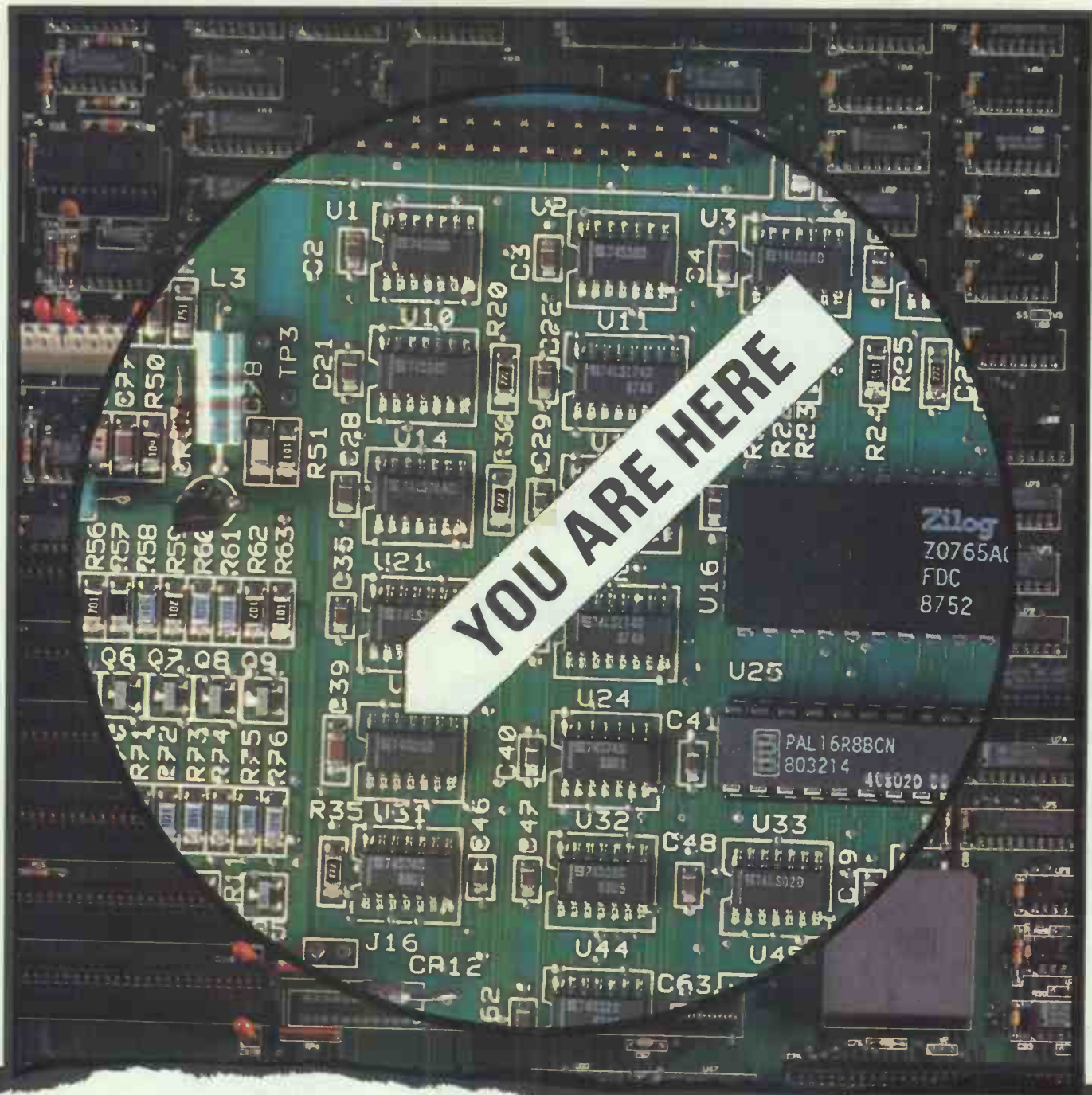
Signature _____

Address _____

Postcode _____

Tel No: _____





GUIDANCE . . . We all need it . . . Especially in the world of personal computing . . . That's why Britain's biggest monthly computing magazine is offering a free in depth guide for PC users on how to get the most out of your equipment . . . As the most comprehensive information and reference work ever compiled, it will give you the facts you need for the fast decisions you need to make . . . Don't miss the first section in March's issue, out February 18th.

**Personal
Computer**
World

I N T O U C H

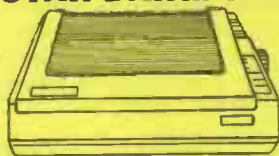
RE: MAJOR UK OVERSTOCK OF IBM COMPATIBLE PC'S AND "FAMOUS NAME" PRINTERS

PREMIER 386



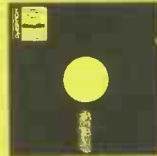
DELTA 40Mb EGA 386
1Mb RAM, 1.2Mb floppy, 40Mb hard disk, 16MHz, 8 slots, 14" EGA display & DOS. **£1795**

STAR BARGAIN!



STAR GEMINI 160 PRINTER
160 CPS dot matrix printer, 80 column width, dot graphics mode, inc tractor feed, parallel i/face. **£75**

BULK DISKS!



UNREPEATABLE OFFER
Diaspron branded, 5 1/4" DS/DD floppy disks; inc sleeves and labels packed in 10's, sold per 100. **£45**

INC WORDSTAR



NEC PORTABLE PC-8401A
Inc WordStar, CalcStar, Personal Filer & Telcom comms software. Battery or mains power. **£195**

SANYO PC!



MBC 16 PLUS HD 20
20Mb, 640K RAM, 1 x 360K, 8MHz, parallel & RS232, mono, DOS 3.2 & BASIC. AS NEW **£525**

MONO MONITOR



THOMSON 230G
12" mono display for IBM & compats, std TTI. Input, 1000 lines res, green screen, inc cable. **£50**

PORTABLE



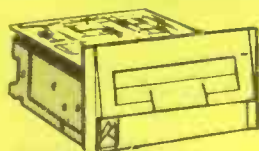
DATAVUE 25
IBM compatible, 256K RAM, 1 x 360K, LCD display, parallel/serial (Battery option £45). DEMO **£250**

DELTA GOLD



DELTA SPRINT 88 PC
640K RAM, 1 x 3 1/2" 720K disk drive, 10MHz clock speed, 12" amber display & keyboard. **£295**

OPTICAL DRIVE



WORM TECHNOLOGY
200Mb internal WORM drive for IBM PS/2, inc controller card & 200Mb cartridge. DEMO **£500**

THREE IN ONE

LOGOTRON

LOGOTRON SOFTWARE
Integrated software suite including Writer WP, Filer database and Planner spread sheet. **£10**

MACINTOSH!



OLIVETTI DM 290
Imagewriter compatible 132 column 160 CPS dot matrix printer (80 col DM 280 £125) **£150**

RICOH 20Mb



CARTRIDGE DISK DRIVE
20Mb cartridge hard drive, half height, uses standard controller, (spare cartridges £100). **£195**

MORGAN GENERIC

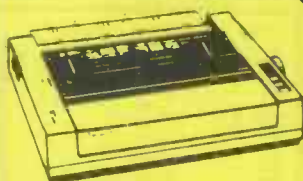
A superb range of industry standard XT & AT compatible PC's. All models include 640K RAM, choice of floppy or hard disk combinations, parallel and RS232 ports, mono, CGA or EGA card, IBM style keyboard, monitor, MS-DOS 3.2 & BASIC, manuals and free Logotron WP & D'base software.



MG PC 640 RANGE MGAT 640 RANGE

1 x 360K, mono ... £395	20Mb, mono £950
2 x 360K, mono £495	30Mb, mono £995
20Mb, mono £550	20Mb, colour £1050
30Mb, mono £595	30Mb, colour £1095
30Mb, colour £750	30Mb, EGA £1350
3 button mouse plus Microsoft Windows £35	
3 1/2" 720K internal drive inc fitting £95	

STAR CLEARANCE £125 NLQ STAR SD-15



STAR SR-10
Amazing value dot matrix printer; 200 CPS draft print plus 50 CPS NLQ, 2K buffer, 132 column width, use std bit image graphics, tractor or friction feed, parallel i/face. **£125**

- 160 CPS draft print speed
- 40 CPS Near letter quality
- 132 column width
- Full graphics capability
- International characters
- Including tractor feed
- 8K buffer
- Parallel I/F

STAR M-18

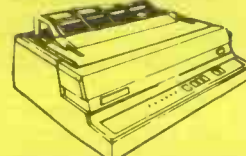
18 CPS daisywheel printer, 132 column width, use std Diablo ribbons and wheels, parallel and RS232 i/face. **£99**

EPSON



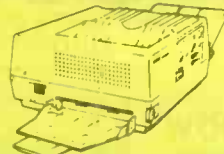
EPSON P80 PRINTER
Portable printer, thermal/normal paper, RS232/parallel, AC adpt. (Also P80 X inc NLQ £150) **£65**

WAS £2000 +



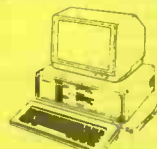
DIABLO 630 API ECS
40 CPS industry standard daisywheel, 110/240 volt, 136 column 192 character d/wheel. **£395**

6 PPM LASER



MORGAN GENERIC LASER
300 dpi res, 6 PPM, HP Laserjet + emulation, 1.5Mb RAM, 9 resident fonts, parallel. **£995**

INC SOFTWARE



MBC 885 INC WORDSTAR
Twin drive IBM compatible PC, 8MHz, inc WordStar & CalcStar, mono monitor & keyboard. **£350**

Part exchanges accepted.

goods new unless indicated

ACCESS AND VISA ACCEPTED
PRICES SUBJECT TO 15% VAT
MAIL ORDER (CARRIAGE EXTRA)

Morgan Computer Co.

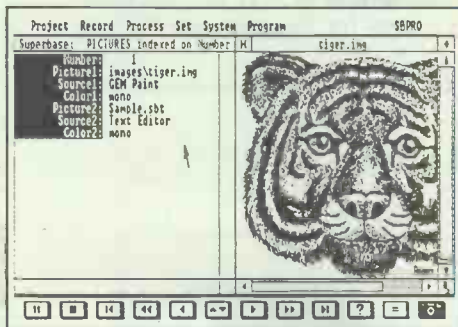
OPEN MONDAY TO SATURDAY
PRICES SUBJECT TO CHANGE
GOODS SUBJ. TO AVAILABILITY

64-72 NEW OXFORD STREET, LONDON WC1. 01-255 2115. 179 TOTTENHAM COURT ROAD, LONDON W1. 01-636 1138

FOUR REASONS TO BECOME A WIMP IN 1989!

A special reader offer from Power Computing

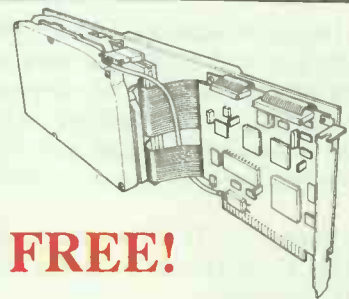
BE FIRST TO BRING YOUR PC* RIGHT UP TO DATE WITH THE AWARD-WINNING **SUPERBASE 4** RELATIONAL DATABASE FROM PRECISION. FOR A LIMITED PERIOD ONLY, BUY **SUPERBASE 4** COMPLETE FOR ONLY £399* (RRP £445) AND POWER COMPUTING WILL PROVIDE, ABSOLUTELY FREE, THE GEM™ DESKTOP*, MICROSOFT™ COMPATIBLE MOUSE AND ALL THE EXTRA DISK STORAGE SPACE YOU WILL EVER NEED!



SUPERBASE

4

WINNER OF THE 1988 PC USER DATABASE CHALLENGE



FREE!

SUPERBASE 4, OF COURSE! TOMORROW'S DATABASE TODAY! JUST LOOK AT A FEW OF THE AMAZING FEATURES:

TOO GOOD TO BE TRUE? WE'RE NOT THE ONLY ONES TO APPRECIATE **SUPERBASE 4**'S SUPERB GRAPHIC INTERFACE, POWERFUL RELATIONAL AND PROGRAMMING FEATURES AND EASE OF USE. HERE'S HOW PC USER* SUMMED IT UP:

“ A powerful database system with facilities for handling graphics alongside text and numeric data. It's economical with data storage and exceptionally easy and enjoyable to use. ”

- SIMPLICITY & EASE OF USE • FLEXIBLE FILE DEFINITION • INTEGRATED IMAGES & TEXT • POWERFUL INDEXING FACILITIES • INTEGRATED FORMS EDITOR • AUTOMATIC TRANSACTION HANDLING • EXTENSIVE REPORT GENERATOR • TEXT EDITOR WITH MAIL MERGE • POWERFUL PROGRAMMING LANGUAGE • READS & WRITES DBASE™ & LOTUS™ FILES • COMMUNICATIONS & MUCH MORE...!

* SYSTEM REQUIREMENTS: IBM PC AT/XT, PS2 or 100% compatible with 640K RAM and Hercules. CGA, EGA, VGA or compatible graphics card * £399 price for IBM XT (eg Amstrad PC1640) only, For IBM AT (286), PS2 (and XT customers wanting more than 20Mb of disk space) the price is £445 for a 30Mb Miniscribe hard card * A Windows 286 version of Superbase 4 is available as an upgrade for £45 * Customers who already have a mouse can choose to be supplied with 4 boxes of Verbatim 5.25" or 3.5" disks instead * Quote from September 1988 issue of PC User.

™ Power Computing recognises and respects all trademarks mentioned. Prices quoted above are exclusive of VAT. We reserve the right to change specifications and prices without prior notice. Offer subject to availability.



- Please rush me... inc VAT
- PC XT only package (20mb) **£466.35**
 - AT & XT package (30mb) **£519.25**
 - Please substitute 4 boxes of 5.25" / 3.5" disks (*please delete)
 - Please send me more information
 - I enclose cheque / PO to Power Computing
 - Please debit my credit card number: _____

NAME: _____

COMPANY: _____

ADDRESS: _____

POST CODE: _____

COMPUTER: _____ XT / PC / AT / PS-2

Expires: ___/___/___

**QUICK AND RELIABLE INPUT WITH THE
PENTAX UNIQUE DESK TOP SCANNER.**

PENTAX



**PENTAX QUALITY WORKMANSHIP MEETS
TODAY'S DEMANDS UP FRONT.**

- * **FLATBED DESIGN WITH FLEXIBLE COVER**
- * **300 DPI LINE ART MODE**
- * **1200 DPI 4BIT GREY SCALE MODE**
- * **64 EFFECTIVE GREY SCALES WITH GAMMA CORRECTION**

World-acclaimed Pentax optics, electronics and mechanics, plus 50 years of engineering achievement makes the Pentax scanner the ideal choice and a dependable solution for desktop publishing and many other tasks.

This versatile Pentax scanner will allow you to capture photographs and artwork directly into your favourite desktop publishing program.

Printed and typewritten documents are easily scanned and converted into an ASCII file for desktop publishing and word processing applications with the Pentax OCR software included with the scanner.

The Digital Research GEM-SCAN software supplied with the PENTAX A4301 will allow you to efficiently scan and handle text and images for easy import into the popular DTP packages such as VENTURA and PAGEMAKER. Word processors like the advanced WORDPERFECT 5 are supported for text and image files. Images can be scanned at up to 300 dots per inch and can be edited down to individual pixel level. Rotating, flipping and inversion of the scanned image can also be easily catered for under GEM SCAN. Line-art, halftone scanning from photographs, scaling and sizing are also quickly and simply carried out.

The Pentax OCR software can convert all typewritten and most typeset documents into an ASCII file for later editing. Proportional or mono spaced text from between 6 to 16 point poses no problem for the versatile Pentax OCR software.

Advanced features of the Pentax OCR software include column detection, ability to read touching characters and the facility to teach new fonts in various languages.

This latest version of the Pentax scanner features Gamma correction for the compensation of under and over exposure of photographs. An effective 64 grey scales is also achieved with double the resolution of competing scanners. The Pentax scanner will convert single sheet or bound documents into computer-readable form, with up to 300 dots per inch resolution. The Pentax scanner's array of CCD sensor cells efficiently handle any job, using selectable dual scanning modes - black and white for line images and text, and halftone for photographs and art materials. When multiple sheets need scanning, an optional automatic document feeder will be available soon.



Now available in the UK for £995. The Pentax A4301 comes complete with the E400 XT/AT interface kit with interface card, Digital Research GEMScan, GEM3, Pentax OCR and cables.

Approved enhancements include:

GM6CP Genius Mouse and software. Can also be configured for Microsoft or PC mouse compatibility £39

EMS2 2Mb EMS memory card with 1Mb memory to speed up operation on XT compatibles £299

PC15 3Mb Extended memory card with 1Mb memory to speed up your AT compatible £349

All pricing plus 15% VAT in the UK. Carriage and packing £15 plus VAT for orders over £400 and £6 plus VAT under £400.

**For sales, service and OEM support please contact:
Citadel Products Ltd
50 High Street, Edgware
Middx HA8 7EP
Tel: 01-951 1848**

**North and South America:
Pentax Technologies Inc. Boulder Colorado, USA.
010 1 303 460 1600**

**For details of your local UK dealer please contact:
Facit Ltd
Maidstone Road
Rochester
Kent ME1 3QN
Tel: 0634 830008**



3 1/2" → ← 5 1/4" SOFTWARE TRANSFER

3 1/2" Internal upgrade for IBM PC's and Compatibles

To read by the stream of press releases that come into the PCW editorial office, you'd think that making a PS/2-compatible machine required no more than taking an ordinary PC-compatible and fitting it with 3 1/2" disk drives.

To our rescue has come a wonderful product from Citadel—a £129 3 1/2" floppy disk drive in a 5 1/4" format chassis that slips into a spare drive slot on a PC and uses standard power and data cables.

Fitting the drive into my AT-compatible proved to be no problem. Getting the machine to format disks correctly proved more difficult. Although DOS said that there was 720k of available space on a newly-formatted disk placed in what I referred to as drive B: no other 3 1/2" disk drive would recognise the disk.

To the rescue came Citadel, who gave the following explanation.

When you format a disk under DOS, the program looks in the BIOS to see what format the disk should be. Even altering the CMOS set-up on an AT doesn't affect this process. The default for drive B: is 360k and this is what it happily does.

Using a program like PC Tools to format disks shows what is really going on as, for my newly-installed drive, it only gave 160k, 180k, 320k and 360k as possible capacities.

The trick is to use DRIVER.SYS which is supplied with DOS versions 3.2 onwards. This installs extra 'logical' drives whose parameters can be specified in your CONFIG.SYS file.

Inserting the line 'DEVICE=DRIVER.SYS/D:1' into my CONFIG.SYS produced a message at boot-up time to the effect that external drive E: had been installed. I then loaded up PC Tools and it informed me that drive E: can be formatted in just one way—to 720k. As long as I access the 3 1/2" drive as E: rather than B: I now have no problems with any DOS operation. D. COHEN

(Reprinted from PCW December 1987)

FLOPPY DISK DRIVE UPGRADES

PC XT & CLONES

D357K	720K 3.5" SONY or TEAC in 5.25" frame	£129
FD235HFXT	1.44Mb 3.5" TEAC in 5.25" frame with controller card for two drives to replace existing card. (Not for Amstrad)	£199
FD55BR	360K 5.25" TEAC second drive. (Not for Amstrad)	£79
CHXT1.2	1.2Mb 5.25" CHINON with controller card for 2 drives to replace existing card (Not for Amstrad)	£159

PC AT & CLONES

FD235HF	1.44Mb 3.5" TEAC in 5.25" frame for AT with 1.44Mb BIOS support. Please check your manual for 3.5" 1.44Mb BIOS support. (Later Tandon models etc.)	£149
FD235HFC	1.44Mb 3.5" TEAC in 5.25" frame with controller card for 2 drives for old model AT with no BIOS support. Old controller card must be replaced and separate hard disk controller fitted	£199
F506	1.2Mb 5.25" CHINON second drive	£99

EPROM AND PAL PROGRAMMERS

EW901	EPROM prog., Single gang, 2716 to 27512, 12.5v to 25v	£129
EW904	EPROM prog., 4 gang, as above	£179
EW910	EPROM prog., 10 gang, as above	£249
PAW401	PAL prog., MMI, TI & NS 20 & 24 pin types	£275
UPW48	8748/9, 8741/2, Eprom Vers. of Intel UPI-41/42, MCS-48/49	£179
Software Features (All models)	Load from disk, save to disk, display data, modify data, print data, blank check, read, write (program) verify device and display errors. Load any length of data to specific device address. Split any combine Eproms (i.e. 2764 + 2764 = 27128). Software utility to convert HEX files into BIN files (Intel, Motorola and Tektronics).	
ERASI	EPROM eraser. Large 17 eprom capacity. Variable 60 minute timer	£99

Citadel's upgrades and components for the IBM PC range and compatibles have the quality that comes from a quarter of a century experience in electronics.

In widespread use throughout industry, these parts have earned their reputation for performance and reliability.

PC INTERFACE CARDS

Many types available. Please ring. Popular types include:

EGA860	Genoa chipset, super EGA high res. 800x600 pixel	£169
PC21	Mono/Graphics/Printer port. Hercules compatible. Short card	£49
EGA	EGA with 256K Ram. For use with Mono/Colour Graphics/EGA	£89
PC1	RS232/Clock/Calendar. for XT Battery backup. COM1 or COM2	£39
PC4	Memory card for XT. Expand from 256K to 640K	£39
EMS2/OK	EMScard for XT. Expand from 1Mb to 3Mb. Uses 256K Dram	£89
PC10/OK	2Mb Extended memory card for AT. With serial and printer port	£129
PC15/OK	3Mb Extended memory card for AT	£99
PC3	XT multi function. With serial/printer/clock/calendar/games	£69
PC5	As above + floppy disk controller	£79
1200C	V22 modem. 1200/1200 full duplex. Short card. (Not approved)	£79
TR-3000	RPT1 Ethernet card. 10Mbit/sec. Thin wire coax. new short card	£199

Software included free, includes drivers for Novell or IBM Netbios. Ideal for dBase 3+, Pegasus, Smart etc.

PC SPARES AND COMPONENTS

K102	Keyboard. IBM enhanced for XT/AT. 102 key UK layout (Not Amstrad and Zenith)	£69
K102PS2	Keyboard. As above for IBM PS2	£89
PC7002	XT Motherboard. 4.77/10MHz. NEC V20, 256K Ram and legal Bios (Norton SI 3.7 and Landmark 4.3 MHz-AT)	£169
PC3001B	AT Motherboard. Directly replaces XT Board. 6/10MHz. 80286, 512K Ram. Special Bios with setup which supports 3 1/2" drives up to 1.44Mb (Norton SI 11.2 and Landmark 13MHz-AT)	£499
PS7025	150W XT Power supply. IBM compatible connectors	£79
PS7030	200W AT Power supply. IBM compatible connectors	£124

INDUSTRIAL CONTROL CARDS

PC14	8255 IO process controller. 48x IO lines and 3x 16 bit timers (Up to 2 cards per PC) With 2x8255 & 1x8253. XT or AT	£58
PC31	RS232 8 ports, D25 connectors. XT or AT Ideal for use with Multilink or Microport Unix	£239
PC26	12 bit A to D converter. 30Khz high speed. 16 channel input	£193
PC30	As above with 2x8 bit and 2x12 bit D to A. 24 IO x lines	£314
PC39	As PC30 with DMA. Sampling to 80Khz	£425
PC22	Pre-Amp. Allpass/Low/High filters for PC26, PC30 and PC39	£280

CARRIAGE PACKING AND INSURANCE

All orders under £250 please add £6 (+ VAT)

All orders over £250 please add £15 (+ VAT)

Prices DO NOT include VAT.

Access or C.W.O. (Official Orders over £100 welcome)

CITADEL PRODUCTS LTD

Dept PCW, 50 HIGH ST.,

EDGWARE, MIDDX HA8 7EP

Tel: 01-951 1848



WILL YOU WAIT FOR A NEW DATABASE VERSION...

No, I won't wait any longer, please send me information about:

R:BASE by Microrim
 specifications of R:BASE for DOS
 specifications of R:BASE for OS/2
 the R:BASE compiler
 R:BASE training
 extensive exchange opportunities and conditions

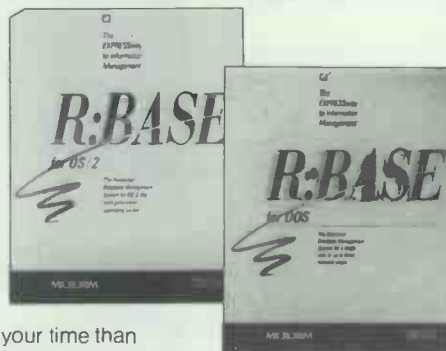
Name: _____ Initial(s) _____
 Position: _____
 Company: _____
 Address: _____
 Town: _____
 Post code: _____
 Telephone: _____

Return the reply card in a stamped envelope to:
 Microrim U.K. Ltd.
 10, Progress Business Centre
 Whittle Parkway
 Slough, Berkshire SL1 6DQ.

PCW 2/7



...OR WOULD YOU RATHER FILL IN THIS REPLY CARD?



Sometimes companies prelaunch software packages with a great deal of fuss. Nothing wrong with that of course, but if it becomes unavailable or displays some simple problems, then things really have gone hay-wire. Microrim keeps to its promises.

Because you've doubtless better things to do with your time than waiting for the new version, we make things easy for you. Just return the reply card to Microrim U.K. Ltd.

The advantages of R:BASE.

You will receive information very promptly about R:BASE by Microrim; probably the best, most complete, relational database management system there is. At least, that's what critical publications like Datapro, Infoworld, Software Digest and PC Magazine all say. What else would you expect from a package which is so easy to use. Like 'Prompt-by-Example', the menu-run function, which allows even beginners to carry out complex tasks without using commands.

A generator writes powerful applications, complete with in-pu screens and data programmes and can be used without programming. It has a programming language with SQL commands for 'mainframe query power' and also standard network support for 3 users without supplementary costs. Furthermore, there is also a version available for 6 and an unlimited number of users. But we haven't told you about the compiler yet, for making your own rapid applications without complex programming commands. Apart from R:BASE there are a number of accessories which make the R:BASE possibilities even greater. For example, excellent graphics can be made using DB Graphics.

Up-upgrades at attractive prices.

You can also request information about the extensive trade-in possibilities. Existing versions of R:BASE can be up-graded at very attractive prices.

For example: to up-grade to R:BASE for DOS Int'l you pay £ 95.00 (ex. VAT). And for the up-grade to R:BASE for OS/2 you only pay £ 195.00 (ex. VAT)*. Special prices are also available for up-upgrades to network versions for six or unlimited users.

You don't need to wait a moment longer for R:BASE.

R:BASE is the second best-selling database package in the world. This means that there are more than half a million satisfied R:BASE users. People who, thanks to R:BASE by Microrim, don't have to wait, can get going right away.

* See trade-in conditions.



Microrim U.K. Ltd.
 10, Progress Business Centre
 Whittle Parkway
 Slough, Berkshire SL1 6DQ
 Telephone 0628 667612

R:BASE, the new standard.

Microrim, R:BASE and DB Graphics, are trade names of Microrim, Inc. © Copyright Microrim 1988.

WE'VE GOT WHAT YOU WANT!

OUR ETHERNET CARD:

VERY STANDARD — IEEE802.3 (CSMA/CD)
 VERY FAST — 10MB/SECOND
 FULLY CHOOSING — 8 BIT CARD OR 16 BIT CARD
 FULLY COMPATIBLE — NOVELL NE.1000
 FULLY AVAILABLE — NOVELL NetWare
 PE-300 PE-310
 PERI-NET ETHERNET NETWORK CARD, 8 BIT ZERO 16 BIT ETHERNET CARD

PE-300



PE-310



PE-514

MULTI USER CARD FOR IBM PC/AT/386 OR COMPATIBLES
 • INCLUDING FOUR RS-232C SERIAL PORTS AND SCO XENIX
 • OPERATION SYSTEMS: DOS, MS XENIX

OUR PRODUCT LINE INCLUDES:

- MAIN BOARD
- DISPLAY CARD
- FDD CONTROLLER FOR 5.25" AND 3.5" FDD
- MEMORY EXPANSION CARD (OR WITH EMS)
- INPUT/OUTPUT CARD
- ADD-ON CARD FOR PS/2 50/60/80 MODEL OR COMPATIBLES
- OTHER INTERFACE CARD
- CABLE, DATA SWITCH, MOUSE AND SCANNER



PERIPHERALS ENTERPRISE CO., LTD.

NO. 3, CHUNG CHENG RD., HSIN TIEN CITY, TAIPEI HSIEN, TAIWAN, R.O.C. TEL: 886-2-9177322(REP).
 TEL: 31159 PERIPHE FAX: 886-2-9154672

MD-DOS XENIX are registered trademarks of Microsoft Corp.
 PC/Xt/AT, PC-MOS are registered trademarks of International Business Machines Corp., The Software Link respectively.
 Novell is a registered trademark of Novell Inc.

Agents & Distributors Wanted!

FINDNICE Ltd. AUTHORIZED BONDWELL DISTRIBUTOR



1FD/20Mb VER £1349.00*
 2FD VER £969.00*
 NYLON CARRYING CASE £29.95*

* Promotion ends 31st January, 1989:
 new prices will be: 2FD VER £1199.00,
 1FD/20Mb VER £1686.00,
 Carrying Case £34.95

- 80C88 microprocessor operating at 4.77 or 8 MHz (switch selectable)
- 8087 numeric data coprocessor socket
- One megabyte of random-access memory
- Super-twisted liquid crystal display with backlight
- 80 column text display
- 640 x 200 pixel graphic display
- Two 720 kilobyte 3 1/2" microfloppy disk drives (Dual Floppy Drive Version)
- One 720 kilobyte 3 1/2" microfloppy disk drive and one 20 megabyte Winchester 3 1/2" hard disk drive (Hard Disk Version)

- 95 key low-profile keyboard
- Real-time calendar/clock with battery backup
- Built-in rechargeable battery for system power supply
- 1200 bps Bell/CCITT Hayes-compatible modem
- Standard RS232C communication port
- Centronics parallel printer port
- RGBI video port
- NTSC composite video port
- MS-DOS² 3.21, GW-BASIC² 3.2, EASY³ 1.5 Word Processor, and utility programs

1. TM Hayes Microcomputer Products Inc.
 2. Microsoft Corp.
 3. TM MicroPro International Corp.

WE STOCK A LARGE VARIETY OF PRODUCTS INCLUDING THOSE SHOWN BELOW. CALL FOR UP TO THE MINUTE PRICES ON YOUR REQUIREMENTS.

- PRINTERS:
 - H.P. Series 2 Laserjet, including 12 month on-site servicing — £1595.00
 - PANASONIC KXP 10B1 — £159.95
 - CALL FOR OTHER PRINTER PRICES
- MODEMS
 - DISKS FROM £8.00 per box (10)
 - FILE CASES FROM £8.00 each
 - CABLES £8.00 each
 - ETC., ETC., ETC.
 - DEALER ENQUIRIES WELCOME

FINDNICE Ltd. 'ROSEHAVEN', MOOR LANE, CRANWORTH, THETFORD, NORFOLK IP25 7SH

Telephone: (0362) 821018 Fax: (0362) 821019

System Science

C COMPILERS

AZTEC C86/PROF with ASM, LINK large mem	£125.00
AZTEC C86/DEV adds DEBUGGER, editor	£175.00
AZTEC C86/COMM adds ROM support lin src	£245.00
MICROSOFT C5.1 with CodeView, OS/2 sprt	£255.00
LATTICE C3.3 new version with OS/2 support	£235.00
QUICK C by Microsoft	£65.00
TURBO C by Borland (New Version)	£call
AZTEC C68 DEV for Amiga, Atari, Mac	£175.00
AZTEC Source Debugger	£85.00
C+ + by Glockspiel	£375.00
C+ + by Zortech	£95.00

C DATAFILE LIBRARY

C Tree by Faircom (source code)	£225.00
R Tree Report Generator for C Tree	£175.00
Btrieve Single User	£155.00
Btrieve N Multi User	£345.00
Xtrieve and Report Option available	£call
XQL — SQL interface for Btrieve	£495.00
Lattice DBC III Database Access Library	£175.00

COMMUNICATIONS

Communications by Greenleaf (source)	£115.00
Aynsch by Blaise (source)	£125.00
Essential Communications (source)	£125.00

PROGRAMMERS UTILITIES & EDITORS

Microsoft MASM Assembler & Code View	£90.00
Plink-86 Plus overlay linker	£195.00
Phix-86 Plus debugger	£195.00
PC Lint by Gimpel	£95.00
MKS Toolkit (AWK, Grep etc)	£115.00
PVCS by Polytron (also for networks)	from £115.00
PolyMake by Polytron	£95.00
PolyLibrarian	£75.00
PolyDoc	£145.00

GRAPHICS

Halo 88 — new version of Halo	£175.00
Metawindows	£115.00
Ingral — scientific no royalties	£175.00
Essential Graphics no royalties	£145.00
Graphic 4.0	£245.00
Turbo Halo for Turbo C	£85.00
GSS GDT (also for Fortran, Pascal OS/2)	£295.00

SCREEN & DATA ENTRY

Panel Plus works with graphics screens	£275.00
Panel/TC or Panel/OC	£85.00
Datawindows by Greenleaf (source)	£195.00
Windows for Data	£195.00
Powerscreen by Blaise	£85.00

MISCELLANEOUS

PforCe — datafile, screen, comms (source)	£195.00
General Functions by Greenleaf	£95.00
C Utility Lib by Essential	£125.00
C Tools Plus by Blaise	£125.00
C Sampler by Greenleaf (TC and OC)	£75.00
Scientific Functions	£145.00

CROSS COMPILERS AND CROSS ASSEMBLERS

IAR Cross Assemblers (inc Link) 8 bit chips	£195.00
IAR Cross Assemblers (inc Link) 16 bit chips	£225.00
IAR 3 Pack (any 3 ASMS)	£445.00
2500AD Cross Assemblers (most chips)	£135.00
2550AD Simulators	£115.00
Forth Metacompiler	£call

Aztec C Cross (8085, 6502, 68000/20)	£395.00
IAR C Cross (8051, Z80, 8096, 7807, 6301)	from £1050.00
Introl C, Modula 2 Cross (6809, 68000, 6301 etc)	£1395.00
Lattice C Cross (Z80, 68000)	£315.00
Experts PL/M for Z80 8085 (Intel Replacement)	£845.00

Also available for Sun, Apollo, VAX VMS, VAX Unix, HP etc

FORTRAN

Microsoft Fortran-77 ver 4.1 with CodeView	£255.00
RM Fortran-77 with RM-Forte	£475.00
Pro-Fortran 77	£275.00
Lahey F77 Compiler	£325.00
Lahey Personal Fortran	£75.00
Halo-88 Graphics Lib	£175.00
Metawindows Graphics	£115.00
Ingral (scientific graphics)	£175.00
ForLib (general functions)	£95.00
Fortran Addenda (graphics and general)	£145.00

PASCAL

Microsoft Pascal 4.0 (OS/2 support)	£195.00
Pecan Pascal PDO	£26.00
Pecan Pascal Powersystem	£95.00
Turbo Pascal 5.0 from Borland (new)	£call
Turbo Tutor from Borland	£45.00
Turbo Graphics, Database, Editor, etc	
Toolboxes	£55.00
Turbo Developers Library	£195.00
Turbo Power Tool Plus by Blaise	£85.00
Turbo Asynch by Blaise	£75.00
Powerscreen by Blaise	£85.00
Turbo Professional 4.0	£69.00
T-Debug Plus 4.0	£65.00
Turbo Analyst	£60.00
Turbo Overlay manager 4.0	£45.00

BASIC

Quick Basic from Microsoft	£65.00
Turbo Basic by Borland	£55.00
Basic 6.0 Compiler — Microsoft (OS/2 support)	£195.00
Btrieve datafile	£155.00
Powerscreen data entry by Blaise	£85.00
Fabs Plus Data File	£145.00

OS/2 and 386

OS/2 (IBM or Compaq)	£240.00
OS/2 Tech Ref (IBM)	£140.00
OS/2 Programmers Toolkit (Microsoft)	£195.00
GSS GDD graphics, Btrieve, Datawindows, Panel for OS/2	£call
Xenix 286, Xenix 386 plus languages, tools etc	£call
PC-MOS 386 (single, 5 user, 25 user)	from £175.00
VM-386 multi-tasker	£195.00
386 MAX — memory manager	£75.00

dBASE Utilities

Clipper dBase Compiler	£475.00
dBrief add-on for Bnet	£85.00
Silver Comm Clipper Comms	£125.00
Tom Rettigs Library	£89.00
dGE Clipper dBase graphics add-on	£165.00
Code Base dBase functions for C	£95.00
UI Programmer	£175.00

UTILITIES

Dan Bricklin's Demo II	£125.00
Norton Utilities Advanced	£75.00
Mace Utilities	£75.00
PC Tools Plus	£75.00
Uniform CP/M disk conversion	£48.00
Unidos CP/M emulation	£48.88
Unidos with Z80 processor	£120.00
Matchmaker (use MAC ext drive)	£110.00
Crosstalk Mk 4	£125.00
ZAP VT 100, 4010 emulation	£95.00
PC/Intercom VT-100	£95.00
SmartTerm 220, 240	from £135.00

DERIVE

The successor to muMath, applies the rules of algebra, trigonometry, calculus and matrix algebra to solve mathematical problems using its unique non-numeric approach.

All prices are exclusive of VAT but inclusive of Inland postage.

A selection from our extensive range. Please enquire if the item you require is not listed

3-5 Cynthia Street,
 London N1 9JF
 Tel: 01-833 1022



BTGOLD 76: CJJ028



Keyport 60 DIN 124 FastTRAP NumeriKeys Dashboard Extended Function Guides Handy Scanner Keyport 300 Dashboard Plus



Keyport 60™ Handy keyboard add-on touch tablet that gives you 60 "soft keys" in addition to all your normal keyboard functions. Stores text, formulae, extra functions etc - uses IBM games port.

FastTRAP™ The perfect alternative to a mouse. Takes up far less room - and has features never seen on a mouse - like 3D pointer control. Can be used as a direct replacement for Microsoft® serial mouse.

NumeriKeys™
A perfect extra for portables and lap-tops. Easy to install as it plugs in between the parallel port and the printer and can be configured for special applications through the easy-to-use software provided.

Electrone Dashboard™ A full function "enhanced" board to fit IBM standard or the AMSTRAD PC port. Can also use our smart software that allows you to configure any key for virtually any application.

A FEW ACCESSORIES TO HELP YOU WHEN YOU'RE AFTER THE FACTS

Extended Function Guides
Designed to fit either Standard or Enhanced boards, these guides show you all the functions for the most popular software available - together with a mini manual for extra information.

Handy Scanner Capable of scanning in various standard graphics file formats at 200 DPI in both directions, this is the perfect add-on for DTP - line or halftones easily input and edited. A must for today's serious computer user.

Keyport 300™ Desk pad equivalent of the Keyport 60 with 300 "soft keys". Ideal for point-of-sale, order entry, databases, financial applications etc.

Electrone Dashboard Plus™
Similar to Dashboard, has Standard IBM plug, "standard" function panel as well as a double row of 22 extra programmable function keys.

Electrone DIN-124 A full professional layout with separate cursor and function pad as well as numeric pad. A row of 25 separate function keys for real flexibility. Drop-on function guide supplied and software included.

**FROM
Electrone**

Haywood House, High Street, Pinner, Middlesex HA5 5QA

FastTRAP is a trademark of Microspeed Inc.
Microsoft is a registered trademark of Microsoft Inc.
NumeriKeys is a trademark of Gest Technologies Inc.
Dashboard is a trademark of Electrone Ltd.
Products may vary slightly from those illustrated

**TELEPHONE: 01-429 24
FOR A FREE COLOUR
CATALOGUE**

LOCLAND 286

- 80286 — 12 MHZ CPU. Zero Wait State. Landmark speed test 16.8 MHZ
- Up to 4 MB on board Lotus/Intel EMS v.4 or extended memory
- EMS driver software included
- New highly integrated BI-CMOS design.

Each system is assembled, configured to your requirements and delivered direct from our Scottish plant.

"... there is more to the Loclang 286 than meets the eye. Inside the case lie a number of important innovations designed to improve performance and increase functionality the computer offers both a notable price/performance rating and an intriguing pointer to the evolution of the "standard" PC into the next decade."

Rupert Goodwins, Personal Computer World September 1988

BUY DIRECT

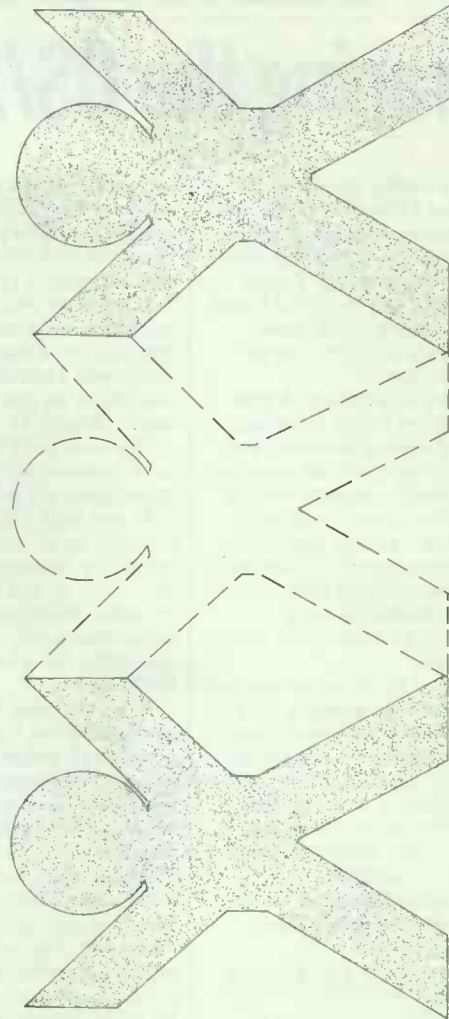
30 day money back warranty. 12 months parts and labour limited warranty and technical hotline support. On-site maintenance is also available.

With 20 MB, 65 MS Hard Drive £1,295

With 40 MB, 40 MS Hard Drive £1,450

With 40 MB, 28 MS Hard Drive £1,595

VAT and carriage not included. Call for other options and special configurations.



SPECIFICATION

Small footprint case only
41 x 43cm

80286 - 12 running at
6 or 12 MHZ

One megabyte of fast
RAM installed

1.2 megabyte, 5.25"
floppy disk drive

Eight expansion slots,
five available

System Clock/
Configuration data in
CMOS RAM

80287 maths co-
processor socket

Hercules compatible
monochrome graphics
card

2 Serial 2 Parallel Ports

Enhanced 102 key
keyboard configured for
the UK

High resolution 14" FLAT
SCREEN monitor

MS DOS 3.3

Prices and specifications are subject to change without notice.

All orders are subject to Loclang's extended terms and conditions of sale, which are available upon request.

LOCLAND
COMPUTER
LIMITED

47 Carron Place, Kelvin,
East Kilbride, Glasgow G75 0YL
Telephone: (03552) 28808

NEWS PRINT Scraping the OS/2 barrel

IBM has finally delivered its Extended Edition of OS/2, the operating system of its future. Initial reaction — believe it or not — was sceptical. People said things like 'So what?' and 'I don't need it,' and even 'What does it do that other machines can't?'

In order to prove that IBM knows more about windows, mice, operating software and how to bring them all together, the company recently invited me to a seminar. Together with other 'leading journalists' I was encouraged to listen to a man from Lotus, a man from Borland, someone from Microsoft, and someone from Micrografx.

The man from Lotus assured us that he was working on a truly wonderful product called Notes (except that it wasn't) which would be out 'sometime in our lifetime' (no, I'm not joking, I'm quoting). He was unable to say what the product did, why it needed Presentation Manager, or which bits of Presentation Manager it used.

The man from Borland told us about SideKick PM. This is just like SideKick, except it works under Presentation Manager under OS/2. Which is a little like saying 'it's like hobnail boots, but designed for horses who will be walking on cotton wool.' SideKick is a

program, almost essential for users of PC-DOS machines (which can only run one program at a time) because you can pop it up whenever you need an editor or a calculator or a comms program or a diary. Under OS/2, you can run as many programs as you need, so who needs SideKick?

The man from Microsoft was very convincing, and persuaded me that whatever IBM had with OS/2 (Extended Edition) on its own PS/2 range would be available from Microsoft as MS OS/2 to run on other machines. That did rather leave unanswered the question: 'What exactly does IBM have?'

The man from Micrografx persuaded me that his company's painting and drawing tools would be absolutely essential for anybody who was pioneering enough to install OS/2 on a PS/2 machine. And also, he had a useful set of programs which would assist anybody faced with the hefty task of taking a Windows-based program and converting it to be a PM program.

Perhaps I should also mention Digital Research. It's major product, Gem, underlies one of the most successful desktop typesetting products around — Ventura. And Digital

Research convinced me that it would be very happy converting its Gem software so that it was actually PM software.

There are times when a lofty silence is far more impressive than a powerful argument. With IBM's latest big weapon in the fight against Apple, the Windows-based Presentation Manager, the lofty silence was all too clearly wearing thin. So IBM decided to go for the powerful argument.

Now, it would be unkind to say that the two days I spent at Hursley Park, IBM's biggest UK research lab, were a waste of time.

But what I did not learn was what IBM was hoping to persuade us — that IBM's software enhancements to its newest PS/2 series are about to sweep all the users of the world away in an irresistible storm of enthusiasm.

What I heard sounded very much like the sound of scraping, coming from deep inside an empty barrel.

Frankly, to pretend that all this was new, was futile. All it could possibly say was what was said a year and a half ago, when IBM launched the PS/2: that by 1989 we would have something that actually matched the Apple Macintosh in its simplicity for the non-expert user — and maybe

exceeded it in being able to run more than one program at a time.

It is more than two years, however, since I sat through a very, very much more impressive seminar in Eastbourne, held by Commodore.

The Amiga development team showed us a genuine multi-tasking operating system. They showed us how a programmer would write code for it. How you could make your message pop up in a window, how you could recognise what the user was doing with the mouse, and how to make your program easy for an Amiga owner to understand. How a program would load in whatever memory was available, even if it was scattered throughout the memory map of the machine in fragments. And how the system would expand as newer and faster, cleverer chips became available.

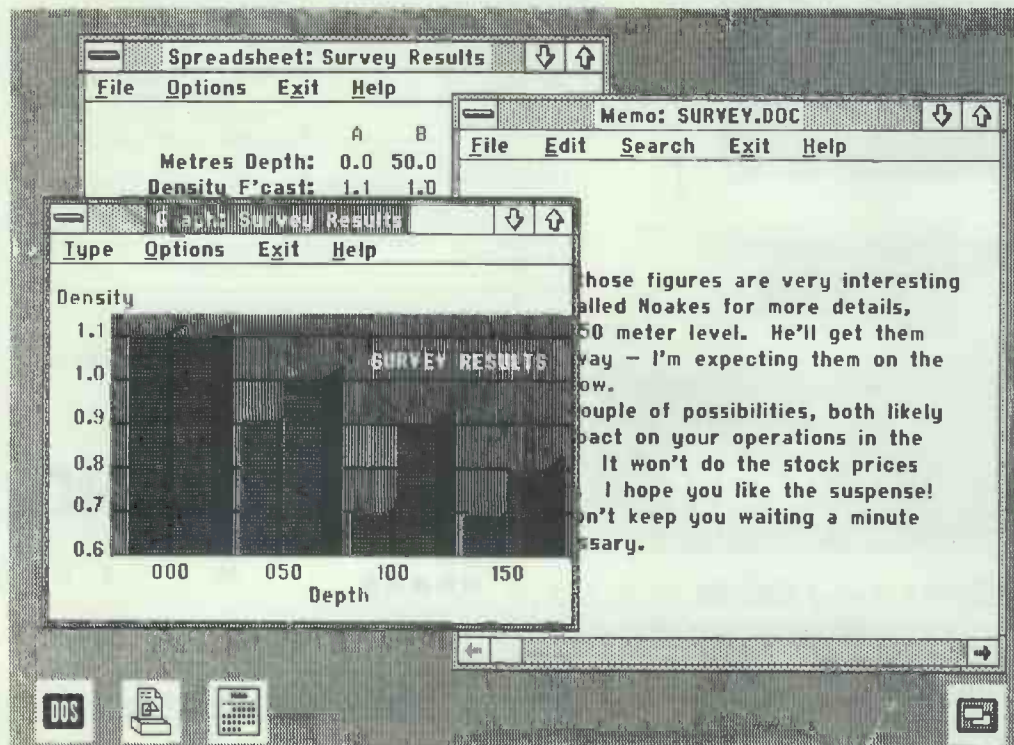
The Amiga didn't sweep the market away. There was only one real reason it didn't: everybody thought Commodore was about to go bust. I know I did. I'm still not quite sure how the company managed to escape from the pit; but escape it did. And today, I would rather run my multi-tasking software on an Amiga than on a PS/2 with OS/2.

My reasons for saying this are not hard to list. First, the only actual program I saw running at Hursley Park was Displaywrite. I needed more time to get into that word processor, but it really didn't look as if it was using PM routines. And in any case, I don't like Displaywrite as a word processor.

So, my feeling is that OS/2 (Extended Edition) does nothing for my machine that I can't get under DOS 3.3 or 4.0 — except, perhaps, boost the amount I have to spend on memory.

Next, the software assumes that I have a four-year-old chip inside my machine — the 80286. Of course, I can actually have an 80386 inside, but PS/2 software doesn't use it that way. You have to tell a 386 to behave in a modern, protected and non-segmented memory way, or it thinks it's an 8086. OS/2 doesn't tell it to do so, because most OS/2 machines are 286-based.

And finally, in a world in which more and more of the data stored is in the form of pictures, IBM has built a Structured Query Language into OS/2. SQL assumes that most data is *not* pixel format ▶



IBM is breaking its silence on Presentation Manager

Chicken-and-egg EISA design

You may recall laughing heartily at our picture of the 'alternative' to the IBM Micro Channel bus — the 'Extended Industry Standard Architecture' proposed by Compaq.

The original design suggested that the bus should be 32-bit, not 16-bit, and any idiot could see that there wasn't enough room in the socket for the extra pins. So Compaq proposed running a second, parallel row of pins on an outrigger or pontoon.

As I saw it, this was useful for two purposes. First it would force you to exert twice as much force on the

motherboard when inserting a card, thus helpfully increasing the risk of breaking connections on the motherboard as well as spoiling the palm of your hand. And second, it made it quite likely that you would snap the pontoon off the add-on card. Finally, there was the bonus: you would only have enough space for half the number of cards in the box.

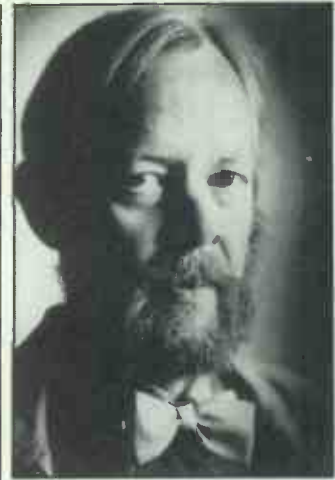
It turns out that Compaq has come to similar conclusions.

The new design of the EISA card is now to have *both* sets of connectors in the same space as the old. Since this

can't be done, the fiddle is to have the new set *below* the old, on a deeper flange. And as long as you really and truly do turn the power off before plugging it in and out, that must be a better idea.

I know it's not the most significant change in the history of computer design. I mention it as a guide to how advanced work is on the full specification of the EISA bus — still pretty plastic.

When they finally finish designing what it has to do, the chip designers can start trying to achieve a bus driver that does it, can't they?



GUY KEWNEY

Pegasus flying high before OS/2

It seems that several of the software houses who were banking on OS/2 to make them rich, are now expecting that their software will make OS/2 successful. The latest to announce is accounting software company, Pegasus.

The logic sounds fatally flawed to me. The original decision to produce a version of a program that runs on OS/2 machines was based on the expectation that IBM would sell millions. As a result, all these users would be screaming for software that ran under OS/2.

So far, that hasn't happened. Now, they seem to be saying that although IBM couldn't sell millions, if they publish the

software anyway, then people will buy OS/2 to run the software.

'OS/2 is such an advantageous operating system, that we felt we should make our software available on it as a high priority,' was the way Pegasus boss Clive Booth put it.

In a real sense, he is right. With multi-tasking, lots of the work of accounting — programs which have to run one after the other on a standard DOS PC — can go on simultaneously. No more 'I can't enter your order because we're running payroll' stories.

Meanwhile, behind the scenes, the alternate reality is rushing along, and Pegasus is

(sensibly) backing that horse as well. It is working on a Unix version of Senior.

Just how hard this will be to do, I can't say. Programmers theorise that all Pegasus software is written in Basic, and then converted. Does the converter produce Unix-style C? Have the programmers at Pegasus learned to write C directly? I can't find out.

IBM has, at last, released the Windows (Presentation Manager) version of OS/2. The extended edition, with database abilities built-in, isn't due in the UK for a while.

My bet: this time next year there will be more Unix Pegasus versions than OS/2 versions.

and that you can index its structure.

Nothing about all this is new, or a surprise. We've known all these drawbacks and arguments about OS/2 for nigh on two years now. For me, it was out of date when it was announced; it's now even more antiquated, and it still isn't ready. And that's the crunch, for me.

The OS/2 operating software brings to the micro all the things that micro users decided weren't worth having. Big machine databases, control by the corporate computer management, integration into a network — a dead weight of annoying irrelevance to most of us. On the other hand, I'd be happy to have a machine like that if I could also get on with the rest of my work.

And can I get on with my

work, under OS/2? I still don't know. Too many questions still float, unanswered, in the air.

For example, what happens to the mighty corporate network when I run one of my badly-behaved DOS programs? On a properly configured 386 (theoretically) nothing. On a 286 chip? If you want to take bets, take them — but not with my money.

For example, what happens to the multi-tasking system if one of my programs accesses one of the IBM screen memory locations directly? A lot of them do. And I know the answer, because some of the nicest features of the VGA screen driver assume that only one program is playing with them; it crashes.

For example, what happens to a program using the serial or parallel port when one of

my accumulated bits of software talks to the I/O chip? Oh, yes, my programs have to, because IBM has decreed that you can't run I/O faster than 38,400 bits per second (not terribly fast) while the chips themselves are quite happy running at three times that speed, or more.

History shows that all these arguments are irrelevant if IBM sells enough copies of OS/2.

When the company launched the PC, I recall remarking that only a mug would buy one — but that there were so many mugs that in a year, only a mug would hold back. But when IBM launched the PC, it was clearly superior to any rival.

Really, the same cannot be said of a PS/2 machine running OS/2 Extended. Novell offers a better network, DesqView

offers better multi-tasking, and you don't have to have a database built into the disk file system to keep track of SQL files on the mainframe.

For a company computer manager, there are good reasons for buying a few copies. For the rest of us? You'd be a mug to buy one now. And I honestly feel I will be able to put my hand on my heart in a year from now, and say the same thing.

In five years' time, when IBM is all-386 and so is OS/3 (or whatever) and it has mastered the problems of optical storage and multi-tasking displays, I think the descendant of OS/2 will be well worth putting on a shopping list. It may even be the major standard.

In the meantime, there's no need to rush out scouring the shops in a panic for a copy.

Newsprint Index

Lukewarm reception for OS/2 Extended Edition	100
EISA design	101
Pegasus software to complement OS/2	101
IBM to take Tulip to court	102
Amstrad on fire	102
Pirate virus and WORMs	102
Bureaucratic wrangle	106
Jumping the gun	107
How to make the most of the Mac	107
Battling to be truly compatible	107
Bare-bones 386	110
Intel's poor show	110
US journals on CD-ROM	110
Grapevine	110

A new blue suit

A lawsuit has been announced by IBM; the target is the Dutch builder of PC clones, Tulip.

The subject, says IBM, is the ROM chip inside Tulip's hardware — the chip which holds the basic input/output system (BIOS) which the machine runs when you switch it on, whether it is going to run DOS, OS/2, Unix or anything else.

This software, say IBM's lawyers, is simply a copy of the software in IBM's own machine.

As is usually the case with matters in which legal minds get entangled, establishing just what is going on is a nightmare.

Tulip, naturally enough, says that the suit is nonsense and there is no question of infringement of IBM's

copyright. And it has suggested that the chip is the standard Phoenix BIOS — which is something that will worry other Phoenix users until the matter is somewhat clearer.

IBM says that the Tulip BIOS is an 'unauthorised copy' and says nothing about whose unauthorised copy it is.

These lawsuits are proof of nothing, either way. Examples: in a recent case between software company Systems Enhancement Associates against PK Ware, it was agreed that PK's archive files included bits of SEA's code, and PK would withdraw its programs and write new ones. But the case was settled out of court, and one of the terms of the settlement was that the terms remained secret.

Example: Zygal has just had an injunction overturned,

granted three years ago, restraining John McNulty (from whom it bought Modular Technology) from working in any communications related field. The company never prosecuted McNulty and eventually the High Court agreed that the injunction had simply expired, after taking one of the UK's brighter inventors out of the business for a substantial period.

Example: Lotus sued Paperback Software for copying the 'look and feel' of Lotus 1-2-3 in VP Planner — the suit, two years old, has yet to come to court.

And the latest example: Ashton-Tate has claimed that Foxbase Plus infringes A-T's rights in dBase II, III and III Plus. And who can forget Apple's suit against Microsoft for Windows — a meaningless attack on a non-existent rival

— or NCR's constant litigious approach to anybody who uses the word 'Tower' in the description of a tall box that stands on the floor.

The computer business really has to get together and agree an independent system of settling these disputes. Rarely do the courts betray any serious understanding of the issues involved, and it is hard to see any sign that they do anything but damage to the parties involved — on both sides.

In the IBM versus Tulip case, one has to wonder what IBM thinks it is doing. What it needs, above all, is a set of clone makers for its PS/2 range who are able to run its OS/2 software. Suing people who try to boost the market must be the strangest form of encouragement seen for some years.

The safety game

On most occasions when I've argued with Alan Sugar he's been right, and I've been wrong. So I thought long and hard before getting up the courage to say this: I think Amstrad's PC200 is his worst ever decision.

I base my decision on Amstrad's decision to cut the price of its cheapest PC range (the 1512 and 1640) to £500.

It's true that I've often thought there was room for a PC clone in the games market. The PC200 is a PC clone, and it is packaged for the games market. It's also true that I've often maintained that the PC family was generally over-engineered. Nobody could accuse the PC200 of this.

But never in my worst dreams did I imagine a PC



Alan Sugar

clone with 60-column TV output as its standard display. Never did I imagine anybody would provide a machine

which expands only if you open the box up and leave it open. And most important, never have PC clones been so cheap.

Perhaps, if the PC200 were cheaper than all other PCs, it might still sell — as Amstrad says, there are a lot of people with a PC at work who would like a PC at home, too.

But the day of the plain, ordinary PC clone with an 8088 or 8086 chip in it is over. And despite getting plenty of warning, several manufacturers have carried on making the things in numbers which the market won't stand.

Digital Matrix currently has the crown for the cheapest 80386-based AT-bus clone at just under £1000. Plus VAT, of course, and the cost of a hard disk. With an Atari ST at £300 (or a Commodore Amiga) and a 386 at £1200, with a genuine

286-based AT around £700, what price should a PC be?

I don't have to answer that one. There are enough adverts in this issue for you to find out what the price is, and no need for hyperbole from me.

Who knows: in six months' time, maybe all the Atari and Commodore and Opus PCs will have been sold to surplus dealer Howard Strowman, and the Amstrad PC200 will be the only PC/games machine in town.

Today, however, the only thing the Amstrad has over its rivals is ease of destruction. With the lid off, in the average house, it isn't going to be a question of *if* somebody drops a pin into the motherboard and starts a fire. It's a matter of *when*.

Saves you buying the box of matches needed to incinerate it, at least.

Well-dressed WORMs

Optical Storage Solutions could not have asked for a better launch commercial for its WORM operating system than the computer virus which struck users of a pirated Activision game, Leisure Suit Larry.

For those who missed it, the story which made the headlines was that the City of London financiers found their machines crashing. It turned out, on investigation, that they had obtained pirate versions of Activision's game, and an attached virus had been playing merry hell with their

hard disks.

This is the world in which people are mindlessly asking for erasable optical storage.

Keith Ragsdale, founder of Optical Storage Solutions, arrived in London with his brand new company about the time of the City Larry episode, warning the world that erasable optical storage is a trap, a dangerous step, a mistake, and something to be avoided like the plague.

The problem with hard disks is very simple: they can accidentally lose data. It's as simple as the Copy command, and it can be as complex as a virus — but once erased, the data on a hard disk is gone irretrievably as if it had never been there.

The solution is also simple: save each file onto write-once optical disk. Each time you produce a new version of the file, the old one is not deleted, but ignored.

The drawback to this solution is the nature of a disk file, which is stored as if it used the same space as the old version. Change one word in a 100k file, and your disk system will create a new 100k file, virtually identical to the old 100k file.

Run a standard disk storage system like this on your optical disk, and you will use up the £150-worth of space within months. Yes, you can get a new one, but no, it still isn't cheap.

Ragsdale tackled this

problem at its source. His company writes disk drivers. This is software which watches your program, and intercepts all requests to use the disk. And when it gets a request to save some data, it doesn't save the whole file, but just the new data.

Theoretically, this approach could be made even more efficient: an incremental file save already exists for programs like Borland's Sprint word processor.

What this does is to keep a record of the original file, plus all the keys you have typed since it was last saved. At any time, you can interrupt the system and the program will reconstruct the file from the base plus the list of keystrokes.

READ THIS HALF OF THE PAGE IF YOU WANT TO PUT TOGETHER A DTP SYSTEM.

OR THIS HALF IF YOU WANT TO BUY A COMPLETE SOLUTION.



WHY WADE THROUGH A STACK OF LITERATURE ON DESKTOP PUBLISHING WHEN A FEW WORDS ABOUT TAXAN'S COMPLETE PERIPHERAL SOLUTION WILL TELL YOU ALL YOU NEED TO KNOW? TAKE VIKING 1 FOR INSTANCE. THIS 19" ULTRA-HIGH RESOLUTION MONOCHROME MONITOR WILL LET YOU DISPLAY TWO FACING PAGES OF TEXT AND GRAPHICS. WHAT'S MORE, ITS 1280 x 960 NON-INTERLACED DISPLAY RESOLUTION AND FLICKER-FREE IMAGE MAKE FOR VERY EASY READING. COUPLE VIKING 1 TO OUR TX300 ROLLER-FED SCANNER (OR OUR TXF300 FLAT-BED SCANNER) AND YOU'RE TWO-THIRDS OF THE WAY TO A PROFESSIONAL DTP SOLUTION. BECAUSE BOTH OUR SCANNERS



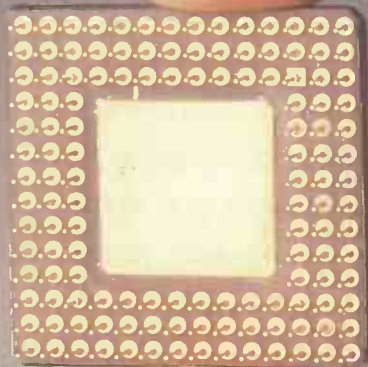
WILL TRANSFORM TEXT, PHOTOGRAPHS OR ARTWORK INTO IMAGES AT 300 DOTS PER INCH. THEY'LL ALSO GIVE YOU AN IMPRESSIVE 64 GREY-SCALE HALFTONES FOR EXCEPTIONALLY FINE, ACCURATE RENDERINGS. TO COMPLETE THE PICTURE, THERE'S OUR CRYSTAL JET PRINTER. WITH ITS LIQUID CRYSTAL SHUTTER, THE KE-300 GIVES A MUCH BETTER QUALITY PRINT THAN LASER ENGINES. IT ALSO HAS FEWER MOVING PARTS, SO IT'S MORE RELIABLE. WHAT'S MORE, THE KE-300 USES A HIGH-SPEED CONTROLLER CARD WHICH DRAMATICALLY REDUCES PRINT-TIME. FINALLY, EACH OF OUR PERIPHERALS WAS SPECIFICALLY DESIGNED TO WORK TOGETHER WITH THE OTHERS. AND ALL CARRY A 1 YEAR ON-SITE WARRANTY. SO NATURALLY WE'RE QUITE CONFIDENT THAT OUR DESKTOP PUBLISHING SOLUTION WILL SATISFY EVEN THE MOST DEMANDING USER. HAVING SAID THAT, IF YOU'D STILL PREFER TO PUT TOGETHER YOUR OWN DTP SYSTEM, READ ON.



TAXAN
A KACA COMPANY
PERFECTING THE IMAGE

TO FIND OUT MORE ABOUT THE TAXAN RANGE OF PRODUCTS, CALL US ON 0344 484646.

Guaranteed to
ruin your SX life.



The Dell 386 range.

Even good SX can't beat the real thing.

Some PC manufacturers will tell you SX is 'good news.' Tempt you with the 'latest technology.' Promise they'll 'never cease to amaze you.' Then lead you up the path they've chosen.

Dell is different.

We're not telling you there's no future in SX. We're simply offering you a real alternative - true 32-bit architecture that can outperform any potential SX machine - at a lower price.

That's not 'technology worth having at any price.' Just the highest available performance from a PC and real value-for-money.

That's the least we aim to offer whenever we bring any significant new innovation to the market-place.

And the direct line from our customers right back to our research and development team tells us we're getting it right.

The Real Thing from Dell.

Plenty of users are looking for the power and performance of a 386 computer. Whether it's for use as a LAN-server, for CAD/CAM, advanced DTP or any of the complex applications that fully exploit 386 architecture, these users know what they want. And they won't be satisfied with anything less than the real thing - a true 32-bit 386 machine.

Dell offers them two. The 20 MHz System 310 and the 25MHz System 325. Fine-tuned, state-of-the-art machines - take a look at the specifications - and the best 386 value you'll find.

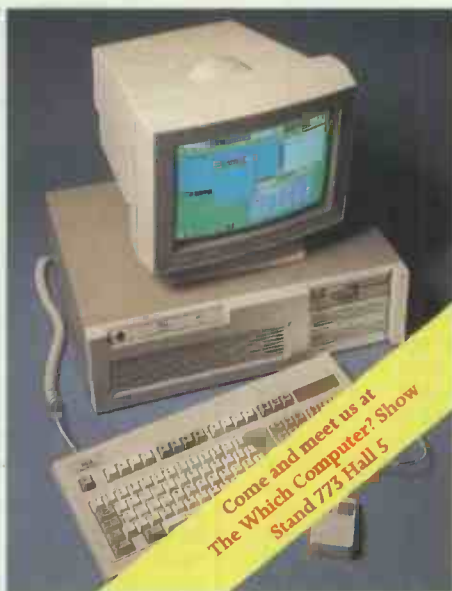
Others may be tempted by SX. After all they've been told it's good for them.

Dell has two suggestions.

If you're attracted to 386 architecture because you're thinking of the long-term future, why settle for a 16-bit SX machine? The Dell System 310 offers you full 32-bit architecture with 20MHz performance. And it actually costs you £541 less than the 16MHz Compaq Deskpro 386s - the best that SX can offer.

If you want to satisfy an existing need for high performance at a good price, then you really are in the market for a 286 machine. And the good news is the Dell System 220. It out-performs any available SX machine, at a saving of £1241 on the Compaq.

The choice is yours.



Dell - the Real Difference.

When you buy direct from Dell you get high-performance systems and excellent value-for-money. But that's not good enough for Dell - or you.

That's why we promise you total accountability. Every Dell system is individually configured, rigorously tested before delivery, then fully supported - by Dell. There's a free Technical Hotline direct to the manufacturer and a 12 month on-site service agreement covering parts and labour, included in the price.

It's all part of the direct personal relationship we offer every customer. And it's supported by our personal, money-back guarantee. If you have the smallest reservation about us or our products, return your system within 30 days and we'll refund your money in full.

Talk direct to Dell now.

Send the coupon freepost for a copy of our information pack. It gives you full details of all our systems, the company and our personal approach to business.

Or, if you can't wait, why not put us to the test right away?

Phone our Sales Hotline on 0800 414535.

The call's free and you can discover how the real thing is going to cost you a lot less than you expected.



Dell System 310.

80386 microprocessor running at 20MHz. 82385 cache controller. 1Mb DRAM expandable to 16Mb on main logic board. Fast video/fast BIOS feature (uses 384k system RAM). Weitek co-processor support.

Sample configuration prices.

Monochrome:	VGA Colour Plus:
40Mb hard drive £2599	40Mb hard drive £2999
VGA Monochrome:	90Mb hard drive £3399
90Mb hard drive £3199	150Mb hard drive £3799
320Mb hard drive £4399	320Mb hard drive £4599

Dell System 325.

80386 microprocessor running at 25MHz. 82385 cache controller. 1Mb DRAM expandable to 16Mb on main logic board. Fast video/fast BIOS feature (uses 384k system RAM). 16-bit VGA adaptor. Weitek co-processor support.

Sample configuration prices.

VGA Monochrome:	VGA Colour Plus:
90Mb hard drive £4299	150Mb hard drive £4899
150Mb hard drive £4699	320Mb hard drive £5699

Also available:

The 20MHz 80286 Dell System 220.

The 12.5MHz 80286 Dell System 200.

All standard configurations include enhanced U.K. 102-key keyboard, tilt and swivel monitor, hard disk drive, floppy disk drive, 1 parallel and 2 serial ports, Dell System Analyzer and full support package.

Compaq Deskpro 386s is a Trademark of Compaq Computer Corporation.

DELL

COMPUTER

CORPORATION

DELL COMPUTER CORPORATION LTD., MILBANKE HOUSE, WESTERN ROAD, BRACKNELL, BERKSHIRE RG12 1RW. TELEPHONE: 0344 860456 FACSIMILE: 0344 860187

The personal computer company

Public sector purchasers may buy at different terms through HMSO. Call (0603) 695257 for details.

0800 414535

Please send me your new information pack.

Return this coupon to Dell Computer Corporation, FREEPOST (RG 1462), Bracknell, Berkshire RG12 1BR or fax us on 0344 860187.

Name

Position

Company

Address

Postcode

Tel no:

19PCW

Ragsdale does some of this, but there are files — highly structured database files, for example, where a single record added can utterly change the shape of the whole — where DOS just doesn't allow real economy.

Strangely enough, even in this worst case system OSS saves more space than you'd imagine because there is one file that DOS is constantly erasing and rewriting, which it really doesn't have to.

This is the file which doesn't appear on your directory when you type DIR. It's the File Allocation Table (FAT). When DOS alters a file, it deletes the FAT and writes a new copy. When the OSS driver sees a file change, it just updates a single pointer.

'I've got two optical disks which I show people,' said Ragsdale on his visit to London. 'One was created by DOS and the other was created on doing the same storage work by our file system. The DOS disk is full. Our disk is 20 per cent full.'

Actually, you don't have to wait for erasable optical storage to see some of the disasters which erasable storage can bring. Big hard disks of over 100Mbyte capacity are already commonplace. Systems with 600Mbytes are not hard to find.

Experts are always on at us to 'back up your data' — copy it onto a tape. Perhaps you'd like to think about this in terms of arithmetic. Imagine your machine is working all day and the major set of files is updated every ten minutes or so — all of them. In the course of the day, you're talking fifty-odd versions of each file. In a week, that's over 200 versions of each file.

How often are you going to back up your disk? Every week? That's 200 versions of each file gone forever. Of course, you could back up three times a day — it would only add an extra 30 minutes or so to your workload, plus the time lost because most systems won't do anything else while backing up.

Now here's the amusing bit. You are a very frequent disk backer-upper. You do it every 48 hours. And you don't know it, but you have a virus on your hard disk. When the system finally crashes and starts deleting important files, how long have you had the virus? A week? Three weeks?

How many back-up tapes do you keep before you re-use the cartridge? Three (most people do)? In that case, your oldest back-up, which will lose you six days' work, is already corrupted with the virus and you dare not restore from it.

Of course, had you been storing things on a write-once disk, you could back-track through the files, reversing time. When you finally found a date when there was no virus, you could copy that set of files to a new optical disk. And then you could work forward from there, to see what had been done and reconstruct the work.

The utilities to track back and forward in time in this level of detail don't exist, not yet, says Ragsdale. On the other hand, the information is stored on his WORM and in an emergency, a competent programmer could retrieve it.

From an engineer's point of view, there is no doubt which storage system is superior. Erasable storage is only of value because we are accustomed to working with smaller-capacity drives than we want.

With WORM drives, when the disk is full, you go and stick another one in. With erasable drives, you delete the least valuable files. At least, you hope they are. My own experiences suggest that those are, remorselessly and inevitably, the files that you really shouldn't have deleted.

Two things need to change. First, disk drives, like those from OSS, need to be more widely used and have to evolve to use less space, allow more fluent reconstruction and (of course) they have to become standard file systems. And second, WORM media has to become cheaper.

Ultimately, erasable optical looks likely to be cheaper, byte per byte, than WORM.

Bob Gleadow, boss of Atari UK, says the reason is pretty simple: the Japanese consumer electronics business needs a successor to the video tape recorder. A video disk recorder would be ideal. Its disk — re-recordable — would rapidly become a very high-volume, low-cost item, around the £10 mark.

I take the point, but I suspect that the evolution of the computer virus makes the WORM almost essential for serious computer use — to the point where it doesn't matter, not that much, if computer WORM disks are twice, or even three times the price of erasable optical disks.

Viruses are going to get worse, not better. It makes no sense to write viruses, but there is always some Herostratus who will do so, just as there is always some idiot prepared to vandalise a phone booth or mangle young trees in a park.

In order to cure viruses, people who kill them have been explaining how they

work. Wouldn't this be very useful to would-be virus writers! And information like this is not suppressible.

A WORM — today, at least — is not totally virus-proof. It is possible to write data onto sectors of a write-once disk which actually hold data already. That has much the same effect as erasing it, of course.

To do this, you have to overwrite the fundamental head control software built into the WORM drive, because it is built into the disk controller not to write to a written-on sector.

At the moment this is very difficult but not absolutely impossible. In the future, however, these low-level disk access routines will be better protected. And even if not, trashing a WORM is not a simple question of trashing the FAT. You also have to trash the previous FAT. And the one before that. And the earlier one. And the preceding one. And even when all those have gone, the data is still on the disk and can be retrieved.

Unless you have also written a routine to trash that data. And the earlier version. And the one before that. And . . .

A virus that worked that hard would have trouble concealing itself from the system. You'd notice it the first day it ran and purge it.

Optical Storage Solutions has a set of drivers to work with DOS machines. It also has a Novell network driver and a Unix driver. Others will follow.

I reckon the market for WORMs is bigger than the market for erasable optical disks. I'd be interested to hear from readers who feel I'm missing a trick.

OSS is in Concorde, California, on (415) 825 3441.

BABT & BSI tangle over bureaucracy

The loudspeaker can go back into the Courier HST modem — official.

A loudspeaker is (I think) an essential component of a modem. You ask the thing to dial, and as often as not, nothing happens. Is it engaged? Ringing unanswered? Or is there an old lady, terrified out of her mind at the sound of the high-pitched whistling, getting a crossed line?

Up until recently, the

approvals body, BABT, made it its business to remove loudspeakers from many modems on the grounds that they 'send too much noise back to line.'

Protests from manufacturers were vain. A 'call progress monitor' (not a loudspeaker, you note) had to meet certain specifications laid down under BS6789 Part 2, and this was one of them.

Miracom, which imports the HST from US Robotics, argued on technical grounds that the requirement was silly. Dowty, I know, wanted to put a loudspeaker in its old Quattro, and was turned down unless it changed the speaker from the one that the American designer put in.

Eventually, I asked BABT why. The conversation that followed started in a friendly vein, with the BABT man explaining kindly that I wasn't technically qualified to understand. I wrote this down, and he began to get cross with me. We parted after half an hour or so, with him informing me firmly that the subject was too complex for me to be able to explain to my readers, and that if I told my readers he'd said that, he'd be very angry, because he hadn't.

Half an hour later, he rang back and said (very nobly, I thought) that he was sorry, he'd been wrong, and he'd reconsidered. And I was quite right, and the loudspeaker restriction was not justified,

and he wanted to write to Miracom himself and explain it, and would I very much mind not contacting that company until he had time to do so?

He added that he would be writing to the British Standards Institute to suggest that it consider changing the standard, along with other changes under consideration.

A week later, a letter (from BABT to BSI) arrived on my desk confirming all this. I contacted Miracom.

'The problem,' suggested a man called Neil Mellor (a brave man, as he will have to get more equipment through BABT in the future) 'is that the Board responds bureaucratically to these

problems, and isn't able to take an engineer's response.'

You could argue that the Board had neatly proved that it was not bureaucratically bound. At least, that was the angle I took in a news item I wrote for a trade paper at the time. To my astonishment, BABT called immediately to complain about the piece. Why?

Because I'd said the Board was writing to Miracom to explain that it was going to get the standard changed. And I get the impression that what worries BABT is that it has no authority to order BSI standards changed, and shouldn't make statements that imply that it is.

Another bureaucratic wrangle, in fact.

False start

This probably isn't the place to mention it, but I notice that the trend for reviewers to jump the gun is growing.

A friend, writing the documentation of — well, never mind what — bought me a drink, wiped the sweat off his brow, and said, 'Whew! Nearly done — I'll send it to

them tomorrow, and then I can start on the Help screens.'

Which surprised me more than a bit, I must say. In print, on my desk was a magazine called — well, tactfully I'll forget which one — with a review of the product. It specifically awarded the documentation a 'Good' rating on the checklist, and the on-screen help got a 'Good' too.

Apple gears up

Never can there have been a better example of how to waste a competitive advantage than Apple's failure to launch a modern operating system for the Macintosh II.

Current UK estimates of how much of the market the Mac holds in the UK suggest somewhere between seven per cent and ten per cent. Plans, suggest sources, are to get this up to around 15 per cent by next Christmas.

The chance to get ahead is wonderful. Apple's major rival in setting standards is IBM, and IBM is still loading its wagon for the journey through the 1990s. There is just loads and loads of excellent software for the Mac, and almost none at all for IBM's OS/2.

All we need to make the Mac look irresistible is the ability to run more than one program at a time. The announcement of a new SE model with the 68030 (reviewed this issue) simply shows that Apple is aware of the need to update its software.

The main difference between the 68020 (the one in the original Mac II) and the 68030 (the one in the new SE and the new Mac IIX) is memory management. There is no memory management chip for the original 68000 chip, and Amiga users will confirm that



The Mac II: behind the times

this makes the machine vulnerable when running two programs. Either of them, if it has a bug in it, can crash the system. And if the other is editing a big file, or updating a big spreadsheet, or merging two big databases at the same time, that can be very embarrassing.

The Motorola chip that followed the 68000 was the 68020. It had no memory management on it, but it did allow you to buy a parallel manager chip. Unfortunately, when Apple launched the SE and the Mac II, this parallel chip wasn't available.

The 68030, strangely, doesn't work with that memory management unit (MMU) but

has its own memory manager built onto the chip. It is, however, only a cut-down version of the MMU, with several functions abandoned.

Apple's launch of the 68030 looks like a leap into the future. What it is really, however, is a pre-emptive strike. It's designed to stop people buying the MMU for their 68020 machines.

Simply put: if you buy a 68020 plus MMU, you are going down a path which Apple is ignoring. In the future, when Apple does manage to produce genuine multi-tasking, you will find yourself unable to run the software.

Apple's recognition of this is seen in the ease with which

you can switch from 68020 chip to 68030 — both on the SE and the Mac II. The strategy, both in terms of how easy it is physically to swap, and also including the price of the upgrade, is unambiguous: get rid of those 020 chips!

As to the chances of the company getting its 15 per cent, I'm not placing any big bets. I'm fed up with recommending to friends that they consider the Mac, only to have them phone back and ask me if I know how much the things cost. And I'm equally fed up with hot air from Apple UK on why this is, and what they propose to do about it.

However, after a recent discussion on this very subject on the CIX online database, I can offer a little advice from those who have taken the plunge. That is: ask for a discount.

Apple is very anxious to keep the fact that its dealers give discounts a secret. I long ago ceased trying to understand this — I'd have thought that discounts were designed to encourage sales, and I simply don't understand the value of a secret discount in encouraging the half-hearted to abandon the IBM standard.

Nonetheless, dealers will knock 30% off if they think this is the only way to get your business. Make sure it is.

No end in sight

It is possible to buy a card which gives all the colours, the high resolution and amazing hidden features of the IBM VGA display card. The trouble is, nobody knows which one is exactly the same — and all the rivals for the position of True Compatible are desperately seeking to slander each other.

'We all want to be the next Hercules', was the way one battle-weary fighter in the VGA clone wars put it, acknowledging that the fight was getting pretty dirty.

A piece of paper, without names, phone numbers or address, was duplicated and left in the Press Release room

at the recent Comdex Fair in November. It purported to be a list of ten tests which the Paradise VGA Plus card would fail, and which the IBM card would pass.

The problem is very simple: there are too many features in the VGA card. Most of them are accidental. If you set this register, you get this strange result; if you change that memory location, you see this wonderful picture. The question 'Does any existing software actually use these registers, or try to show these pictures?' is never asked. And of course, there is no way of knowing whether one day soon, some new Lotus might release a wonder product

which just happens to require this magic element of the display standard, and without which no card maker will be able to sell.

The trick, of course, is to persuade the market that your own card, while possibly not 100% IBM identical (though naturally it is!) has unique abilities which mean that any such programmer will automatically use your card's facilities as the base standard.

Wyse, for example, showed an enormously high-resolution monochrome monitor for desktop publishing. It shows two full A4 print pages side by side. And it will run VGA — the VGA card will run in parallel with the high-res

mono card, and swap information with it. Not just any VGA card, of course — it has to be a Wyse VGA card.

The company which gave us the EGA Wonder (it did EGA on a CGA resolution screen) has now produced the VGA Wonder, which can tell what sort of computer it is inside, and what sort of screen it is connected to. It can also emulate IBM's ultra-high resolution of 1024x768.

Paradise's response to all this was not a data sheet, but a number count. It proudly announced that it has shipped more than a million VGA compatible cards, and over five million EGA plus VGA. If that doesn't make a standard,

Kudos – The independent hard disk experts

No. 1 for mass storage

Kudos were the first to bring you a full spec hard disk system for less than £300. We followed up that breakthrough by supplying a whole range of drives at impossible-to-beat prices. Through the years, our knowledge of the hard disk market has enabled us to stay one step ahead. Now we can confidently claim to be **the** experts in the field. When it comes to hard disks, we know what we are talking about. If you need convincing then take a look at some of our products:

Kudos Harddisk 20

Top selling 20MB hard disk suitable for most PC/XT compatible, includes: Miniscribe 3425, Western Digital Controller, Cables, Manual & utility software (65 ms access time)



£189

Seagate

ST 251-1

40MB Hard Drive
(28ms access time)

£289



KudosCard 30

30MB Hardcard
(65ms access time)

NEW LOW PRICE £229



Kudos Harddisk 30

Kit includes Miniscribe 8438, Western Digital RLL Controller, Cables, Manual & Utility software (65 ms access time)



£239

NEW!
diskdoubler £139
Doubles the storage capacity of your hard disk.
The diskdoubler is a new short card that simply fits into your IBM compatible – doubles storage capacity without a performance compromise.
Call for more details.

Kudos Harddisk 40

Kit includes Miniscribe 3650, Western Digital Controller, Cables and Disk Manager. (65 ms access time)



NEW LOW PRICE £249

FEBRUARY'S SPECIALS

Seagate ST 4096

80MB Full Height Hard Drive (28ms access time)

£459

3M DC600A Data Cartridge

£13.95

Minimum order – 5 cartridges

Intel 8087-2 Maths Co-processor

£89

Seagate Hard Drives

ST 125	20MB 40ms	£179
ST 225	20MB 68ms	£169
ST 138R	30MB 40ms	£189
ST 238R	30MB 68ms	£179
ST 251	40MB 40ms	£259
ST 251-1	40MB 28ms	£289
ST 157R	49MB 40ms	£299
ST 4053	44MB 28ms	£399
ST 277R	60MB 40ms	£315
ST 4096	80MB 28ms	£459
SCSI Hard Drives		
ST 225N	20MB 68ms	£219
ST 251N	40MB 40ms	£329

('R' denotes that drive uses RLL Controller)

Miniscribe Hard Drives

MS 8425	20MB 65ms	£174
MS 8425F	20MB 40ms	£229
MS 8438R	30MB 65ms	£199
MS 8438RF	30MB 40ms	£218
MS 8450	40MB 40ms	£229
MS 3650	40MB 61ms	£269
MS 8051	40MB 28ms	£399
MS 3053	44MB 28ms	£409
MS 3675R	60MB 40ms	£259
MS 6085	70MB 28ms	£499
MS 6128R	110MB 28ms	£599
MS 9380	330MB 16ms	£1599

('R' denotes that drive uses RLL Controller)

Also available – Hard disks from Priam, Micropolis, Core and Mitsubishi

Software? – Whatever your requirements, call Kudos first.

Printers – A Full range at hard-to-beat prices. Call for details.

Western Digital Controllers

WD XT-GEN 20MB MFM	£49
WD1002-27X 8-BIT RLL	£59
WD1003-WA2 16-BIT Dual MFM	£99
WD1004-RA2 16-BIT Dual RLL	£109

Accessories

XT Connecting Cables	£10
AT Connecting Cables	£10
Amstrad Fixing Kit (includes Beige front panel)	£11

Larger capacity drives available plus the full range of Everex memory boards, graphic adaptors, AT compatibles and monitors at Kudos – Your one stop shop.

All Kudos Systems' products come with a 12 month no-quibble guarantee

Kudos – The tape streamer specialists

No. 1 for Everex

Kudos breaks the tape streamer price barrier! Making a backup of your hard disk data is quite a chore. It takes too long and it's very complicated (You have to use 55 floppies to backup a 20MB drive). It never seems to be worth all the effort – until you lose all your data! Tape streamers make the task quick and easy but they're too expensive for most users to consider. **Until now.** Kudos Systems present a range of high-quality products which break the tape streamer price barrier.

Everex Excel Stream 40 (internal)



£449

Everex Excel Stream 40 (external)



£499

Everex Excel Stream 60-8 (external)



£599

PC/XT/AT/386 Tape Streamers

Everex Excel Stream 60 (int)	£849
Everex Excel Stream 60 + QIC-02 (ext)	£1095
Everex Excel Stream 125 (int)	£1395
Everex Excel Stream 125 (ext)	£1445

New

Kudos Stream 60 int
60MB internal tape streamer. Top spec. **£399**

New

Kudos Stream 60 ext
60MB external tape streamer. Top spec. **£499**

Accessories

Everex QIC-02 Controller for PC/XT/AT	£155
Everex QIC-02 Controller for PS/2	£289
Everex QIC-36 Controller for Stream 60-8	£219
Additional controllers enable 3-4 computers to share one tape streamer	
Y Cable power splitter	£15
Xenix Drivers	£69
DC600A Data Cartridge	£13.95
CT600H Data Cassette	£20
DC600 Head Cleaner	£24
Refill kit for above	£11

IBM PS/2 Tape Streamers

Everex Excel Stream 60 PS/2 (ext)	£1375
Everex Excel Stream 125 PS/2 (ext)	£1695

Remember, we stock the full Everex range including Computers, Memory Cards, Macintosh Peripherals, Tape Streamers, Multifunction Cards and Graphics Cards. If the product you want is not listed here then give us a call on 01-200 6511

These tape streamers, from the highly regarded Everex range, are suitable for most IBM PC/XT/AT compatibles. They come complete with controller card, software, comprehensive manuals, cables and free cartridge/cassette – just plug in and go. Features include:

- 5MB per minute backup speed
- No need to pre-format tapes
- Automatic scheduler lets you preset 8 different times for unattended backup – intelligent software knows if you're using your micro and will wait for you to finish before making a backup
- Multiple tape capability allows unlimited capacity to backup even the largest drives
- Multiple datasets for recording more than one session on a single tape
- Context sensitive on-line help is always available with just the right messages
- Supports both image and file-by-file backup and restore
- File-by-file restore from an image backup
- File-by-file operations at near streaming speeds
- Software assisted installation
- Local area network compatible (Xenix, Novell, Pick, BOS, etc.)
- Movable, nestable windows make menus understandable
- External units can be shared by just adding additional controllers
- Dynamic adjustments to disk and system speeds
- Works with concurrent DOS

New Amstrad range now in stock – Call for details

To order or to find out more about our product range, complete the coupon below or ring 01-200 6511
Please add carriage as follows – Hard disks – £9, Tape streamers – £11, Accessories – £2.50



KUDOS
Systems
LIMITED

If you're a government department, education authority or PLC, just call us, quoting an official order number and your goods will be despatched on the same day.

Export and dealer enquiries welcome.

Kudos Systems Ltd
Unit K
Colindale Business Park
Carlisle Road
London NW9 0HW

01-200 6511

(12 lines)
Telex 8813241
Fax 01-200 5153

Personal callers welcome – Call in and save on delivery charges



All tradenames and product names are the property of their respective manufacturers/owners. Prices and descriptions correct at time of going to press.

Prices exclude VAT

To Kudos Systems Ltd. Unit K, Colindale Business Park, Carlisle Road, London NW9 0HW

Please rush me the following products:

_____ (Qty) _____ £ _____
_____ (Qty) _____ £ _____
_____ (Qty) _____ £ _____

Please send me your latest information pack Carriage £ _____

on hard disks on tape streamers VAT @ 15% £ _____

I enclose a cheque for £ _____ TOTAL £ _____

or debit my Visa Card Number _____

Name _____

Company _____

Address _____

Postcode _____ Telephone _____



the implication is, what will?

There were one or two comebacks. Most innovative was the response of Cirrus Logic, which has produced its own VGA, and has now 'extended' this to drive the Sharp liquid crystal display — the 640x480 resolution screen which can give 16 grey scales in VGA resolution.

But for the most part, vendors showed pieces of paper which described their own offering as '100% register compatible with IBM' and offered disks which would trip rival cards up. It's a battle with no end in sight.

US computer journals on CD-ROM

With an addition to the still sparse category of software on CD-ROM, International Software has come out of the closet. The two-year-old company has been selling its services and solutions to corporates with little publicity but recently decided its £16 million UK turnover needed a boost. So it took on a PR agency, put together a package for which it has the UK exclusive rights, and told the world.

The application, known as Computer Library, is a collection of 43,000 articles from the US computer and associated press, along with the necessary software to find references. Text from directly computer-related journals is held in full, while articles from financial and peripheral

Fast and full

Latest contender for the 'lowest price on a 386 machine' comes in at £999. This is a pretty bare-bones system with a floppy, a keyboard and 512k of memory.

To have a proper working system, with this 'deskscraper' design (you can't call them towers, since NCR copyrighted the name) you need to add a hard disk and a mono screen.

There's a 'full 32-bit' 386 chip inside it, according to importer Clive Warner at Digital Matrix. And it runs at 20MHz, no wait states.

'We still haven't decided on a name for it, and I'm constantly going over my figures, trying to make sure I can do it for that price,' said a nervous-sounding Warner last month when I spoke to him. 'But it has five proper AT slots, and it will run Xenix.'

The reference to 'full 32-bit' is a sly dig at various Far Eastern clone builders who are using faulty versions of the 386 chip (the ones which Intel sold off cheap as fast 80286 replacements because of a bug in the 32-bit instructions). Those chips, says Warner, will not run Unix.

publications are held in summary form. No article is over a year old.

Lotus BlueFish, a text retrieval package, used for searching and indexing, is distributed on the CD-ROM along with the library database. From BlueFish, you can select articles by subject, author or publication, or by searching for keywords within the text. Searches can be nested, and the text of a previous search may be edited to increase the precision of a search operation. Boolean operators, such as AND, NOT and OR can be used further to refine a search.

Once found, an article can be printed directly from BlueFish or loaded into the user's word processor for formatting, editing and printing.

The hardware uses the standard HS CD-ROM format which gives over 500Mbytes of storage per disk, although the first ones to be shipped will be only just over half full.

International Software expects

this figure to grow during 1989, when it will have incorporated material from European journals.

Computer Library is expected to be invaluable to corporate information centres, corporate evaluation and purchasing departments, and those in publicity and computer-related media.

To circumvent the major drawback of CD-ROM-based databases — their tendency rapidly to become outdated — International Software is selling the disks on a subscription basis for £795 per annum. For that, you get a monthly disk update — which may also include a free program upgrade — from which articles over a year old have been eradicated. For £825, International Software will also sell you the necessary kit, consisting of the drive itself, an adaptor card and a device driver, although these are available from third parties.

For further details, contact (01) 847 3761.

Manek Dubash

In confidence

Intel has warned everybody that it is going to post poor financial results 'because of a slowdown in PC sales.'

Chip maker AMD has laid off staff. It blames a slowdown in personal computer growth.

The American research firm DataQuest has forecast a severe slowdown in personal computer business in the US for next year.

Howard Strowmer, purchaser of unsellable hardware which he peddles at incredibly low prices to faraway places like Poland and the Middle East, is receiving 'plenty' of offers of large stocks of PCXT clones — he reckons £300 will soon be a high price for a hard disk XT.

And what does Compaq have to say?

'The business sector of the personal computer industry is booming,' it said in an announcement at the FT conference on professional PCs. 'And there's never been a time when the future direction of the industry is more predictable.'

There are straws of hope. For example, memory prices are starting to drop. One supplier said that they dropped 35% in the middle of November. Maybe this is a trend? Or maybe the market is collapsing?

Research firm Context said that the value of the UK market for PCs went up by over 60% in 1988, with the number of machines shipped going up 35%.

Well, maybe the 386 market is in for a good time. But I still find it hard to believe that the next nine months aren't going to be slow.

Grapevine

Weighing only nine ounces, a little hard disk drive from Phase IV (UK agent for PrairieTek in the US) is light enough for laptop use (and small enough, physically, and miserly enough in terms of electrical power) while still providing 20Mbytes capacity. It requires an average 1.5W of power, has several features designed to make it more reliable when being bumped about the countryside in a suitcase, and is pretty fast (28 milliseconds average seek time) too.

Details can be obtained from Phase IV at Unit 6, Oxford Business Centre, Osney Lane, OX1 1TB or call the company on (0865) 792200.

A compiler for the 48k Sinclair Spectrum has been released by Mira Software at £15. At that price, I'll happily overlook the fact that it is BS 6192 Standard Pascal. And for anybody who wants to actually produce their own serious programs that run at meaningful speeds, Pascal, once learned, is a vast improvement at every level over the Basic supplied with the machine. I've no hesitation in urging you to send your cash to Mira; write to 24 Home Close, Kibworth, Leicestershire LE8 0JT.

Insignia Solutions continues to amaze the world with its emulation software for the PC:

latest to buy it is minicomputer maker Hewlett-Packard, which is running it on its 9000 series.

As an alternative to File Genie, a new program which converts odd file formats into each other is **Datashuttle**, launched at Comdex by Softway of San Francisco. Formats covered include dBase, Lotus, Symphony, open access, Quattro, Multiplan, VP Planner, Framework, and so on.

Details in the US on (415) 397 4666.

To prove that Windows is not the same as Presentation Manager under OS/2, Micrografx has produced a piece of software which helps

a Windows program turn into a PM program. The software, called Mirrors, was developed internally to help translate Graph Plus, Draw Plus and Designer to PM.

Details in Richardson, Texas on (214) 234 1769.

As expected, Mitac announced its PS/2 clone at the show — a pair of them, in fact. The model 50Z clone is based on the 16-bit 386 SX chip, but it also announced a 20MHz model 80 lookalike — except it is smaller. In the US it will cost under \$3000, but at press time there were no details of what that system would include, or what UK pricing might turn out like.

Inside every pyramid
there is always one
outstanding leader



Discover Arche Technology
for yourself
The first computers
with a 2 Year
On Site Warranty

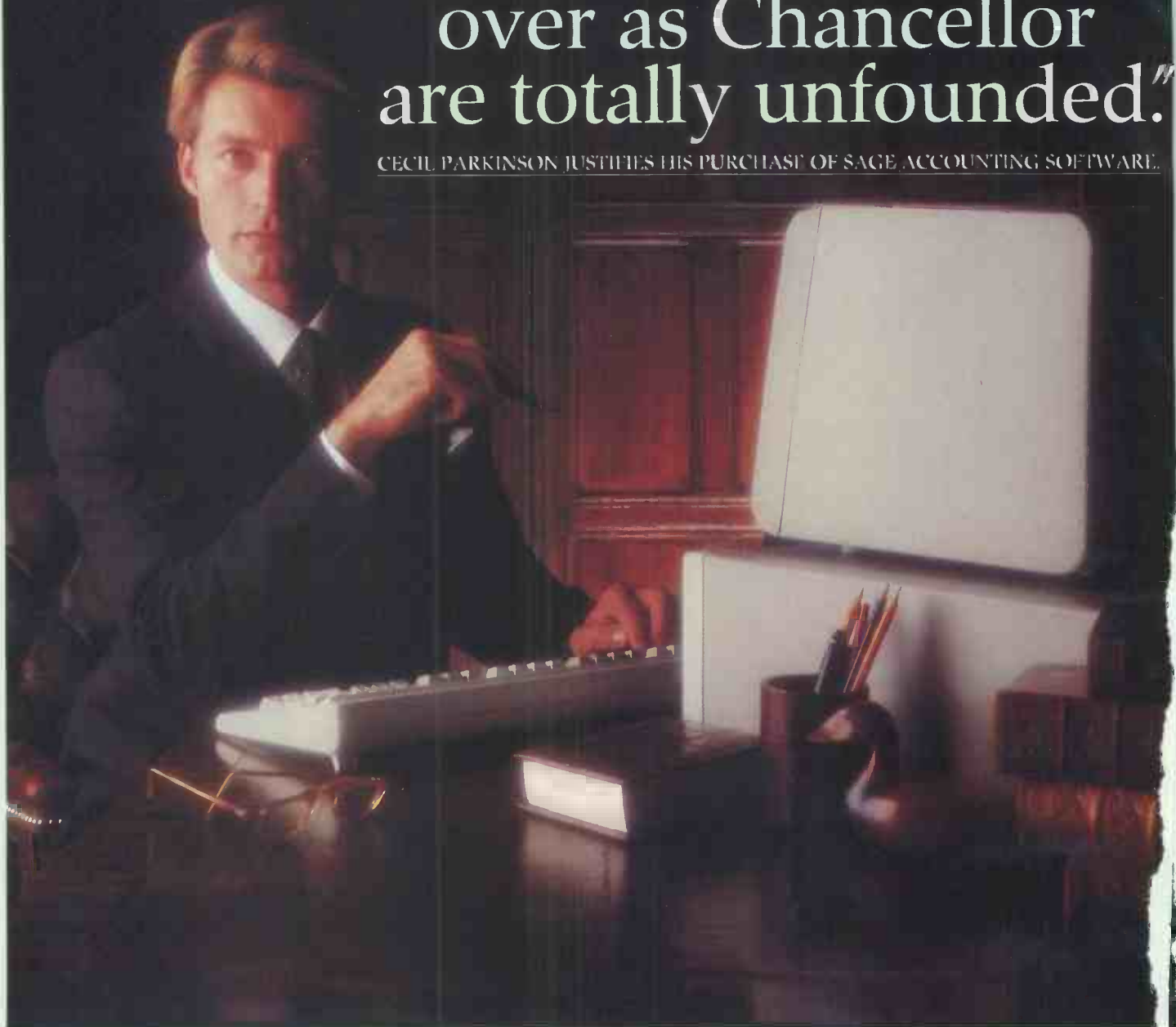


CONTACT ARCHE FOR DETAILS OF YOUR NEAREST ARCHE ASSOCIATE

ARCHE TECHNOLOGY (U.K.) LIMITED, ARCHE HOUSE, LONGWALL AVENUE, QUEENS DRIVE INDUSTRIAL ESTATE, NOTTINGHAM NG2 1NA
TEL: 0602 862700 FAX: 0602 862717

"Any rumours that I am to take over as Chancellor are totally unfounded."

CECIL PARKINSON JUSTIFIES HIS PURCHASE OF SAGE ACCOUNTING SOFTWARE.



I would like to take this opportunity to adamantly refute any rumours there might be. The suggestion that I am to be Chancellor now, or at any time in the future, is nothing more than conjecture, and my recent purchase of Sage Financial Controller has no bearing on the issue.

Having experienced the Sage 'Businesswise' accounting programs over many years, I am totally convinced they provide the best value

on the market. Through Bookkeeper, Accountant and Accountant Plus right up to the sophisticated



Financial Controller, they provide the small to medium sized business with all the accounting software they need.

They're very easy to use and understand, they work with all IBM compatible PCs, and

Shareware is hard to evaluate because it has such a long 'half-life' — people don't throw it away if it's useless, the way storekeepers throw away unsellable software with a price tag. Latest in a long line of hopefuls who intend to make money out of this problem is **Wizardware**, 'the source for quality shareware' as they call themselves, with a new dodge: a menu. Wizardware products are 'selected' and all have a front end which lets the inexperienced user run them all by typing GO.

Sounds silly to me, but you can talk to them on US (215) 866 9613.

Award Software now has a BIOS program for the 80386SX chip — the 16-bit version of the 386. Intriguingly, the company claims that this BIOS allows programmers to use the 386's special 'protected mode' — something which isn't normally available in DOS-style operating software. Award may have a partner in Chips and Technologies Inc, which has released a chip set to allow any dumb soldering iron user to put together an AT-style machine based on the SX chip. The chips are an enhanced NEAT set called NEATsx.

Award details in California on (408) 370 7979. C&T is on (408) 434 0600.

Disk management software for the PC was always necessary, because finding your way from one sub-directory to another was a bit like wandering through an adventure game maze. **Xtree**, the company which did very well out of mapping this confusion, has now launched a similar product for helping Macintosh users. For the life of me, I can't see why any Mac user with a graphics interface would want it, but obviously there are some deprived PC users out there, stuck in front of Macs they don't like, who want things to appear hard.

Details from Xtree in California on (805) 541 0604.

Tandon didn't launch a Micro Channel based machine at Comdex but they thought about it. Instead, it will appear in Spring, sources confided at the show. Machines which Tandon did launch included three based on the 386, and two (same chip) without disks for network use. All are data pac standard machines, without the data pac. There is just a very big hole where the data pac can be mounted.



A keyboardless machine? Daft, but apparently there is a demand for such — using a touch screen. It's portable, too, called the **Datalite**, and marketed by Quebec firm Varstop Inc from Greenfield Park, Quebec J4V 1M9. Tel: (514) 466 8909.

Beep! The missing noise from your HP LaserJet when it runs out of paper has been surgically replaced by **Laser Edge** of California. It costs \$79, a lot for a control-G device, but the company says that the machine is so quiet that time is very often wasted by people who simply didn't know it had stopped, waiting for a refill. **PaperPeeper** will ship next month, and details are available on (415) 835 1581.

Unlikely though it may sound, there is space on a 3½in floppy for 20Mbytes of data. Normal drives use 1.4Mbytes. The trick is to get the tracks closer together, and normally, that requires a very, very accurate 'servo track' which makes sure the head is always in the same position. The bright idea of Insite Peripherals of Santa Clara was to make the servo track an optical track, rather than magnetic, which meant that the media didn't have to be perfect.

The **Floptical** drive will ship next year, costing around \$250 for a SCSI-based unit. Anybody planning to buy 5000 or more should contact Insite on (408) 727 8484.

The generators of the very fast Optasm assembler for the PC have released a new member of the family; a linker and debugger called **Optlink** and **Optdebug**. Cost is \$125 each.

SLR Systems is on (412) 282 0864.

Abbey's CCFT display

After Rupp showed the way with a machine-to-machine link using the parallel printer port on a PC, **3X USA** has gone one better with a sort of local network based on the parallel port. What this one does that **Fastwire II** doesn't do is to work in background mode, letting the user get on with other applications while files transfer from one box to another — and even onto the printer, using the same port. And automatic scripts allow automation of complex backup tasks.

Details on (201) 592 6874; One Executive Drive, Fort Lee, NJ 07024, USA.

Postpone the evil day of having to install a local area network between your Mac and your neighbour's PC with **Lap-link Mac**, from Travelling Software. The new version doesn't just transfer files between the machines: it translates them, too. It can convert popular word processing files into MacWrite and Microsoft Word Mac formats — the list includes WordStar, Multimate, Microsoft Word (PC), IBM Displaywrite, WordPerfect, XYWrite, plus ASCII and DCA conversion format. And the package also does the Mac binary transfer, to help get graphics files from Mac to PC. Price: £100 (including disks, universal cable, and manual) from most dealers — it's certainly available through distributors Softsel and Frontline if your dealers say they've never heard of it).

The photo above shows a genuine paper-white display, not one of those plausible

enhanced pictures of supertwist LCDs. The technology is CCFT — cold cathode fluorescent tube. **Abbey Microsystems**, which imports this laptop, claims that CCFT requires even less power than LCD screens and can be used in direct sunlight. The machine itself has lots of nice features worth listing — it can plug into a car cigar lighter, or any voltage around the world from 90v to 260v; it has a high-resolution display (better than EGA but including EGA, says Abbey). And the price? It's £1000 cheaper than the Toshiba 3200 (the Tosh doesn't operate off batteries) at £2734 for a 20Mbyte hard disk model, capable of 12MHz clock speed.

Details from Abbey Microsystems of 30-38 Cambridge Street, Aylesbury, Bucks HP20 1RS, or phone (0296) 393322.

The machine is also available from a number of other importers including Walters on (0494) 32751 and ITS on (0592) 753424. Pricing varies between manufacturers according to specifications.

A Texas company which reckons it can save around £500 per printer per year by recharging the toner cartridge, has started touting for business in the UK. The company, **Laser Charge**, is based in Austin, the capital of Texas; the founders had to face considerable hostility from the laser printer establishment, which clearly makes a useful profit on supplying brand new toner cartridges. 'In the event that our service voids the warranty on your printer, we provide a full printer replacement warranty,' commented the company's UK press agency. 'In the event, no customer has had to invoke this warranty.' Details in the US from Laser Charge on (512) 328 1630. UK contact point is Graeme Mitchell of Mitchell Marketing, Admirals Quarters, Portsmouth Road, Thames Ditton, Surrey KT7 0XA, phone (01) 398 9636.

A 3D module has been added to TurboCAD. The price of the package remains unchanged at £100. Intriguingly, the package runs faster than the two-dimensional version. And unlike the 2D version, drawings are no longer restricted by the amount of RAM in your PC — they are continuously saved to disk. And it works on Hercules, EGA, or VGA displays. Upgrades: a modest £39. Details from Micro Distributors on (0293) 547788. **END**

RE: AMSTRAD CLEARANCE

MAJOR DISTRIBUTOR OVERSTOCK, LOWEST EVER UK PRICES

OLIVETTI M15



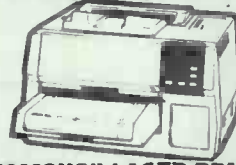
TWO DRIVE LAPTOP. NEW!
Supertwist LCD 80 x 25 screen, twin 720K drives, 512K RAM, battery/mains. Case £15 **£495**

LIST £795!



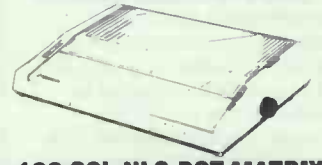
SILVER REED EXP-600
25 CPS daisywheel, 3K buffer, parallel or RS232, copy mode, 132 col, EXP 800 40 CPS £250. **£195**

POSTSCRIPT!



"FAMOUS" LASER PRINTER
Postscript laser, 35 Adobe fonts, 3Mb RAM, 8 PPM, 300 dpi, parallel, RS232 & Apple. **£1995**

FAMOUS NAME



132 COL NLQ DOT MATRIX
180 CPS draft, 30 CPS NLQ, full IBM character set, inc tractor, parallel. Sheetfeeder £45 **£175**

TOSHIBA 3 IN 1



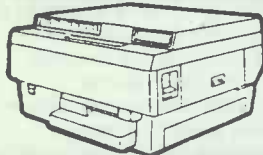
TOSHIBA 24 PIN P341e
216 CPS 24 pin dot matrix, 72 CPS NLQ, 132 col, 2 resident fonts, IBM character set, dual I/F. **£295**

INTEL 386 PC



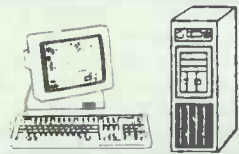
CHEAPEST EVER 386!
2.5Mb RAM, 1.2Mb floppy, 20Mb hard drive, 16MHz, 8 slots, 102 key keybd, mono. **£1595**

EX DEMO LASER



QMS K8 LASER PRINTER
6 PPM, Canon ser 1 engine, 300 dpi, Epson/IBM, Diablo & Qume emulation, parallel. DEMO **£650**

25MHz 80386



MORGAN GENERIC 386
2Mb RAM, 5 1/4" 1.2Mb & 3 1/2" 1.44Mb floppies, 20Mb drive, mono monitor & keybd. **£1995**

POWERTYPE!



STAR M-18 PRINTER
18 CPS daisywheel printer, 132 column width, Diablo ribbon/wheel, parallel and RS232 interface. **£99**

Part exchanges accepted.

AMSTRAD COMPLETE OFFICE SYSTEM!

PC 1640 DD

MONO MONITOR

DMP 4000 WIDE CARRIAGE PRINTER

WORDSTAR 1512 SUPERCALC 3.1 & ACCOUNTS MASTER



£695

DMP 4000



200 CPS draft, 50 CPS NLQ, 132 column width, Epson or IBM compatible, full graphics facility, includes tractor feed, parallel I/F. **£195**

LQ 5000



High speed 290 CPS 24 pin dot matrix, 96CPS NLQ, 132 column width, 8K buffer, graphics, inc tractor, IBM & Epson compat. dual interface. **£345**



PPC 512

Superb value Amstrad 512K portable PC's with choice of single or dual 720K drives; 8MHz speed, 80 x 25 supertwist display, external monitor port, parallel and RS232 ports, full 104 key enhanced keyboard, choice of mains or battery power and is supplied complete with carry case, AC adaptor & DOS 3.3. **£295**
PPC 512 S, 2 x 3 1/2" 720K drive £395

OLIVETTI M24 PE



20Mb HI-RES COLOUR!
640K, 8MHz, 20Mb hard disk, 1 x 360K, 6 slots, inc keyboard & 14" hi-res colour display. **£895**

ATARI PC 2 HD



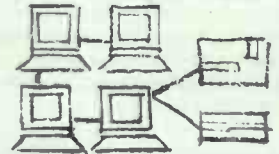
30Mb IBM COMPATIBLE
512K, 1 x 360K, 30Mb drive, mono EGA display, parallel/RS232, inc mouse, GEM & DOS 3.2 **£695**

PAPER WHITE



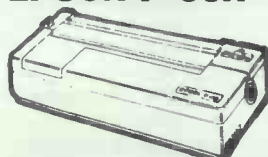
THOMSON 451W DISPLAY
15" paper white high resolution mono display, standard 9 pin TTL input, inc tilt/swivel stand. **£65**

AST STAR LAN



STAR SYSTEM STARTER KIT
Easy to install local area network, inc 2 cards and all necessary cables. Extra cards £95. **£195**

EPSON P-80X



PORTABLE NLQ PRINTER
Portable printer, uses thermal/normal paper, draft & NLQ mode, inc AC adaptor, RS233 I/F. **£150**

FRONT END



EPSON TAXI
Bus mouse system for IBM or QX 16, includes mouse, card and software, requires CGA. **£35**

AMAZING VALUE



SAMLECO DX 85
100 CPS dot matrix printer, graphics capability, friction or tractor feed, parallel I/F. **£75**

goods new unless indicated

ACCESS AND VISA ACCEPTED
PRICES SUBJECT TO 15% VAT
MAIL ORDER (CARRIAGE EXTRA)

Morgan Computer Co.

OPEN MONDAY TO SATURDAY
PRICES SUBJECT TO CHANGE
GOODS SUBJ. TO AVAILABILITY

64-72 NEW OXFORD STREET, LONDON WC1. 01-255 2115. 179 TOTTENHAM COURT ROAD, LONDON W1. 01-636 1138

IBM stacks the deck over MCA

In recent discussions at Comdex with Bill Lowe of IBM (just before his resignation and move to the Xerox Corporation) he revealed that IBM would not seek any royalty fees for the use of the MCA BIOS until the company received the actual patents that have been applied for.

According to Lowe, IBM's lawyers have decided that it would not be prudent to charge these fees until the patents are actually in hand.

IBM sources also said that retroactive fees would not be sought, and when the patents were finally issued, the company would review each MCA licence individually at that time. They also said that IBM would look for any type of cross-licensing agreement with any of these clone makers and try to find something that IBM could use somewhere in their products, thus keeping the final royalty fee as low as possible.

This is quite a turnaround from IBM's original stance, as it has led the industry to believe that anyone who used an MCA BIOS had to start paying royalties at once. In fact, many vendors who have had discussions with IBM



Normerel's NS50 — with MCA

confirm that this was in fact true, and that the royalty fees could have been as much as 5%, depending on what types of infringements existed on the clone box.

Why this new, conciliatory change of heart? It seems that IBM has 'seen the light' and realised that cloning is critical to MCA's acceptance in the marketplace. And, the company never anticipated that an EISA standard would be proposed, this giving its own bus some serious competition.

The most interesting thing to watch, as this drama unfolds,

is whether the Gang of Nine will stick together and force a new standard, or will some of them jump ship and add an MCA box to their line, thus watering down the potential impact of EISA.

Sources close to Wyse and NEC say that they will introduce a new MCA box by the end of 1989, and that as many as five of the Gang of Nine will add MCA systems to their product lines by Comdex Spring. So, although IBM will probably charge a smaller licence fee to these vendors once these patents have been granted, anyone who wants to can sell an MCA box and pay nothing to IBM until the patents are granted.

And, considering the US legal system and its slow rate of granting these types of patents, a vendor could have two to three years free to ride on IBM's coat tails.

But the most important thing that will come out of this unique ploy by IBM is that it sucks many vendors into MCA and will guarantee that MCA will be a major standard. At the same time, it leaves doubts in many people's minds about the true potential of EISA, especially when EISA founders



TIM BAJARIN

How is IBM responding to the challenge of EISA? Our US correspondent, Tim Bajarin, reports on Big Blue's latest change of tack.

cover their tails by having boxes with both bus structures to sell.

You can be sure that the bus wars are not over, but it looks like IBM is doing everything it can to stack the deck in its favour to make sure it is the ultimate winner.

Action required on a PC Hypercard

When Apple introduced Hypercard eighteen months ago the company made a lot of noise about its potential in the market and how it would change the way we work with data links in the future. Since then Apple has shipped over one million copies of the product and at least 40 related applications are available.

However, a frequently asked question is: when will we see a full-power PC equivalent?

At least one product, Guide from Owl International, lays claim to being a Hypercard-type product in the PC world. But the one that could have a similar impact on the DOS world as Hypercard has had on the Mac community, is a product called HyperPad from BrightBill Roberts, the Syracuse, NY-based software house which publishes Show Partner, a presentation product for the PC.

Although a release date for

the product is not firm, HyperPad is getting rave reviews by analysts and media folks who have had a chance to get a behind-the-scenes peek. It is a text-based product, not a Windows-style product like Hypercard or Guide. But, for the traditional DOS user, this style of interface makes a lot of sense. They are not used to Windows environments yet, and this textual-style data-linking tool is easily understandable.

HyperPad basically works and acts just like Hypercard. It allows you to create stacks, link them together and display them. The same tools and metaphors provided by Hypercard allow the user to create a database and use the searching and linking methods to connect everything together.

Sources close to the company say that it could ship as early as February 1989. Whenever it appears, though, you can expect it to set in motion a lot of interest in Hypertext-based systems, leading to the introduction of Windows-based products by Comdex Spring.

BrightBill Roberts is in the US on (315) 474 3400.

Presidential Macs

Now that George Bush has become the President-elect, his staff want to make sure he continues to look good, especially on paper.

His transition team has just put 20 Mac IIs in their Washington office and will carry them into the White House on 20 January when Bush becomes President.

Mac jottings

A new program from Mediagenic's TEN.0 division really shows how valuable pop-up desk accessories can be. A new Macintosh desk accessory developed by Working Software of Santa Cruz, Quick Letter, is literally an 'on call' word-processing program.

Let's say you are in a spreadsheet when an idea grabs you, or you are working on a graphics drawing and want to jot down some notes. Or you have a full letter planned and you want to write it while it is on the tip of your tongue. Unlike SideKick, you can use Quick Letter as a

The Bush campaign team has used Macs throughout to handle their scheduling, word processing, last minute press material and, in some cases, actual flyers and publicity documents to hand out at rallies.

So, when you see photos of the White House staff slaving away at their desks in the future, look for a Mac to be at their side . . .

powerful, robust WP.

The program also allows for pre-designed envelopes and form letters at your command. Just open Quick Letter from the menu bar and you instantly have a full-featured word processor on hand. You even have all the Mac fonts from the font desk accessory at your disposal, and can use the normal cut and paste features like Mac Write. You can then save your work to various file formats as you need them.

Quick Letter is an indispensable productivity tool for your Mac. It will be available in the UK from Mediagenic TEN.0 dealers in late January. ▶

Strong signals about DSP

One of the most fascinating components of the NeXT computer, launched in October, is the high-speed digital signal processing chip that is built directly into the system.

DSPs are incredibly fast chips, capable of taking in a vast amount of data and emitting a response almost instantly. Their speed allows them to handle seven or eight chores in the same time that a conventional microprocessor might handle one or two. This type of chip is usually found in large telephone systems and modems.

The Motorola 56001 DSP chip can execute a command in 97.5 nanoseconds (millionths of a second). That enables it to process at a speed of 10.3 MIPS (million instructions per second) — a speed which, until recently, was found only on supercomputers.

The 56001 chip costs around \$100. But even this chip is slow when you compare it to the TI TMS-320C30, the leader in the DSP market. The C30 is about three times as fast, and sells for around \$1000.

These chips have other advantages besides speed. They are capable of processing compact disc quality sound. They can be used for speech synthesis, which will allow the development of software that talks to the user. They also enable the computer to accept and store voice mail, adding a dimension to electronic communications.

Because they are telecom-based, they can double as a modem chip set. Since the DSP can send and receive data at 9600 bits per second, it can also be used as a fax transmission

device. And it can also provide high-speed number crunching, bringing any machine that uses it almost into the supercomputer class. If that's not enough, it can also work as an array processor, speeding the performance of graphics onscreen for such tasks as 3D modeling and handling the complicated screen commands from the new generation of Windowing environments.

In other words, the DSP chip can make a computer more versatile and much more powerful than other machines of its type.

One of the other imaginative ways this chip could change the way we use computers is in 'Soundware'. Imagine a French language program that pronounces a word when the user highlights it on the screen. In future versions of complicated software, you could cut the keystrokes out completely — just tell the program what to do and it would respond to your voice.

DSP chips will radically change the character of future software, making today's computers seem as if we have all been watching television with the sound off.

To his credit, Steve Jobs has again seen the future. Due to his desire to make a computer for the rest of us he has forced us to make a quantum leap into the next generation of computing. By using a DSP chip, all vendors will be able to create new software that is easy to use and puts powerful computers into the hands of even the most technically illiterate.

But the fact that this technical wizardry is now out in the open

becomes Jobs' Achilles heel. If you take a close look at his machine, at least in hardware terms, you soon see that almost any serious vendor could come up with something similar. Indeed, Silicon Valley sources say that Apple and Sun Microsystems have new computers with DSPs embedded into their systems, and will release them in mid-1989. And IBM sources say that a DSP is already in the new RT that the company will launch in the Spring.

In the one area that he does have an edge, software, Jobs' object-oriented programming scheme could be short-lived if he is not able to get both machine and software to market in early 1989.

Although IBM will use NeXTStep, Apple and Sun could adapt the Xerox Smalltalk language to emulate his program, and with the newer versions of this code being streamlined, they could match NeXT with a similar concept by the summer. Even if Smalltalk is not the answer they choose, object-oriented programming is such a surefire market opportunity that industry insiders say at least three software systems similar to NeXT are in the works, and will run on multiple platforms by launch time in 1989.

With the market bigshots all going after this new generation of computers by adding DSP chips to their hardware, computers will become more powerful and easier to use. However, it's still too early to tell if Jobs and his company will actually be successful, or if Sun and Apple will do well out of this marketing opportunity.

Windows of opportunity

I have just had a look at Ami, the new Windows-based word processor from Samna reviewed on page 150 of this issue.

What's important about Ami is that it's the first of a breed. First of breeds tend to enter a market with a bang and slowly take over ground won by products whose features have increased but within an old environment.

Ami is a good case in point. Industry experts agree that the first two or three Windows-based WP programs will have a major impact on the traditional word processor players. WordPerfect could take the biggest hit.

Samna is first, and Microsoft, with its Windows-based WP codenamed Opus, will probably be second. Samna's product will have a good three-to-six month lead on Microsoft and could gain some important ground. But Microsoft, with its marketing clout, will come in quickly and become the number one player. And although WordPerfect has a lot of users today, the company must watch this Windows development and respond quickly if it wants to stay in the hunt.

A new breed of Windows product is so important because corporate America normally plays it safe, and often stays with a single product even when other, better items appear — to avoid re-training.

However, since IBM and Microsoft have told Mr and Mrs Corporate USA that OS/2 and Presentation Manager are the future, they will start to migrate into the Windows environment in 1989.

But because of the difficulty of making a great leap into the Windows world, they will start slowly and build up steam.

It is for this reason that companies like WordPerfect need to respond to the Windows gauntlet *now*. And, for that matter, so does Lotus. Big corporations are already standardising on Excel, and Lotus could lose some important territory if it may never win back, unless it puts out a Windows-based 1-2-3 soon. Lotus 3G is probably only an interim solution and the company will need to produce a Windows application that is truly powerful if it wants to stay out of trouble. **END**

Better graphics

One of the products introduced at Comdex last month could make many users of the HP LaserJet printer very happy.

Although the LaserJet is great for text, it leaves a lot to be desired when it comes to graphics. In fact, the quality of the graphics output from Apple's LaserWriter or other Postscript-type printers is the best way to get both high-quality text and graphics into your copy. But Visual Edge, a new product from Intel's PCEO division, is a printing enhancement and speed accelerator for any HP LaserJet II printer.

It brings the possibility of photographic-quality half-tone

reproductions to a range of applications, improves standard LaserJet II resolution by 300%, and speeds printing by 200% to 600%, depending on the document size.

Consisting of a PC-size half-card, a printer board, a cable and software, Visual Edge supports AT-class systems and above.

Priced at \$695, it is an inexpensive way to make your LaserJet II act more like a Postscript printer.

According to Mark Christensen, product manager for Visual Edge, users expect to trade resolution for grey scale. 'With the Visual Edge system, they get both.'

For example, at 70 lines per inch resolution, Visual Edge

produces 64 levels of grey compared to the 19 levels on a standard LaserJet II printer. At 100-line resolution, the results are 37 levels compared with 10 levels on a LaserJet II.

With this higher grey level, photocopies of the original documents come out sharp and crisp instead of dull and 'bleeding'. Intel plans to start marketing this card as a system for use in publishing by photocopier. If you have ever tried to photocopy a graphics image from a LaserJet II, you know how much room there is for improvement.

Although I don't think it will ever replace Postscript, it will at least make any LaserJet II much better than it is today.

Pocket-sized power!



Dataflex Design's battery-powered POCKET STRADCOM modem is much like the gentleman on the left – small, but very, very powerful. It can out-perform modems ten times bigger costing twice as much. And it works with *any* computer – *anywhere*.

Dataflex Design are renowned for innovative use of the latest proven technology. We design and build in the UK to produce better, more reliable products at prices our competitors, locked into older technologies, cannot match.

The original STRADCOM, a PC half-card modem, scooped What Micro's 'best value modem' award by literally halving the cost of 1200/1200 communications. We went on to produce a full range of internal modems offering speeds up to 2400/2400 baud.

We're ahead again with a powerful modem card for the PS/2 Micro Channel standard. MCA BISCOM incorporates all the advanced asynchronous *and* synchronous facilities needed for professional data communications. And again, the price is unbeatable.



Every Dataflex modem comes with:

- **FULL BAPT APPROVAL** – ours is the *only* pocket modem that has it!
- **FULL YEAR WARRANTY** – built in Britain to unequalled standards of quality
- **INTELLIGENT FEATURES** – autodial, autoanswer and auto-sensing to match the speed of incoming calls
- **BUILT-IN SPEAKER** – to monitor what's going on
- **INDUSTRY STANDARD AT COMMANDS** – for control of the modem from the keyboard and compatibility with all the popular PC communications packages
- **FREE COMMUNICATIONS SOFTWARE** – our easy-to-use DATA-LINK program provides sophisticated MNP and VASSCOM error detection, full PRESTEL/VIEWDATA support and lots more
- **FREE REGISTRATION** to Microlink Telecom Gold and Mercury 7500 services for access to information databases, telex, fax and e-mail

Dataflex Design

To order, or apply for more information, cut the coupon or call Dataflex Design now on 01-543 6417

Info.	Modem	RRP	Special offer	Qty
<input type="checkbox"/>	POCKET STRADCOM V21, V22 battery modem	£199	£175	<input type="checkbox"/>
<input type="checkbox"/>	POCKET STRADCOM Z88 version	£250	£219	<input type="checkbox"/>
<input type="checkbox"/>	STRADCOM V21, V22 half-card PC modem	£175	£155	<input type="checkbox"/>
<input type="checkbox"/>	BISCOM V21, V22, V22 BIS half-card PC modem	£249	£219	<input type="checkbox"/>
<input type="checkbox"/>	QUADCOM V21, V22, V23, V22 BIS half-card PC modem	£299	£265	<input type="checkbox"/>
<input type="checkbox"/>	MCA BISCOM multi-standard sync/async modem	£499	£449	<input type="checkbox"/>

FREE CARRIAGE ON ALL ORDERS – SPECIAL OFFER PRICES APPLY TO CHEQUE-WITH-ORDER OR CREDIT CARD PAYMENTS ON THIS FORM ONLY

Visa Master Card AmEx Expires: End: ____ / ____

Card No.:

Name

Company

Address

Send to: Dataflex Design Group plc,
Merton Park House, 2 Jubilee Way,
London SW19 3XD Tel.: 01-543 6417

Total

Plus 15% VAT

Amount Due

Tel:

We used to make Britain's best-selling graphics package.

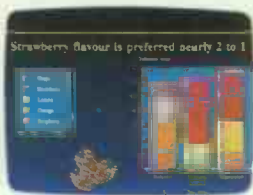
We've given it a world class charting capability.

No other software can offer better charting now that we've taken the most popular graphics package in the country and upgraded it into one the others will have a hard time trying to match.

Now creating your charts is as simple as filling in a form, and there's a new feature that lets you select chart type on the menu. And Freelance Plus 3.0 can actually make the design decisions for you.

We've added an easier-than-ever drawing capability no other software can equal.

You know how great Freelance Plus was when it came to drawing. Now it's even better to help you with freehand drawing to create almost any image you want from cartoons to flow diagrams, that you may need for business use. What's more, there are over 900 symbols like maps, cars, office equipment – even fruit to make your presentations outstanding.



A few final touches.

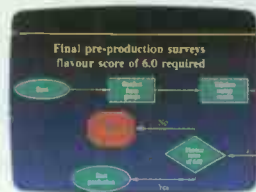
We've integrated bezier curving that makes copying logos or even signatures incredibly easy. It's quicker than digitising since straight lines are used to create your outline shapes and bezier curving smooths them out.

Photographs and line drawings can now be scanned into presentation work.

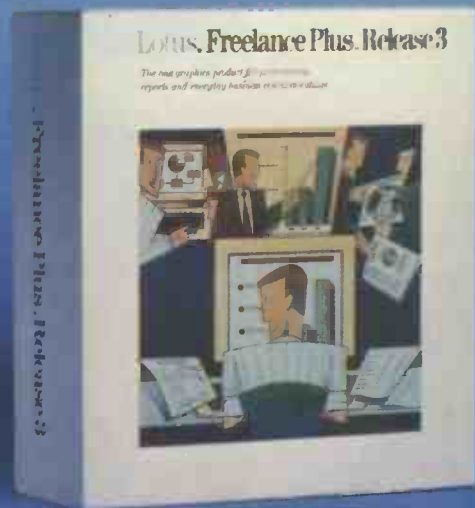
Datalinking, so if your chart is based on spreadsheet data, when that changes, your chart is automatically updated. And a 'Hot View' facility that allows you to look into your spreadsheet and select data without leaving Freelance.

A showcase facility that allows you to run presentations on your PC screen. It's portable too, you can take your presentation on floppy disk and use it to present even on PCs that don't have Freelance Plus 3.0.

Freelance Plus allows you to maximise on the output facilities you have available and is compatible with a huge range of printers and plotters.



Now we make the best as well. Freelance Plus 3.0.



Plus the benefits you'd expect.

A free Lotus Hotline that connects you to the Lotus support team when you need them – the largest product support team in the country, by the way.

(The free Hotline really is free to users who return their completed complimentary software registration cards – and it's open every day during working hours, Monday to Friday.)

Our famous Output Bureaux, so that disks can be taken into a Lotus Authorised Consultant and 35mm slides or O.H.P.'s printed out or even enhanced for you.

And if you're already a Freelance Plus 2.0 or 2.01 user, it's easy to upgrade for only £95.

Freelance Plus 3.0. The most complete, most effective, easy to use business presentation package in the world.



For more information ring (049 481) 6667 or send the coupon now to Freelance Plus 3.0, Freepost, Lotus Development (UK) Ltd, Consort House, Victoria Street, Windsor, Berks SL4 1EX.

Please send me more details of Freelance Plus 3.0 by return.

Or please send me details of the Freelance Plus 3.0 upgrade.

Name

Position

Company

Address

Postcode

Telephone number

I also use 1-2-3 Symphony Manuscript Agenda

Other

Lotus Freelance Plus 3.0™

APCW01FEB

BANKS' STATEMENT

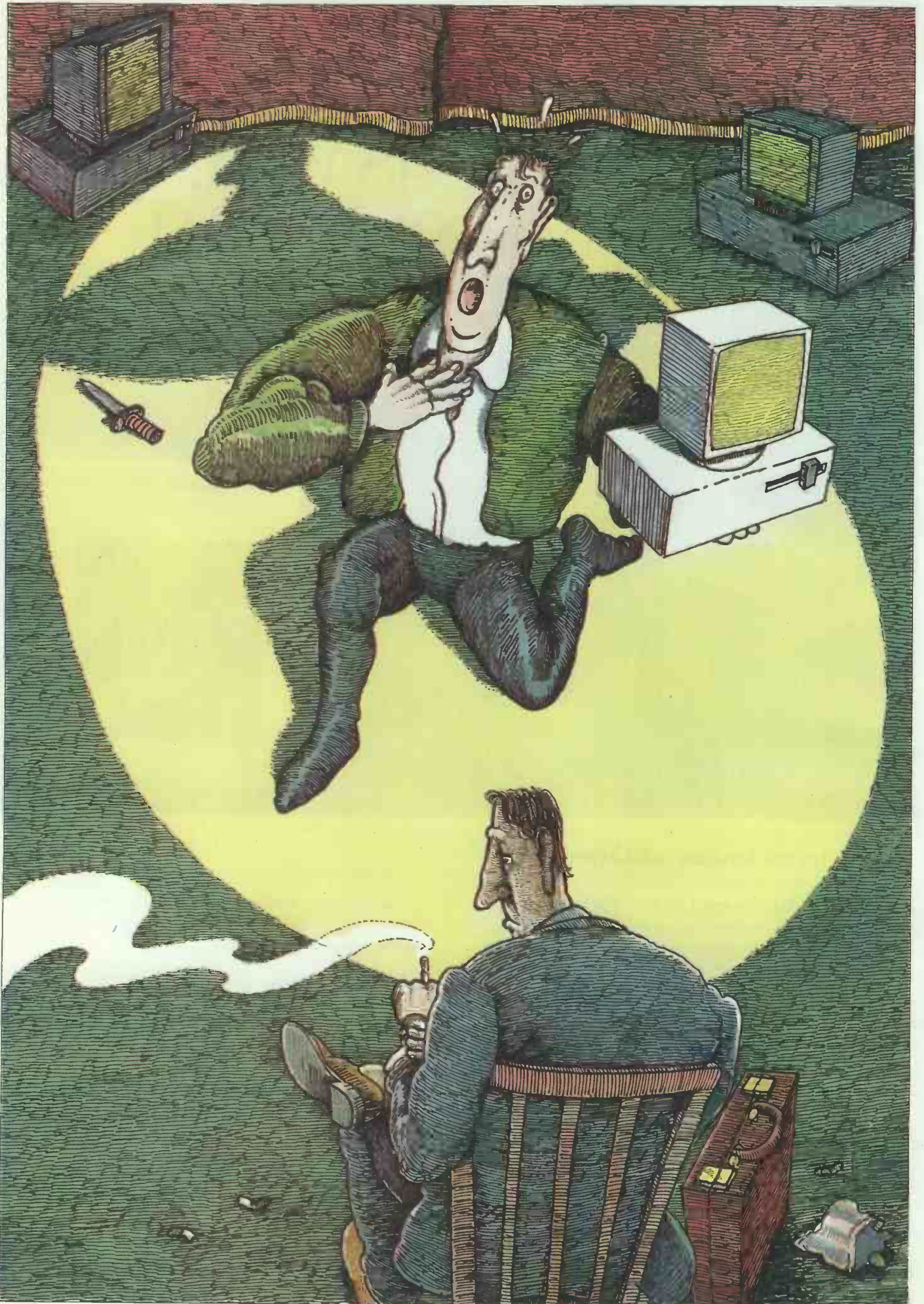


Illustration by Mark Hackett

Song and dance

Just because computer journalists are so laid-back, it should no longer be assumed that the entire industry has the same image. With their sharp suits and silvery speech, the personal computer showmen are taking over . . .

I don't care who you are, or indeed, who I am; we are all beset by image. We may like to think that this is an affliction only of 'the others', everyone else except us, but unfortunately that is not the case.

Image is not just something which affects individual people, though we all have our problems in this area. It also affects companies and indeed whole industries. Everyone can spot an undertaker, for example, especially when they are working. It is more difficult to spot diners, of course, for the male version of the breed tends to dress the same as the waiters who serve them. But bank managers always wear sombre suits, don't they? They're so easy to spot, even when they're on holiday.

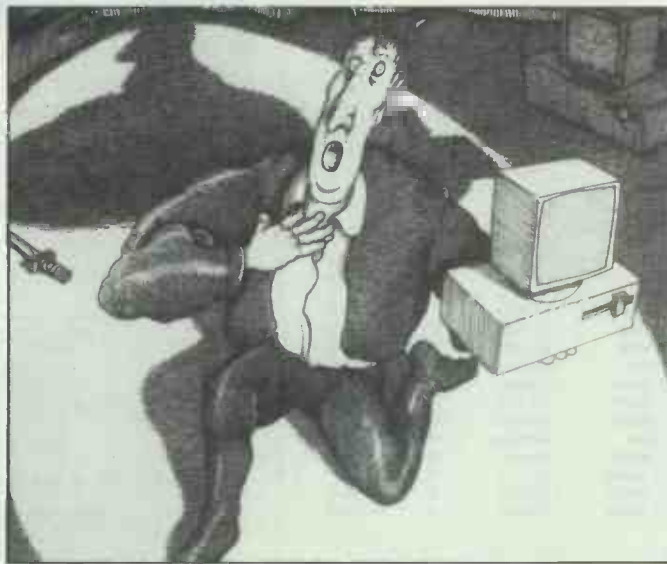
Image has also had its place in the mainstream computer industry, of course. IBM staff, especially those that have to meet anyone from the outside world, have traditionally worn a white shirt and a dark (preferably blue or grey) suit. And one large management services company used to have the reputation of taking its ideas on image to puritanical lengths, so that no staff could, for example, have any form of facial hair, or they lost their job.

When the personal computer came along, the image changed, though 'image' it certainly remained. Suddenly, one had to be desperately laid-back to be in the PC business. It became very important, even in darkest Oswestry, to have the image of someone who had just come back from the beach, man, where . . . you know . . . you had been . . . you know . . . *thinking*, man.

Not surprisingly, Apple was the company that best personified this image, with Jobs and Wozniak creating the genre almost single-handed. This is ironic, in a way, for it is now Apple which is at the forefront of a sea-change in the image of the PC business, and itself in particular. I have not been alone in admitting a certain sadness at the passing of the

'fun' image of the PC business — while accepting that it has over the years become a much more serious business altogether. But a definite change in attitude has recently come about. The PC business is now *important*.

And if you don't believe me, look at the evidence the industry presents about itself. It has a higher opinion of its place in the world than anyone else. And the results of this change can be seen not only in the industry, but in some of its products and their impact on the world. It is in danger of



making 'image' products that do little more than enhance the image of the already image-conscious. A bit like designer underwear, really.

Take, for example, the recent spate of TV adverts by Apple. Very significant boardroom types sit around a table while 'the boss' demands some form of publishing miracle to be produced in the next thirty-five seconds. Oh gosh, the Apple-freak is the only one who can produce the goods.

In another advert, one important-style executive person is stunned by the quality of the report that another executive-style person is posing with. The first is then stunned again by the fact that the second produces this sort of

pretty-looking thing all the time.

Not once, however, does anyone talk about more than production speed and presentation. The content of all this artistic endeavour is probably a heap of dodo's droppings, but so long as it looks pretty, the adverts imply, you'll get a seat on the board and a company Ferrari.

The same effect can be increasingly seen in company videos. Every damned one is packed full of the most boring rubbish you could ever be unlucky enough to observe. All



MARTIN BANKS

to patronise or be patronised. In that way, they can define their place in a hierarchy, a necessity for them which is aided and advanced by the excessive use of image.

Now we are starting to see the ultimate version of this self-importance among members of the PC business. If you ever have the chance to attend the launch of a new product by a PC manufacturer, go along — but not to see the gizmo (it's bound to be just another box with a bit more memory, a bit better disk, a slightly more whizzo processor and a teensie bit more fanciful colour display). Instead, look at the company executives.

There you will see the latest shift in the PC image business — the marketing manager as *performer*.

Yes, you will be stunned by this star turn: you will marvel at lines learned to perfection, slide show precisely timed, demonstrations (usually) going like clockwork. And the clothes . . . well, they are always stylish, à la mode, and direct from the smoothers.

And the product? Since it is just another box of bits, much like all the others, it's the marketing manager's dance routine which now marks it out as 'better', or 'different'.

This raises an interesting thought. Noel Coward once wrote a song called something like 'Don't Put Your Daughter On The Stage, Mrs Worthington'. He is still right.

Now, Mrs Worthington, you should send her to the PC industry. She'd get more acting experience, and I'm told the work is more regular.

Rumour has it that RADA is starting an acting course for marketing managers very soon — the market is ready for it. **END**

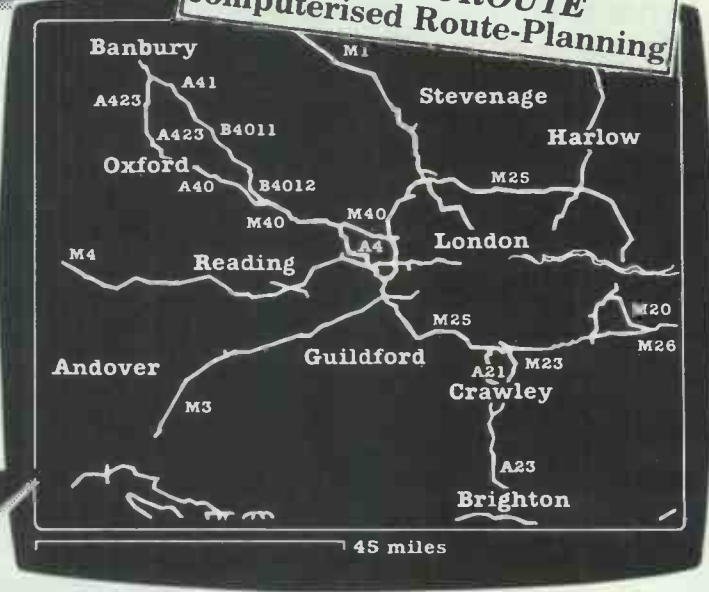
4000 WASTED MILES EVERY YEAR!

Save up to **20%** of your driving time & costs with **AUTOROUTE** computerised Route-Planning

● **Plan Any Journey In Great Britain**
AUTOROUTE saves up to 20% of driving time and costs by calculating the quickest, cheapest or shortest route for any journey in Great Britain.

● **Extremely Easy To Use**
 Simply enter your start and finish points, any calls you need to make en-route, and any roadworks to avoid. Select the vehicle type, enter any preferences for motorways, A-roads or B-roads . . . and, in seconds, *AUTOROUTE* searches its vast database of 67,000 miles of Ordnance Survey mapped roads to calculate the optimal route.

● **Ordnance Survey Based Map Displays**
 High resolution maps are displayed on screen in full colour and you can zoom in on any point to obtain more detail.



● **Detailed Directions Printout**
 Having chosen your route, detailed driving directions may be printed off with precise navigational details.

● **PC User "Excellent value for money"**
AUTOROUTE is available for all true IBM PC compatibles including lap-tops and costs just £130+ VAT.

Autoroute V1.31

Quickest route from Brighton to Swindon
 Total time: 2 hrs 17 min
 Total distance: 123 miles

Time	Road	For	Dir	Towards	
11:18	DEPART Brighton	A23	22 miles	N	Crawley
11:43	At M25 J11 turn off onto	M25	14 miles	E	(M25 J10)
11:57	At M25 J7 turn off onto	M25	23 miles	W	(Banbury)
12:26	At M25 J12 turn off onto	M3	7 miles	W	(M3 J3)
12:31	At M3 J3 turn off onto	A322	6 miles	N	Bracknell
12:40	At Bracknell turn left onto	A329	2 miles	S	Reading
12:43	Turn off onto	M329	3 miles	N	(M4 J10)
12:46	At M4 J10 turn off onto	M4	42 miles	W	(Theale)
13:01	At M4 J18 turn off onto	A419	1 mile	N	Cirencester
13:22	Turn off onto	A4289	¼ mile	W	
13:23	Turn off onto	B4006	2 miles	W	Swindon
13:31	Turn left onto	B4289	¼ mile	W	Swindon
13:32	ARRIVE Swindon				

● **Annually Updated**
 All registered *AUTOROUTE* users can contract to receive an annual update incorporating every road change known to the Ordnance Survey themselves.



The Intelligent Map

Nextbase Ltd. Unit 18, Central Trading Estate, Staines, Middlesex TW18 4XE

Phone 0784-60077
 to order direct
 or return the coupon to . . .
Nextbase Ltd.
 Unit 18, Central Trading Estate,
 Staines, Middlesex
 TW18 4XE

Please tick one of the following:

IBM 5¼" IBM 3½" Atari ST

and one of the following:

I enclose a cheque for £149.50 payable to NextBase Ltd.

Please debit my Access/Visa account by £149.50 number expires

Please send me a FREE colour brochure

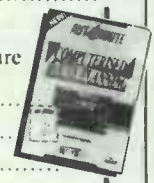
Name

Job Title

Company

Address

..... Phone 2/89 - PCW



Don't believe a Word

Bought any good software lately?

The creative copy of the ad writer is often more powerful than the programmer's code.

Take Word 4. I say take it, because anyone's welcome to mine. It's a remarkable word processor. It has to be, to blithely indicate you're on line

684 of page 1. Or on page 46 when it really means 54. Adds up columns of figures too... Until the fateful day you decide to check the results. Anyone mysteriously gone bankrupt lately? And it comes with loads of printer drivers. These are wonderful things when they work. Mine don't.

Ah yes, I hear you say, but Microsoft has a Hot Line. Wrong. Lukewarm. Phone calls, correspondence and returning disks have produced no results. (I lie. After six months I've received a letter. Says they've no record of ever receiving anything. But if you'd like to try again, sucker...)

Word 5 soon, huh? Exactly who are the pirates in this industry?
Jim Bodley, Paris

School's out for the Spectrum

I brought myself up on Spectrum Basic and wrote educational software that packed into the tiny 48k, each tape taking forever to load: two French programs and one Latin. The French were so popular with the parents at the school where my wife teaches that parents would go out and buy a Spectrum so that they could buy the tapes!

My head swelled. My hopes raised. My adverts went into educational software magazines. My hopes faded. What I did not realise was that schools are full of BBCs, and not Spectrums as I had imagined. Reprogramming the

software in BBC meant I would have to take the fun out of the programs, animation and music, which were all part of the joy of the learning discipline. The Archimedes was not around when I was re-educated to IBM compatibles.

IBM and its clones are all the rage. I must rewrite the programs for IBMs. Well, I can program in GWBasic quite well, but how do I get the music and the animation in? I must work on it. Then bingo... Matrix ((0752) 796363) brings out the panacea to all my ills, so I am told. 'Layout — you'll never have to write programs again. It is so

easy... my friend said.

My copy of Layout is on my Amstrad PC1640 hard disk; I have printed out the massive amount of Help pages. The technical support teams have sent me special software to run with GEM — or rather without it. I have spent many hours trying to make the simplest of routines work, fighting my way through layers of pop-up screens, overlapping one another like blankets on my bed, where I think I will go now, and dream of the possibility of making a breakthrough in producing my fantastic educational software to run on an IBM, or its clone — but sadly without Layout, and a friend less!

David Lacy-Hulbert, Devon

Why the Nimbus is better

I am computer manager at a large college where about half of our micros (that's over a hundred) are Nimbuses. The Nimbus was no more intended to be a flash office or hobbyist machine than a Jaguar was designed for a driving school. We can and do teach standard computer applications using Word 3, WordStar, Multiplan, Lotus 1-2-3, Logistix, Excel, dBase III Plus, Database, Framework II, Turbo Pascal, BBC Basic, PC Paintbrush, Draw!, Aldus Pagemaker 3, Superdraft CAD, Pegasus, Sage Accounts and hundreds of other packages which have been specifically written for

schools and colleges.

What makes the Nimbus better than the BBCs, IBMs, ICLs and Apples which we also use is the fact that it was designed as a teaching machine. The most relentless testers any computer can face are a couple of thousand teenage users a year. After a couple of years use, the only failure we have had is one power supply unit. (I wish I could say the same for the monitors and printers on the same networks.) Name any other micro which can have boiled sweets forced into its drives and still run perfectly when they are removed.

What I find disappointing in Guy Kewney's Newsprint (December 1988) is the inaccuracies. The IBM does not use the 8088 or 8086 chip. The IBM emulator quoted is several generations outdated. One advantage of the 80186 in an environment of students is that when some bright spark tried introducing a virus of some sort it found the processor incompatible — unlike the IBM network.

Money also matters to educational bodies. The £3000 worth of software (including PageMaker, Windows 2, Word, Database and Excel) which comes with a Nimbus Network means a lot to us.

Arthur McGiven, North Tyneside Council

Call Archie

As a regular reader of PCW since 1984 I like the new layout of the regular items at the back of the magazine, in particular the Special Interest sections. I do however miss the music column.

I have a fairly broad interest in computers, being a former Sinclair ZX81 owner, shortly to take delivery of an Acorn Archie, and using Olivetti M24s and a Prime 2250 in my office.

In common with a number of your readers I regret the concentration which your magazine and others like it have on IBM-compatible machinery, but accept that this reflects the business world.

The possibility of an Archie column is of obvious interest to me, in view of the boxes of Acorn kit that will soon adorn my spare bedroom. I hope that other readers reply with a similar request.

Tony Garland, Essex

There have been a number of requests for an Archimedes section and it is top of the list for additions to the regular columns. But the pagination of PCW is limited and something else will have to go.

Our Reader Survey every year gives us some clues as to what should stay and what should go (and the music column proved the least popular last year), but further suggestions are always welcome.



Send your letters to Derek Cohen, 'Letters', Personal Computer World, VNU House, 32-34 Broadwick Street, London W1A 2HG or contact us on Telecom Gold 83: VNU200.

FullWrite isn't copy protected

The October issue of PCW included an article on Ashton-Tate's FullWrite Professional, entitled 'Not quite everything'. I would like to point out that FullWrite Professional is not a copy-protected piece of software. It is not copy-protected, as is the case for all software in the Ashton-Tate Macintosh range.

Also, designed as the best word processor available, FullWrite Professional is built to run on all 1Mbyte Macintosh computers from the Mac Plus upwards. Extra memory is only a requirement for those users heavily reliant on memory-resident INIT's and Desk Accessories above the norm, or those who would need to use 'beefed up' machines for their large scale applications anyway.

P McManus, Ashton-Tate

Where are those Amstrads?

I didn't manage to go the Personal Computer Show but I read that Amstrad demonstrated its 286 and 386 machines. Some weeks later, at the Amstrad show, they were nowhere to be seen. What happened?

DR Hughes, Gwynedd

Being unable yet to deliver the 286 and 386 machines, our guess is that Amstrad would rather arouse interest in the machines it can provide.

Perfectly daft

Can I echo Tony Klouda's letter (*PCW*, November) about the change from WordPerfect 4.2 to version 5.

Having used 4.2 for a year, I was happy to see the new version, although to be honest I couldn't really imagine how Sentinel could improve the product as I hadn't needed two thirds of the features that were already there. I went through the upgrade process, which was painless, and discovered that Sentinel had totally ruined an excellent program.

WordPerfect 5 is a devil to set up, especially matching printer drivers to documents. It is desperately inflexible — changing a paper size is so difficult I have on several occasions re-typed a document manually rather than go through the bother.

If, at some time, you just

want to print out a note on a complement slip (something which didn't occur to you three months ago when you defined the printer driver) you can't. Simple as that.

There are other difficulties which arise in actual printing, but they're too stupid to go into here.

I am now using a different word processor. And, as the change came right in the middle of an evaluation of word processors to determine which would be the standard across my company, Sentinel has lost out.

I can hardly wait for the next version, where you have to define paper thickness, height above sea level, printer ribbon supplier and wood pulp used to make the paper.

John-Paul Keates,
Data Services Manager,
Evans Halshaw Contracts,
Birmingham

Please would you publish this letter to help the cause of arguably the best word processing package in the world.

Why does the Support Group Inc in the USA publish the *Word-Perfectionist* and the Netherlands have ClubPerfect?

Here in the UK we have tens of thousands of WordPerfect users and no user group (unlike Word, WordStar, Lotus, and so on). Sentinel Software/WordPerfect UK has invited comments/suggestions but has neither come with concrete proposals nor adequate support for Version 5 (or even 4.2!).

Should any reader be interested in joining ClubPerfect UK or attending the inaugural meeting, please write to me.

Iain McNeil-Sinclair,
89 Park Road, Uxbridge
UB8 1NW

I read with interest a letter from Tony Klouda in your November issue which suggested that WordPerfect 5.0 had 'lost the useful facility for telling the printer which range of pages you wish to print'. The facility does still exist; accessing it has changed.

WordPerfect realises the importance of this function and now has two methods of choosing and printing pages in 5.0. First, using the List Files function, you can identify the file and select option 4 (Print). This offers the option to print all of the document or a selection of pages, for example 1-3, or 5-6,8. The second method is to use the Print option (Shift F7) and option 3, Print from Disk. Again, it is possible either to print the whole document or take a selection of pages.

I hope this is helpful.
David Godwin, WordPerfect

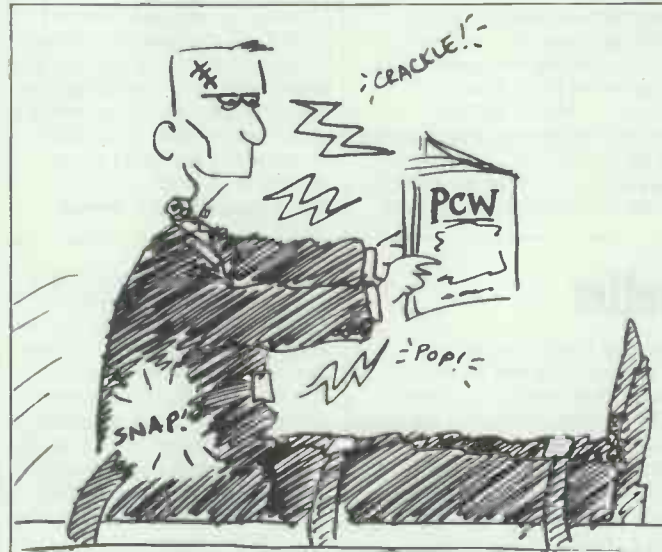
And a free electric band

In view of the dangers of static electricity to computers you may be interested to hear that the polyethylene band around my December copy of *PCW* was so highly charged it made the hairs on the back of my hand stand up.

The band, when rubbed on the cover of the magazine, is such an efficient generator of static it made a useful science demo for my son.

Thank you for two gifts in one. Perhaps other readers' experiences might not be quite as happy.

Paul Shave, West Lothian



Beware the Z88

With Cambridge Computers keen to move the Z88 into the education market I feel compelled to advise the education authorities to stay well clear of the machine.

Ask anyone who has used a Z88 for a few months (less if they are a heavy user) and I can almost guarantee that they will tell you that a keyboard fault has occurred. I got through four Z88s in 12 months before giving up.

The thought of thousands of these machines in schools and colleges under heavy use fills me with horror.

David Whitmore, Wisbech, Cambs

We must admit you are almost alone in condemning the Z88. Among both PCW's staff and readers the Z88 has been welcomed as a very portable and practical notebook computer.

Punishing the innocent

I agree entirely with Guy Kewney's sentiments concerning copy protection ('Breaking down en route', *PCW*, October).

Some months ago our office administrator upgraded his keyboard and the new one had a slightly different layout. At some point in his work he pressed Z and another key, and a message came up: 'Are you sure?' 'Of course I'm sure,' he murmured, and pressed Y.

The program or operating system or whatever he was in at the time promptly zapped his hard disk, which contained all our accounts. Yes, he had regularly and carefully backed

up so all the data was saved up to the previous day. But the program was gone.

We contacted the software house who said in effect 'Hard luck!' and referred us to the dealer, who then had to contact the software house for a replacement set of disks for which they charged £50 plus VAT.

The dealer then had to make two visits, first to install the software and then to re-install the data for which he charged £200 plus VAT.

The whole process took over two weeks, during which time more data accumulated. If the software had not been heavily copy-protected the simple mistake could have been rectified by ourselves from a back-up copy.

Copy protection is illogical

as it penalises honest people. It is ineffective for its supposed purpose, since thieves will find a way round it but honest people won't try. It is unfair since it is the legitimate users who have to pay extra cash for a back-up copy, a replacement, or a 'special non-copy-protected version'.

It is for these reasons that my company decided never again to buy copy-protected business software. If software houses will not trust us with their programs, we will not trust them with our money.

As an author I am fully aware of the need for writers to be properly rewarded, but there is no need to punish legitimate purchasers for the activities of pirates.

Stanley Jebb,
Dunstable, Beds

I/O adaptor for the ZX81

I have passed on one of my old ZX81s to a friend who wants to use it to control an extensive model railway system, but we cannot find an I/O adaptor.

Can you or any of your readers help? Or how else can we harness the ZX81 to its intended task?

What else do you think we will need?

RFG Day, Bognor Regis **END**

Kyocera Laser Printers

Kyocera Laser Printers

Kyocera Laser Printers

Take a card for instant recall



The IC-card, a unique feature of Kyocera laser printers. Use it to save graphics, drawings, even macro commands. You will find it makes your printer as easy to use as a photocopier.

With PRESCRIBE, the printer command language, you can create new typefaces, graphs, charts, and even business forms. Then, just save them on the IC-card and recall them whenever you need them.

Kyocera printers give you seven different emulations as standard. They have 79 resident fonts, three dynamic



fonts, international character sets and barcodes. There are four models with outputs of 10 to 18 pages a minute.

We'll help you make a better impression.

Please send me information on Kyocera printers together with original print out samples.

Name

Position

Company

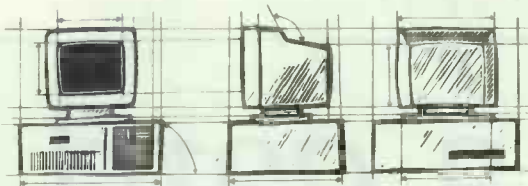
Address

Telephone

Kyocera Electronics UK Ltd ^{E2}

8 Beacontree Plaza, Gillette Way, Reading RG2 0BP
Telephone: (0734) 311500 Fax: (0734) 311108





Apple Mac SE/30

To many observers, the personal computer world is dominated by two superpowers — the PC and the Apple Macintosh. In the last couple of years the Mac has steadily been losing ground to its technologically inferior rivals; now, as Guy Swarbrick found, Apple has trumped them again.

The Apple Mac's heritage (especially if you consider the ill-fated Lisa, launched in the middle of 1983 as part of the family) is almost as long as that of the PC. In that time the Mac has, until recently, always been ahead of its sheep-like cousins, technologically at least.

Many people, though, even people within Apple, will admit that the original 128k single-floppy Mac was never really in a position to challenge the PC world. In terms of raw processing power it had a significant edge, the 8MHz Motorola 68000 processor making it roughly equivalent to the IBM AT which was still a few months away, and the user interface was (and still is) the best available on a microcomputer. (This position may change in the next few months with the introduction of Unix-based windowing systems on machines like NeXT and Atari's Transputer Workstation, but it is reinforced by the fact that every revision of Microsoft's Windows/Presentation Manager brings it closer to the Mac.)

What the machine lacked which would have made it truly useful was a decent amount of memory and a built-in hard disk. There were other things which, though not essential, would certainly have helped, for instance colour and expandability.

The memory would come in two stages, first with the 512k so-called Fat Mac and then with the 1Mbyte Mac Plus. Both machines, though, were still limited to a single floppy drive, though the capacity had been doubled to 800k; and, at last, the

Mac came with a SCSI port to make the connection of an external hard disk less harrowing.

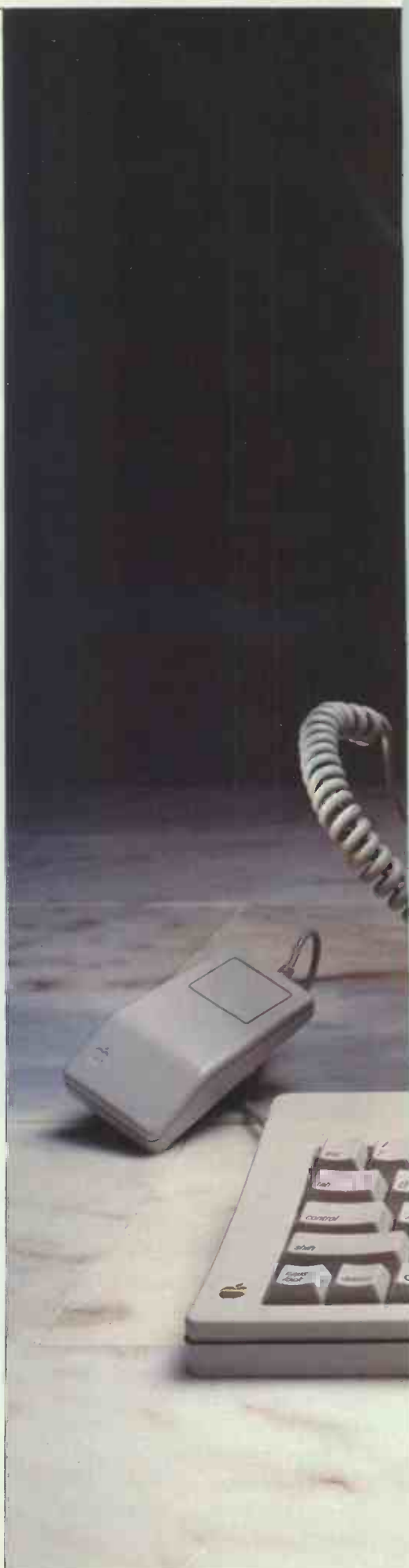
On the subject of a colour Mac, I have been told at different times that colour is 'a nonsense' and that a black and white machine is not worth buying. Both these attitudes lack more than thirty seconds thought, but both have influenced buying trends over the last five years or so.

As for the lack of expandability, the slots in most PCs have always been filled with video cards and I/O ports which the Mac user had on-board anyway. For most people, most of the time, they were unnecessary.

It took the Mac SE, launched in April 1987, to make the Macintosh the machine it always should have been — a 1Mbyte RAM, 20Mbyte hard disk machine with an expansion slot. For those who were still unsatisfied there was even the Mac II; not the conventional cuddly Mac box but 16.8 million colours, a considerable advance over the original two, the more powerful 68020 processor and Nu-Bus, an industry-standard expansion bus for those who needed it.

The timing of this launch was interesting in that, although Apple had finally made the Mac truly useful (and despite several operating system upgrades) it was still basically the same machine they had launched three years earlier.

Taking into account the fact that the Macintosh started from a position of strength (being the equivalent of a 16-bit 80286 machine before such a machine had been introduced) Apple had squandered the





Macintosh SE/30

lead. In the same time as the PC had moved from the 8088 through the 8086 and 80286 to the 32-bit 80386 (by this time even IBM had a 386 box, in theory, at least), the 'compact' Mac had remained at roughly the same technological level.

By the launch of the SE, the Mac had carved itself a nice little niche in areas such as desktop publishing and graphic design and was a favourite tool among professional writers, but the advantages it had had for the last few years, the excellent user interface in particular, were now being challenged by the newer, faster PC clones.

Now, with the Macintosh SE/30, Apple has catapulted the compact Mac standard back into the forefront of the technological race.

Hardware

Externally the machine is very similar to the current SE range. Indeed, the machine we were supplied for review was cased in a standard SE box, partly for security reasons and partly due to the fact that the new mouldings hadn't arrived from the States.

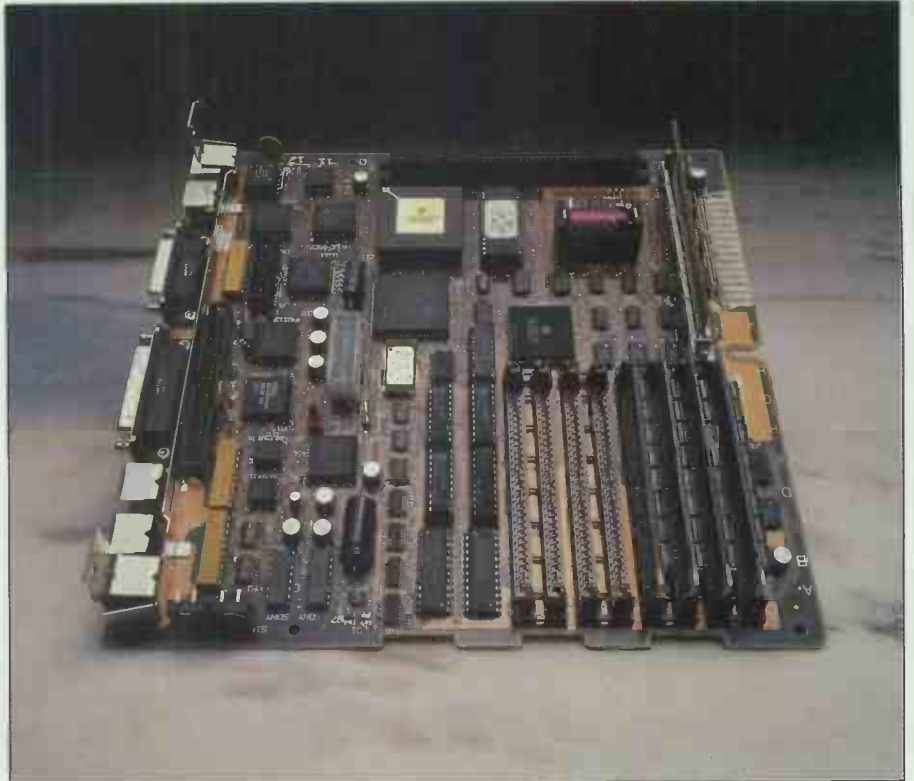
The external ports are, again, identical to those on a standard SE: two Apple Desktop Bus connectors for mice, keyboards, trackballs and so on, an external floppy drive port, a SCSI port for one of the growing range of SCSI devices from scanners to WORM drives, a serial printer port, Apple Talk connector and a stereo headphone socket.

At 9kg the SE/30 is just as transportable as its older brethren, retaining its telephone-style hand grip. And, of course, the integral design means that once you have lugged it to another location there is no need to spend hours looking for two or three spare wall sockets.

The heart of the Macintosh SE/30 is Motorola's 68030 processor. Not as fundamental an upgrade as the 68020 used in the Mac II was from the original Mac, it is nonetheless a significant upgrade from the 68000 in the other compact Macs.

Essentially the 68030 replaces the combination of 68020 processor and 68851 Paged Memory Management Unit (PMMU) by integrating their functions in one chip. In addition to the benefits this provides, the 68030 is also around 30% faster than the older design. Being a direct descendant of the 68020, the 030 is 100% instruction-compatible with its predecessor (hence the decision to use the 68020 Mac II ROMs).

The 68851 is a sophisticated demand-paged memory management unit which will, eventually, be used to bring true multi-tasking to the Macintosh. At present, the sys-



Other than the 68030 and the 68882 co-processor, most of the SE/30 motherboard is made up of VLSI gate arrays

tem software in both the SE/30 and the IIx is the same 256k ROM set which originated with the 68020-based II. But eventually, probably by way of a much improved MultiFinder designed around the PMMU, the Macintosh will be able to provide a stable multi-tasking environment by taking the memory management tasks away from the overworked 68030 and providing the hardware support a multi-tasking system requires to be effective and secure.

The 68030 actually contains a slightly cut-down version of the 68851 and it would appear that Apple's reasoning behind the introduction of the Mac IIx and, in particular, the SE/30 (which bypassed the 68020 altogether) is to introduce new machines based around the 68030 now, before use of the 68851 is common, and to discourage use of the separate PMMU. In view of the Apple approach to software development and the strict guidelines it maintains, this kind of enforced standardisation has considerable benefits.

The processor runs at a respectable 16MHz which gives the machine a performance roughly four times that of a Mac SE. It is, however, rated to run at twice that speed. Apple's reasoning behind the relatively slow clock speed is partly the increased cost of the support components (faster RAM and so on) but mainly the availability of these higher-specification parts.

This is not an unreasonable excuse

but, in the light of Steve Jobs' decision to clock the NeXT cube at a far more zippy 25MHz, it does seem a little conservative. The parts obviously are available, although NeXT will obviously require them in much smaller quantities (initially at least) and faster versions of the 68030 Macs are not beyond the realm of possibility.

Alongside the processor is the 68882 maths co-processor. Said to give a 100% improvement in speed over the older 68881 device found in the Mac II, the 68882 was designed with faster throughput, rather than outright mathematical speed, in mind. The claimed 100% speed increase is obtained only when the co-processor is driven by true 68882 code, but even with 68881 instructions an improvement of up to 30% on that chip is suggested. We were unable to obtain any software which used the 68882 in its native mode but, even driven as a 68881, floating-point operations were improved by nearly 1800% using the co-processor directly and by 110% using Apple's SANE (Standard Apple Numerical Environment) routines, which allow software to run on standard machines but take advantage of a co-processor if it is available.

Also carried over from the Mac II is the sound chip. Fans of the Apple IIGS (and there are some, despite its low UK sales) will welcome this cut-down version of that machine's sound chip as a replacement to the

traditional Mac method of driving the speaker directly with software.

The chip is basically a four-channel version of the 16-channel stereo chip in the IIGS and, as well as the four-voice wave-table synthesizer, it provides stereo sound with a sampling rate of up to 44.1KHz. Although a cut-down version of the IIGS chip, it is nonetheless a welcome addition and will go some way to relieving the load on the main processor.

The two main components on the well laid-out 9in square circuit board are the 68030 itself and a larger VLSI glue chip containing what would have been dozens of small logic chips in days of yore. In fact, VLSI chips make up most of the chip count, controlling the SCSI ports (one external and one internal for the built-in hard disk), the floppy disk drive, the Apple Talk network bus and so on. The rest of the board is made up of the 68882 floating-point co-processor, the cut-down version of Ensoniq's Digital Oscillator Chip (DOC), a SIMM containing the system ROMs and four SIMM sockets containing the standard 4Mbytes of 120ns RAM. Up to 16Mbytes will be possible once the necessary 4Mbyte components become available.

The standard hard disk on the UK specification Macintosh SE/20 will be the comparatively fast (28ms) 40Mbyte hard disk currently in use in the higher spec SEs. This unit, as well as being quicker, is considerably quieter than the 20Mbyte device.

The floppy disk drive on the SE/30 is also significant, especially for those working in mixed PC/Mac environments. Many offices produce text on PC word processors and transfer it to the Mac for desktop publishing. There are many ways of achieving this, but the new FDHD 3½in drive fitted as standard to the SE/30 and IIx has to be the easiest. As well as reading single and double-sided Mac disks, the drive can read 720k and 1.44Mbyte MS-DOS format disks and Apple II disks.

The Finder can still only read Mac format disks, and Apple's File Exchange program must be used to transfer files to and from foreign formats, but the process beats a serial cable hands down. File Exchange also allows for specific file format conversions as documents are copied, which should make life a lot less complicated.

The SE screen is the same 9in 512x342 as other compact Macs, as are the keyboards available for the machine and the excellent, single-button mouse.

Perhaps the best news for current Macintosh SE owners is that the SE/30, like the Mac IIx, is available as an upgrade to existing machines. The

job is a half-hour dealer upgrade and, although the price hadn't been set when this review was written, it is unlikely to be less than the price difference between an SE and an SE/30 as everybody would buy an SE and upgrade it (nor will it be much more, as Apple wants to encourage people to upgrade rather than force them to buy new machines).

System software

The system software in the SE/30 is something of a disappointment at first, but it is a disappointment rooted deep in PC/Macintosh psychology. Because it is so easy to use, people somehow expect the Mac to outperform every other machine on the market and, because the PC world treats its customers so badly, these same people expect Apple to be perfect.

The operating system is the 256k Mac II ROM set (System 6.0) and, as such, is written in 68020 code, allowing it to take advantage of the features of that chip, if not of the 030. My first thought was that the machine shouldn't have been launched until an 030 operating system, taking full advantage of that processor's new instructions and the built-in PMMU, was written and tested. I still feel that in an ideal world that would be the case but, in the real world, the competition is quite happy to produce 286 and 386 machines running an 8086 operating system. In those terms, the use of 020 code, omitting only the use of the PMMU, is a huge advance.

One of the spinoffs of using the Mac II ROMS without alteration is that Color Quick Draw routines are available, even though it is a black and white machine. The addition of a colour board in the expansion socket should allow colour applications to run without change.

System 6.0 also includes the latest version of MultiFinder which is far more stable than previous versions. I managed to keep FullWrite Professional, Turbo Pascal and Hypercard in memory at the same time with no

problems while I was writing this review. I even managed to run a couple of unfriendly games under MultiFinder without upsetting other applications.

The only compatibility problem I had was with a copy-protected version of Adobe Illustrator 88 which ran fine on a standard SE with the same version of Finder but steadfastly refused to run on the SE/30.

Also supplied are a couple of useful utilities including the invaluable MacroMaker. MacroMaker enables any series of mouse movements and keystrokes to be remembered and played back with a single keystroke. At first, not being a macro fanatic of the Kewney/Cohen ilk, I thought the program was an interesting but pointless gimmick. A little experimentation, however, led to large amounts of word-swallowing *chez* Swarbrick.

Finally, for the complete beginner, there is the Apple Tour disk. As twee as ever, it nonetheless provides an excellent and comprehensive introduction to the machine.

Applications

Bundled with the SE/30, as with all other Macs, is Hypercard, currently version 1.21. The virtues of this remarkable piece of software have been extolled in *PCW* before (November 1987).

Documentation for Hypercard is limited and provides no information whatever about the Hypercard programming language, Hypertalk. A Hypertalk manual, though, is available for those who need it and there are a large number of third-party books now available on the subject.

Expandability

The expansion socket on the SE/30, as with the standard SE, is not a true expansion bus but an extension of the processor bus onto which a single expansion card may be added. Unlike the SE, though, the socket is a 32-bit one to match the 68030 processor, so ordinary SE expansion cards won't fit in an SE/30.

Technical specifications

Processor:	Motorola MC68030
Co-processor (standard):	68882
RAM:	4Mbytes
ROM:	256k Finder (68020 code)
Mass storage:	400/800/720k/1.44Mbyte FDHD floppy disk drive
Keyboard:	Standard 81-key or Extended 105-key
Monitor:	Built-in 9in 512x342 black-on-white
Standard interfaces:	Apple Desktop Bus (2), External floppy disk, SCSI, serial (printer), serial (modem), stereo audio output
Expansion:	Internal 32-bit expansion socket
Size:	343mm x 241mm x 279mm
Weight:	9kg
Bundles software:	Hypercard 1.21
OS:	Macintosh Finder 6.1, System 6.0.2, MultiFinder 6.0.1

Although potentially an area for criticism, the choice of a new expansion socket was really unavoidable within the framework of the compact Mac. Unlike the PC/AT which was able to expand its bus by adding a second connector to handle the extra address lines, no such option was available to Apple in the far more cramped conditions on the SE board.

Indeed, even in the PC world the problem of going from 16 to 32-bit buses is one that has still to be resolved satisfactorily. Apple's solution should, in fact, affect very few people. The main problem will be with people who bought expansion cards for their existing SEs and want to upgrade without losing this investment. In fact, most of the boards which have been purchased for the SE are accelerator cards which would be redundant in the SE/30.

Colour boards and an Ethernet adaptor are among the options expected to be available by the time the machine is launched.

Documentation

The four spiral-bound manuals supplied with the review machine were all for a standard SE. Presumably some alterations will be made, particularly in the spec sheets and the chapter in the *SE Owner's Guide* which details the Macintosh internals, but there should be no need to change three of the manuals (*Hypercard*, *System 6.0 Software* and the *Utilities* manual) at all.

The manuals are up to Apple's usual high standard — well laid out with clear diagrams throughout. Separate manuals are supplied for system software and the basic hardware specification (although some of this, obviously, was not applicable to the review machines, much was, particularly details of the I/O ports) and, although they have the characteristic friendly Macintosh feel there is a surprisingly high technical content, far greater than is normally the case with user manuals. For those who require more, however, Apple also offers a superb range of hard-bound reference guides covering subjects from Hypertalk to the LaserWriter.

Prices

Unfortunately, prices had not been fixed by the time *PCW* went to press. We understand, however, that it is Apple's intention to fit the Macintosh SE/30 in between the top of the SE range and the bottom of the II/IIx range. The price of a 1Mbyte RAM, 20Mbyte hard disk SE is £3495 and the price of a 1Mbyte RAM, 20Mbyte Mac II is £4795.

Conclusion

Apple's pricing structure, which places the SE/30 at the head of the compact Macintosh range — the SE's and the Plus — but below the Mac II (see 'Second opinion') leaves the Mac looking frighteningly expensive. But in performance terms this machine is the equivalent of a good

386 and the price reflects that. If you must have colour and expandability then there still isn't a suitable compact Mac, but if you can settle for one or the other then the SE/30 could well be for you.

Apple has once again produced one of the most powerful microcomputers of the current era. (Many Intel groupies would argue that the 80386 is a superior chip. This is a complex, usually heated and, in the end, fairly pointless argument. Suffice it to say that the 386 and the 030 are the most powerful of the current commercial processors.) The SE/30 offers unparalleled performance for its size and it would be a shame to see Apple settle into an IBM-like technology suppression cycle rather than continuing to make the Macintosh the best machine it can possibly be.

Much of the performance, however, has come from unashamed devotion to the V8 approach. The Mac's main performance problem has always been that the processor has to do all the work and the solution, traditionally, has been to fit a bigger, faster processor.

Now, at last, the foundations are there for a Mac where the processor spends the majority of its time doing what it does best, rather than trying to function as a maths processor, memory management unit and sound chip. The MMU is there waiting for the software to drive it and the benefits to be gained from its use are substantial, and the use of SIMMs for the ROMs should make the upgrade a painless one. What is still missing, however, is a dedicated graphics processor to handle the complexities of the Mac's windowing system. Although the scrolling speed is much improved in the new machine it is still slower than an equivalent text-based system. The idea of a separate graphics processor is not totally alien to Apple as the IIGS proved, but it still seems some way off for the Macintosh.

Throughout 1988, Apple constantly told us there would be no new CPUs that year (despite sneaking in the 68030-based IIx). Now the company tells us 1989 will be the year of the CPU. Hopefully, the SE/30 is the shape of things to come, and with 16MHz to spare on the processor speed there is no reason why this superlative performer should not be improved still further.

Until now, my ideal writing environment has been a Mac II and a LaserWriter II. The availability of a compact 68030 machine changes that — and reduces the cost as well.

Second opinion

As a Mac sceptic, I view Apple's latest machine with very mixed feelings. Right from the beginning, the easy-to-use interface of the Mac has led people, myself included, to expect the screen handling to be as fast as a text display. Seeing the SE/30 in action I finally saw a machine that provided the facilities I wanted without the sacrifice in speed brought about by the heavy overhead of processing the graphics. And the 'superdrive' floppy disk drive makes using such a machine in a mixed Mac/PC environment easier. If there was a machine that would persuade the individual power user to switch to a Mac, this would be the one.

Apple's pricing policy is another matter. The different profile of Mac ownership between the UK and the US is striking. In the US everyone and their child has a Mac in the garage. People 'love' their Macs, and the Mac has become the way into serious computer usage for many people. However many Macs exist in environments in both the UK and the US, it is the individual ownership in the US which has fulfilled Apple's promise of the Mac being a computer for the rest of us. But in the UK the rest of us cannot afford one.

The profit figures for Apple show that its strategy of selling a high-priced prestige computer product pays well. And the company claims that this profitability will enable it to branch out and develop further areas of Mac ownership. So, Apple UK is saying that 1989 will be the year of the CPU.

The Mac SE/30 will increase the interest in Macintosh computing. But until Apple either reduces the prices of some of its machines or introduces low-end products, many people will have to forgo the pleasure of using a Mac.

In 1992 the single European market should allow Apple's Cork manufacturing plant to produce large volumes of fewer products rather than having to engineer computers for each country. But even now the production line at Cork can easily switch from one product to another, so 1992 may not herald much change in manufacturing economies.

I like the SE/30 — it's the first Mac I would consider having on my desk, though I'm not sure how I'd cope without colour. But until Macs become more widely owned, computing with a Mac may remain something which, in Apple's own words, 'people aspire to' rather than actually enjoy.

Derek Cohen

Apple is on (0442) 60244.

END

THE BIG DIFFERENCE IS THE BOTTOM LINE.

	AMSTRAD'S LQ5000di PRINTER	EPSON'S LQ1050 PRINTER
PRINT OUTPUT	24 pin print head Excellent print quality Full bit image high resolution graphics	24 pin print head Excellent print quality Full bit image high resolution graphics
FEATURES	Many different typefaces Inbuilt friction and tractor feeds IBM compatible Dual interfaces centronics/parallel and RS232 serial	Many different typefaces Inbuilt friction and tractor feeds IBM compatible Dual interfaces centronics/parallel and RS232 serial
CONSTRUCTION	Wide carriage Heavy duty mechanism	Wide carriage Heavy duty mechanism
PRINT SPEED	288 CPS draft (12CPI) 96 CPS letter quality (12 CPI)	264 CPS draft (12CPI) 88 CPS letter quality (12 CPI)
PRICE (RRP)	£449 + VAT	£849 + VAT



Introducing Amstrad's new LQ5000di printer. It offers you virtually everything that Epson offer you along with something they don't. Around £400 change.

Please send me further information on the Amstrad LQ5000di.

NAME _____

COMPANY _____

ADDRESS _____

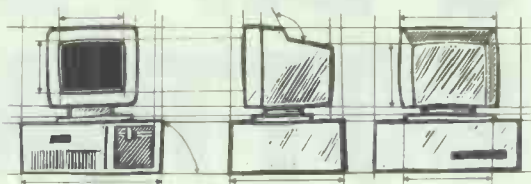
POSTCODE _____

TEL. _____

PCW2/89

AMSTRAD

Amstrad plc PO Box 462,
Brentwood, Essex CM14 4EP.
Telephone (0277) 262326.



Hi-Grade

Dealer-built micros offer a way to cut the cost of quality, high-speed machines. Guy Kewney examines the extent to which one, the Hi-Grade, lives up to this promise.

Available from one London dealer is a very fast machine called 'Hi-Grade'. The fully equipped Hi-Grade 386 bristles with speed features; a 20MHz processor, with 2Mbytes of fast static memory and one of those turbo arithmetic chips — the 80387 — and a pretty quick disk, turns out to benchmark at a *PCW* Index figure of 4.0. That's quick.

But no matter how fast, you might be wondering why an international magazine like *PCW* is concerning itself with machines from a small London dealer which sells maybe 50 machines a month at most. And most of those to local businesses.

The answer is: because this is a dealer-built machine.

The dealer-built machine is a phenomenon you can expect to see more frequently in the PC world over the next year or so. The surprising thing is not that dealers build their own machines, but why so few of them do. The reason for this is probably that the average computer retailer will do anything possible to increase profit *and* reduce price.

Buy a machine from Tandon, Victor, Compaq, IBM or Olivetti or Amstrad, and you make your dealer very worried. Why should you buy from one shop, rather than the next? Good question; let's knock another two per cent off the price. Oh, dear, look at the price tags over the road in Dixons! How are we going to make a profit? By bundling expensive (pirated) software in free? Yes, it does happen.

The first legitimate option for the hard-pressed retailer is to try to cut out one of the middlemen. If possible, buy from somebody like Tandon direct, not from a distributor. That gives you an extra two to five per cent. Then try to sell a hundred a month instead of 10 — that gives a much bigger discount.

Of course, if only one could cut out the manufacturer too, the profit would be even better! The only trou-



ble is: who can build a PC from components? Very, very few people.

Kits of components are available, and you can indeed put together a cheap system that way. But even when the kit is made from components which somebody else has selected, making all the bits work correctly is a nightmare of twisted cables, mismatched drivers, hard-to-

diagnose faults, and — in the end — complexity.

Dealers like Euromicro and Hi-Grade are the unusual ones, set up by electronics experts who know how to tell a good motherboard from a bad one, who know the difference between a faulty disk and when the controller is below par, who can buy a memory board that will work with

the main motherboard, and know how to fix problems quickly if they arise.

The Hi-Grade company was founded by Ori Yiassoumis, formerly a lecturer in computer science at North London Polytechnic. (Coincidentally Euromicro, a much older firm, was founded by Ori's predecessor.)

I first heard of Hi-Grade a year or so ago, when a journalist friend asked me to recommend a dealer from whom he could buy a cheap, reliable AT-standard machine for desktop typesetting. I never recommend dealers. 'Pick somebody as nearby as possible who looks honest and knows what they have in stock,' I said. 'Most dealers don't know one printer ribbon from the next, never mind how to set up a hard disk, so honesty and proximity are the two prime requirements.'

My friend lived within walking distance of Hi-Grade, and so (since the young directors clearly met the honesty criterion) he asked the price of an AT. The answer was low enough to astound him, and he walked out of the shop with a system.

At that time, Hi-Grade used systems put together in Taiwan by ASI. Yiassoumis quickly discovered that the motherboard was bought from a Californian supplier, Micronics, and soon arranged his own bulk purchase direct from Sunnyvale, cutting out the extra middleman in prime form.

Shortly after, the company found another source of systems in Hong Kong, and it now offers three or more machines, all of which it assembles in its North London premises. Not surprisingly, it recently moved into a larger workspace.

At this stage, I started hearing the name Hi-Grade mentioned in glowing terms by other users. When I made contact, I found a partnership determined to grow into a respectable small, independent, manufacturing operation.

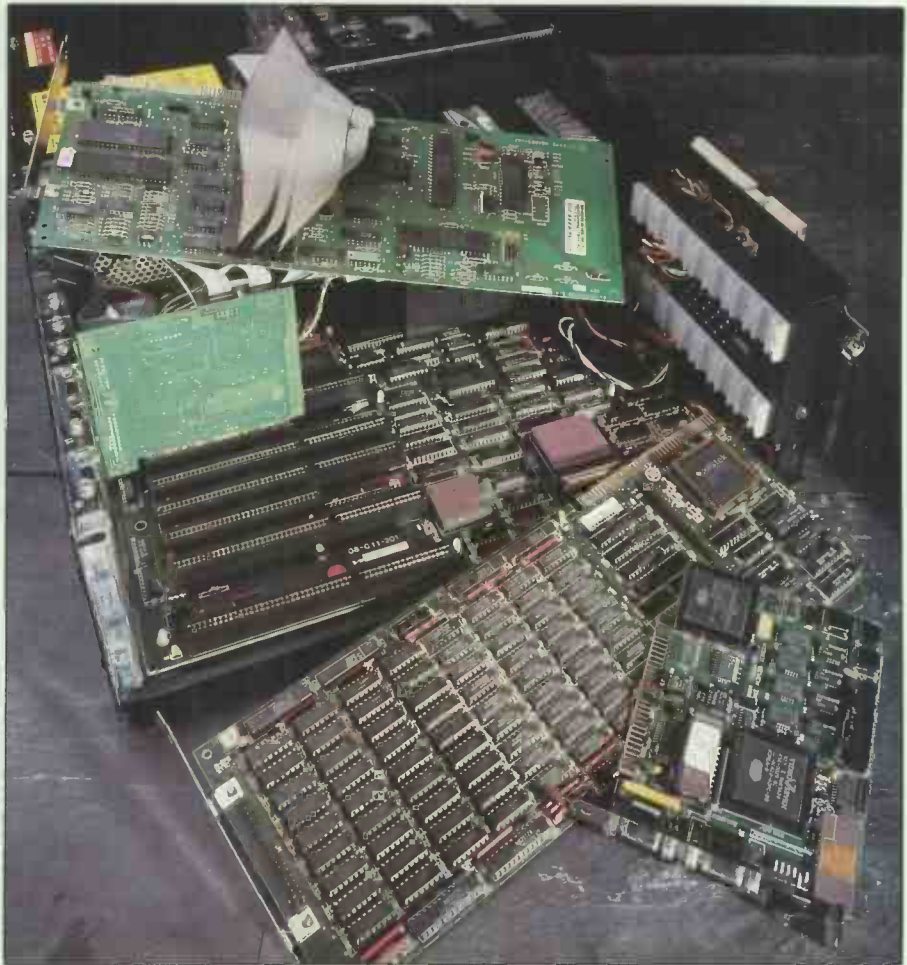
Hardware

The turbo 386 model looks like an AT — you couldn't mistake it for anything other than an AT family machine. That is to say: it's grey, big, and has a row of slits on the front panel to let air in.

There's room for three half-height diskettes on the right-hand side. The test machine had one 5¼in floppy, one 3½in drive, and an empty slot — but one floppy and a full-height hard disk could go in equally easily.

Behind the metal of the case there is room for another full-height device. The test unit had a 40Mbyte fixed disk, a Miniscribe.

Two buttons — one red, one yellow — also decorate the front. The



Under the video card, the 32-bit static RAM card also carries an Austek memory cache controller

red button is aptly coloured — it will kill the machine whenever you press it, abandoning all your work. Yes, it's a reset button, not often found on PC family machines.

The yellow button is provided for people who want to build a machine that can switch speed when you press the button. Hi-Grade didn't want to do this, but the panel had the button on anyway. So they left it there. Why not?

And next to the buttons, you can see the keyboard lock, and lights — a red 'power on', a yellow one that shows the machine is running at full 20MHz clock speed, and another red one that flashes when the disk is used. A standard AT.

The only surprises are round the back, where you find that the serial ports are full 25-pin jobs, not the cut-down 9-bit bodge which IBM introduced to plague us all on the AT. And much to my surprise, Hi-Grade appears to fit a games port as standard, too.

Getting started was a simple matter of taking computer and screen out of the box, plugging them together, and switching on.

Because I always do everything wrong first time, it took me a minute

or two to discover whether the screen was working. There were too many options — the monitor supplied had a bewildering number of buttons, sockets, options and switches (TTL/analogue, 16 or 64 colour, text/graphics, and so on) and several had to be matched to each other. (An owner's manual would have been useful here, but Hi-Grade doesn't supply one.)

Once switched on, the machine turned out to have its disk formatted already under DOS 3.3, with DOS loaded, and all utility software installed. The BIOS was Phoenix. American Megatrends (AMI) chips are available instead, if you prefer.

The machine can be operated at three clock speeds — full 386 speed of 20MHz, or 8MHz or 6MHz. Some programs, some peripheral cards, and some humans may require the system to be slowed down occasionally. The only problem is: how do you pick the speed?

Irritatingly, the speed is selected by software, not by the Turbo button on the front. I never know which I like less — the system which requires you to be able to load a speed-up program, or one which means you have to remember some unlikely

combination of fingers. If I were to ask for anything on this machine to be changed, it would be to connect that yellow button to the speed function. I'm afraid, however, that you just have to put up with it.

For a hard disk system with a fan, the noise level's pretty acceptable — nowhere near as loud as a Dell, nor as quiet as an Apricot.

Serial ports were provided by a plug-in card, and jumpers are used to select interrupts and port addresses if you need other serial devices — otherwise it came set up to work as COM1 and COM2.

Both ports passed all tests, official and unofficial. The parallel port was also a plug-in board function. The card included a games port, which was not tested. The LPT1 port was fully standard, usable even with highly unorthodox software like Fastwire II which drives the chip direct to give bi-directional data transfer to another PC. On test, this easily clocked up 500kbits/sec.

The reset switch produces a cold restart — its only virtue being that you don't need to use the Big Red Switch (which is a standard BRS, by the way, that sits on the right hand side at the back, the way IBM used to do it, so you didn't have to jerk your disk heads when something crashed).

The only security feature was a standard keyboard lock.

Architecture

This machine is based on the full 32-bit 80386 chip, running at 20MHz — nearly as fast as that chip is permitted to run in any machine. The motherboard has space for a full 32-bit arithmetic chip, the 80387, not the 80287 which often comes with AT machines. It costs more, but for the CAD user or somebody doing fractals, it's worth having that option.

Because the chip is a genuine 386, multi-tasking systems like DesqView can be loaded. Most system crashes under DesqView are caused, not by the memory or the processor or the software, but by the short-sighted design of the VGA card and its lack of properly documented specifications. With the Video 7 VGA card supplied, compatibility with the IBM standard is about as good as one gets today, and the only crashes were screen modes, easily cleared by running MODE to reset the video.

The machine was fitted with 2Mbytes of 80ns static memory chips. There was also a 32k memory cache. As a result, I was quite surprised to get a Landmark Speed indicator of only 27MHz, indicating some kind of memory wait states in operation. Details weren't available at press time, however.



The rear shows the Hi-Grade's twin serial ports, and its TTL and analogue VGA video outlets

There is a single 32-bit slot on the motherboard for the memory board. Apart from the clock memory in which data is maintained permanently (four dry cell batteries, not a board-mounted rechargeable one, maintain the clock) there is no memory on the motherboard.

This means that expansion over 4Mbytes will have to wait for bigger chips — the 256k chips mounted on this board (half socketed) can only be supplemented by a piggy-back board.

Of course, you can add as much 16-bit memory as you like in the remaining four expansion slots. But this would slow your system down — perhaps unacceptably.

Inside the Hi-Grade case, everything was neat and tidy. The motherboard is an established design. You might even accuse it of being a bit out of date, with no on-board I/O, graphics, or battery. On the other hand, there's no problem with little blue wires and partly debugged circuitry, either.

Access to the main setup switches was straightforward (they did not need setting for this test, but they

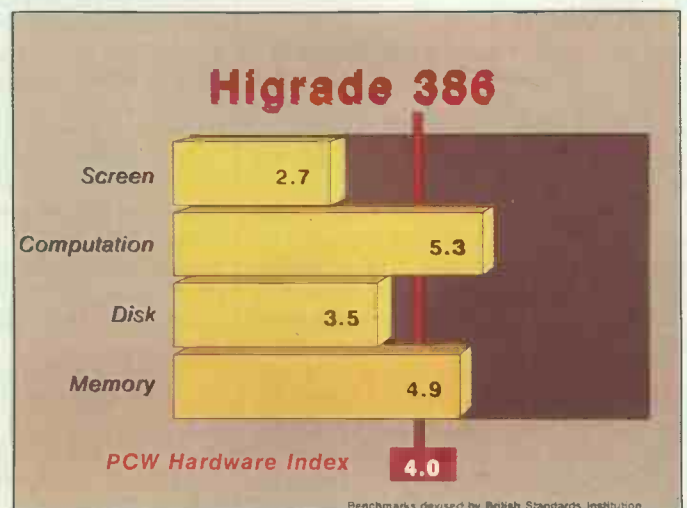
were properly documented). The 200W power supply happily drove all the boards, hard disk and peripherals. The monitor took its power from the extension socket. Access to the disk connectors was as easy as it ever is in an AT — which is to say, you lose skin off your knuckles if you have to change connectors. I didn't have to.

Mass storage

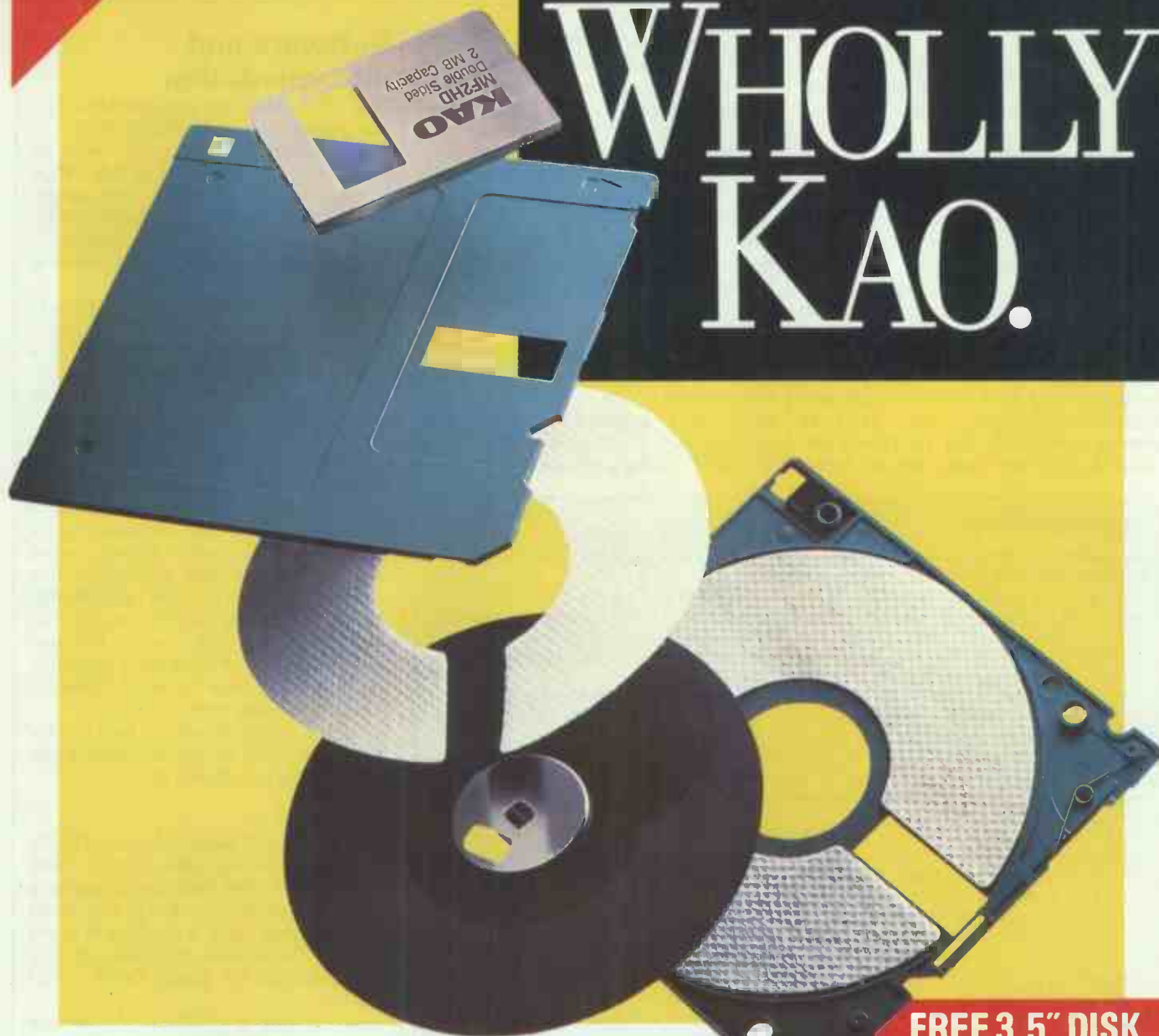
A Miniscribe 40Mbyte disk was already fitted. The Core International CORETEST program indicated this to have a 33 millisecond average seek time, with a track-to-track seek time of under 6.0 milliseconds.

Two high-density floppy drives, one 3½in and one 5¼in, were fitted for test. Initial problems with the 3½in drive were quickly repaired by the owner of Hi-Grade who arrived within 20 minutes of my phone call on Sunday morning. I mention this because friends who own Hi-Grade kit have reported that this is by no means unusual treatment dished out to impress a journalist, but a measure of how the company reacts to problems.

Machine under test: 20MHz 80386; 45Mbyte hard disk; Video 7 VGA. (Numbers indicate overall and specific function speeds compared with an IBM PS/2 model 30)



WHOLLY KAO.



The floppy disk. The whole floppy disk. And nothing but the floppy disk. That's all we make at Kao Corporation's Infosystems Division.

We know that a flaw at any stage of manufacture can mean a flaw in performance, so we always do the whole job ourselves — from raw materials to final packaging. Total vertical integration.



Over 100 years of Kao leadership in surface science technology goes into every Kao floppy disk. Whatever size, density or colour you choose, you know it will exceed every industry standard world-wide. Our 3.5" disks are the perfect example.

For a free sample and further information, clip the coupon now. And make sure every floppy disk you use is wholly Kao.

FREE 3.5" DISK

Please send me my free 3.5" disk, and further information on Kao floppy disks. Subject to availability. Offer closes March 31st 1989.

NAME _____

POSITION _____

COMPANY _____

ADDRESS _____

SYSTEM _____

MF20D MF2HD (Please Tick)

Post coupon to: Kao Corporation, Quay West, Salamander Quay, Park Lane, Harefield, Middlesex UB9 6NY. Telephone 0895 824081.

PCW 2

SEE US ON STAND 1559 AT THE WHICH COMPUTER? SHOW,
N.E.C., BIRMINGHAM 21st-24th FEBRUARY 1989

KAO
Media from the Surface Scientists

Display

The display is provided by a Video 7 VGA card, which passed all the tests *PCW* has evolved for VGA, except two. The first problem was one of the VGA registers, which appeared to have an extra bit. And second, one of the split-screen modes failed. This behaviour was fully detailed in December's *PCW* article on VGA cards, and provoked no surprises.

What did puzzle me, however, was its problems with a program called GRASPRT, normally used to show a succession of video images in animation mode. My first reaction on running this test was that the VGA was crippled. Whereas I am used to seeing something like 10 frames per second, this one gave two or three.

Time didn't permit me to get to the bottom of this. However, the phenomenon is obviously related to some conflict between system clock and screen refresh, because the program ran faster when it was sharing the machine under DesqView than it did on its own.

The Hitachi multi-scan display is excellent, but standard VGA in shape and size. Obviously, other makes and models of CRT can be chosen.

The keyboard is a standard Cherry 102-key model and, like all modern keyboards, appears incapable of generating a control-backslash (ASCII 28) which I need for communications. This appears to be a widespread BIOS problem — I've found it on other, totally unrelated machines.

Software and documentation

The price does not include MS-DOS, but version 3.3 is available. Hi-Grade is a computer dealer as well as manufacturer, and sells a full range of applications software. Not surprisingly, perhaps, it is not much tempted to give away such software — and it doesn't — so there's nothing bundled with the machine.

With the box you get an Hitachi manual for the monitor, a keyboard manual and circuit diagram, and a brief 40 pages' from Micronics, builder of the motherboard, on how to configure the system.

Since Hi-Grade supplies it fully configured, this could be described as 'without documentation' for most purposes. It has to be admitted that the company is actively catering for the customer who knows what machine to buy, and has some idea of how to use it. And admittedly, many rival firms which actually do provide an owner's manual for new users seem to think that a patronising tone of voice is all it takes to educate the beginner.

All the same, if you're looking for the weak point of the Hi-grade package, you've just found it.

Prices

A Hi-Grade 386 with 1Mbyte of RAM, a Hercules-compatible video card, two parallel and two serial ports, a hard disk controller, 5¼in and 3½in floppy drives and a keyboard costs £1995. The review machine, including 2Mbytes of static RAM, costs £2995.

Extras: for a 44Mbyte Miniscribe hard disk add £305; for VGA card and monitor add £360; for VGA card and multi-scan monitor instead of analogue add £495.

Conclusion

There are no surprises here, except perhaps for the fact that the machine seems slower than you might expect. On paper, it ought to be a very, very fast machine. In testing, it was fast, yes — perhaps one of the real speed freaks of the PC world — but not streets and streets ahead.

The actual configuration reviewed doesn't have to be what you will be offered, since the machines are built to requirements. But the one supplied for test sat next to the Dell equivalent, and matched it pretty well feature for feature. It was quiet, seemed robust, and there was nothing half-built or botched about it.

For anybody lucky enough to live near North London, it must go to the top of the shortlist.

In perspective

As predicted in *Newsprint* a year ago, the time has indeed arrived when a sensible buyer wants a 386-based PC for choice.

Apricot's range of Qi machines has the advantage of coming from a manufacturer which still survives, and of having extra features — built in networking, for example, and compatibility with IBM's PS/2 range. On the other hand, the Hi-Grade model matches the Qi pretty well for features, and has the genuine advantage of using a proper 32-bit version of the 386.

It may be that the time when a 16-bit 386SX seems lacking in essential features (memory, speed) is still some years away. On the other hand, if you can get a full 32-bit machine for the same price as the SX, why settle for the half-pint?

Other machines which the potential purchaser of a Hi-Grade machine might want to look at will include the Dell and CompuAdd, plus the new Amstrad (when available) and other mainstream 'bargain' boxes from people like Tandon, Victor, or Opus and Walters.

If Hi-Grade was ten times the size it is, you might worry a bit about its use of static memory. However, the number of chips it needs for a year's production could fall off the back of any Silicon Valley lorry or Hong Kong junk.

On technical grounds, it's hard to see any argument which would favour any of the possible rivals over this machine.

This is the sort of machine and the sort of supplier that worries people like Dell and CompuAdd, because it does what they do best. It can be built exactly to your requirements. You don't have to take whatever the shopkeeper has on the shelf ('yes, I know it only has a 20Mbyte disk, but the supplier has had trouble with the 40Mbyte model, and the 60Mbyte one is twice the price, but isn't the display clean?'). When it breaks down, you don't have to deal with some gaumless shop assistant. You talk direct to the manufacturer, who has several other components which will be built into a similar machine, if your component is genuinely bust.

Dell, of course, counters these smaller operators by noting that they don't design their own boards.

This means that if, say, Micronics gets an order for 10,000 boards from the US Air Force, and has to delay shipping for three months, Hi-Grade has to go and find another board builder. And that may turn out to be nearly, but not quite, the same spec. And it may suddenly not drive this VGA board, or that disk controller.

For the big, corporate buyer who wants at least 10 machines now and another 10 this time next year, this is a frightening thought.

However, for people who want their own fast AT with a 386 in it, who cares? As long as the machine works, never mind whether the company will be selling a different model next year, just look at that price!

And indeed, Hi-Grade's prices are very tempting.

Technical specifications

Processor:	20MHz 80386
RAM:	1Mbyte 32-bit static as standard, expandable
ROM:	Phoenix BIOS
Mass storage:	45Mbyte Miniscribe 30msec
Storage options:	Five half-height slots
Keyboard:	102-key PS/2 style
Graphics:	Video 7 VGA
Standard interfaces:	Two serial ports, one parallel printer port, one games port
Expansion:	Five 16-bit AT slots, two 8-bit XT slots, one 32-bit memory slot
Operating system:	DOS 3.3 available

Hi-grade is on (01) 482 4024.

END

FOR JUST £99*

CREATE YOUR OWN PROGRAMS WITHOUT WRITING CODE

MATRIX LAYOUT is an IBM PC compatible package that automatically codes any program from the flowchart you've created.

Turbo Pascal, Turbo C, Lattice C, Microsoft C, or Quick Basic... you choose the code, LAYOUT does the work, and it's all 100% bug-free source code ready to compile. LAYOUT is so efficient everything you create will work incredibly fast, even on standard PCs with 256K and only one disk drive.

No one else can offer you anything that saves so much time and hard work - whether you're a first-time user or a seasoned professional.

And the best news of all is that LAYOUT is being offered in the UK at just £99 (plus insured delivery and VAT)... complete with three major additional packages, absolutely free.

"Matrix easily outclasses its competitors in both speed and size... it has a large technical edge over its competitors which will last for at least the next five years..." (US Independent Market Report on Operating Environments 1987)

➤ **Totally unique** - the first true CASE (Computer Aided Software Engineering) development tool for the PC, exclusively from MATRIX.

➤ **Create your own programs**, just by drawing a flowchart, and LAYOUT does the rest. Anyone can use it - no programming knowledge necessary.

➤ **Amazingly fast and easy to use** - yet LAYOUT creates a choice of completely bug-free source codes.

➤ **Create programs that include windows, icons, menus, buttons, dialogue boxes, graphics and text** - plus automatic mouse support and Hypertext functions.

➤ **Free HOTLINE support** - help and advice whenever you need it.

➤ **Satisfaction guaranteed** - if LAYOUT fails to meet all of these criteria, return within 10 days for refund in full.

➤ **Launch offer includes 3 extra packages** - entirely free

- **PAINT**, the high-powered professional graphics tool.
- **HELPMAKER**, enables you to create your own electronic manual.
- **DESKTOP**, an easy-to-use disk, file and directory manager.

Matrix Software Technology, Matrix House, Derriford Business Park, Derriford, Plymouth PL6 5QZ. Registered in England 2193851.

ACT NOW - MATRIX LAYOUT JUST £99* (ex delivery & VAT)
PLUS - PAINT · HELPMAKER · DESKTOP absolutely free

Save £147 on recommended retail prices

Offer open to all enquiries received within 21 days

**OR
SEND FOR MORE
INFORMATION**

Video and Brochure just £2.95
Reusable 1-hour tape - yours to keep



DIAL 100 AND ASK FOR FREEFONE MATRIX SOFTWARE,

quoting code when connected or complete and post the coupon below

PW4


YES, please send me: (please tick)

MATRIX LAYOUT - plus **PAINT**, **HELPMAKER**, and **DESKTOP** - at the offer price of just £117.25 per set (£99 plus insured delivery and VAT).
Number of sets required: _____

VIDEO and BROCHURE for just £2.95. No other purchase necessary.
Quantity required: _____ **FREE BROCHURE** only.

I enclose my cheque for £ _____ as payment in full.

I prefer to pay by credit card. Please charge my account on despatch.

Mastercard/Access Visa American Express 

A/c No:

Signed _____ Expiry Date _____


MATRIX SOFTWARE TECHNOLOGY
From creative vision to graphic reality

Post to: Matrix Software, FREEPOST MD3, Plymouth.
PL5 2BR (no stamp required)

Name: _____ (PLEASE PRINT)

Company (if applicable): _____

Nature of business: _____

Position in company: _____

Address: _____

Postcode: _____ Daytime Telephone: _____

CONTINENTAL EUROPEAN ENQUIRIES:

Please contact our Belgian Office.

Tel: (016) 20.20.64. Fax: (016) 20.77.10.

Matrix Software Technology,

Geldenaaksebaan 476, B-3030 Leuven.



Mathematica

The art of mathematics in all its forms makes a spectacular appearance on the Mac. If you have a penchant for equations, calculation and problem solving, Mathematica is all you need.

Jack Weber figured it out.

How on earth do you even begin describing a program like Mathematica? I mean, here is something that does 3D colour animations, has its own comms software, lays out posters big enough for a hoarding, runs on anything from a Cray to a Mac, does word processing in its spare time. And it understands maths. Not just arithmetic but proper symbolic mathematics. Calculus, simultaneous equations, complex numbers — that sort of thing.

Back in the mid-fifties when Alan Newell and Herbert Simon wrote Logic Theorist — a program for solving problems in symbolic logic — they were far ahead of the field in artificial intelligence. And even now, symbolic calculation is something of a pioneering activity found only on heavy-duty academic machines. A few programs such as TK Solver have, it's true, brought certain aspects of algebra to the micro, but never before has anything like Mathematica been seen on a desktop. Nor even on most university machines.

In recent months Mathematica has received a certain amount of reflected glory from the launch of Steve Jobs' NeXT computer which includes the program as part of its comprehensive software bundle for the complete academic. Versions are also being prepared for various workstations and minis. But, for the time being, the majority of users are going to experience Mathematica on the Mac — the computer on which it makes its first public appearance.

Overview

Reflecting this ability to run on many different machines, Mathematica is made up of two separate programs. The Kernel, which is the mathematical engine, is a hefty 150,000 lines of C. It can be run locally, on a nearby networked machine or even on a re-

mote supercomputer (hence the comms software). But it is never directly seen by the user who interacts only with the Front End. This is a machine-specific interface which sends messages to the Kernel and displays the results of its mathematical deliberations. On the Mac it accounts for another 50,000 lines of code.

Mathematica is the closest thing to a mainframe application that you are likely to find on a micro. But we are not talking low budget here. To run the complete package of Front End and Kernel requires an absolute minimum of 2.5Mbytes on the Mac, though 4Mbytes is actually a more realistic figure, especially if graphics are widely used.

The Front End alone can be run in as little as 1Mbyte which opens up the possibility of using even a basic Mac Plus, provided that it has access to a larger machine. But portability is restricted by the fact that separate versions are provided for the Mac II and for other Macs. Both are identical in every respect except speed — the Mac II version makes use of the 68881 maths co-processor so cannot run on anything less. Given lashings of memory, Mathematica will operate very happily under MultiFinder.

In very broad terms Mathematica works within three areas — numerical calculation, symbolic calculation and graphics. But it is much more than a mere collection of handy solving routines; this is really a programming environment which, at its simplest could be used just for its in-built functions but, with more experience, could also be customised and extended in many powerful ways. It is founded on a broad and talented base that presents few limitations.

For example, numerical calculations can be carried out to any arbitrary precision. So, if you need π to a hundred decimal places or a sine to three hundred then Mathematica will

readily oblige. The only limitation is your own patience — a square root with a thousand places takes about three seconds on a Mac II but lesser machines will struggle with such extravagance. Positive, negative and undirected infinities are correctly handled, as are imaginary numbers — so you can roam unfettered over the whole complex plane.

Just as impressive on the symbolic side is Mathematica's ability to deal with algebraic equations and cope with notoriously difficult activities like integration. Numerical integration is, broadly speaking, a doddle with well established techniques for approximating to the correct solution. But with something like this:

$$\int \frac{1}{x^3 - 1} dx$$

where the result has to be another algebraic expression rather than a number, there are precious few general rules to fall back on. Mathematica tackles that indefinite integral, and many other more thorny ones, with ease. Sometimes, when it cannot solve a complete expression it will still do what it can and leave the rest in symbolic form. But, as in all areas, additional rules can be added at any time to extend Mathematica's abilities.

Mathematica's handling of algebra is pretty intuitive and closer to mathematical than to programming conventions. Enter something like

Expand [x²-x](2x+1)]
and Mathematica immediately responds with

$$-x - x^2 + 2x^3$$

Notice that the input line did not require any multiplication signs — Mathematica understands how we write algebra. It will solve simultaneous equations, generate power series for a function, find roots, eliminate variables and do virtually all

the other things that need to be done in order to manipulate algebraic formulae.

I was particularly impressed by Mathematica's ability to cope with awkward problems where singularities, local spikes and discontinuities attempt to make life difficult. For example, the function $\text{Sin}(x)/x$ tends ever closer to one as x approaches zero, but becomes indeterminate when x actually is zero. Mathematica finds the limit with no difficulty. In numerical integration it will often deal with singularities automatically and, if it can't will usually warn you of the problem, in which case a very little extra work will tell it explicitly where to look for them.

In use

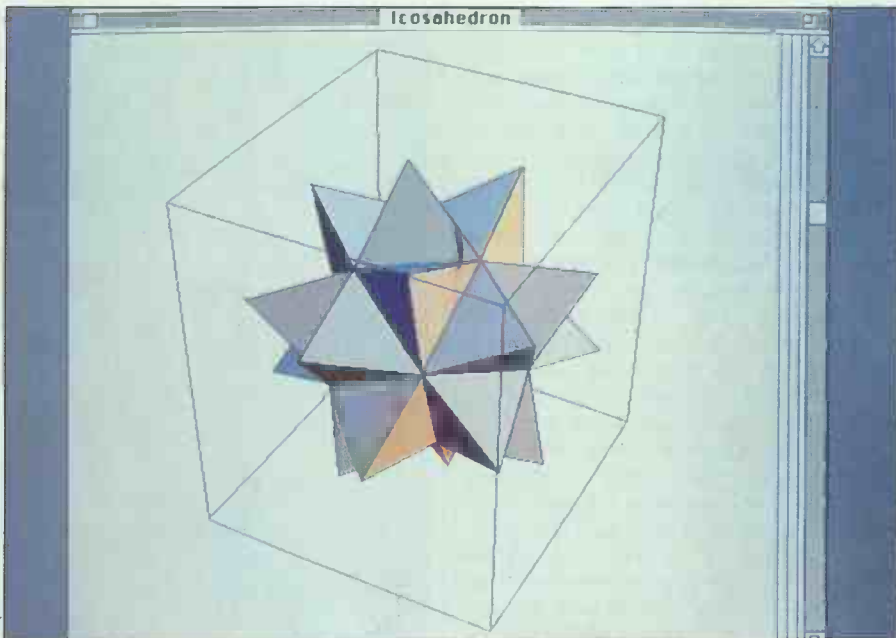
Using Mathematica for the first time is rather like discovering that Father Christmas really does exist — you don't quite believe it but still you can't miss the opportunity to ask for anything that might be going. One of the first things that anyone will grab hold of is the graphics. They are superb — functional and down to earth as befits a serious working program, but capable of being unashamedly decorative. With up to 256 colours available plus dithered tones and some of the most impressive 3D shading and lighting routines that I have seen, this program offers remarkable facilities for visualising mathematics.

For a start, any function, discrete or continuous, can be plotted as a graph — you simply need to specify the range to be covered. All plots are drawn as straight line segments between sampling points (spline curves may be very misleading when you are trying to represent specific functions) but Mathematica automatically adjusts the frequency of sampling according to how much the curve is wiggling about, so you always get a smooth result. Unless specified, the y axis will then be set to contain only the 'interesting' parts of the plot and any singularities or regions where the curve increases too rapidly will be chopped off.

Scales may be linear or logarithmic and routines are provided for drawing point plots as well as parametric and polar graphs. Arrays of data can be displayed as contours, density plots or as 3D surfaces. And here, Mathematica offers really remarkable abilities — you can set shading (in colour or grey scale) to be determined by the height of the plot or by any specified function. Alternatively, turn on the lights and you have an illuminated surface with full control over the colour and intensity of both overall ambient lighting and multiple point sources that can be positioned



Surface: Another memory eater — this single graphic takes up just over 1Mbyte but shows the excellent results that can be obtained. The surface is illuminated using Mathematica's default settings of no ambient light and three point sources (red, green and blue) at 45° to each other



Icosahedron: Routines for creating regular solids, like this icosahedron, are included with Mathematica, but any two or three-dimensional pictures could be produced using its graphic primitives

anywhere. Combine this with the ability to move the viewpoint all around the graphic, and there is very little that cannot be achieved. But specific effects can take a good deal of experimentation to get right.

Although function plotting is likely to be a prime use of Mathematica graphics, there is no reason why it should be the only one. The program actually works with quite general PostScript graphics primitives which can be put to any use; and whatever

you draw, you have access to the full range of 3D lighting effects. This versatility is well demonstrated by a set of routines which will draw complicated regular polyhedra such as an icosahedron or a stellate dodecahedron. But even this virtuosity is overshadowed by its ability to produce animations.

If you create a sequence of pictures (Mathematica can do this automatically), each one slightly different from the last, you can make Mathe-

matica display all of them in rapid succession within the first frame of the group. In this way you could fly around a 3D shape, see how a function depended on one parameter, or, simulate the development of some activity that is determined by mathematical functions. Even while the animation is running you can vary its speed and direction or single-step through it. But don't expect Disney-like smooth colour animation unless you can provide mountains of memory, so that frames never need to be called up from disk. If you can, I promise you won't be disappointed with the results.

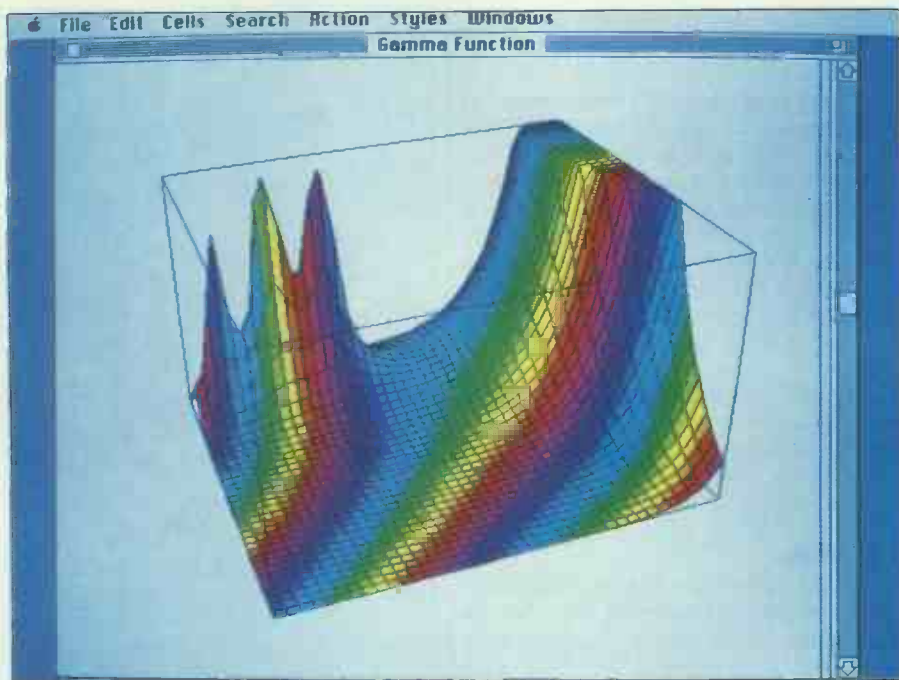
On the whole . . .

So far I have looked in isolation at a tiny selection of Mathematica's more important individual features. But to understand what Mathematica is about you really need to step back and see the whole. For all its flexibility, Mathematica is a very unified environment designed to impose a house style that will make it a medium for sharing mathematics rather than just doing it.

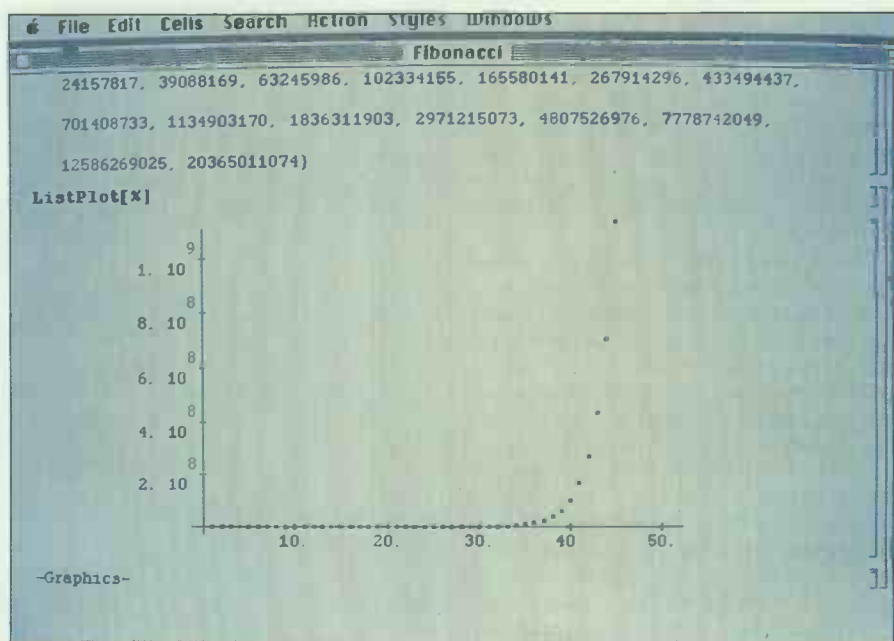
The basic Mathematica document is the Notebook — a sort of magic calculating paper on which user and Kernel conduct a dialogue. This may be as simple as a back of envelope calculation, but the structured nature of Notebooks means that they may just as easily form a presentation, an exam paper or even an interactive textbook. Notebooks are specifically intended to be used as a medium for exchanging, and even publishing, mathematical ideas. This plan is already starting to be exploited and, if it catches on, could do much to boost the success of Mathematica.

Every Notebook is made up of cells — organisational units containing text, graphics or calculations. Each time you enter a formula or command, it forms a new cell. When Mathematica returns a response, that becomes another linked cell. As the dialogue progresses, Mathematica automatically names these cells as In[1], Out[1], In[2], Out[2] and so on. Normally, everything that is typed will be sent to the Kernel as soon as Enter is pressed but cells may also be defined as Inactive, in which case they will be ignored by the Kernel and can be used for explanatory text.

The extent of every cell is marked by narrow square brackets along the right-hand side of the window. They can be grouped and nested in many different ways — for example, as an Evaluation Group which will be re-evaluated whenever any cell in the group changes. Groups of cells may also be opened or collapsed, just as in an outliner, so that increasing levels of detail are revealed. The con-



Gamma: A surface plot of the Euler Gamma function — one of Mathematica's built-in functions. The plot command above it contains a list of attributes to be used for displaying the surface



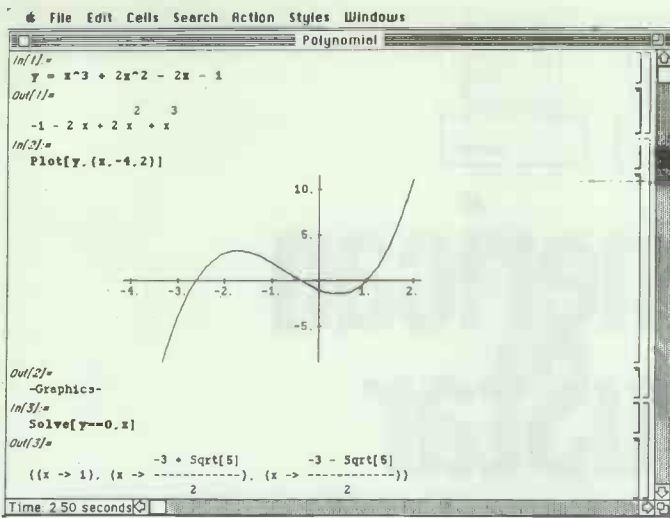
Fibonacci: A simple function definition which allows Mathematica to find any number from the Fibonacci sequence. The first line defines the function recursively, the next line sets the two starting values. When that's done, finding the fiftieth Fibonacci number is a piece of cake

tent of any cell can be referred to simply by its name but the most recent output cell is always more conveniently available as the object '%', so chained calculations will often be a sequence of simple commands like **Solve [%]**.

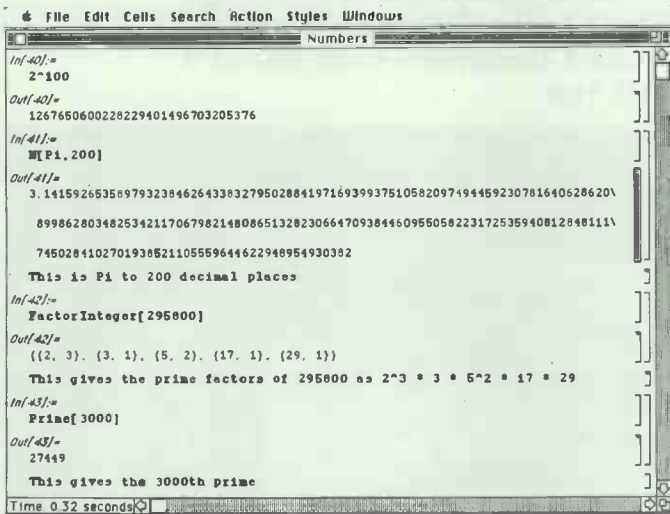
This arrangement of cells makes using Mathematica rather like working in a single-column spreadsheet — very convenient for calculation, but it does restrict the layout possibilities since cells cannot be positioned

side by side. That apart, the display options are very flexible with a comprehensive style sheet containing 22 preset and five custom styles (all 27 may be re-defined), precise control over cell width and spacing as well as special options for pasting up multiple pages to produce giant posters. Notebooks and their individual graphics may also be exported in a variety of formats, but this is not always a straightforward process.

Mathematica is by no means con-



A typical Mathematica Notebook, here being used to work on a simple polynomial equation



Mathematica tackles numerical calculation with ease and understands the difference between precise integer values and approximations like the value for Pi, calculated here to 200 decimal places. Notice the cell brackets on the right: one cell, with the darkened bracket, is currently selected

finned to mathematicians: it will be welcomed by economists, engineers, physicists — everyone who employs any sort of mathematical techniques. And it is designed to be extended into such areas by adding whatever specialist routines may be needed. These come most conveniently in the form of Packages. Packages are not Notebooks but simple input files containing definitions and routines. Around 40 are provided with the Mac version and they cover many topics from permutations to Runge-Kutta methods for solving differential equations. Many more will no doubt become available.

Too good to be true?

The richness and extent of Mathematica's environment is such that there is barely room to skim over the surface here. I haven't even touched on Mathematica's powerful capabilities as a programming language. Nor its ability to produce output in TeX, C or Fortran form. Nor even the possibilities for calling external programs or for exchanging animation data with VideoWorks.

The whole package is a vast and resonant construction and it would take many months to explore all its

remoter corners, let alone get familiar with using it all. Evidence of that richness is everywhere: even the wait cursor (equivalent of Apple's wristwatch) demonstrates a mathematical principle. And students of cellular automata — the area of research for which Mathematica's creator, Stephen Wolfram, has become best known in recent years — will find entertainment provided in the About Mathematica box.

But if Mathematica sounds too good to be true then it's only fair to point out the shortcomings. Foremost among these, at least for Macintosh users, must be the program's deep roots in more traditional operating systems. It's quite obvious that Mathematica's authors think in C and dream of Unix. That's not to say that the Front End doesn't make use of menus, dialogue boxes and so on but they feel like a bit of an afterthought — interactive it may be, but there is no possibility of putting buttons into a Notebook, for example. Indeed the Kernel is almost entirely keyboard driven, which is a shame because the Mac's graphical interface could work wonders in speeding up something like colour, viewpoint and lighting selection for 3D graphics.

Sometimes the clash of cultures produces stark contrasts — as in error handling. If something goes seriously wrong you can look under the Apple menu (a bizarre place to choose) for an item called Why The Beep? which will explain the problem in clear, meaningful English. But lesser difficulties, such as when the Kernel is worried about something but decides to continue anyway, will produce Messages within the Notebook. These are mostly gobbledygook and the situation is not helped by the fact that nowhere in the documentation are any of these Messages listed and translated.

Summing up

But, enough of harsh reality. There are good enough points for me to forgive all these failings. Mathematica is the most extraordinary program that I have ever used, and, I believe, one of the most significant. Notwithstanding that it is designed for a small and specialist market, it has an importance which affects all micro users because it points the way towards a new generation of more intelligent machines that will have the power to solve problems.

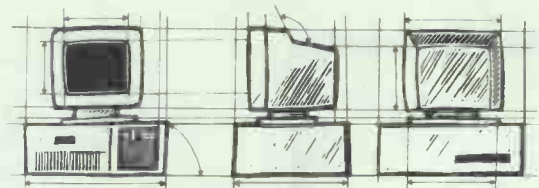
Not many of us have an everyday need to deal with Fourier transforms or integration but we do have a need for information derived by such means — whether it's finding seasonal patterns in sales figures or calculating the concrete needed to lay a semi-circular patio. For the ordinary user, I can envisage more developed front ends coping with natural language requests and sending them on to something like a Mathematica kernel, which will remain hidden and be apparent only in the fact that the computer knows how to do maths.

That prospect lies in a (not too distant) future when computers operate as intelligent assistants. In the meantime, for anyone who takes professional or recreational pleasure in doing mathematics, this program will be an absolute joy. If it succeeds then it could certainly revolutionise the teaching of mathematics and the exchange of mathematical ideas. Its only major limitation is likely to be the cost, both of the software and the machines to run it. But if you need an excuse to buy a Mac II, then look no further.

Mathematica is distributed in the UK by The MacSerious Company on (041) 332 5622. The Macintosh II version retails at £795 and the Mac SE/Plus version at £495. Review copy supplied by InTouch on (0222) 882334.

An MS-DOS version of Mathematica to run on 80386-based PCs was released in the US at the end of December 1988 and will soon be available in the UK. It will need 6Mbytes of hard disk and EGA/VGA graphics.

END



Wells American CompuStar

Built to last in an aluminium tower, with a plethora of ports and drives, the Wells American CompuStar's fairly high price is certainly matched by its very high power. Rupert Goodwins even found it behaved well, too.



The most interesting IBM compatibles are those that are very cheap and those that are very expensive. Between these two types, the ground is fiercely contested by hoards of near-identical clones. Nearly all of the innovation in the market happens at the edges. At the bottom, it's a contest to produce the cheapest computer that doesn't make the user go blind. At the top end, the battle is on to provide features that can tempt buyers to spend more. Not easy, when the whole idea of this game is for both sorts of computer to run much the same software and perform the same sort of job.

The CompuStar, from Wells American, is an expensive computer with many new ideas and a few old ones. In price, design and intended market it's very much a head-on competitor for the IBM PS/2 model 80, though with some ideas that IBM wouldn't or couldn't include. It can use both AT and MCA expansion buses, for example, which is a first for any computer.

Wells American is an American (surprise!) company with more history behind it than most micro-computer manufacturers. Best known previously as Intertec Data Systems, the company behind the fondly-remembered SuperBrain CP/M computer, it was badly shaken by the explosion in the IBM compatible market at a time when it had only non-compatible options. In 1985, following dramatic drops in revenue, it changed its name to Wells American and brought out its first IBM-compatible computer, the A*Star. That was a success in America, and now the company is confident enough to try out the UK market again with the CompuStar.

Hardware

What the CompuStar offers above everything else is flexibility. Instead of choosing one computer from a range of three or four, the prospective CompuStarer buys a Base Model 100 and chooses from an array of options. A computer more unlike its Tandy portable namesake is difficult to imagine; the Model 100 is the largest and heaviest 'micro' of my acquaintance. A desktop computer only by virtue of being able to be both desktop and computer, it's barely carryable by an unaided reviewer, even with its fold-down handle folded up from the top. In overall design, it follows the tower format with the front panel housing power switch, reset button, lock and miniature display.

This display, similar to that included in the first Dell computers, can show up to four characters or numbers. It's normally used for error



Wells' co-resident MCA module sits below the six conventional bus slots

reporting if the computer finds something wrong when first turned on; if everything's OK it indicates the speed the processor's running at. Program developers, who must be one of the target markets for Wells American, should find the display more than a gimmick as it can be used to divulge information from within a program without using the video screen at all.

All the technical information needed to drive the display is in the manual, which even includes a small Basic program to output a message. The display hardware is independent of operating system, BIOS or processor, and thus can be accessed at any time from any program. It would be possible to write a small program to, say, constantly display the amount of free memory, but I suspect the main purpose of this gimmick is to let Wells American soaktest a roomful of computers without having to plug in VDUs all over the place to check on their progress. During normal use, the display just looks pretty.

The lock on the front panel isn't like most AT locks — it doesn't disable the keyboard. Instead it secures or releases one of the side panels of the main case. The panel then slides out to reveal both the reason for the CompuStar's weight and the depth of thought that's gone into the design of the computer. The mass is pro-

vided by an extruded aluminium chassis, a sturdy framework with a lot of metal in it. Ernest Swinton (inventor of the World War 1 tank) would have a good look-and-feel case against these people.

Into this massive monolith are set seven slots for drives. Two are 3½in and front-facing; these normally (as on the review machine) accommodate 1.44Mbyte floppy drives. There are four 5¼in half-height front-facing slots; one was taken up by a 1.44Mbyte floppy on the review machine. Wells American can, or will be able to, supply tape streamers and a number of disk drives, both magnetic and optical. On the 'Available Jan 1989' list is an erasable optical drive with 1Gbyte capacity and a removable disk; it looks like the technology is here to stay. Shame that it costs about £4000, though. Maybe next year...

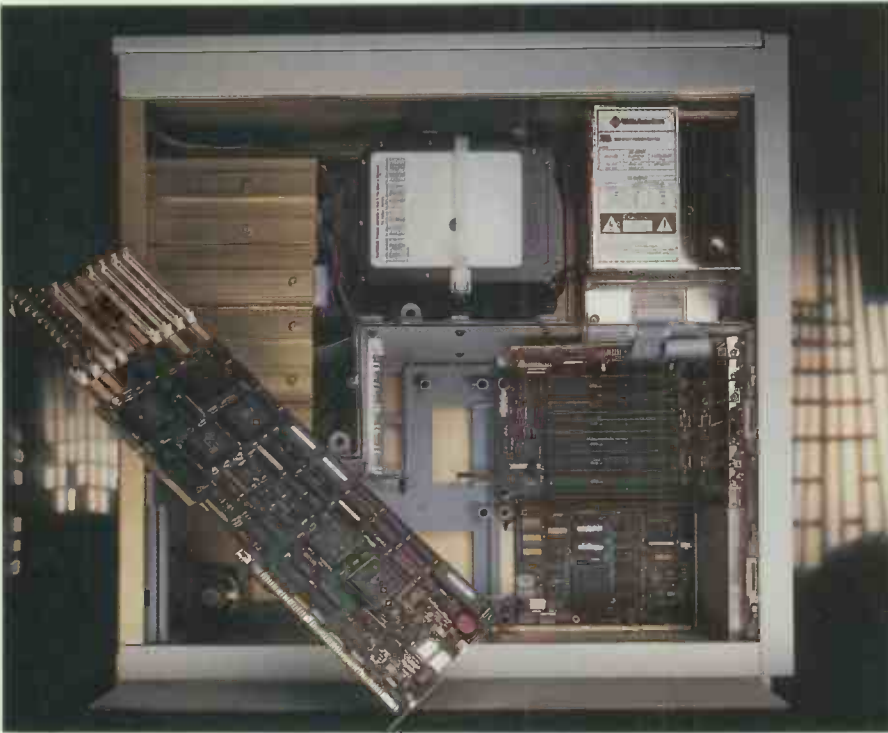
The final slot is internal, and can hold a single, full-height hard disk. On the review model, this was a 150Mbyte, 28ms access time ESDI drive. It's a good bet that there's no combination of standard mass storage devices that can't be catered for by the CompuStar; the maximum capacity of the computer, if fully stocked, is currently about 3Gbytes, and next year will be half that again. Enough for even the largest spreadsheet.

The unit's power supply can produce 220W, which should keep at least some of those storage acres happy. It sits above the card frame, an enclosed area of the computer which houses most of the digital electronics.

The general design of the CompuStar is a series of boxes isolating the various units: disks, power supply and so on. The covers to these boxes are held on by a special type of snap-fit fastener which can be removed and replaced by hand. In fact, the only screws in the chassis, those that hold disks and cards in place, are Torx pattern. These star-shaped screws were pioneered in PC manufacture by Compaq, and although no flat-blade or Philips/Posidrive screwdriver fits them the special tools needed are now generally available.

However, Wells American provides a Torx wrench, which is found in a special storage socket on the main chassis. So it is possible — provided the main key is available — to install and remove drives and expansion cards by hand with no tools other than those provided in the machine. That's what they used to call attention to detail.

The power supply also forces air around the computer, and the placement and sizes of the boxes is such as to maintain adequate ventilation



The processor card contains RAM and slots into either or both types of bus module: industry standard or MCA

for (hopefully) all the options. I'd be a bit worried if more than three disk drives were installed on the front panel, as these can generate a lot of heat, but by then the chances are that the power supply would be getting close to overload.

Unclipping the cover of the card frame reveals the main computing section. The only part that comes as standard is the motherboard. This houses seven AT-compatible bus slots, a keyboard and mouse interface (both with PS/2 rather than AT sockets), two serial and one parallel ports. There's a floppy disk controller built in with four cable connectors, and it can cope with all common floppy disk drives.

The main board also has built-in VGA, based around the same Paradise chip as used in the new Amstrad PCs. This should mean that any Amstrad 2000 series graphics software which uses the extra modes will run, unmodified, on the CompuStar. In any case, the video supports Hercules, MDA, CGA, EGA and VGA standards, with extra modes up to 1024x768 pixels with upgrades. There are both old-style CGA/MDA/EGA/Hercules and VGA connectors, meaning that any old (as well as any new) monitor will work with the beast.

What's missing from the standard board is any sign of a computer. That's because CPU and memory are supplied on separate boards which plug in, and the user has to choose from many options. The cheapest, lowest performance option is the

8086-based board which provides a 10MHz CPU with 512k of RAM, expandable to 2.5Mbytes on board. It doesn't seem likely that this will be a popular option, since the minimum system based on this will still cost around £1000 before any hard disk.

The next CPU board, and one which should be far more popular, is the 80286-based circuit. This can work at up to 20MHz, and has space for 8 or 16Mbytes of RAM. This, with 1Mbyte, was the board provided on the review machine, and the one which was benchmarked. Most of the standard tricks for speeding up an AT-compatible are implemented; the copying of ROM into faster RAM so that the system BIOS (written by Wells American, apparently) and interleaved memory are standard.

Interleaved memory, by the way, is a method of doubling or quadrupling the speed of cheap RAM chips. Because the chances are very high that the computer will read RAM in strict sequence, location 1 followed by location 2, followed by 3 and so on, it makes sense for all the odd locations to be held in one set of RAM chips and all the even ones in another. This means each chip is accessed once every two memory reads, instead of once every one. It's like playing the drums; using just one hand results in a far slower drum roll than if each hand is used alternately. It's even possible to have four banks of memory, each taking one out of four memory accesses, which is four times faster — a drummer with four hands.

Since the maximum speed of a RAM chip is the speed at which two different locations can be accessed, slower, cheaper chips can be used to support fast processors if interleaving is employed. Interleave fails if the processor jumps out of sequence, in which case the memory hardware has to tell it to wait while the new location is accessed. Even then, the chances are that the processor will start to read in sequence again and full speed will be regained in a few reads. The practical upshot of all this cleverness is that the computer runs fast without needing memory circuits that cost the earth.

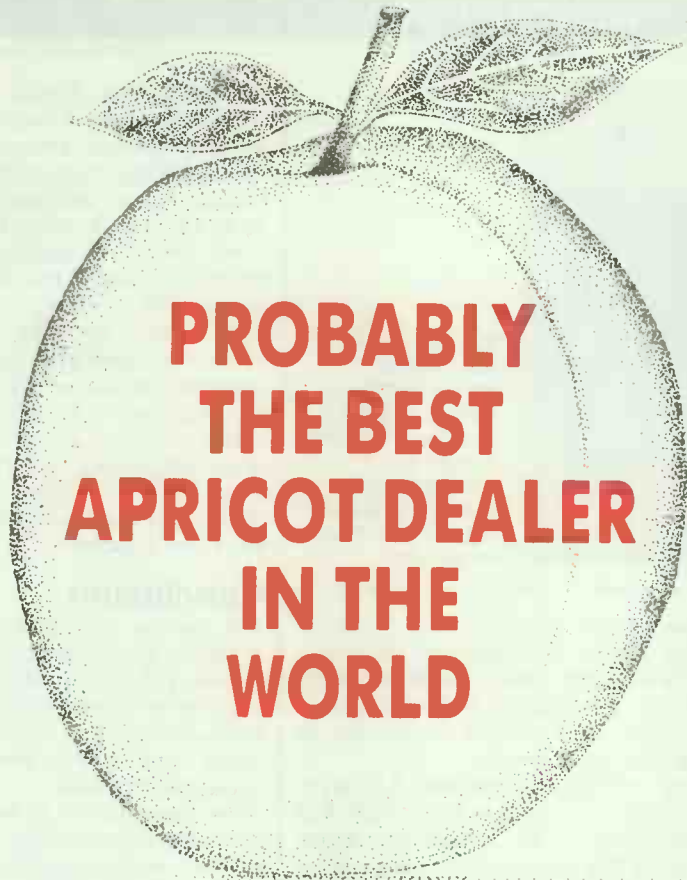
Another trick of the 80286 board is the second bus connector. The board has to plug into the main circuit, using one of the AT-standard slots. But it has another connector, into which plugs a PS/2 adaptor module. This wasn't available for testing, for (Wells American assured me) legal rather than technical reasons. Certainly the board exists and has been seen to work, and might become available any day now. Another board provides five MCA slots, which turn the Wells into a dual-bus machine. If all this PS/2ery doesn't appeal, a second board full of AT-style slots can be attached in its place, thus upping the total to thirteen. Even after losing two, one to the CPU card and one to a hard disk controller card, there are enough spare slots for almost any conceivable purpose.

There are also 80386 and 80386SX modules available, though only up to 16MHz at the moment. They, like all other processor boards, have a real-time clock. Wells American says that as new technology becomes available and reliable — EISA bus (though that looks increasingly unlikely ever to happen), 80486 or whatever — a board will be produced to utilise it. Furthermore, during the guarantee period of the computer — a year in the UK — a user can upgrade to a higher-performance board by sending the original board and the difference in price. Most people won't want or need to take advantage of this service, but for those occasions where a DTP or network server has just run out of steam, the option to add another MIP's worth of processor for minimal outlay will sound inviting. And upgrading is just a matter of ten minutes and no screwdrivers.

Peripherals

Another option in the (extensive) list of Wells Americana is an SCSI (pronounced Scuzzy) interface. SCSI — Small Computer System Interface — is the up and coming standard for microcomputer storage.

Outside the IBM world it's become

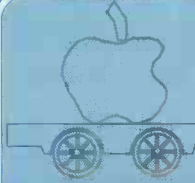


PROBABLY THE BEST APRICOT DEALER IN THE WORLD

- 🍎 Networking
- 🍎 Desktop Publishing
- 🍎 On Site Maintenance
- 🍎 On Site Training
- 🍎 After Sales Support



Bristle Hill, Buckingham, Bucks. MK18 1EZ Telephone: (0280) 816087



APPLEKART

THE INDEPENDENT MACINTOSH™ SPECIALISTS

3 PEVERELL RD * PORTHLEVEN * CORNWALL
TR13 9DH PHONE 0326-561695(2 lines)

1. Phone lines open from 9am to 6pm Mon to Sat (2 Lines)
2. P&P add £2.50 for software £10 for hardware, Int'l Phone
3. V.A.T. is not included in prices
4. Pricing and availability subject to change without notice. E&OE.

- **DATABASES's** •
 - Business FilevIsion £300
 - C.A.T £229
 - dBase Mac £305
 - Double Helix 2 £399
 - FileMaker 2 £150
 - FileMaker Plus £150
 - Omnis 3+ £298
 - Omnis 3+ multi user £157
 - Reflex Plus £157
- **WORD PROCESSING** •
 - FullWrite Pro UK £200
 - MacWrite v5 £80
 - Spelling Coach £64
 - Word 3.01 £210
 - WordPerfect £180
- **D.T.P** •
 - PageMaker 3 £435
 - Quark Xpress V2 £500
 - Ready,Set,Go! 4 £410
 - Scoop £299
 - Silicon Press £37
- **BUSINESS SOFTWARE** •
 - Cricket Graph £120
 - Excel V 1.06 £210
 - MacProject II £335
 - MacSQZ £55

- More
 - PowerPoint £140
 - SUM £189
 - Works 1.1 £58
 - £173
- **GRAPHICS & DESIGN** •
 - Adobe Fonts from £60
 - Adobe Illustrator 88 £399
 - Aldus FreeHand £365
 - Canvas £120
 - Cricket Draw £200
 - FONTastic Plus £50
 - FONTographer £255

- Full Paint
 - GraphicWorks 1.1 £105
 - MacDraft £170
 - MacDraw II £335
- **HARDWARE** •
 - **MASS STORAGE**
 - Mini Qisk 20 £360
 - Mini Qisk 45 £556
 - Mini Qisk 70 £716
 - Qisk II 20 £431
 - Qisk II 45 £636
 - Qisk II 140 £1111
 - Qisk Mac II 40 Int. £431
 - Qisk Mac II 140 Int. £999
 - IRWIN 40MB TAPE BU. £850
 - IRWIN 80MB TAPE BU. £1050
 - Tecmar QT40 TAPE BU. £850
 - MassMicro 45R £1300
 - MassMicro 140XT+45R £2500
 - **SCANNERS** •
 - DataCopy 730 inc OCR £1799
 - DataCopy 830 £2100
 - NEW AGFA OCR option £880
 - NEW AGFA S800GS CALL
 - Microtek CALL

RODIME HARD DISKS

\$20+	£365
\$45+	£485
\$60+	£540
\$100+	£700
\$140+	£860

INTERNAL FOR SE OR II
PHONE FOR BEST PRICE

- **LARGE SCREENS** •
 - Max Monitor 19" £1596
 - Monitorm Viking
 - Viking 1 19" £1699
 - Viking 2400 24" £2100
 - Viking Gray Scale 19" £2100
 - Viking 10 Colour 19" £3170
- RADIUS**
 - Full Page Display Plus £995
 - Full Page Display SE £1095
 - Full Page Display II £1300
 - Two Page Display SE £1500
 - Two Page Display G/S £1999

- AUTHORISED TAXAN DEALER
PHONE FOR LATEST PRICES**
- **MISC's** •
 - Radius Accelerator 16 £575
 - Bose Speakers £220
 - Personal Laser Pr'ter £1800
 - MacRecorder £140
 - MAC ViewFrame £999
 - LaserWriter+ Toner's £69
 - NEW JUMBO Toners £89
 - Thinking of **NETWORKING**
phone for details
 - MEMORY UPGRADES**
 - 2 x 1MEG SIMMS £575
 - 1 MEG for MAC II £175
 - 2 MEG SIMM MAC II £500
 - 4 MEG for Mac II £999
 - 3.5" DISKETTES**
 - Sony DS/DD Box 10 £16
 - Sony DS/DD 5 Box's £75
 - BASF 10's £13
 - BASF 50's £60
 - BASF 100's £108

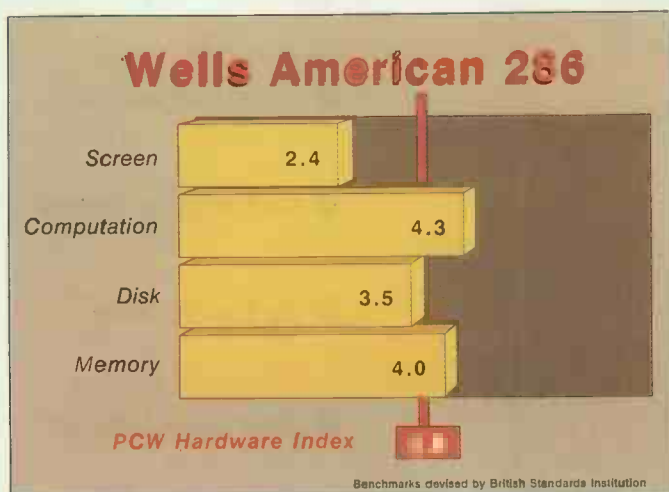
A NOTE TO ALL OUR
CUSTOMERS PAST
PRESENT AND FUTURE

All our products advertised are purchased through UK authorized Distributors IE: **MACSERIOUS COMPUTERS UNLT. PRINCIPAL DIST. FRONTLINE** therefore giving a **FULL** manufacturers 12 Month Warranty

ACCESS European and Educational orders welcome

THIS MONTH'S TOO GOOD TO MISS OFFER!
FULLWRITE PROFESSIONAL (UK) £200.00
ADOBE ILLUSTRATOR 88 (UK) £399.00

Shown here is just a small selection from our extensive range of Macintosh Software and Hardware, if you can not see what you want or not sure if it will do the job.
PHONE and ASK



Machine under test: 20MHz 80286; 130Mbyte hard disk, VGA. (Numbers indicate overall and specific function speeds compared with an IBM PS/2 model 30)

the RS232 of mass storage, and since IBM's November announcement of PS/2 SCSI it should become increasingly important within the Big Blue world as well. A SCSI interface board is capable of controlling up to seven devices — Wells American is selling theirs as an interface to the optical media, but it can cope with SCSI magnetic hard disks, tape backup drive and whatever turns up in the future. Most kinds of devices are available as SCSI, currently for a premium.

There's nothing to stop a user from fitting to the CompuStar whatever disk drives seem appropriate, and Wells American's own offerings are priced competitively in recognition of the fact. The 20Mbyte drive costs under £200, although that needs a controller. There's a range up to 650Mbytes; there are four separate options above 100Mbytes indicating that the systems are aimed at the nascent workstation and network server markets.

The display supplied with the test system was a colour VGA monitor. Although not of the highest resolution, and (with a dot pitch of 0.31mm) not quite as highly specified as the Amstrad competition, it was steady, even and of low geometrical distortion. Circles were circular, and squares square. For a while, I indulged in my current hobby of fractal picture generation, and the display

proved itself more than capable of doing justice to high-resolution, colourful pictures. Other monitors available are a Hercules version in green or amber, and a VGA monochrome device in paper white.

The 102-key, extended AT style keyboard is a follower of the IBM PS/2 standard, with a curved slope bringing the top rows of keys within typing distance of a pair of relatively stationary hands. There will be two keyboards available, identical to look at but with different amounts of tactile feedback (so says Wells American). Mine was slightly stodgy, but it nevertheless seemed to be the third most pleasant keyboard I've used, after the IBM PS/2 keyboard itself and the Amiga 2000. I'd have liked to have tried it at work for a few days, but because the PS/2 keyboard connector is different from the more common AT/PC, I couldn't. As most keyboards are currently AT standard, this might make obtaining an emergency replacement a problem while Wells fixes the old one.

Wells' standard 1-year on-site maintenance goes a long way towards mitigating such fears, however, especially as it is (like Dell's) free. Likewise, each machine comes with a free on-site set-up, courtesy of a real live technician, although every ounce of Wells' design effort seems to have been expended producing a computer which doesn't need this sort of

mollycoddling. Which is, no doubt, why they feel so happy about offering the service, and people like Dell have proved that investing in such backup is well worthwhile, for a quality product that doesn't really need it.

All this hot design would have been irrelevant if the machine wasn't capable of running the software it was bought for. The usual spreadsheet, database and word processing applications worked; and the computer accepted a variety of odd cards without turning a hair. 20MHz of 286 is potent, even with the 386 breathing down its neck, and the benchmarks reflect both this and the fast hard disk supplied.

Conclusion

The closest analogy I can find to this machine's design philosophy is in a similarly large, similarly heavy bit of electronics called the B40. This was state-of-the-art in 1948: an Admiralty radio receiver that was designed as separate modules for serviceability. Improvements could be slotted in (to an aluminium chassis, as it happens) as they were designed. It had a built-in toolkit for non-standard (at the time) fasteners that were part of the design. Many of those receivers worked for thirty years with upgrades that hotted up the performance as electronics advanced — proof of the soundness of the initial concepts.

It's not cheap, but Wells American, aka Infotec Data Systems, has been around for a long time and this shows in the quality of the documentation and the sturdiness and ingenuity of the design. The performance of the system on test wasn't the best recorded, and those with an eye for pure speed should be able to find a faster machine for the price.

However, quality of construction is also important to many people, and avoiding a technological cul-de-sac is similarly appealing. I can't see that anyone who decides to buy a Wells American will be disappointed, which is possibly not the case for other PC compatibles.

The CompuStar is a computer designed to make an impression. It combines old and proven ideas from many sources with a very plausible guess at what will be needed over the next couple of years. It's a machine for a mature marketplace, aimed at people who know what they want and who aren't overawed by big names. Whether the design trade-offs made by Wells are as relevant in the UK as they are in the US remains to be seen, but with the CompuStar the decision is, more than ever, up to you.

Technical specifications

CPU:	20MHz 80286 processor, zero wait state
RAM:	1Mbyte SIMM, expandable on-board to 16Mbytes
Mass storage:	Two 1.44Mbyte, 3½in floppy disk drives; one 1.2Mbyte 5¼in floppy disk drive; one 150Mbyte ESDI hard disk drive
Display:	MDA, Hercules, CGA, EGA and VGA
I/O ports:	Two RS232 serial, one Centronics parallel, mouse and keyboard
Expansion:	Seven AT-style 16-bit expansion bus slots
O/S:	MS-DOS 3.3

Note Spec for the test machine (total price £3765) only. Many other options are available.

Wells American is on (0494) 26211. **END**

NEW

JET WARETM : ADD VITAMINS TO YOUR LASERPRINTER WITH A SURVIVAL KIT

PRODUCTS FOR H.P., BROTHER, CANON, SIEMENS, OLIVETTI AND OTHER LASER PRINTERS.



SPREADSHEET KIT 1 MB STARTER AND JetFont 123	PUBLICATION KIT 1 MB STARTER AND JetFont F	WORD PROCESSING KIT 1 MB STARTER AND JetFont 4-in-1	OFFICE KIT 1 MB STARTER AND JetFont 123 or 4-in-1 and F	PROFESSIONAL KIT 1 MB STARTER AND JetFont 123 AND 4-in-1	ALL IN ONE FONT KIT JetFont 123 AND 4-in-1 AND F	DESK TOP KIT 1 MB STARTER AND 3 MB EXPANSION
--	--	---	---	--	--	--

- Diversified kits to meet almost all applications.
- Expandable memory using latest shrinking technology
- International character set
- Blessed by HP, Lotus and Canon
- Choice of 26 fonts
- Compatible with most popular word processing software, including Word, Displaywrite, Wordperfect, Wordstar 2000, Multimate Advantage.
- 30,000 characters on A4 spreadsheets.
- Drivers supplied for immediate set up.
- Improved text and typography.
- Distributor support in all countries.
- Attractive price savings.
- 2 year warranty.

ASK YOURSELF! Do I need clear and crisp business letters, internal memos, presentations, forecasts, business plans, spreadsheets, financials, offering documents, sales reports and news letters using laser printers? Should I buy from the manufacturer of **laser printers** or should I buy from the **SPECIALIST AND MANUFACTURER OF LASER PRINTER ADD-ON PRODUCTS** like **COMPUTER PERIPHERALS INCORPORATED**. Did you know that manufacturers of **laser printers** supply you only with non-upgradable memory boards which means that you have to throw away the original board memory if you want to increase your memory capacity? Did you know that manufacturers of **Laser Printers** supply you with font cartridges without drivers, limited interna-

tional character set and standardized cartridges which may not be suitable to your applications?

With CPI, **THE LASER PRINTER No.1 ADD-ON SPECIALIST**, we provide you with solutions for your office needs so that you can effectively maximize your **laser printer** investment. These solutions include upgradable memory, word processing software drivers, International character sets, 240 column spreadsheets and now **JETWARE BUSINESS KITS** which are tailor made for your applications. So contact our International authorized distributor or our European Headquarters in Paris or our International Division in USA for prompt attention and service.



ADD-ON EXPANDABLE PRODUCTS FOR LASERPRINTERS.

667 RANCHO CONEJO Boulevard Newbury Park, California 91320 (805) 499-5751 FAX (805) 498-8848 ; TLX: 759 299 CPI

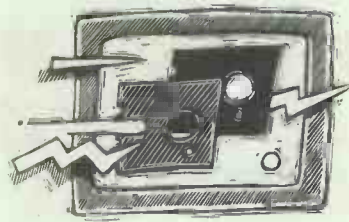
COMPUTER PERIPHERALS (EUROPE) 75, avenue Parmentier - 75011 Paris - France Tel. (1) 43 55 30 64 Fax : (1) 43 55 71 14 - Telex : 211 303	U.K.: NORTHAMBER 01-391 2066 PROTEK 01-245 6844 COMPUTERLAND 0908 664244	456 WORLD 0206 44456 MICRO PERIPHERALS 0256 473232	EUROPE: COMPUTERLAND (352) 437751 BORSU INTERNATIONAL B.V. (31) 294019905
---	--	---	--

Specifications subject of change without notice.

H.P. is a trademark of Hewlett-Packard Corporation, Canon is a trademark of Canon Corporation, Brother is a trademark of Brother Corporation, Siemens is a trademark of Siemens A.G., Olivetti is a trademark of Olivetti s.p.a.

Displaywrite is a trademark of International Business Machines, Word is a trademark of Microsoft Corp., Wordperfect is a trademark of Wordperfect Corp., Wordstar 2000 is a trademark of Micro Pro Corp., Multimate Advantage is a trademark of Aston Tate Corp.

LOGO GENERATION - TEL. (1) 47.70.08.09



Ami

PC users have looked enviously at graphical word processors on the Mac, with only Windows Write offering a limp alternative on their own machines. Until now. Manek Dubash considers whether Samna's Ami lives up to people's expectations of a Windows-based word processor.

They've been using graphics with word processing on the Mac for years, yet WP applications that use Microsoft's Windows are not common. The longest-standing package in the field is the one that Microsoft bundles with the environment, Windows Write. It is widely acknowledged to be fairly basic and does not supply the kind of features to which high-end users are accustomed.

Windows WPs — the theory

A few stabs have been made at producing a Windows word processor. The West German company, Siemens, developed Comfotex which did not fulfil the expectations that its authors may have had for it. Palantir's Wintex has had a good press but again has not set the market alight. All in all, Windows word processors have been pretty enough but have not possessed enough features to justify users re-starting at the bottom of a new learning curve. So now Samna, producer of Samna Word IV, has come up with Ami. It has been a long time in the brew; can it live up to high expectations?

People demand a lot of a Windows-based word processor. Of course, it should at least cover the majority of functions that users now demand of word processors, but it should add a lot that most don't. At the top of this list would be WYSIWYG-ness — or what you see is what you get. Windows' graphics-based front end can compensate for the accepted shortcomings of purely text-based word processing.

Next on the list for most people is the integration of graphics and text. The distinctions between DTP and word processing are blurring, chiefly due to the ever-more extensive range of graphical features carried by a larger number of word processors.

Samna will have to give its product a high level of graphical functionality in order to persuade a significant number of users to switch, not just to Ami but to Windows as a standard interface.

Finally, of course, Ami has also to satisfy those who want a full-featured word processor with a top-end degree of functionality. Unfortunately, this is where Ami is the most disappointing.

Overview

Ami offers the usual range of features expected of a WP, including text attributes like bold, italics, subscript and superscript. Others that you would expect to be there, such as search and replace, headers and footers do exist, along with slightly more esoteric options such as configurable bullets.

'All in all, Windows word processors have been pretty enough but have not possessed enough features ...'

Like many packages, Ami uses style sheets to store information relating to three determinants of a document's format: page layout, frames (for graphical images) and paragraph styles. And it does make use of native Windows features like extra fonts, integrated graphics and on-screen formatting.

Installation

Samna recommends a minimum hardware setup of a PS/2 model 50, or a PC/AT or compatible with 640k

RAM, EGA, VGA or Hercules monochrome graphics display, a 10Mbyte hard disk and DOS version 3.0 or later. I got it going on a Dell 20MHz 386 machine. A special version on 360k floppies is available for those who want to run it on PC and PC/XT clones.

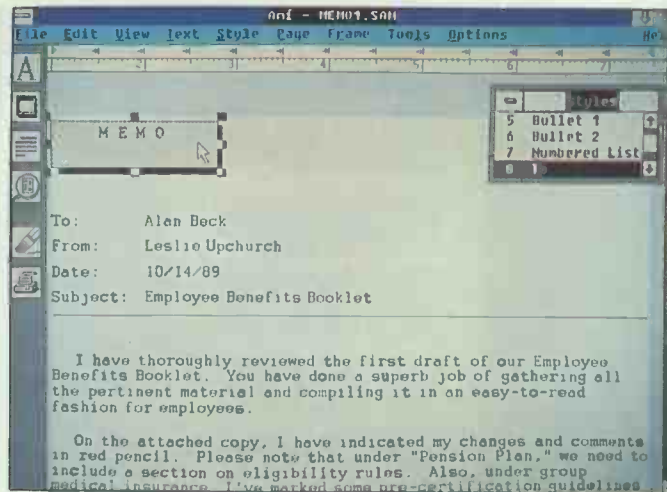
Ami is installed in a similar manner to Windows. It comes on no less than five disks, one of which is marked as the program disk. The others contain utilities, fonts and display information. Most of the program information is too big to fit on a single disk and is stored in the popular archived format created by programs like PKARC.

On typing Install at the DOS prompt, Ami un-archives itself and installs on the drive and directory of your choice. The program creates its own directory as instructed, along with two sub-directories — one for styles, the other for documents. An alternative procedure, using the disk marked SAE (Single Application Environment) Setup, installs the program with a run-time version of Windows/286.

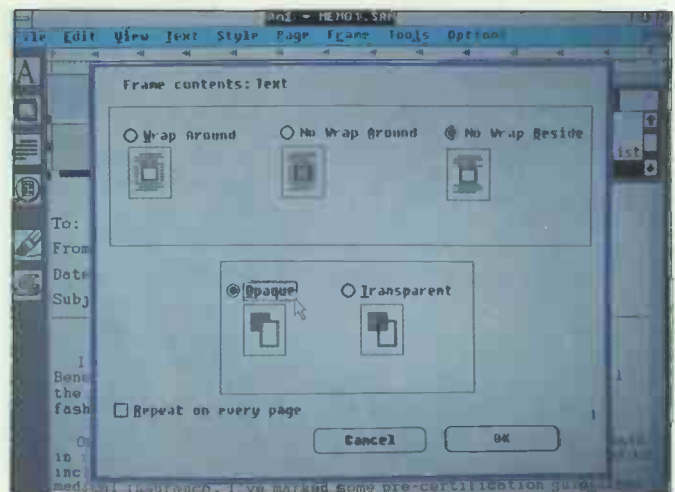
First impressions

Booting the program produces an attractive front screen, starting with a twinkling Ami logo. The opening screen resembles the top half of an A4 sheet of paper. It is surrounded on the left-hand side by half a dozen icons — more on these later — and extended scroll bars to the right and below.

The scroll bar below controls sideways movement, which can be slow if the screen is full of text in a graphical font. Next to it, a pair of up and down arrows mounted in small, dog-eared page icons motor through documents a page at a time. A small window in the top right-hand corner headed Styles is the most prominent feature.



Text in working mode stays within the boundaries of the screen. The Memo box is a separate object that can be moved around at will



From the Frame menu, the current frame can be made transparent or opaque, and its relationship with the surrounding text altered to taste

Ami will import several foreign formats, including ASCII, WordPerfect version 5.0, TIFF files, and WordStar. Like many reviewers I believe that software should be usable straight out of the box, so the first thing I tried to do was import into Ami some notes I had made. They were generated by Tornado, a notepad program that produces ASCII files. The program reported it could not find the conversion routine, even though it was sitting in the same directory as the main program, Ami.Exe. The same problem recurred no matter which file format I tried.

Similarly, when I tried the spelling checker and editing the dictionary, Ami reported it could not find the relevant program files and insisted that I insert the program disk into drive A:. This was doubly irritating as, on my Dell, drive A: is a 3½in drive, whereas the program is shipped on the larger 5¼in disks; there is no way of telling Ami to look on drive B:. Only pathnames for style sheets or documents may be altered, and even those changes are temporary and must reset each time Ami is loaded.

In use

Ami defaults to layout, one of its two text-viewing modes. Here you get the half-sheet of A4 displayed in the font of your choice. The default display in this mode is Courier, and is recognisable as Courier on-screen.

Text snaps to fit the margins when the cursor leaves the current line. On the fast PC I was using there was little problem with screen updating but, on less zippy machines, users could find themselves waiting a while for the screen to be repainted after each character.

The other viewing mode is draft, which shows a document in Windows' standard text without any

attempt to make it appear like the finished article. Screen updating is, of course, much faster.

Ami makes looking at a document as a whole relatively easy, as it gives a full-page view, somewhat like WordPerfect's page preview but with the added bonus that it is not passive. Although you can manipulate text in it, in most fonts, all you can see on-screen is a grey mass — it is better at showing the shape of text rather than the detail. It is a pity Samna did not add a 'facing pages' option, as many authors might otherwise move the program higher up their wish lists.

Ami provides an enlarged mode which gives a close-up of the text and is useful for examining the fine details of graphical images. The final view of the document is called standard by Samna; it makes no attempt to squeeze the text into the on-screen window. The manual suggests that it is good for comparing Ami documents with those from other Windows applications. In effect, the text looks bigger and the ends of lines disappear. They can be viewed using the horizontal scroll bar.

Like many other Windows products, Ami makes provision for experienced users and those without a mouse by recognising keystrokes that shortcut the pull-down menus. They cover the most frequently accessed options. Most are fairly mnemonic so, for example, Ctrl-R aligns text right, Ctrl-C centres it and Ctrl-S saves the current document. Cursor movement is fairly intuitive too, with Ctrl-Left moving a word to the left and vice versa for Ctrl-Right. In particular, I liked the way the cursor moved to the end of a word, rather than the start of the next one, if it was immediately followed by a punctuation mark such as a hyphen

or a full stop.

Mouse shortcuts are provided too, with a double-click on the page number box allowing users to go directly to a specific page number. In this case a dialogue box pops up into which the next page is inserted as a default; it can of course be altered. A word upon which an operation is to be performed, such as boldening, can be selected by double-clicking.

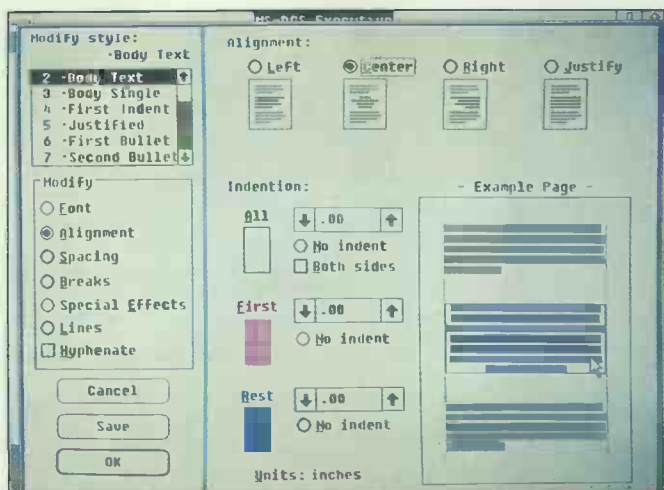
An alpha icon — one of those on the left of the screen — gives a shortcut between layout and draft modes. The other five are also shortcuts through to menu options and, from top to bottom, allow the user to modify the default text style — adding underline and so on — to go directly to page preview, to undelete and to print.

Style sheets

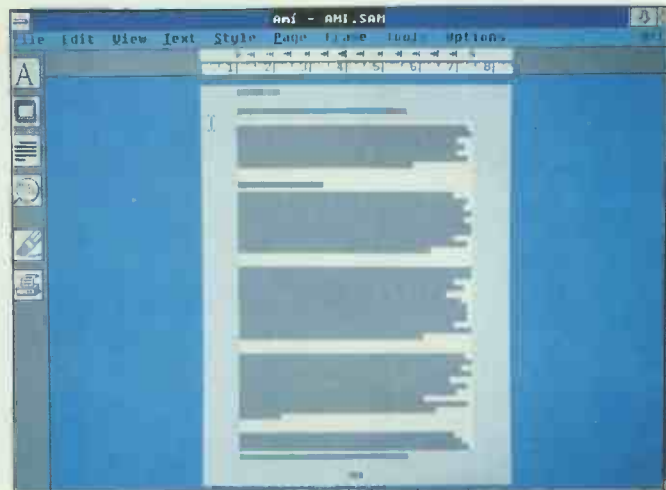
When starting a document, a decision has to be made as to which style sheet it will use. Style sheets are also a major part of the method Ami uses to change the appearance of text. It is worth examining the process in some detail, as it gives an insight into the way the program works and into whether it is easy to use.

Either the default style (the file named Default.Sty), one of the ten styles provided, or a user-defined style, has to be selected. Ami's predefined styles, displayed in the Styles box on the opening screen, apply either to a highlighted block — if there is one — or to the current paragraph. So, for instance, you can choose one of the indented, bullet or bold styles and the entire current paragraph will adopt that style.

Clicking on the Modify Style icon on the left of the screen, or using the Modify Style option from the Style menu, brings up a large dialogue box. This contains a number of small-



Modifying a style. In this case, a dynamic picture shows the effect of changing the paragraph style to centre



Text cannot be read in Page Preview mode but you do get an idea of what the finished page will look like

ler boxes, the first part of call being the list of styles in the top left-hand corner. Once chosen, the attribute within that style to be altered is selected from the list. The default font for that style can be changed or the font itself manipulated. If, for example, you want to alter the Courier font, then bold, underline or other attributes can be added using a large box that opens to show the changes dynamically, as they happen. The possible changes depend on the attributes installed in Windows.

Alignment, line spacing and the way Ami provides page breaks can also be altered for the current style, with both a dynamic, page preview-style image of a paragraph's appearance, and either up and down arrows or text boxes with which to change characteristics like line spacing.

An option not often found on word processors is the non-exclusive choice Ami offers of breaking a page within, after or before paragraphs. This can be used to add protection against widows and orphans. A special effects option allows elements like bullet styles to be altered and, for line drawing, the line thicknesses and spacing can be altered.

Finally, hyphenation is turned on and off from within Modify Styles. On hyphenating a document, Ami will restrict the consecutive number of lines to be hyphenated to two, will not hyphenate if the word contains numerals, and will not break words with hard hyphens in.

Also on the Style menu is a Style Management option. It allows you to select which of the document's styles — user-created or bundled — should be included in the program's default settings. Styles may also be deleted. The Styles box previously mentioned can be used to switch quickly between styles or it can be turned off, as there is nowhere on-screen to put it where it will not obscure text.

Graphics

Graphical images — created with a Windows application or imported into Windows' clipboard — may be imported into a document. It is best to create a frame as this allows text to flow around it. This default option can be changed to allow text to flow vertically or horizontally only. The graphic is then pasted into it in the normal way. Frames can be resized or moved as desired, and it is even possible to rescale the image while retaining its original aspect ratio. The image cannot, however, be rotated in the frame. Moving it within the frame can be accomplished by resizing the frame around it.

Bugs

I did hit a couple of snags relating to the problem I mentioned earlier of finding the program files of this modular application. When attempting to hyphenate the document, Ami reported it could not find the relevant hyphenation module of the program. It then opened another box that invited me to put a disk in drive A: or hit Cancel. I clicked on Cancel, whereupon I got the first box back again. Nothing could persuade Ami to leave the loop it had got itself into and, in the end, I had to reboot. Although the version I looked at was on late beta test — it was version 0.998 — this type of bug should have disappeared by now.

When asked, Samna said the problem could be solved by including the Ami directory in the path setting, advice not in the manual.

Other less drastic bugs meant that updating of the screen after a change was not always complete. For example, the tops of some letters in one line would be offset to the right or, occasionally, what looked like truncated underline characters appeared, randomly dotted around the text.

Like the lost files problem, by the time the shrink-wrapped version is shipped Samna will have dealt with this too.

Other features

Bugs aside, I found the program generally simple to use, although there were exceptions: for example, adding an attribute to the entire text can be cumbersome. I found I had to move to each page individually to, for instance, add justification or columns. Another way is to go either to the top or bottom of the document by pressing Shift-Ctrl-Home or Shift-Ctrl-End respectively, highlighting the entire text along the way.

One of the reasons for Ami's general simplicity in use is that it is not a very rich environment. It lacks a large number of features that users now want and is sometimes not as intuitive as you might expect. For example, you might anticipate that adding a visible ruler to the top of the page would result in that setting being saved along with the document. But it is not.

A major drawback has to be that Ami can support only one open document at a time, while most word processors allow at least two; Sprint gives you over twenty. A way round this is to open two or more copies of Ami, but this could lead to excessive memory consumption — a problem in unexpanded machines.

And I found the document management facility a curiosity, largely because of its location. Rather than hanging somewhere off the file menu, it is buried at the bottom of the tools menu, above which are the search and replace option, the spelling checker and the dictionary editor. On choosing the document manager, you get the choice to copy, move, rename or delete document files. Files other than documents can be manipulated by changing the default

mask of *.Sam, Ami's document file extension.

Columns are a feature with which many word processors have problems and Ami is no exception. It offers up to eight columns in snaking, newspaper format only. The default gutter widths can be altered and the columns balanced so that they line up at the tops and bottoms of the page. Ami failed this test when running into a Mannesmann Tally laser printer and using its native Courier font. Printing this review with two or more columns resulted in some pages having one column about half a line higher than the other, with no consistency to the error.

Ami provides a 114,000-word dictionary, although the only version I saw was the US edition. By the time Samna ships the program, a de-Americanised version will be available. From the Tools menu the dictionary may be edited, although you cannot get into it while the program is doing a search and replace.

Spell checking is reasonably fast; it took 25 seconds to proof a 4000 word document with no mistakes in it. But presumably in an effort to keep itself clear of the relevant word, the spelling checker's dialogue box jumps unpredictably from the top to the bottom of the screen.

I found this extremely irritating as, no sooner had I got the mouse positioned in more or less the correct position it leapt to the other half of the screen.

What I missed most, though, were macros. As a WordPerfect user, I find that the most tortuous of keystroke combinations can be assigned to a single keystroke — or for dangerous commands, to a named macro. That means I don't have to remember which particular pot-pourri of function keys does what. It makes life easier but, sadly, Ami does not give you the option.

Another two features I use a lot are automatic red-lining and strikeout. If a document has to be revised, it is valuable to see at a glance the differences between it and the original.

An ability to produce indices, tables of contents, and perform simple calculations on columns of figures would also be useful to many authors, but Ami gives no joy here either.

The last three elements I hoped to find were an undelete facility, a timed autosave and an ability to look at text over a page break. But Ami does not allow you to peek at the next few lines if they happen to fall on the next page. To do so means a wait while Ami updates first its internal pointers then the screen. Even on a 20MHz 386, this operation was by no means instantaneous.

It also only provides one level of undelete — surely some mistake when so many packages provide up to three — and has no timed backup facility.

On the other hand, though, all beta test software tends to be slower than its shrink-wrapped version. Once the debugging code has been removed, this may become less of a problem.

Documentation

Ami's three manuals are of a reasonable quality. The first covers the usual ground on how to use a word processor, about word-wrap and simple operations like searching and replacing, moving and copying text, and file handling. The back end forms the bulk and describes each menu, option by option. Even though my manuals were draft documents — produced, according to the blurb, using Ami — Samna has added plenty of clear diagrams to show what the real thing should look like.

What it lacks is a decent index and a chapter on troubleshooting. Look-

'Samna Ami is evidence that Windows on the PC still has a long haul to catch up with the Macintosh.'

ing up hard hyphens, for example, took me to a page that mentions them in passing, and the same goes for hard spaces; I still haven't found out how to produce either.

Anyone who gets into trouble with the package will get no assistance from the manual either. This has to be a major minus point as, in my experience, what new users find most disheartening is not knowing how to get out of mistakes they have made, or if pressing a key will cause them to lose the work they have already done.

The second manual is dedicated to style sheets and takes a tour round the 25 bundled styles. It starts with the bold heading 'If you're not going to read this guide ...'. A two-page introduction to style sheets and how best to use them follows. The remainder goes through each style individually.

Last of the three tomes is a guide to Microsoft's Windows. It leads the newcomer round the scroll bars via the keyboard, taking in elements like dialogue boxes and menus on the way. All the keyboard equivalents are shown.

Conclusion

It is ironic that the Apple Mac should be so much better endowed with powerful word processors when it is the Mac's graphical ability that seems to make the guys on the aeroplane gush so nauseatingly. Samna Ami is evidence incarnate that Windows on the PC still has a long haul to catch up. Billed as a powerful package, it is in fact a middle-ranking product in terms of the features it offers. One thing is certain — power users will not be mobbing Samna to demand copies.

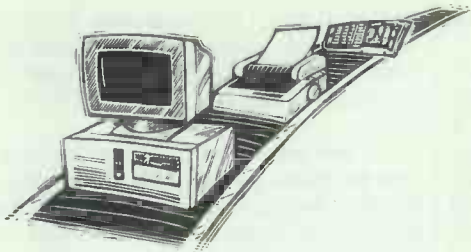
And if it is aimed at pulling new people into the Windows environment, I believe it will fail. With a manual that does not cover the ground in anything like enough detail or tell newcomers how to back out of trouble, and a lacklustre list of features, it is more likely to reaffirm prejudices about Windows being pretty on-screen but delivering little real punch.

But that is not to say that it does not have a role to play. Many businesses, both small and large, are experimenting with Windows in the hope, firstly, that it will make the computer easier to get along with and, secondly, that it will future-proof them against OS/2. Once familiar with Windows, the argument runs, OS/2 — which in this instance means Presentation Manager — will come easy. So the more Windows applications with a list of features long enough to satisfy the majority of users, the better.

With the impending arrival of Microsoft's Word for Windows, however, Samna will find it has a fight on its hands. While this product will be more expensive at around £475 compared to Ami's £199 price tag, it will fill a lot of the gaping holes in Ami's list of features. If you rush, Ami will be on offer at a special price of £99 until the end of February.

Alternatively, Samna is producing an upgrade soon, called Ami Professional. It will include many of Ami's missing features and is likely to have a price tag to match — somewhere around the £400-£500 mark. Samna couldn't give very precise details about it or about its release date but did mention it would include mail-merge, surely an essential feature in most offices.

So it's horses for courses. If you need a relatively modest package that goes further than Windows Write (not difficult) then Samna Ami could be the answer. Power users will have to wait for the Microsoft product — or for the somewhat more nebulous Ami Professional.



Agenda

Now that, to some people, the diary and notebook have been consigned to the scrap-heap of history, the electronic equivalents are poised to take over. Andy Redfern has been testing the Agenda from Microwriter Systems, a pocket organiser with several differences.

Even the directors of Psion could never have predicted just how successful the Psion Organiser would be. In fact, were we to have believed the pundits' reviews, Psion would have bitten the dust long before it became a public limited company earlier this year. But its small, brick-like *aide-memoire* has managed to find a space in the hearts (and pockets) of efficient people everywhere.

What has been more surprising is that in the Organiser's three-year rise to fame, no-one has been able to produce a product that competes on size, performance and cost. There have been attempts from companies such as Victor and Sharp, but they have failed to achieve a volume of sales to compete with the Psion. It was with some interest, therefore, that we greeted a new Psion-sized computer when it arrived in the PCW office. A hefty dose of surprise was added to our interest when we discovered the company which had produced it was Microwriter.

Microwriter Systems designed and sold a new-style keyboard/word processor called, imaginatively, the Microwriter. Those of you familiar with the TV adverts showing Dennis Norden clicking away on one, will remember that it was a grey, odd-looking box with a set of keys recessed in the top section. In fact, although it was a fully functioning keyboard it only had seven keys. Each individual character was generated by pressing and releasing a combination of the keys.

An unusual and original idea it certainly was, but Microwriter only managed to sell 13,000 of them. When the company designed its new product it aimed at a much bigger and far more lucrative market — the filofax-carrying members of our society. The Agenda is being sold as a



filofax basher although, as we'll see in the 1989 electronic filofax price war, it will be treated by most people as a Psion basher. I have to admit that when it first arrived I was fascinated by this electronic notepad and diary, but I was more than a little cynical about which was greater — its usefulness or its poseur value.

Hardware

The Agenda is a small, black piece of plastic about 7insx4ins in size. Although it is only three-quarters of an inch thick, it is far from flimsy as it weighs well over a pound. The case is constructed from two stylish matt black plastic shells that join round a third piece, which mounts the circuit board and the interface connectors securely inside. On the right-hand side are the on-off switch, the DC voltage input, a 'battery

charging' indicator and a single connector which can operate as a serial or parallel port, depending on which cable you attach to it.

The top of the Agenda is the working surface containing the keys and the screen. The keys are divided into three sections — the function keys, the alphanumeric keys and a halo of Microwriter keys.

In the top left-hand corner is the screen, a standard LCD unit with no backlighting. It can display 4 lines of 19 characters, which makes it approximately twice as big as the Psion's screen. The characters are generated from a 5x8 pixel matrix which gives a reasonable-looking font except that the characters with descenders (g,j,p,q and y) look a little compressed and flattened.

The Agenda contains a Hitachi 63A03Y being driven by a 4MHz crys-

tal. It comes with 32k of RAM and 32k of system ROM as standard. A real-time clock and five cadmium button cell batteries also reside in the slim case. The batteries are rechargeable and a small DC recharger is supplied.

On the back of the Agenda are two expansion slots which allow up to 128k of RAM to be added. They are protected by dummy blanks that slide into the slots. Adding a RAM pack is simply a matter of turning the machine off, removing the blank and inserting the RAM cartridge. The RAM cartridges contain a small non-rechargeable battery (similar to the kind used to power a camera), a RAM chip and a small amount of control circuitry. When connected to the Agenda the RAM cartridge draws its power from the main batteries. Upon its removal from the machine, the lithium battery will power the RAM for over five years.

Software

When you design a proprietary operating environment, no matter how advanced the hardware technology is, the software must be just as impressive or your product will never be successful. The software on board the Agenda is basically a free-form database, with simple word-processing capabilities for adding and updating the database records. There is also an easy-to-use but fully functioned calculator.

Each piece of data you wish to store is added into a file. This is where new users will have an advantage over veteran computer hackers, as a file is actually a record in normal database terminology. I could see no reason why Agenda's couldn't have been called a record and it certainly confused me to begin with.

Each file of data is placed with a 'drawer' in the Agenda's filing cabinet. This allows different types of data to be stored in separate places and also allows special functions to be performed on certain drawers. When you first enter any data into the Agenda, like a phone number and contact name, it is added to the O(ordinary) drawer. A diary entry is added to the D drawer and special system commands are added to the Z drawer. A file can be switched from one drawer to another, but it should be noted that drawers X, Y and Z are special system drawers.

To search for data within a specific drawer, simply press the letter of the drawer at the main menu. The screen will then display the first record in that drawer, and a count at the top left will indicate how many files are present. You can scan the files and switch between them using the four arrow keys.

24th January 1988

David Smith
231 Cocksparrow St
Warwick
CV35 6PP

RE: Overdue payment of invoices

It has come to our attention that the following invoices remain unpaid.

Date	Description	Price
10/10/88	Star LC10 with printer cable and a box of fan-fold paper	£329.00
12/10/88	Amstrad 1640ECD	£599.00
		£928.00

Much as it grieves us to hear that your bank isn't keen to offer you overdraft facilities, we do feel it is a little bit cheeky to then ask your computer dealer.

Your prompt settlement of this account should stop us from taking your wife hostage, although she would provide a bit of company for your dog, who, during his 3 week 'stay' with us, seems to be missing you.

Also, if payment happens to be in the post when the boys come round on Monday, please accept our heart felt apologies for any inconvenience we may have caused and you can rest assured the flowers are on the way.

Sarcastic Systems PLC

This print sample was generated using the Agenda with a Star LC24-10. The Agenda dealt with the columns and different styles of text by the simple addition of a printer command look-up table and a tab set-up string

If there is a large number of files, you can search for a text string simply by typing it at the prompt. As each letter is typed, the number of files which contain the string so far entered is displayed. After four or five keystrokes this number will reduce down to one and the file you are searching for will be displayed. If the search is invoked at the main menu rather than in a drawer, the search will be performed across all the drawers.

As mentioned before, the D drawer is used to store diary data. When you select New, a default time and date appears which can be modified for the event you're about to enter. You will then be asked if you want an alarm to remind you of the appointment. This is a piercing beep-beep that sounds even when the Agenda is switched off. You can disable the alarm if you are going to be somewhere you don't want it to sound.

The word-processing software that allows you to edit the files is far superior to anything else that is viable on a machine of this class. It has word-wrap unlike the Sharp IQ. It understands what a carriage return means, unlike the Z88. And it has the ability to drive a printer without any additional software, unlike the Psion Organiser.

It has many excellent features, too many to list in full, but I used the Agenda to create and print out the document above. This is a complex document where the middle section is created using column mode, and is not generated by entering lots of spaces. A tabbed heading descriptor is set up. Between two special descriptor markers, the three headings are separated from another special column set character. Entering the tabular data is then simply a matter of typing the text with a tab between each field. The Agenda even

prompts, at the top line of the screen, which heading you are currently under. It doesn't matter on the first couple of items, but because of the small screen the headings quickly disappear up the document. Also, 'Star LC10 with printer cable and a box of fan-fold paper' was entered in full and the Agenda calculated at print time how many characters could be fitted within the space.

The above example is complex, but it helps to underline just how good the system software is. Setting up the printer was simply a matter of adding to the Z drawer strings of escape codes for the different fonts and effects I wanted to use.

The final area of importance for Agenda owners is data integrity. If you are committing your schedule and notes to the little machine, you

want to be sure you can get them out again. You can back-up the data either to a plug-in cartridge or to a PC. The back-up and restore software was not finished while I was reviewing the machine, but the back-up system to the RAM packs worked. Simply select Backup at the main menu and the system is saved; select Restore and it is restored. It is very fast, simple to use and comes with suitable warnings to make sure you realise everything on the RAM card will be lost when you overwrite it with the new back-up data.

Although the utility to back up and restore to and from the PC isn't finished, data can be sent between the Agenda and the PC (or any other computer with a serial interface). Set the baud rate to be the same on each of the machines and connect the special serial cable. To send from the Agenda, simply select the files you want to transfer and then print them. On the PC, type COPY COM1: NEW-FILE. The reverse operation is achieved by moving to the Y drawer and typing COPY OLDFILE COM1:. The text will then miraculously appear in the Agenda. (Due to the Agenda's file size limit of 8k, you can't send files bigger than that to it.)

What is Microwriting?

Microwriting is a specialist form of typing that only uses seven keys. The keys are pressed and released in different combinations to generate all the characters you need. These combinations are called chords, and in some ways learning to use the Microwriter does bear a passing resemblance to practising your scales on a piano.

Each finger, including the thumb, rests on one of the five black keys, and in normal use you hardly ever need to move your fingers off them. This has some distinct advantages. Firstly, you don't need to look at the keyboard while you're typing. Secondly, you can hold the Agenda in one hand and still type with the other. Thirdly, even in the most unfriendly typing situations, like the top deck of the number 55 bus, typing is possible because once you've placed your fingers firmly on the keys, you hardly move them at all.

An obvious disadvantage, for left-handed people, is that the Microwriter keys are in a right-hand configuration.

The chords you need to learn in order to type the lower case alphabet are shown below. The overlaid letters which are used to remind you of the keys may look a bit odd but they actually do work. It took me about 20 minutes to learn the basic characters and about a week to improve my speed sufficiently to make Microwriting faster than using the Agenda's normal keyboard. Even so, I can still write faster than using the Microwriter keys and I can certainly type faster on a full-size keyboard. People who have been Microwriting for longer than I have suggest it is possible, with practice, to improve your speed to around one-and-a-half times faster than normal writing.



The Microwriter chords for the lower case letters are generated by pressing and releasing different combinations of keys. Microwriter Systems provides some useful tips for remembering the different key combinations

Conclusion

The Agenda is a well made, thoughtfully designed product that should prompt a great deal of interest from outside the usual computer markets. Many first-time computer owners will be attracted to this machine, and they will not be disappointed as the Agenda shields the user from most of the complex, jargon ridden areas of personal computing.

Having said that, just how useful is an electronic filofax? Personally, I will use the Agenda for a few more weeks to give it a full evaluation, but after that I'll return to paper and pen.

Often, when I make a note of someone's address, I also sketch a map of how to get there. When I'm in a boring meeting and come up with a useful programming idea, I draw a sketch of the logic rather than write the code directly. The Agenda can't cope with either of these problems — but neither can my PC!

Whether you find the Agenda useful or not will depend on the way in which you work. You'll love it so much only surgery will separate you from it, or you'll wander round with a bemused look wondering what all the fuss is about. Whether you need an electronic filofax is a question only you can answer (I've managed to survive the last 22 years without even a paper one), and if you do, this is probably the best on the market.

Microwriter Systems is on (01)-685 0300. **END**

**WHICH
Computer Show
Stand No 2227**



Norwegian Defense Department • Universidad de Ingenieria, Lima • National
 Eurotax Verlagsges, Vienna • Technische Universitat, Vienna • Banco Industrial
 Daimler Benz, Stuttgart • Saudi Eastern Petrochemical Company • Global Engineering
 Philippine Institute for Development Studies • J. Walter Thompson, Madrid • Institute for Infor
 AB Volvo • Universidade Nova De Lisboa • Instituto Superior Tecnico, Buenos Aires •
 Chulalongkorn University, Thailand • Philippine
 Far East Broadcasting Corporation • AB Volvo •
 Saudi Eastern Petrochemical Company • King
 Kommunedata, Denmark • University of
 Singapore Polytechnic • Westinghouse • Jet
 Global Engineering Ltd., London • EPFL,
 Universitat Stuttgart •
 University of
 Goteborg •
 Banco Indus
 ial de Peru
 BOSCH,
 erlingen-
 chillerhohe
 Institute
 or Infor-
 ation
 ndustries,
 Taipei • The
 Library Cor-
 oration • AB
 olvo • Babcock
 nd Wilcox
 ational
 rnk Service
 of the United
 ates • Tech-
 sche Universi-
 t, Vienna •
 Universidad de Ingenieria, Lima • Institute for Information Industries, Taipei • Eurotax Verlagsges, Vienna • Daimler Benz, Stuttgart •
 Universidad de Ingenieria, Lima • Iberia
 Airlines • Saudi
 Eastern Petro-
 chemical Com-
 pany • Global
 Engineering Ltd.
 • Chulalongkorn
 University, Thailand •
 • Eurotax Verlagsges,
 Vienna • Philippine Institute
 for Development Studies •
 • J. Walter Thompson, Madrid •
 • UNESCO, Asian Pacific Headquarters
 • Universidad de Ingenieria, Lima • Institute for Information Industries, Taipei • Eurotax Verlagsges, Vienna • Daimler Benz, Stuttgart •

Why do institutions worldwide trust ARC?
 Before you purchase your next computer,
 call us. You owe it to yourself to find out.

					ARC American Research Corporation		
(2) 633500	274-8350	967211	(40) 660051	(1) 442-7154			
							
(1) 687699	(2) 852-0232	2421812	(52) 609-100	(2) 396-9900	562459	257-581	(213) 265-0843
							
(22) 825575	(222) 934212	1681169	(31) 658551	(3403) 90911	(2) 402391	(2) 251-7078	(1) 684-4144
							
(42) 12560	3826-5007	128-68481	(14) 415-206	(21) 380-2717	(3) 798-2663	297-475	574980

ARC  **American Research Corporation.**
 160B Handcroft Road, Croydon, Surrey CRO 3LE.
 Telephone: 01-684 4144. Fax: 01-683 1948.

Picture this

The field of computer graphics is in a state of extremely rapid change — as developers strive for perfection, systems which were once acceptable are regarded more critically. Nick Hampshire assesses what further improvements we can expect in the next few years.

A few weeks ago, while clearing junk from a cupboard, I came upon my old, 1982 vintage, Commodore VIC 20 computer. Amazingly the machine still worked, and the next few hours were happily spent rediscovering some original VIC games.

This discovery was a revelation. It clearly demonstrated how far the personal computer has developed over the last seven or eight years. For many, the VIC or the Spectrum was their first introduction to colour computer graphics. By today's standards they were crude: the VIC had a screen resolution of just 176x184 pixels with 16 colours. In contrast, a modern Extended VGA screen has a 640x480 pixel resolution with 256 colours out of a 262,144 colour palette.

Early computers like the VIC 20 may now be considered primitive, but at the time they seemed wonderful. Most importantly, they demonstrated the potential of colour computer graphics. They made people think of possible applications. They made people dream of having a display that was as crisp and clear as reality; one that could show images moving in real time, and even (that dream of dreams) a true three-dimensional image.

The goals and the problems

The enormous improvements in computer graphics which have taken place are the result of thousands of man-years of work around the world, and an enormous investment. Why has this enormous effort and expenditure been committed to producing stunning pictures on a monitor screen?

The answer to this lies in that old saying, a picture is worth a thousand words.

It is not surprising that graphical output has long been considered an essential requirement for computers. The development of graphics devices has been encouraged because higher resolution and colour displays can have a higher information content. Improved displays have in turn led to the development of computer applications such as CAD and desktop publishing.

The ultimate goal for computer displays has to be photographic-quality output. This is determined by the resolution of the human eye, and varies from one individual to another. It also depends upon viewing distance. One can see more detail in a photograph at close range than at arm's length.

In printed matter or photographs, the unaided eye's ability to resolve fine detail lies in the range between 1/1000 and 1/2500in, the thickness of a very fine hair. There would be little point, therefore, in having a display technology with a finer resolution.

The need for such fine resolution is further reduced by the increased viewing distance and the fact that most video displays are active light producers rather than light reflectors. With an active light producer there is a tendency for any pixel to be visually blurred: a light pixel will become larger and a dark pixel smaller. The fact that a display is a light producer also means that we view it from a further distance than a reflective display (such as a sheet of paper).

However, light producers have the advantage of allowing a wide range of light intensities to be created on a single pixel: 256 grey shades is quite common. In printed matter, grey shading requires image screening, which reduces resolution because it utilises a variable dot size. The increased viewing distance means that we will visually lose very fine detail.

These factors cause the maximum display resolution to be little more than about 1/400in. Such a display would need to have 400 dots per inch vertically and horizontally, or 160,000 per square inch. There is an additional factor that any movement in the display, such as character animation, will reduce the need for high resolution, since movement blurs image detail further.

For colour displays this maximum resolution is somewhat lower, due to the higher information content of colour images and their lower contrast. The maximum colour resolution is therefore probably about 1/300th of an inch.

We are also limited to a maximum perceptible number of colours. The human eye has excellent colour discrimination, but with a hundred differ-

ent shades of the same colour ranging from full saturation to colourless it is virtually impossible to distinguish between two adjacent shades. However, this is required to give a display a sense of depth, light reflection and surface texture. Colour palettes with 16.7 million colours are therefore justified. Systems limited to 256 colours on the screen at any one time are unsatisfactory and such limitations must be overcome in future generations of displays.

Display technologies

The most important component in the further development of computer-generated graphics is the display technology. Without further progress in this area all other developments in computer graphics would be pointless. There are five different technologies in commercial use: cathode ray tube (CRT), light emitting diode (LED), liquid crystal display (LCD), gas plasma (GP), and electroluminescent (EL).

Other potential techniques include scanned laser beams and vacuum fluorescent panels, but the computer displays of the 1990s will undoubtedly be developments of the five current technologies. Given this range of different display technologies, how will they develop over the coming years, and what problems will be encountered in their development?

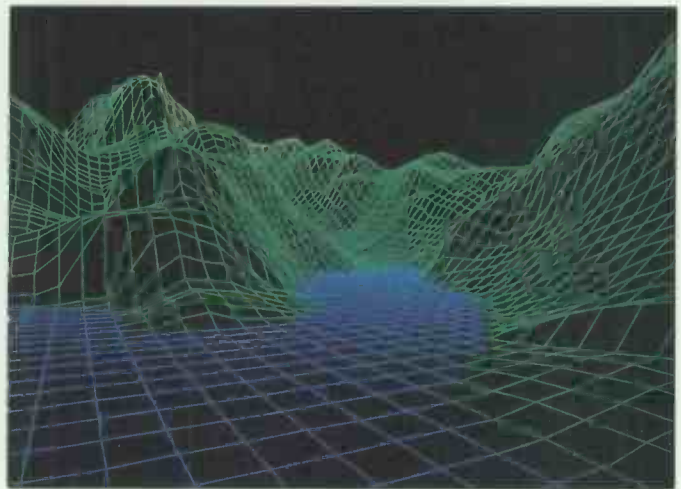
The CRT is the most widely used display. A CRT works by scanning a thin electron beam across a phosphor coating on the inside of a glass vacuum tube. Improving display resolution means focusing this beam to a very fine spot. The size of this spot is known as the display's dot pitch. Reducing dot pitch also means increasing the number of horizontal scan lines and ensuring that the circuitry can turn the beam on and off fast enough.

Making the electron beam smaller means that it will produce less light when it hits the phosphor. Improvements in phosphor formulation can help, so can raising beam power. But the best way is to increase the beam scanning rate. This ensures that it produces the maximum amount of light and has the added effect of reducing screen flicker.

Unfortunately, the increased scan-



False colour shading of a 3D map from a battle management system



3D colour display of map data

ning rate means an increase in the current switched through the deflection coils, and therefore an increase in their heat generation. Dissipating this heat without affecting the magnetic deflection field is quite complex.

Focusing the beam to a finer resolution also means that there is an increased defocusing due to the curvature of the screen. Flatter and more even screens are being made, but curvature can never be eliminated since it gives strength to the tube.

The solution is to vary the focusing as the beam sweeps across the tube so that an even dot pitch size is maintained. Some systems use analogue electronics to do this, but one of the most sophisticated systems uses digital electronics. This system, manufactured by Westwood, stores a map of any surface irregularities in the screen so that it can exactly focus the beam for every pixel location. This map is created and stored in ROM when the display is manufactured and is unique to each screen; it is controlled by its own focusing processor.

Monochrome CRT displays with a 1660x1200 dot image size are now quite common. There is even a 4096x3300 dot screen available from MegaScan Technology of Pennsylvania. This screen has a dot pitch of just .003in — equal to a resolution of 300 lines per inch, which is very close to true photographic quality.

Because three electron beams are used in a colour CRT, the maximum resolution is less than that of a monochrome CRT. Increasing the resolution means decreasing tri-dot pitch size. The development of high-resolution colour CRTs faces the same problems as monochrome CRTs, with the additional problem that making the dot size smaller means that the holes in the shadow

mask must be smaller.

This increases the number of electrons hitting the shadow mask rather than the phosphor. The result is images of lower intensity and a heating of the shadow mask due to absorbed electron energy. This heating is the biggest problem, since it causes the shadow mask to buckle and thereby distort alignment. This is being overcome by using thermally stable metal alloys (such as Invar) and by keeping the shadow mask under tension. This type of mask tension system, known as FTM, has been commercially developed by Zenith in the USA.

The resulting colour display is claimed by Zenith to have better colour purity, to be 50% brighter and to have a 70% better contrast than conventional displays.

Colour computer monitors with a resolution of 1280x1024 are now quite common in computer workstations. Such displays have a resolution of about 100 lines per inch with a tri-dot pitch of about 0.01in and offer good image clarity. But further improvements can be expected: Mitsubishi has demonstrated a 2000x2000 dot colour CRT with a resolution of 150 lines per inch, about half way to our ideal display.

The other widely used computer display technology is the LCD panel, the most common form of display for laptop and portable computers. It provides a monochrome display which has the advantage of small size, lightness, and low power consumption.

Creating a graphics image using LCD technology is simply a matter of having rows of fine electrodes on each of the transparent surfaces of the screen. These are placed at right angles with the nematic liquid between them. Dots are created by addressing the correct row and column.

Increasing the screen resolution makes the control electronics very complex, but that can be overcome by using an 'active matrix' LCD. Thin film transistors are used at every pixel location, effectively turning the display into a memory. Once a pixel is addressed it stays illuminated until it is switched off. There is no need for multiplexing so the scanning effect seen on large displays is eliminated.

The use of active matrix LCDs has enabled the development of colour displays. These use coloured organic filters in front of each pixel which are then backlit. The range of colours is rather limited, typically either eight or sixteen, but this system is employed in the manufacture of 3½in colour screens for pocket televisions. The resolution is only about 50 lines per inch, and there is the added disadvantage that such panels are very difficult to manufacture, with nearly 80% being rejected as substandard.

Despite this we can expect to see colour LCD displays with a resolution of 1500x1500, and better than 100 lines per inch, within the next five years — a trend which has been reinforced by the announcement a few months ago of the joint development by IBM and Toshiba of a 14in square colour LCD display of 770x550 pixels, with a range of sixteen colours.

A display technology employed in high-price portable computers as well as military and aerospace applications, is gas plasma. This is the type of display employed in machines such as the GRiD portables and the Compaq transportables, as well as the top-range Shibas.

The attraction of this type of flat panel display is that it is light emitting and visible in all light conditions. It can also be manufactured in much larger panels, and 20in plasma screens are already available. Such large displays could form the 'hang-



Synthesised image from a CAD file showing both multiple light-source reflection and surface shading



Use of a high-resolution colour display to show a colour photographic image with associated text

on-the-wall TV' of the future, or they could be used to create an 'intelligent' drawing board for CAD. The drawback is that a high operating voltage, about 200v, is required in order to generate the plasma.

High voltages are an inherent problem with plasma display technology, and developments in semiconductors, such as Bi-CMOS, will make their control far easier. These developments are enabling designers to reduce the number of components, thereby reducing both the cost and complexity. Improved control techniques have also allowed pixel brightness control to be incorporated into plasma displays — up to 16 levels of grey scale are now possible.

Progress is also being made in the manufacture of colour plasma displays. Since the colour is dependent upon the type of gas, it is impossible to manufacture a simple triad of pixels. Instead, designers have stacked a red, a blue and a green display on top of each other to create the colour display.

Some Japanese display manufacturers regard plasma displays as being a serious contender to replace the CRT for high-definition TV. Already, major manufacturers like Fujitsu have started manufacturing a full colour 500x500 pixel display on an 8in square panel. In the laboratory, plasma displays may now be rivaling high-quality CRT resolution, but making them is a complex process and it will be some years before they can be manufactured as cheaply as the CRT.

The electroluminescent panel is very similar to the plasma display, but instead of a gas it uses a chemical phosphor which emits light in the presence of an alternating electric field. It has proved very popular in military applications since it is an extremely rugged device with a long operational life.

The drawback with electroluminescent displays is that they operate at high voltages and, like gas plasma, use a lot of power. However, such displays can be manufactured as large high-density panels with a very low weight.

Like plasma displays, the light intensity of any pixel can now be varied thanks to advances in the control electronics. The display has a very high contrast, and current manufacturing techniques allow extremely small pixel sizes. The standard current generation of an EL display has a 640x640 pixel resolution with a 10in screen. However, prototype 1024x1024 pixel displays have already been demonstrated by several manufacturers.

The power behind the display

A computer graphics display is a partnership between several technologies. It is no good simply having a high resolution display with lots of colours; we also need a means of creating the image from a manageable amount of data. A high resolution colour image contains an enormous amount of data: the average colour display on a low-cost workstation occupies over a megabyte of memory. It also requires fast electronics, repeatedly shifting that megabyte out to the display at a flicker-free refresh rate of 1/30 second, or less.

The use of graphics primitives to compress an image cuts down on memory requirements, but has the negative effect of forcing the computer into extensive image reconstruction. For a large full-colour image the processor time involved starts to slow the system down noticeably.

By using a special graphics image processor, the main system processor can be left free to perform its normal computing function. The

main processor simply feeds the graphics processor with the compacted image in graphics primitive form. The primitives are used by the graphics processor to reconstruct the full image in a special display memory.

Graphics systems processors (GSPs) are now used in virtually every graphics computer system. They range from a simple dedicated chip to a highly complex parallel processor circuit. Some GSPs now utilise the most advanced computer architectures to deliver supercomputer power which is considerably higher than the main processor. Such computing power is needed to handle the vast amount of data, as well as performing calculations which are now considered essential for graphics display creation.

Now that displays tend to make two-dimensional representations of three-dimensional objects, they involve surface texture synthesis, shading and reflection from multiple light sources. These features require a lot of complex processing on each pixel. In addition, there is now an increasing requirement for real-time animation. With a million or more pixels and a thirty frames a second refresh rate, it is no wonder that designers are working on GSP systems with a processing power of one thousand megaflops, or about the same as a small Cray computer.

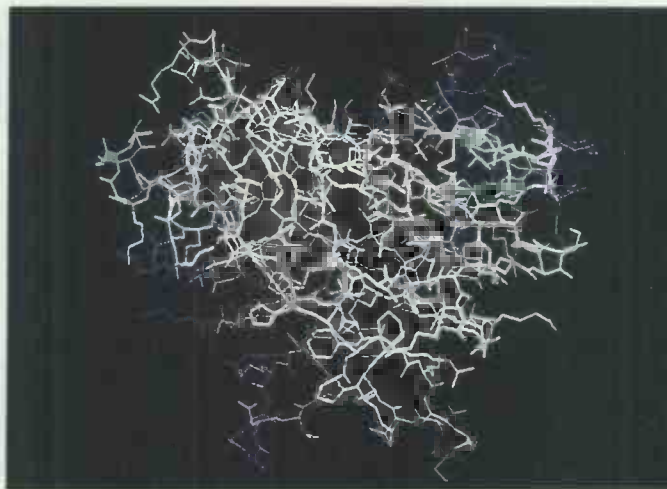
An example of a device where this type of computing power is being applied to graphics creation is the AT&T Pixel Machine, and in particular the PMX900 series. This machine delivers 820Mflops of computer power, derived from a parallel architecture of 32-bit floating point digital signal processors.

The only way to generate such computing power economically is, like the Pixel Machine, to use parallel processors. Graphics image proces-

This is a satellite image of the British Isles. The details are not clear when the image is viewed with a monochromatic grey scale. However when false colour is applied, the various features become more visible. Note the cloud cover over the north east and south western parts.



A high-resolution synthesised image showing extensive use of Giraud shading, texturing and specular reflection



3D image of a complex organic molecule

sing is an ideal application for parallel processing since the data can easily be divided into a number of discrete blocks: each processor works on its own small sub-display. Another factor in the designers' favour is that the number of basic graphics operations is quite small, so they can construct the parallel GSP from fast RISC processors.

At the moment there are seemingly as many different types of processor employed in graphics systems as there are graphics systems. They include special-purpose RISC processors, digital signal processors — originally designed for use in radar and telecommunications systems — and commercial RISC processors such as the Inmos Transputer. Whichever processor is used, they all have very high instruction execution rates and the ability to work as part of a parallel system.

Video memory

Combined with the increasing amount of computing power required by a graphics processor, there is also an ever increasing demand for video memory. Two types of memory are used in a display system, video RAM and dual port RAM.

The video RAM stores the bit image and consists of ordinary dynamic RAM chips. Although data is read from video RAM at very high rates by the display circuitry, it does not have to have an unduly fast access time. Data is accessed in blocks and placed in a high speed shift register which then pumps it out at a rate of between 50 and 80MHz.

The dual port RAM is a special type of memory which can be accessed by two processors. It is used to communicate the graphics primitives from the main processor to the graphics processor.

Even a fairly modest display such as that found on low-cost worksta-

tions will need at least a megabyte of video RAM. In top range systems the amount of video memory can be between 8 and 20Mbytes. In a colour display each pixel will have three associated values, the intensity values of the red, green and blue dots comprising the desired pixel colour. Allocating four bits to each of these three values, a total of twelve bits in all, will allow generation of 4096 colours, insufficient for an advanced colour system.

A full colour range requires between six and eight bits per primary colour or eighteen to twenty-four bits per pixel. To this must be added further information about depth coordinates, reflectivity, window ID and so on: it's little wonder that in some graphics workstations as many as 96 bits are needed for each pixel.

It would require 3Mbytes of RAM to store a colour image with a resolution of 1024x1024 and 16.7 million colours. It is not surprising, therefore, that most current systems limit the range of colours which can be used in a particular image. This is typically set to 256 colours which are obtained not by storing the RGB intensity values in memory, but by using a colour value which is converted into the RGB values by a special colour palette chip located in the video output circuitry. As RAM chips become larger and cheaper we can expect such limitations on colour range to be considerably reduced.

Software standards

The third major component in advanced display technology is the software which allows increasingly sophisticated display hardware to be utilised by applications programs. At the lowest level, graphics display software simply involves the routines which convert the graphics primitives into a bit image.

These are basic commands such as

line draw, circle draw and block fill. On top of these basic graphics commands there are, in an advanced system, a fairly large number of functions relating to operations such as 3D rotation, scaling (and transformation), specular reflection, shading and perspective, complex functions which involve calculations such as matrix inversion and multiplication. True graphics primitives are implemented by software resident within the graphics system processors.

The graphics primitives constitute a language in which application programs can model their desired display. How these graphics primitives are converted into a bit image is irrelevant to the application; that is the function of the GSP. At this level, standardisation is very important. Without any standards for graphics primitives it would be impossible to transfer programs between machines which have different graphics systems but are in all other aspects identical.

What is needed is a universal standard which can be independent of display hardware. Developing such a standard has proved no easy task, but has been undertaken by the international sub-committees on computer graphics of both the ISO and ANSI standards organisations.

The result of several years' work by these committees has been the publication of the Programmer's Hierarchical Interactive Graphics Standard, or PHIGS, which has just been adopted as an international standard by both the ISO and ANSI. It is designed as a common programming base for graphics hardware and applications programs, providing a system of graphics primitives as well as firm data structure for modelling any desired 2D or 3D image. It also includes standards for the description of surface textures, reflectivity and shading.

While providing a fixed standard for applications software interfacing, PHIGS supports a flexible definition of the graphics hardware, so it should be applicable to any future form of graphics hardware. It offers us a path out of the current chaos of graphics hardware/software incompatibility and will hopefully lie at the core of most future developments.

However, in order to achieve its potential, PHIGS will have to be incorporated into future generations of operating systems, and we may have to wait a long time for this to happen. Unfortunately, the designers of OS/2 did not have advanced graphics systems too high on their list of priorities.

What about 3D?

Currently available computer graphics systems are used to display either two-dimensional images or two-dimensional representations of three-dimensional images. For many applications this poses no great problem, but there are some where a true three-dimensional image would be invaluable. These are applications where simply being able to walk electronically around or through a computer model is insufficient, where the user needs to be able to see the object in its entirety.

Over the years a great deal of thought has gone into the creation of systems capable of displaying true 3D images, an image which is contained within a cubic space rather than a projection of that image on a flat screen. So far three potentially viable techniques have emerged: computer-generated stereoscopy, computer-generated holograms and a rotating mirror projection system.

All three systems have been made to work in laboratory environments and each has its own particular advantages. However, of these three techniques only the rotating mirror projection system offers *real* 3D. The other two systems, while better than 2D projections of 3D images, are probably best described as 2½D because the viewer is still limited in viewing angle.

It is possible to generate a holographic image of a three-dimensional computer-generated object. There are two ways in which this can be done: direct hologram synthesis or creation via photographic images. It is possible to model the interference pattern which makes up a hologram, but the results are coarse-grained and impractical.

Alternatively, a hologram can be built up in exactly the same way as the moving image of Shakespeare on the new cheque guarantee cards. It involves producing a series of photographic images of the object, each taken at a slightly different angle of rotation. These are used to create a hologram of the object which can then be viewed at different angles as if it were a real physical object. The main drawback to the use of holograms is that they are far from interactive, and their production is a lengthy and expensive process.

Stereoscopy is interactive, and gives the user true depth perception which is lacking in a 3D image projected onto a 2-D surface. Full use is made of our binocular vision — humans see two slightly different images because our eyes are in different locations. The brain fuses these two images into a single one, and in so doing extracts depth information

from the scene.

We can simulate this by creating two images, one for each eye. To do this requires a special pair of spectacles with a liquid crystal shutter in each of the lenses, an electronic means of alternately blanking out one eye then the other. By synchronising the shutters with a CRT which is rapidly alternating a display of the two stereoscopic images, it is possible to give the user an illusion of three-dimensional depth on a flat screen.

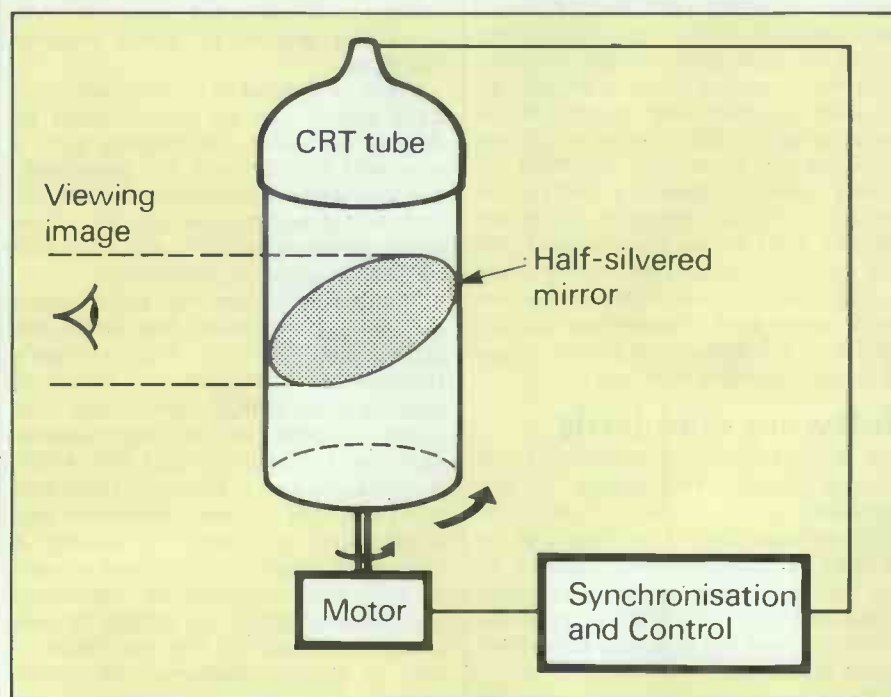
There is currently only one system which can create a 3D image which appears to hang in space and can be viewed at any angle simply by walking around it; this is the rotating mirror projection system. The development of such systems dates back to about 1968, but it is only recently that improvements in computing and display electronics has made it a practical possibility.

The system is conceptually quite simple (see below). A half-silvered mirror held at a 45° angle is rotated about its central axis. This mirror reflects an image which is projected onto it from either a CRT screen or a scanned laser beam. As the mirror rotates it traverses every 3D coordinate within a volume of space, the size of which is dictated by the size of the mirror. By projecting a series of images which are synchronised with the rotating mirror, you can create a true 3D object in beams of light.

Conclusion

Computer graphics have come a long way since the VIC 20. In the last half-dozen years we have seen the development of the graphics workstation, the birth of new graphics-orientated applications such as CAD and desktop publishing, and the arrival of relatively low-cost systems capable of creating three-dimensional images with all the features of shading and reflection which are encountered in real life. During this period we have also seen the development of new graphics display technologies such as LCD, plasma and electroluminescent panels.

Looking forward over the next five to ten years, there is certainly no evidence to suggest that the rate of development in this particular area of the computer industry will slacken. In 1995, looking back to today, it is certain that we will be looking on our PCs with their VGA displays in the same way as we now look upon the display capabilities of machines like the VIC 20 or the Spectrum. There is also a strong likelihood that new technologies will have emerged, and that forecasts in articles such as this will have seriously underestimated the rate of change.



BIG BRAIN *small* FEET



The Minstrel workstation is a giant step forward in PC-AT workstations. In performance it walks taller than Compaq's 386SX. Yet on your desk, it occupies just over a square foot.

Disk performance outstrips virtually every other PC. The intelligent caching disk controller brings up data almost instantaneously with disk options of 42 or 120 Mb.

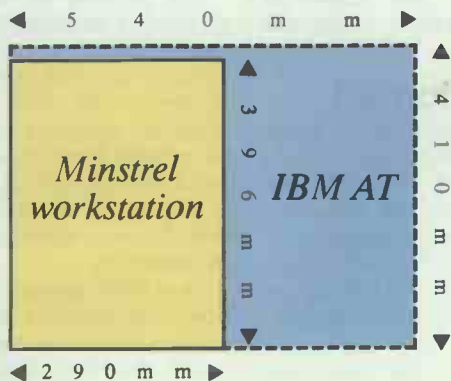
PC compatibility is absolute. So you can run all MS-DOS, OS/2, UNIX, Novell, 3-Com and TurboDos applications. At 16 or 20 MHz.

Latest VGA graphics make it ideal for realistic full colour pictures and desk top publishing.

Standard RAM is 1 Mb with expansion options to 5 Mb. Networking is simply a matter of choosing your system. And you can add a fax card for only £795.

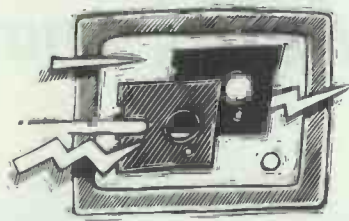
The Minstrel workstation comes with a 3 year guarantee. All this and British made too.

Our brochure will tell you more. Just dial 100 and ask for Freephone HM Systems.



From £1552 to £2410.

H M S Y S T E M S P L C
 M I N S T R E L H O U S E • 2 2 0 T H E V A L E
 L O N D O N N W 1 1 8 H Z
 T E L 0 1 2 0 9 0 9 1 1 • F A X 0 1 2 0 9 0 9 1 2



Screen grabbers

When you want to preserve certain screen images for later use in a desktop presentation or feature, a screen capture program is what you need. Ed Brown looks at some of these 'screen grabbers' in action.

How often have you looked at a screen display on your computer and wished you could save it for use in another situation. Perhaps something interesting happens within a program, or you've created a graphic you want to include in a document either using a word processor or a desktop publishing package. Perhaps you're writing the documentation for a computer program and you want to include some pictures of the application in action, pull-down menus and all.

When computer programs were simple and text-based, and printers were equally unsophisticated, a simple **PrtSc** key would provide a hard copy of what was on your screen. But as both applications and printers become more graphic in their capabilities, more sophisticated tools are necessary. In addition, the multiplication of graphics standards on PCs has meant that existing screendumping programs often could not cope.

Another area in which screen grabbing programs come into their own is prototyping — where you want to create sample screens for a new application. Not all screen grabbers and screen print programs allow for editing, but some do.

While researching this article, the packages were used on an AT clone with a Hercules graphics card and a Microsoft mouse. Some of the programs were also used on a Compaq with a VGA screen fitted. The DTP software used to check the loading of the graphics files was Ventura Publisher version 2.0. Where the files produced were in an IMG or PCX format, they were also tested with graphics programs which support these formats.

Unfortunately, it was not possible to check the file formats with PageMaker as the copy required did not arrive in time. Due to the nature of screen capture programs and the way they take over the keyboard and screen when they are invoked, it was

not possible to provide any screendumps of the programs in action. However, examples of screen captures can be seen in the article 'Font facts' published in October's *Desktop Publishing World*.

Pinch & Punch Version 3.0

This low-cost capture program compares with a five-page manual and the programs all on one diskette. It is easy to install and run, although the choice of screen is currently limited to CGA, EGA and Amstrad format with VGA promised soon.

The program was easy to install and use, enabling up to 99 graphics screens to be captured at any one time. This was achieved by running the Pinch utility followed by the program to be captured. It is then a simple matter of pressing the Print Screen key to capture the screen to a file.

Following the capture of the screen a standalone utility was run to convert the captured screen to a TIFF image file which can then be loaded into the DTP package.

Pinch & Punch does not support the capture of text screens or any format other than TIFF but is unique among the packages looked at here as being the only one to support the Amstrad format. It also provides a way of displaying the captured screens as a presentation using the Punch utility.

GrafPlus Version 3.1

This program is designed to allow the printing of screens as a Print Screen enhancer and, as such, the manual cleverly hides the essential information for capturing screens for use in DTP programs. For the record the program to use is GRAFLSR on the diskette supplied with the 26-page manual.

When GRAFLSR is run you are asked to specify the screen type and the output printer you wish to use.

For DTP the printer option to select is the file option for PCX which is buried in the middle of the options.

When the method of installing the file option was discovered and the software installed, the program was easy to use and supported a good selection of screens. It was able to capture both text and graphics screens but was again limited to a specific hot key — in this case, the shifted Print Screen key. On pressing the hot key the current screen is saved to disk with a predefined name which is automatically incremented. Unfortunately, the file is saved on the current directory and this can lead to problems in tracing where files have been saved.

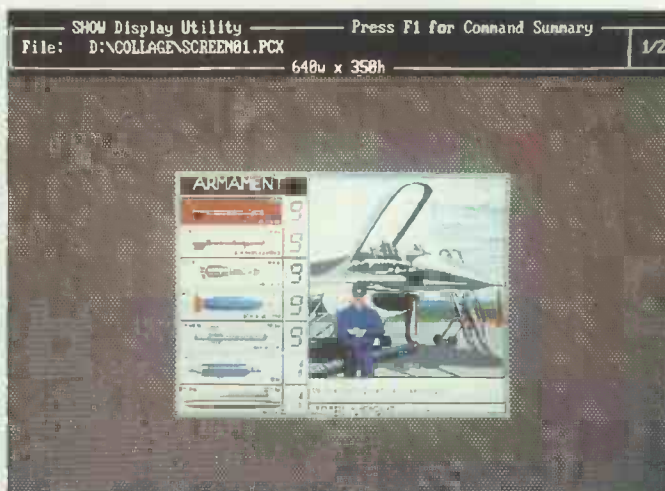
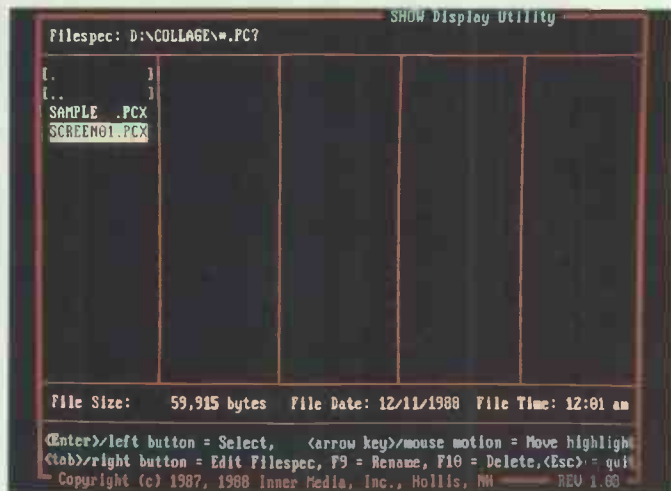
Halo DPE Version 1.2

DPE, or Desktop Publishing Editor, is a graphics editing program which comes on three disks accompanied by a 159-page manual that includes a table of contents and three pages on the screen capture option, but no index.

Installation is a straightforward process of copying all the files to the hard disk and then running the setup program to configure the software to the screen and printer being used. This process leaves many files on the disk with no indication of which can be deleted.

The process of capturing graphics screens is described clearly and concisely, and you can quickly get the system up and running to capture screens. The DPE screen capture program supports most of the popular screen formats and again uses a fixed hot key which, in this instance, is based on a hardware scan code that, for my machines, was the multiplication key.

The DPE screen capture program does not capture text or Windows screens and was the only package to cause memory problems with other programs. The process of getting a captured screen into a DTP format is



Collage's Show program has a useful front end which displays available files and allows the user to rename or delete them to form a complete presentation

Before displaying the whole screen, Show presents the screen in miniature which is useful for quickly scanning through the files. Oversize images can be cropped first

accomplished by using DPE itself, and the captured file has to be loaded into the editor and then exported in either an IMG or a TIFF format.

Although this approach has the benefit of allowing the captured screens to be edited, the usual mode of operation does not require any editing to take place. Halo would have benefited from a standalone utility to convert the captured screens directly into a format suitable for DTP.

PC Paintbrush Plus Version 1.02

PC Paintbrush Plus is another graphics editing program which comes on two diskettes accompanied by a 152-page manual that includes a table of contents, an index and 17 pages on the screen capture program. Several problems were encountered in attempting to install and capture screens, and the manual left much to be desired when it was referred to for assistance.

PC Paintbrush Plus allows the capture of screens by using the Frieze program which comes supplied with the package. This is capable of capturing graphics screens only and uses the Shift Print Screen key as a hot key.

When tested, Frieze would not capture GEM or Windows screens but was capable of capturing screens from other graphics applications such as Doodle and TurboCAD.

When captured, the screens can be loaded into the DTP program or edited using the Paintbrush Plus editing features which are the prime strength of the package.

Collage Release 4

Collage is one of the two packages examined which was designed specifically for assisting the user to include captured screens in desktop

publishing software. It comes on a single diskette together with a manual of 80 pages. Installation is accomplished smoothly with a program supplied which copies across all the necessary files and prepares the program for use. The manual is well written and clearly explains the program's features, and provides several useful tips for including the files in DTP packages such as Ventura or PageMaker.

The process of capturing screens is a simple one of loading the Snap screen capture program and then the

application to be captured. Snap will capture both text and graphic screens and save them in a text or PCX format to the sub-directory specified when it was loaded. The hot key is the Shift Print Screen by default, but you can change this to Alt and Shift if there is a conflict with the default hot key.

When the hot key is pressed a capture menu comes up which allows you to specify what action is to be taken.

You have the choice of printing the screen directly to the printer, saving

Screen capture

A screen capture program has to reside in memory when the program you wish to capture is run, and wait until you command it to capture a screen. This type of program is called a Terminate and Stay Resident (TSR) program; it is run before the application you wish to capture and activated by the use of special keystrokes.

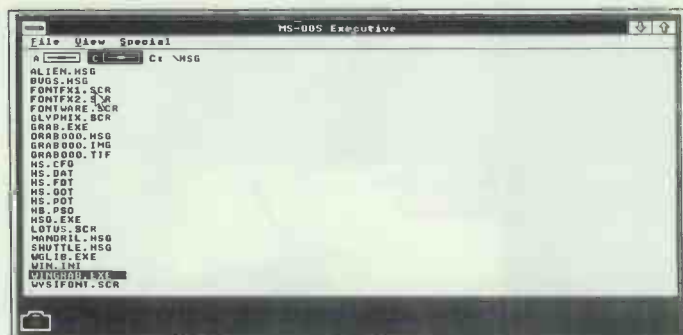
Once activated, the program may need to display a message on the screen so that you can interact with it. To do this it needs to first save the area of the screen it is going to use for display so that it can be restored at a later stage, and then carry out the commands required. Before returning to its idle state, it must return the screen to the state it was in before it was called up. The TSR must be able to perform this save and restore function regardless of whether the screen is in text or graphics mode, to avoid corruption of the screen.

The task of saving and restoring the screen is not easy, as the screens use the memory in different ways depending on whether they are monochrome or colour, text or graphics, and what resolution they are in. In general terms all screens are located at address A000 which is the top of the 640k address space for a DOS application. Varying amounts of memory above this address are used to store the screen information, and the amount of memory used is dependent on the resolution of the screen and the text and graphics mode in use.

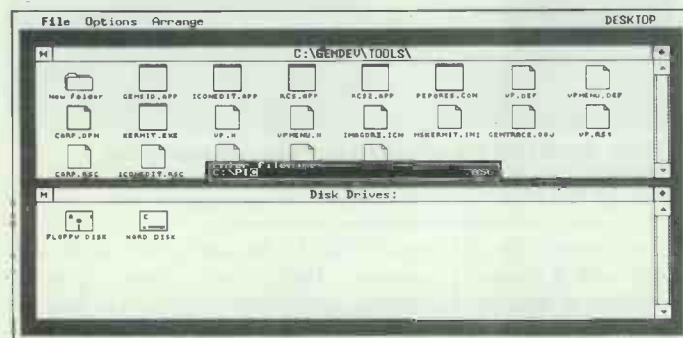
If the screen is in text mode the memory is divided in such a way that each byte containing a character is followed by a byte describing its attributes, such as colour and bold. In graphics mode two mapping methods are employed: the first is similar to the text mode where each dot is followed by its attributes such as colour and intensity. This method is called multi-bit-per-pixel (MBP). The other method is where the screen is divided into four planes, each of which contains dots for the full screen, and each plane represents a colour. This method is called multi-plane-per-pixel (MPP). The EGA and VGA screens use the MPP method and the other graphics screens supplied by IBM use the MBP method.

When graphics screens have been captured there are no significant problems in converting them to graphics files as it is just a matter of converting screen pixels to graphics file format pixels. Text screens, however, provide more of a challenge as the characters which have been captured need to be converted from character codes to pixels and retain the correct spacing which was shown on-screen.

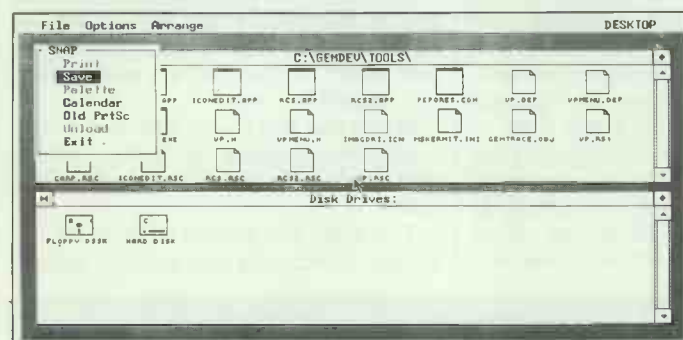
Screen capture is not a straightforward process, and for those who are interested in examining the process further I can recommend *The Programmer's PC Sourcebook* by Thom Hogan, published by Microsoft Press.



When installed under Windows, Hotshot Graphics appears as a camera icon on the desktop. Hotshot also comes in a non-Windows version which saves screens to an intermediate HSG format



Hotshot is invoked by a Control-Alt combination under Windows. It then prompts for a filename and the screen is saved in PCX format



The Collage screen grabber, Snap, provides for a number of file formats as well as reinstating the original PrtSc function. The calendar is a strange addition with no obvious function

it in a text or PCX file format, adjusting the palette of colours (only on colour monitors), displaying a calendar, using the old print screen function or unloading the utility. By selecting the 'save' option you are provided with a selection of PCX file formats which you can save in. The exact use of these is not clear from the screen but the manual takes several pages to clearly explain under what circumstances it is best to use each option.

When the file format has been selected the package captures the screen and returns you to the main menu. The menu has then to be specifically cancelled to continue with the application from which the screen was captured.

All the popular screen formats are supported and the software is quick and easy to use with the ability to capture text, GEM, Windows, and other graphics screens.

In addition to the screen capture facilities there are other facilities, for playing back the screens as a presentation, smooth-scrolling the screen and increasing the number of lines onscreen.

Hotshot Graphics

This is the second of the two packages designed specifically for assisting the user to include captured screens in desktop publishing software. It comes on two diskettes together with a 170-page manual. Installation is accomplished smoothly with a supplied install program which firstly copies across the necessary programs and then prompts the user for information about the system being used. The manual explains the features of the package in detailed and logical form. The screen capture programs are relegated to the reference section of the manual but again are clearly explained.

Unlike Collage there are two screen capture packages supplied with Hotshot, one of which is specifically for Windows applications. Both work very well, although the Windows screen capture uses a fixed hot key of holding Alt and then pressing Ctrl which will cause the screen to be saved to a file with a PCX extension. This is in contrast to the non-windows screen grabber which allows the user to specify the hot key and the file path and name which the

file is to be saved under. In this mode, the file is saved in an internal HSG format which is later processed by HSG to produce the file for inclusion in a DTP package.

The screen capture utilities can capture both text and graphics screens which can then be converted to a number of popular graphics formats including TIFF, PCX, EPS and IMG format. The HSG program can also load and edit these files and the screen captures, and includes a section of editing facilities for annotating any screen captures as well as cropping the screens which have been captured. You can manipulate many of the parameters of the captured screen, for instance to alter the size and adjust the mapping of colours to grey scales. These two overcome the problems associated with scaling and adjusting these parameters inside the DTP package, which tends to result in moire ('watered') effects on the output.

One of Hotshot's strongest features is its ability to batch process screens for inclusion in a DTP package. You can capture all the screens needed for the document, then batch process them to produce a standard format. Extras include the full 300dpi bit editor and the ability to playback captured screens as a presentation.

Conclusion

A range of screen capture programs has been covered here and, depending on the features required, one or other of them may be more appropriate. Both Pinch & Punch and Graf-Plus provide good facilities but do have limitations which some may find too restrictive.

Although Halo DPE and PC Paintbrush Plus provide screen capture facilities this is not their primary function, and this is highlighted by their relatively poor performance in this area. If, however, you already have these programs or need their editing capabilities then they may well suffice.

Any choice between Collage and Hotshot Graphics will depend on the functions which are required from the screen capture program.

Pinch & Punch costs £20 from Iolo Davidson on (0453) 860827.

GrafPlus costs £49 from Ctrl-ALT-Deli on (0908) 662759.

Halo DPE costs \$150 from Media Cybernetics on US (0101) 301 495 3305.

PC Paintbrush Plus costs £120 from Graphics Displays on (0793) 512700.

Collage costs £100 from Software Forward on (0234) 272474.

Hotshot Graphics costs \$250 from Symsoft on US (0101) 415 941 1552.

Edward Brown is principal of Cavalier Data and Documents Ltd, a company specialising in desktop publishing. He can be contacted on (0295) 720425.

END

RAW POWER..



- Intel 80386 microprocessor
- Switchable 6/20 MHz clock speeds
- High Speed RAM cache memory (64K-25 ns)
- Super Fast (22 ms) 70 Mb voice coil actuated hard disk drive (110 Mb option)
- 14" VGA colour monitor (Multiscan/800x600 pixels)
- VGA, EGA, CGA, Hercules and MDA support
- 3.5" (1.44 Mb)/5.25" (1.2 Mb) disk drive options
- 4 Mb system memory expandable to 16 Mb
- Enhanced 102-key keyboard
- 6 expansion slots
- 2 Serial/1 parallel printer ports
- Socket for 80387 maths co-processor
- On-site maintenance option
- 12-month warranty

£3,999*

**PC7
TURBO
CACHE**

Substantial savings on education, business and public sector orders.

Authorised Distributors:

■ **CITY BUSINESS SYSTEMS** ■
Micro Peripherals Ltd

Opus Technology Ltd

T H E K E Y N A M E I N C O M P U T I N G

For details call us today on (0737) 765080 or Fax (0737) 769873. *Price quoted exclusive of VAT and carriage.
Opus Technology Ltd, 53 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey RH1 2LW.

REFINED POWER

PC 7 TURBO CACHE 386

When it comes to sheer speed, computing has its own contenders for gold. But in the 20 MHz 386 event one newcomer looks certain to upset the favourites — the PC 7 Turbo Cache from Opus Technology Ltd. Quite simply it's one of the fastest and most powerful 20 MHz personal computers ever produced.

The secret of the PC 7 Turbo Cache is its high speed (25 ns) RAM cache memory which allows zero wait state operation for virtually all of your computing tasks.

Fully OS/2-compatible, the PC 7 Turbo Cache also features a special controller card capable of reading and moving data from the hard disk at twice the speed of conventional machines (1:1 interleaving). Its comprehensive specification also includes VGA Multiscan monitor, fast 70 Mb hard disk drive, the choice of 3.5" (1.4 Mb) or 5.25" (1.2 Mb) floppy, 4 Mb of system memory and an enhanced keyboard.

In short the PC 7 Turbo Cache has the muscle to tackle the toughest applications from local area networking through computer-aided design to desktop publishing. What's more, at just £3,999 + VAT, it can show most of its rivals a clean pair of heels on price as well as performance.



LANDMARK TEST: 30.9
NORTON SI TEST: 23.2

A FIST full of micros

Fantasy Interactive Scenarios by Telephone employ an unusual mix of computer technology to provide hours of entertainment and adventure via a telephone handset. Tony Dennis dials in to describe the development of the services provided by those 0898 numbers.

A new way of playing dungeons and dragons launched earlier this year onto the unsuspecting world may have escaped the attention of all but avid games freaks. Called FIST, the game is accessible over normal telephone lines. Nothing unusual about that, perhaps. After all, hackers were using their modems to play MUDD (Multi-User Dungeons & Dragons) on the computer at the University of Essex many moons ago. The novelty with FIST is that players don't have to possess a micro or terminal of any description.

Dialling into FIST, players can hear realistic sound effects of such fantasy characters as Vampira and the Demon Prince Kaddis-Ra. And then kill them. In order to make such a move, however, all the player has to do is use the telephone handset to dial a number. As an incentive, of course, those who become proficient at killing their opponents then have the chance to win real gold pieces.

FIST, and its recently launched rival, Dial Dr Dark, are especially intriguing since they employ a mixture of computer technology in rather off-beat ways. For example, FIST employs some six hours of digitised voices and sound effects which are stored on hard disk. Microprocessors are also used for recognising the commands given by the player over the phone as well as for dealing with the incoming telephone calls in the first instance. One company, TIC, even has a network of micros to handle its range of services.

The word FIST stands for Fantasy Interactive Scenarios by Telephone and it was specially created for its operator, Computerdial, by Steve Jackson — a leading light in fantasy gaming in the UK. He is best known for his *Fighting Fantasy* books. FIST took to the lines in March 1988 and was effectively the first game of its kind in the UK. Its success has led to FIST II being launched, which is a

separate game called The Rings of Allion. FIST and Rings are rather unusual in that both games can recognise responses made by the caller from rotary dial telephones as well as tone dialling ones.

Technology

A brief sortie into telephone technology would seem appropriate at this point. Currently in the UK the majority of telephone subscribers (approximately 80 per cent) are still using handsets which use the old 'pulse' method of signalling a number to the exchange. As this method originated from phones where it was a matter of sticking a finger into a rotating dial and then turning it, the method has also come to be termed 'rotary dialling' even though the actual moving dial has disappeared from most handsets. The alternative technology is to generate a specific audio tone for each number which the exchange can then recognise.

Most readers will be familiar with tone dialling since it is used extensively by switchboard extension phones. In North America where tone phones are widespread, it was only a short step to utilising audio tones to instruct not just telephone exchanges but a whole range of other telecomms equipment, such as answering machines. Hearing a recorded message saying something like 'Key 1 to leave a message' or 'Key 2 for more information' is now becoming an everyday occurrence for most Americans.

FIST and Dial Dr Dark come under what British Telecom describes as CallStream services for which callers are charged at BT's highest M rate (or what used to be called the Irish Republic rate). This translates to a hefty 38 pence per minute at the standard rate and 25 pence at off-peak times. CallStream services begin with the numerals 0898 and share this price privilege with cellular

radio services like Cellnet and Vodafone. Companies operating CallStream services, however, have to split the profit with BT so they have no real say over charges. The effect is, therefore, to encourage the suppliers to make games like FIST as realistic and spellbinding as possible.

From 12 January FIST won't be alone. Telephone Information & Communication (which is itself part of ICD) is competing directly against FIST with a new service called Dial Dr Dark. This is another fantasy game which has been developed for the company by the rather appropriately named Nightmares for Real. Dr Dark is itself based on the Robert





England film *976 Evil*, so those who have seen the film/video will be at an obvious advantage when playing the telephone game. Unlike *FIST*, Dr Dark will only respond to tone-generated commands.

Jennie Wilson, systems development manager at TIC, admits that her company drifted into the games field rather than setting up specifically for the leisure market like *Computerdial*. TIC had originally been formed to supply financial information to the general public but was left rather high and dry after the share price collapse in October 1987. Jennie Wilson explained: 'Basically, because people lost interest in the market,

they stopped trading (shares). And once they stopped trading, they stopped needing access to financial information. We therefore started looking around at other areas, and sport, leisure and pop were the routes we picked.'

Thus, apart from continuing to operate *Sharecall* (information on share prices), TIC is starting up a number of pop services so people can dial in and listen to their current favourite single. Another good example of TIC's offerings is the *Genius* game which is effectively a quiz based around questions from the *Guinness Book of Records*. TIC therefore has a whole batch of services,

most of which have numbers in the form of 0898 345XXX. In fact, the company is actually responsible for dealing with these last three digits so it needs line-switching equipment.

Hardware & software

It's at this point that matters become rather complicated. British Telecom supplies the incoming lines as far as physical devices known as P-muxes (Primary multiplexers) which are effectively multiplexing (splitting up) the calls from a single 2Mbit/sec feed. The P-mux then passes the incoming calls to DDI (Direct Dialling In) equipment owned by TIC. The function of the DDI unit is to look at

the last three digits dialled by the caller and attempt to link him/her to the service required. Ribbon cables connect the DDIs to several types of 'intelligent boxes' installed by TIC.

TIC has bought a number of different systems from Marconi Speech & Information Systems which go by the names of Keycall, Marcall and Incall. The last two are the easiest to describe since they are 'passive' systems that can best be thought of as giant telephone answering machines. An Incall holds 96 minutes' worth of speech in RAM and can cope with 60 lines. On the other hand, the Marcall holds three to seven hours' worth of speech on hard disk but can cater for only 30 lines. Both machines will support 100 different services from their speech banks.

The most interesting device is the Keycall, the unit that has the job of responding to callers' input (that is, audio tones). It is normally referred to as an Interactive Voice Response Unit, or IVRU for short. Currently these machines are equipped with 380Mbyte Winchester disks capable of storing up to 26 hours' worth of speech/sound effects. The intention is to upgrade to twice the storage capacity with 760Mbyte drives.

These are basically 80286-based machines which were originally designed by a gentleman in the States called Brite, under the auspices of Voice Systems Inc. They are now being marketed in the United Kingdom by Marconi.

The system was originally intended as an advertising vehicle whereby callers could dial in and hear what was playing at the local cinema or what was on special offer at the local

supermarket, for example.

To further confuse the casual observer the guts of these machines have been installed in a box that carries the Sperry name! They have standard 5¼in floppy disk drives as well as internal hard disk drives (in most cases). Interestingly, these micros are all networked together over a proprietary form of Arcnet and, as such, go into an Arcnet hub from Standard Micro Systems.

In their favour the 80286s are not running anything as mundane as MS-DOS. Oh, no! They are running a version of Unix known as QNX which was written by Quantum Software Systems of Ontario. In order to control the Marconi/Brites, Jennie Wilson and colleague Peter Haddow have written what they refer to as IAS (Interactive Audio Systems) code in C, using QNX C from Quantum.

The system also calls for a great deal of information to be held in the form of a database. In the end Wilson ended up using a database package called ZIM from Zante Information of Ontario which is compatible with QNX. Luckily Jennie Wilson has found a UK importer for QNX and ZIM, Genus Systems of Edinburgh, from which she was able to obtain all the necessary user manuals and support.

Despite the hardware complexity, writing the code is relatively straightforward: it is just a matter of telling the system where to look for the right pre-recorded response. The latter may just be a 'passive' announcement or the set response generated by the Keycall recognising a specific choice indicated by the caller sending a particular tone.

Basically TIC has nine of the Marconi units, all networked together. Three are used for development purposes, two hold the administrative databases and the other four are acting as IVRUs.

Jennie Wilson explained that TIC originally opted for Keycall because it was a purpose-built system with the tone recognition abilities already built in. Although it wasn't particularly applicable for the UK market, at least the Brite system had software designed for the US financial market, called Dowphone. This could be used as the model for TIC's own Sharecall service, working with information supplied by the Stock Exchange rather than Dow Jones.

At the time of writing, few details about Dial Dr Dark were available but the company would say that the sound effects were created with professional actors in a sound studio and recorded on reel-to-reel tape machines. The results were then fed into the Marconi systems via their internal digital-to-audio processors. Each sound segment is referenced to a database stored on a separate machine. TIC then writes the IAS code which accesses the database, thus instructing the system which sound effects to play according to the response the caller has selected, and thereby creating the game.

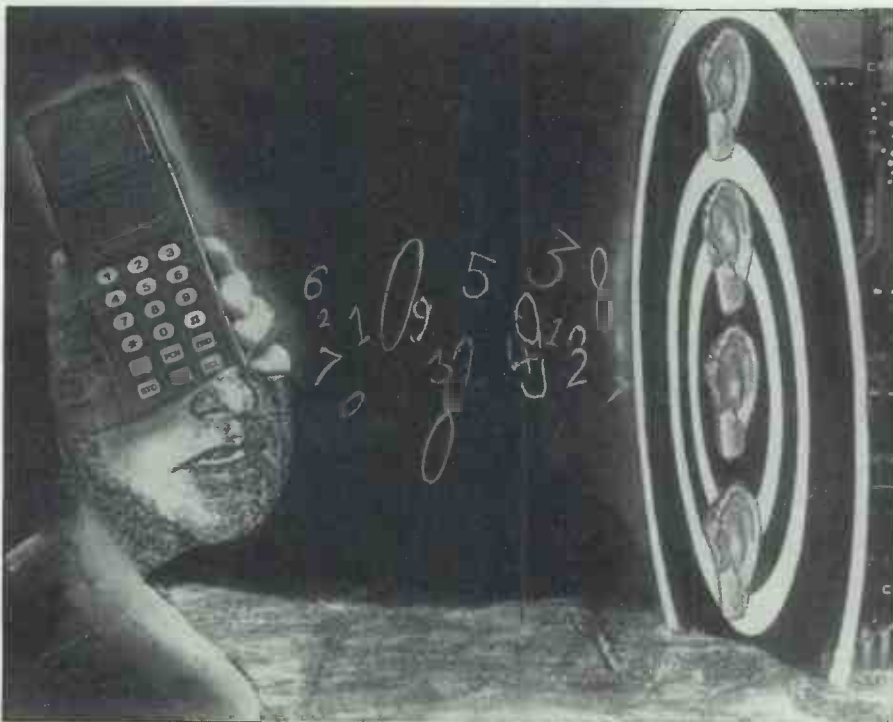
Computerdial

Unlike TIC, Computerdial is using a more homegrown mixture of technology. Each of its systems has 32 individual cards which handle 32 incoming lines, and according to managing director Bret Pirquet, there are at least four of these systems. The line cards are in turn governed by a Eurolog line controller which receives its instructions serially from an IBM PC.

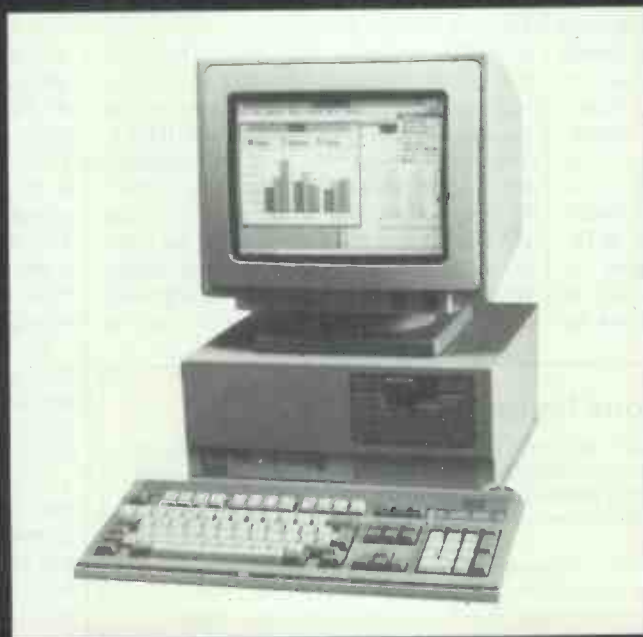
Depending on these instructions, the caller will hear a particular pre-recorded message conveyed by a BTK 30 digital-to-audio processor supplied by Voicetek. The actual messages have been stored digitally on a 150Mbyte Priam hard disk drive. A simple audio jack is all that is needed to load the disk from the BTK processor. Interestingly enough the process is reversible, allowing the caller's speech to be recorded onto disk if so desired.

To record FIST took the equivalent of seven days of studio time. This resulted in some ten and a half hours of tape which was eventually edited down to six hours. The final product was then transferred to hard disk. The result is that it is possible to roam around FIST's Castle Mammon, entering many new locations, and never hear the same message twice.

Some of what the caller hears are



What makes this Olivetti M280 go so fast?



This!

£1375.00

Let's not beat around the bush – this is a very special offer.

An advanced AT – compatible PC from one of the market leaders, for the sort of price you would expect to pay for a Taiwanese clone.

The M280 from Olivetti offers 12Mhz 80286 performance: 1MB of memory; 20MB or more hard disk storage, and a wide range of disk and display options.

Plus the design quality that made Olivetti Europe's No. 1 compatible PC manufacturer.

Frankly, at £1375 for a 20MB system, it's a lot of PC for your money.

But what if you want more?

Fortunately, we can be equally generous towards users with larger storage requirements:

Olivetti M280 40MB £1495

Olivetti M280 60MB £1650

So whatever system you need, you can take advantage of this special summer promotion. Naturally, all the systems have a full 12 month warranty, and are supported by our technical services staff, with full training and maintenance available.

These M280 systems are available from stock. But please hurry – at these prices, they really are going very fast.

**MAYFAIR
MICROS**

Blenheim House, Podmore Road, London SW18 1AJ
Tel: 01-874 6474 Fax: 01-871 9786
Telex: 936066 MICROS G

Prices exclude VAT & delivery

stock sound effects, most of which were manipulated using a Yamaha SPX 90 digital effects processor. In order to provide an echo-prone environment another processor, this time an AMS RMX 16, was brought to bear. Finally, voices were mixed over the top. What a shame that the end result is sent down a telephone line!

The clever stuff comes from the line cards which originate from a French company called Ferma and go by the name of Divaphone 1. Responding to audio tones is relatively easy technically speaking, but these cards have also been trained to handle rotary-dialled numbers through an adaption of voice recognition technology. Basically, the cards are trained to count the number of clicks and calculate the caller's response from that information. A Divaphone card is quite capable of accepting voice-given commands as well (that is, words such as Yes or

No). However, Pirquet maintains that regional variations in British accents make implementing such technology more trouble than it is generally worth. Life is much simpler for all concerned if the system sticks with numerals.

Surprisingly, feeding instructions to the line controllers isn't a complicated task. Computerdial currently has a number of IBM PC/ATs and compatibles like Compaqs which are fitted with AST Fourports. The latter provide the PCs with four serial ports and mean that one PC can control up to 126 lines (four systems). The control program has been written in Microsoft Basic, chosen because of its good string handling abilities. There's no need for any complicated multi-user operating system either. Pirquet admitted, however, that the plan is to eventually migrate to Unix on a VAX with the software being written in C. (Incidentally, Computerdial's Basic code was written by its

own in-house programming team.)

Why did Computerdial go to all the trouble of assembling its own system when speech recognition cards like the Votan for IBM PCs are available from companies such as VSI of Cambridge? As Bret Pirquet explained: 'We looked at other speech-activated interactive systems and found them to be cumbersome and subject to the accent of the caller. We have yet to find an (existing) system which works to our satisfaction.'

In addition, Computerdial needed a system which could cope with large numbers of simultaneous calls. The advantage of its current setup is that all the cards are rack-mounted rather than sitting inside individual PCs. With Computerdial's existing system it is possible to update all 32 cards simultaneously with a new message. There's no need to insert floppy disks into a multitude of individual PCs each time a change has to be made.

In order to operate the service, Computerdial was originally able to obtain site-specific authorisation from BT. However, the company has been developing a more compact version of its system which received the appropriate BABT approval last summer. The deliverable product has yet to be finalised but it will probably have eight line cards inside a typical PC casing. The system will naturally be running a version of Computerdial's own program.

One potential application is sales order processing where the system recognises a credit card number dialled by the caller, checks the credit rating via a separate modem link, then records the caller's spoken address so that the product can be sent out.

Over and out

With Computerdial soon to market a BABT approved system, a great many similar services should soon start to spring up in the UK. The ability to accept rotary-dialled responses effectively provides the mass market required. Add to this the potential to respond to voice commands as well as recording speech back to disk, along with the facility to link up with other external services (the Stock Exchange, credit card companies, and so on) and the scope for innovative new applications is enormous.

FIST and The Rings of Allion are available on (0898) 800876. More details from Computerdial, 7 Leapale Road, Guildford, Surrey GU1 4JU.

A demo of Dial Dr Dark is available on (0898) 345976. More details from TIC, 16 Hatton Garden, London EC1N 8AT, tel: (01) 242 1002. Marconi Speech & Information Systems is on (0705) 664966.

Genus Systems is on (031) 225 6924.

VSI (Votan cards) is on (0223) 862327.

END

How to access telephone fantasy scenarios

What is the best way to access such services? The straightforward approach would be to swap your existing telephone handset with one which is switchable between pulse and tone dialling. With such a phone it is possible to call up one of these services using standard/pulse dialling, then flick the switch to tone and start issuing commands.

Some readers might even be in for a pleasant surprise. British Telecom doesn't often publicise the fact, but many subscribers are already on System X style exchanges which handle both tone and pulse dialling. If this is the case, those subscribers will find that tone dialling works anyway. And it's worth changing over since calls connect much faster using tone dialling.

A recent trip to London's Tottenham Court Road revealed that it is quite possible to purchase a switchable phone for under £30 (including VAT). For those who are interested, one such device is an Answercall Trojan 3000 which costs £29. It isn't too difficult to spot other switchable phones going at lower prices (around £19) but closer examination will reveal that such equipment is missing the Green Circle sticker (indicating BABT approval). To our knowledge no one has actually been prosecuted for using unapproved telephones, but is it worth taking the risk?

An alternative route is to buy a tone generator from one of the CallStream suppliers. Both Computerdial and ICD can supply such devices for around the £10 mark (and they have BABT approval too). All the user has to do is hold the device close to the telephone mouthpiece and key the appropriate numeral. The generator then emits a tone which should happily travel down the phone line.

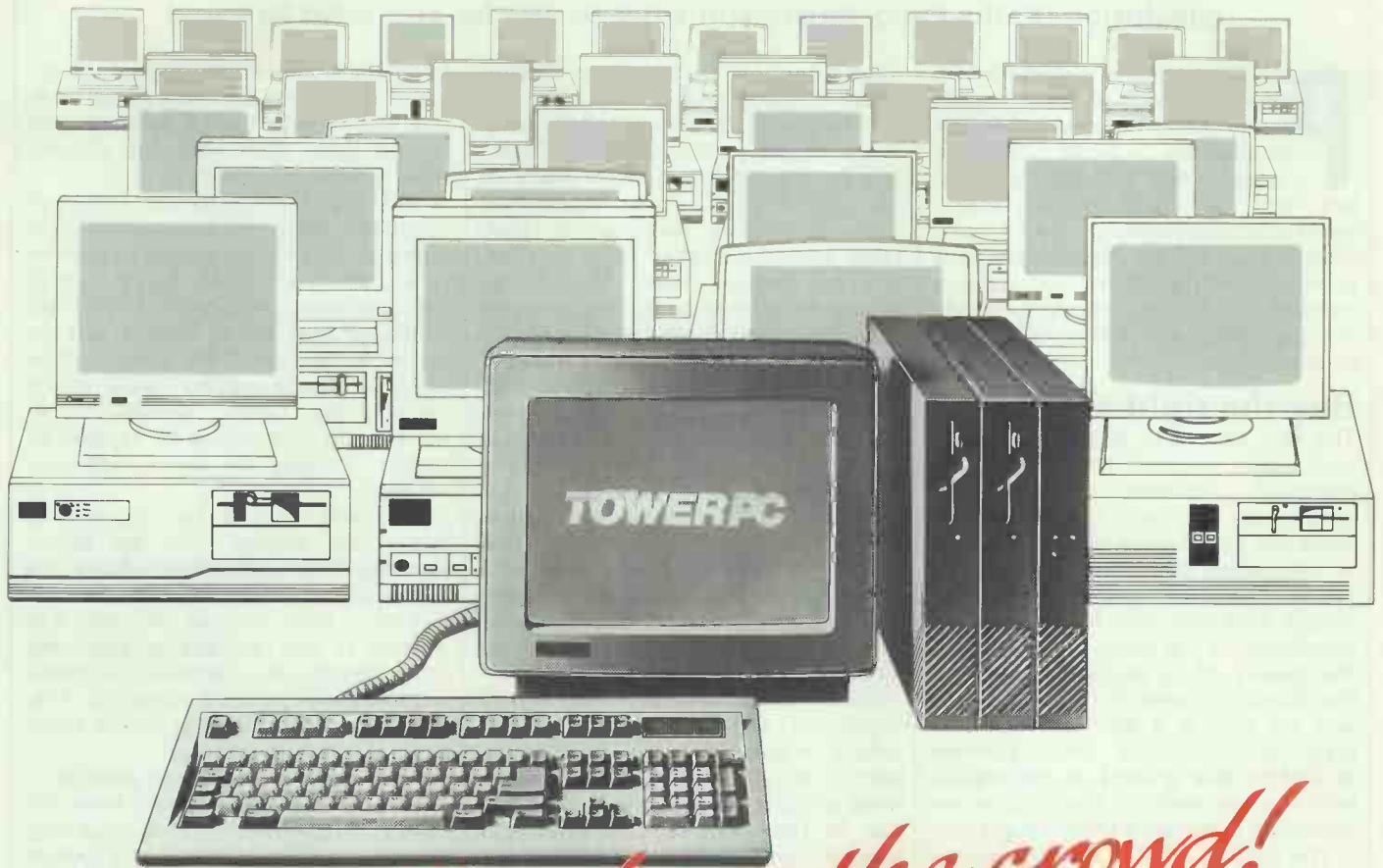
The best deal seems to be offered by Computerdial which supplies a tone generator with its £10 Adventurer's Pack along with details on how to play the game. According to Computerdial's Bret Pirquet, the company is supplying them almost below cost in order to promote the game.

Before rushing out to buy a generator, it might be worth joining one of the trendier building societies first. These companies have been supplying their members with tone generators so that they can call up a similar system to check their current balance, pay a particular bill, and so on. Members are asked to supply a £10 cheque which will only be cashed if the generator isn't returned. A building society beeper will work just as well on FIST as it will with the Nationwide/Anglia!

There are even ways of persuading a typical autodialling modem to generate the right tones since the majority of modems support tone dialling anyway. Cobbling together a routine which generates Hayes commands is one possible way to make it work. It's really a question of plugging the handset and the modem into the same BT socket using a two-jack adaptor. Dialling with the handset will then prevent the modem from dropping the line. Determined readers will probably be able to come up with their own more elegant ways of doing this.

Obtaining a tone generator or tone phone will be a major boon with FIST since it will allow a player to take advantage of the special 'limbo' feature which cannot be activated by rotary dialling. This facility allows a caller to store his/her character against a PIN number which remains active for 30 days. It therefore provides a means of rejoining the game at a specific point without the need to start over again. (Incidentally, those on System X exchanges will be doubly lucky in not only being able to use tone phones but being able to hear the games better through superior line quality!)

Schneider Computers



...stand out from the crowd!

You can be forgiven for thinking that all desktop microcomputers look the same, because, until now, they have. However, the arrival of the new range of micro's from Schneider sets new standards in design, performance and value for money. After all as a leading West German consumer electronics manufacturer we have a reputation to protect.

Our new range of PC compatibles really does stand out from the crowd — take a look at the stylish entry level Euro PC, the versatile performer which is equally at home with the beginner, the home computer enthusiast or the small businessman.

Alternatively there is the Tower AT, the trendsetting new 80286 micro processor based computer with modern soft-line styling and a processor unit with a unique Tower-style modular concept which means that it can easily be expanded to meet increased data storage requirements.

For those requiring powerful computing performance in an attractive and conveniently transportable package the Portable AT is the obvious choice.

Ask your Computer Dealer for details of the trend setting Schneider range and don't forget that each model comes complete with Microsoft Works, the leading integrated software package (worth over £140) comprising word processing, spreadsheet, database, graphics and communications.

 Schneider
Made in Germany

SCHNEIDER COMPUTERS LIMITED
Schneider House, 5 Harrowden Road, Brackmills, Northampton, NN4 0HW.

All trade marks acknowledged

Laser lines

Trying to produce good-quality laser printer output without paying attention to some important little details can lead to a disastrous conclusion. Kathy Lang shows you what to aim for and what to avoid.

Properly handled, output from a laser printer can look significantly better than even the best daisywheel, while printing many things a daisywheel cannot, and can come close to low-resolution typesetting. Badly produced laser printer output can look pretty appalling. There are quite a number of things you can do to make sure you come out on the side of the angels.

Buy the right system

The first step is to acquire, not only the right printer, but also well-matched software and other peripherals such as a scanner. If you have not yet bought a system, proper integration should be high on your list of criteria. For example, whatever others may tell you, the amount of resolution in the scanner does affect the quality of its output, as well as the levels of grey it can handle. If you are buying a 300 dots per inch laser printer, then your scanner should be able to work at that resolution too, as well as handling a respectable number of levels of grey.

The basic quality of the printed results should also, of course, be a significant criterion. It is a good plan to organise a simple set of test files which can be output on each printer you are considering. If you haven't yet bought the desktop publishing software, go for test files which are widely available, such as the Ventura Capability Page on IBM PC systems. And it pays to evaluate these in relation to your own applications.

For instance, if you don't print many illustrations, it makes sense to go for a printer which produces good characters even if its graphics are not so hot. This is often a basic choice, since most 'write white' engines give excellent solid blacks, but tend to be slightly fuzzy around the edges of characters at small point sizes; whereas 'write black' engines tend to show the reverse characteristics.

Using good consumables

Just as it pays to buy good-quality floppy disks, it also pays not to skimp on printer consumables if you want good results.

The element requiring renewal

most often will be the toner. Buying decent quality not only helps get good printing, it also, perhaps even more important, helps to avoid damage to the more expensive parts of the printer itself. Toner which has larger-than-usual particles, or contains spurious matter such as dust, can do serious harm. The printer manufacturer will be able to suggest authorised suppliers of toner cartridges; these now include most of the big mail-order companies, who carry a much wider range than they did even a year ago. Their stock also turns over faster, so you should not be sold toner which is past its 'use by' date. (That happened to me once. I was reassured by the supplier that it did not matter, and since I was desperate for the stuff and it was the day before Christmas Eve, I had to reluctantly believe him. But the results proved him right.)

Some toner cartridges are made expensive by their sealed design (which makes them easier to transport). It may seem that all you really need to do is replace the toner powder in the existing cartridge, and several firms provide a service for refilling the most popular of this type of cartridge. I have not tried this route myself, and am rather wary of it, since it is impossible to check the quality of the toner supplied for impurity or coarse particles.

The increasing availability of the most popular brands makes it worth shopping around, and if you have the space and don't mind losing (or paying) interest, it may be substantially cheaper to buy in bulk.

Probably the most important thing is to establish a regular source of supply, and to check this out before buying the printer. Some less common brands may be hard to find, at least in small units (perhaps two cartridges at a time rather than six). And the longer you store your toner, the more important it is to make very sure that it is in a completely dry place, since damp toner tends to stick everywhere it shouldn't.

Keep it clean

Any equipment which works by charging and discharging surfaces will attract and generate a lot of dust. And particles of toner will sometimes

build up at vulnerable places inside, causing streaks on the printed output. The outside can be cleaned with an ordinary cloth, but the insides need special treatment.

Most suppliers of consumables sell complete cleaning kits, which provide part of what you need at exorbitant cost. It is usually better to buy the elements separately; that will probably cost more initially but be much better value for money. The platen and other rollers inside, which occasionally need cleaning, can usually be cleaned with typewriter platen cleaner or with isopropyl alcohol.

No fluid should be allowed to come into contact with the drum. Lint-free (that's *vital*) cotton buds and thin wipes are very useful for removing toner from internal crevices. It is unwise to use for this purpose the compressed air aerosols supplied with general-purpose cleaning kits, since you risk blowing loose toner around inside the printer.

All this advice applies in general — your printer manual should have detailed instructions about cleaning, and it pays to check it out before buying or using cleaning materials.

Paper for conventional printing

Laser printers work by depositing particles of toner, through an electrical process, onto areas of paper. For this to work well, you also need good and appropriate quality paper. Printers vary quite widely in the maximum thickness of paper they can handle, but most can tolerate at least 100gsm, which I have found to be the best for routine office printing of final copies. (It is more expensive than lighter-weight paper, so I generally also keep some 80gsm for draft work.) The paper should be uncoated, like ordinary office copier paper, so as to absorb the toner. I use Conqueror High White Wove and get quite good results.

It is wise to avoid the laid papers often used for letter-head stationery (you can tell them by the crinkly surface) because the electrical process deposits ink unevenly on this surface, unlike the impact process used by daisywheel printers. (This can oblige you to hunt around to find

Qume ScriptEN

Version 47.0 Revision 1

Defined Font Outlines

Times®-Roman
Times-Bold
Times-Italic
Times-BoldItalic

Helvetica®
Helvetica-Bold
Helvetica-Oblique
Helvetica-BoldOblique

Courier
Courier-Bold
Courier-Oblique
Courier-BoldOblique

ITC Avant Garde®-Book
ITC Avant Garde-Demi
ITC Avant Garde-BookOblique
ITC Avant Garde-DemiOblique

Palatino®-Roman
Palatino-Bold
Palatino-Italic
Palatino-BoldItalic

New Century Schoolbook-Roman
New Century Schoolbook-Bold
New Century Schoolbook-Italic
New Century Schoolbook-BoldItalic

Helvetica®-Narrow
Helvetica-Narrow-Bold
Helvetica-Narrow-Oblique
Helvetica-Narrow-BoldOblique

ITC Zapf Chancery®-MediumItalic
ITC Zapf Dingbats®
Symbols Set

ITC Bookman®-Light
ITC Bookman-Demi
ITC Bookman-LightItalic
ITC Bookman-DemiItalic

Qume ScriptEN

Version 47.0 Revision 1

Defined Font Outlines

Times®-Roman
Times-Bold
Times-Italic
Times-BoldItalic

Helvetica®
Helvetica-Bold
Helvetica-Oblique
Helvetica-BoldOblique

Courier
Courier-Bold
Courier-Oblique
Courier-BoldOblique

ITC Avant Garde®-Book
ITC Avant Garde-Demi
ITC Avant Garde-BookOblique
ITC Avant Garde-DemiOblique

Palatino®-Roman
Palatino-Bold
Palatino-Italic
Palatino-BoldItalic

New Century Schoolbook-Roman
New Century Schoolbook-Bold
New Century Schoolbook-Italic
New Century Schoolbook-BoldItalic

Helvetica®-Narrow
Helvetica-Narrow-Bold
Helvetica-Narrow-Oblique
Helvetica-Narrow-BoldOblique

ITC Zapf Chancery®-MediumItalic
ITC Zapf Dingbats®
Symbols Set

ITC Bookman®-Light
ITC Bookman-Demi
ITC Bookman-LightItalic
ITC Bookman-DemiItalic

Different brands of copier paper produce widely varying standards of output

coloured paper, since few suppliers stock coloured paper in a wove finish, especially in heavier weights.) It is as well to be sure that the toner is quite dry on the paper before you make large piles of printed sheets, especially if you have to fold them for insertion in an envelope.

In the US, there is an increasing trend towards paper sold specially for laser printing. It is, of course, more expensive, but some reports suggest that it is worth it for high-quality work. Certainly not all copier paper is suitable — the samples above were printed by the same printer on the same day, using two different brands of paper from the same manufacturer. As usual, it is worth experimenting before you stock up with reams of the wrong stuff.

Every computer user knows that, far from bringing about the paperless office, the computer is the worst enemy trees have. Desktop publishing, which encourages you to tweak your output many times to get it just right, has just exacerbated the situation. You may be tempted to recycle the wasted paper, or you may

want to print on both sides anyway, but this is very unwise if your printer is not explicitly recommended for this mode of use.

Some printers leave a lot of static on the paper, causing paper jams. Others curl the edges of the paper in passing it between the rollers, and again tend to jam when the paper goes through the second time. Worst of all, once-printed paper may scatter odd bits of toner through the machine as it goes through the second time, doing your machine no good and affecting the quality of printing adversely.

These problems may be felt most keenly when printing addresses. Envelopes have to be hand fed on most laser printers, so that's definitely out. The obvious alternative is labels. But the number of addresses you need to print rarely coincides with the number of labels on a sheet, so you may be tempted to pass a sheet through again to avoid waste. But the dangers of passing a sheet of labels through more than once are significantly greater than for ordinary paper, and I don't think the game's worth the candle. (I once got a label

stuck in a matrix printer. Ninety minutes later, as I withdrew the last tiny piece, I swore never to risk that again — and it would be much worse on a sensitive instrument like a laser printer drum!) I've gone over to window envelopes for everything — they don't look at all bad if they match your stationery properly.

Paper for camera-ready copy masters

When preparing camera-ready copy on paper, which will be used by a (human) printer as masters in the duplicating process, different considerations apply. To give the clearest possible image, the general consensus seems to be that, rather than use an uncoated paper into which the toner can be absorbed, a coated paper is best. This produces a sheet in which the image is slightly raised from the surface, and there will be no blurring of character edges caused by absorption of toner into the paper surface.

Such pages need careful handling, however, since the same characteristic makes them likely to smudge, or even to lose part of the image by sliding off the page. Heavier paper gives better results, too. Putting those two constraints together, 120gsm blade-coated paper has been recommended to me by several people who ought to know.

Fonts

Another major aspect of quality is the availability of the right fonts. All laser printers come with a basic set of fonts: on PostScript printers these are usually Helvetica, Times Roman, Courier and Symbol, while on printers which use bit-mapped fonts (such as the Hewlett-Packard LaserJet and its emulators) there is no such unanimity. Your ability to use extra fonts depends on three things: the market view taken by font suppliers, the depth of your pocket, and the amount of memory on your printer. All typefaces (the styles from which particular fonts are built) were designed by humans who, either themselves or through typesetter manufacturers or type suppliers, own the copyright.

Manufacturers supplying cheap printers to the mass market try to keep the cost down by implementing their own typefaces, usually in imitation of the standard designs; this is one reason why the same text may take up different amounts of space in two fonts with almost identical names. (This need be no handicap unless you plan to use your printer to proof material which is later to be typeset, of which more later.)

A more serious problem may be the aesthetic quality of the typeface;

Choosing your typefaces

When deciding on the ideal typeface for your work, you should bear in mind that at different sizes, different typefaces may be more or less suitable.

<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Palatino 6 point: serif face, not readable</p>	<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Helvetica 6 point: just readable</p>
<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Galliard 6 point italic: fussy and serif, worse than Palatino.</p>	<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Helvetica 6 point bold: on the borderline</p>
<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Helvetica 8 point: getting clearer</p>	<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Stone Sans Serif 6 point: not as good as Helvetica</p>
<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Helvetica 8 point bold: just readable</p>	<p>1234567890 1234567890 1234</p> <p>Garamond 12 point: thin uprights for digits</p>
<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Garamond 18 point: even at this size, uprights still small</p>	<p>1234567890 123456</p> <p>Stone Sans 8 point</p>
<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Stone Sans 8 point bold</p>	<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Stone 8 point as printed</p>
<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Palatino 8 point</p>	<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Stone 12 point.</p>
<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Palatino italic 8 point: fussy serif just readable</p>	<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Galliard 10 point italic: now readable</p>
<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Galliard 8 point.</p>	<p>The quick brown fox</p> <p>Helvetica 18 point: OK for headlines, but how boring otherwise!</p>
<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Galliard 18 point: readable and interesting</p>	<p>The quick brown fox</p> <p>Helvetica 10 point</p>
<p>The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog. The quick brown fox jumps over the lazy dog.</p> <p>Palatino 10 point</p>	<p><i>The quick brown fox jumps over the lazy dog.</i></p> <p>Zapf Chancery 18 point: italic only. Note how the narrow characters and large x-height make it look cramped</p>

many typeface designers will tell you that you get what you pay for, in fonts as in most other things. Supplementary fonts are not, however, cheap to buy whatever your printer; prices vary from around £100 to £250 or so, depending on what is included in the package.

Price, plus the length of time needed to download fonts, are the main reasons why some PostScript printers, usually named with the suffix Plus, come with a larger set of basic fonts. This usually comprises (in addition to Helvetica and co) Avant Garde, Bookman, Helvetica Narrow, New Century Schoolbook, Palatino and Zapf Chancery Italic, plus Zapf Dingbats with its range of more unusual symbols.

There are several sources of supply of PostScript fonts, among them Adobe (the originator of the PostScript language, which supplies through Aptec and Letraset), Bitstream Fontware (distributor Aptec), Qume and Publisher's Type Foundry. Adobe, and other suppliers such as Qume, simply supply packages of disks, each containing one or more typeface in several styles, which can be installed directly. Bitstream fonts must be installed first, using an installation program which is bought separately (though included in that package is the medium weight of Bitstream's specially designed laser font, Charter). This makes Bitstream fonts more expensive per set, unless you plan to buy several.

Bitstream fonts can also be used with Hewlett-Packard LaserJet printers, and others which emulate them and permit downloading; an additional benefit is that you can create fonts larger than those available on the basic printers of this type. For cartridge-based printers, Fontware supplies a range of font cartridges called DoubleTops in which the grouping of fonts is such that a wider variety of styles and sizes is available on each cartridge, thus reducing the need to change cartridges. Fontware also provides a service for creating customised fonts and logos, in both cartridge and outline form.

The typefaces available vary among the suppliers, and include both conventional fonts and those designed explicitly for laser printers.

By and large, the more curvy and 'fussy' a font is, the more trouble you will have in getting good, precise results from your laser printer, especially in smaller point sizes, because of the limitations of 300 dots per inch. Other features to avoid include heavily contrasting stroke thicknesses — in particular, the very thin strokes found in, for example, the digits in Garamond often do not

print well, and relatively closed hollow letters such as O and P.

Some fonts designed for laser printers are, by contrast, rather dull for my tastes. My personal favourite among them is the Stone range from Adobe, which very usefully includes semi-bold varieties as well as bold, giving you three levels of emphasis in a single typeface, and three styles: Serif, San Serif, and Informal (similar to Souvenir). This combination makes it easy to get a good variety of styles and weights, yet you can be sure, even if you are not an expert on typography, that all the variations will harmonise well.

On laser printers with a resolution as low as 300 dots per inch, readability at small typesizes is often a problem. In general, San Serif faces will be easier to read; Helvetica's reliability in this area is one reason for its tremendous popularity. Fortunately for the reader, such material is not usually meant to be read at length — it is usually parts lists, catalogues and the like, where data compression is vital — otherwise readers would see dots before their eyes in no time.

The availability of a wide range of fonts has great attractions, but it can also go to your head and give your readers eyestrain. Some fonts are more suitable for particular applications than others — for more details see my article 'If the face fits, print it' in *PCW's Desktop Publishing* supplement, June 1988.

Briefly, it is better to keep to two fonts for a single document, and to at most four variations of size, weight and style on one page. Every change of font, size, style and weight should have a reason — don't just alter them arbitrarily, but try to 'style-code' text just as you might colour-code your keys or your Filofax pages. And the universal conclusion of the vast amount of research on reading suggests that capital letters are harder to read than lower case, and that underlining distracts the eye from the text it is supposed to emphasise.

Graphics

Very few page make-up systems have adequate facilities for creating graphics, so you must import them from other packages or from scanners. This immediately raises questions of scaling and orientation. It is important to match the scaling applied to a graphic to its original scale. For example, if you create a graphic file in Encapsulated PostScript format, you, or the program which writes the EPS file, must include at the start of the PostScript code a bounding box. This defines the extremities of the graphic, usually in points. If you then import this

graphic into Ventura, and if you make the size of the frame identical to the dimensions of the bounding box in the EPS file, the graphic will appear at exactly the same size as the original. You can then scale it appropriately if you need to, ensuring that Ventura uses the Maintain Aspect Ratio option to keep the relationship between the dimensions in step.

Not all packages allow you such exact control over scaling, but at least, if you begin with having the imported graphic the same size as the bounding box, you will start with the correct relative dimensions.

Page & document design

This is not the right place, and I am not the right person, to give you an extended lesson on page design. But some brief general rules hold good for most types of publication: by and large, you need a good reason for breaking them, and this is most likely to happen when creating something to be really eye-catching.

Balance is probably the most important aspect of a well-designed page: for example, top and bottom margins should be about the same size, though sometimes the bottom needs to be slightly larger to avoid the text appearing to 'fall off the bottom' of the page. Left and right margins need not match each other, but should either be the same on every page or mirror each other on left and right pages.

Balance is important within the page, too: for example, if you have several figures all near the top of two facing pages, the pages tend to look top-heavy. Cueing — in headers and footers — also needs to balance, for example by putting the chapter or document title at the outside edge of each header. And readers tend to see the upper and outer quarter of right-hand pages most often when browsing, so this can be used to attract attention, for example, in a manual, by starting each major section on a new right-hand page.

I hope these comments are enough to start you thinking: for more on page design, try John Miles' book *Design for Desktop Publishing*, published by Gordon Fraser.

Gilding the lily: reduction

If you are producing master pages on your laser printer, which will subsequently be used for replication either by photocopying or by conventional printing, you may get better results if you produce the masters larger than the final desired page size, and reduce to final size when duplicating. It is important to remem-

ber that reduction affects the overall dimensions of all margins and of any columns, as well as the size of the characters and of line spacing, and allow for this in your page design.

If your material includes graphics, still greater care is needed. The best approach is to create some sample pages, including graphics as well as text, and get these reduced to the final size to see how they look, before you make any irrevocable decisions about layout.

Proofing

You may use your laser printer only or occasionally as a proofing device, to make sure copy is correct before it is typeset. At present, the only way to be sure of getting entirely compatible results from page make-up programs such as PageMaker and Ventura is to proof on a PostScript printer, send the output to a PostScript file, and have the copy run out on a typesetter with a PostScript RIP.

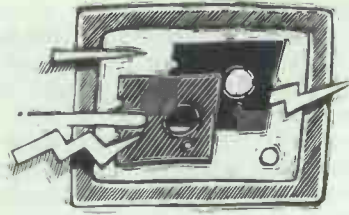
If you do not go for this combination there may be inconsistencies, such as different line endings or column or page breaks. There is also some suggestion that the width tables used by Bitstream fonts are not identical with those used by Adobe, and hence even if the typeface has exactly the same name on the Linotron, the results may not be identical.

This is just one aspect of a wider problem, the coincidence of fonts on your proofing printer and the typesetter — not every Linotron will have the complete range of available fonts since they are expensive to buy. And even where the fonts are the same, the character sets may have some minor variations. As with reduction, serious experimentation, including all the fonts and styles you plan to use, and a test file of all characters involved (such as that provided with Ventura) is an essential preliminary to serious work.

PostScript's virtual monopoly in this situation has strengthened considerably in the last six months, with all the major typesetter manufacturers falling into line, concluding agreements with Adobe to produce their own PostScript machines.

Putting it all together

The secret of success, overall, is to test every link in your chain before you put any weight on it. This applies to buying a system in the first place, but it is also relevant to producing good final results. For example, when generating masters for final printing, you should check the process through to duplicating one or two masters, to make sure the duplicated version is as readable as you expect it to be. **END**



Oracle Developer

What are the advantages — and disadvantages — of a powerful mainframe relational database implemented on a PC? Mike Liardet gets to grips with the complex and expensive Oracle Developer.

Relational databases are currently one of the great growth areas in mini and mainframe computing. A number of relational database management systems (RDBMS for short) are available on PCs, and traditional micro database companies such as Ashton-Tate are frantically (and ill-temperedly, according to many accounts) implementing their own versions as well.

In this article we are going to look at one particular PC version of one particular RDBMS, Oracle Developer, but before going any further we should pose the question of why the reader should be interested in any RDBMS on a PC. Why should he give up his elegant and simple PC database system for all the complexity (and expense) of an RDBMS?

There are two ways of analysing this RDBMS/PC marriage. Firstly, for a PC user, we should consider: what are the possible benefits of an RDBMS; and secondly, for an RDBMS user: what are the benefits of a PC?

For the established PC user, the main benefit of switching to an RDBMS, the one that finally might prise him away from his favourite PC database product, is that an RDBMS offers solid multi-user capability via networked PCs (and other hardware). All data can be shared, with all staff having instant access to the latest information in the organisation. This can even benefit traditionally off-line activities like spreadsheeting, by guaranteeing that the various budgets and financial models are based on the most recent figures and not on some floppy disk copied several weeks previously.

Another benefit to the PC user is greater expansion capability. If an application were ultimately to out-grow the PC, it could instantly be transferred lock, stock and barrel, programs and data, onto a larger

machine, and without a major rewrite. Also, RDBMS are not based on *ad hoc* database techniques but all conform to well known standards (ANSI and IBM), and accordingly have a strong measure of compatibility with one another. Thus an organisation opting for a particular RDBMS on a PC is not really putting all its eggs in one basket, but has a number of future options to change either hardware or software relatively painlessly.

Looking at the marriage from the other viewpoint, PCs also have a role for established RDBMS users, arising from the PC's capability as an inexpensive calculating engine. An RDBMS can eat up mainframe power at an alarming rate, and some of its functionality (notably the 'forms' that handle user interaction) can readily be off-loaded onto PCs. And, of course, application development falls into this category too. If an application can run unchanged across all different types of hardware, then why tie up expensive mainframe resources during a project development? Instead, let the developers work on PCs, running their resource-hungry compilers and debuggers, and then only transfer the application to its ultimate destination towards the end of the project. And this is precisely where Oracle Developer comes in...

Getting started

Oracle appears highly intimidating on first inspection. Firstly there is the plethora of manuals, and then there is the fact that it comes on no fewer than 18 disks. It's a big system, with a lot in it!

Unfortunately, because of Oracle's size it will not run on an ordinary PC, but requires the power of an AT or compatible and at least 896k of extended memory in addition to the machine's 640k fitted as standard. Not surprisingly, with 18 disks of

software a hard disk is mandatory, and Oracle will eat up 8Mbytes if all the facilities are installed — and that's before you start using it for any data.

Because it uses extended memory the 640k of ordinary non-extended memory is barely touched by Oracle, so any other applications on the PC should still be runnable as normal.

The machine used for this review was a Dell 286 with a 20Mbyte disk and 1Mbyte of extended memory. Oracle was installed by simply running the installation program contained on one of the supplied disks. This program directs the whole installation operation, with simple, clearly worded instructions and explanations. It can even automatically adjust your system's configuration files should they not be correctly set up for Oracle's requirements. The whole process took about 30 minutes of tedious swapping in and out of disks, and set up demonstration tables in the database, help files, and absolutely everything you subsequently need.

Before any Oracle work can proceed the kernel must first be loaded into extended memory. There is a special program to do this, which could easily be run from the Autoexec.Bat file when the system is first switched on. Thereafter, the Oracle facilities are run directly from DOS — there is no overall menu for the system.

SQL*Plus

The SQL*Plus component of Oracle allows the user to query and change the database via a complex and powerful set of commands. As the name implies it is an implementation of SQL, but with additions to the ANSI standard, such as the ability to modify the structure of database tables after they have been created.

SQL stands for Structured Query Language, but do not be misled by

```

--SQL--
The next 15 lines come straight from the database...
EMPNO  ENAME  JOB  MGR  HIREDATE  SAL  COMM  DEPTNO
7329  SMITH  CLERK  7902  17-DEC-8  800  300  20
7499  ALLEN  SALESMAN  7698  20-FEB-8  1600  300  30
7521  WARD  SALESMAN  7698  22-FEB-8  1250  500  30
7566  JONES  MANAGER  7839  02-APR-8  2975  20  20
7654  MARTIN  SALESMAN  7698  28-SEP-8  1250  1400  30
7698  BLAKE  MANAGER  7839  01-MAY-8  2850  30  30
7782  CLARK  MANAGER  7839  09-JUN-8  2450  10  10
7788  SCOTT  ANALYST  7566  09-DEC-8  3000  20  20
7839  KING  PRESIDENT  17-NOV-8  5000  10  10
7844  TURNER  SALESMAN  7698  08-SEP-8  1500  0  30
7876  ADAMS  CLERK  7788  12-JAN-8  1100  30  20
7900  JAMES  CLERK  7698  03-DEC-8  950  30  30
7902  FORD  ANALYST  7566  03-DEC-8  3000  20  20
7934  MILLER  CLERK  7782  23-JAN-8  1300  10  10
Avg Salary Calc  2873.214
    
```

Press HELP (F1) any time. (Begin SQL with \$, formula with +, command with /.)

```

===== EMP =====
EMPNO 7329 ENAME SMITH
JOB CLERK MGR 7902
HIREDATE 17 DEC 80 SAL 800
COMM 300 DEPTNO 20
    
```

Char Mode: Replace Page 1 Count: 1

Oracle provides a spreadsheet-type facility for viewing tables of data

A simple screen-based form for entering or viewing information

this; it can handle more than just queries, and it is not really that highly-structured. It is at least a language — a command language in fact — and at the heart of nearly all RDBMSs. I cannot go into great detail about SQL here but I'll give the reader just a flavour, with some observations on Oracle's implementation of it.

The key concept behind relational databases and SQL, the usual language used to manipulate them, is that the data is organised in 'tables', where each row in the table represents a 'record' of some item, and each column represents a property or feature (a 'field') applying to all these records.

On page 180 there are three tables with which we shall be working throughout this article. They represent part of a personnel database. To read the EMP table observe that each row represents an employee, and the columns represent various employee attributes — for example, the JOB column of EMP specifies what jobs the employees do, and so on. Notice that the different tables cross-reference one another, with more information on a particular employee's department becoming available if his or her department number is looked up in the DEPT table. Similarly, an employee's grade can be ascertained by checking his salary against LOS-ALs and HISALS in SALGRADE.

SQL*Plus enables commands either to be typed in and executed directly from the keyboard or run non-interactively from batch files. The listing on page 182 is of a fairly typical (brief) interactive session with SQL*Plus. The session starts from DOS command level — as I have said, the Oracle system has no overall menu control. Notice that the user has to log in to the system first, with a password.

Oracle maintains tight security on all aspects of the database, and the

security system can restrict individual users to access only certain tables, or even just parts of tables, or to be denied the option to make changes, and so on. Clearly, the security is essential in multi-user applications but of rather less importance for a single-user developer.

Following the log-in, the SQL> prompt is displayed to indicate that SQL*Plus is ready for user input. The commands typed alongside it were keyed in directly at the keyboard, and numbered within comments (/x Statement x */) so that they can be referred to here. The system's responses followed immediately after each command and generally disappeared off the top of the screen before I could read them — that is, until I discovered the SQL*Plus Set Pagesize and Set Pause commands.

Nine SQL commands were used, briefly summarised as follows:

- 1 Display the entire contents of the EMP table;
- 2 Display the entire contents of the SALGRADE table;
- 3 Display everything on employees earning between £800 and £1100;
- 4 Display the employee number and name, for grade three employees;
- 5 Change employee number 7329's department to 30;
- 6 Visual check that it really happened to precisely one employee.
- 7 & 8 For the whole organisation display the management structure under the heading HIERARCHY (in a 'sawtooth' format, so we can see that Jones, Blake and Clark report to King; Allen and Ward report to Blake, and so on along with each employee's level from the top of the organisation, his number, manager and department.
- 9 Finish and return to DOS.

This simple session only scratches the surface of SQL*Plus. There are a number of other basic SQL commands to create and delete tables, add or delete fields from tables, and

insert and delete records. The Select command is even more powerful and flexible than we have shown here. And there are a number of more exotic SQL*Plus facilities, typically restricted to a skilled 'database administrator' — commands to improve database performance, assign new users and monitor existing users.

There is also a Help facility in SQL*Plus. Simply type 'help' followed by topic required, and you are treated to a screen version of a section from the *SQL*Plus Reference Guide*. As the *Reference Guide* is arranged alphabetically for ease of reference, and it has a bigger page size than the PC, it is simpler to just use it directly and ignore Help altogether.

To an experienced PC user, the lack of menus, windows and function key facilities in SQL*Plus may seem a little barbaric, but be reassured: this is only Oracle revealing its mainframe origins. To be fair we should say here that, in a number of areas, Oracle Corporation is now striving to attain the higher standards of user interaction pioneered by PC software. And one of its newer products, which may overcome some of these objections, is Easy*SQL. Easy*SQL is not included with the Developer, but will shortly be available as an option for the PC.

SQL*Calc

SQL*Calc is a fairly standard spreadsheet system, working much like, say, Lotus 1-2-3, but without the graphics, and without what Lotus refers to as 'database'. Of course there was no way Oracle Corporation would get involved with implementing this level of rather puny RAM-only 'database' facility!

As with all Oracle programs, SQL*Calc cannot be run without first logging into the database. This feels slightly odd in this case as it is quite feasible to use SQL*Calc as a stand-

alone spreadsheet system and without touching the database. However, once logged in all the normal spreadsheet interaction and facilities become available.

Formulas, text and numbers can be entered into cells on a 256 x 8192 worksheet. As with all spreadsheets you can't use the entire worksheet area on offer because PC memory is insufficient for this amount of data. Some interesting effects happen if you try and use the bottom right-hand corner of the area (cell IV8192): recalculation becomes alarmingly slow, even for trivial two or three-cell models. It's best to keep to the top left.

The interesting part of SQL*Calc is its interface to the Oracle database, which allows data in the database to be read into the spreadsheet and subsequently written back. This is achieved by entering SQL statements into the cells, distinguished by a leading '\$'. To get data into the worksheet a Select statement would be used, for example:

```
$select * into &a2 from emp
```

This statement reads all the data in the 'emp' table into the worksheet starting at cell A2. The column headings are included, and the table is loaded into the worksheet in a fairly obvious fashion, each worksheet row corresponding to a row in the table. Once loaded, calculations can be performed with the data in the normal way.

The screendump on page 179 shows the 'emp' table loaded, and then the average of all the salaries calculated by:

```
+avg(f3.f16)
```

Of course, the Select statement can be used in all its full generality with

search conditions, sorting and calculations, and so on. SQL*Calc also allows Update, Insert, Delete and Lock SQL commands to be placed in the spreadsheet. All SQL commands are distinguished from other entries by the preceding '\$' and they are displayed as ***SQL***.

There is an 'Oracle' option on the main menu which contains all the other database-specific spreadsheet facilities. Its options are:

- **Table** — a facility to create or re-create tables. The column names for the table and the data itself can be read straight out of the worksheet;
- **Rollback/Commit** — standard database management facilities to undo (rollback) or finalise (commit) any changes to the database during the session, or rather since the last 'commit';
- **Logon** — it is possible to log in to the database as an alternative user, without quitting and restarting the spreadsheet session;
- **Options** — when a table is loaded (by a \$select...) the system checks there is room for it in the area specified, and warns the user if there is not. The Options option enables this checking to be switched off, or for excess rows to be ignored;
- **Show-info** — lists the database tables available to the particular user currently logged into the database;
- **Execute** — The system does not redo any of the SQL statements when it does a spreadsheet recalculation, as this would not normally be required. Instead these statements must be re-executed under separate control, from the Oracle/Execute option. Since it is not normally required to execute the whole lot together, each different type of statement can be re-executed independently.

SQL*Forms

SQL*Forms is the Oracle facility for designing and then running screen layouts to interact with the end user. Without forms, data entry and modification to the database would have to be in SQL, using Select, Update, Insert, and so on. This would just about be acceptable for a skilled programmer, but quite worthless for the less expert users who will typically be running Oracle applications.

At its simplest it is quite feasible to set up a simple form in less than two minutes. Such a form might enable a user to view, add, delete and modify records in a single table, but would not involve any further complexities. The first form shown on page 179 was created in about this time, and allows the user to work with the EMP table below.

To create a form, the forms designer facility must first be used. When a form has been designed a 'generator' compiles the design into a state that can be used by the third program, the 'forms processor'.

The forms designer is menu-driven with a complex range of options, and its function keys take a little getting used to. This is mainly because the documentation describes a generalised version of the system, and it is necessary constantly to cross-reference a list of keyboard assignments which tell you that, for example, [Accept] in the documentation means function key F2 on the PC keyboard.

To set up a simple form is simply a matter of running the designer, specifying a name for a form and a name for the table it will access, and asking for the default setup. This automatically designs the second form shown on page 179. The prompts on the screen, and the areas where data will actually appear (the fields) are all put in place by the system making appropriate choices of defaults.

However, with the designer it is possible to be considerably more complicated than we have shown here:

- Validation can be specified for each field so that any data entered for a particular field can be checked for range, type, and so on;
- Forms can be spread across several pages if the quantity of information is too great to fit on a single screen;
- In multi-table applications forms can be split up into 'blocks', where each block handles a different table;
- 'Triggers' provide a powerful processing capability, where following an 'event' (usually a user data entry), arbitrary calculations and

EMP							
EMPNO	ENAME	JOB	MGR	HIREDATE	SALARY	COMM	DEPT NO
7329	SMITH	CLERK	7902	17-DEC-80	800.00	300.00	20
7499	ALLEN	SALESMAN	7698	20-FEB-81	1,600.00	300.00	30
7521	WARD	SALESMAN	7698	22-FEB-81	1,250.00	500.00	30
7566	JONES	MANAGER	7839	02-APR-81	2,975.00		20
7654	MARTIN	SALESMAN	7698	28-SEP-81	1,250.00	1,400.00	30
7698	BLAKE	MANAGER	7830	01-MAY-81	2,850.00		30
7782	CLARK	MANAGER	7839	09-JUN-81	2,450.00		10
7788	SCOTT	ANALYST	7566	09-DEC-82	3,000.00		20
7839	KING	PRESIDENT		17-NOV-81	5,000.00		10
7844	TURNER	SALESMAN	7698	08-SEP-81	1,500.00	0.00	30
7876	ADAMS	CLERK	7788	12-JAN-83	1,100.00		20
7900	JAMES	CLERK	7698	03-DEC-81	950.00		30
7902	FORD	ANALYST	7566	03-DEC-81	3,000.00		20
7934	MILLER	CLERK	7782	23-JAN-82	1,300.00		10

DEPT			SALGRADE		
DEPT NO	DNAME	LOC	GRADE	LOSAL	HISAL
10	ACCOUNTING	NEW YORK	1	700	1200
20	RESEARCH	DALLAS	2	1201	1400
30	SALES	CHICAGO	3	1401	2000
40	OPERATIONS	BOSTON	4	2001	3000
			5	3001	9999



United We Stand. Divided We Stand, too.

Many businesses have already discovered that WordPerfect®, PlanPerfect®, and DataPerfect® are united by more than the good name they share. Each program shares a similar interface. Each program integrates with the others. And each program comes with free lifetime support.

In fact, they're so unified, some people may overlook their independence.

For example, PlanPerfect stands up to the best spreadsheet programs on the market.

DataPerfect, with its rapid look-up, sets new standards for database software.

And, of course, one word processor stands out among the rest—WordPerfect.

Tie these products together with WordPerfect Library™ and you're on your way to forming a perfect union.

So, if you were going to buy WordPerfect programs just because they stand so well together, don't.

Buy them because they stand so well alone. Too.

SENTINEL
SOFTWARE

Wellington House, New Zealand Avenue · Walton on Thames, Surrey KT12 1PY · (0932) 231164

WordPerfect and DataPerfect are registered trademarks of WordPerfect Corporation. PlanPerfect and WordPerfect Library are trademarks of WordPerfect Corporation.

A typical Oracle session

SQL> select * from emp;

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7329	SMITH	CLERK	7902	17-DEC-80	800	300	20
7499	ALLEN	SALESMAN	7698	20-FEB-81	1600	300	30
7521	WARD	SALESMAN	7698	22-FEB-81	1250	500	30
7566	JONES	MANAGER	7839	02-APR-81	2975		20
7654	MARTIN	SALESMAN	7698	28-SEP-81	1250	1400	30
7698	BLAKE	MANAGER	7839	01-MAY-81	2850		30
7782	CLARK	MANAGER	7839	09-JUN-81	2450		10
7788	SCOTT	ANALYST	7566	09-DEC-82	3000		20
7839	KING	PRESIDENT		17-NOV-81	5000		10
7844	TURNER	SALESMAN	7698	08-SEP-81	1500	0	30
7876	ADAMS	CLERK	7788	12-JAN-83	1100		20
7900	JAMES	CLERK	7698	03-DEC-81	950		30
7902	FORD	ANALYST	7566	03-DEC-81	3000		20
7934	MILLER	CLERK	7782	23-JAN-82	1300		10

14 records selected.

SQL> select * from salgrade;

GRADE	LOSAL	HISAL
1	700	1200
2	1201	1400
3	1401	2000
4	2001	3000
5	3001	9999

SQL> select * from emp where sal between 800 and 1100;

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7329	SMITH	CLERK	7902	17-DEC-80	800	300	20
7876	ADAMS	CLERK	7788	12-JAN-83	1100		20
7900	JAMES	CLERK	7698	03-DEC-81	950		30

SQL> select empno,ename from emp,salgrade
2 where grade=3 and sal between losal and hisal;

EMPNO	ENAME
7499	ALLEN
7844	TURNER

SQL> update emp set deptno=30 where empno=7329;

1 record updated.

SQL> select * from emp where empno=7329;

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7329	SMITH	CLERK	7902	17-DEC-80	800	300	30

SQL> update emp set deptno=30 where empno=7329;

1 record updated.

SQL> column hierarchy format a21;

SQL> select lpad(' ',2*level) || ename hierarchy, level, empno, mgr, deptno
2 from emp
3 connect by prior empno = mgr
4 start with ename = 'KING';

HIERARCHY	LEVEL	EMPNO	MGR	DEPTNO
KING	1	7839		10
JONES	2	7566	7839	20
SCOTT	3	7788	7566	20
ADAMS	4	7876	7788	20
FORD	3	7902	7566	20
SMITH	4	7329	7902	30
BLAKE	2	7698	7839	30
ALLEN	3	7499	7698	30
WARD	3	7521	7698	30
MARTIN	3	7654	7698	30
TURNER	3	7844	7698	30
JAMES	3	7900	7698	30
CLARK	2	7782	7839	10
MILLER	3	7934	7782	10

14 records selected.

other consequences can be invoked.

- Forms can also be multi-record, where a number of records can be tabulated beneath the column headings.

Normally the generator program can be invoked as an option within the designer program, but due to memory limitations this is not possible on the PC, and the designer program must be exited and the generator run independently. When this has been done the form can be used. (The usual Oracle security arrangements apply before any information in the database can be accessed.)

Conclusion

Oracle Developer has a mainframe 'feel' about it, in terms of size, scope, and (on the minus side) user interaction. It contains an amazing breadth of facilities, too many to mention here, and a great deal of power once you can get to grips with it.

The Oracle software is really a family of products and tools, all of which relate to the central relational database in one way or another. Oracle Developer does not encompass the full range.

The price of Oracle Developer is pitched at a PC level but it is really the spratt to catch the mackerel, and everything that follows is at a higher rate. Don't forget that the Developer can only be used to develop applications, and that to actually run them involves purchasing Oracle Professional, which costs considerably more.

The above points indicate that a considerable commitment is being made when purchasing Oracle Developer. It is not just a matter of spending £400 on a piece of PC software, but ultimately a great deal more money will be spent if the system is to be used as intended: staff training, outside professional expertise, network hardware, maintenance agreements and further Oracle software purchases are all likely to follow as a natural consequence of the initial purchase.

Prices

- Oracle PC Developer: £399
- Oracle PC Professional: £1600
- Lotus 1-2-3 add-in: £200
- Maintenance: £550 per year

Versions of Oracle for larger machines are typically priced in tens of thousands of pounds.

Oracle Corporation UK can be contacted at Oracle Park, Bittams Lane, Guildford Road, Chertsey, Surrey KT16 9RG. Tel: (093287) 20220.

Thanks to Dell for the loan of a Dell 286 for this review. They can be contacted on (0344) 860456.

END

MIN-MAX MAINTENANCE FOR MINI/MICRO COMPUTERS

Your Computer Maintenance is costing you too much – why?
Are you paying too much for machines that never break down?
Are you tied to one repairer?
Are you getting the service you require?

If these questions raise a doubt in your mind, then perhaps you should consider an alternative method which may allow you to save money and choose your own repairer.

R.J. LANGMAN INSURANCE BROKERS LIMITED have arranged a Computer Breakdown Insurance Cover with a leading International Insurer which offers you an alternative.

The cover is arranged for business use Mini & Micro Computers up to 5 years old. The first payment for Min-Max Maintenance is 6% of the new replacement value (minimum £500 premium per policy, not per machine). If you have no claims during the course of the year, that is all it costs you. If you have numerous claims, then your total costs will increase to 11% of the new replacement value – but it doesn't cost you this straight away. All you pay is £250 each time you claim, no matter how much the value of the claim. But your total contribution during the year will not be more than 5% over your initial payment. To summarise – the charge will be 6% if no claims are made, and the maximum additional cost, (no matter how many claims are made), will be limited to an additional 5% in £250 steps

Even if you pay the maximum (and all claims after this are free) this compares very favourably with most dealers maintenance contracts, and its your choice who you want to repair the machine.

The cover includes:

- A) Electrical and mechanical breakdown
- B) Replacement of components likely to fail in the near future
- C) Hire fees for temporary equipment if your machine is taken away for repairs

The cover does not exclude: Wear, Tear or Gradual Deterioration arising from an internal cause.

If you would like a Proposal Form and Specimen Wording please complete and return the attached reply card to: R.J. LANGMAN INSURANCE BROKERS, ENSIGN HOUSE, ADMIRALS WAY, SOUTH QUAY, LONDON E14 9RS TELEPHONE: 01-538 0959

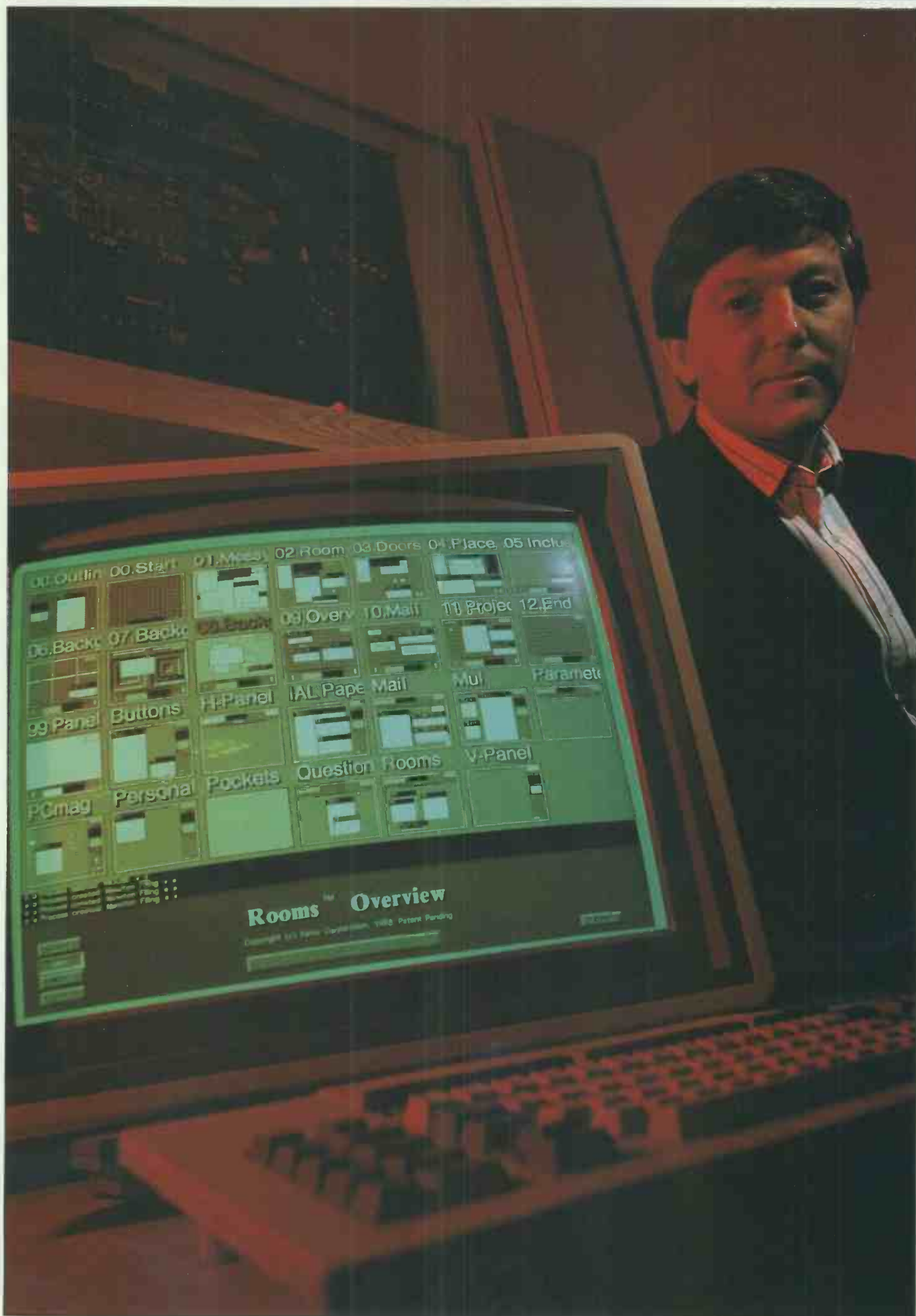
PLEASE SEND ME A PROPOSAL FORM AND SPECIMEN WORDING IN RESPECT
OF YOUR MIN-MAX MAINTENANCE COVER

COMPANY NAME: _____

ADDRESS: _____

TELEPHONE NO: _____

CONTACT: _____



Changing rooms

In the last of his visits to Xerox EuroPARC David Tebbutt learns about Austin Henderson's work in tailorability and development, and his belief in reconciling system design with the changing needs of the user.

Austin Henderson spends his life whizzing between the Palo Alto Research Center in California and the UK equivalent, EuroPARC in Cambridge. When in the UK, he heads up the Tailorability and System Development research efforts. He is a kind of human bridge, facilitating cooperation between the two laboratories.

Henderson's view of the world is that effective systems aren't simply designed by producers then used by users. They are developed over time by a wide range of individuals from the system architect right through to the end user. Feedback from the various participants results in change both before and after the product reaches the market. Once in use, people adjust their work practices to accommodate the new technology and, as the nature of the work changes, the technology is modified still further.

Photocopier patterns

Although his research centres around computer systems, Henderson likes to illustrate the points he makes by using the photocopier as an example. Installing a photocopier is not just a case of plonking it on the floor and expecting everyone to use it. People need to decide things like where it will go, what systems it replaces, who will operate it and how it will be paid for. They then have to figure out how to make the most of it. It's bound to have features they hadn't anticipated and, maybe, lack some they had expected.

Users find themselves involved in the process of discovery, each trying to assess how the copier affects their own work. They all ask themselves 'is this new machine better for me, or worse, than what I had before?'. This adaptation of the individual and the environment to a new system is central to Henderson's research. His team studies the processes of adaptation and looks for ways of helping users and designers to come up with better systems.

Even a relatively rigid product like a photocopier stimulates new patterns of usage as people's awareness grows. The manufacturer will try to build into the machine as much flexibility and user control as possible.

After all, the last thing it wants is for users to call each time they want to do something new.

If the humble photocopier stimulates new patterns of usage, computers must do this to a far greater degree. All the more reason for putting control of this adaptation into the hands of the users. Henderson wants to push design as far down the development chain as possible. He thinks that design is a process which should continue even while the product is in use, partly because users often don't know what they want until they start using it.

To continue the photocopier analogy, Henderson talks of users finding that the image doesn't fit on the paper, so they re-orient it or use a different size. This is an admittedly trivial example of what he refers to as 'design continued in use'.

Henderson regards photocopiers as mid-way between low-tech unchanging systems, like paper and desks, and high-tech complex and malleable technologies like computers. Even with static technology like paper, we adapt it to our needs as we use it. We fold it, tear it, staple it and file it according to our personal preferences. But, once other people start to get involved in our paper systems, things change. It then becomes part of a wider system.

The public use of paper involves a lot of agreement between the affected parties. How is it to be filed? Where? What about access by other people? Conflict arises if everyone does their own thing. And that's just paper.

This sort of problem is at the heart of Henderson's tailorability issue. It's the need to reconcile the interests of the individual with those of the group. It's also a question of striking a balance between the design of the system and the user's preferred way of doing things.

Henderson's team focuses much of its research effort on tailorable human interfaces. These enable users to experiment with changes to their systems without the active involvement of any of the systems designers, developers, analysts, consultants, support staff and tinkerers who usually have a hand in the more conventional systems. For such a system

to work it has to be very easy to use and, in EuroPARC's view, be as simple as moving icons on the screen.

Rooms

Henderson is co-inventor, with Stuart Card, of just such a system, called Rooms. This is a window management system which lets users assemble 'Rooms' of the programs and data they need for different tasks. In the 'Mail Room', for example, they may have a word processor, an electronic mail program, a chat window, an address book and an on-line diary. This kind of system works very well, but Henderson would like to find ways of enabling users to make even more complex alterations to their systems.

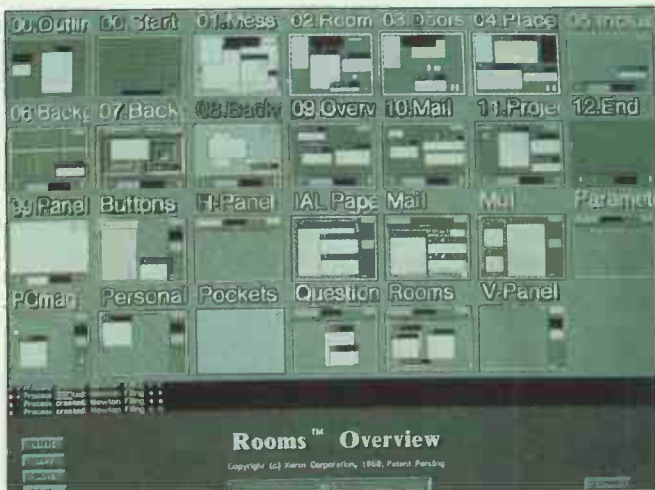
One of the major causes of user alienation and dissatisfaction with computer systems is that they cannot articulate exactly what they require of the end system. In fact, they usually don't know because they have no idea of what the system will be capable of. What is delivered is usually the system developer's interpretation of what he or she thinks the user wants. Blame is hurled back and forth but it's not really anyone's fault. Until users are actually sitting in front of the finished product, they don't fully realise what they should have asked for in the first place.

Henderson would like to see users in this situation being able to take the design further and to adapt it to their particular working methods. He wants them to be able to imprint their own way of working on the system. So, rather than simply replicating their working practices, the computer will begin to complement and enhance them.

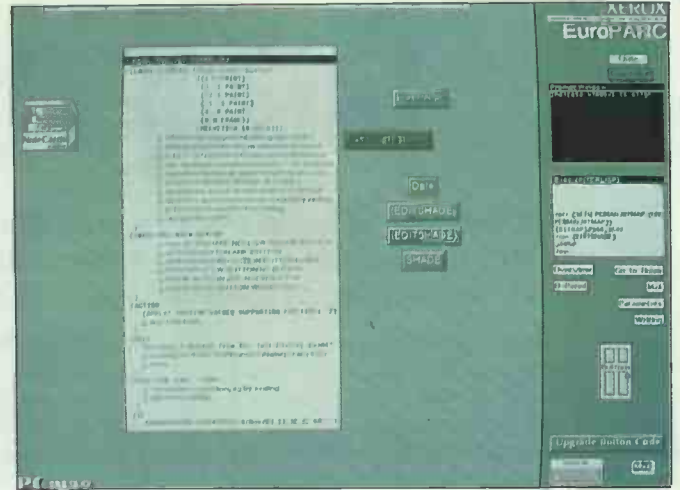
When users are able to tailor their systems, they will often want to share their discoveries with others. They will also want to find out about other people's discoveries to see if the problem they face has already been solved.

Traditionally, programmers have been well known for their resistance to other people's ideas, preferring instead to reinvent their own version of the wheel. This is usually called the NIH, or Not Invented Here, syndrome. Apparently, NIH is less of an issue among users when the solution

INSIDE XEROX EUROPARC



Overview of the rooms in Henderson's own system



The code which drives the Exec Event button

is directed at improving their work environment. Henderson actually had someone else's 'discovery' running on the screen while he was being interviewed. The program simply stepped through a series of clip art illustrations to prevent 'burn in'. Henderson was obviously immune, but it was highly distracting for the interviewer (me).

Henderson would like to design hooks in the technology to help users to find others of like mind, and locate the community of users who are most likely to want to share ideas with each other. He returns to the copier for more parallels. Setting the contrast for pink forms might be a problem. One day, someone discovers the right combination of settings. Their community is all the 'pink form users'. One way of communicating the discovery might be to install a bulletin board on the wall by the photocopier. This would be a user-implemented solution. Or, if the designer of the machine gets to hear about it, he or she could build in a special panel onto which users can stick post-it notes.

This, at the photocopier level, is how patterns of use are developed and shared and the technology evolved. Actually, Henderson believes that non-technological solutions like this are often appropriate, even among a community of networked computer users. He believes 'it is the arrogance of the technologist to assume that all problems have a technological solution.'

On the InterLISP computer system at Xerox, users are able to hide all sorts of complexity, from a note to a full-blown application, behind a device called a Button (see also last month's EuroPARC article in PCW). In one sense Buttons are similar in concept to keyboard macros. InterLISP can be driven from direct commands, some of which can be very complex.

Rather than run the risk of error, Henderson simply makes the most common ones into Buttons, activating them whenever he needs to repeat these commands.

The difference between a Button and a keyboard macro is that the Button is a movable, copiable object and it can be a keyboard sequence, a program or a document. Henderson says: 'I, who can do something arcane, can do something at my workstation, put it in a Button and send it to someone else.' A Button can be sent over electronic mail, on disk, through a direct link or through a chat window hooked up to another user. This is one way of sharing discoveries with others in a way which is very simple for the users. When the Button arrives at its destination, a click of the mouse button activates it and the program executes or the document is displayed.

Henderson's 'Rooms' is also a deceptively simple technique which enables users to define the computer resources they need for any task. This enables them to overcome the limitations of a small screen and the problems which come from trying to display too much information at the same time. When Henderson was dreaming up Rooms, he reckoned that a typical user would need a screen the size of a dining table to display all the possible activities and files. This was obviously impractical and led to the idea of having a different workspace for each task.

A Room is simply a screen, which displays all the application windows a user needs for a given task, in the layout best suited for that task. A user might have a programming room, a writing room and so on. Some applications may, and usually will, appear in several different Rooms. 'Door' icons can easily be defined, which take the user directly into other Rooms. Moving from one

Room to another causes all the windows in the current Room to be closed and those in the new Room to be opened. Users can, if they wish, take active windows with them when they change Rooms. Otherwise, the new Room is in exactly the state it was left in the last time it was used.

Another way into a Room is to go in through the Overview, a display of all the Room icons. If users have the time, they can design some quite elaborate Room icons and Room layouts just as they can with the real rooms that they live and work in.

Designing Room layouts and icons doesn't involve the users in any systems analysis and design, they just do it. The benefits of icons and background designs are that they make the workspace attractive and they also make it easier to find Rooms. Since the creation of a Room is so simple, users will even find themselves setting up *ad hoc*, or transitory, Rooms for one task and then throwing them away immediately afterwards.

The creation of a Room results in a source code file in Rooms' own LISP structure. The more adventurous users (programmers perhaps) can edit these and create new ones from scratch. Most users will make their Rooms simply by opening windows and moving icons into them. The source code would then be generated automatically.

In Henderson's EuroPARC world, everyone has access to a Xerox workstation running InterLISP and which is networked. His environment is designed so that no-one else can rummage around from their remote workstations. If he wants to share stuff with others, he likes to do it explicitly. He would like to see a system that incorporates security measures which give remote access to certain Rooms to appropriately authorised visitors. Some would still re-

The day Roger Jackson sent his first mailshot.



I was impressed by the fact that Star have now produced a great looking little budget printer with a 24 pin head.

I was impressed by its excellent quality – the 8 resident fonts available and its high density letter quality helped me produce a really professional mailshot.

I was impressed by the extremely swift draft elite speed of 170cps and LQ elite at 57cps and the standard 7k buffer.

I was impressed by the special push-tractor feature that allows the LC24-10 the lowest possible tear off and its ability to 'park' continuous paper and load single sheets automatically – so there's no need to remove the continuous.

I was impressed by the touch-button front control panel that makes using the printer an absolute dream.

But most of all, I was particularly impressed with myself.

Because my Star LC24-10 was so inexpensive and no other printer comes close for sheer quality and value-for-money.



THE
Star
COMPUTER PRINTERS

Star Micronics U.K. Ltd.
Craven House, 40 Uxbridge Road,
Ealing, London W5 2BS.
Telephone: 01-840 1800.

A division of
Star Micronics Co., Ltd., Japan.

Please tell me how the Star LC24-10 can handle my printing needs.

Name _____

Company _____

Address _____

Postcode _____ Telephone _____

Or just call Belinda on 01-840 1829.

PCWLZ411

Behind the Doors

In last month's article, we learned the importance of passing on, to future designers and programmers, the rationale behind an application. It would be relatively easy for someone to pick up the Rooms ideas and to take them further. What they may not appreciate is why the program has been designed the way it has.

Henderson and Card identified nine desirable properties for a user interface which would enable users to switch between tasks. Most user interfaces concentrate on helping the user follow the current task through to completion. The truth is that users like to switch back and forth between several concurrent tasks. With a command line system this is exceedingly tedious and, even in a normal windows-based system, much effort can go into moving, resizing and repositioning windows and shrinking and expanding icons. Added to the physical problems are the mental ones of keeping track of all the various tasks and their related data files.

The two problems Henderson identifies in task switching are: a) the amount of time it takes; and b) the complexity of remembering how to invoke the other task and how to get into mental context. He and Card identified three related requirements for an effective task-switching system:

- Fast task switching
- Fast task resumption
- Easy to re-acquire mental task context

Fast task resumption is necessary when the new task is a digression or a short sub-task. And users need to get back 'in the swing of things' more or less instantly.

A user might need to work with rapid access to a couple of word processor documents, a files browser, a prompt window, a thesaurus, a dictionary and a clock. The user may not be able to have all these windows open at the same time, so the access time is slowed while windows are closed and new ones opened. These observations led to three additions to the requirements list:

- Access to large amounts of information
- Fast access to information
- Low overhead

Although users do switch between tasks, they are only involved in a single task at a time. This led to the decision to set up independent workspaces around each task and to allow fast transitions between them. But the task environments quite often require access to the same resources. This led to the next three requirements:

- Engaged Tools shareable among several tasks
- Collections of Engaged Tools shareable among tasks
- Task-specific presentation of shared Engaged Tools

'Engaged Tool' is the term used to describe a Tool and the data it contains which makes it unique. The three properties above enable an Engaged Tool to be used in multiple tasks, for groups of regularly used tools to be used in different tasks, and for the appearance of the Engaged Tool to be varied in different tasks.

The Rooms concept, that of a screen-sized workspace containing a number of Engaged Tools, was created to enable the rapid transition between tasks. The icon-like Doors give a one-way route into another Room. Any Room may have several Doors.

Because users will want to use the same window in multiple rooms, Henderson and Card had to allow it to change its position and appearance between tasks; otherwise it would impose an impossible constraint on the design of subsequent Rooms. They came up with the abstract concept of Placement,

which combines the identity, position and presentation of a Window in a Room. This splits the functional aspect of the window as a Tool from its appearance and position on the screen.

Many users will want collections of Engaged Tools to appear in a number of different Rooms. Furthermore, they will want all changes made to the collection to appear at the other locations as well. An example, according to Henderson, might be a control panel with an executive window, a prompt window, a clock and a system memory indicator. The answer they came up with was Room Inclusion, the ability of one Room to contain another. This way, the common elements could be defined in a Room of their own and then that Room could be included in all the other Rooms that required the information.

Sometimes users will want to carry Engaged Tools to another workspace or they may want a permanent collection of Engaged Tools to go around with them, regardless of destination. In the first case, the users can enter a mode in which they select the windows to be carried to the next Room, then they go through the door. In the second case, the act of going into the next Room causes the permanent set of Engaged Tools to appear on the screen. The user would have defined these as a Room first. Henderson describes the first of these methods as putting the Engaged Tools into the user's Baggage and the second as filling the user's Pocket.

As you can imagine, a complex set of Rooms with all sorts of interconnections can cause serious navigational problems. The most obvious of these is how to get back to the Room last used. The answer comes in the form of a Back Door. Because Doors are one-way, Rooms automatically creates a Back Door, in inverse video, which takes the user back to the Room they just came from. This Back Door is destroyed after a single use.

Henderson and Card have provided two solutions to users who have forgotten which rooms exist and how to reach them. The first is a pop-up menu of all the Room names. The other is the Overview mentioned earlier which contains a set of Room pictographs. Each looks like a miniature screen showing its layout and reminding the user of the Tools it contains. The name of the Room is underneath and they are all listed in alphabetical sequence. Other help is provided by allowing the user to instantly expand a Room pictograph to full size or to call upon a drawing command to show how the Rooms are connected.

The final set of facilities relate to the user's need to quickly change the arrangements of Tools and windows in the various Rooms. While in a Room, the user can create, move shape and delete windows. At the Overview level, the user can copy, move, reshape and delete windows and have the changes reflected within the Rooms.

Users also need to save, restore and share their Rooms with other Users. This is all done using the ubiquitous Buttons.

The discoveries made as a result of the development of Rooms are that users experience a strong psychological sense of relief when their tasks are separated into different Rooms. They actually end up with a far larger workspace - Henderson estimates it is the equivalent of between one or two five-foot desks in terms of raw screen space.

The users tend to make three different types of Room. Firstly they have functional Rooms, such as a mail Room. Secondly they have project Rooms, for the different tasks upon which they're engaged. Thirdly they have management Rooms where they keep Tools for systems initialisation, storage management and so on.

main strictly private. Within those Rooms, individual documents might be sensitive, so they might be fronted by a marker saying something like 'For information about this, please call Fred Bloggs.'

Summary

Summarising his work at EuroPARC, Henderson says that the thing to be tailored is not just the technology, it's the practice of its use. The tech-

nology is at the centre, but it is work which is being tailored. He stresses the fallacy of seeing design and use as separate stages in the creation of a usable system. He focuses instead on design as an on-going process while a product is in use.

He thinks it is worth pulling out the theme of substrates. The different people involved in the design process operate to different timescales, using different skills.

He reiterates the aim to push as much as possible of a system's tailorability down towards the user, but without making it compulsory. Users should be able to use a system as it arrives. The attitude should be 'you can tailor it if you want'.

He wants the technology to help the social process of information exchange, especially through the capture of knowledge and of its communication. **END**

Some people are getting more colour for a lot less money this year

Some people already know how to bring a little colour into their lives without breaking the bank. Now Opus Technology Ltd. would like to offer you an all-year-round solution.

The PC IV Turbo is a new generation, enhanced graphics IBM XT-Compatible computer with a price tag that's making its competitors more than a little browned-off.

At just £995* it offers a quality 14-inch EGA colour monitor, 20 Megabyte hard disk drive and 10 MHz performance, all for several hundred pounds less than its major rival.

There's one final reason for choosing the PC IV Turbo. Unlike the lady on the left its colour will never fade!

- 8088 microprocessor
- super-fast 10 MHz performance
- 14" high-resolution EGA colour monitor
- Graphics chip supporting EGA, CGA, MDA (text) and Hercules monochrome graphics
- 20 Mb hard disk drive
- 360K 5.25" floppy disk drive (3.5" 720K/1.4 Mb option)
- 768K motherboard memory (expandable to 1Mb)
- Parallel and serial printer ports
- Mouse port
- 2 free expansion slots
- UK-style 84-key keyboard
- Super-small footprint case



£995*

PC IV TURBO

Opus Technology Ltd

For details call us today on (0737) 765080 or Fax (0737) 769873. *Price quoted exclusive of VAT and carriage.
Opus Technology Ltd, 53 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey RH1 2LW.

Operating difficulties

Derek Cohen seems to have started something with his recent comments on OS/2. This month he responds to criticism of his views, explains why we're networking the PCW office, and spends some time on the floor switching jumpers.

Letter to the editor

Dear Sir

I am horrified and quite amazed at your apparent lack of understanding about OS/2. Indeed, your article ('From the top', PCW December) contains technical inaccuracies — for example, saying that OS/2 sessions would be frozen when the DOS box was entered.

Programs like DesqView and Windows only run existing applications in a pseudo multi-tasking environment. No additional function or feature is added. The environment is somewhat unstable and no protection exists for program crashes.

OS/2 provides re-entrant processes, stability for errant programs, and the ability to write applications that could never be done under DOS/DesqView/Windows. Why do you think that companies like Lotus have not released their long-awaited group productivity tools?

You have also failed to understand what motivates any large company to standardise on an operating system. The software has to provide a base for future growth — in such environments systems are the key. The individual PC is now part of a much larger structure, be it LAN or a HOST/PC symbiotic environment. Have you ever tried running a 3270 session, Token Ring drivers and a large 640k package at the same time? I have and it is not possible.

You espouse the virtues of Unix, and so on. These are fine multi-user ASCII environments but they are most unsuitable for the SAA environments that will come. In addition, they too require large amounts of memory to run effectively. With the lower-cost LANs now appearing, a multi-user environment will be based on cooperative processing and server/requestor technology and not on ASCII/serial systems.

Mike Gove

Senior technical analyst
Sun Alliance Insurance Group

Mike Gove's letter, printed above, deserves a considered reply. For a start, I must acknowledge my error in saying that, under OS/2, when you are running a program in the compatibility box, all OS/2 applications are frozen. I checked this with a number of colleagues from different pub-

lications and they all agreed with me. Further checking with a Microsoft representative reveals that in fact the OS/2 applications continue to run. But it is a measure of how little take-up there has been of OS/2 that this misconception is so widespread.

What concerns me more about Mr Gove's letter is the basic premise that only IBM and Microsoft know anything about operating systems. I'm not criticising him personally because I think that, from his perspective as a systems engineer in a large corporate organisation, I too would see OS/2 as the solution to many of my problems.

Underlying his argument that DesqView *et al* provide pseudo multi-tasking is a belief that somehow OS/2 has privileged access to something which other software does not. Now if you look at OS/2 code you'll see that, like MS-DOS and Unix and DesqView and Concurrent DOS, it's all just CPU instructions. OS/2 may be cleverer software than most, but then it's larger, has taken longer to develop, and is designed to do snappier things than many of the others.

But you can't get away from the fact that, whatever PC operating system you are running, you still have only *one* CPU. And whether you call time slicing real or pseudo multi-tasking, ultimately you are sharing that processor's attention among many applications. OS/2 adds some extra functions, such as multi-tasking within programs. But then Concurrent DOS is a multi-user system as well; and DesqView multi-tasks ordinary DOS applications and provides inter-application messaging.

On anything lower than an 80386 CPU there is no foolproof, built-in protection of one application from another: you have to do it in software. Even OS/2, which will run on an 80286-based machine, can only use software methods of protection. Even so, on most multi-tasking operating environments it is possible to Ctrl-Alt-Del one shell and leave the others running.

It's early days for OS/2, and I don't see why we should believe all the PR blurb about it. In a year's time, when we've seen plenty of badly-behaved

OS/2 programs running alongside each other, then I'll be willing to listen to claims that OS/2 offers real protection of one application from another. Get a Borland OS/2 application and you'll have a *real* test of OS/2's ability to provide protection against delinquent programs. Borland's DOS applications are about the worst offenders around, and that from a company which founded the association for treating other TSRs nicely.

This past month we received the real 386 version of DesqView. This uses the virtual 8086 protected mode of the 80386, provides various levels of software protection, and gives each application anything up to 580k of its own protected DOS shell. Not only that, but you can also run this alongside your LAN drivers and mainframe sessions.

I don't want this column to become a running advert for DesqView. But I do think that we need to remember that IBM and Microsoft are not somehow privy to skills and information denied other software houses. In fact, both OS/2 and DesqView have some common ancestry in Topview. And even the great god Bill Gates started out as an ordinary small-time computer programmer.

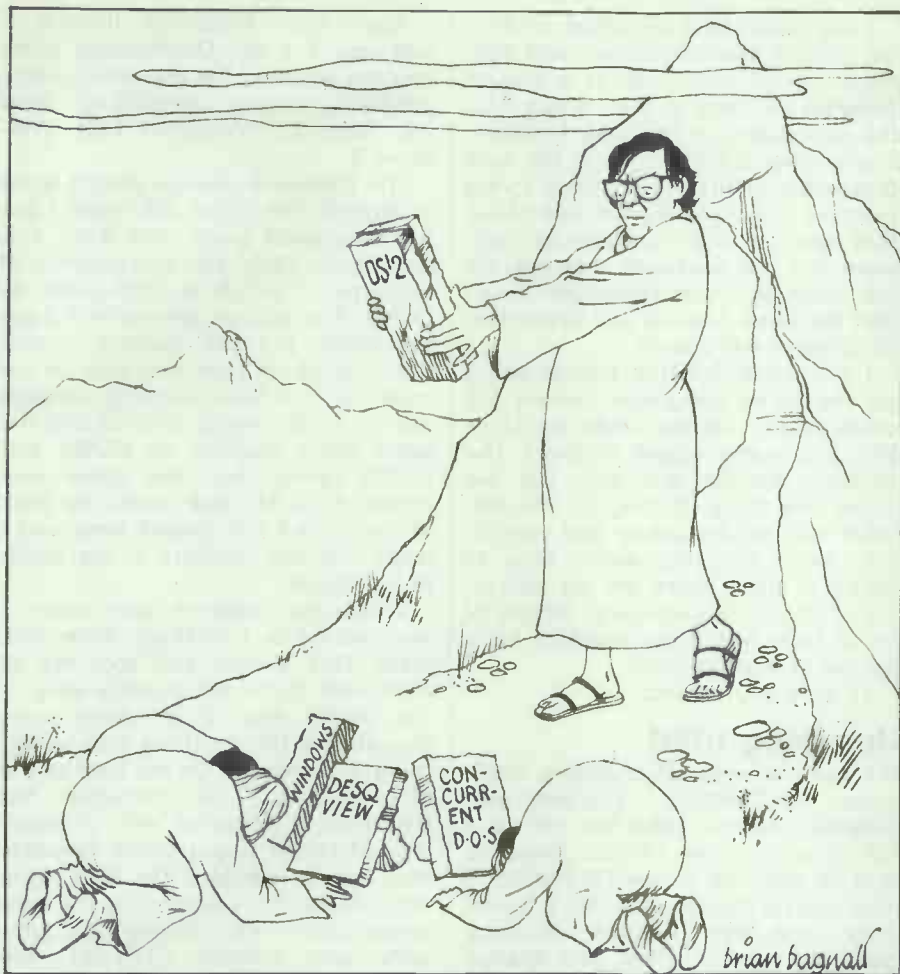
OS/2, DesqView and Concurrent DOS all run on the same family of CPUs. And IBM and Microsoft don't have a magic key which unlocks new, secret capabilities of that family of processors. Making CPUs sing and dance requires hard work and imagination, not a magic wand and a seat in the ear of Intel.

To see how much innovation there is, you have only to look at Hewlett-Packard's New Wave or its DOS emulations running under Unix, or Presentation Manager for Unix (PMX) or the work of many other companies who are developing operating environments. Ultimately what I want is to be able to make choices about what sort of operating environment I use, who I buy it from, and how much I gain or lose in functionality and compatibility moving from one to the other.

Making connections

Just look at this PCW editorial office. It's probably one of the best equipped small offices around. Four of the editorial staff are running 386 PCs — from Zenith, Dell and Delta Gold. We have two laser printers — from NEC and Mannesman Tally. We are one of the most technically knowledgeable teams around. And we spend our day passing floppy disks around the office when we want to access each other's information.

We aren't networked. The most sophisticated resource sharing in this



office is an Inmac printer buffer/sharer.

Any systems manager used to the efficient management of information would throw their hands up in horror on entering this office. Three of us use AskSam for our contacts database, one uses a dBase application. So what started as one common database has become sibling-like, each a bit different from the next but having a common parent. I forward-plan the contents of PCW using GrandView; deputy editor Manek Dubash uses Lotus Agenda. We each use different scheduler programs — Andy Redfern and Guy Swarbrick use WordPerfect Library, Manek and I use DesqView Datebook.

We haven't been networked for one main reason — memory. We all use DesqView (sorry — I'll stop boring you with that in a sentence or two). And any programs, such as network drivers, loaded as they must before DesqView to be accessible to all applications, take memory away from all those applications. Fortunately, with the new 386 version of DesqView we can load resident programs and drivers above the 640k DOS limit so that each program has the maximum size DOS shell available to it.

Now we are going to network the office. We're going to use Sagesoft's

MainLAN because our experience has shown it to be the easiest to install and it has a good software front end. It allows for each PC to be both host and terminal, and we can treat each other's resources such as disk drives and printers as if they were our own (if we are given security clearance).

But networking is going to impose a certain discipline on us which I'm not sure I relish. If we are to do the sensible thing and use one common database for our contact details; if we are to share one scheduler for all our appointments; if we are to freely transfer text files around the network, we will need to standardise on some packages.

And I suspect that is where the arguments will start. Do we use WordPerfect's scheduler or DesqView's? Which will win between Agenda and GrandView? Will my little oasis of PC-Write resist the onslaught of WordPerfect?

The coming couple of months are bound to see some heated arguments. There is no great systems manager in the sky imposing software on us. We are an autonomous group of computer anarchists able to use what we want. We don't even have financial constraints as nearly all software companies are happy to give us products to test. ▶

MICROMART

NEW AND USED EQUIPMENT BARGAINS (Used unless stated otherwise)

Dec Vax, Unibus and Qus - Systems and Options.....	Call
Dec Printers and Terminals - VT100, LA120 etc.....	Call
Dec Rainbows, Pros, Decmates.....	Call
Tektronix (4105, 4114, 4632 etc) Equipment.....	Call
Diablo Tactor (for 630, 1640, 1650, 1345 etc).....	£75
Diablo 630, 1345A, 1641, 1650 Printers.....	Call
Facit C7500 and 4512 printers.....	Call
Microbar DBC 68k Multibus 68000 Single card.....	£250
Matrox RMB 1000 VGM 1000 Multibus RGB Colour.....	£300
3 COM Multibus Ethernet Controller.....	New.....£350
Lambda L052-5 or LODX-152 Power Supply.....	New.....£60
Summagraphics Bit Pad One - IEEE Int.....	New.....£300
CITOH CIT 101 VDU.....	£150
Graftek Meteor WS 1024 Colour System.....	£750
Visi-On Optical Mouse (Mouse Systems)-IBM.....	New.....£50
PC Paint (IBM) + Mouse (as above).....	New.....£75
Calcomp 81 Plotter.....	£800
HP 110 Laptop.....	£450
HP Thinkjet (2225D).....	£350
HP Plotter (7470A).....	£1000
HP Portable disk (9114).....	£500

BOUGHT AND SOLD AT ASHLING UK

Call Tom Tobin on 0788 70618

Why
get stuck
with anything else?
For industrial labelling
solutions that work...
Text - Bar Codes
- Numbers



Contact:

WESTERN INTELLIGENCE LTD.
THE STABLES, BABBAGE ROAD, TOTNES, DEVON
TELEPHONE: (0803) 865339 · FAX: (0803) 864503

DISCS

<p> 3.5" DS/DD 13tpi HQ BULK, inc Labels Made by (MAXEL, VERBATIM or KAO) Standard BULK AT 75p + VAT</p>	<p>85 p each + VAT. Min order 10 Units of 10</p>
<p>3.5" HQ/DD (2mb) HQ BULK, inc Labels, Made by Verbatim</p>	<p>£2.95 + VAT. Min order 10 units of 10</p>
<p>5.25" DS/DD 48tpi HQ BULK, inc Labels, sleeves etc. Made by SYNCOM (USA) 5.25" OS/DD 96tpi 38p</p>	<p>33 p each + VAT. Min order 25 Units of 25</p>
<p>5.25" HD 96tpi HQ BULK, inc Labels, sleeves etc. Made by SYNCOM (USA)</p>	<p>99 p each + VAT. Min order 25 Units of 25</p>

A Free delivery on all supplies
See our Advert on next page for
Branded Disks.

24 hour Credit Card Hotline 0705 511439
ATHENE CONSULTANTS (MEDIA CENTRE)
16 Stoke Rd, Gosport, Hants PO12 1JB
Fax: 0705 511646

ATHENE

Budget TYPESETTING

There is NO NEED to purchase special software or DTP equipment to produce fully professional typesetting using the simple BUDGET system.

YOU can typeset books, magazines, newsletters etc from any computer (IBM, Amstrad, BBC etc) using your favourite word processing software (WordPerfect, MS Word, Wordstar etc).

Ask now for your free information pack from:

BUDGET TYPESETTING

53 Rowan Walk, Bromley, Kent BR2 8QW
Tel: 0689 53546 Tel: Gold 83:BTL001
or dial Typenet 0689 50866 (300,N,8,1)

DISCS



BRANDED

3.5" (1Mb)	Per box of 10
Sony 3.5" DS/DD	£15.00
Verbatim 3.5" DS/DD	£12.00
3M 3.5" DS/DD	£15.00
3.5" HD (2Mb) Disks	
Verbatim 3.5" HD	£34.74
3M 3.5" HD	£41.00
Sony 3.5" HD	£39.95

5.25" DISKS	
Special Offer 3M 5.25" DS/DD 48tpi	£6.50
Special Offer Dysan 5.25" DS/DD 96tpi	£11
Special Offer Dysan 5.25" HD 1.6Mb	£14

Many more Brands available.
Please call for Quantity Discount.
All Prices + VAT Postage Free in UK.
See our Advert on previous page for unbranded Disks. Call queuing system please hold.
24 hour Credit Card Hotline 0705 511439
ATHENE CONSULTANTS (MEDIA CENTRE)
16 Stoke Rd, Gosport, Hants PO12 1JB
Fax: 0705 511646.

ATHENE

DISK CONVERSIONS

DISK/DISK • DISK/TAPE • TAPE/TAPE

We can transfer your data across more than 1,000,000 permutations of Micras, Minis, Mainframes, Typesetters and WPs

Tape

1/4" - QIC-11, QIC-24, QIC-120, QIC-150 (QIC-02)
1/2" - 800, 1600, 3200, 6250 BPI
ANSI, CPIO, DEC 'DOS', IBM Labelled / Unlabelled / ASCII / EBCDIC / Binary, ICL 6 bit, SYTOS, TAR, VAX Backup / Copy, VME DEC - TK50, TS11, TUS8; RLO2 removable disk pack

Floppy

8", 5 1/4", 3 1/2", 3"
Acorn, Amiga, Amstrad, Apple, Archimedes, Atari, CP/M, CP/M86, Displaywriter, FLEX, IBM, Idris, ISIS, Linotype, Macintosh, MDOS, MS-Dos, Olivetti, OS/9, PC-Dos, RT11, Torch, Unix, Victor-Sinus, Wordplex, Xenix ...

Duplication

Most 5 1/4" and 3 1/2" formats - please phone for costs

Disk to Page

Typesetting / Laser printing, full design and print production services

Kermit Distribution Centre

Ring or write for a full format list
Prices from £10 + VAT per disk

Usual terms C.W.O.

A.L. DOWNLOADING SERVICES

VOYSEY HOUSE
BARLEY MOW PASSAGE
LONDON W4 4PT
Fax: 01-994 4959
Tel: 01-994 8471

I see networking the office, arranging proper standardisation and centralisation of resources, as a way of growing up. And, in that, it jars with the delinquent in me and, I reckon, many other people. This is the side that experiments, that enjoys trying out new hardware. It's the side of me that uses not the most popular software but the packages that get the job done. Will standardisation mean that the quick take-up and discarding of software will cease?

I am concerned that standardising on the same programs around the office might dull our creativity. Or is this just some hippie fantasy? The coming months will tell. But we know one thing. Setting up the network will be disruptive and painful. So, we're devoting some time to doing it when there are no distractions, and no requirements for any of us to have a working machine for a couple of days at least.

I'll keep you posted.

Jumping mad

It's been a week of changing hardware. At Comdex I bumped into Stephen Marmoy who has set up a UK operation for Mouse Systems, and he sent me a new PC Mouse II. This optical mouse now has a hunch back and two buttons. Marmoy admitted that, in effect, the change from a three-button to a two-button mouse is a climbdown for Mouse Systems and a victory for the Microsoft standard. Mouse Systems (and Summagraphics, and other companies using three-button mice) use a 5-byte data format which can cause some compatibility problems with certain software, though I personally have never had any problem. Mouse Systems has moved down to the Microsoft 3-byte data format.

Previously at home I had been using a Summagraphics three-button mouse, and all my software — Gem, Ventura and Windows — needed reconfiguring. This is no trivial task. For reasons that I do not understand, many programs do not provide easy ways of altering their hardware set-up. In fact, Ventura is one of the few programs I know where command line parameters carry the necessary hardware information.

The line below specifies my screen driver (S=SDFVGA86.VGA) and mouse (M=13 means Microsoft mouse on COM2). To use the 800x600 driver supplied by Video 7 with its Fastwrite card I just change the S= argument to SD_VGA_5.VGA or something like that. And if the mouse is on COM1 I change it to M=03.

DRVVRMRG VPPROF %1/
S=SDFVGA
86.VGA/M=13

Apart from DesqView (honest, I just use it a lot, Quarterdeck don't pay me anything) every other major program needed reinstalling Gem 3.0, Gem 3.1, Windows 1.03, Windows 2...

The hardware change wasn't quite as simple. The Arche 386 tower I use has two serial ports, one 9-pin and one 24-pin. And I also use an internal Quattrocard which is configured as COM1. The mouse came with a 9-pin connector, but my Summa mouse used the 24-pin port. So I was on my knees on the floor, moving jumpers around on the serial card so that the ports were mapped as COM2 and COM3 rather than the other way round. It's a bit dark under my desk at home and I'm always surprised I don't lose the jumpers in the depth of the carpet.

While the machine was open, I also added a 1.44Mbyte 3 1/2in disk drive. This 'simple' task took me all afternoon. Some things were easy — the Arche has 3 1/2in drive bays though the Citizen drive was something of a snug fit. On the back of the drive is a 2x17-pin connector, but the drive is supplied with a small, printed circuit board which converts this into a standard flat disk drive edge connector. Confusingly the converter board also carries two jumpers, one marked AT-PC/XT, the other just OPEN. Interestingly, one of these labels is incorrectly marked.

The documentation, as is often the case a translation from the Japanese via Serbo Croat, merely suggests that, should the drive not format correctly, the OPEN jumper should be moved. The fact that the documentation was all about 360k and 720k formatting, with not a mention of 1.44Mbytes, inspired little confidence. But Arche had assured me this drive would work.

Fortunately, the Arche disk drive ribbon cables carry both edge connector and 2x17 plugs so the data cable was easy to fix. I don't know what I would have done had I needed the jumpers.

The power cable did in fact need a converter, as the drive used a small 4-pin socket and I needed to use the supplied conversion cable to join it to the chunkier standard power lead.

All the connections were very stiff, and I managed to bend some pins on the 2x17 plug and snap one of the minute power connections while testing the drive before final installation. A Saturday afternoon, just days after they've just closed down your local Tandy store and your motorbike has a flat battery, is no time to discover that a minute sliver of metal poking out of the carpet stands between you and a working floppy disk drive.

I won't bore you with the sorrowful

details of how, using a table-top vice, two pairs of pliers, an ancient soldering iron and a less than steady hand I managed to rejoin the cable, but the drive is now fitted and working, and it does format to 1.44Mbytes. In fact I tested it on one of my prized possessions — one of the first ever 1.44Mbyte 3½in disks ever produced, given to me by Maxell which had just received a very large order from IBM. It took another year for machines using the disks to appear. I still have a 2½in floppy disk, also made by Maxell at the same time, which has yet to be used in a main-stream computer. But then it only holds about 200k.

Returning to the floor ... As I lay there, trying to fit the drive, I wondered why it is that, with all this micro circuitry, intelligent peripherals and high-tech development work, the basic ways that computer hardware fits together haven't advanced much. I remember how, seven years ago, my heart beat loud when I did my first memory upgrade on my Acorn Atom. I knew enough to rock the chips on the table first to bend the pins in slightly so they'd slide into the sockets more easily. But bent legs on pins are still a hazard and SIMMs are a welcome if still not yet universal means of memory upgrade.

If there is anything which encourages a fear of computer hardware among people who have the courage to open the box it must be those damned little legs on the chips, just waiting to get bent or, worse still, snapped off. I've been told that soldering a paper clip to the side of the chip is the answer, but I'm not recommending it.

When IBM first demonstrated its PS/2 range, one of the selling points was the ease of configuration of the machines. There are no jumpers on the motherboard; the disk drives slide in and out almost as easily as Tandon's PACs, and the machines are intelligent enough to work out what's inside them.

I ask you. What sense is there in a machine which, at power up time, counts up 4Mbytes of memory on its system board and then bleats at you that the Setup says there ought to be two and what are you going to do about it? These are supposed to be intelligent machines. I find the PS/2 idea of a Reference Disk program that takes stock and synchronises the hardware and software very attractive. Though why you have to run the program I don't know. Why can't the machine just make the adjustments, just asking for permission on the way so you're still boss?

One of the reasons why our reviewers found MainLAN a good network was that its cards are self-

configuring. Serial communications are a nightmare of interrupts and base addresses. Just look at this table from Procomm Plus:

PROCOMM PLUS SETUP UTILITY		
	BASE ADDRESS	IRQ LINE
A- COM1	0x3F8	IRQ4
B- COM2	0x2F8	IRQ3
C- COM3	0x3E8	IRQ4
D- COM4	0x2E8	IRQ3
E- COM5	0x3F8	IRQ4
F- COM6	0x3F8	IRQ4
G- COM7	0x3F8	IRQ4
H- COM8	0x3F8	IRQ4

Who needs all this? Consider too this extract from the documentation for the bus version of the PC Mouse II:

'The new Bus Plus Card now has only 2 jumpers. This will eliminate confusion in setting the jumpers on the Bus Plus Card. When you have run the BUSSET program it will show you where to place the three jumpers. Instead you will place 1 jumper on the IRQ address (as shown in BUSSET) and the other jumper on the single port address. If BUSSET recommends placing jumpers on the pairs of pins marked with xF8 and 2xx, you will place the second jumper on the pair of pins marked 2F8 (xF8+2xx=2F8). Now continue with the rest of the instructions.'

We shouldn't have to bother with all this junk. Mice, like modems, give off distinctive signals. To set up a serial communications device like a modem or mouse you should merely run a program that sends out a signal and watches to see where the response comes from. It then stores that address somewhere safe. If MainLAN can do it, why can't the others?

I've always been struck by the difference in ease of use between computer communications and fax. When did you last see someone standing by a fax wondering whether they'd got the data format and baud rate right? Why can't serial devices in computers be as simple?

And as for jumpers, in this weather I'd rather wear them than switch them.

PCW's editor, Derek Cohen, can be contacted at the editorial offices (see page 3); and electronically on Telecom Gold, 83:VNU200; on The Source BEK303; on CIX as derek, and on Prestel 919993794.

MICROMART

READ & PRINT BAR-CODES USING ANY COMPUTER

Complete identification system including microprocessor controlled scanner hardware plus software to print barcodes on Epson (or similar) dot matrix printer. Most Industrial & commercial codes can be read. Packages available for virtually any computer. Our systems are in regular use by many private & public sector organisations worldwide. Prices start from £250. More information on request.



ALTEX INSTRUMENTS
Enterprise House
44-46 Terrace Road
Walton-on-Thames, Surrey
KT12 2SD
Tel: (0932) 244110
Telex: 295800 CWAOL

WEST YORKSHIRE

TRILOGIC

Home & Business Computer Centre
Unit 1, 253 New Works Road
Bradford BD12 0QP

All prices include VAT. Carriage £7 per order.

	OUR PRICE
Commodore 64 Starter Packs	£149.99
C64 Compatible Disk Drives	From £129.99
Amiga A500 + Software Pack & Modulator	£419.99
A500 + Philips Colour Monitor + Software	£619.99
A500 + Philips Colour Monitor	£585.99
Philips Colour Monitor for Amiga or Atari	£199.99
Citizen 120D Printer and Cable	£149.99
Star LC10 Colour Printer, Parallel or CBM Version	£269.99
Atari 520 STFM + Mouse + 1 Meg Drive	£287.99
Atari 520 STFM with £400 Software pack	£387.99
COMMODORE PC RANGE	
Commodore PCI with Mono Monitor + Software pack	£360.00
Commodore PCI with CGA Col Mon + Software Pack	£479.99
Commodore PC10 III HDD Mono Mon + Dual Floppy	£749.99
Commodore PC10 III HD Mono Mon + Hard Disk	£1099.99

For friendly helpful service, Jargon Free advice, and competitive prices call us now!

Tel: (0274) 691115

ACCESS/VISA

FROM DISK TO PAGE

TYPESETTING • PRODUCTION • PRINT

Full Production Service

Design, original artwork, paste-ups, typesetting, printing, binding.

Typesetting

We set newsletters, brochures and templates as well as books and manuals involving colour separations, custom-made characters or complex setting. Laser or Linotronic c.i.c.

We can arrange for keying, or text can be taken from over 1,000 different disk / tape formats. Phone for a quotation.
Time charges £25 / hour

Custom-made Fonts

Original Postscript outline characters or fonts designed to your specifications, (plus Ventura driver, if required).

Postscript File Output

If your DTP or WP software can output 'Postscript', you can now produce top quality artwork direct from your own files, phone for advice.

Output on... Laser (300 dpi) 60p / A4
Linotronic (1275 dpi) p.o.a.
Discounts for bulk. £10 minimum order.

Disk and Tape conversions

Copies and translations across 1,000+ disk / tape formats.

Prices exclude VAT

Usual terms C.W.O

A.L. DOWNLOADING SERVICES

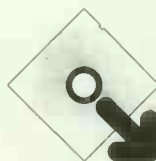
VOYSEY HOUSE

BARLEY MOW PASSAGE

LONDON W14 4PT

Fax: 01-994 4959

Tel: 01-994 3471



STEP UP TO FAST, RELIABLE LASER PRINTING.



RX7200

It's called the RX7200. And it's the next logical step in the evolution of laser printers.

It comes from Fujitsu, Japan's No. 1 computer maker and the maker of some of the world's fastest and most powerful laser printers for over 10 years.

We've taken the big step of putting the same kind of technology that goes into our industrial laser printers into an office laser printer. The result? Speed. Quality. Economy. Reliability.

The RX7200 is fast—12 ppm. Reliable—10,000 pages per month. And very easy to use.

It's versatile, too, with a wide choice of available type fonts and emulations for all kinds of

office printing. From spreadsheets to graphics, and from word processing to desktop publishing.

In fact, the more printing you do, the more you'll like this new member of Fujitsu's laser printer family. Because the RX7200 is not only easy to operate, it's also easy—and inexpensive—to maintain.

With the RX7200, we've taken a big step forward in laser printing. Now the next step is up to you. Call "Freephone Fujitsu" or send off this coupon today.



The RX7200 is available with either one or two 250-sheet paper bins.

Japan's No. 1 computer maker

FUJITSU

I'd like to know more about Fujitsu printers.

Please send more information about the following:

- RX7300E (17 ppm page printer)
- RX7200 (12 ppm page printer)
- RX7100 (5 ppm page printer)
- DL5600/DL5600 Colour (24-wire dot matrix)
- DL3300/DL3400 (24-wire dot matrix)
- DL2600/DL2600 Colour (24-wire dot matrix)
- DX2300/DX2400 (9-wire dot matrix)
- DX2100/DX2200 (9-wire dot matrix)

Name: _____

Title: _____

Company: _____

Address: _____

City: _____ Country: _____

Phone: _____ Fax: _____

Fujitsu Europe Ltd., 2 Longwalk Road, Stockley Park, Uxbridge, Middlesex UB11 1AB. Phone: (01) 573-4444

Mike Mudge looks at the generation, storage and analysis of Lucas Sequences.

In the latter half of the last century, E Lucas, working in Paris, considered two distinct one-dimensional arrays which we shall denote by (U_0, U_1, U_2, \dots) and (V_0, V_1, V_2, \dots) . The elements of these arrays are positive integers (or zero) and are defined in two stages:

- (i) the first two elements of each array are given, $U_0=0, U_1=1, V_0=2$ and $V_1=P$.
- (ii) Two integer parameters P & Q are specified, and all subsequent elements of the arrays are defined in terms of the two preceding ones by the linear recurrence relations of the second order in terms of P & Q,

$$U_n = P \times U_{n-1} - Q \times U_{n-2}$$

$$V_n = P \times V_{n-1} - Q \times V_{n-2}$$

We now illustrate particular examples of these Lucas Sequences.

Example I $P=1, Q=-1$.

Recall that $U_0=0, U_1=1$ and, therefore, using the given values of P & Q in the recurrence relations above:
 $U_2=U_1+U_0=1, U_3=U_2+U_1=2$
 etc.
 3, 5, 8, 13, ... $U_{46}=1836311903$. .

These are the Fibonacci Numbers (see 'Numbers Count', PCW, May 1983).

For $3 \leq n \leq 1000, 21$ Prime Fibonacci Numbers are known, $U_3, U_4, U_5, \dots, U_{569}, U_{571}$. What are the other members of this list? Recall that $V_0=2, V_1=P=1$ and, therefore, using the given values of P & Q in the recurrence relations above:
 $V_2=V_1+V_0=3, V_3=V_2+V_1=4$
 etc.
 7, 11, 29, ... $V_{46}=4106118243$. .

These are the Lucas Numbers for $0 \leq n \leq 500, 22$ Prime Lucas Numbers are known, $V_0, V_2, V_4, \dots, V_{353}$. What are the

other members of this list? $V_{503}, V_{613}, V_{617}$ and V_{803} are also known to be prime.

Example II $P=3, Q=2$

Exercise for the reader to identify the U_n and the V_n , certainly no computer is needed! Note that $U_{50}=1125899906842623$ while $V_{50}=1125899906842625$.

Example III $P=2, Q=-1$. Here it is readily seen that $U_{10}=2378, U_{20}=15994428$ and $U_{40}=723573111879672$. These are the Pell Numbers.

$V_{10}=6726, V_{20}=45239074$ and $V_{40}=2046573816377474$. These are the Companion Pell Numbers.

Example IV $P=4, Q=3$.

$U_{10}=29524, U_{20}=1743392200$
 $U_{30}=102945566047324$
 $V_{10}=59050, V_{20}=3486784402$
 $V_{30}=205891132094650$

Do these have any particular significance? What are their prime factors?

Detail any other Lucas Sequences which have attracted particular attention in number theory.

Readers are invited to generate Lucas Sequences for particular P & Q values, hence verifying some or all of the numerical results for U_n and V_n given here. Further problems involving the Prime Lucas and Prime Fibonacci numbers, and the identification in Example II and factorisation in Example IV, are hinted at.

Attempts at some or all of these problems may be sent to Mike Mudge, 'Square Acre', Stourbridge Road, Penn, South



Staffordshire WV4 5NF, tel: (0902) 892141, to arrive by 1 April 1989. These submissions will be judged using suitable subjective criteria and a prize will be awarded by PCW to the 'best' contribution received by the closing date. It would be appreciated if such submissions contained a brief description of the hardware used, details of programs and run times, and a summary of results obtained, together with suggestions for further investigation; all in a form suitable for publication in PCW.

Please note that submissions can only be returned if a suitable stamped, addressed envelope is provided.

Note Further to the decoding challenge from TK Boyd in PCW, October 1988, the program listing in the box below may help.

Mr Boyd still thinks that without the appropriate seed value a decode is unlikely. Who can prove him wrong?

Review, August

This topic involved Prime Residue Indices and Artin's

constant, it was surprisingly popular, and all interested readers are referred to a book called *Repunits and Repetends* by Samuel Yates, particularly pp102-105.

Mention must be made of the efforts in Forth on an Atari 520 STFM with a single-sided disk drive by Christopher Brooksbank of Peterborough; also the 230 hours of BBC Basic on an Electron attacking Problem B up to 15,000 primes by Frank Webster of Middlesbrough.

However, this month's very worthy prizewinner is Fred Hartley of 46 Hughes Road, Hayes, Middx UB3 3AP, who has used an Archimedes 310 in ARM assembler to calculate indices for 11.6 million primes in about 68 hours. Fred has also carried out a very detailed empirical and theoretical analysis of this problem (details on request) and should be recognised in the literature as and when his results are published.

Mike Mudge welcomes correspondence on any subject within the areas of number theory and other computational mathematics. Particularly welcome are suggestions, either general or specific, for future articles. All letters will be answered in due course.

```
10 INPUT "SEED",S 11 IF S>0 THEN S=S*-1 20 C1=RND(S)
30 INPUT "MESSAGE",M$ 35 VDU2 40 FORC1=1TOLEN(M$)
50 C2=ASC(MID$(M$,C1,1))+RND(255) 60 IF C2<256 PRINT"";
62 IF C2<16 PRINT""; 70 PRINT; ~C2;" "; 80 NEXT 90 VDU3
```

LEISURE LINES

Brainteasers courtesy of JJ Clessa.

Quickie

Here's one to get you thinking. If the letters of each word in an English dictionary are put into alphabetical order (for example, Fish would become FHIS, Cat would be ACT) and the resulting 'words' were then made into an alphabetical list, which original English word would be the last in the list, and which would be the second? (First would be 'A', of course.)

Prize Puzzle

My thanks to Roy Newham of Nottingham for sending in the idea for this puzzle — almost four years ago. (We may be slow but we got there in the end!)

A roll of cloth 120 inches wide is cut into a number of lengths. If every length and every diagonal of each piece cut is a different exact number of inches, what is the maximum length that the roll

could be?

Answers on postcards only (or backs of sealed envelopes) to reach us not later than 28 February 1989. Send your entries to:

February Prize Puzzle, Leisure Lines, Personal Computer World, VNU House, 32-34 Broadwick Street, London W1A 2HG.

Note Winners of the November Prize Puzzle will be announced in next month's issue.



A CHOICE 286 COMBINATION



We'd like to offer you the two most powerful reasons for buying an AT-compatible computer – the PC V and PC VI Turbos from Opus Technology Ltd.

To complement our best-selling 10MHz machine, we've now introduced a super-fast 12 MHz computer – the new state-of-the-art PC VI Turbo. Together they make a 286 combination with all the performance and features you're ever likely to need.

Our AT-compatibles offer the choice of VGA, EGA or monochrome displays, fast and even faster hard disks, up to 4 Mbytes of system memory and the option of 3.5" or 5.25" disk drives. There's plenty of room for expansion and as well as a 12-month warranty we can offer competitive on-site maintenance cover.

So whether your choice is outright speed or simply value for money, we've a 286 computer capable of making a powerful impression on you.

PC V TURBO AT-COMPATIBLE

- 16-Bit 80286 microprocessor
- Switchable 6/10 MHz (zero wait state) clock speeds
- Fast 30 Mbyte hard disk drive (40 Mbyte option)
- 1 Mbyte system memory
- 3.5" (1.44 Mbyte)/5.25" (1.2 Mbyte) disk drive options
- Super high resolution flat-screen monitor (EGA option)
- Graphics card supports MDA, CGA and Hercules monochrome graphics
- Parallel and serial printer ports
- Mouse port
- Five free expansion slots
- 102-key enhanced keyboard
- Socket for 80287 maths co-processor

PC VI TURBO SUPER FAST AT-COMPATIBLE

- 16-Bit 80286 microprocessor
- 8/12 MHz clock speeds
- NEAT chip set
- 1 Mbyte system memory (expandable on motherboard to 4 Mbytes)
- Supports EMS (LIM version 4.0)
- 60 Mbyte hard disk (110 Mbyte option)
- 3.5" (1.44 Mbyte)/5.25" (1.2 Mbyte) disk drive options
- 14" high resolution VGA monitor
- VGA, EGA, CGA, Hercules and MDA support
- One parallel and two serial printer ports
- Socket for 80287 maths co-processor
- 102-key enhanced keyboard

TURBO

TURBO

Authorised Distributors:
■ CITY BUSINESS SYSTEMS ■
Micro Peripherals Ltd

Opus Technology Ltd.

■ Prices from £1,295 ■

THE KEY NAME IN COMPUTING

For details call us today on (0737) 765080 or Fax (0737) 769873. *Price quoted exclusive of VAT and carriage.
Opus Technology Ltd, 53 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey RH1 2LW.

Graphic art

You only have to look at the 'Smarties' television advert to appreciate the ingenuity of computer graphics, so this month our reviewers take a look at some of the more interesting titles on the subject, plus there's our general section too.

Computer Animation

Author: Neal Weinstock
 Publisher: Addison-Wesley
 ISBN: 0-201-09438-X
 Price: £23.95

Neal Weinstock's *Computer Animation* is a balancing act between the author's keen interest in the present state of the animator's art, and his sincere respect for work produced prior to the quiet revolution which he claims is 'changing the making of animated motion pictures.' I say 'claims' because until a short while ago it looked as if computer animation of one kind or another would indeed kill the practice of hand-drawing cartoons.

However, *Who Framed Roger Rabbit?*, a new full-length feature film containing live actors and hand-drawn characters, apparently heralds a backlash to the cold hyper-realism of computer-generated animation.

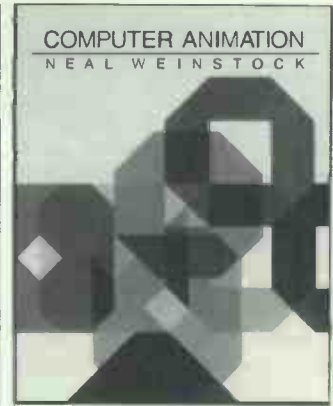
The development of 'low cost' high-performance machines such as the Commodore Amiga and the IBM PC (equipped with a graphics card) has put the tools for producing fairly high quality animation within easy reach. Computing power obviously separates these machines from those used by most professional animators. But as Weinstock endeavours to show, animation theory is much the same regardless of the machine one uses.

The book's opening chapters

deal with fractals, ray tracing, vector graphics, aliasing and antialiasing, and so on. Weinstock communicates well the complex ideas in a lucid and, even, chatty writing style, which neither belittles the difficulties which some of the ideas might pose, nor patronises readers who might already know something about the subject.

At *Computer Animation's* core are several sections about programming graphics on an IBM PC (or PC compatible) in Basic and C. Windows, viewports, paint palettes, structures and arrays are just some of the many subjects covered in depth.

In the detailed appendices which round off *Computer Animation*, Weinstock gives vent to the film buff in him as



he talks about the history of animation in movie making. Many of the landmarks between Peter Mark Roget's theory of the persistence of vision, in 1824, and relatively recent films like *Blade Runner* and *Close Encounters* (as well as numerous X-rated cartoons), are considered in the context of their place in the development of animation during a period spanning almost two centuries.

Computer Animation is an indispensable guide for anyone interested in trying their hand at animation: it is informative, instructive, and a good read.

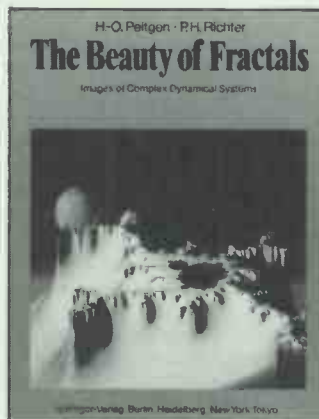
Stephen Applebaum

The Beauty of Fractals

Authors: HO Peitgen & PH Richter
 Publisher: Springer-Verlag Berlin
 ISBN: 3-540-15851-0
 Price: DM78

Half coffee table gloss, half text book formality — *The Beauty of Fractals* is a rare and extraordinary book. Originally produced to accompany a German photographic exhibition that travelled through Europe and North America, its language is nevertheless concentrated mathematical symbolism. I am not at all convinced that this synthesis works either as an exhibition catalogue or as a maths text. But I am quite certain that anyone who has ever explored the intricate folds of the Mandelbrot set will want this book and will be delighted by it.

With over 180 fractal illustrations, around half of them beautifully printed in colour, this is certainly a book to leave lying around, to flip through at idle moments and to use as an atlas when exploring the fractal realm. As something to sit down and read it leaves much to be desired — clarity for a



start. And it is not helped by the occasional diversion into philosophical ramblings about art and science that offer little insight for the weight of words.

There are high spots though — especially a chapter by Benoit Mandelbrot (written in his unmistakable self-centred style) which describes his early work with fractals, and one by Adrien Douady — the French mathematician who first coined the name 'Mandelbrot set'. But even they cannot hold the attention for long in competition with the pictures.

This book, above all, is a celebration of fractal forms and as such it works superbly. More than any other book I've seen, it demonstrates to those

innocent of algebra why maths is so often described in aesthetic terms. It is exactly about the beauty of fractals. But existing fans of fractals will rightly quibble that the title suggests more than it delivers. There are no Gaussian hills in these pages; no Menger sponges or self-squared dragons. *The Beauty of Fractals* is really the beauty of the Mandelbrot set (and its associated Julia sets) with precious little recognition that fractional dimensions apply anywhere else.

That bias could be limiting but the familiar forms are interpreted in so many different ways, and with such good use of colour, that even the most jaded fractalist must find much to wonder at.

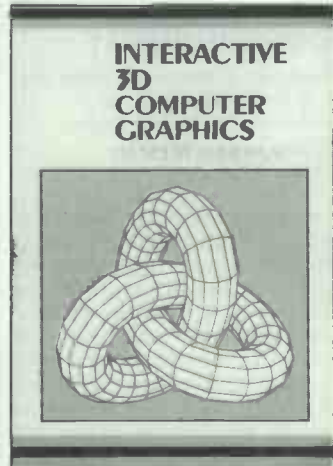
An appendix provides some limited explanation of how these fractal sets can be created on the computer screen but overall this is no recipe book. There is, however, a new title, *The Science of Fractal Images*, emerging from the same stable, which promises more for the experimenter. In the meantime, buy this book (or, better still, get someone to buy it for you) and enjoy it.

Jack Weber

**We shall be looking at
 The Science of Fractal Images
 as soon as it is available.**

Interactive 3D Computer Graphics

Author: Leendert Ammeraal
 Publisher: John Wiley & Sons
 ISBN: 0-471-92014-2
 Price: £00.00



Interactive 3D Computer Graphics is an eminently practical book, free from any notions of collaterality with other mediums such as film. Like *Computer Animation* it is targeted at users of IBM PCs and PC clones, but unlike that

work it is based on a suite of three dimensional modelling programs, designed by the author, Leendert Ammeraal. What he has produced, in effect, is an interactive guide which supplies readers with the raw materials for producing line and hidden-line 'three-dimensional' models.

The aforementioned programs are designed to run on any IBM PC fitted with a graphics adaptor; and since they are written in C, require a good C compiler to run them.

Readers with time on their hands (and protective plasters on their finger-tips) can enter the programs manually. As the program listings account for some 49 or more pages, you might prefer to pay an extra £14.95 for a disk-based copy being offered by the publisher. (Buying the disk also obviates the need for a C compiler.)

Whether you type in the programs or buy the disk, you really need to have the programs up and running to appreciate the book. What

makes this necessary is its division into sections for users and programmers respectively. If you are one of the former, you need only read chapters one and two, whose primary aim is to teach readers how to create and manipulate models with D3D, the aforementioned design program. Ammeraal does not expect all his readers to be able to program, but he does expect them to have a more than average grasp of trigonometry.

Programmers are directed to

chapters three and four, wherein they will find guidance about writing application programs. To come through these sections requires a good working knowledge of the C programming language, coupled with a proclivity for advanced trig. Anyone who possesses these qualities, and is particularly interested in creating 3D models for themselves on an IBM PC, will find Ammeraal a rich source of information.

Stephen Applebaum

GENERAL

Managing your Computing: A Practical Handbook

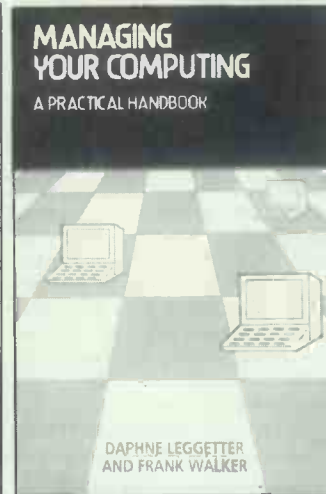
Authors: Daphne Leggetter and Frank Walker
 Publisher: Blackwell Scientific Publications
 ISBN: 0-632-01808-9
 Price: £14.95

Well, to be honest, on first impressions *Managing your Computing* left me feeling gloomy. The chessboard-like cover looked dull and flicking through the book, it was page after page of closely-typed text with the occasional mock-up schedule springing out. As a possible 'non-specialist with administrative responsibility

for the strategic planning and implementation of the commercial office systems' it wouldn't have jumped off the bookshelf at me and persuaded me to part with £15.

But, as we all know, you shouldn't judge a book by its cover (tee-hee) or, come to that, by just flicking through its pages. It is a heavy read but then it has got a lot of ground to cover. Chapter 1 deals with planning resources, physical and otherwise, the use of a Steering committee, annual plans and budgets and estimated guidelines — for projects — these are all pretty hefty topics on their own, never mind being combined together in the opening chapter.

To be fair to the authors, I cannot fault their thoroughness. They really have thought it all out for you. They cover 'all aspects of planning, implementation and maintaining



project planning or financial debt through to how to deal with resignation and dismissal of staff. I did feel that the Contents page left a lot to be desired — so much is covered in each chapter that merely quoting the page number on which each chapter begins really isn't enough (subsections and titles exist within the chapters so why not in the Contents page?)

Also, I was horrified to find overprinting followed by blank pages from pages 181-188, therefore completely obliterating a good portion of Chapter 8: The Human Factor. I sincerely hope that this was only in my review copy.

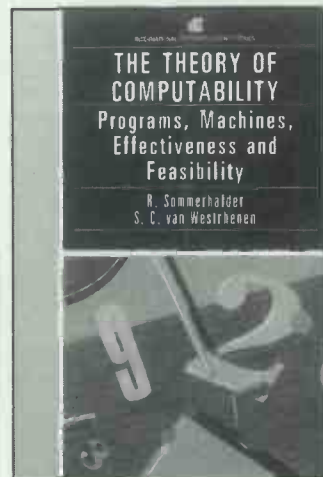
If this is your area, then take your time looking through this book, start to read some of the sections and I'm sure you'll find as I did that it definitely grows on you.

Lorna Kyle

The Theory of Computability

Authors: R Sommerhalder and S C van Westrhenen
 Publisher: Addison-Wesley
 ISBN: 0-201-14214-7
 Price: £15.95

I must admit that I found this book difficult to read. Not difficult in the sense that it has nothing to say, but more in the sense that it is so obviously a subject course book that it is out of context to try and read it like a novel or refer to it as a reference book. It is quoted as being 'suitable for self-study' but I would have thought that it would take an extremely gifted person to understand, unaided, that 'A Cantor numbering of K-tuples of natural numbers is a bijection between N^k and N '. Or who could prove that 'The set R of all real numbers is uncountable'. So, if you are a student of Computer



Science or Electrical Engineering read on; if not, beware!

Faced with questions such as 'What is an algorithm?' 'What is the computational complexity of a problem?' and 'What are the limitations of computation?' the authors have set themselves no easy task. They aim 'to provide a

rigorous mathematical introduction to the theory of algorithms and computability, encompassing both the practical and conceptual aspects of the subject.' Chapters 1 to 5 cover a short historical preamble to the theory of computation, introduce the programming language SAL, Simple Algorithmic Language, together with recursive functions and their relations to SAL, and the Halting Problem: 'Does the computation on a given input x, induced by a given program P, terminate' is discussed in Chapter 6.

The Turing machine comes into play in Chapter 10 and is used thereafter as the model of computation. Exercises are provided throughout, and each chapter commences with a boxed section showing the subsections in that chapter and ends with references to papers and literature of interest. A serious book for the very serious student.

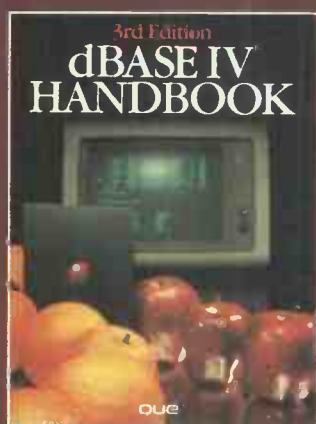
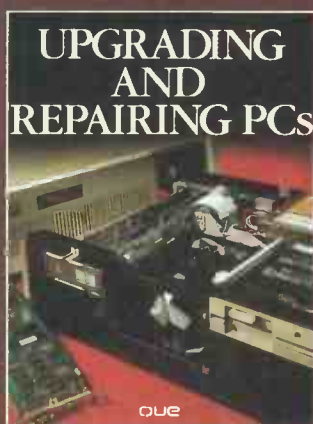
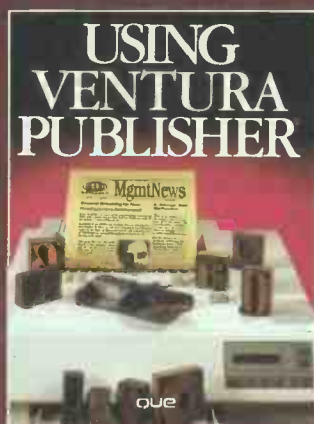
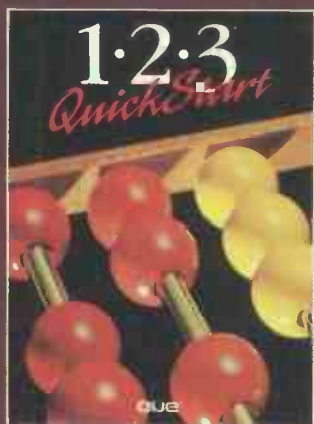
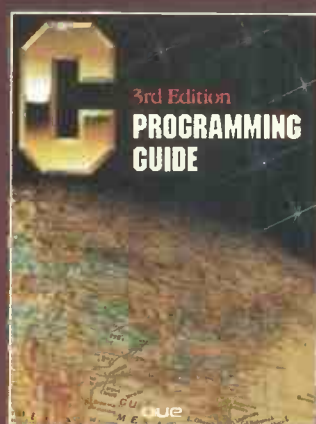
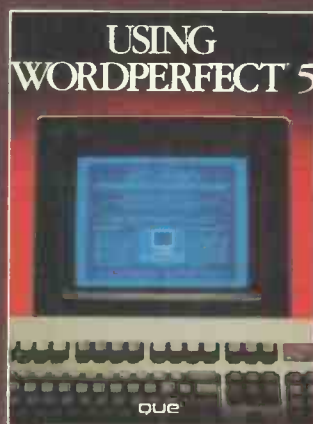
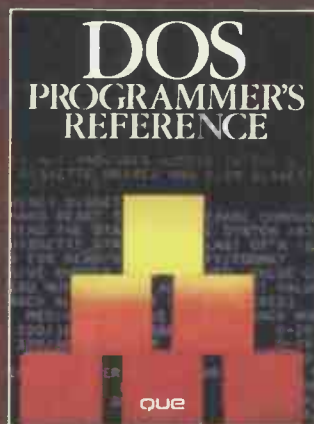
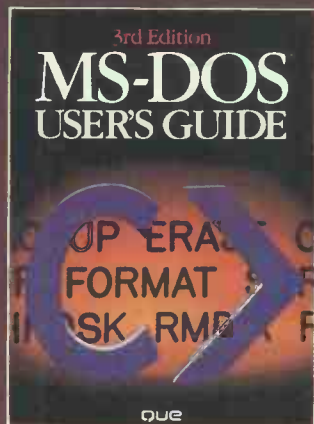
Lorna Kyle



Stephen Applebaum is a freelance journalist. Jack Weber is a television producer. Lorna Kyle is a systems analyst/programmer.

Next month: expert systems **END**

When Only the Best Will Do, Choose Books from Que!



When you want to get the most from your personal computer, turn to the books that give you the most information—turn to books from Que. You know that Que books are the best-written, most informative titles available on personal computer programs and applications.

Que is dedicated to bringing you the best possible books on the most popular computer topics. This season Que is introducing more than 40 new titles, covering topics from WordPerfect 5 to AutoCAD. No matter what your needs, you can turn to books from Que to add power to your personal computing!

New Autumn Titles from Que:

1-2-3 QuickStart • C Programming Guide, 3rd Edition • CAD and Desktop Publishing Guide • dBASE IV Handbook, 3rd Edition • dBaseXL and Quicksilver Programming: Beyond dBase • DOS Programmer's Reference • DOS Tips, Tricks, and Traps • Microsoft Word Techniques and Applications • MS-DOS QuickStart • MS-DOS User's Guide, 3rd Edition • Upgrading and Repairing PCs • Using AutoCAD • Using Clipper • Using DacEasy • Using Dollars and Sense, 2nd Edition • Using QuickBASIC 4 • Using Sprint • Using Ventura Publisher • Using WordPerfect 5 • WordPerfect Macro Library • WordPerfect QuickStart • *Plus the Que Quick Reference Series!*

Order your Que books today! Sole U.K. Distributor: Computer Bookshops Ltd.
30 Lincoln Road, Olton, Birmingham B27 6PA Telephone No. 021-706-1188

que

Pacmania

Chris Cain wallows in nostalgia as he re-lives the fledgling years of computer games in a fun-filled, power-packed update of a true original.

Computers: Atari ST; Amiga; Archimedes; C64; Amstrad CPC; MSX
Supplier: Grandslam
Format: Cassette & disk
Price: ST, Amiga, Archie, £19.95; C64 cassette £9.95, disk £14.95; Spectrum cassette £8.95, disk £12.95; Amstrad cassette £8.95, disk £14.95; MSX cassette, £8.95

A couple of years ago, if someone had told me that in 1987 I'd be going to arcades especially to play Breakout I would have been inclined to doubt them. If they had then informed me that Pac-Man would be one of my favourite computer games at the end of 1988, I'd think it was time for the men in white coats to pay a visit.

However, they would have been absolutely right. In 1987 I was pushing coin after coin into Arkanoid, a game based on the old bat-the-ball-against-the-wall machines of the late Seventies. Now, in December '88, I am playing Pacmania, a highly entertaining and addictive version of the all-time classic, Pac-Man.

Pac-Man has become something of a legend in the computer entertainment sector. People played it in the amusement arcades for absolutely ages. It had pathetically 'blocky' graphics and the sound was rough, but its sheer playability brought you back over and over again.

In fact, it was so popular that Atari converted it to run on its brand new VCS computer games system. PCW's long-standing Production Editor, Lauraine Danker, actually went to the launch of the cartridge. What an honour!

The Pac-Man arcade machine was then followed by Ms Pac-Man and, more recently, Pacmania.

The basic idea behind Pacmania is simple. Using a joystick, you must guide Pac-Man through mazes which are littered with little dots. As you move along a maze, Pac-Man eats the dots and you collect lots of points. Easy, yes? No. Unfortunately, the maze has some other inhabitants. Inky, Pinky, Blinky and Clyde are

four evil ghosts who haunt the mazes and they don't like visitors — especially small, round, yellow ones.

As the player attempts to collect all the dots and gain supreme position in the high-score table, Inky and the gang try to stop them. Should one of the spooks manage to catch Pac-Man they will 'chomp' him and the player loses a life. When all five lives have been lost, the game is over.

To help Pac-Man achieve his goal, each maze contains four power pills. Power pills render Pac-Man with the ability to strike back at the ghosts for a short time. Upon eating one, any ghost giving chase will turn blue and suddenly remember some urgent business over the nearest horizon. However, when the effect of the pill has worn off it will make a speedy return.

Other edible items to be found in the mazes include pieces of fruit and two more special pills: a red power pill that lasts for around five seconds and a go-faster green tablet.

An extra feature in Pacmania not found in the older games is the ability to bounce. At the press of a button you can send the grapefruit with a gob flying into the air. This can be a life-saver when you're cornered by gnashing ghouls.

You can also steer Pac-Man while in mid-air. Just to make life more complicated, though, the green ghosts have the ability to jump on some of the later levels and the purple ones gain Ferrari engines.

When you manage to completely clear a maze of dots, you are transported to the next world. There are four worlds in Pacmania — Block Town, Pac-Man's Park, Sandbox Land and Jungley Steps — and each world looks vastly different from the others. Block Town, for example, is a maze made up of what appear to be pieces of multi-coloured Lego while Pac-Man's Park consists of various sets of railings.

The actual graphic display in Pacmania is a far cry from the original idea. What were once two-dimensional, single-colour mazes are now glorious, multi-



coloured, scrolling three-dimensional affairs. They look a real treat, but looks aren't everything. Due to the size and nature of the graphics you can't view the entire playing area, so the ghosts can spring surprise ambush attacks.

The mazes span the entire screen area on the Amiga as the game is set in 'overscan'. Overscan allows graphics to be displayed in what is usually the border area of the screen, which gives the game that arcade look. Unfortunately this is not the case with the other versions, so they don't look quite so polished.

Most of the display moves smoothly — the sprites work very well indeed. The vertical scrolling routine, however, appears to contain a bug. When racing along a vertical corridor in one of the first three worlds the screen has a slight judder to it. This is present on both the Archimedes and Amiga versions of the game. On the Amiga, this is corrected in the fourth world and doesn't happen again. The Archimedes version, however, continues to wobble. Luckily, this is just a cosmetic detail and does not affect gameplay.

Sonically, the game is just as impressive. Three jazzy tunes accompany the frantic action and the effects are true to the arcade version. My personal favourite is the Jungley Steps theme.

Also included in the Archimedes and Amiga versions are two or three intermission cartoon sequences which pop up occasionally between levels. One such sequence involves Pac-Man chasing a single blue ghost across the screen. Then, suddenly, a hundred ghosts come racing out of the border at him. It's quite funny the first time you see it.

Pacmania is a great little game. It combines all the qualities you expect from a computer game such as smooth, colourful graphics and stereo sound, with the addictiveness, speed and genuine fun of the original. I've put an awful lot of hours into this game and I can see myself playing it for a long time to come. The only real complaint I have is that it doesn't have an 'if the boss wanders past, bring up a word processor' mode so the monitor has to be switched off when Derek goes for a stroll!

Highly recommended. **END**

"TOPSPEED EARNS A STANDING OVATION!"

— Kent Porter, Dr. Dobbs Journal



See us at COMDEX
Cashman A348

The successor of Pascal: JPI TopSpeed™ Modula-2 produces better code than Microsoft C, Turbo C, Logitech Modula-2 and Turbo Pascal 4.0.

Introducing VID: The easy-to-use, source-level debugger. Single-step and trace through source in multiple modules. Examine and modify all variables in symbolic form, including arrays, records, enumerated types and pointers. Point and shoot breakpoints including "One-shot," "Sticky," "Delayed," and "Monitor." Watch both variables and Modula-2 expressions during execution. Automatic variable trace of all variables accessed, and assembler, registers and procedure call-stack trace windows. Package includes symbolic disassembler and execution profiler. 72-page manual.

The Compiler Kit includes: High-speed optimizing compiler (3,000-5,000 lines/min. on a PC AT 8MHz), integrated menu-driven environment with multi-window/multi-file editor, automatic *make*, fast smart linker. All Modula-2 sources to libraries included. **BONUS:** Complete high-speed window management module included with source. 258-page User's Manual and 190-page Language Tutorial.

The TechKit™ includes: Assembler source for start-up code and run-time library, JPI TopSpeed Assembler (30,000 lines/min.), TSR module, communications driver, PROM locator, dynamic overlays, and technical information. 72-page manual.

System Requirements: IBM PC or compatible, 384K available RAM, two floppy drives (hard disk recommended).

"...TopSpeed is surely one of the finest new products introduced to date in the PC arena...DDJ doesn't give unqualified raves very often, but there's no question about it in this case; JPI's TopSpeed Modula-2 is first-rate."

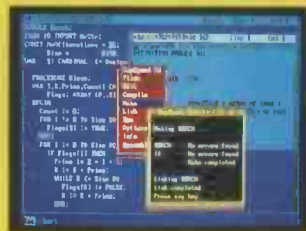
Kent Porter
Dr. Dobbs Journal

"JPI Modula-2 looks like another classic in the making. It generates code as good as or better than leading C compilers and the programming environment is a genuine pleasure to use."

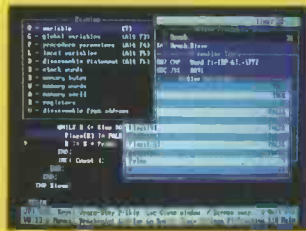
Dick Pountain
BYTE Magazine

"I liked all of the hard-disk space that was recovered after I deleted my BORLAND, MICROSOFT, and LOGITECH compilers, because with TopSpeed Modula-2 all the rest are obsolete!"

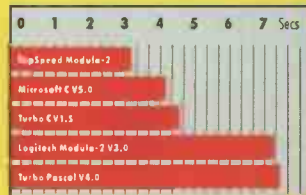
Robert D. Randall
Donnelley Marketing



See our OS/2 version at COMDEX.



VID (Visual Interactive Debugger): power without complexity



Sieve benchmark measured by the British Standards Institution (BSI)—25 iterations on an 8MHz AT.

Compiler Kit £59.95
TechKit £34.95
VID £34.95

3-Pack £119.95
(Compiler, TechKit & VID)

To Order:

Call: (01)253-4333

Or mail us your order with a cheque (payable through a UK bank or Euro cheque), money order, or VISA/ACCESS information.

30-day unconditional money-back guarantee.

VAT postage & packing:

In the UK: add £3 for each product ordered, PLUS appropriate VAT: Compiler Kit £2.69, TechKit £2.03, VID £2.03, 3-Pack £6.13.
In Europe: add £6 for up to 3 products ordered, and £2 for each add'l product.



Jensen & Partners
International

Jensen & Partners UK Ltd.
63 Clerkenwell Road
London EC1M 5NP
Phone: (01)253-4333

TopSpeed and TechKit are trademarks of Jensen & Partners International. Other brand and product names are trademarks or registered trademarks of their respective holders.

MULTIBUFFER: THE ULTIMATE PRINTER PLOTTER SHARER



New British-made universal buffered printer/plotter sharer and data switch

- Up to 14 user-installable serial and/or parallel ports.
- ALL INPUT/OUTPUT PORTS CAN BE ACTIVE SIMULTANEOUSLY.
- Up to 4 MEGABYTES of common memory, automatically allocated and deallocated as required on each active port.
- SEVERAL PCs CAN SHARE ONE OR MORE PRINTERS OR PLOTTERS.
- ANY PC CAN ACCESS ANY PRINTER OR PLOTTER.

New: Inter-PC File Transfer

DON'T BUY A NETWORK UNTIL YOU HAVE READ THIS!

Users can now transfer multiple files of unlimited size between IBM & compatible PCs, irrespective of disk or PC types, with a user-friendly interactive program. The Multibuffer offers these network-like features at fraction of the cost of any network. Serial ports are required.

User-configurable for future requirements

The MULTIBUFFER can be factory- or user-configured with 1-7 plug-in interface cards for up to 7 parallel ports or 14 serial ports, or a combination of parallel and serial. Each serial card provides two data ports. Data direction (input/output) of each port is selectable and all common baud rates and handshakes are supported.

All users can send data simultaneously

Each port is separately buffered, allowing simultaneous data flow on all input and output ports. Installed ports can be used for any combination of PCs, printers and plotters.

Up to FOUR MEGABYTES buffer memory

Buffer memory is automatically allocated and deallocated to each user in real time from a common 'pool' of up to 4MB.

Simple but powerful PC-based set-up

All user-configurable features of the MULTIBUFFER are accessed via a user-friendly program running on a PC. No fiddly switches are used. Also, when the MULTIBUFFER is driven from several PCs, each user can activate a RAM-resident pop-down menu for printer selection and other useful functions. Setups are stored in non-volatile memory.

Highest-ever data throughput

State-of-the-art high speed 16-bit CMOS technology allows up to 13 input ports to receive data simultaneously at a full 9600 baud without slowing-down the PCs – much faster than other printer sharers. Data rates up to 38400 baud (serial) and 30000 bytes/sec (parallel) are possible – ideal for lasers and DTPs such as Ventura or Pagemaker.

The perfect choice for CAD

The MULTIBUFFER can allow THIRTEEN PCs to share a plotter – or 10 PCs to share 4 plotters, and so on. You can now optimise the utilisation of a single high-performance plotter with AutoCAD, Robocad, Cadstar and most other popular CAD programs.

OTHER DATA COMMS PRODUCTS AVAILABLE FROM RINGDALE INCLUDE



MEGABUFFER – Universal Data Buffer

- Reduces computer waiting time while printing/plotting.
- Allows you to use your PC more.
- New battery backup version.
- Compatible with most computers, printers and plotters.
- Software – independent.
- Data buffer and interface converter.
- 64K – £185, 256K – £315, 512K – £455, 1024K – £598.



MEGASWITCH AS – Serial Data Selector

- Single unit multiplexer and demultiplexer with 2K buffer.
- RS-232 and RS-422 versions.
- Multiplexer – ideal for printer sharing, 4 inputs, 2 outputs. Can automatically select any channel supplying data.
- Demultiplexer – ideal for driving several different printers from a PC. 2 inputs and 4 outputs.
- Software and manual selection. RS232 version – £169



MEGASWITCH AP – Parallel Data Selector

- Connects any of 4 inputs to one of 2 outputs.
- Can automatically switch to any channel supplying data.
- Ideal for laser printer sharing.
- Universally compatible – works with all standard Centronic computer and printer interfaces.
- Use it with a Megabuffer for additional time saving – £169

MULTIBUFFER PRICES

1/2MB	1MB	2MB	4MB	Serial Card	Parallel Card
£545	£695	£995	£1895	£80	£40

RINGDALE PERIPHERALS

Southdownview Way,
Worthing, West Sussex BN14 8NR

Sales, Tel: 0903 213131
Tech/General, Tel: 0903 213752
Fax: Tel: 0903 204296
Telex: 265871 (REF: JBC 2021)

UK Delivery £6 per unit. Cables from £15. All prices excluding VAT. Dealer and Export enquiries welcome.

The learning curve

Mick O'Neil describes the Mac's emergence in the education market and looks at events in the software world.

Although originally marketed as a business machine, the Macintosh has become an inevitable force in education. This may seem particularly surprising when a survey of the field shows a relative scarcity of dedicated educational software. But educational software is based on curriculum structure, goals and methodology, and in most school systems these change and evolve.

Thus, educational software developers have been shooting at moving targets; much educational software is outdated as soon as it's published. Macintosh software developers, on the other hand, have attempted to deliver written communication and information management skills to the lowest level. Their success in the business world has almost inadvertently spilled over into education.

Young students with a few simple lessons in keyboarding can access word-processing functions that are still far too complex on rival systems. Niche software areas like desktop publishing, idea processing and desktop presentations are changing both student and teacher methodology, while Hypercard and CD-ROM could

have an enormous impact on our whole information delivery system.

Back to Works

Microsoft Works is considered a 'low-end' integrated package in that it combines word-processing, database, spreadsheet and communications modules in one integrated package and does so in a way that each module seems a subset of a more sophisticated standalone program.

For that reason, Works received rather mixed reviews with inevitable comparisons to power programs like Word and Excel. Some observers failed to notice, however, that each module is sufficient to accomplish what most users want, and that the integrated desktop and overlapping command structure provide an improvement in accessible power similar to the Macintosh System and Finder's improvements on DOS.

Works 2.0 both fine tunes and enhances the original program. Common improvements include a print preview option, a stationery option that allows you to save a group of formats such as font, type, and style and then apply them to other documents, a networking capability, and an option to save a Works Desktop without quitting Works.

MacLink Plus vs Lap-Link Mac

Traveling Software recently upgraded its PC/Mac file transfer system to include built-in translators, a convert international characters option, and a method of transferring text to a Macintosh in text or MacBinary format. At release time the translators are limited to word-processing documents but the company promises a more extensive series of translators in a free update to all registered users.

Impressively, LapLink Mac can transfer data between the Mac and the PC at rates of up to 57,600 baud and includes a cable with connectors for the Mac 512k, MacPlus, Mac SE and II, and both the 9 and 25 PC DIN plugs

MacLink Plus doesn't include as nifty a cable but the transfer

		Budget (\$\$)			
	A	B	C	D	E
1					
2	Expenses	Mag	Percent	June	Percent
3	Basic Food	\$30000		\$10000	
4	Special Food Requests	\$0		\$6000	
5	Lodging	\$60000		\$20000	
6	Bicycles	\$20000		\$5000	
7	Promotions	\$12000		\$72000	
8	Total Expenses	\$122000		\$113000	
9					
10	Total Budget Avail:	\$135000		\$67500	
11					
12	Under (Over) Budget	\$13000		(\$43500)	
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					

Works 2.0 includes new drawing tools which can be accessed from either the word processor or the spreadsheet

software options and translators are far superior. The fact that MacLink uses the Macintosh as a base means that it's much simpler to use than the PC-based Lap-Link Mac.

Scanner in view

I've finally had a chance to use Apple's new scanner and it's pretty impressive. The software that drives it is simple but powerful and the scanner itself behaves flawlessly. Power users will be disillusioned that it only handles 16 shades of grey but I found myself quickly running out of disk space after scanning just a few pictures at this resolution.

For that reason, a scanner might not be useful to everyone. I used mine to copy company forms into FileMaker II to produce perfectly formatted reports, and to set up standard headings and logos for word-processing documents.

Sequence of events

In late November Ashton-Tate shocked the software industry by filing suit against Fox Software, maker of a dBase clone called FoxBase+ and a dBase 'workalike' called FoxBase+Mac, claiming Fox unlawfully copied the dBase concept, 'look and feel', programming language, sequence of events, and arrangement of the program as presented to its end-user.

A successful outcome for Ashton-Tate on concept, programming language or sequence of events could plunge the industry into the software dark ages, with suit and counter suit based upon any arbitrary criteria. Small software developers would disappear under the shadow of the enormous legal expenses and lack

of competition would slow progress to a virtual halt. On the other hand, FoxBase+Mac appears to be quite safe as no jury in the world could accuse it of having the 'look and feel', sequence of events, or same concept as dBase, and surely Fox Software must be preparing a similar release for PS/2 compatibles under Presentation Manager.

In the end it may be Ashton-Tate which is forced to emulate the speed and interface of FoxBase+Mac. Surely, no developer would release software under Presentation Manager that confronts the user with a dot prompt.

Copy protection by any other name

An alarming new trend in the entertainment market is to copy protect software by requiring the user to recall something obscure from a manual or coding device. AFT, the Advanced Flight Trainer from Electronic Arts, asks a question about the size or flying capabilities of a particular aircraft which can only be gleaned from the reference section of the manual, while Mindscape's Colony is a 3D space simulation that asks you to refer to a code sheet which comes with the game. Unfortunately, if you're not the organised type and misplace these items, the software becomes virtually useless.

Mick O'Neil is computer coordinator for the US Department of Defence Schools in the UK and a regular contributor to PCW and other computer magazines. He welcomes readers' comments on Telecom Gold 72: MAG20370 or c/o PCW.

Contacts

MacLink Plus
\$195
DataViz Inc
16 Winfield Street
Norwalk, CT 06855, USA
Tel: 0101 (203) 866 4944

Lap-Link
£100
Frontline Distribution
(0256) 463344

AFT
Electronic Arts
Tel: (0753) 49422

Colony
\$49.95
Mindscape
3444 Dundee Road
Northbrook, IL 60062, USA

Works
Microsoft
Tel: (0734) 500741

Apple Scanner
£1295
Apple Computer
Tel: (0442) 60244

SPECIAL INTERESTS

Showing off

Some items of interest from Atari's Christmas Show, and new software which may take your fancy, presented by Marvey Mills.

'How would you like to win a fortune?' Thus went the opening line of an erstwhile salesman's pitch at the recent Atari Christmas Show. Being a sucker for this sort of sales ploy I was instantly captivated and drooling for more cliches.

The subject of all this excitement was a program called Jackpot 2 ('The power to forecast the pools the way you want to') from Futuresoft. I'd like to forecast wins every time, please. 'Well, it doesn't actually tell you how to win,' said the aforementioned salesman, 'you enter a formula of our own design and the program calculates past wins.' Then you compare this against the true results until your formula is as near perfect as you can make it, then presumably make your 'fortune' by applying the formula to the next fixtures.

Sounds like jolly hard work to me but they said it was selling well (they would, wouldn't they) and that there was a great demand for this type of program. If Ernie isn't your best friend at the moment then this may well be just what you're looking for.

Contact Futuresoft at 8 Pump House, 49 Greenwich High Road, London SE10 8JL.

Atari on show

I know that by the time you read this the Atari Christmas Show will be a foggy memory but I'll tell you what I got up to just the same. Judging by Peter 'Atari do know how to design computers, you know' Walker's (Atari's PR chieftain) comments when I called him a few weeks ago, it seems my little daydreams about a perfect ST of a few months ago may have upset a few people in the Atari camp, so I thought the show would be an ideal place to clarify a few details about the forthcoming laptop ST, the ST Plus and the Transputer Workstation.

Armed with only a notepad and my enthusiasm to protect me I approached the nearest friendly-looking Atari person, introduced myself and waited to be enthralled by tales of wonderful hardware 'in the pipeline'. 'Actually, you prob-

ably know more about it than me,' he wailed. 'I read all I know in CTW this morning!'

I was incredulous to say the least but I did manage to prise a few titbits from the woe-begotten representative. The ST Plus will basically be a souped-up ST or, in the words of Mr Atari Rep, an 'Amiga beater'. It will contain a blitter chip, a custom scrolling chip and a brand new custom sound chip (could this be the long awaited Amy, I asked myself but alas, not him). What's more, it will be 100 per cent compatible with existing ST software!

How then, I asked, would software directly addressing the existing Yamaha sound chip make any noise if it wasn't there? Easy, the Yamaha chip will be there, hiding itself away on the motherboard waiting to be POKED.

If Atari really does manage this colossal feat then it may well have an Amiga beater on its hands, especially since I was told that the price would be 'approximately £100 more than a normal ST'. Can't wait.

We did get on to the subject of the DRAM shortage and Mr Atari Rep took great pride in explaining to me that Atari how has a chip manufacturing plant all of its own in Germany and is producing its own DRAMs and custom chips there. 'Great,' I said, 'so that means you'll be dropping the price of the entry-level 520STFM back to £299?' Silence!

I reminded him that Atari blamed the £100 price hike on the global DRAM shortage and now that it was over (for Atari at least) the company could revert to the original pricing structure, but strangely enough I could not get confirmation on this subject. In fact the price was dropped before Christmas, with the ST Super Pack and 20 games being offered for £399.

I did get a quick look at a prototype transputer workstation running a demo animation program and the colour and resolution were stunning, but I'm not going to comment further until I see something running which is worth the rumoured £5000.



Shopping around at the Atari Christmas Show

Also starring . . .

So much for Atari. The rest of the show was, as usual, generally given over to the software and hardware box shifters vying with each other to unload their stock at bargain prices. I did, however, uncover a few dainty morsels.

Most notable on the hardware front was Vidi-ST, a video digitiser for only £99.95. I saw it running real-time frame grabbing at 50 frames a second in colour (using 16 shades). The software seems fairly comprehensive (although I didn't get a close look) and at that price is sure to be a winner.

Romantic Robot was showing Multiface ST, a ROM cartridge that allows you to 'freeze' a program and save it out to disk.

Built in is a comprehensive set of monitor/debugging tools but at £49.95 it's fairly expensive.

Always one of the most interesting stands to visit at an Atari show is, of course, the Llamasoft stand. Trip-a-Tron, Jeff Minter's latest pride and joy, was the main attraction and Jeff was happily taking it through its paces (until the wide-screen projector broke down, that is!).

The light synthesiser has been an ongoing project with Llamasoft and has appeared in various guises on machines other than the ST. One of my favourite quotes is that Colourspace (as Trip-a-Tron used to be known) is fine but it should really come with a Jeff Minter emulator built in since he can produce a fine display.

Now you can get about as near to that as possible, as Llamasoft has just released Merak, a 50-minute video set to synthesiser music showing

just what can be done when you set your mind to it. It used at least five Mega STs with a video mixer and the initial results look out of this world.

Llamasoft did promise to send me one to review so I'll say more when I see it.

Come the revolution

I recently received a little program from HiSoft (of DevPac fame) which should revolutionise the ST. Called Turbo ST, it is in fact a 'software blitter' and replaces key parts of the GEM operating system with fast, compact machine code routines (GEM has suffered in places from being written in C). Judging from the Benchmarks on the back of the manual it even manages to outdo the hardware blitter chip on certain operations.

What you get for your money is faster windows, alert boxes, screen refreshes, drop-down menus and, most important of all, faster text scrolling. It really does work and I urge you to take a look for yourself — the ST seems to whizz along when it is installed.

HiSoft also sent me its new FTL Modula-2 developer's kit which I'll write about in the next issue of PCW, together with a world exclusive preview of the innovative Talespin adventure writing software from Microdeal. Also coming up — a serious look at educational software on the ST.

Details can be obtained from HiSoft on (0525) 718181.

Any suggestions for this column in future issues, or any general comments about the Atari ST, should be sent to ST User Stack, PO Box 102, Southend-on-Sea, Essex SS1 2UU.

Casting a spell

The Z88's weak points have been well documented, especially the problems with Pipedream. Guy Swarbrick has found some solutions.

Cambridge Computer's Z88 portable doesn't have many faults. It's reasonably cheap (far cheaper than its MS-DOS based rivals), the battery usage is minimal and, most of all, it's ridiculously light. It is the only portable I have ever been able to use on the coach commuting from Kent to London every day without crippling myself and annoying my fellow passengers, most of whom are trying desperately to get to sleep and could well do without the clacking of keyboards, the whirring of disk drives and the irritating PC bleep.

Pipedream problems

The faults may be few in number but they're there alright, and those that are there tend to be fairly fundamental ones. The main problem is the built-in spreadsheet cum word processor, Pipedream; and, for most people, Pipedream is the only piece of software on the Z88.

A word processor based on a spreadsheet was never going to be perfect and although the authors had a pretty good try, it is Pipedream more than anything else which lets the machine down. It has been criticised for many things, some of them trivial, but 'features' like not being able to delete back onto the line above the cursor and the difficulty of splitting a paragraph, make using Pipedream for any length of time somewhat less than enjoyable.

One of the less serious criticisms is the lack of a built-in spelling checker. I suspect most people use the Z88 'on the road' and upload the files to a 'real' computer with more sophisticated software. For them, the inevitable higher cost of the base machine might well have outweighed the advantages the spell checker would have brought.

QuickEdit

Ironically, the solution to the Pipedream problem may lie with a spell checker cartridge from Computer Concepts. Spell Master provides a dictionary, a pop-up utility called WordFinder which combines a dictionary browser and an anagram and crossword solver,



Z-Term in action, via a Pocket Stradcom modem.

and adds a new text editor, QuickEdit.

QuickEdit, while in many ways inferior to Pipedream in terms of features, is, in the end, a far more usable program. As I said, I think most people are quite happy using the Z88 for fairly basic text entry and QuickEdit does this very well, with sensible paragraph splitting, deletion and real tabs.

It is also the only way to spell check Pipedream documents. If you're using Pipedream to edit a document (and there are still good reasons to do that — QuickEdit has no maths features, for example, nor does it have boldening or italics) the procedure for spell checking sounds a little ridiculous.

First you save the file, then exit Pipedream and load QuickEdit. Re-load the file and run the spell checker. When you've corrected the document, you save it again and return to Pipedream where you re-load the file and continue editing.

In practice, because of the way the Z88 keeps multiple applications in memory, the swapping about is more like an over-complex menu system and although it sounds clumsy, you soon get used to it.

One potential problem with transferring files to QuickEdit

is that Pipedream's formatting and maths control codes are not used in QuickEdit. The solution is that, although the program ignores Pipedream control codes, it retains them unaltered and re-saves the file in its original state.

QuickEdit's only major handicap is the lack of a word count, a strange omission as it is a natural side effect of a spell checker whose function rather obviously depends on its ability to distinguish separate words within a file.

The solution, for those unwilling to carry on using Pipedream with QuickEdit for spell checking is, of course, to use QuickEdit to enter and edit the text and Pipedream for word counts and tidying up.

The other feature of Pipedream which I thought I would miss in QuickEdit is the excellent page preview at the right-hand end of the screen. Strangely, since I have always maintained that it makes the Z88 usable despite its small screen, I don't miss it.

The spell checker itself is reasonably fast and the dictionary pretty comprehensive (it's got 'Sinclair' in it ...) though it's not particularly good at guessing correct spellings. The anagram and crossword solvers, likewise, do what they do at a reasonable

rate: the function of the former is obvious; the latter will find, for example, WARSHIP and WORSHIP given W#RSHIP and CATCHWORD and CROSSWORD given C*WORD. Word-Finder can also help if you are unsure of a spelling. Asking it to find a close match for WORSHIP again brings up WARSHIP and WORSHIP.

Spell Master is the best product for the Z88 so far. That is as much a criticism of Pipedream as anything else but nonetheless it is an essential purchase for anyone who uses their Z88 regularly.

Z-Term

When you've finished your masterpiece (or even your PCW copy) you need some way of uploading it to a desktop machine and, while there are programs for most machines which enable you to connect directly and transfer files, that's not much use if the machine in question is 4000 miles away (or 40, for that matter).

The answer to this could well be Z-Term from Word-mongers. Now bundled on Superchip 2 with Z-Base (see PCW, November 1988) and two games (of which more later) it is the latest version of a comms package that has been around for a while and includes Viewdata emulation as well as normal scrolling text.

Using a comms package on the Z88 can be a real pain, particularly if you frequent bulletin boards where the participants are prone to attacks of verbosity. At 2400 baud a 40-line message on an eight-line screen is not really a viable proposition.

One way around this is to have all the text spooled to a file but, although it is possible to instruct some bulletin board software (CIX, for example) to pause every eight lines, it would have been nice to be able to set Z-Term up to stop the scrolling after each screen of text.

Z-Term also claims to provide Prestel Viewdata emulation. Don't expect, however, to see Prestel pages in all their graphical glory(!). All Viewdata mode does is display text in the correct places and *s or £s in place of the graphics. There's no real reason why it couldn't have been done properly: one of the games on the same cartridge uses bit-mapped graphics, so it is not beyond the capabilities of the machine. That aside, the software works reasonably well, coping with Prestel's Dynamic Pages which can give some software problems. **END**

Show me what's new

Chris Cain reports from Commodore's 12th Christmas show.

BBC2 Amiga

Possibly the show's biggest attraction was the announcement of a BBC Micro emulator for the Amiga. Entitled the BBC=Emulator, this program allows the user to run most well behaved BBC software within an Amiga environment (that is, software which does not drive the hardware directly).

On hearing of this product I was sceptical, to say the least. I have seen computer emulators on lots of different machines and none of them have been all they're cracked up to be. Now, having seen this program up and running, I am fully convinced of its potential.

Running on a standard Amiga 2000 under the emulator was a BBC Basic graphics demonstration. A copy of this program was also running on a genuine BBC model B. While the Acorn machine struggled to draw a complex pattern across the screen, the Amiga finished it, coloured it in and went on to the next stage of the demo. The speed difference was impressive.

What was more impressive, however, was the fact that the demonstrator then pulled down the Amiga screen to reveal not one but two more emulators running, each going faster than the original hardware.

The BBC=Emulator runs pure 6502 programs slightly slower than the original machine, but BBC Basic programs can go up to seven times faster. Most software has a mixture of both. It supports all text and graphics modes including Mode 7, the BBC's teletext mode. The program is being aimed at schools, giving them the opportunity to upgrade to more powerful machines without the need to scrap all their existing educational software.

The BBC=Emulator is the work of a specialist software design house, Ariadne. Ariadne is a London-based company which has previously enjoyed only limited recognition in the Amiga world, for work with interactive video applications. Commodore approached Ariadne because it had detailed knowledge of the Amiga, the BBC Micro and of teaching environments; two of Ariadne's founding members are ex-teachers. The choice proved to be a wise one.

When asked about the emulator, leading Ariadne programmer David Parkinson said: 'This has been a fascinating project for us. It's like introducing two of your best friends to one another. The Amiga and the BBC Micro are excellent machines, so it was a pleasure to link them up.'

At present, BBC programs



Education answer: the Amiga to receive BBC emulation

are transferred to the Amiga via a serial link. Ariadne should have it reading BBC disks soon, though. The finished product should be on sale by the time you read this, at £49.95 (or £39.95 for schools). I'm sure the BBC=Emulator will be the breakthrough into the education market Commodore has been seeking for a long time.

Key to Genlock

Although Desktop Video (DTV) is popular among Amiga users, many have been put off by the high price of equipment. An Amiga set-up is much cheaper than dedicated hardware, but specialist bits like Genlock have always carried a price of around £300.

Until now, that is. A relatively new company called The Electronic Workshop has come up with a composite video Genlock (full colour) for just £99. Yes, £99. That will certainly please a few people. MiniGEN, as it is known, is a small unit which looks not unlike a TV modulator, and plugs into the RGB output port.

The unit allows you to mix computer-generated images with video signals to create special effects, titling and so on. It does not require any special software and is a doddle to use. Such was its popularity at the show that the company sold all the units it had by 5pm on the Friday. I will be taking a closer look at this product just as soon as The Electronic Workshop can get one to me.

Brighter outlook

Amiga Workbench icons have always been a pleasure to look at. Disks look like disks, Basic listings are shown as small flowcharts and games often have icons which animate when selected. Yet Workbench, although in a resolution capable of displaying 16 colours,

is restricted to only four, which is a waste. Just think what icons would look like in sixteen colours!

Icon Paint is a revolutionary new program that lets you create and display Workbench icons in 16 glorious colours. It takes the form of a very small utility which, when run, looks something like a mini version of Deluxe Paint — hence the name.

Many drawing tools are supported, including outlines and filled boxes, circles of a similar nature, lines, text input and freehand. Icons can be anything from a pixel to a quarter of the screen in size. You can even import brushes for packages like Deluxe Paint.

All that is needed to use these newly designed icons on a standard Workbench disk is a pair of files which can be quickly copied from the master disk. When these are placed in your start-up sequence, your Workbench will take on a whole new image.

Icon Paint is available from Hi Tension and costs £14.95.

Cain Comments

PD or not PD — that is the question

A number of Amiga public domain libraries have been set up to allow users to access the vast amount of free software floating about. Two of the best known distributors are George Thompson Services (famed for the disk magazine *Jumpdisk*) and 17 Bit Software.

Both of the above had stands at the show, and both were doing a roaring trade. In fact, I purchased a 'Best of Public Domain' software pack and a 'Mega Demo' collection from GTS. The PD pack contains nine disks full of useful programs, utilities and games. At £19.99 I thoroughly recommend buying a copy.

The Mega Demo pack concerned me, though. It has some clever demos, some of which have to be seen to be believed, but it also has a lot of music on it.

And this music comes from commercial software. The Compact Hi-Fi disk was one example, containing a program which played five different pieces of music, two of which I recognised as being from games I had played.

I must admit, I do like having the tune from Electronic Arts' Fusion pounding away as a background task, but I wonder if GTS has the right to sell it. If it has the all-clear from software houses then that's fine, but is that likely?

Contacts

Ariadne Software
273 Kensal Road
London W10

George Thompson Services
Dippen
Brodick
Arran
Scotland KA27 8RN
Tel: (077082) 234

The Electronic Workshop
Queensway Business Centre
Brigg Road
Scunthorpe DN16 3RT
Tel: (0724) 281317

Hi Tension
Alexander House
Station Road
Aldershot
Hants GU11 1BQ
Tel: (0252) 344454

ARE YOU SEEING RED?

BECAUSE YOU PAID MORE THAN



FOR A COMPLETE 386 SYSTEM

16MHz 386 Mono System

Compatible with the following operating systems:-
PCDOS, MSDOS, OS/2, UNIX, XENIX and Concurrent DOS.

SPECIFICATION*

CPU 80386. Clock Speed 6/16 MHz. 1Mb of Main Memory
(640 k usable memory) Expandable to 16Mb. 8 Slots 5 x 16 bit, 2 x 8 bit,
1 x 32 bit 1.2 Mbyte Floppy Disk Drive. 14" Mono Monitor. Hercules
Compatible Mono Card with Parallel Printer Port

CHOOSING WALTERS CAN HELP YOUR BLOOD PRESSURE

I would like further information on Walters International Systems.

NAME

COMPANY

ADDRESS

Please send to:-



WALTERS INTERNATIONAL LTD

Matrix House · Lincoln Road
Cressex Industrial Estate
High Wycombe · Bucks HP12 3RD · England
Telephone: (0494) 32751-9
Fax: (0494) 33757

*Price does not include VAT or delivery

MIRROR IMAGE

WITH A DIFFERENCE

Hi-Grade Computers, we freely admit, did not set the industry's technical standards. We are, however, setting a new value-for-money standard by basing our prices on reality rather than image.

All Hi-Grade systems come with both 5.25" and 3.5" floppy drives as standard, equipping the user for all eventualities. To complement the systems' high processing speed all hard disk drives have access times of less than 40ms.

£1065 Hi-Grade-286-12

Intel 80286CPU, 12/10/8/6MHz switchable • 8 Expansion slots (5 free) • 2 parallel 2 serial ports • 102 key keyboard • Mono graphics Hercules comp. card • 12" flat screen mono monitor • 1.2Mb 5.25" floppy drive • 720K 3.5" floppy drive • 20Mb (28-35ms) hard disk • Warranty covering parts & labour for 1 year • Hot-line technical support.

£1150 As above with 40Mb Hard Disk

£1430 As above with 70Mb Hard Disk

£1365 Hi-Grade-286-16

For those who think 12Mhz 80286-based machines are yesterday's technology, Hi-Grade has introduced a 16Mhz version based on the NEATCHIPset technology. A computer developed with OS/2 very much in mind, its performance is one that a lot of 80386-based systems would envy.

For an extra \$300 the user gets an Intel 80286-16 CPU running at 16.8Mhz, 1Mb (80ns) RAM and a 1.44Mb floppy drive instead of the 720K.



HI-GRADE 386 £1700

Our experience has taught us that there are two types of customers searching for 80386-based systems. One type is interested only in speed and raw horsepower while the other puts more emphasis on value for money. So we have introduced two systems, the 386A and the 386X respectively, to meet these different needs.

Both systems include the 32-bit Intel 80386 CPU running at 20MHz, 1Mb RAM and the rest of Hi-Grade's standard specifications.

Prices begin at £1700, including the fast 20Mb hard disk, with performance of up to 28MHz on the Lanmark speed scale.

EGA colour upgrade £275

VGA colour upgrade £360

For EGA & VGA colour systems simply add the upgrade price to the price of the basic mono system. Both colour upgrades include card and monitor.

For other configurations, you are welcome to write to us or call us on 01-482 4024 for a free quotation and expert advice on the system best suited to your requirements. Our showroom is open for free demonstrations Monday to Friday, 9.30am to 6.00pm

Telephone:

01-482 4024

HI-GRADE
HI-GRADE
HI-GRADE
HI-GRADE

HI-GRADE

COMPUTERS LTD.

13-15 KENTISH TOWN ROAD,
LONDON NW1 8NH

TEL: 01-482 4024 FAX: 01-267 6138

TELEX: 262563 XENON G

Please send me an information pack about Hi-Grade Computers.

Return this coupon to Hi-Grade Computers Limited, 13-15 Kentish Town Road, London NW1 8NH, or fax us on 01-267 6138.

Name _____

Job Title _____

Company _____

Address _____

Tel. No. _____

Fax No. _____

MICROMART MICROMART MICROMART

SYSTEMS ADD-ONS

ATOM IBM COMPATIBLE SYSTEMS 01-801 1838 ATOM IBM COMPATIBLE SYSTEMS

PCC 820B XT

- SPECIFICATIONS:**
- TURBO MAINBOARD 4.77/10MHz. MAX. MEMORY ON BOARD CAN BE 1MB; OK; 8 EXPANSION SLOTS
 - 150W POWER SUPPLY; 102 KEYBOARD
 - CASE REGULAR SIZE
 - FULL SET OF MANUALS

SEE ATTACHED LIST FOR ADDITIONAL CARDS

£176.00

Orders under £50 subject to £10 surcharge. TRADE AND EXPORT ENQUIRIES WELCOME. WARRANTY FOR 12MTHS.

MT-901 (ATOM 286A) AT

- SPECIFICATIONS:**
- MAINBOARD 6/12MHz; ZERO WAIT STATE;
 - EXPANDABLE TO 4Mb + EMS, OK RAM;
 - 8 EXPANSION SLOTS; (SEE BAY 999)
 - 102 KEY KEYBOARD;
 - 200W POWER SUPPLY;
 - BABY AT CASE W/KEY LOCK, TURBO SWITCH;
 - RESET SWITCH; FULL SET OF MANUALS

SEE ATTACHED LIST FOR ADDITIONAL CARDS

£368.00

ST 310A (ATOM 386A)

- SPECIFICATIONS:**
- 386 MAINBOARD 16/20MHz;
 - EXPANDABLE TO 8Mb ON BOARD (SEE BAY 1000)
 - 102 KEY KEYBOARD
 - 200W POWER SUPPLY
 - BABY CASE W/KEYLOCK TURBO SWITCH;
 - FULL SET OF MANUALS

SEE ATTACHED LIST FOR ADDITIONAL CARDS

£910.00

MAINBOARDS (include keylock; turbo hard switch; reset switch; connectors; legal bios)

TUB 550A	MINI TURBO XT4.77/10MHz; MAX. MEMORY ON BOARD 1MB OK RAM	£63.00
TUB 550B	TURBO XT4.77/10MHz INC. 2RS232; 1 PARAL GME PORT/F. CONT/CLK	£120.00
BAY-999A	AT MAINBOARD 286CPU 6/12MHz ZERO WAIT STATE EXPANDABLE TO 4Mb ON BOARD + EMS 8 EXPANSION SLOTS	£310.00
BAY-1000	386 CPU 16/20MHz ZERO WAIT STATE; EXPANDABLE TO 8Mb ON BOARD; 8 EXP SLOTS; 1x32/5x16 BIT/2x8 BIT; RUN ALL 8088/86 80286 + 80386 PROGRAMS + OP SYSTEMS INCL MS-DOS; MS-OS/2/WINDOWS/386; XENIX; UNIX; DESKVIEW/QEMM; LOTUS 123; AUTOCAD; NOVELL etc	£750.00
BAY 1000A	386 CPU 16/20/24MHz ZERO WAIT STATE (ALL OTHER SPEC AS BAY1000)	£835.00

VIDEO CARDS

CGP-990	COLOUR/GRAPHIC/PRINTER XT/AT/386 LOW RES	£38.00
MGP-990	MONO/GRAPHIC/PRINTER XT/AT/386 HI RES; 720x380 (HERC. COMPACT)	£34.00
EGA-340	ENH. COLOUR GRAPHIC ADP; HI RES; IN COLOUR & GRAPHIC; AUTOSWITCH FOR ALL MODES XT/AT/386	£115.00
VGA-340	SUPER HI RES ENHANCED; COLOUR GRAPHIC ADP. AUTOSWITCH ALL MODES XT/AT/386	£230.00

FLOPPY & HARD DISK CONTROLLER CARDS

FDC-660	XT/2x360K, DR 2x720K; 3.5" OR 5.25 FLOPPY	£16.00
FDC-310	XT/AT 2x360/720/1.2/1.4/5.25" OR 3.5" FLOPPY	£25.00
HDC-770	XT (NON RLL)	£37.45
HFC-310	HARD/FLOPPY/DISK CONT. AT/386	£99.75

COMMUNICATION AND INDUSTRIAL I/O CARDS

RSC-880	SERIAL CARD 2xRS-232 PORTS (1 OPT)	£13.90
PTC-880	PARALLEL PRINTER CARD	£13.90
PSC-320	PARALLEL/SERIAL CARD XT/AT	£27.25
STC-880	SERIAL CLOCK CARD XT	£23.10
MIO-880	MULTI I/O CARD XT W/PARALLEL/2 SERIAL/1 DPT/GAME/ CLOCK	£34.65
PSG-880	PARALLEL/2 SERIAL/1 OPTIONAL/1 GAME PORTS	£21.50
DIO-880	DISK I/O; W/2 FLOPPY CONT.; 2RS232 PORTS (1 PORT OPT); 1 PRINTER/GAME PORTS/CLOCK XT	£43.50
RSC-990	4 PORT SERIAL CARD (3 OPT)	£36.40
RSC-880N	2ND SERIAL PORT KIT (STATE WHICH CARD)	£9.45
JSC-880	JOYSTICK CARD 2 PORTS	£11.30
IEE-880	SUPER HI RES CONTROL CARD & CABLE	£194.25
BPC-660	BUFFER PRINTER CARD	£54.00
DAC-12	12 BYTE AD/DA CARD	£64.00
DAC-16	16 BYTE AD/DA CARD	£149.00
PIO-660	8255 I/O CARD, 24 PROGRAMMABLE I/O PORTS	£51.45
PRG-880	EPROM PROGRAMMER	

MORE I/O 8255 PORTS ARE AVAILABLE

MONITORS

MJM-880	12" GREEN/AMBER/B&W MONOCHROME	£68.00
MJM-996	14" GREEN/AMBER/B&W FLAT SCREEN	£36.00
MJM-990	14" E.S.A. COLOUR HI RES	£285.00
MJM-1000	14" MULTISYNC COLOUR	£390.00

HARD AND FLOPPY DISKS

HDD-882A	20MB HARD DISK (AT/386) 6MB/S	£168.00
HDD-884	40MB HARD DISK (AT/386) FAST 28MB/S	£282.00
FDD-880	360K 5.25" FLOPPY DISK DRIVE	£59.00
FDD-990	1.2MB 5.25" FLOPPY DISK DRIVE	£68.00

INPUT DEVICES

KBD-320	84 KEY KEYBOARD (XT/AT)	£34.00
KBD-330	102 KEY KEYBOARD (XT/AT)	£41.00
MUS-880	MICROSOFT COMPATIBLE MOUSE (XT/AT)	£38.00

CASES AND POWER SUPPLIES

CAS-320	FULL SIZE AT CASE	£50.40
CAS-330	BABY AT CASE	£45.15
CAS-883	XT CASE	£30.45
CAS-993	TOWER CASE	£145.00
PSY-880	150W POWER SUPPLY	£39.90
PSY-320	200W POWER SUPPLY	£69.90

BIOS

BIO-880	XT PHOENIX/AWARD LEGAL BIOS	£12.60
BIO-999	AT PHOENIX/AWARD LEGAL BIOS	£26.25
	MEMORY CHIPS 640K	Call

MANUALS AND SOFTWARE

USM-550	XT MANUAL & BINDER	£10.50
USM-999	AT MANUAL & BINDER	£21.00
USM-1000	386 MANUALS & BINDER	£65.00
DDS-880	MS DOS 3.2 MANUAL, GW BASIC & MANUAL	£47.25

Prices exclude VAT & Delivery. Prices subject to change without prior notice.

MANY MORE PRODUCTS AVAILABLE, PLEASE RING OUR TRADE COUNTER FOR FULL PRICE LIST & CATALOGUE



ATOMSTYLE LTD

MILLMEAD BUSINESS CENTRE
MILLMEAD RD, LONDON N17 9QU

01 801 1838

You Can Have Access to The Largest Range of PUBLIC DOMAIN & Shareware

SOFTWARE for IBM PC & CP/M

More than 2000 disks choice of high quality programs at low cost. all

Available from stock.

We support most CP/M & MSDOS 5.25, 3.5, 3.0 & 8 inch disk formats.

PDSL is one of the longest established libraries in the UK (1982) and contains the widest selection of PD & Shareware is available in Europe. If you would like access to the whole of the public domain, not just the limited selection held by other libraries, contact us today. Access & Visa accepted.

Send two first class stamps for full catalogue to:—

The Public Domain Software Library
Winscombe House, Beacon Rd, Crowborough Sussex
TN6 1UL, Tel: 0892 663298

PUBLIC DOMAIN SOFTWARE

ONLY £3 A DISC OR LESS

Thousands of discs of the best IBM PC Shareware & Public Domain programs & Data from the USA & EUROPE. Orders posted the same day with a complete catalogue, POSTAGE FREE & virus free.

PUBLIC DOMAIN ADVICE
01 267 4193



WIN WITH COURSEMASTER NEW

THE COMPUTER HORSE RACING PROGRAMME

- RATES ANY RACE IN SECONDS - DAILY NEWSPAPER IS ALL YOU NEED
- NEVER out of date - Both N. Hunt and Flat - Fast data entry
- AMAZING ACCURACY!! - Now you CAN BEAT THE BOOKIE!!
- Works on the simple principal FAST HORSES BEAT SLOW ONES!!!!
- Clearly identifies selection in every race plus these AMAZING features:
- First, Second and Third choice shown for Tricasts etc. Actually works out your WINNINGS on most popular bets In a PATENT, YANKEE, CANADIAN, HEINZ etc. Good EACH WAY and long odds bets clearly shown.
- Will PRINT out your BETTING SLIP for you
- Maintains a BANK ACCOUNT - BETS like PROFESSIONALS do!
- PLUS!! - THE AMAZING COURSEMASTER SYSTEM - Huge returns from small stakes. Try it! Can pay for itself many times over on the first day!
- Supplied with 20 page Betting guide and Manual
- FREE HOT TIP of the month to every purchaser

All for £18.95 inc. post and packing. Disc users please add £2 for disc.

Available now for all Spectrum's (inc +3 disc version). All PCW's/Commodore and Amstrad, IBM/PC CPC, BBC and Electron. Please state which.

INTRASET LTD. Freepost (Dept PERCW), Gilderale Close, Gorse Covert, Birchwood Warrington WA3 2BR or SAE for further details.

SPEECH SYSTEMS FOR IBM PC OR COMPATIBLES

SPEECH RECOGNITION SYSTEM. The Cherry Voicescribe system as previewed in PCW Oct '88. Features include:

- ★ Communicate with any IBM PC or compatible virtually hands free
- ★ Easy to install PCB card, fits into full length slot
- ★ Comprehensive manual and software supplied
- ★ Up to 1000 word vocabulary
- ★ Software overlays for well known programs

Voicescribe 128 Word £395

Voicescribe Word £895

VOICE GENERATION SYSTEM. The Audiocard 300E voice analysis and synthesis card. Features include:

- ★ High Quality Speech and Sounds
- ★ IBM PC and Compatible Interface
- ★ Record, Store, Play and Edit Speech
- ★ Software, Microphone and Loudspeaker included
- ★ Supports Turbo PASCAL, Assembler and 'C' also Basic
- ★ Synchronisation with Graphics and text

Audiocard 300E £360

Large SAE for full info and other products in our range
Prices exclude VAT

C.E. SYSTEMS

32 Churchill Crescent, Wickham Mkt
Suffolk IP13 0RW. Tel: 0473 711538

No comparison!

Following last month's challenge, Andy Redfern sets another in his article on file comparison. Meanwhile, certain programming books seem to be helping him with his MSc. This month's programs include a picture dissolving algorithm and new batch file techniques; the BSI columnists look at language standards (among other things), and in SubSet the heapsort receives David Barrow's close attention.

Program File, like all things, has to be regarded as an evolutionary part of the magazine. This is for the obvious reason that just as the computers you use change, programming techniques change and so do the languages we program in. In the last year Program File has changed dramatically to cater for the needs of users and programmers alike.

From the feedback I have been receiving, most of you seem to like the new direction in which Program File is going, but the changes will continue to make it even more useful as a programming resource. If you have any good ideas about the way in which Program File should progress, or you just want to air your views on what you like or what you don't, then get in touch either electronically or by snail mail.

In case you're sceptical about whether I actually listen or not, the two ideas for Program File I'm about

to introduce were suggested by readers. Admittedly I made them contribute the material needed to prove their ideas would work, but I don't think they'll complain, as all contributors to Program File get paid at the usual PCW rates.

Firstly Graham Robinson from the Cleveland ITEC, a regular contributor to Program File and other programming journals, suggested that we should include a regular column called 'Making use of:'. This column will carry your tips and tricks on how to get the most out of the languages and operating systems you program in. They will be simple tips that anyone can use and will help to improve the programs you write.

In this month's issue, he considers a couple of examples how typed constants in Turbo Pascal can be used. He explains why Borland should have used true initialisers and didn't, but they did provide a useful feature

Contents

File comparison	211
Programming books	212
Correspondence	213
This month's programs:	
Object-orientated C++	214
A picture dissolving algorithm	217
More creative batch file techniques	218
Psion Organiser enhanced Find	224
Making use of:	
Typed constants	228
BSI	230
SubSet	234

for programmers to use instead.

Secondly Richard Drake from Objective Computer Systems suggested that a series on object-orientated computing would be a valuable reference and starting point as the languages we use change in the next few years. Object-Orientated Programming Systems (OOPS) allow development speed and system security to be enhanced. There are also gains to be had in using more advanced compilers and languages. In this three part series he will be looking at three specific areas of object-orientated programming.

To begin with, in the first two parts he will explain the concepts that lie behind object-orientated programming in C++. C++ is an extension of the C language that has gained a great deal of publicity in the last year due to rumours of products from Microsoft and Borland, and the launch of a budget C++ compiler from John Haggins at Zortech (See the July 1988 issue of PCW).

Finally, in the third part, Richard Drake will be explaining about a practical implementation of a C++ system. In fact, he has been commissioned by Zortech to write the Database Class Library for Zortech's C++ Tool Kits and he will be explaining the pitfalls and the advantages of undertaking a large project in C++. Many of the criticisms aimed at OOPS are connected with the fact that most professionals see them as research toys without any benefits for large programming projects. In this series he'll be explaining how real projects are done and what to watch out for.

Also in this month's Program File are the regular features and a selection from the best programs and programming ideas I was sent this month. In the BSI column the team are looking at standards for languages and C compilers. The Disk Library listing contains some new disks for the Atari ST and the PC while this month's flood of books contains a number of excellent technical references.

Guidelines for submissions to Program File

PCW is interested in publishing programs, programming tips and hardware modification ideas. Submissions should be sent in for any popular home or business micro and programs can be written in any of the major programming languages. Include *printed, double-spaced* documentation and a *dark single-spaced* listing. Where applicable a disk or tape copy of the program and documentation should also be supplied.

The listing should be no more than 80 characters wide and, if possible, a sample output from the program should be included. Ensure all items submitted are marked with your name, address and daytime telephone number. Also the exact type of machine used and the program's minimum hardware requirements should be clearly explained.

All programs submitted (unless explicitly indicated) will also be eligible for inclusion in the Disk Library. A royalty of 50p per disk is charged and this is divided between all the writers of the software contained on the disk sold.

Check through previous issues to see the type of programs we usually publish. Both original ideas and new implementations of tried and tested techniques are welcome. The programs should be well written and simple to understand. If the program is short it may be printed in full but longer programs will only be available from the Disk Library. All programs should be fully debugged and your own, original, unpublished work. You may use routines from programs already published but acknowledgement must be included.

Hardware submissions must include a complete, double-spaced explanation of exactly what you've done, the approximate cost and any dangers involved, such as invalidating manufacturer's warranties.

We try to return all submissions but you *must* include a stamped addressed envelope of a suitable size. Programs and documentation are paid at the rate of £50 a page, plus a bonus of £50 for Program of the Month.

Send your contributions to: Andy Redfern, Program File, *Personal Computer World*, VNU House 32-34 Broadwick Street, London W1A 2HG.

File comparison utilities

Comparing the contents of two files is a task I perform regularly. Whether it be to check an .EXE file hasn't become corrupted or to prove that the latest version of my Reflex database conversion and global update program has worked successfully, I always feel very dissatisfied by the file comparison tools that are available. Most utilities perform a very simple byte-for-byte comparison. This is fine for checking that two files of equal length are exactly the same, but that isn't always how things are.

Let me explain the problems the standard utilities fail even to recognise. Firstly the files might be of unequal length. If the file comparison program simply returns the message 'Files are of unequal length', I've been told nothing that I couldn't have figured out myself simply by executing a DIR command and comparing the file sizes myself. In fact, it was probably the fact that they were of different lengths which prompted me to compare their contents in the first place. And just because the files are of different lengths doesn't mean I don't want to know what the differences are — I may be performing the file comparison to find out what has been added to one file, so it can be changed when compared with the other.

Getting in touch

If you want to send me material for publication such as letters, book reviews, product reviews, programs, hardware projects or simply your comments, I can be reached in a number of ways. Please, wherever possible, send programs and their accompanying documentation by post, as this makes it much easier to deal with. Any other communication, however, can be sent by whatever manner is convenient to you.

On the CompuServe Information eXchange (CIX), I'm registered as 'aredfern'. You can either send me a mail message or put your comments in the 'prog.file' conference. Prog.file is a topic of the PCW conference where, you will also find discussion about a number of issues, including the Benchmarks.

On Telecom Gold I can be contacted at the mailbox address 83:vnu201. If you are in the US I can be contacted on the Source at the mailbox address BEK303. Telex messages should be sent to the VNU telex machine, 23918 VNUG and addressed to me personally.

Finally, if all else fails you can send your submissions to me at the usual PCW address — Andy Redfern, Program File, *Personal Computer World*, VNU House, 32-34 Broadwick Street, London W1A 2HG.

The second problem comes when a single byte has been added in the middle of the file. For example, I may have created a database file with records in it. The program I'm testing should add a single byte to the first record, but appears to add two bytes. To find out where the bug is, it would be helpful to know where in the file the second character has been added.

Simple, you think — compare the two files and the two extra bytes will be marked as not being the same, the program will tell me the offset from the start of the data file and I can begin to trace the bug in the source code. Wrong.

What actually happens is that the file comparison program flags everything as being OK until it finds the first of the added bytes. It then reports every byte after that as being different, because from a strictly logical point of view they are. A long stream of bytes fly past, scrolling up the screen — and spotting where the next added byte occurs is more than a little tricky.

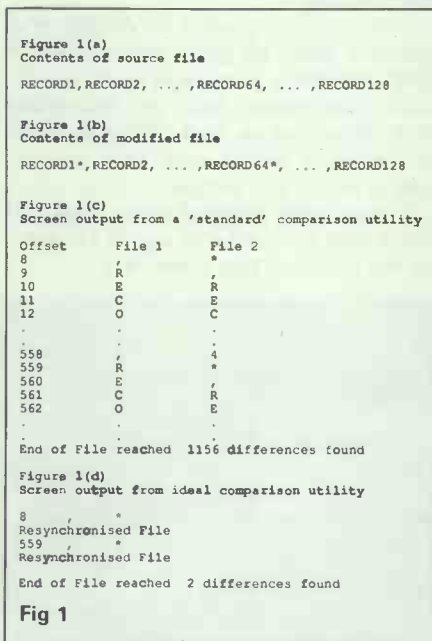


Fig 1

As you can see in the example shown in Fig 1, the program is logically correct in what it shows in (c), but it would be far more useful if it resynchronised the files as shown in (d). Once it hit a single extra byte, it simply checked to see if the following bytes could be resynchronised with the file that was intact. If it finds that it can resynchronise, it should indicate what it has done and then continue the comparison.

Fig 2 is a pseudo-code listing of the logic behind such a program. In a practical implementation it would run much quicker if the files were compared using block reads rather than byte reads.

```

Character a=0
Character b=0
integer offset=0

```

```

While not EOF
  repeat
    offset=offset + 1
    Read (a,first_file)
    Read (b,second_file)
  until a<>b
  report_difference()
  check_synchronisation()
endwhile

```

Fig 2

Of course, the program would need to be a bit cleverer than that. The distance it checks for a resynchronisation should be switchable, as should the resynchronisation feature itself. This is because if we searched forward 128 bytes for every byte that is different, the program could slow down unreasonably.

Also the length of search forward for a resynchronisation is directly related to the programming task you're involved in. If you're working on a computer that stores data in 128-byte blocks then, if you are searching for a block being inserted in a file, you will need a forward search value of 136 bytes — 128 bytes to clear a duff record and 8 bytes to check if the file has resynchronised. In fact the 8 bytes we've specified here should also be a variable value called the 'confirmation accuracy'. If the file contained a lot of similar data then a longer confirmation accuracy would be needed to guarantee that a resynchronisation has occurred.

Finally the order in which files are specified is also important, as the result of comparing A with B (instead of B with A) will produce a different output. A pseudo-code listing of a practical resynchronisation loop is shown in Fig 3.

```

Check_resynchronisation()

```

```

integer runlength=0
boolean resync = FALSE
const confaccuracy = 8

```

```

while not resync
  read b
  if a = b then runlength=runlength+1
  else runlength = 0
  if runlength > confaccuracy then
    resync = TRUE
  endwhile
  return (resync)

```

Fig 3

Although this is my main criticism of the utilities I currently use, there are some other features I can cope without, but which would certainly be nice to have as extras. For inst-

ance, the ability to work in text, hex, octal or even binary mode so that, whatever the file contained, the output would be useful to me. Another handy feature would be the ability to merge the two input files into one new file, where all the common data was included, all additional data in each file was included, and where the data that conflicted could be specified as having a higher precedent from a selected file.

This way a database file could be merged. The common records would be added untouched. The records that were only in one file could be included in the output file. And the data that was different in both files could be set to be taken from only one of the files. Now that would be handy when I've made updates to two copies of the same file! (And just think of it — no more network conflict errors!)

Challenge

I and other people I've talked to want this utility (or an even better one). I'm therefore making this the second prize program of 1989 (the first was mentioned in the January issue).

What I want is for you to implement your perfect file comparison utility in any language you choose, on any machine you choose. I will judge the entries and make the best Program of the Month in the June issue.

Not only will the winner receive

the usual remuneration for submitting Program of the Month, but there will also be a special prize of a year's free subscription to *PCW* (oohs and ahhs all round as everybody staggers at Andy's generosity!).

I will try and publish a selection of the best runners up. The closing date for entries is 24 March 1989. Good luck!

Programming books

PCW Machine Code

No, not a book about the assembler code I've written for *Personal Computer World*, but how to program in assembly language on one of the 8000 series machines from Amstrad. It really is quite a neat book, with a simple introductory section that should allow most people at least a chance to dabble.

As well as handling how to program the Z80, it handles some of the ways of accessing the more quirky aspects of these machines. It looks at the printer, RAM drives and how to use CP/M calls directly from assembly language.

This is exactly what PCW8256 *et al* owners need to get them started in Z80 assembly language and, as the machines come with an assembler and debugger as part of the bundled software, it won't cost you an arm and a leg to get started.

I only saw a proof copy, but this book will be available soon: I'll put it in the Booklist box when it is.

More Peter Norton

Peter Norton is one of those people you love to hate. You appreciate the books and programs produced by his company, but why does his picture have to adorn them all?

To be fair, the original incarnation of this book is probably what made him into the guru he's supposed to be. The original *Guide to the IBM PC* was the first book to lift the lid of the PC and explain what it contained in a more sensible language than the *IBM Technical References* (IBM being a big company that became famous despite the efforts of the Plain English Society). And because it was first, it sold 300,000 copies.

But just because it was the first doesn't mean it was the best — in fact there are far better books than the original now available. To counter this loss of the leading edge, Peter Norton and Richard Wilton (who probably did all the work) have released the new improved version.

The new *Peter Norton Guide to the IBM PC and PS/2* simply adds some more detail to one or two items and brings the book into the late 1980s. Apart from that, little of the content has really changed, and after being spoilt by the quality of technical information from Ray Duncan, Richard Ferraro and Joerg Mayer, the book seems fairly tame.

If you're looking for a friendly front end to the *IBM Technical References* then it will certainly suffice, but it definitely isn't the best technical introduction or advanced programming guide for the PC.

EGA and VGA Programming

Richard Ferraro's book is excellent. This is a well written guide that takes you from display technology to directly programming the EGA and VGA registers. It explains everything from Bresenham's straight line drawing algorithm to using the horizontal pixel panning register.

Each item of the two standards covered is fully documented with an accompanying assembler or C listing. If you're having problems programming a display, then this could well be the book to buy in the January sales. The best recommendation I can give it is that I'll probably get through my Masters Degree because of it.

My only whinge is the price of the supplemental toolbox disk. Not only does it cost \$24.99 (and you thought the *PCW* Disk Library was extortionate!), but the postage and packaging adds another \$24 to the price. One has to assume it will arrive hand-delivered by Federal Express.

The full titles and ISBN numbers of the books mentioned, and other books that came into the office this

Booklist

The New Peter Norton Guide to the IBM PC and PS/2 by Peter Norton and Richard Wilton. Microsoft Press, 1988: ISBN 1-55615-131-4; £19.95.

Programmer's Quick Reference to Essential OS/2 Functions by Ray Duncan. Microsoft Press, 1988: ISBN 1-55615-177-2; £7.95.

Quick Reference Guide to MS-DOS Commands by Van Wolverton. Microsoft Press, 1988: ISBN 1-55615-182-9; £4.95.

Programmer's Guide to the EGA and VGA cards by Richard F Ferraro. Addison-Wesley PC, 1988: ISBN 0-201-12692-3; \$26.95. *The companion toolbox is available on disk for just \$48.99 mail order from the USA.*

Mastering Turbo Pascal 5 by Douglas Hergert. Sybex, 1988: ISBN 0-89588-529-8; \$21.95.

Introduction to Pascal including Turbo Pascal, 2nd Edition by Rodney Zaks. Sybex, 1988: ISBN 0-89588-533-6; \$22.95. *Includes support for Turbo Pascal 5.*

Supercharged Graphics, A programmer's source code toolbox by Lee Adams. Tab Books Inc, 1988: ISBN 0-8306-9259-9; \$19.95.

Programmer's Guide to the Hercules Graphics Cards by David B Doty. Addison-Wesley PC, 1988: ISBN 0-201-11885-8; \$24.95.

Microsoft QuickBasic Programmer's Toolbox by John Clark Craig. Microsoft Press, 1988: ISBN 1-55615-127-6; £21.95.

Experiments in Artificial Neural Networks by Ed Rietman. Tab Books Inc, 1988: ISBN 0-8306-9337-8; \$16.95. *This book is amazing, and deals with every aspect of neural networks from programming them to growing neurons on the surface of a 68000 processor!*

month, are listed in the box opposite.

It is worth noting that many of these books are in a second or third edition. This means you can't expect there to be price reductions as shops clear the old stock. So if you're not too bothered about getting the most up to date information then now is probably the time to buy.

Correspondence

When 'Computer Answers' was cut as a section in the April 1988 issue of PCW, I promised that I would continue to support any technical queries that were sent in. Here is this month's selection of questions and answers.

If you are having problems with hardware or software, don't hesitate to get in touch with me and I'll try to sort out where the problem lies. (Perhaps we ought to rename this the section as PCW's Problem Page?) Also, if you don't think my answer is good enough or you know a better way of tackling the problem discussed, send in your solution and I'll publish it as an updated answer.

VGA Palette

I have just purchased a Video Seven VEGA VGA card. I bought the card so I could use the 256,000 colour palette, but I don't seem to be able to access it from any of my programs. Also, in mode 19 (320x200 pixels), there are 256 colours available but they don't seem to follow any pattern. It seems to be fairly random in the way that colours are assigned to each number. Can you shed any light on this?

Simon Lewis

When a VGA card boots up, it fills the look-up table with a default selection of colours from the palette. To keep compatibility with previous video cards, the first 16 colours are the CGA text colours and the next 48 are EGA extended col-

ours; then, above that, a selection of other colours is loaded.

Changing the palette is very simple and only requires a single DOS interrupt call to be performed. It can also be achieved by writing directly to the correct port addresses, but this is not recommended as it may not be very portable. You can use assembler to make the interrupts set the palette colours, but the example I've included is written in C.

The union REGS is available in most versions of C on the PC but isn't always called REGS. Check out the header file DOS.H to find out. The colours themselves are generated by setting different quantities of red, green and blue. For example, to get a 256-band grey scale simply set each RGB value to be the same. Now colour 0 (red=0, blue=0 and green=0) will be black and colour 255 (red=255, blue=255 and green=255) will be bright white.

Accurate Timing on the PC

I am a research student working on a project which requires a large amount of data to be input into the computer through an A/D converter. The sampling rate we use is 5ms. Is there any way for a PC to record the exact time of the sample?

I tried using the MS-DOS system clock, but this only seems to be able to give accuracy of around ± 20 ms. I also tried using the real clock but that only appears to be updated every second. Do I need to install another real-time clock in one of the free slots?

Steve Roberts

You are correct about both the real time clock and the PC system clock. They will not give you the accuracy you require. You basically have two solutions — one hardware and one software.

The hardware solution is to use one of the other channels of the A/D converter to read a ramp voltage. Generating a ramp voltage only requires a simple circuit and would provide a way of checking the time as accurately as you can switch channels on the A/D converter.

Set the ramp generator to swing between 0 and 1 volt every second. Then each time you read the sample in, read in the ramp voltage as well and, by dividing its value by the maximum ramp voltage (1 volt) a reading in milliseconds will be provided. This will only work if your sampling rate is often enough to be able to count each time the maximum is reached so you can measure the time elapsed.

Although the hardware solution above would work, I think a software solution would be much neater. The PC contains a timer chip with three channels. Channel 0 is used to generate the memory refresh timing, and if you don't let it refresh your memory it will begin to 'forget' things, so it's best not fiddling with it.

Just as an aside, you can make your computer run much faster by reducing the refresh rate. Many manufacturers not only set the refresh rate for the fastest possible RAM, but include a quite unreasonable margin for error. So if you reduce the refresh rate you can make the computer run much faster. But beware, it only takes one bit to flip its state and the whole system can crash.

```

/*Define the 3 palettes */
#define P_RED 0
#define P_GREEN 1
#define P_BLUE 2

/*Assign some storage to hold the palette */
int palette_table[256][3];

/*This routine reads the contents of the current VGA palette
into the palette table. Note there is no checking to see
if a VGA is actually present.
Call with: nothing
Returns: nothing
*/
read_palette() {
    int color=0;
    union REGS r;

    while(color<<256) {
        r.ax=0x1015; /*8086 AX register */
        r.bx=0x0000; /*8086 BX Register */
        int86(0x10, &r, &r); /*Call interrupt 10 */
        /*read the results into the palette */
        palette_table[color][P_RED] = r.h.ah;
        palette_table[color][P_BLUE] = r.h.cl;
        palette_table[color][P_GREEN] = r.h.ch;
    }

    /* This routine only sets a single colour in the look up
table. Simply include a loop if you want to fill the
whole table. */

    write_color(int color) {
        union REGS r;

        r.ax=0x1015; /*8086 AX Register */
        r.bx=0x0000; /*8086 BX Register */
        r.h.dh=palette_table[color][P_RED];
        r.h.cl=palette_table[color][P_BLUE];
        r.h.ch=palette_table[color][P_GREEN];
        int86(0x10, &r, &r); /* DOS interrupt 10 */
    }

```

How to set VGA palette colours using interrupts from C

MICROMART

CHESHIRE COMPUTERS

MOST TYPES OF
BUSINESS COMPUTERS
BOUGHT & SOLD

FOR THE BEST NEW
& 2nd USER PRICES

contact

GRANT PENALUNA

Tel: (0606) 852853

Mobile: (0836) 521531

Fax: (0606) 852664

Also available
Tandon, Compaq & IBM

Tandon

▶ PCA 20	£999
▶ PCA 20 Plus	£1099
▶ PCA 40 Plus	£1299
▶ PCA 70 Plus	£1499
▶ Target 20	£Call
▶ PAC 286 I.2	£999
▶ PAC 286 I.2 Plus	£1099
▶ 30Mb Data Pac	£199

CANDID

▶ computers

140 Temple Chambers, Temple Avenue, London EC4Y 0DT

Ring 01-353 7080 Now!!

Self Adhesive Computer Disk Labels

DISK LABELS - 3" & 3½" Disk, 70 x 70 mm, on tractor feed backing for computer overprinting. White: 500 - £15.55, 1000 - £22.05, 2000 - £25.69. Tinted labels in - Blue, Pink, Grey, Cream, Yellow, Orange, Green: 500 - £21.35, 1000 - £31.05, 2000 - £43.63.

5¼" Disk, 95 x 36 mm, White: 500 - £12.75, 1000 - £17.75, 2000 - £20.56. Tints as above: 500 - £15.20, 1000 - £24.65, 2000 - £34.36.

DATA LABELS - printed with horizontal ruled lines for data disk labelling of both 5¼", 3" and 3½" disks, these labels are coloured red, green, blue or old gold, and can be supplied in single colour or four colours along the roll, perforated between labels.

5¼" 1000 - £18.32, 2000 - £27.92, 5000 - £35.46
3½" 1000 - £26.60, 2000 - £35.65, 5000 - £54.11
All prices are inclusive of VAT & carriage.

We are specialist computer label makers and can provide printed labels in 24/48 hrs. For price list and sample brochure of our full range of self adhesive micro computer labels plus details of excellent quantity discounts
☎ Sittingbourne (0795) 28425 (24 hrs)
Fax (0795) 22365

Industrial
Process

Unit 15
Church Road
Business Centre
Sittingbourne
Kent ME10 3RS

Self Adhesive Labels - SUPERFAST

This month's programs

Channel 2 is used by the sound output chip for the frequency of the beep, and although it can be changed to modify the beep, it doesn't help us much with more accurate timing.

Channel 1, on the other hand, is used by the PC to update its system clock. Every 18ms it adds one to 32-bit number stored in the BIOS data segment. This number is then converted into the usual time format. Simply by writing to the timer control port, it is possible to make the timer interrupt the PC even more often. This will then facilitate more accurate timing, although it does have a nasty side effect — the system clock will be speeded up.

The solution to this is therefore to set the timer to generate the interrupt every millisecond: each time you're interrupted, increment your own clock byte. Then every 18th time you're interrupted, call the system clock interrupt. (See page 145 of Peter Norton's new book for details.)

One final point is that even if you can get the timer to run faster, if another interrupt interrupts and performs a large number of instructions, the accuracy is once again lost. So for a definite solution with little margin for error the ramp voltage would be more accurate, despite being less elegant.

Changing the printer assigned to PRN

In the December issue of *PCW*, I published a letter from a reader who wanted to know how to switch the default printer, PRN, from LPT1 to LPT2. I mentioned at the time that the only way it could properly be done was by messing about in the system BIOS data area. This is how.

All you need to do is swap the two addresses that are stored in the BIOS. Simply read the address pointed to LPT1 and then read the address pointing to LPT2.

Then write each back to the other's port. Now whenever DOS sends data to PRN and therefore LPT1, it will instead be sent to LPT2. Of course, running the program again will simply restore the two printer ports to their original states.

The address of LPT1 is stored in the BIOS data segment (0040H) at 0008, while LPT2 is stored at 000A.

Using the information I explained in the September issue, it would be very simple to create a TSR printer swap program in assembler. The following listing is written in Turbo C but could be simply converted into other versions of C or other languages. I've checked it works with all versions of DOS higher than 3, but if you want to use it with version 2, do take care.

```
#include <stdio.h>
#include <dos.h>

#define lpt1 0x0040,0x0008 /*Address of LPT1 in BIOS */
#define lpt2 0x0040,0x000A /*Address of LPT2 in BIOS */

main() {
    unsigned int printer1; /*Storage for addresses */
    unsigned int printer2;
    printf("\n\n");
    printf("PRN is now working with other printer!\n");
    printf("\n\n");
    printer1 = peek(lpt1); /* Get LPT1 address */
    printer2 = peek(lpt2); /* Get LPT2 address */
    poke(lpt1,printer2); /* Write LPT2 to LPT1 -
    now PRN */
    poke(lpt2,printer1); /* Write LPT1 to LPT2
}
```

Changing PRN from LPT1 to LPT2

This month's selection of programs has an unusual mixture of discussion, pseudo-code and short listings.

The picture dissolving algorithm by Charlie Dancey is a neat idea for making your programs look more professional. It requires a little study to work out exactly what is going on, but it definitely works, — I've used it.

Sending listings in pseudo-code form, whether as a complement to a full listing or not, makes it far easier for people who program in a different language (or on a different machine) to gain some insights from your ideas.

'Creative batch file techniques' explains how to get the most out of the

world's slowest interpreted language — the MS-DOS command line interpreter. This article takes you from the simplest batch file right through the commands available. It makes use of the What command available from Microsoft; there are many other commands available in the public domain, like Ask.Com.

The Find command is an enhanced version of one I published last year. This article is of some interest as it explains how to write machine code on a Psion. We would have liked to include more details about how to use machine code, but unfortunately we are restricted by non-disclosure agreements.

Object-Orientated Programming in C++

by Richard Drake

It's a well-known quip that you can always spot a group of computer experts — because they'll be disagreeing with one another. In the old days they'd no doubt have been disagreeing about what was the best programming language. Nowadays, as likely as not, they'll be disagreeing about whether somebody's favourite object-oriented language is *really* object-oriented at all.

The fact that there are as many different definitions of object-orientation as there are computer experts does little to help the average programmer make sense of this exciting but jargon-ridden area of software. But before the marketing experts spread the confusion to everyone, including themselves, there are some very cheap ways of gaining experience of object-oriented programming — and one of the most popular looks like being AT&T's successor to the C language, C++.

Now I happen to believe in object-oriented languages, having used them for over four years, and as I think that C++ is a genuine object-oriented language, I'm excited about the prospect of it becoming widely used. I have to admit, though, that my experience of C itself could be written on the back of a smallish postage stamp, so apologies in advance to C gurus if anything that follows offends you. (Come to think of it, if you like C's cryptic syntax you would probably compliment me on getting a full-featured C program onto a postage stamp.)

In this article I'm going to concen-

trate on introducing the object-oriented facilities of C++, and at the end I'll make a few controversial comments on the implications of C++ for how we're going to program computers in the next few years. As I'm likely to be involved in a large C++ programming project in the next few months I may well be back to tell you more of the nitty gritty detail in future articles.

Although software is meant to be soft, anyone who has programmed anything larger than good old Eratosthenes' sieve to produce the first 100 prime numbers (as if we didn't know them already) knows that in practice it isn't. It may be to the person who wrote it, just after they wrote it (or, if they're very talented, the next week) but give the source code to someone else months later and ask them to make a minor change... and there's a good chance that either you won't see them again, or worse, you won't see your system working again.

I call this kind of system 'brittleware'. It's not soft, in the sense of being mouldable into any desired shape, yet it's not totally unchangeable; it's just that if you try to change it very much you have a high chance of breaking it altogether. And I happen to believe from experience that if anything can save us from having to pay for the construction and breakdown of brittle software systems in the future, the best answer on the horizon is object-oriented programming, just like it's possible to do in good old C++.

So what *is* object-oriented pro-

gramming? The minimum requirements for a language to be object-orientated, in my book, are two things: *encapsulation* and *inheritance*. Before the jargon numbs the brain, let's take a look at how C++ provides each of these mechanisms.

C++ introduces the notion of *class* into C (in fact it used to be called 'C with Classes') but as a C++ struct (ure) is more or less the same as a class, let's talk about structs for the moment. A C++ struct differs from a C struct in that it not only has member *fields* (that is, data such as integers, strings and user-defined types), but it can also have member *functions*. For example, assume we want to define a bank account. A C definition might be (conveniently ignoring size limits on identifiers):

```
struct bankAccount {
    char*   name;
    date   dateOpened;
    long    overdraftLimit;
    long    balance;
```

and there might also be functions to deposit and withdraw money which would be used as follows:

```
bankAccount myAccount;
long         salary;
long         weeksCash;
...
deposit(myAccount,salary);
withdraw(myAccount,weeksCash);
```

In C++ the equivalent code would be:

```
struct bankAccount {
    char*   name;
    date   dateOpened;
    long    overdraftLimit;
    long    balance;

    void    deposit(long amount);
    void    withdraw(long amount);
};
...
bankAccount myAccount;
long         salary;
long         weeksCash;
...
myAccount.deposit(salary);
myAccount.withdraw(weeksCash);
```

Deposit and **withdraw** are now 'member functions' of the struct **bankAccount**, which means that any variable declared as a **bankAccount** will 'know about' these functions but variables of other types won't know anything about them (unless they too have identically named functions declared in their struct definition, but we'll look at that important point a bit later).

Encapsulation is a lot more than the 'privatisation' of publicly-owned functions into member functions owned by a single type (fashionable though such an idea might be in the current political climate). Like most

really good ideas in software, its power only becomes apparent when you try to build something really big or complex. But in any case I claimed that a language like C++ is fully object-orientated because it has encapsulation and inheritance. So let's look at inheritance before we decide if encapsulation is worth having.

Assume that we have just opened a deposit account for the extra money we've earned as an object-orientated programmer and want the program referred to above to cope with this. A lot of our work defining an ordinary bank account seems like it should be applicable to a deposit account, and happily inheritance allows us to take advantage of this, as follows:

```
struct depositAccount : bankAccount {
    float   interestRate;

    long    interest(int numberOfDays);
};
```

The colon signifies that **depositAccount** is a derived struct (or class) of **bankAccount**, and this means that any **depositAccount** will automatically inherit both the member fields (such as **balance**) and the member functions (such as **deposit**) from **bankAccount**. In other words, in the following extract from our program:

```
depositAccount myDepAccount;
long           salary;
...
myDepAccount.balance
    +=myDepAccountinterest(30);
myDepAccount.deposit(salary);
```

myDepAccount knows about both the member field **balance** and the member function **deposit()** defined for **bankAccount**. In a real system, of course, there would probably be member functions to work out the monthly interest in **depositAccount** and provide other facilities, but this simple example is meant to illustrate both the way inheritance works and how useful it can be in building programs that will change gracefully with a changing world.

My examples have used C++ structs, rather than the very similar but slightly more sophisticated classes, because I wanted to emphasise how well Bjarne Stroustrup, the designer of C++, has managed to disguise a brand new object-orientated language in the familiar old clothes of a much less powerful language, C.

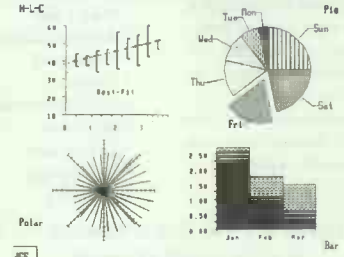
In fact, classes add just one important facility to C++ structs, and that is the ability to protect certain member fields and functions from being used from outside the class — these are implicitly declared as private by being listed before the public members of the class.

MICROMART

dGE

All purpose graphics library
for the dBASE family.

CLIPPER dBASE III FOXBASE
dBASE IV QUICKSILVER dBFAS



bits per second
£165 + VAT
Blits Per Second Ltd.
17 Guildford Road,
Brighton BN1 3LU
Telephone: (0273) 727119

**WANTED
DEAD
OR
ALIVE!!!**

CASH! CASH! CASH!

An Arabian exporting company
will pay top cash for
COMPUTERS -

**(IBM) OLIVETTI, APRICOT,
APPLE (etc, etc).**

**PRINTERS, Telephone Systems
and any other business machines
on behalf of their Middle Eastern
eager buyer. Unlimited cash
available for immediate
decision.**

Please telephone 01-360-8095

Fax No. (01) 368 5318

(NO HOME COMPUTERS, PLEASE!)

Computer MUSIC Systems

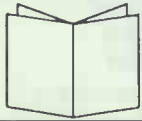
Music Printing
Music Software
Desk-top Music Publishing
MIDI Sequencing/Editing
MIDI Interfaces
Synthesisers/Keyboards

Specialists in Music Software for the
IBM PC and Compatibles

Tel: 01 977 4546

Fax: 943 1545

MICROMART



LASERPAGE DESKTOP PUBLISHER

Designers and producers of a wide range of laser-printed masters. We can create or transform your printed word. Eliminate stress and error. Save time and give your documents a professional finish.

- * Reports
- * Newsletters
- * Worksheets
- * Transparencies
- * Forms
- * CVs
- * Theses
- * Documents
- * Brochures
- * Price Lists
- * Business Cards
- * Invitations
- * Leaflets
- * Advertisements
- * Magazine
- * Letterheads
- * Typesetting
- * Scanning

We accept any RM, IBM or Amstrad PC disks
Send or phone for details

0902 - 310360

13, Paget Road Wolverhampton WV6 0DS
Telecom Gold Mailbox 72:MAG100750
Telex: 265871 MONREF G Ref: 72:MAG100750

CHENDAI PORTABLES

AT: INTEL 80286 6.8/12MHz CPU; 640KB RAM EXPANDABLE TO 8.5MB; CHOICE OF 5 1/4" OR 3 1/2" DISK DRIVE; 11.5" DETACHABLE 640x400 BACKLIT SUPER-TWISTED LCD SCREEN WITH REVERSE VIDEO MODE; CGA, MDA, EGA AUTOSWITCHABLE DETACHABLE AT COMPATIBLE 88 KEY KEYBOARD; 1 SERIAL PORT, 1 PARALLEL PORT, 1 EXTERNAL FDD PORT, 1 EXTERNAL KEYBOARD PORT, 1 EXTERNAL MONITOR PORT, BUILT-IN REAL TIME CLOCK; 2 INTERNAL EXPANSION SLOTS; SOCKET FOR 80287 MATHS CO-PROCESSOR; UTILITY AND MS-DOS 3.3
DIMENSIONS: 15.5" x 15.3" x 5.5"
30MB HD FROM £1,799
49MB HD FROM £1,999



XT: INTEL 80186, 16 BIT, 4.915MHz CPU (10MHz OPTIONAL); 640KB RAM; CHOICE OF 5 1/4" OR 3 1/2" DISK DRIVES; 80x25 BACKLIT LCD SCREEN (640x200 PIXELS); 88 KEY IBM PC/XT COMPATIBLE KEYBOARD; 1 SERIAL PORT, 1 PARALLEL PORT, 1 RGB VIDEO OUTPUT PORT, 1 COMPOSITE VIDEO OUTPUT PORT; 96 PIN CONNECTOR FOR FUTURE EXPANSIONS; MS-DOS 3.3
DIMENSIONS: 15.4" x 12.2" x 3.5"
DUAL DISK DRIVE MODEL £399
20MB HD £399

Prices exclude VAT and Delivery
Demonstration by Appointment Only
KACZER LIMITED
17 HIGH STREET, SEVENOAKS
KENNETH 11HZ.
0732-740933

MOTOR CONTROLLER BRING YOUR PC TO LIFE!

Ideal for technical construction sets, model railways, cars, robotics, education and many more:

£99 + VAT

MC4 — provides programmable control for up to 4 small motors using simple commands sent via your printer port. It also has 4 switch inputs to allow conditional operation

INCLUDED FREE

DCL — Device Control language is a complete programming environment with integrated editor/interpreter/compiler, for PC/XT/AT compatible.

MC4 will work with any computer that can send data via either a parallel or serial port. It can control 4 motors using an external power source from 4-18v at upto 1.5A per motor.

Write or call for more information or order form:

AEJIS Ltd.,

2-12 Whitchurch Road,
Pangbourne,
Nr Reading,
Berkshire.

Tel : 07357 5295
Tx : 849910 BEBECE G
Fax : 07357 5396



PROGRAM FILE

For example, the **cumulative-Interest** field is a private member (is this beginning to sound too political?) in the following alternative definition for **depositAccount**:

```
class depositAccount : bankAccount {
    float    cumulativeInterest;
public:
    float    interestRate;

    long    interest(int numberOfDays);
};
```

This facility is called 'information hiding' and can be enforced very effectively using classes rather than structs in C++; although if you're a newcomer to object-orientated concepts as a whole I suggest that it's much more important to get to grips with encapsulation (structs and classes having functions as members as well as fields) and inheritance (derived structs or classes) than information hiding.

Having said that, nobody in their right mind should use structs for long in C++, as classes give you everything that structs do plus the private/public distinction, and that is well worth having once you're familiar with it. So for the rest of the article I will abandon all pretence of nostalgia for the old C name and refer only to classes.

Although we've covered member functions and derived classes, there's one vital ingredient missing that makes these mechanisms really earn their keep — 'virtual functions'.

Let's say that in our home banking system we want to include a facility to forecast the amount in a bank account a given number of days in the future. One way to do this would be to subsequently define a virtual function, **forecastAmount()**, in **bankAccount** and redefine it in **depositAccount**:

```
class bankAccount {
public:
    char*   name;
    date   dateOpened;
    long   overdraftLimit;
    long   balance;

    void   deposit(long amount);
    void   withdraw(long amount);
virtual long forecastAmount(int noOfDays);
};

class depositAccount : bankAccount {
public:
    float   cumulativeInterest;

    float   interestRate;

    long   interest(int numberOfDays);
    long   forecastAmount(int noOfDays);
};
```

forecastAmount() needs to be redefined in **depositAccount** because the rules for working it out are different for the different types of account (because of interest payments) and straight inheritance won't work. The implementation of these two func-

tions needs to be provided elsewhere in the program, using the following syntax:

```
long bankAccount::forecastAmount(int noOfDays)
{
    // code for forecast amount without interest
};

long depositAccount::forecastAmount(int noOfDays)
{
    // code for forecast amount including interest
};
```

(In fact all the member functions we've defined so far would be implemented in the same fashion.)

The powerful thing about virtual functions is that having provided the above definitions you don't need to worry what kind of bank account you are dealing with in a particular part of the program — you simply ask for its forecast amount as required and C++ does the rest (technically this is called 'late binding' of functions). An example might be:

```
bankAccount*
newAccount(long initialAmount)
}

bankAccount* account,

if (initialAmount>500)
    account = new depositAccount
else
    account = new bankAccount;
account->deposit(initialAmount);
...
if (account->forecastAmount(365) >
    1000)
...
return account;
};
```

Note that **account** is declared as a pointer to **bankAccount**, but may hold a pointer to either a **depositAccount** or **bankAccount** (the C++ operator **new** creating a new object of the required class in free store and returning a pointer to it). More importantly, although the compiler cannot tell which of these it is going to be, at run time the correct **forecastAmount** function will be invoked.

As with all small-scale examples, this may seem like a lot of extra trouble to achieve something that could equally well be coped with in plain old C. The real crunch comes when you scale up to life-size problems, with all their complexity. The fact that in C++ the same member function call can cause different code to be executed, depending on the class of the object concerned, opens the door to truly general-purpose code that does not have to be modified for every change in the real world or in the scope of the system.

For example, suppose you decide to open a building society account. Of course, you will probably have to create a new class, derived from one of your original ones, and re-implement member functions such as **forecastAmount** if they happen to

be different. But once you've done that you *don't* have to change any of the code where `forecastAmount` is used — late binding of this function will automatically make sure that your new code gets used whenever a building society account is being dealt with.

Notice that this change in specification leads to a very localised change to the program, making implementation and testing far easier and more secure. This increase in speed and reliability of modification is one of the most impressive factors about C++ and other OOPs when you are building really large systems with them.

So how will all of this change the way programming is done? Not everyone thinks that it will. In a classic phrase from the preface of Bertrand Meyer's excellent book on *Object-Orientated Software Construction* the object-orientated 'tidal wave' is viewed '... by some as typhoon, by some as a tsunami, and by some

as a storm in a tea cup'!

My own view is that nothing can stop the object-orientated tidal wave from sweeping across all kinds of computer systems, and that one of its biggest effects, within a few years, will be to change programmers into true software designers. Because object-orientated languages are able to describe the real world much more naturally than conventional languages, the real rewards will be for those who use them to make software more and more intelligible to its users.

I like to think of this as the revenge of the programmer for all the current talk of putting him out of business through the use of Computer Aided Software Engineering (CASE) and the like. Object-orientated languages will give him the power and flexibility to stay in control of his job and remain a valued part of his organisation, but only if he is willing increasingly to think and program in terms which the users of his software understand.

A picture dissolving algorithm

by Charlie Dancey

The principle of this algorithm is that every pixel in the rectangle defined by XBASE, YBASE, WIDTH and HEIGHT is to be visited once and once only in a pseudo-random order. That is, it should *look* random.

One way of doing this would be to index each pixel in some way, say a list of coordinates, and then shuffle the list before plotting the points. Unfortunately this is slow and consumes a large amount of memory for the list.

This algorithm takes advantage of the fact that the pixels in the rectangle are addressed by separate X and Y coordinates. Normally to plot every pixel in the rectangle you would simply write a pair of nested loops which would spew out every coordinate once. For the dissolve effect we first scramble the order in which the Y coordinates are generated (by using the array YORDER as an index), and then apply an offset to it.

The offset is held in the array XOFFSET (the X means that it is indexed off the X value of a given point). Because adding to the Y value may cause the point to move outside the rectangle, we use the MOD operator to cause it to wrap round, and thus remain in the required limits.

Now I realise that this may sound a little incomprehensible, so I have two suggestions for the puzzled reader. First: use it! It works whether you follow it or not. Secondly: try the following substitutions for the 'plot' line in the algorithm:—

```
plot(XBASE+N,YBASE+YORDER[M]+
XOFFSET[N]) {No 'mod HEIGHT'}
plot(XBASE+N,YBASE+(XOFFSET[N]
mod HEIGHT)) {No scrambled order}
plot(XBASE+N,YBASE+YORDER[M])
{No Offset}
```

By seeing the effects of these alterations you will find the algorithm easier to follow.

DISSOLVE algorithm.

Variable names in upper case.
Functions and procedures in lower case.
Curly braces enclose comments.

Procedure Dissolve(parameters are XBASE,YBASE,WIDTH and HEIGHT)

Define an array YORDER(0 to HEIGHT)
Define an array XOFFSET(0 to WIDTH)
Declare M,N, and R as integer variables.

{initialise YORDER array}

```
for N=0 to (HEIGHT-1)
YORDER(N)=N
end for N
```

MICROMART

PBA SOFTWARE

PRESENT

THEIR POWERFUL NEW UTILITY PACKAGE

— POWERPACK

Fast File Backup: Reduces your backup time to a minimum.

- choose files from a pictorial representation of your disc
- maintains a log of copied files
- identifies files unchanged since last backup

Data Secure: Unique programs to protect your data

- hide files
- password protect directories
- encrypt and decrypt documents

DOS Turbocharger: Spend less time retyping!

- program your function keys
- recall and edit your last 20 DOS commands

DOS Help: Instant info on every DOS command—cross referenced with examples and descriptions

Alarm Clock: Pops up your reminder at a preset time — works while you are in any software package.

AND MANY MANY MORE FEATURES

POWERPACK costs only £29.95 including P&P.

Send your order to:

PBA Software, 17 The Moors, Pangbourne
Reading RG8 7LP.

DACOL

Tel: (02814) 6076

NEED AN ACCOUNTING SYSTEM THAT WORKS?

STRUGGLING TO FIND THE RIGHT PACKAGE?

We provide independent advice on choosing, installing and implementing the right accounting software package for your business.

All installations performed by fully qualified accounting and computing personnel.

DISK CONVERSION

1000+ Formats: 8" 5¼" 3½" 3" Disks
PC, WP, DTP, TYPESETTERS

PC-DOS, MS-DOS, AES, IBM, APPLE, APRICOT,
AMSTRAD, XEROX, WANG

Disk to Disk	≥ 1 Mbyte Disk	< 1 Mbyte Disk
1st Disk	25.00	25.00
Further Disks:		
Dump - Code for Code	15.00	10.00
From non-ASCII to ASCII	18.00	12.00
From ASCII to non-ASCII	18.00	12.00
From non-ASCII to non-ASCII	20.00	15.00

NB above prices inclusive of disc & p p

Formatted Disks £
Floppy Disks 2.50
Formatting Client's Disk 1.00

Work despatched in next days post. Courier available.

Disk to Paper

A4/A5 documents:— manuals (any kind), price lists, directories, quotations, tenders, reports, theses (any format). Punched, stitched or bound. Archiving available to ensure ease of reproduction.

Savings of 30%+ on traditional printing.

For details contact:

"Colmar - DPS" on 01 - 300 8088

29, Leith Hill, St. Pauls Cray, Orpington BR5 2RS

C.W.O. + VAT Please

MICROMART

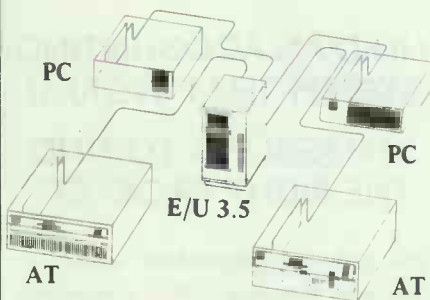
EASYUSE LANS

PRICES LIKE SAGE AND AMSTRAD, BUT SPEEDS APPROACHING NOVELL, CREATING THE MOST DOS LIKE MULTIUSER ENVIRONMENT ON THE UK MARKET

EASYUSE BABY LAN

- Two User Starter Kit £375
- Two User System Complete Two AML Criterion 286 AT's & Baby Lan — Ready to Run only £2,195

EASYUSE DEDICATED SERVERS WITH LARGE HARD DISKS AND TAPE BACK-UP READY TO RUN



BUSINESSMAN'S SPECIAL:

- Easyuse 3.5 2 to 4 Users
151 Meg Hard Disk
60 Meg Tape Back-Up
Two AML Criterion 286 AT Workstations Complete
only £5,995

AML CRITERION 286 AT's
12 MHz, 8 Slots, 286, with Clock, P/S, 1.2 Meg Floggy, 101 Keyboard, Workstations — 512K Ram
Servers — 1 Meg Ram

WE ARE A COMPLETE SOLUTION HOUSE OFFERING FULL SUPPORT

American Microcomputers,
Trend House, Dallow Road,
Luton LU1 1LY,
☎ 0582-400156.

Tugby Computers,
Network House, Wood Lane,
Tugby.
☎ 0537-56411.

PROGRAM FILE

```
{shuffle YORDER array
random(LIM) is a function that returns a random integer between 0 and LIM;
swap(A,B) is a procedure that swaps the contents of a and b}

for N=0 to (HEIGHT-1)
  R=random(HEIGHT)
  swap(YORDER(N),YORDER(R))
end for N

{initialise the XOFFSET array}

for N=0 to (WIDTH-1)
  XOFFSET(N)=random(WIDTH)
end for N

{now visit each pixel in the rectangle once, in this example we plot points}

for M=0 to (HEIGHT-1)
  for N=0 to (WIDTH-1)
    plot(XBASE+N,YBASE+((YORDER[M]+XOFFSET[N]) mod HEIGHT))
  end for N
end for M
```

Creative batch file techniques for DOS

by David R Stout

To most people, batch files are relatively straightforward and present few problems. However, if you feel that batch files ought to do a lot more besides setting paths, changing directories and starting programs, then this article is for you. A lot of the information presented here isn't immediately obvious from the relevant section in the DOS manual, and much of it has been gleaned from using DOS over a number of years. A rudimentary knowledge of the workings of batch files is assumed.

Batch files can be created in a number of ways by using a WP package, EDLIN or typing them directly in DOS after typing the command sequence 'COPY CON name.BAT' at the DOS prompt, where 'name' can be any name of your choice as long as it follows the normal DOS file-naming rules. To terminate input to the file when using the COPY command it is necessary to enter an end-of-file character (Ctrl-Z) — by typing the letter Z while the Ctrl key is depressed.

Personally, I prefer to use EDLIN to edit batch files as it loads quickly and is fairly simple to use, especially if you use a utility such as NDOSEDIT which allows you to use the Insert and Delete keys à la Basic. Also EDLIN will allow you to enter control characters, including Escape for use with the ANSI driver.

User interaction

One of the biggest drawbacks with batch files is their almost total lack of interaction with the user — the Pause command being about the only way a batch file will stop and wait for input from the keyboard (whereupon the batch file will continue regardless of whichever key was pressed). This command is often used to provide an option to abort the batch process by typing Ctrl-C at the Pause prompt. For example:

```
ECHO OFF
CLS
ECHO * * * About to format the disc in
drive A * * *
ECHO Press Ctrl-C to abort, or
PAUSE
FORMAT A:
```

will wait for a keypress before moving onto the Format command, but pressing Ctrl-C will terminate the batch file and return to DOS before any damage is done.

I always find Ctrl-C a little clumsy in use and I prefer to take a user directly to the 'Terminate batch job (Y/N)?' prompt by inserting a Ctrl-C into the input buffer from within the batch file. This is not as tricky as it sounds and the above example can be modified quite simply:

```
ECHO OFF
CLS
ECHO * * * About to format the disc in
drive A * * *
ECHO ^C | TIME >NUL
FORMAT A:
```

The ECHO command is used to pipe a Ctrl-C character to the Time command which, in turn, redirects its output to NUL (redirection and piping are considered in more detail later). NUL is a dummy device that behaves like COM1 or LPT1 but does nothing with the output sent to it. Time is used here as it is one of the few internal DOS commands that require keyboard input.

On receiving the Ctrl-C, the Time command is aborted and DOS displays the 'Terminate batch job (Y/N)?' prompt to ask if we wish to abandon the entire batch file or continue with the next command. Perhaps the least obvious stage is inserting the Ctrl-C character into the Echo command. It is not simply a matter of typing ^C or Ctrl-C directly from the keyboard — this would simply abort the command as we type it in.

Instead, we use EDLIN and type Ctrl-V followed by C. On the screen this appears as ^VC but when the entire line has been entered and accepted it converts this to ^C. Ctrl-V tells EDLIN that the next character is a control character, so this is the way that control characters should be entered in batch files. The only exception to this rule is the Bell character or ^G which may be entered directly as Ctrl-G. In fact, the Escape character is really ^[and this can be entered as Ctrl-V[— handy for use with Ansi.Sys or controlling printers, as will be discussed later.

Creating menus

If you are serious about batch files then you will need a utility to allow the batch file to perform different tasks depending on user input. A number of such utilities can be found amongst the Public Domain software and exist under various names — ASK, REPLY, CHOICE and so on.

These all work by waiting for a valid keypress and setting an exit code within the utility, the exact code being dependent on the key pressed. This exit code can then be tested by using IF ERRORLEVEL within the batch file. For example, the following code forms the basis of a simple menu facility.

```
ECHO OFF
CLS
ECHO SIMPLE MENU
ECHO*****
ECHO.
ECHO a) Show DOS version
ECHO b) Show volume name
ECHO.
CHOICE ab
IF ERRORLEVEL 2 GOTO VOLUME
VER
GOTO EXIT
:VOLUME
VOL
:EXIT
```

In this example, the Echo command is used to display the menu on the screen and then a full-stop immediately after the Echo command will echo a blank line to the screen. Using Echo on its own will cause DOS to display the current state of the screen echo (On or Off).

Setting Echo Off will prevent the batch commands from being echoed to the screen and only the initial Echo Off command will be visible. However, users of DOS 3.3 and above can precede the Echo command by the @ character to prevent even this from being echoed to the screen.

When the Choice command is reached, the program halts for keyboard input and will only accept lower case a or b, whereupon Error-Level is set to 1 or 2 respectively, and the batch file continues.

The next stage is to test the Error-Level value and, if necessary, branch to another part of the batch file using the Goto command. If we wished, we could have tested for upper case letters as well by including these as parameters to the choice command, for instance, CHOICE abAB, and using further IF ERRORLEVEL commands to trap these responses.

By far my favourite utility for this is What.Exe as supplied with the Microsoft Macro Assembler. This little gem can also provide other information regarding disk space, file sizes, printer status, memory and the presence of a co-processor or ANSI driver. It does this by saving the required data as a DOS environment variable of the same name (What). It is then a simple matter from within the batch file to test the value of this variable and take appropriate action.

The various options provided by the What utility are stored in a Help file; this information is printed out when What is invoked with no parameters. This utility could be used to form the basis of a more sophisticated menu program, as the following example shows.

```
@ECHO OFF
:START
CLS
TYPE MENU.TXT
ECHO.
SET WHAT=
WHAT C"Your selection =>" ABCDE
IF "%WHAT%"=="A" WP
IF "%WHAT%"=="B" SPREAD
IF "%WHAT%"=="C" PCTOOLS
IF "%WHAT%"=="D" GOTO PRINT
IF "%WHAT%"=="E" GOTO EXIT
GOTO START
:PRINT
WHAT P
IF "%WHAT%"=="1" GOTO OK
ECHO
ECHO ERROR — check printer
PAUSE GOTO START
:OK
ECHO.
SET WHAT=
WHAT S "Name of file to print?"
IF NOT "%WHAT%"==" " TYPE
  %WHAT% >PRN:
GOTO START
:EXIT
ECHO.
```

As batch files read each line from disk they tend to run slowly and, in order to display a large amount of text quickly, it is often wiser to use the Type command to put the menu on the screen. A typical menu file, Menu.Txt, as used in the example above, may look like this:

Menu Selector

- Word processor
- Spreadsheet
- Pctools
- Print text file
- Exit Menu

MICROMART

EVERLOCK

THE NEW GENERATION
OF COPY PROTECTION

- NO** User hassle
- NO** Back-up problems
- NO** Hardware add-ons needed
- NO** Changes to source codes
- YES** EVERLOCK supports hard disks and networks
- YES** EVERLOCK is transparent to end users
- YES** EVERLOCK has many options and facilities
- YES** EVERLOCK is for all IBM and compatibles and EVERLOCK IS ONLY **£309.00** (+ £5 p&p and VAT)

FREE Demo Disk Also Available
For further information Phone or Write to

microcosm

Microcosm Limited
26 Danbury St., London N1 8JU
Tel: 01-226 9092 Telex: 94011285

COMPUTER SECURITY ACCESS CONTROL UNIT

- * Protects your Computer System from unauthorised access through a modem or locally connected terminal.
- * Stores 120 user PASSWORDS and ID's.
- * Three levels of security, including DIAL-BACK.
- * Can be used with any asynchronous modem. For DIAL-BACK the modem must have an auto-dial facility, a range of dialling protocols are supported.
- * Disconnect on Data Inactivity Timeout option.
- * Monitors the Data Rate signal from the modem to match the incoming Baud Rate, enabling modem access at two different speeds without the need to alter the computer's Baud Rate.
- * Fully buffered communication channels supporting most Baud Rates, Word Lengths, Parity and Flow Control protocols.
- * Supervisory Console facility for the setting of all parameters stored in non-volatile memory.
- * Console Lock keyswitch which disables the Console and activates the anti-tamper circuitry.
- * Optional Event Logging which records the date, time and duration of all accesses, against the User's ID number.
- * Full Data Sheet available. Prices from £295 (+ VAT).

SUMMIT COMPUTERS LTD

Star Centre, 2 The Boulevard, Blackmoor Lane,
Watford, Hertfordshire WD1 8YW
Fax 0923 54301 Tel 0923 34004

Need a MODEM? Then 'talk' to US!

Amstrad	
PC V21/23 AA AD + s/w	£125
MC2400 V21/22/23/22bis int.	£165
SM2400 V21/22/23/22bis ext.	£229
Miracom	
WS4000 V21/23 AA AD	£115
WS3000 V21/22/23 AA AD	£243
WS3000 V21/22/23/22 bis AA AD	£349
Keycard V21/22/23 AA AD	£243
Keycard V21/22/23/22bis AA AD	£349
Courier HST MNP Class 5	£799
Pace	
Error Correction Unit	£119
Linnet V21/23 AA AD	£115
Linnet 1200 V21/23/22 AA AD	£199
Series 4 2123S AA AD	£209
Series 4 1200S AA AD	£309
Series 4 1200S AA AD EC	£419
Series 4 2400S AA AD	£389
Series 4 2400S AA AD EC	£499
Discovery	
1200P Pocket Modem V21/22 AA AD	£99

This is just a small selection of the vast range of modems we can supply.

Please add VAT at 15% to prices shown.
Carriage will be charged at £9
Access/VISA accepted. Make cheques PO's payable to:



Rovoreed Limited

The Coach House, 65a Grand Drive, London SW20 9DJ
Tel. 01-540 8573 Fax. 01-542 9769

MICROMART

BULK DISKS

LESS THAN TRADE!!

UNBRANDED DISC PRICES INCLUDE: SLEEVES LABELS AND WRITE PROTECT TAGS. ALL CARRY A CERTIFIED 100% LIFETIME GUARANTEE

	25	50	100
5 1/4" D/S 48	9.50	17.50	33.00
5 1/4" D/S 96	10.50	18.50	34.00
5 1/4" H/D 1.6	23.75	45.50	89.00
3 1/2" D/S 135	24.00	46.00	85.00
3 1/2" H/D 2.0	59.00	115.00	199.00

ALL PRICES INCLUDE VAT AND CARRIAGE
ALL PRODUCTS CARRY A NO-QUIBBLE REPLACEMENT GUARANTEE FOR LIFE!!

SAME DAY DESPATCH
★★★★
RIBBONS CABLES

DATApro Computer Supplies
DATApro House
North Street
Leighton Buzzard
Beds LU7 7EQ
0525 853333 (10 lines)
Fax: 0525 850485
Tlx: 826717 SHARET G 165
TRADE ENQUIRIES WELCOME

24 HOUR ORDER-LINE
★★★★
DISKBOXES LABELS

3 1/2" DISKS

LESS THAN TRADE!!

	S/S	D/S	H/D
Verbatim	12.49	13.85	36.69
Dysan	11.99	14.49	38.15
3M's	10.99	15.35	44.20
Sony	13.35	14.35	39.99

ALL PRICES INCLUDE VAT & CARRIAGE
ALL PRODUCTS CARRY A NO-QUIBBLE REPLACEMENT GUARANTEE FOR LIFE!!

SAME DAY DESPATCH
★★★★
RIBBONS CABLES

DATApro Computer Supplies
DATApro House
North Street
Leighton Buzzard
Beds LU7 7EQ
0525 853333 (10 lines)
Fax: 0525 850485
Tlx: 826717 SHARET G 165
TRADE ENQUIRIES WELCOME

24 HOUR ORDER-LINE
★★★★
DISKBOXES LABELS

5 1/4" DISKS

LESS THAN TRADE!!

	D/S 48	D/S 96	H/D 1.6
Verbatim	7.99	12.35	14.49
Dysan	8.35	10.15	11.99
3M's	7.49	13.15	14.25

ALL PRICES INCLUDE VAT & CARRIAGE
ALL PRODUCTS CARRY A NO-QUIBBLE REPLACEMENT GUARANTEE FOR LIFE!!

SAME DAY DESPATCH
★★★★
RIBBONS CABLES

DATApro Computer Supplies
DATApro House
North Street
Leighton Buzzard
Beds LU7 7EQ
0525 853333 (10 lines)
Fax: 0525 850485
Tlx: 826717 SHARET G 165
TRADE ENQUIRIES WELCOME

24 HOUR ORDER-LINE
★★★★
DISKBOXES LABELS

PROGRAM FILE

By enclosing a DOS environment variable with the per cent character (%), DOS replaces this construction with the actual value of the variable as the batch file executes. This can be demonstrated by removing the @Echo Off from the example given above and observing the IF expressions as they are evaluated.

The command following the equality test is executed if the test is true. If the command is a program name, then that program will be executed and, on termination, the batch file will continue.

In this example, a Goto loop has been incorporated so that the menu is again displayed. If the command is the name of another batch file then control is passed to this file in a similar way to the Basic Chain command. If we require the original batch file to continue processing, we could insert the name of the first batch file as the last command in the second batch file, thus chaining back again. Alternatively, the second batch file could be treated as a subroutine by using the Call command:

```
IF "%WHAT%"=="A" CALL WP
```

Now when execution of the WP batch file is complete, the Menu batch will continue with the statement following this IF. Unfortunately, the Call command was not implemented for versions of DOS earlier than 3.3, and to achieve a similar effect it is necessary to invoke another copy of the command processor by replacing the IF statement with the following:

```
IF "%WHAT%"=="A" COMMAND /C WP
```

The /C means that the command processor will exit and return to the previous level on termination of WP. In effect, this is now running another program (Command.Com) and not a batch file, so execution of the original batch file continues when WP terminates.

Of course, if you do not have any of these utilities, you could display a similar menu and the batch file could exit to DOS, where you would type a single letter and press Enter to kick off a batch of that letter, such as A.Bat.

The command to display the Menu would also be inserted at the end of A.Bat to re-display the Menu when that batch file terminates.

Using DOS variables

DOS environment variables can be very useful. For example, you may have a batch file that loads a driver or 'Terminate and Stay Resident' program (TSR) before loading some other program, and it may be impor-

tant to ensure that this is loaded only once. In the start-up batch, we could insert the following code:

```
IF "%LOADED%"=="YES" GOTO LABEL1
... initialisation code ...
SET LOADED=YES
:LABEL1
... rest of start-up code ...
```

Other DOS environment variables may also be put to good use.

Often, batch files are used to change to a specific directory and change the DOS search path before loading a program. When the program exits, the path and directory may be wrongly set.

Although we could insert two extra lines into the batch file to set another path and directory, it would be nice if the original path and directory were restored whatever they may have been set to. Resetting the path is easy. In our batch file we could insert the line:

```
SET OLDPATH=%PATH%
```

before the path is changed, and the line:

```
SET PATH=%OLDPATH%
```

just before the batch file terminates. Storing the current directory is not quite so easy, as DOS does not store this as an environment variable. We could of course use the What utility by inserting the line:

```
WHAT Y
```

in our batch file in conjunction with:

```
CD %WHAT%
```

to restore our directory at a later stage.

If the What utility is to be used for other purposes within the batch file, the returned string must be copied to another variable. For example, to save path, drive and directory we could have:

```
@ECHO OFF
SET OLDPATH=%PATH%
WHAT YE
SET DRIVE=%WHAT%
WHAT Y
SET DIRECTORY=%WHAT%
... rest of batch file ...
SET PATH=%OLDPATH%
%DRIVE%
CD %DIRECTORY%
```

If you don't have What.Exe then a little more cunning is needed to restore the current directory.

First we have to create a small file as follows:

```
COPY CON PREFIX.CD
CD_<Ctrl-Z>
```

The underscore represents a space, so press the Space bar and *not* the underscore character. It is important that you do not press Enter after the CD_ but press the Ctrl-Z key combination to insert the end-of-file character. This is then utilised in our batch file as follows:

```
@ECHO OFF
COPY PREFIX.CD OLD-DIR.BAT
REM now append current directory
CD >>OLD-DIR.BAT
... rest of batch file ...
CALL OLD-DIR.BAT
```

As mentioned earlier, if you are using a version of DOS below 3.3 then the Call will have to be replaced by Command /C. If this line is at the end of the batch file then just use Old-Dir without the Call or Command to chain to that file. Also ensure that you have changed back to the correct directory for Old-Dir-Bat to be found — I generally prefix all such files with a backslash (\) character to put them in the root directory and I can call them from there.

How about a small batch file to extend the current search path? A file called Addpath.Bat may contain:

```
@ECHO OFF
IF "%1"==" " GOTO ERROR
SET PATH=%PATH%;%1 GOTO EXIT
:ERROR ECHO ^GUsage: %0 directory
:EXIT
```

By typing 'ADDPATH C:\UTILS' the directory C:\UTILS (which replaces the %1 on the third line) is appended to the current path. If no parameter is specified, the batch file branches to the line labelled Error and then proceeds to process the Echo command. The ^G in the Echo command is the control character to produce a beep (enter this in the batch file with Ctrl-G) and the %0 is the replaceable parameter which holds the batch file name, so that, even if you subsequently rename this file, the correct name is always displayed. Although this is a simple batch file, it will save a lot of hassle if you need to add an extra directory to an already fairly lengthy search path.

Increasing the DOS environment

If you make extensive use of DOS variables or have very long paths set, you may find DOS coming up with the error message 'Out of environment space'. This is because, by default, DOS allocates only 127 bytes to the DOS environment when it starts up. Although, in theory, the DOS environment can extend beyond this, the presence of a TSR program will prevent this. Remember that DOS utilities like Mode, Print and Graphics are also TSRs. To overcome this

problem the following line can be added to your Config.Sys file.

```
SHELL=C:\COMMAND.COM /E:256
```

This will tell DOS that the top-level command processor is Command.Com (which it defaults to anyway) and that 256 bytes are reserved for the environment. You can of course adjust this to whatever value you wish up to 32768 bytes, but remember that this is being taken out of your usable memory.

Utilities

We can, of course, enlist other DOS utilities to make our batch files even more useful. Search.Bat searches for all files containing a certain string.

```
@ECHO OFF
IF "%1"==" " GOTO ERROR
SET FILESPEC=%2
IF "%2"==" "
SET FILESPEC=*. *
FOR %%A IN (%FILESPEC%) DO FIND
%1 %%A
GOTO EXIT
:ERROR
ECHO ^GUsage: %0 "string" [filespec:
default=*. *]
:EXIT
```

The variable Filespec contains the file specification to be used for the search, and this is supplied as the second parameter to Search. If this is unset then Filespec is set to *. * to search all files for the key string. As the Find utility cannot accept wildcards for the filename (and so cannot search multiple files), a For loop is used where the Find command is successively repeated for all files matching Filespec.

The For is perhaps the most difficult batch command to understand. In essence, the specified variable (in this case %%A), is sequentially assigned to whatever is enclosed by the brackets. This may be a list of items, commands, filenames or parameters. If a wildcard is used then this is expanded so that the variable is sequentially set to each of the files which matches the file specification. For each evaluation of the variable, the command following the Do is executed using the evaluated parameters.

Piping and redirection

Another useful batch file is Where .Bat which searches an entire disk to find a file or filenames containing a specified string.

```
@ECHO OFF
IF "%1"==" " GOTO ERROR
CHKDSK /V | FIND "%1"
GOTO EXIT
:ERROR
ECHO ^GUsage: %0 filename
:EXIT
```

MICROMART

384Mb*

£1750

Micropolis 18ms access
ESDI or SCSI Full Height Drive
Includes Controller
*Formats to 357MB

40MB Miniscribe with controller £230

XT/AT Controller £45/£95

LASER RECHARGE KITS
£99

250g LASER TONER £18

All Prices plus VAT & Delivery

Innovation Ltd
39 Charing Cross Road
London WC2H 0AR Tel: 01-434 1533

Hurry, Hurry, Hurry

STOCK CLEARANCE

We are disposing of 100's of brand new and boxed and guaranteed colour and monochrome monitors at give away prices.

Example:

0.31 Hi-res Rgb TTL 12"
for under £100

Dealer Enquiries Welcome

PHONE CROFTON NOW
ON 05448 557

Complete range of NEC Monitors & Printers available at competitive prices

MICROTECH BUSINESS SYSTEMS

APRICOT COMPUTERS	Mono	White	VGA
XEN-I 286/30	£1490	£1570	£2060
XEN-I 286/45	£1710	£1790	£2280
XEN-I 386/45	£2220	£2300	£2540
TOWER 386/100	N/A	£3040	£3280
TOWER 386/100	N/A	£3770	£4010

CHOICE OF 5.25" OR 3.5" FLOPPY DRIVES

USED APRICOT'S BOUGHT AND SOLD

WE STOCK ZENITH, AST PREMIUM, AMSTRAD AND EPSON MODEMS, PRINTERS, FAX MACHINES ETC ALWAYS AVAILABLE

PLEASE TELEPHONE FOR CURRENT PRICES:

(0934) 633875 or (08606) 49926

PRICES SUBJECT TO CHANGE WITHOUT PRIOR NOTICE

PRICES EXCLUDE VAT BUT INCLUDE DELIVERY AND INSTALLATION

MICROMART

PRICE BREAKTHROUGH ON PC-286

With 1Mb Dram, 1.2Mb FDD, 20Mb HDD + Mono£895.00
 For those who prefer a ride on a fast lane with 80286-16/20.

Call for 286 prices at 386 performance. Or better still don't take our word for it, seeing is believing.

PCXT 4.77/10MHz 640K 2 FDD.....£495.00
 AT-386 16/20MHz 2Mb MEM 1.2Mb/1.44, 40Mb HDD + EGA£2400.00

DESK TOP PUBLISHING

HS-3000 Handy Scanner with free DPE software.....£195.00

DISK DRIVES

ST-125 3.5" 20Mb HDD 35-40MS (Seagate).....£185.00
 ST-225N 5.25" 20Mb HDD 65MS (Seagate).....£199.00
 ST-251 5.25" 40Mb HDD 40MS (Seagate).....£255.00
 ST-251 1 5.25" 40Mb HDD 28MS (Seagate).....£285.00
 RF542BT 360K External Drive (XT/AT).....£95.00
 RF552BT 1.2Mb External FDD (AT) Toshiba Compatible.....£120.00
 RF302BS 720K 3.5" External Drive.....£110.00

CONTROLLER BOARDS

360KB/720KB/1.2Mb/1.44Mb FDD Controller (XT/AT).....£39.00
 FDD/HDD Controller Card AT (W.D.C.).....£99.95
 WD-GEN XT HDD Controller + Cable.....£52.00
 WD1002A-WX1 XT HDD Controller + Cable.....£55.00
 (Half Card, Super BIOS)

GRAPHIC CARDS

Mono Graphic/Printer Card.....£33.50
 Colour Graphic/Printer Card.....£35.05
 EGA Card Hercules Compatible (Short).....£115.00

MONITORS

MM-1201 12" Monochrome Monitor (Dual FRE).....£85.00
 MM-1401 14" Monochrome Monitor (Dual FRE).....£90.00
 COL-14A 14" Colour Monitor Medium Res.....£220.00
 COL-14C 14" Colour Monitor High Res. (EGA).....£325.00
 TE-5155 Teco Multiscan Super High Res Mono.....£425.00

MEMORY CHIPS

41256-12.....£8.00
 41256-10.....£8.75
 80287-8.....£140.00

MOTHER BOARDS

PCAT-286-12.....Call
 PCAT-286-16/20.....Call
 PCAT-386-16/20.....Call

ALL PRICES EXCLUDE VAT & DELIVERY
 ALL PARTS GUARANTEED FOR 3 MONTHS

We have more than those listed above.
 For 48 hour repair service or more information call:

MENSCO ELECTRONICS & COMPUTER SYSTEMS LTD

01-751 0923

(24 hour Credit Card Holders Access-Visa)
 Telex: 94016893 TAME G

PROGRAM FILE

Here CHKDSK is used with the /V parameter to list all the files on the disk. This is piped to the Find utility where only files matching the supplied parameter (%1) are listed. For example, Where Results.Doc will show the complete file specifications of directories containing Result.Doc and Where.Bat will show all directories and names of batch files.

Note that the Find utility will not expand wildcards, and the search is case-sensitive (so enter search strings in capitals and do not use ? or *). The vertical bar is used to signify piping, which is simply chaining the commands and using the output of one as the input to the other. If we wanted the output sorted we could pipe the output to the Sort utility.

```
CHKDSK /V | FIND "%1" | SORT
```

This would produce an output which is sorted alphabetically.

Note that the Sort utility is used after the Find. If our search string produces more than one screenful of output we could pipe it to the More utility:

```
CHKDSK /V | FIND "%1" | SORT | MORE
```

By typing 'WHERE DIR' a listing of directories is obtained. Ensure that all these utilities are in the DOS search path for the commands to work properly.

Before moving away from piping, here is another example called Dir-sort.Bat. This batch file will sort a directory by name, extension or size and uses an interesting variation of the For loop.

```
@ECHO OFF
FOR %%A IN (n e s N E S) DO IF
"%1"=="%A" GOTO %1
ECHO Usage: %0 followed by N or E or S
[/R] ^G
ECHO to sort by name, extension or size
ECHO /R reverses sort (option)
GOTO EXIT
:N
DIR | FIND "-" | FIND /V "<DIR>" | SORT
%2 | MORE
GOTO EXIT
:E
DIR | FIND "-" | FIND /V "<DIR>" | SORT
/+10 %2 | MORE
GOTO EXIT
:S
DIR | FIND "-" | FIND /V "<DIR>" | SORT
/+16 %2 | MORE
:EXIT
```

Here the For loop is used to test the first parameter (%1) against any of the valid inputs. If a match is not found then processing continues with the subsequent lines, which display the instructions for use. If a match is found, then control is directed to the appropriate label. Interestingly, the Goto label does not

appear to be case-sensitive, hence it is convenient to use whatever was supplied as the first parameter (in this case %1).

For each of the options a degree of filtering is necessary. The first filter, FIND "-", finds only lines containing a date — file entries, and other redundant information is rejected. The second filter, FIND /V "<DIR>", finds only lines that do not contain <DIR>, — directory entries are rejected. Finally, the resulting output is sorted on the appropriate field and piped to the More utility to display it one screenful at a time. If /R is used as the second parameter on the command line, the sort order is reversed.

There are two forms of redirection: redirecting output (>) and redirecting input (<). Output can be directed to (and input can come from) a file or a device: by default, input normally comes from the keyboard and output normally goes to the screen. Both keyboard and screen use the device name Con (for console). Another example of input/output redirection is a small utility to show when the computer was last used. First, create a small file called CRLF with the following keystrokes:

```
COPY CON CRLF <Enter> <Ctrl-Z>
```

This file contains only a carriage return/line feed sequence (hence the name). Next, create two more files called Editdate and Message with the following keystrokes:

```
COPY CON EDITDATE
2D1RCurrent date is e
<Ctrl-Z>
COPY CON MESSAGE
Computer last used on<Ctrl-Z>
```

The batch file Lastused.Bat would then use these three files to store the current date to a file called Lastused.Txt.

```
@ECHO OFF
IF EXIST LASTUSED.TXT TYPE
LASTUSED.TXT
DATE <CRLF >TODAY
EDLIN TODAY <EDITDATE >NUL
COPY MESSAGE LASTUSED.TXT >NUL
TYPE TODAY >>LASTUSED.TXT
DEL TODAY
```

The Date command effectively reads an Enter from the CRLF file, but the output is redirected to a file called Today. This file is then edited using EDLIN but instead of taking commands from the keyboard, the commands come from the file Editdate. Editdate contains the commands to delete the second line of output, delete the text 'Current date is' and end the edit. The output is redirected to NUL to avoid seeing the editing process on the screen — the required

DRAFIX CAD ULTRA. YOU'LL GROW INTO IT, NOT OUT OF IT.

DRAFIXCAD ULTRA FINALLY FILLS AN IMPORTANT GAP IN LOW-COST CAD.

Drafix introduces CAD for the real world. The first inexpensive CAD software package that can turn your drawings into usable database and spreadsheet information. New Drafix CAD Ultra with CADapult.

CADAPULT YOUR DRAWING INTO LOTUS 1-2-3 OR DBASE.

Any CAD package lets you create drawings. DrafixCAD Ultra's CADapult utility lets you turn them into facts and figures.

First, you can give every element in your drawing specific attributes- a name, a part number, a price for example. Then, you can transfer that data into other formats like Excel, Lotus 1-2-3, Foxbase, dBase and other spreadsheet and data-base programs. With little more than a push of a button, you can convert the data into spreadsheet, move it to a database or insert it into your drawing.

Suddenly your concept becomes a bill

“By design, this product is very simple to learn and extremely easy to use” PC WEEK

of materials, a component pricing list, an order form, a job estimate.

Drafix CAD Ultra even lets you transfer files from WORD, WORDPERFECT, and other popular word processing programs or lets you move your HPGL files to Ventura, Aldus PageMaker and a variety of other desk-top publishing programs.

DRAFIX THE EASIEST CAD PACKAGE YOU'LL EVER USE.

“Easy to learn and use.” That's how PC Magazine described Drafix and our incredibly simple user interface, it is still one of the unique features you'll find in new Drafix CAD Ultra.

We've eliminated the need for memorization by leaving our menus on the screen all of the time. In minutes you'll create sketches and drawings that would require weeks of training on other CAD systems.

DRAFIX CAD ULTRA. YOU'LL GROW INTO IT, NOT OUT OF IT.

Unlike other low cost CAD programs we've taken no shortcuts.

Drafix offers amazing power and

sophistication for its price. All of the drawing, designing and editing functions demanded by architects, engineers, designers, contractors and other serious CAD users are included.

- Create your own symbol libraries with attributes or use our pre-attributed, predrawn symbols supplied with package.
- Draw lines, arcs, polygons, splines and bezier curves or freehand sketch.
- Access our full complement of item and-grid snaps for superior accuracy.
- Use our powerful and flexible automatic dimensioning system and crosshatching and solid fill for complex drawings.
- Take advantage of function key macros for even greater performance.
- Revolutionary word processing window for adding and editing text in drawings.

Plus much, much more.

And, it has depth that will let you continually expand your drawing capability.

Feature for feature, no other package, costing less than £500, delivers the capabilities of Drafix CAD Ultra.

EVERYTHING YOU NEED IN A SINGLE PACKAGE.

Other low-cost packages require expensive add-on modules. There's nothing missing from Drafix CAD Ultra. It now comes complete with DotPlotter, a General Symbols Library.

SYSTEM REQUIREMENTS

- IBM PC, XT, AT, PS/2, 386 and all compatible personal computers.
- PC-DOS or MS-DOS Version 2.11 or later
- Maths coprocessor recommended but not required.
- 512K RAM required 640K recommended
- Mouse or digitiser required. Drafix supports all popular pointer devices including:
 - Microsoft, Mouse Systems and Logitech compatible mice, Summagraphics compatible digitiser tablets
- Graphics display board required. Drafix supports all popular displays including:
 - Hercules and compatibles
 - IBM CGA and compatibles
 - IBM EGA and compatibles
 - IBM VGA and compatibles

Large Plotter capability and CADapult, our conversion utility which also includes a variety of standard reports for easy output of Bills of Materials or parts lists. *At no extra cost!*



In workgroups **OTTO** the Drafix/ AutoCAD file conversion utility will allow Drafix to co-exist happily with other CAD packages that support the Autocad DXF format.

Drafix CAD Report allows you to design your report format and then sort, group or summarize your drawing information in the layout that best meets your needs.

Drafix 3-D modeller specially designed to work with Drafix 2-D programs. Drafix 3-D will create true three-dimensional models, that can be viewed from any angle. Includes **automatic hidden line removal**.

DRAFIX CAD ULTRA. DON'T LET OUR LOW-COST FOOL YOU.

Drafix CAD Ultra is a serious CAD tool. Not a toy. A software package that, as one reviewer said, *“you'll grow into not out of.”*

You can spend a little less for CAD software. But you'll be buying a lot less performance.

CALL US TODAY FOR YOUR FREE DEMO!

Fill in the gap in your CAD capability with Drafix Cad Ultra.

For a free demo diskette and the name of your nearest Drafix dealer call Roderick Manhattan & Associates today on 01-978 1727

01-978 1727

Order your copy now

Please Send me

Drafix CAD Ultra £395.00
 Drafix Cad Report.. £150.00
 Drafix 3D £295.00
 OTTO £99.00
 CAD Introduction £79.00

A total of £ _____ is enclosed

Prices exclusive of VAT. Carriage free

Name _____

Company _____

Address _____

Card No. _____

Expiry Date /
**14 DAY MONEY-BACK
 GUARANTEE**

If you are not entirely satisfied with any Drafix product.

Roderick Manhattan & Associates
 Cloisters Business Center
 8 Battersea Park Rd, London SW8

All trademarks acknowledged PCW-1210

It offers all of the 2-D capabilities and features you'll need in the future, at a price you can live with today. DrafixCAD Ultra including DotPlotter, our Symbols Library and CADapult is available for just £395.

MICROMART

PARAGON TECHNOLOGY (UK) LTD

20MHz 286 AT COMPATIBLE



IBM RAM MONO SYSTEM £999

NORTON SI 23, NEAT CHIPSET
12MHz AT 286 COMPATIBLE

512K RAM MONO SYSTEM **£699**

16/20MHz 386 COMPUTER **£1999**

2Mb RAM MONO SYSTEM **£1999**

ALL SYSTEMS COME WITH 1.2Mb FDD, FDD/HDD CONTROLLER, 200W PS, 101 KEY K/BOARD, 12 MONTHS FULL WARRANTY AND 2 YEARS LIMITED WARRANTY.

OPTIONS

20Mb H/D SYSTEM	ADD £160
40Mb H/D SYSTEM	ADD £250
80Mb H/D SYSTEM	ADD £450
EGA SYSTEM	ADD £290
VGA SYSTEM	ADD £530

HARD/FLOPPY DISK DRIVES

20Mb SEAGATE ST225 65ms	£168
20Mb SEAGATE ST125 3.5" 40ms	£179
40Mb SEAGATE ST251 40ms	£249
40Mb SEAGATE ST251-1 28ms	£299
80Mb SEAGATE ST4096 28ms	£449
3.5" 1.44Mb FLOPPY DRIVE KIT	£109
5.25" 1.2Mb FLOPPY DRIVE	£99

ADD-ON/INPUT DEVICES

EGA CARD	£99
GENOA SUPER VGA CARD	£249
HERCULES COMP/PRINTER CARD	£39
HARD/FLOPPY CONTROLLER FOR AT/386	£99
PARALLEL/SERIAL CARD (XT/AT)	£29
286 SPEED CARD FOR XT	£289
FAX CARD G2/3	£289
LOGITECH BUS/SERIAL MOUSE	£69
GENIUS MOUSE	£45

MOTHERBOARDS

TURBO XT 4.77/10 OK RAM	£72
AT 6/8/10/12MHz OK RAM	£269
AT 16/20MHz 1Mb RAM	£700

MONITORS

12" AMBER MONITOR	£72
14" PAPER WHITE MONITOR	£92
14" EGA MONITOR	£299
14" NEC MULTISYNC II	£439
QUADRAM MULTI-SCAN	£399

PLUS MANY OTHER PERIPHERALS
CALL FOR MULTI USER SYSTEMS
ALL PRICES EXC VAT & DELIVERY

PARAGON TECHNOLOGY (UK) LTD

280 WINDSOR STREET
BIRMINGHAM B7 4DW

CALL (021) 359 1807

PROGRAM FILE

date is still in the file Today. The message prefix contained in Message is copied to the new file Lastused.Txt; redirection to NUL is again used to avoid echoing '1 file copied' onto the screen. Finally, the date in Today is appended to Lastused.Txt using the redirect-with-append characters, >>.

File deletion

Another utility using a For loop is Delbut.Bat which deletes all files except those named as parameters. To use this utility type Delbut followed by the filespec(s) of the files not to be erased. For example:

```
DELBUT *.COM *.EXE *.C *.H
```

will delete all files having an extension other than COM, EXE, C or H. A maximum of eight filespecs is allowed.

```
@ECHO OFF
IF "%1%"==" " GOTO ERROR
FOR %%A IN (%1 %2 %3 %4 %5 %6 %7 %8) DO ATTRIB +R %%A
ECHO Files about to be deleted . . .
ECHO.
ATTRIB *.* | FIND /V "R " | MORE
ECHO.
PAUSE ECHO Y | DEL * . * >NUL
ATTRIB -R *.*
ECHO Done GOTO EXIT
:ERROR
ECHO ^GUsage: %0 filespec1 filespec2
... filespec8
:EXIT
```

This utility uses Attrib to set the read-only attribute of each file in the supplied filespecs. A file cannot be deleted if its read-only attribute is set. Attrib is used again in conjunction with Find and More to show those files which do not have the read-only attribute set (those about to be deleted).

The files are deleted with the Del *.* command but with Y piped to it from an Echo command to avoid

further keyboard input. After the deletion, the Attrib utility is once more used to restore the files to their original condition.

Printer control

Using the Echo command and redirection it is possible to send escape sequences and set up strings to printers. I frequently use the HP DeskJet printer for dumping C source code listings, which are often more than 80 characters wide. Although the DeskJet is limited to A4-size paper, the fine print quality means that 6pt-size characters are perfectly legible, so I use a batch file, Dump.Bat, to set up the printer accordingly.

```
@ECHO OFF
REM setup sequence for HP DeskJet to
give 132 column mode
REM set reset to printer
ECHO ^[E >PRN
REM set NLQ mode (Courier) @ 20cpi and
6 point size
ECHO ^[s2q3t6v20H >PRN
REM set 0 characters for left margin
ECHO ^[&a0L >PRN
REM set 2 lines for top margin and 8 lines
per inch
ECHO ^[&i8d2E >PRN
REM print file and send form-feed
TYPE %1 >PRN
ECHO ^[&i0H >PRN
```

Remember that the Escape character ^[is entered by typing CTRL-V[when using EDLIN — it should appear as ^V[when typed. (And note that the character following the ampersands in the fourth-last and last lines is a lower-case L.)

Some of the batch files shown here are disk-intensive, and may run very slowly on a twin floppy XT system. However, these examples illustrate some of the more interesting features of batch file processing and form a basis on which you can develop your own utilities. Have fun!

Find for the Psion Organiser

by Jeremy Roussak

Find is a replacement for the top-level Find function of the Psion Organiser II. In addition to all the features offered by that function (such as editing the found record and/or storing it on a different pack), Find allows the user to:

- search all the data packs currently inserted (drives A:, B: and C:);
- specify in the usual fashion on which pack the search is to start;
- search any file (not just Main);
- scroll backwards through up to 32 previously found records, even if

they are on different packs;

- find out in which file the currently displayed record resides, what its record number is and how many records are in the current file.

The complete routine comprises three OPL procedures: Find, Finded and Testos%. In addition, one other OPL procedure, Install, must be run once to provide the machine code interface and another, Insfind, may optionally be run to allow access to find from the main menu. These routines are described below.

Insfind

Insfind subtly alters the top-level menu of the Organiser so that the Find option runs the OPL Find procedure, and not the built-in Find function. Once made, this change lasts until the next top-level Reset or cold boot. To reserve it (and so access the built-in Find function), simply delete Find from the main menu and then re-insert it.

Install

In order to carry out various operations, Find needs to call some functions provided by the Organiser's operating system. This must be done from a machine language program. Install puts such a program into the top of the Organiser's RAM and fiddles a pointer so that the routine will not be overwritten.

Install thus needs to be run only once (and indeed will refuse to allow itself to be run more than once). The routine will then remain resident until a top-level Reset or a cold boot is carried out.

The machine code routine installed is shown in the first listing. (The first byte is not resident, but is used by Install to fix up the 'sta a,fncode' instruction.) Usage is as follows:

- 1 Declare three variables: local fn%,d%,x%;
- 2 Execute the following:

```
mc%=peekw($2065)
if peekw(mc%)<>%j*256+%r or
peekb(mc%+2)<>$12 raise 203 :rem
missing procedure
mc%=mc%+3
```

This checks that Install has been run and then sets mc% to the code address;

- 3 Set the function code into fn%;
- 4 Set d% and x% to the required values of the d and x registers for the call. Also poke appropriate values into utw_s0 (\$41) and utw_s1 (\$43) if necessary;
- 5 Call by r%=usr(p%,addr(x%));
- 6 If r%=-1, the error code is in d%. If r%=0, d% and x% hold the contents of the d and x registers on return from the call, and any values put by the swi into utw_s0 and utw_s1 are still there (but probably not for long).

Find

This is the main program. It first gets the search string with the usual Find A: prompt. Pressing Mode changes the A: to B: or C: as usual, but this merely governs which pack is to be searched first; all three packs will be looked at. On/Clear exits and a null string finds all records, as usual.

If the Shift key is held down when Exe is pressed to enter the search string. Find will prompt for a file-

name to be used instead of Main. If a null string is entered here, Find will use Main as usual.

Find then displays the found records in the traditional manner. The following keystrokes are recognised while a record is being displayed:

- up/down arrow: move around the displayed record;
- Mode: edit the displayed record (see FindEd);
- On/Clear: exit;
- Space: show a message in the format:

```
File A:MAIN
Record 17/175
```

and wait for a keypress. If it is On/Clear exit, otherwise redisplay the current record;

- Del: show previous record. 32 previous records are stored in a circular buffer. pc% has the number of records in the buffer, p% points to the most recently inserted and ppk% and pp% are the buffers, holding the pack and record numbers of the records;
- Exe: show next record.

When end-of-file is reached, the usual '*** End of packs ***', message is displayed. If no matches have been found for the search string, a '*** No match ***' message is shown instead. Exe then restarts the search, Del moves backwards and On/Clear exits.

FindEd

Perhaps this procedure should be called Found! FindEd handles the editing of the current records. It copies the record into the editor buffer using system function 109 (copy) and allows it to be edited using function 104. The edited record is then saved using the same algorithm as used by the top-level Find function, namely:

```
if new length is zero
if drive unchanged
erase old record
endif
else
if drive unchanged
update old record
else
save new record on new drive
endif
endif
```

Testos%

Testos% performs the functions described under stage 2 of the section on using the machine code routine above. If the machine code is present, Testos% returns its start address: if not, it prints a message and stops. There is, therefore, no error return from Testos%.

MICROMART

QuickBASIC 4.0 & Libraries

MS QuickBASIC V4.0 Compiler	£65.00
Windows oriented development environment, fully Integrated editing, debugging and library facilities. GW/BASICA compatible. You'll wonder why you ever used anything else!	
Quick Windows +library	£89.00
Create lightning fast windows, pop-up/pull-down menus, dialogue boxes, data entry screens etc. Operates in text & graphics modes, full mouse support.	
Probas V3.0 Utility library	£99.00
Now with over 300 fast, general purpose functions for file handling, screen control, string extended memory management, edited input etc.	
Finally! XGRAF Graphics library	£89.00
Fast graphics, XOR plotting, load/save PC & EGA paint files, scalable fonts, text at any pixel position/angle, automatic pie/bar charts, Epson Laserjet printer dumps.	
Genius Mouse - with Dr HALO III, mouse pad	£39.00
Co-Max 80287 accelerator - accelerates programs using 80287 by up to 35%	£49.95
HS2000 Hand scanner (105mm), Dr HALO DPE	£189.00
Complete FAX card - full background operation, menu-driven, DOS file transfer	£399.00

We use all products listed ourselves and offer full technical support. Prices exclude VAT. VISA orders accepted by telephone.

Amber Logic Ltd, Pinedale, Oakwood Park, Bingley, West Yorks, BD16 4SG
TEL: (0274) 566224
FAX: (0274) 551234

SP Electronics

Amstrad & Acorn Approved
Business Centre &
Service Agent

We stock the entire range of Amstrad products, with special offers on the following:
PC1640 HD30-MD £949; PC1640 HD30-CD £1099;
PC1640 HD30-ECD £1249
*40Mb Add £50 - 65Mb add £100 to above prices.
*Free Menu software with all Hard drives
*Fully guaranteed 12 months
FD3 second 6 1/4 disc drives £99
640k extra memory kit of fitted £24.95
20Mb Hard cards and discs from £249 - 40Mb Hard discs from £349.
30Mb Hard discs from £299 - 65Mb Hard disc from £399.
*(complete with software, brackets & bezel)
Amstrad PCW9512 £499, Amstrad LQ3500 £349.
Amstrad PPC 512 & PPC 640 portables from £399.
Training centre and qualified consultants on hand. Full service and repair facilities, with maintenance contracts from 9%.
Huge stocks of software, hardware, printers, modems, peripherals, stationary and accessories.
Easy Boot Hard disc menu software for Amstrad, IBM PC and compatibles £9.95.
Fast and efficient service to the one man band to national corporates.
*All prices exclude VAT and delivery
Don't forget to phone us on the prices for the new 2000 series Amstrad computers
Acorn Archimedes in Stock Now! Models 305-310m Atari 620 STFM from £242. Commodore Amiga A600 from £416. MultiSynch monitors from £605 for Archie or IBM etc. Software & peripherals for entire Acorn/BBC range of products.

2 High St., Hucknall, Nottingham NG15 7HD
Tel: (0602) 632467
Fax: (0602) 630101

DP for DTP**PostScript Interpreters:**

GoScript v2.0, GoScript Plus, Dynatyp, Colour from £195.00 +vat Dealer enquiries welcome.

Budget PostScript Printing:

H.P. DeskJet for 300 dpi laser quality AND a PostScript interpreter from £795.00 +vat

Adobe/Addison-Wesley books: (no vat)

PostScript Reference Manual £21.95 Cookbook & Tutorial £15.95 PostScript Program Design £19.85 Programs from these books on disc £10.00 +vat FREE when all three books are purchased.

New Book: Real World PostScript £22.45

Public Domain LaserJet Fonts 8 discs for £20 +vat

H.P. LaserJet-DeskJet font utilities: convert +view +correct +print widths £25.00 +vat

For full details of these and other utilities, write to:
David Pollard DTP Folly Bridge Workshops,
Thames St., Oxford OX1 1SU (0865) 727203

MICROMART



French, First Aid, Football, Spelling, Science, Spanish, Sport, Scotland, England, English Words, German, General Knowledge, Geography, Italian, Arithmetic, and Natural History.

Let your computer help you learn

Write or phone for a FREE 20 page illustrated catalogue of our Leisure and Educational Software.

Available for IBM PC Compatibles and most home computers

KOSMOS SOFTWARE LIMITED

FREEPOST (no stamp needed)
DUNSTABLE, Beds LU5 6BR
Tel: 05255 3942 or 5406

A.M.O. Acorn Mail Order

Buying mail order you naturally want good prices and prompt delivery.

We believe our service is second to none, with most items available and on your premises within 48 hours of us receiving your order.

We have available a very comprehensive range of hardware, software and consumables at excellent prices, for example:

Amstrad 1640 HD Mono.....	£670
Amstrad 1512 SD Mono + 20Mb.....	£590
Amstrad LO 5000 di.....	£355
Amstrad LO 3500 di.....	£270
Amstrad/Sinclair PC200 + Free Software - from.....	£289
Atari 520 STFM.....	£255
Atari 520 STFM Super Pack.....	£325
Atari 1040 STFM + Mono Screen + Steinberg Pro 24 V3.0.....	£718
Commodore Amiga 500.....	£330
Commodore Amiga 500 + Colour Screen.....	£540
Pision Organiser II Model CM.....	£82
Pision Organiser II Model XP.....	£115
Dbase III Plus.....	£296
Lotus 1-2-3.....	£256
AMS D.T.P. Kit (Finesse/Gem/Fontware/Mouse/Scanner).....	£330

★ ★ EXTRA SPECIAL ★ ★

Dataprocessor 8022 132col printer, IBM graphics, NLQ..... £270
 The above is but a very small selection from our extensive range. All prices are inclusive of delivery, but exclude VAT. Account facility available for business users.

Interested? Then call us to discuss your requirements and volume purchase prices.

0622 28353

Ask for A.M.O. Action Desk
 Acorn Mail Order, P.O. Box 148 Maidstone, Kent ME16 8NW

TK COMPUTERWARE

Stone Street, North Stanford, Ashford, Kent TN25 6DF, England.
 Tel: 0303 81 2801 Int: 010 44 303 81 2801 Telex: 966676 PMFAB G
 Fax: 0303 81 2892 Int: 010 44 303 81 2892.

PSION ORGANISER 2:	Cambridge Computers Z88:
CM Model £99.50	Z88 Computer £287.50
XP 2 Model £139.50	32k Ram pak £20.00
32k Datapak £35.00	128k Ram pak £50.00
32k DRam pak £55.00	512k Ram pak £200.00
64k Datapak £60.00	32k Eprom pak £20.00
128k Datapak £100.00	128k Eprom pak £50.00
Spelling Checker £30.00	Z88-PC 2 link £35.00
Letter Organiser £35.00	Mains Adaptor £10.00
Harvester Superchip £100.00	ZBase £69.00
Pure Finance £50.00	Spellmaster £59.00
Spreadsheet £40.00	Z88-Mackintosh link £60.00
Comms Link £60.00	Z88-Amstrad PCW link £30.00
Using Psion Organiser book £10.00	Z88 Computing book £10.00
Leather Carry Case £13.00	Carry Case £10.00

● ALL PRICES INCLUDE VAT & UK MAINLAND DELIVERY - WE EXPORT WORLDWIDE ●

Phone for details of other products OR send SAE for our latest catalogue
 Credit card phone orders accepted, or send cheques, postal orders, Eurocheques



PROGRAM FILE

```

# Aug 88: 1.0      all the basics
# Sep 88: 1.1      fnx introduced (previously, user had to poke)
# Sep 88: 1.2      push & pop before & after swi for UTDDSP

0d      .byte      $0d      ; offset for fncode
6a 72   .ascii    "jr"     ; this is the header
12      .byte      $12     ; version 1.2

18      xgdx      ; var addr to x
3c      pahx      ; save for later
a6 05   lda       a,5,x    ; get code from fnx
b7 00 00- sta     a,fncode ; fixed up by INSTALL
ec 02   ldd       2,x      ; load from dx
ee 00   ldx       0,x      ; load from x%
3e      pahx      ; in case it's 110
3f      swi       ; do it

fncode:
00      .byte      0        ; function code goes here
31      ins       ; loss pushed x
31      ins       ; (doesn't affect carry)
25 0d   bcs       error    ; whoops

df 45   stx       utw_w2:   ; temporary save
38      pulx      ; retrieve var addr
ed 02   std       2,x      ; save into dx
de 45   ldd       utw_w2:   ; retrieve return x
ed 00   std       0,x      ; save into x%
ce 00 00 ldx      #0        ; signal success
39      rts

error:
38      pulx      ; retrieve var addr
4f      clr       a        ; so d=error code
ed 02   std       2,x      ; save in dx
ce ff ff ldx      #-1     ; signal failure
39      rts
    
```

Install — resident machine code

```

testos%:
local mc%
mc%=peekw($2065)
if peekw(mc%)+xj+256+xr
    if peekw(mc%+2)=s12
        return mc%+3
    endif
    print "wrong",
else
    print "No",
endif
print "system"
print "Must run INSTALL";
set :stop

insfind:
local fx,p%,sw%,s%(13)
s%="Press any key"
sw%=s1839
print "insfind:"
p%=peekw($2002)
do
    if lowers(usr$(addr(sw%),p%))="find"
        pokew p%+5,0
        fx=1
    endif
    p%=p%+peekb(p%)+3
until peekb(p%)=0 or fx
if fx
    print "success";s%
else
    print "failure";s%
endif
get
    
```

Testos%

```

finded: {pk%}
local ps(4),bx,ix,fnx,d%,x%,ax%,tmp$(255)
ax%=addr(x%)
bx%=peekw($2016)
pokew $41,peekb(bx%)+1
d%=s2187
x%=bx
fnx=109
usr(mc%,ax%)

ps="Save"
x%=addr(ps)
d%=s01fe
fnx=104
pokeb $a2,pk%
    
```

Insfind

```

if not usr(mc%,ax%)
    if peekb($2187)=0
        if pk%=peekb($a2)
            erase
        endif
    else
        tmps=usr$(addr(sw%),$2187)
        while ix<len(tmps)-2
            ix=ix+1
            if mids(tmps,ix,2)="<" : rem found, so replace with tab
                tmps=lefts(tmps,ix-1)+chr$(9)+rights(tmps,len(tmps)-ix-1)
            endif
        endwhile
        if pk%=peekb($a2)
            pokeb bx,0
            a.s=tmps
            update
        else
            close
            trap open chr$(peekb($a2)+%A)+fs,a,s
            if err
                create chr$(peekb($a2)+%A)+fs,a,s
            endif
            pokeb bx,0
            a.s=tmps
            append
        endif
    endif
endif
    
```

FindEd

```

find:
local k%,pk%,opk%,p%,pc%,ppk%(32),pp$(32),v%,ps(4),s%(255)
local fnx,d%,x%
global mc%,sw%,fs(9)

escape off
mc%=testos%:
sw%=s1839

ps="Find"
d%=fff :x%=addr(ps)
pokeb $2187,0
fnx=104
if usr(mc%,addr(x%))
    
```

```

return
endif
a$=user$(addr(sw%),$2187) :rem copy string up into a$
if peekb($7b) and $80 :rem SHIFT-EXE pressed
  at 1,2 :print "File:";
  input fs
endif
if len(fs)=0
  fs=":main"
else
  fs=":"+fs
endif
pk%=peekb($a2) :rem start pack (set by fn 104)
opk%=pk%
do
  do
    trap open chr$(pk%+XA)+fs,a,a$
    if err=0
      while find(a$)
        vx=-1
        do
          k%=disp(vx,"")
          vx=0
          if k%=1 :rem ON/CLEAR
            close
            return
          elseif k%=2 :rem MODE
            finded:(pk%)
            close
            return
          elseif k%=8 and pc% :rem DEL
            if ppk%(pk%)<pk%
              pk%=ppk%(pk%)
              trap close
              open chr$(pk%+XA)+fs,a,a$
            endif
            position ppk%(pk%)
            p%=(p%-2 and $1f)+1
            pc%=pc%-1
            vx=-1
          elseif k%=32 :rem SPACE
            cls
            print "File",chr$(pk%+XA);fs
            print "Record",pos;"/";count
            if get=1
              close
              return
            endif
            vx=-1
          endif
        until k%=13
        p%=(p% and $1f)+1 :rem wraparound pointer 1..32
        if pc%<32
          pc%=pc%+1
        endif
        ppk%(pk%)=pk%
        ppk%(pk%)=pos
        next
      endwhile
    endif
    if pk%=2
      pk%=0
    else
      pk%=pk%+1
    endif
  until pk%=opk%
  cls
  print rept$(" ",17);
  if pc%=0
    print " ** No match **";
  else
    print " End of packs ";
  endif
  do
    k%=get
    if k%=8 and pc%
      goto p: :rem Aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa!!!!!!
    endif
  until k%=1 or k%=13
  cls
until k%=1

```

Find

```

install:
local space$(100)
local i%,ok%,op%,p%,vx%,vnx%,vnmj%,vnmix%,cs$(100),hs$(16)

vnmj%=1 :vnmix%=2 :rem major & minor version numbers
vnx%=vnmj%*16+vnmix%
print "Install v":vnmj%,"":vnmix%

pk%=peekw($2065)
if peekw(pk%)-Kj$256+Kx and peekb(pk%+2)=vnx%
  view(2,"System "+chr$(%0+vnmj%)+". "+chr$(%0+vnmix%)+ " already installed.")
  stop
endif

:rem last byte of cs is checksum
cs%="0d6a7200183ca605b70000ec02ee003c3f003131250ddf4538"
c%="c8+ed02dc45ed00ce0000c39384fed02cefff399b"
hs%="0123456789abodf"
ix%=1
pk%=pk%-len(cs)/2
op%=pk%

do
  vx%=(loc(hs,mid$(cs,ix,1))-1)*16+loc(hs,mid$(cs,ix+1,1))-1
  pokeb pk%,vx%
  cks%=ck%+vx%
  pk%=pk%+1 :ix%=ix%+2
until ix%>len(cs)

:rem checksum should add to $xx00
if cks% and $ff
  view(2,"Checksum error: check cs")
  stop
endif

pokeb op%+3,vnx% :rem fix version number
vx%=op%+4+peekb(op%)
pokeb op%+9,vx% :rem fix address for sta a,fncode
pokeb $2065,op%+1 :rem offset byte is non-resident
print " : okPress any key.":
get :stop

```

Install

MICROMART

THE DIRECT CONNECTION

On Line Service
For a free demonstration call:
01-853 3965
(300-2400 bps, 8 bits)

Or for more information call
01-853 2283

SIGMA PRESS The Best-Known Publisher needs the best authors!

Sigma Press is the longest-established specialist computer book publisher in the UK. We've published more than 100 books, including such best sellers as Build Your Own Expert System, UNIX the Book, All-in-One Business Computing and many others from beginner to advanced professional level. Many of our books are equally successful in the USA and in foreign language editions - a useful bonus on top of royalties.

Sigma Press books enjoy a high reputation and are sold in all good book shops, computer dealers, at computer shows and by direct mail. We have a reputation for timely, practical books that sell well.

We are now expanding rapidly and need new authors in many areas - communications, all popular packages, operating systems, and hardware.

If you have a flair for writing and a good knowledge of your subject, you should contact us immediately and share our success.

Contact: Graham Beech - Commissioning Editor.
Sigma Press, 1 South Oak Lane, Wilmslow,
Cheshire, SK9 6AR.
Telephone: 0625-531035

H.C.L.

HOBURNE CONSULTANTS LTD
9R RIVERSIDE ROAD, SOUTHWICK,
SUNDERLAND SR5 3JG.

SPECIALISTS IN THE SUPPLY AND INSTALLATION OF COMPUTER HARDWARE, SOFTWARE AND DATA SUPPLIES

SPECIAL OFFER
PRECISION 5.25" DSDD DISKS
ONLY £3.50 PER BOX 10

Unbranded 5.25" DSDD £3.75 per box 10
Unbranded 5.25" DSHD £8.99 for 10
Unbranded 3.5" DSDD £8.99 for 10

ALL PRICES INCLUDE VAT AND POSTAGE

Access Welcome

Callers Welcome

PROGRAMMING

MICROMART

NEW

TIRED OF THE SAME OLD SOFTWARE ?
LOOKING FOR SOMETHING NEW ?

Send or 'phone for your free personal copy of our latest catalogue, and discover an exciting new range of imported software at bargain prices. Free gift with every software purchase!

EKSAR TRADING COMPANY LIMITED
Dept.: PCN
FREEPOST MK1149 (NO STAMP REQ)
P.O. BOX 683
MILTON KEYNES, MK12 6PL
Tel: (0908) 317711 (24hrs)
Fax: (0908) 319277

FREE GIFT

35mm Slides, Large Format Transparencies and enhancement from 'Lotus Freelance', 'Harvard Graphics' and programs that create a Computer Graphic Metafile (CGM).

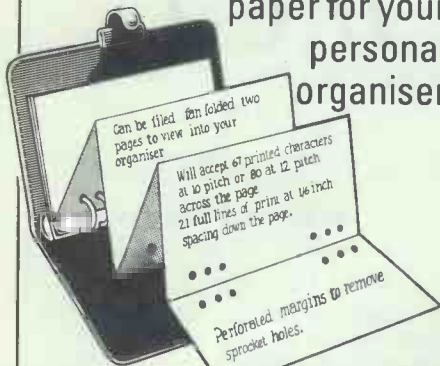
RCW Colour Slides Ltd

Phone: 01-437 2183
Fax: 01-439 1247

PO Box 4DL
7a Livonia Street
London W1A 4DL



The practical computer paper for your personal organiser



£15.85
(inc VAT) per
600 sheets size
171mm x 93mm

Enve-form Ltd
Redmays House
Cheddar Road
Wedmore
Somerset BS28 4EP
Tel: 0934 712345

PROGRAM FILE

Making use of:

Typed constants in Turbo Pascal

by Graham Robinson

Turbo Pascal provides a number of extensions to standard Pascal, a very handy one being typed constants. Typed constants, as their name implies, provide the facility to define constants of a type of our own choice. The most useful ones are arrays and records. The syntax for defining typed constants is a logical extension of the standard syntax:

Standard syntax is <id> = <constant>
Extended syntax is <id> : <type> = <typed constant>

C programmers will see the resemblance to their variables with initialisers. In fact, I find it much better to consider typed constants as global initialised variables, in that we can use them as variables, including being able to assign new values to them. Even typed constants declared within a procedure or function are

allocated global storage; as a result, local typed constants will retain their value from one invocation of a procedure to the next (as demonstrated by the accompanying listing 'Static-Variables').

The second listing 'Romans' demonstrates the use of typed constants as initialised look-up tables. The provision of initialised variables removes the space and run-time overhead of explicit initialisation code. An added benefit is that 'reference' variables are distinguished from 'working' variables, making the meaning of the code clearer.

Borland should have added true initialisers to variables, as this would have provided a more general and flexible alternative to typed constants. All the same, typed constants are a handy addition and we don't want to upset the purists too much do we?

Listing 1 — typed constant as hidden global variable

```
PROGRAM StaticVariables;
{
  Program to demonstrate the use of typed constants as local static
  variables. (c) Oct 1988 by GC Robinson
}
VAR
  I: INTEGER;

PROCEDURE ErrorReport(IsError: BOOLEAN);
{
  This procedure gives increasingly "helpful" messages
  in response to repeated errors.
}
CONST
  ErrCount: INTEGER= 0; { Typed constants are effectively initialised }
  { global variables, even if they are declared }
BEGIN { ErrorReport } { inside a procedure or function. This means }
  IF IsError THEN { that they will retain their value from one }
  BEGIN { invocation of a procedure to the next, but, }
    ErrCount:= { since they are declared locally they remain }
    Succ(ErrCount); { hidden from the rest of the program. }
  CASE ErrCount OF
    1: Writeln('Retry. ');
    2: Writeln('Single digits please. ');
    3: Writeln('Enter a number in the range 1 to 9, or 0 to quit. ');
    ELSE Writeln('You must be joking. ');
  END;
  END
  ELSE ErrCount:= 0;
END; { ErrorReport }

BEGIN
  Write('Enter an integer : ');
  Readln(I);
  WHILE I <> 0 DO
  BEGIN
    ErrorReport ( ( I < 1 ) OR ( I > 9 ) );
    Write('Enter an integer : ');
    Readln(I);
  END;
  Writeln('Zero ends the test. Thank-you. ');
END.
```

Listing 2 — typed constants as look-up tables

```
PROGRAM Romans;
{
  Roman numeral to decimal and decimal to roman numeral converter.
  Copyright (c) Oct 1988 by GC Robinson.
}
```

```

CONST
  { Look-Up Tables are handled very nicely using Typed Constants }
  TableTop= 13;
  { Store the valid roman numeral 'prefixes' along with their decimal values}

  Value: ARRAY[0..TableTop] OF INTEGER=
  ( 0, 1, 4, 5, 9, 10, 40, 50, 90, 100, 400, 500, 900, 1000);
  Symbol: ARRAY[0..TableTop] OF STRING[2]=
  ('', 'I', 'IV', 'V', 'IX', 'X', 'XL', 'L', 'XC', 'C', 'CD', 'D', 'CM', 'M');

TYPE
  RomanStrType= STRING[80];

PROCEDURE DecimalToRoman(   DecVal: INTEGER;
                          VAR RomVal: RomanStrType;
                          VAR Valid: BOOLEAN);
{
  Convert integers in range 1..3999 to a roman numeral string
  Valid returns false if number out of range.
}
VAR
  i: INTEGER;
BEGIN { DecimalToRoman }
  IF (DecVal < 1) OR (DecVal > 3999) THEN Valid:= FALSE
  ELSE
  BEGIN
    Valid:= TRUE;
    i:= TableTop;           { Starting at M or 1000 }
    RomVal:= '';
    WHILE DecVal > 0 DO     { While anything left of the decimal }
    BEGIN
      WHILE DecVal < Value[i] DO { Find largest value that can be taken }
      i:= Pred(i);           { out of the decimal. }
      RomVal:= RomVal + Symbol[i]; { Add approp. roman symbol to result. }
      DecVal:= DecVal - Value[i]; { Reduce decimal value by approp. value. }
    END;
  END;
END; { DecimalToRoman }

PROCEDURE RomanToDecimal(   RomVal: RomanStrType;
                          VAR DecVal: INTEGER;
                          VAR Valid: BOOLEAN);

VAR
  i, j: INTEGER;
  TmpRom: RomanStrType;
BEGIN { RomanToDecimal }

  RomVal:= RomVal+'$';           { Add end of string marker and }
  FOR i:= 1 TO Length(RomVal) DO { convert input to uppercase. }
  RomVal[i]:= UpCase(RomVal[i]);
  DecVal:= 0;
  i:= 1;
  WHILE RomVal[i] <> '$' DO      { until end of string }
  BEGIN
    j:= TableTop;               { find valid roman prefixes }
    WHILE (j > 0) AND           { ignoring invalid symbols }
    (Symbol[j] <> Copy(RomVal, i, Length(Symbol[j]))) DO
    j:= Pred(j);
    DecVal:= DecVal + Value[j]; { accumulate value into result }
    i:= i + Length(Symbol[j]);  { skip along string }
  END;
  { to validate the input we compare it with the correct roman }
  { representation for our result. }
  DecimalToRoman(DecVal, TmpRom, Valid);
  Valid:= Valid AND ((TmpRom+'$') = RomVal);
END; { RomanToDecimal }

VAR
  ARomVal: RomanStrType;
  ADecVal: INTEGER;
  ValCode: INTEGER;
  IsOK: BOOLEAN;

BEGIN { Main Program }
  Writeln;
  Writeln;
  Writeln('Decimal <-> Roman Converter');
  Writeln;
  Writeln('Enter a number in the range 1 to 3999,');
  Writeln(' a roman numeral in the range I to MMMCMXCIX or');
  Writeln(' return only to quit. ');
  Writeln;
  Write('Convert: ');
  Readln(ARomVal);
  WHILE ARomVal <> '' DO
  BEGIN
    Val(ARomVal, ADecVal, ValCode);
    IF ValCode <> 0 THEN
    BEGIN
      RomanToDecimal(ARomVal, ADecVal, IsOK);
      IF IsOK THEN Writeln(ARomVal, ' in decimal is ', ADecVal, '.')
      ELSE Writeln(ARomVal, ' is not a valid roman numeral. ');
    END
    ELSE
    BEGIN
      DecimalToRoman(ADecVal, ARomVal, IsOK);
      IF IsOK THEN Writeln(ADecVal, ' in roman numerals is ', ARomVal, '.')
      ELSE Writeln(ARomVal, ' is not a valid decimal number. ');
    END;
    Writeln;
    Write('Convert: ');
    Readln(ARomVal);
  END;
  Writeln('Bye!');
END.

```

MICROMART



LASERJET PREVIEW SOFTWARE

High speed software simulation of the HP LaserJet laser printer, *softJET* allows accurate, on-screen previewing of output from any application(s); including word processors and text formatters like TEX and TROFF. Can be run memory resident or stand alone. All PCL commands are supported including soft fonts, graphics, rules/patterns and macros. For the IBM PC and PS/2 with CGA, EGA, VGA or Hercules graphics.

£80.00 (+VAT)



QUEENSDOWN GRAPHICS
14 Osbaldeston Road,
London N16 7DP
01-806 1944

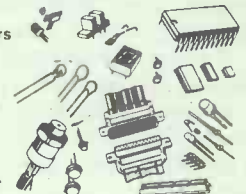
MEMORIES

EPROM · SRAM · DRAM · EEPROM · 2716 · 2732
2764 · 27128 · 27256 · 27512 · 4116 · 4164 · 41256
2114 · 6116 · 6264 · CMOS
AND LOW POWER

MICROPROCESSORS

NEC · INTEL · MOTOROLA · AMD · 8085 · 68000
Z80A · 80186 · 8086

Semiconductor Sensors
Ferrite Cores
Optoelectronics
Semiconductors
Thermistors
Integrated Circuits
Potentiometers
LEDs
Connectors
Suppression Switches.



Lowest prices worldwide for memories, digital, linear IC's.

Send for complete components catalogue
UK-£1.50. Export-£2.50

PVS ELECTRONIC COMPONENTS

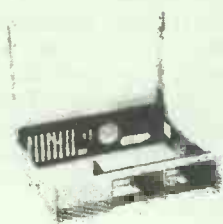
244 Deansgate Court,
Deansgate, Manchester M3 4BQ
Phone: 061-831 7086 & 0860 399945 24Hrs Tlx. 66898 Fax. 061-832 6934

PC CASINGS

OEMs/TRADE WELCOME

SOFTMACHINE DISTRIBUTION LTD
UNITS/F18/F25
HARBET RD,
LEA VALLEY,
EDMONTON,
LONDON N18 3LR.
ENGLAND.
TEL: 01-807 7644
FAX: 01-807 2748

Trade Hours:
10am-6pm



SOFTMACHINE
DISTRIBUTION LTD

Tel: 01-807 7644 FAX: 01-807 2748

Fun and games

Our BSI correspondents ensnare MS-DOS with a C trap and offer an overview of worldwide language standardisation, plus various useful tips and queries including the problem of what makes a good manual.

Feedback

This is our fourth monthly column, and we'd like to thank everyone for the very supportive and positive feedback: keep it coming.

Here is a small selection from the many comments we received on Martin's 'comms' problems that caught the eye.

Mr R Smith of Follansbee (UK) Ltd seems to be having the same problem as we are. On using an Amstrad MC2400 modem with Mirror on a Dell 300 he said: 'Despite reducing the processor speed to 8MHz we still have problems receiving, often being left with a clear screen, the cursor flashing down it and no reaction to any of the keys — we have to reset and try again.' This can't be right, can it? He goes on to say 'The price/performance of this modem/software looked very attractive, but its performance seems very poor.'

On the other hand, J Gale from Hemel Hempstead says he has no problems accessing the Luton PSS mode, although he uses an Amstrad V21/V23 modem card — whereas we use V22.

Mike Florey managed to send over four pages to us via Luton PSS (from Croydon) all about communications standards. He even managed to send it error-free. (Even after reading it I don't know how!) As he says: 'Default to Useless — most things do in my experience, humans included.'

M Stockwell of New Life (a financial services company) needs to download equity and unit trust prices for a graphical analysis package. The company receives the prices from Finstat via a Telecom Gold mailbox. On requesting information on what file transfer protocols were available, 'No-one at Telecom Gold seemed to know that such things existed, never mind whether Telecom Gold provided this sort of service.'

PC comms is a lot of fun, isn't it? It's almost like an arcade game at times.

Matthew Horton

C bits and bugs

Well, actually just bugs. This month I am going to take a look at how well the leading C compilers detect and cope with data overflow on MS-DOS systems.

Stackrap

No, this is not the latest song to hit the charts, just an interesting means of creating unions with Turbo C and killing our favourite O/S.

```

/*
 * STACKRAP.C
 * Demonstration of stack wrap around.
 * Using Turbo C under MS-DOS
 */

#include<stdio.h>
#include<process.h>

int i;
int * ip1; /* pointer 1 to an int */
int * ip2; /* pointer 2 to an int */
main()
{
    int big0[25000]; /* size 50,000 bytes */
    int big1[7780]; /* size 15,560 bytes */
                    /* Total 65,560 24 byte overflow of segment ? */

    for( i=0; i<20; ++i)
        big0[i]=128; /* set first 20 entries of big0 to 128 */

    puts("big0 initialised");

    for( i=0; i<7780; ++i)
        big1[i]= i; /* initialise all of big1 */

    puts("big1 initialised");

    for( i=0; i<10; ++i)
        printf("big0[%d] = %d\n", i, big0[i]);

    ip1 = &big0[0];
    ip2 = &big1[7768];

    printf("big0[0] at %p big1[7768] at %p\n", ip1, ip2);
    exit(0);
}

```

Here is the output from this program from Turbo C v2.00, compiled as a small model program with stack checking on!

```

big0 initialised
big1 initialised
big0[0] = 128
big0[1] = 128
big0[2] = 128
big0[3] = 128
big0[4] = 128
big0[5] = 128
big0[6] = 128
big0[7] = 128
big0[8] = 128
big0[9] = 128
big0[0] at FFC2:big1[7768] at FFC2

```

This generates a pretty nasty problem. No error is given at compile or run time but the two arrays overlap.



Stackrap has actually occurred undetected. I tried compiling this using Turbo C, with and without stack checking, and with various memory models: the result was the same.

Microsoft C v5.0

This compiler successfully diagnosed the potential problem with the following output at compilation time:

```

stackrap.c
stackrap.c(16) : error C2126: main : automatic allocation exceeds 32K
stackrap.c(16) : error C2126: main : automatic allocation exceeds 32K

```

Watcom C v6.5

This compiled and executed in a reasonable manner when a large memory model was selected. The small model program compiled successfully, but on execution (and boy do I mean execution!) MS-DOS went bye-bye.

Zortech C++

This gave similar results to Turbo C when there was no stack checking but did give a stack overflow error when stack checking was used — which seems entirely reasonable.

Turbo C and Watcom C users beware of using too many stack variables — it's bad for your computer's health.

Neil Martin

Appeal for test code

As you'll be aware by now, BSI tests compilers. To do this we need large, powerful test suites, made of programs designed to meet various criteria. We'll be writing more about testing strategies another time (perhaps in a separate article), but we can summarise the different types of test under the following broad categories:

- conformance tests (designed to investigate correct execution of legal programs);
- deviance tests (designed to investigate how a compiler handles incorrect programs);
- quality tests (such as benchmarks).

Tests are useful only if they help to establish attributes of a compiler that are relevant to users. We have

already begun to receive suggestions for new tests from *PCW* readers and would welcome more. These tests could be for validation or evaluation; either way we offer you the opportunity to influence the type and de-

gree of testing we perform.

All contributions will be acknowledged both personally and with a suitable source code comment. Over to you...

John Souter

A quick canter around language standardisation

One of the most frustrating aspects of writing for *PCW* is the long lead time between drafting and publication (approximately six weeks). As November draws to a close, here is a quick and somewhat biased summary of what is going on in programming language standardisation around the world:

- Ada** The agonising over Ada-9X is starting; but have PC users caught up with existing Ada yet? Lots of work going on on Ada language bindings (to POSIX, SQL, GKS and so on).
- Basic** After the tremendous success of standard Minimal Basic, what new heights can standard Basic reach? Again, unlikely to influence the PC world, which opted for diversity long ago.
- C** The scoop in our last column was to report that the ANSI C committee (X3J11) has voted to publish the existing draft. (Note: it is not actually *published*, as the column implied.) However, the document still has two important hurdles to clear. Firstly, ANSI must endorse the committee recommendation (usually a formality) and then ISO must also decide whether to accept the ANSI standard as an international one. The news here is a little worrying, since ISO members (such as BSI) are not totally happy with the current document. Watch for developments.
- C++** Is this the next one up for standardisation? The ANSI X3J11 committee is talking about it.
- Cobol** We find it hard to get excited about Cobol, but apparently over 70% of the world still has to program in it. Is this one occasion where the PC world is a lot more sensible than mainstream (mainframe) commercial data processing? Despite the pressure from 4GLs, standard Cobol continues to develop, with the publication of substantial amendments to the 1985 standard (rather than waiting for the traditional eleven-year cycle of complete revision and replacement).
- Fortran** Vying with Lisp as biggest international standards muddle of the moment, the draft Fortran-8X remains controversial and subject to political ploys, death threats and so on. At one stage, it looked too big to be of interest to PC users (it seemed to combine the features of all known languages other than Fortran) — again, watch for developments.
- Lisp** Lisp is one of the oldest languages, which makes standardisation late in its life an almost intractable problem. I receive vast tracts of e-mail correspondence about the efforts to resolve two (perhaps three) seemingly incompatible standardisation efforts (Lisp at ISO level, based on European work, Common Lisp by ANSI, and Scheme by IEEE). Do PC users care?
- Modula-2** I can speak a little more authoritatively here, since I am the secretary of both the BSI and ISO Modula-2 standards committees. We have a semi-complete formal draft (in VDM, the Vienna Definition Method) but need more help with drafting and review. Are any readers with Modula-2 experience interested?
- Pascal** The existing standard is effectively frozen, except for bug fixing (yes, standards do have bugs). A completely compatible Extended Pascal draft standard was issued recently; we will cover this in a future column.
- PL/1** Another muddle. Standard PL/1 differs from IBM's mainframe implementation (remember who invented it), and the standardisation committee doesn't seem able to resolve this. There is talk of standardised PL/1 subsets. Again, do PC users care?
- Prolog** This is another standard being drafted by BSI, and is nearing completion. Again, we'll cover this in a future column.

(Note the views expressed here are BSI Quality Assurance, not BSI Standards.)

John Souter

MICROMART

GAASCOM Ltd

St Peters, Frome, Somerset BA11 2TT
Tel: 0373 66437

PSION ORGANISER II

Organiser XP	£139.00	Finance Pack	£29.95
Organiser CM	£99.50	Maths Pack	£29.95
Organiser POS	£139.00	Psion formulator	£29.95
8k Datapak	£12.95	Spelling checker	£29.95
16k Datapak	£19.95	Spreadsheet	£39.95
32k Datapak	£34.95	Finger organiser	£34.95
64k Datapak	£59.95	Letter organiser	£34.95
128k Datapak	£99.95	Data organiser	£34.95
32k Rampak	£54.95	Inform organiser	£39.95
Developer/		Superchip pack	£99.95
IBM emulator	£57.45	Travel pack	£39.95
Comms Link	£59.95	Pure finance pack	£39.95
Mains adaptor	£12.95	Portfolio	£39.95
Other adaptors	£Call	FN Key	£49.50
Formatter	£44.95	Diary Link	£12.95

SPECIALS

Barcode reader	£143.75	Barcode Printer I	£97.75
Magnetic card swipe	£109.25	Kodak battery	£2.99
Bulk eraser (16 packs)	£339.25	Leather case	£12.95
Bulk copier Mk3	£1144.25	Organiser II book	£9.95
Grey nylon padded case	£6.99	Psion Printer	£224.25
Centronics printer interface for Organiser II			£39.95

BARCODE PRINTER I prints code 39,2/5 ITF, EAN 8, EAN 13, UPC Kodak Lithium Battery lasts many times longer than Alkaline.

TOP QUALITY BRANDED FLOPPIES

An unbeatable offer from GaasCom for SKC floppies, the most reliable and dependable diskettes on the market.

	5.25"	Price for ten
Single sided,		
double density 48tpi		£7.47
Double sided,		
double density 48tpi		£8.05
Double sided,		
double density 96tpi		£10.35
Double sided,		
high density 96tpi		£17.25
	3.5"	Price for ten
Single sided,		
double density 135tpi		£14.95
Double sided,		
double density 135tpi		£18.40

Every disk is inspected and carries a *no quibble* lifetime guarantee.

All prices on Organiser and Floppy Disc Products include VAT.

Add £2.50 for carriage.

Go for Gold

AMSTRAD

PC 1640 Mono SD	£475	PC 1640 ECDD	£660
PC 1640 Mono DD	£542	PC 1640 ECDD	£725
PC 1640 Mono HD20	£725	PC 1640 ECDD HD20	£920
PPC 640 SD	£479	PPC 640 DD	£589

TANDON

PCA20 (8MHz)	£1143	PAC286 1.2 (8MHz)	£1449
PCA20 Plus (10MHz)	£1286	PAC286 1.2 Plus (10MHz)	£1549
PCA40 Plus (10MHz)	£1429	386-16, 40Meg HD	£2505
PCA70 Plus (10MHz)	£1645	386-20, 112Meg HD	£3439
Ad-Pac, Cont/Cables	£322	30Mb Data Pac	£212

Tandons come with green or amber monitor, 102-key enhanced keyboard, MS-DOS 3.2, GW Basic and MS Windows. EGA option add £285.

All prices are for CWQ, exclusive of delivery and VAT. Prices correct at copy date and are subject to change without prior notice.

CONSULTANCY

We specialise in consultancy and bespoke software development. Please phone for details.

GOLD Computer Services Ltd
35a Hermitage Road, Hitchin, Herts SG5 1BY
Tel: (0462) 31575 Fax: (0462) 36362

MICROMART

SIGNWRITER

instant display lettering **£92**
(PC version)

- * Characters any size - big & sharp!
- * Prints banners too
- * Powerful formatting capabilities
- * Sign revision (most versions)
- * On-screen design of logos etc
- * 24 extra fonts (£5.75 each)



Versions also for BBCs, Amstrads, Apricots, Archimedes

ALSO: LABELWRITER for product labels
PAPERBASE DE LUXE for bibliographies
POSTGRAPH for plotting graphs
OXSTAT for statistics

See us about: VINYL-CUTTING
POINT-OF-SALE DISPLAY

WIGHT SCIENTIFIC IO11 858 2699
44 Roan Street, London SE10 9TT

This advertisement was printed A4-size with SIGNWRITER



Magnolia House, Stetchworth Road,
Woodditton, Newmarket CB8 9SP
TEL: (0638) 731044

ETHERNET Cards (Western Digital) for PC, XT, AT	£229.00
ETHERNET Micro Channel Cards (W Digital) for PS/2	£299.00
Novell Network PLS VER 1 (LAN operating software)	£375.00
NETBIOS Interface software	£65.00
TOP/IP Protocol software (WAN)	£237.00
TALK over your networking requirements	Ring Netland now
* TAX * PC facsimile cards (BABI) approved	£289.00
WESTERN Digital Filecards 32MB (42 MB available call)	£234.00
AT performance controller (WD 1006V) 1.1 interleave	Call
WINCHESTER controller for PC, XT	£49.00
80286 10 MHz Motherboard Direct XT replacement OK Ram	£299.00
286 Motherboards HDC, ECA, floppy ideal PC, XT upgrade	Call

☎ ** CALL US ON (0638) 731044 ☎

COMPUTER EXCHANGE

5A THE BALCONY, QUEENS ARCADE, LEEDS, LS1 6LF. TEL: (0532) 435583.

Used Computer Agency
All types of used computer equipment, including: Amstrad PC1512's, PC1640's (& other compatibles) & PCW's: Bought, Sold, Part-Exchanged and sold on your behalf.

Please send £1.00 for a copy of the current lists which contains advice on how to value your equipment a list of equipment currently available and a form to fill in the details of items you have for sale

PIC files

A recent e-mail message from an Alan Griffiths asked the question: When is a .PIC file not a .PIC file?

Alan has problems with Timeworks DTP when importing .PIC files that were produced with VP Planner. We have tried importing .PIC files created by Lotus 1-2-3 into Timeworks and this works perfectly. Unfortunately we do not have VP Planner so we have not been able to check this. Has anybody else suffered a similar problem? It strikes us as an example of where standards (small 's') are letting us down.

It might be interesting to try to establish a directory of PC file interchange formats, their specifications, who developed and/or controls them and so on.

Would anyone with detailed knowledge of .PIC and other file formats like to contribute?

Neil Martin

Manuals

A bastardisation of Parkinson's Law is: 'manuals always expand to overflow the shelf space allotted to them.'

At BSI we have hundreds of manuals: the Xenix manuals take up a shelf and the Vax VMS manuals keep arriving in crates. What on earth do you do with them? 5 November only comes round once a year, most of us have converted from coal to gas, and there are only so many paper animals you can construct during working hours without being considered frivolous or work-shy. Taking as a baseline '101 uses for a dead cat' I wonder if any of you can think of interesting uses for particular manuals.

The best manual I ever owned was a one-page reference guide to MVS (the horrendously complex IBM mainframe operating system). It didn't contain anything at all — except the name of the technical support guy and an ASCII to EBCDIC conversion table. This gave me all the information I needed to fix any problem, without the effort of having to read anything.

Turbo Pascal version 3 has a one-volume manual, and version 4 has a two-volume manual. Microsoft C version 5 has three manuals. Are they strictly necessary? I must admit to not reading manuals until I am already irritated with the product. I try to do something. I fail. I ask the next twenty people I see if they know how to make it work. They don't. Eventually, I turn to the manual to try and find out what I want.

As software gets bigger and more complex, so do the manuals. The problem is that to use a manual you have to identify your problem in the terms in which the manual was writ-

ten. This gets more and more difficult the larger and more complex the manual is. Terminology changes from product to product and the functionality provided (and indeed expected by the users) is increasing at such a rate that duplicate terminology can be a real problem. Even where it is commonly agreed, what each term actually means is often ill-defined.

The problems caused by the expansion of manuals do not stop at shelf space. The cost of changing from one word-processing package to another, for instance (Sprint: 4 manuals, 1300 pages in all) becomes phenomenal. This may have two effects — firstly to tie people to packages they are familiar with, but which may not be the best on the market, and secondly to create experts (like my adviser on MVS), who then increase the overheads of owning a computer.

A manual has to be comprehensive if it is to be useful. As software becomes more complex, it is necessary to increase the size of the documentation provided and decrease its usability.

An attempted solution that many packages provide is on-line help. In most cases this is as useless as the manuals, because it suffers from the same problems of volume. Help has to be accurate if it is to be useful, and it is as difficult to index the help as it is to use the manual.

The second line of defence used is to endow a package with an intuitive command set. The only command set I would accept as being intuitive is one that accepts only one command ('Do what I mean') and always gets it right. Some are better than others, but there are always going to be cases where the default is wrong and you want to know how to change it.

The best way to make a manual easy to use is to structure it functionally, limit its size and use a common vocabulary. If a product can only be used by experts then it is either an extremely specialised product or it is never going to be used at all. As Occam's Razor states: 'It is vanity to do with more what you can do with less.'

Martin Davies

We'd like to try and keep to our original goals, and write about standards and software quality assurance — but we'll try to keep this focused on our experience as PC users. However, we will attempt to respond to reader feedback, so feel free to suggest the areas/products or standards (large or small 's') you are interested in.

You can contact us via uk.ac.rl.gm (JANET), 84:MNU174 (Telecom Gold) or via Andy Redfern at the PCW office. We look forward to hearing from you!

Disk Library

None of this month's programs were suitable for the disk library — they

are all either short hints or (in the case of the Psion Organiser) for a machine which does not take disks. The listing is therefore unchanged from last month.

IBM PC 5.25 inch 360k			
IBMS-08787-0001	Oct 87	Mosaic Molecular Models	Creates and displays correct 3D molecular models
	Sept 87	MBasic MS-DOS File Manager	Access files via a menu system with password protection
IBMS-APR87-0002	Apr 87	Turbo Pascal Circuit Validation	Creates and analyses logic circuits on screen in graphics
	Aug 87	PC/AT CMOS RAM restorer	Examines and modifies the AT's CMOS RAM
IBMS-SEP86-0003	Sept 86	Turbo Pascal Logispro	Interpreter for simple version of Prolog
	Aug 86	Turbo Pascal Sideways Printer	Print things out sideways on the printer
IBMS-JUL86-0004	Jul 86	Turbo Pascal 6502 Emulator	Run 6502 code on your PC. Can run the BBC Micro OS!
	Feb 86	MBasic Expert System	Powerful expert system shell
IBMS-NOV87-0005	Nov 87	Turbo Pascal Menu	Front-end menu for programs and DOS in Turbo
	Sept 87	Graphics Algorithms	Vary fast graphics routines in assembler and Turbo
IBMS-FEB87-0011	Feb 87-Apr 87	Teach Yourself Prolog	Programs from the Teach Yourself Prolog series
IBMS-NOV87-0015	Nov 87	MBasic Number Pursuit	Educational arithmetic game based on Trivial Pursuit
	Dec 87	Turbo Pascal Circuit2	Design and layout circuit boards (with disk 2 above)
IBMS-DEC87-0017	Dec 87	C Screen Writer	Fully featured scrolling sign display on screen
	Jan 88	C Pop-Down Menu	A set of routines for pop-down menus written in Turbo C
	Feb 88	C Pdup command	A simple memory dump program in hex, octal or decimal
IBMS-JAN88-0018	Jan 88	Turbo Pascal Organ	Used to play chords by switching the tones very fast
	Jan 88	Turbo Pascal Christmas Tree	Shows how to use 16 colours on an Amstrad PC-1512-CH
	Jan 88	MT+ Taktchecker	Style-checking program to accompany feature in PCW
IBMS-FEB88-0019	Feb 88	Turbo Pascal Movie Maker	Lets you create animation sequences on a CGA screen
	Apr 88	Turbo Prolog Universal Parser	A parser useful as a front end to other systems
IBMS-JUL88-0024	Jul 88	DOS Shell	A handy Xtree-style utility package
	Jul 88	Keytree	GWBasic, MBasic and TBasic listings to accompany article
IBMS-AUG88-0025	Aug 88	Viruses, Trojans and Virus killers	A set of programs to accompany Alan Solomon's article
IBMS-DEC88-0031	Dec 88	TP4 Mouse Unit	An excellent mouse control unit
	Dec 88	TP4 Example units	Example units to accompany G Robinson's intro to TP4 units
IBMS-JAN89-0032	Jan 89	Prune DOS utility	Allows whole directory structures to be deleted
	Jan 89	Connect 4	The Connect 4 game written in TP4
BBC Micro (single-sided/single-density 100k disks)			
BBC1-JUL87-0006	Jul 87	Arctwork	Fully featured painting program, icon based
	Mar 87	1D Cellular Automata	Investigate a fascinating mathematical world
BBC1-NOV87-0013	Nov 87	USE	Text file display and search utility for help files
	Nov 87	Susy Drive	Checks if a drive is empty, works with most DFS's
BBC1-JUN87-0022	Jun 88	Stallator	Excellent polygon plotting program
BBC1-JAN89-0033	Dec 88	Marata Desktop	A desktop and diary utility
	Jan 89	DiscAid	A disk sector data recovery and repair utility

Apple Macintosh single-sided disks			
MAC-JUL87-0007	Jul 87	Worm Plotter	Unusual mathematica-based patterns
	Jun 87	Excel Macro	Derive rules from tables of data using Excel
MAC-DEC86-0008	Dec 86	Mac Mandelbrot	Mandelbrot program with a menu, fast plotting algorithm
	Mar 86	Mac Fractal	Create realistic 3D landscapes using pseudo-fractals
Atari ST single-sided disks			
ST-JAN87-0009	Jan 87	Darwin's Lens	Investigate natural selection (black and white)
	Sept 86	Super Strabout	The old favourite in black and white
ST-MAR88-0021	Mar 88	Fast Basic Chaos	Uses a mono screen to explore chaos plots
	May 88	Yamaha TX81Z Editor	Synth editor for Yamaha TX81Z series
ST-SEP88-0027	Jul 88	ST Link Prog	288 to ST file transfer and conversion utility
	Sept 88	PECHAI	A gofr-matrix file and data search desk accessory
ST-OCT88-0028	Aug 88	Data compression	A simple Huffman encoding file utility
	Oct 88	btrees	Examples and a library of btrees functions
ST-NOV88-0029	Nov 88	Timer	An interrupt-driven memory-resident timer
	Nov 88	Memory Management Unit	An improvement on the TOS memory manager
Amstrad PC single-sided disks			
PCW-JUN87-0010	Jun 87	Mailout	Mailmerge program for LotusScript
	Jun 86	Touch Typing Tutor	How to untangle your fingers
PCW-NOV87-0014	Nov 87	Kong	Donkey Kong game written in Basic - design screens!
	Dec 87	File recovery	Menu-driven undelete program - good and classy
PCW-MAR88-0016	Mar 88	Nibble Fingers	Useful typing game for brushing up your technique
	Apr 88	Communications program	Excellent comms package with Proset capabilities
Amstrad CPC single-sided disks			
CPC-MAR87-0011	Aug 87	Adventure Creator	Superb text-adventure creation system
	May 88	Brainchild Outline Processor	Powerful and fully featured outline processor
Commodore Amiga			
AMGA-DEC87-0020	Dec 87	Amiga 3D image maker	Using the Amiga's blitter for 3D moving graphics
	Feb 88	Amiga Label Printing Utility	An address label printer to accompany PCW feature
AMGA-AUG88-0026	Apr 88	Disk Sector display	A byte-level disk sector display utility
	Aug 88	Nonplussed	A simple tactical game using a variable-sized grid
Acorn Archimedes			
ARCH-JUL88-0023	Apr 88	Mouse pointer editor	Allows the creation and use of any shape of mouse icon
	Jul 88	Acorn Logic	A simple educational digital circuit logic emulator
ARCH-DEC88-0030	Nov 88	Archimedes Utilities	A number of relocatable modules for screen, memory and disks
	Dec 88	Archimedes File Utilities	A collection of Archimedes file utilities in module form

PCW Disk Library details

- The disks cost £5 each, including VAT, postage and packing. Of this money, 50p goes to the author, being split evenly between them if there is more than one.
- The disks are *not* public domain and may *not* be copied at will. If you have one and friends want a copy, they must order their own.
- Programs are not immediately available in the Disk Library after being published in PCW — there will be some delay in sorting programs out. Programs intended for the Disk Library will carry the Disk Library symbol on the listing. As soon as a program is available, it will appear in the catalogue.
- No documentation is provided with the disks except that which is embedded in the programs themselves. Only order disks which you have copies of PCW for, unless a lack of documentation is not a problem. Back issues of PCW can be ordered from the Back Issues Department at VNU House, 32-34 Broadwick Street, London W1A 2HG, or by telephoning (01) 439 4242 and asking for the Back Issues Department.
- The catalogue list is organised by machine and disk size. The first number is the disk's catalogue number which should be quoted when ordering. The date is the issue of PCW in which the program appeared, and the rest is a brief description of the disk's content.
- **IMPORTANT** Disks can only be ordered from S&S Enterprises, PCW Disk Library, Weylands Cottage, Water Meadow, Germain Street, Chesham, Bucks HP5 1LP. Payment can be made by credit card, cheque, banker's draft, postal order or cash. Telephone orders can be made by credit card on (0494) 791900. **Please do not contact PCW about orders — we cannot help**

MICROMART

DAMSON COMPUTING

NEW and GUARANTEED SYSTEMS AT COMPETITIVE PRICES

£299 PC Compatible System is Here: COMMODORE PC1 New deal on Commodore PC1, single drive, keyboard, screen, 512K RAM (optional 640K), integrated software: ABLE ONE word processing, spreadsheet, database for only.....£299

Deals on Sanyo and SBC PCs with on-site maintenance Sanyo MBC16+, Japanese technology - DOS 3.2 plus GWBasic 3.2 Sanyo (above), 640K RAM, mono monitor plus 20Mb HD.....£749 SBC (above) with SD, HD 30Mb, 12 months on-site maintenance.....£899 Sanyo and SBC AT286 range.....£POA

AMSTRAD Special Deals PC1640 DD/HD and PPC640 DD range at RRP with free Dictaphone on-site maintenance contracts plus free 20 disks. Amstrad SDs add £25 on RRP for on-site.

Sanyo Laptop MVC-16LT, wide clear screen, single drive.....£699 Double Drive.....£799

Laser printers with free on-site maintenance HP Laser Jet II, 5Mb expandable on 4Mb RAM.....£1450 Star 8ppm 1Mb RAM expandable to 2Mb RAM.....£1440 SBC Speed Laser 6ppm, with 112 typesets.....£1495

Citizen, Epson, Panasonic, Star Printers at 29% off RRP Canon PW1080A = £179, Citizen 120D = £133, Panasonic 1081 = £139 Oume Daisywheel Letter pro 20 Serial Printer = £229

DRAMS 4164-12/41256-12 available at reasonable prices

We try to beat any legal price in the range we sell. All prices are ex-VAT and delivery and subject to change without notice. Installation charge in London only £25/PC (00 hours). We sell AMSTRAD, APRICOT, ATARI, CANON, CITIZEN, EPSON, COMMODORE, HP, HONEYWELL BULL, JUKI, KAYPRO, MIRACLE TECH, NEC, PACE, OLIVETTI, PANASONIC, SANYO, SBC, PSION, add-ons, software, games, maths, co-processors, papers, disks 3pp, boxes, F/H drive, hard cards, ribbons, books, d/wheels.

Fast Facts 79

PLEASE RING 01-803 7074/807 7577 OR SAE for literature: 6 Rays Road, Edmonton, London N18/or PO Box 100, London N18.

SCIENTIFIC PC

PCW

USER GROUP

NEWSLETTERS LOCAL MEETINGS PRODUCT SUPPORT PROGRAMMING SHAREWARE APPLICATIONS & REVIEWS

An independent user association for all Scientists & Technologists! Call for further details if YOU use technical PC's.

ASYST LABTECH NOTEBOOK DADISP LOTUS PRODUCTS LABWINDOWS DAOS MATHCAD UNKELSCOPE LABVIEW

Tel: 0777-709009

SCIENTIFIC PC USER GROUP

FREEPOST, PO BOX 17, RETFORD, NOTTS, DN22 6BR.

File Name : STOCK	MAIN MENU	
Record Name : B003490	CREATE AMEND	
Line Number : 9	DELETE VIEW OPTS	
	SUB MENU	
F1 MENU OPTION	F2 SELECT OPTION	
Esc EXIT MENU	HELP	
Line	File Name	Contents
1	DESCRIPTION	30 X 150 ALUMINUM CHANNEL FOR ROOF SUPPORT
2	BIN NO.	12B
3	MIN STOCK	1230
4	ORDER LEV.	4000
5	MAX STOCK	12000
6	LEAD TIME	2
7	UNIT COST	34.97
8	SALES LOC.	BRIDGNORTH, SHROPSHIRE
9	STOCK QTY	2523

MINIBASE is a unique data base system, that lets you, the user, tailor it to your own requirements, easily.

If you are not satisfied, return the product, within 21 days and a full refund will be given.

For information, or to order, send your check/postal order, along with your Name & Address To: -

BARSOFT

16 Golden Acres,

Alveley,

Bridgnorth,

Shropshire. WV15 6NJ

£39

PROGRAMMING

All sorts of speeds & subroutines

There's more to life than a fast Batch sort — try a heapsort instead. David Barrow helps things along.

Heapsort

Martin Simmons of Cambridge is surprised at all the effort being put into speeding up the Batch sort when other sorts are intrinsically faster. This being so, he offers a Z80 routine to perform the 'heapsort' on files of any size or type of record (Datasheet 1), along with a set of subroutines performing the file access operations on 16-bit signed integers (Fig 1).

The 'heap' used in a heapsort is a partially ordered binary tree with the following properties:

- The root is always the largest element of the tree.
- The one or two children of each node are always less than or equal to the parent node.
- There is no ordering between the two children of any node.

The sorting technique consists of placing a new element at the root, comparing it with its two child nodes and exchanging with the larger child if found to be smaller. The inserted value thus moves down the tree until its correct heap position is found — either as a terminal node or greater than or equal to both child nodes.

By starting with single node heaps and combining them, the largest element must necessarily have found its own level at the root of the tree when the entire file is heap structured. The root node can thus be removed from the heap and placed in correctly sorted order at the end of the file. The process iterates with one less element in the heap each time until the whole file is sorted.

Program description

Instead of a Datasheet program description, Martin has provided a complete test program in BCPL (Fig 2). The latter part provides the algorithms used by Martin for his HEAPSZ, PILEUP, SWAP and BACKWD routines.

In Martin's opinion a program written in a structured language, such as BCPL, can show a routine's structure more clearly than any pseudo-code description. This may be so, but only if you can understand the syntax or quirks of the language concerned. For reasons of spatial, logical or ergonomic economy these are not always clear to non-users of the language.

On the whole, I would far rather see an algorithm boringly described in a bog-standard pseudo-code whose three or four constructs are obvious to anyone with no more than a modicum of intelligence.

Digital reorganisation

Recent SubSets have featured routines in many common codes that rapidly reverse the order of bits within a byte, known as 'byte-flips'. The 256-byte look-up table method has proved fastest.

I have had queries as to the usefulness of this type of routine. In October I suggested a major use in dot matrix and laser font redefinition. Now Chris Blackmore of Taunton has written to say that he remembers this process as part of the Fast Fourier Transform. He didn't say which part.

All helpful programming hints and short, useful new routines are welcome, as are improvements to or conversions of those already printed.

Submissions must be printed or typed clearly and must be documented to the SubSet standard, although documentation may be amended for publication. Send your contributions to SubSet, PCW, VNU House, 32-34 Broadwick Street, London W1A 2HG.

Datasheet 1

```

=====
HEAPSZ      Own-space in-RAM Heapsort.
=====
STRUCTURAL CONCEPTS
PROGRAM      See BCPL program.
=====
SYSTEM REQUIREMENTS
PROCESSOR    Z80
HARDWARE     RAM as needed by file length and subroutines.
SOFTWARE     Local subroutine: PILEUP.
              User supplied file access routines:
              KSWAP : locate & swap two records, given keys.
                  input:  HL = 1st key
                        DE = 2nd key
                        BC' = address of R(0)
                  output: Cy = 0 = error,
                        S = address of R(0)
              ASWAP : swap two previously located records.
                  input:  HL' = 1st record address
                        DE' = 2nd record address
                  output: Cy = 0 = error,
                        S = D if 1st R. is after 2nd ...
                        Cy = 0 = error.
              BACKWD: locate & test if two records are backward
                  given record keys.
                  input:  HL = 1st key
                        DE = 2nd key
                        BC' = address of R(0)
                  output: HL' = 1st record address
                        DE' = 2nd record address
                        S = D if 1st R. is after 2nd ...
                        Cy = 0 = error.
              CALC  : find addresses (2nd level subroutine).
                  input:  HL = 1st key
                        DE = 2nd key
                        BC' = address of R(0)
                  output: HL' = 1st record address
                        DE' = 2nd record address
                        Cy = 0 = error.
=====
PROGRAM DETAILS
INPUT        DE = size = number of records.
              HL = address of 1st record, R(0).
OUTPUT       Cy = 0 for error in user supplied routine.
              Cy = 1 for sort completed.
STATE CHANGES AF BC DE HL AF' BC' DE' HL' changed.
              Main memory affected by KSWAP & ASWAP.
I/O ERRORS   None known but errors could occur in user
              supplied routines.
OPTIMISATION Use of known carry for exit/error flag.
              A reversed comparison to save next record in NODE
              reducing number of addresses calculated.
INTERRUPTS   Interruptable and re-entrant, depending on user
              supplied routines.
LOCATION NEED Not specific. Not relocatable. PROMable.
PROGRAM BYTES 100
STACK BYTES  8 + subroutine use.
TIMING        23 seconds to sort 10 000 random signed integers,
              using supplied routines, at 4 MHz with no wait
              states and no interrupts.
=====
HEAPSZ PUSH HL      ;Copy array start into BC'.      E5
        EXX          ;                                .D9
        POP BC       ;                                C1
        EXX          ;                                D9
        LD H,D       ;Save array length.             62
        LD L,E       ;                                6B
        SRL H        ;Get middle element.           CB 3C
        RR L         ;                                CB 1D
;
HPL1  PUSH HL      ;Save current node.              E5
        CALL PILEUP ;Add new element to the heap.   CD 10 hi
        POP HL      ;Retrieve current node.         E1
        RET NC      ;Exit Cy=0 if error.            D0
;
        DEC HL      ;                                2B
        LD A,H      ;                                7C
        OR L        ;                                B5
        JR NZ,HPL1 ;Loop until node 0.             20 F5
;
HPL2  LD HL,1      ;Set first node.                 21 01 00
        CALL KSWAP  ;Swap max element with end of   CD 10 hi
        RET NC      ;heap, exit if error.           D0
;
        DEC DE      ;Put old last element          1B
        CALL PILEUP ;back into heap.              CD 10 hi
        RET NC      ;Exit if error.                D0
;
        LD A,D      ;                                7A
        AND A       ;                                A7
        JR NZ,HPL2 ;Loop until high byte = 0       20 F0
;
        LD A,E      ;                                7B
        CP 1        ;                                FE 01
        JR NZ,HPL2 ;Loop until low byte = 1        20 EB
;
        SCF         ;Set Cy=1 for success          37
        RET         ;and exit, sort completed.     C9
;
... Local subroutine to rebuild heap (preserves DE = NEXT)
PILEUP LD B,D      ;Copy DE=NEXT to BC=LAST.       42
        LD C,E      ;                                4B
;
PUL1  LD D,H      ;Find 1st child of NODE          54
        LD E,L      ;at NODE#2.                   5D
        ADD HL,HL   ;                                29
        JR C,PILED ;Exit Cy=1 if end of array..    38 11
;
        SBC HL,BC   ;Check for end of array.       ED 42
        ADD HL,BC   ;                                09
=====

```

```

EX DE,HL ; EB
JR C,PMORE ; 38 0E
SCF ; 37
JR NZ,PILED ;Exit Cy=1 if LAST < NODE. 20 08
CALL BACKWD ;Deal with an only child. CD to hi
JR NC,PILED ;Exit, Cy=0, if error. 30 03
CALL M,ASWAP ;Swap records if needed. FC to hi
PILED LD D,B ;Restore DE=NEXT to entry value. 50
LD E,C ; 59
RET ;Exit, Cy flagging any error. C9
PMORE PUSH HL ;Current node has 2 children. E5
LD H,D ;Calculate 2nd child node. 62
LD L,E ; 6B
INC HL ; 23
CALL BACKWD ;Ensure HL = greater child. CD to hi
JP P,GOTBIG ; F2 to hi
EX DE,HL ; EB
GOTBIG POP DE ;Current node into DE=NEXT. D1
JR NC,PILED ;Exit Cy=0 if BACKWD error. 30 EF
CALL BACKWD ;Test order of node and child. CD to hi
JR NC,PILED ;Exit Cy=0 if error, 30 EA
JP M,PILED ;or Cy=1 if correct order. FA to hi
CALL ASWAP ;Swap if out of order and CD to hi
JR C,PUL1 ;loop if no error 38 CC
JR PILED ;else exit, Cy=0, if error. 18 E0

```

Fig 1

```

=====
... KSWAP, ASWAP, BACKWD, CALC for signed 16-bit integers.
... input/output: HL, DE contain keys.
... HL', DE' contain record addresses.
... (see HEAPSZ) BC' contains address of record (0).
... Swap two records given keys.
KSWAP CALL CALC ;Get addresses from keys. CD to hi
RET NC ;Exit if error, else fallthru... D0
... Swap two records given addresses.
ASWAP EXX ;Access addresses. D9
LD A,(DE) ;Swap record low order bytes. 1A
EX AF,AF' ; 08
LD A,(HL) ; 7E
LD (DE),A ; 12
EX AF,AF' ; 08
LD (HL),A ; 77
INC DE ;Point to hi-bytes. 13
INC HL ; 1A
LD A,(DE) ;Swap high order bytes. 08
EX AF,AF' ; 7E
LD A,(HL) ; 12
EX AF,AF' ; 08
LD (HL),A ; 77
EXX ; 09
SCF ;Set Cy=1 to flag success. 37
RET ; C9
... Locate and test order of two records given keys.
BACKWD CALL CALC ;Get addresses from keys CD to hi
RET NC ;Exit if error. D0
EXX ;Access addresses. D9
LD A,(DE) ;Compare low order bytes. 1A
SUB (HL) ; 96
INC DE ; 13
INC HL ;Point to hi-bytes. 23
LD A,(DE) ;Compare high order bytes. 1A
SBC A,(HL) ; 9E
JP PE,SAMESN ;Return result if same sign. EA to hi
XOR 80H ;Else complement result. EE 80
SAMESN DEC DE ;Leave pointers at 1B
DEC HL ;record addresses. 2B
EXX ; 09
SCF ;Set Cy=1 to flag success. 37
RET ; C9
... Locate records given keys.
CALC PUSH HL ;Save keys. E5
PUSH DE ; D5
EXX ; D9
POP HL ;Retrieve key and double it E1
ADD HL,HL ;for 2-byte records. 29
ADD HL,BC ;Add base (address of R(0)). 09
EX DE,HL ;Address into DE'. EB
POP HL ;Repeat for 2nd key, E1
ADD HL,HL ; 29
ADD HL,BC ;address in ML'. 09
EXX ; D9
SCF ;Set Cy=1 to flag success. 37
RET ; C9
=====

```

Fig 2

```

=====
... HEAPSORT program in BCPL showing the algorithm used in the
... Z80 routine HEAPSZ.
GET "LIBHDR"
manifest
$(
size0 = 39
numbersize = 10
numberbase = 0
seed0 = 12341
)
static
$(
array = ?
size = ?
seed = seed0
)
let start() be // The main routine
$(
let mem = vec size0
array := mem
size := randy(1, size0)
selectoutput(findoutput("SYSPRINT"))
fillrandom()
displayheap()
heapsort()
displayheap()
)
and fillrandom() be // Initialize
$(
for i = 1 to size do
array[i] := randy(numberbase, numbersize)
)
and displayheap() be // Print out heap
$(
writes("#NHeap contents:#N")
for i = 1 to size do
writef("%N ", array[i])
newline()
)
and randy(base, mag) = valof // Find the next random number
$(
seed := (13*seed+time()) & $x7FFFFFFF
resultis (seed rem mag)+base
)
and heapsort() be // ACTUAL SORT ALGORITHM of "HEAPSZ".
$(
for i = size/2 to 1 by -1 do
pileup(i, size) // Ensure a partial order
for i = size to 2 by -1 do
$(
swap(i, 1) // Remove maximum
pileup(i, i-1) // Re-establish partial order
)
)
and pileup(node, last) be // Establish partial order in heap
$(
let next = node*2
if next > last then break
if next = last // Deal with an only child
$(
if backward(node, last) then swap(node, last)
break
)
if backward(next, next+1) // Find greater child
then next := next+1
test backward(node, next) // Move up a large child
then
$(
swap(node, next)
node := next
)
else break // Heap is now partially ordered
)
) repeat
and swap(x, y) be // Exchange A(x) and A(y)
$(
let temp = array[x]
array[x] := array[y]
array[y] := temp
)
and backward(x, y) = // Test for A(x) before A(y)
array[x] < array[y]
=====

```

New Solidisk ATs: We

Basic System = S	286/12 = 1	286/16 = 2	WDM286 = 3	386/20 = 4
Speed Index:				
Norton SI (XT=1-2)	11.7	19.2	12.5	20
Landmark	12MHz	20.2MHz	13MHz	21.2
CPU	80286	80C286	80286	80386/16
Clock speed -MHz	6/8/10/12	6 to 20	6/12.5	16/20
RAM socket for	512/640/1M	512K to 8M	512/1M	1-8MB
RAM type	a,b	a,b,c,d,e	d	d,e
serial port	2	2	2	2
parallel port	1	1	1	1
BIOS	Phoenix	AMI	Phoenix	AMI
Disc controller	option	option	WD1006WA2	option
Display	option	option	SEGA480	option
8-bit slots	2	2	1	2
16-bit slots	6	6	3	6

For comparison, most turbo XTs have SI between 1 to 2.
 Ram type: a=64K, b=256K, c=1M, d=256K SIM, e=1M SIM. OK fitted.
 Slide-in case with space for two hard and two floppy disc drives (half height).
 Highest quality ATE UK keyboard meets DIN ergonomic standard. It has 101/102 keys, a metal base and 'clicks'.
 180 Watts power supply unit, more than 3 times average requirement.
 MS-DOS and GW Basic, two discs and 4 manuals are included.
 Guarantee one year. Your system will be individually built, tested and benchmarked before shipping.

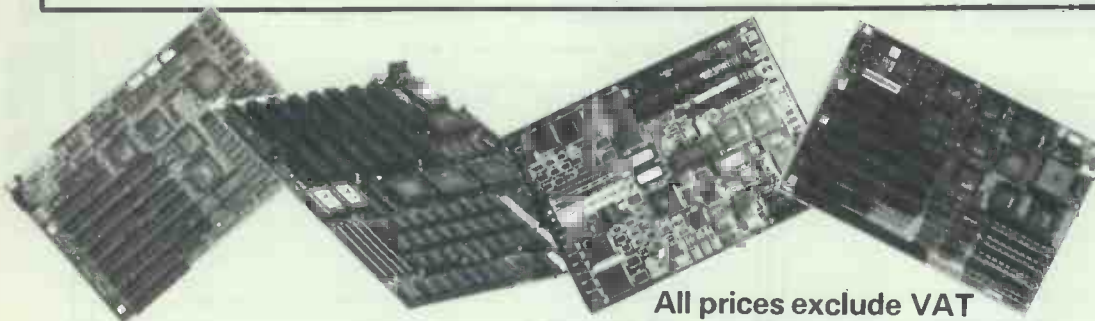
PRICE:	£399	£499	£549	£999
---------------	-------------	-------------	-------------	-------------



Pick One of

64 Thousand

+ Configurations



All prices exclude VAT

RAM = R		Floppy Disc = F		Hard Disc = H		HDD/FDD Controller = C	
1 — 512KB (18xb)	£108	1 — 360K Suntronic	£65	1 — 20MB MFM 65ms Sea.	£170	1 — WD1003-WA2 MFM int. 3	£65
2 — 512KB (2xd)	£130	2 — 1.2MB TEAC/NEC	£85	2 — 40MB MFM 65ms Min.	£199	2 — WD1003-WA2 MFM int. 2	£70
3 — 640KB (18xa+18xb)	£145	3 — 720K/1.44MB Citizen/NEC	£85	3 — 40MB MFM 40ms Sea.	£240	3 — WD1006-WA2 MFM int. 1	£110
4 — 1MB (36xb)	£216			4 — 60MB RLL 40ms Sea.	£270	4 — WD1003-RA2 RLL int. 3	£110
5 — 2MB (18xc)	£400			5 — 125 MB ESDI 28ms Ro	£665	5 — WD1007-WA2 ESDI int. 1	£135

Ram type: a = 64K, b = 256K, c = 1 Megabit, d = 256KB Memory Module, e = 1 MB Memory Module.

Floppy discs: 360K and 1.2MB are in 5.25" 1/2H form factor. The latter is the standard. It will automatically double step on 360K XT discs. The 1.44MB drive is now standard on PS/2 but comes in a 5.25" 1/2H cradle for easy fitting. It will work with 720K discs. Hard discs: AT HDD/FDD cards are at least 4 to 12 times faster than their XT counterparts. Speed also depends on interleave factor: int.1=450KB/sec, int.2=250KB/sec, int.3=170KB/sec. For comparison, most XT and hard card controllers run at 40KB/sec.

Display cards: HGC 720x348 mono, CGA 640x200 4 of 16 colours, EGA 640x350 16 of 64 colours, SEGA 640x480 16 of 64 colours, VGA and ultra VGA: low resolution: 256 colours, high resolution: 16 of 221,000 colours. SEGA and VGAcards can emulate 100% all lower screen modes and come with software disc(s).

SPECIAL DEDUCTIONS:

We are offering until 31/12/88 £10 off for AT system with HGC + Samsung, £15 off for SEGA + SUN350, £19 off for SIGMA VGA + TVMMD11. Ontop of these, 2.5% education cash discount if qualified and 5% trade cash discount if qualified.

TYPICAL SYSTEMS:

- 1) 40MB/28MB 12MHz mono: 286/12 + 512K RAM + 1.2MB FDD + 40MB HDD + WD1003WA2 + HGC + 14" SAMSUNG = £1,002 (S1,R1,F2,H2,D1,M1)
- 2) 40MB/28ms 12.5MHz EGA: WDM286 (SEGA/WD1006WA2) + 512K RAM(SIM) + 1.2MB FDD + 40MB HDD + SUN350 = £1,254 (S3,R2,F2,H2,M3)
- 3) 125MB/28ms 16MHz VGA: 286/16 + 512K RAM + 1.2MB FDD + 125MB HDD + WD1007WA2 + SIGMA VGA + MD11 = £1,992 (S2,R1,F2,H5,C5,D4,M5)

Carriage: 24 hours courier service £8.70 for up to 10 kilos, £17.70 above.

OPEN HOURS:

Monday-Saturday 9.00am to 5.30pm.

If you want to see and buy (no obligation), please phone through 2 hours before calling. Demonstration at your home/office can be arranged with our local agents (small petrol fee). Unless you have an account with us, our offers are CWO. We reserve the right to change prices and specifications. Part time Local Agents wanted.

Literatures and sales conditions available on request.

Offer More Choice



Take one of our four speedy IBM AT compatible basic systems. Decide on how much RAM, how many and which of floppy, hard discs, D/FDD controllers, display cards and monitors you want to have. No need to pay for things you don't need or already have. Add them up. Then compare with the competition.

THE 20MHz CMOS 286 IS HERE!

Before deciding for a 20MHz-386, check out our 20MHz CMOS 286.

Advantages of 286 over 386:

- 1) 286 versions of OS/2, SCO Xenix, C-DOS, Novell cost less than 386 versions.
- 2) For most applications (eg Lotus, VP, ACAD etc), they run at the same speed.
- 3) The 286 has Shadow RAM but unlike the 386, you do not have to use it. This means that you lose 384K of RAM on the 386 and you don't on the 286.

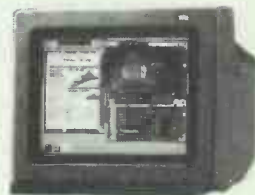
Norton SI of 286: 19.8, of 386: 21.2

Price list

Image Scanner	£179
FAX Card (non BAPT app.)	£239
Hewlett-Packard HP LASERJET II + Toner	£2249
(includes 12 months on-site guarantee).	
Siemens PT10 HP LASERJET compatible + TONER.....	£1399
(includes 12 months on-site guarantee).	
Font Cartridge for HP/PT10 (20 different types).....	£79
2Mb RAM Card (OK fitted, add 160 per Megabyte.....)	£70
Extra TONER Cartridge (black or brown)	£97
Panasonic KP1081 dot, 80col, 120cps, 28cps NLQ F+T PAR	£139
Black Panasonic Ribbon	£8
Star LC10 colour	£260
NEC P7 Plus.....	£699
Printer buffers and sharers from	£50
SCO Xenix.....	£495
Novell Advanced Netware 8 users	£495



SUN 350 EGA



MD11 VGA



Tower case add £80

Display Card = D	Monitor = M	Accessories = A	Accessories = A
1 — HGC monochrome £30	1 — Samsung 14" amber FST £80	1 — Genius Mouse + Dr Halo £35	6 — Panasonic KP1081 9-pin £139
2 — CGA £39	2 — Packard Bell CGA 14" £149	2 — Ams.2400Baud modem £190	7 — Star LC10 9-pin 7 fonts £189
3 — SEGA 480 (Par.) £100	3 — SUN350 EGA 14" £250	3 — VGA video lead £15	8 — Ethernet LAN card £129
4 — SIGMA VGA 800x600 £190	4 — HITACHI 560 14" multi £399	4 — 3M 1.2MB AT disks £15	9 — 2.5MB RAM card OK £50
5 — ULTRA VGA 1024x768 £299	5 — TVM MD11 14" col. multi £329	5 — Sony 1.44MB disks £25	10 — IBM printer lead £6

Send to:

**SOLIDISK
Technology Ltd**

17 Sweyne Avenue
Southend-on-Sea
Essex
SS2 6JQ
Tel: 0702 354 674

SYSTEM REQUIRED

(Please circle item numbers)

S1	R1	F1	H1	C1	D1	M1	A1
S2	R2	F2	H2	C2	D2	M2	A2
S3	R3	F3	H3	C3	D3	M3	A3
S4	R4	—	H4	C4	D4	M4	A4
—	R5	—	H5	C5	D5	M5	A5

Special Instructions:

Deliver

Date:

Send quote

ex VAT =

Ring:

VAT =

Total =

Name:

Address:

ACCESS/VISA:



Protect yourself

As a bulletin board user or SysOp, do you know where you stand in relation to the Data Protection Act? Gerald Janes gives some guidelines.

I have received many suggestions for future articles for this column, including a discussion about the Data Protection Act, a novice's guide to setting up and running a bulletin board, and comparisons of the features and benefits of the many file transfer protocols in use on bulletin boards. This month I'll look at the Data Protection Act 1984.

The Data Protection Act 1984

The Data Protection Act 1984 is a wide-ranging piece of legislation. The Data Protection Registrar publishes a comprehensive set of guidelines which are available free of charge from The Office of the Data Protection Registrar, Springfield House, Water Lane, Wilmslow, Cheshire SX9 5AX. The telephone number for enquiries is (0625) 535777. I have drawn upon some of the salient points from the guidelines, some extracts of which are quoted here.

The Act is about the storage, use and availability of 'personal data'. Personal Data, which is information about people, is not subject to the Data Protection Act 1984. The Act places obligations on those people who record and use personal data; these are called 'data users'.

Personal Data is defined as information recorded on a computer about living, identifiable individuals. Statements of facts and expressions of opinion about an individual are personal data but an indication of the data user's intention towards the individual is not. Data users are people or organisations who control the con-

tents and use of a collection of personal data. A data user will usually be a company, corporation or other organisation but it is possible for an individual to be a data user.

I have spoken to the Office of the Data Protection Registrar on more than one occasion to try to obtain clarification about how the Act applies to bulletin boards and bulletin board SysOps. It appears that we fall in a grey area not specifically categorised. The general response was that if you were not sure whether or not you should register, err on the side of caution and do so. I have outlined here some personal opinions which I hope will enable you to determine if the Act applies to you and whether or not you should register.

BBS guidelines

For me, the key phrase in the guidelines was the fact that the Act covers information stored on a computer about *living, identifiable individuals*. The question you need to ask yourself is 'do I fall within this definition as a consequence of running my bulletin board?' Certainly you are storing information on your computer. Is the information about living, identifiable individuals?

Unless you have a unique bulletin board and a route to the afterlife, it is almost certain that your users are living! Therefore, it comes down to whether or not the information you store makes your users identifiable. The chances are it is almost certain to be the case.

Unless you run a bulletin board which operates exclu-

sively using pseudonyms and 'handles', and users give no other information, it may be that you do not fall within the scope of the Act. If you have one or more users whose real name and/or telephone number and/or address and/or date of birth are stored on your system in the user database, then it is almost certain you fall within the scope of the Act.

Having determined this, what do you do about it? Do you register your BBS with the Data Protection Registrar or do you do something which takes you outside the scope of the Act? It has been suggested to me that turning your bulletin board into a club and declaring it as such obviates the need for registration.

Exemptions

Guideline 6 contains a list of the exemptions. Exemption 5 is unincorporated members' clubs (see page 15 of the guidelines). The guideline says that personal data held by an unincorporated members' club and relating only to members of the club is exempt from the whole of the Act so long as two conditions are observed:

- *The first condition* is that all members of the club must be asked whether they object to the personal data relating to them being held by the club.
- *The second condition* is that the personal data about members may only be disclosed in limited circumstances. The guideline also covers instances where members do object to personal data being held by the club and where disclosure may be made.

The exemption does not apply to any personal data held by the club about individuals who are not members of the club, if the club is a corporate body, and to a club which is not owned by its members — a proprietor's club.

It is this last condition which causes me concern. I own and operate my bulletin board but the users join the 'club'. Am I operating a proprietor's club? It is most likely that provided I comply with the conditions laid out in the guideline I am OK and do not need to register, but I cannot say this with 100% certainty. When I spoke to the Office of the Registrar I was told that it was almost certain that compliance with these conditions exempted me, but again, if you are in doubt do contact them directly.

How have I overcome the problem? I have created a display which declares my BBS to be a club and which broadly covers the exemption conditions, and all new users are presented with a message describing them. (Having started to write this article I have realised there is a mistake in my own message. It refers to the 1985 Act — it should be 1984!)

At present I am considering whether to register under the Act. At the time of writing I have not come to a decision. If I decide to, I will let you know how I get on.

What do you, the readers, think? Are you a SysOp who is debating whether to register or not? Are you a BBS user who is interested in the impact of the Data Protection Act upon your activities? If you have any strong views why not drop me a line?

Suggestions, information and amendments to the BBS list should be sent to Gerald Janes via his own BBS, Hawk's Castle, or on Prestel (MBX 819990436); CompuServe (71571,347); or Telecom Gold (81:TWH153). He can also be contacted on CIX as 'gjaner'.

London

- 01 for Amiga (01) 377 1358 MF; 8pm-10am; WE:24hrs; 3/1275; Amiga & ST
- ACS BBS (01) 591 8887 10pm-9am; 3/1275; Mainly ST
- Arrakeen (01) 738 7304 24hrs; 3/1275
- Body Matters (01) 803 7581 24hrs; 3-24; Medical topics
- Britton ITeC (01) 735 8153 24hrs; 1275
- Brown Bag (01) 591 8887 24hrs; 3/12/24
- Cershalton Atari BB (01) 773 0408 24hrs; 3/1275; Mainly ST
- CBBS-London (01) 249 3238 24hrs; 3/1275; Mainly Spectrum
- CIX (01) 399 5252 24hrs; 3-24; multi-user; conferencing; subscription
- Club 1512 (01) 204 8755 24hrs; 3-24
- Communitel (01) 988 7402 24hrs; 1275v
- Co-op Board (01) 316 8488 24hrs; 3-24;

PC & BBC

- Crystal Tower (01) 886 2813 24hrs; 3-24 Gen interest; Apple & IBM
- Cynotel (01) 346 2816 9pm-8am; 1275v; Amstrad
- Dark Crystal Fido (01) 207 2989; 24hrs; 3-12
- Data Network (01) 478 5484 24hrs; 3-24; PC, Atari, CP/M
- Databank (01) 534 1200 24hrs; 3-24; PC, CP/M
- Dataflex BBS (01) 543 7020 24hrs; 3/12
- Direct Connection (01) 853 3885 24hrs; 3-24; MU; Subscription;
- Direct Line (01) 841 1847 24hrs; 3/12/24; PC Support
- Distel (01) 879 8183 24hrs; 3/1275 Commercial
- The Embassy (01) 366 1778 24hrs; 3-24
- The Emerald Tower (01) 405 8883 9am-5pm; 3/1275

- Gnome at home (01) 866 8894 24hrs; 1275v; MU; Public areas & Subscription
- Heokney BBS (01) 985 3322 24hrs; 1275v
- Health Data (01) 986 4360 24hrs; 1275v; Medical topics
- Heaven (01) 994 9119 24hrs; 3/1275v; MU; MultiUser games
- Infotel ROS (01) 581 3378 24hrs; 3/1275; Amstrad
- Jolly Roger (01) 742 1840 24hrs; 3/1275
- Kybermele (01) 673 7294 24hrs; 3-24 For church & charity computer users
- London Connexion (01) 857 3240; 24hrs; 3-24; Subscription
- London Metropolis (01) 519 1085 24hrs; 3-24
- London U'gnod (01) 863 0198 24hrs; 3-24; MU
- MacTel Metro (01) 543 8017 24hrs; 3-24; MU

system

- MBBS Mitcham (01) 648 0018 24hrs; 3/1275
- Metrotel (01) 941 4285 24hrs; 1275v
- NHBS London (01) 455 8807 24hrs; 3/1275
- NotJingdale Teo Ctr (01) 988 6033; 24hrs; 1275v; Communitel system
- OSI Lives (01) 429 3047 24hrs; Ring back; 300
- PC Access (01) 808 0081 24hrs; 3-24; M PC User Mag BBS; Subscription
- PC Server (01) 884 2833 24hrs; 3-24; M
- The Pink Triangle (01) 981 5888 10pm-8am; 3/12/24; Gay BBS
- Promastheus (01) 300 7177 24hrs; 1275v; Astronomers' SIG
- Sirius/WBBS (01) 542 3772 24hrs; 3/1275
- Skull's Tower (01) 943 1194 24hrs; 3/1275; IBM
- SW10 Warehouse (01) 351 7262 24hrs;

- 3-24; HST
- **TBBS Rovoreed** (01) 542 9787 24hrs; 3-24
- **TBBS London** (01) 348 8400 24hrs; 12/24
- **Techno-Line** (01) 450 9784 24hrs; 12/25v; Commercial
- **TechnoLine 2** (01) 452 1500 MF: evenings; WE:24hrs 12/25v Commercial
- **The Village** (01) 484 2518 24hrs; 3-24 Atari 520ST based
- **Third Wave Systems** (01) 585 3183 24hrs; 3/1275
- **Wanderland** (01) 680 5530 24hrs; 12/25; MUG
- **Woodgreen BBS** (01) 889 5824 24hrs; 3/1275

The Midlands

- **AIX 386 BBS; Worcester** (0905) 754127 & 52538 24hrs; 3-24; Subscription
- **Academics; Birmingham** (021) 705 9677; 24hrs; 3/1275
- **Barney's Rubble; Birmingham** (021) 444 2854; 24hrs; 3-24
- **Central Opus; Birmingham** (021) 711 1451 24hrs; 3-24; PEP; 130Mb storage; Trailblazer
- **CBABBS; Birmingham** (021) 430 3781 24hrs (not Thurs); 300 Atari based can send mail to Canada
- **Chrono's Lair; Birmingham** (021) 744 5581 24hrs; 3-24
- **Digital Matrix; Birmingham** Birmingham (021) 705 5187; 24hrs; 3/1275/12
- **Exchange Centre; (0787) 505111**; 24hrs 3-24
- **Intel-Ace; Oundle** (0832) 73003; 24hrs; 12/25v
- **The Junction; Crewe** (0270) 580099; 24hrs; 3-24 08:00 - 23:59 and 3/12/24/HST 00:00 - 07:59
- **MacTel HQ; Nottingham** (0902) 455444; 24hrs; 3-24; MU; Mac
- **Monusol Opus; Coventry** (0203) 545685; 24hrs; 3-24; For DP professionals
- **MWCFE; Leamington Spa** (0926) 21844; 24hrs; 3-24
- **The City; Birmingham** (021) 353 5488 24hrs; 300 Atari 8 bit & ST; Lonely Hearts
- **Project Stourbridge** (0384) 401770; 24hrs; 3-24
- **Sherwood Forest BBS; Nottingham** (0602) 387113; 24hrs; 3-24
- **TABBS Amiga BBS; Leicester** (0533) 550893; MF: 8pm-9am Sun:24hrs; 3/1275/12; Amiga
- **Trinity 4; Leamington Spa** (0926) 28294; 24hrs; 3-24
- **TUG II; Birmingham** (021) 444 1484; 24hrs; 3/1275 Amstrad;Tandy
- **Wolverhampton BBS** (0602) 745337; 24hrs; 3/1275 MS-DOS; CP/M; Commodore areas

The North East

- **Enterprise; Beverley** (0482) 872284; 24hrs; 3/1275
- **Forum-90; Hull** (0482) 859 189 MF:7pm-11pm; WE:1pm-11pm 3/1275
- **Hamnet; Hull** (0482) 465150 MF:8pm-8am; WE: 24hrs; 300; Radio Hams
- **Kirkless ITeC; Batley, Yorks** (0924) 442598; 24hrs; 12/25v Information Technology Centre
- **Kirkless Opus** (0484) 685415 8pm-9am; 3-24
- **Leconfield RCPM**(0964) 550745 24hrs; 3-12
- **LEMS Wildcat; Leeds** (0532) 600749; 24hrs; 3/1275
- **Log On Tyne Fido; Tyneside** (091) 477 3339 24hrs; 3-24
- **Merlin; Bradford** (0274) 573481 24hrs; 3-24
- **N. Yorks Opus Knaresborough** (0423) 888065; 24hrs; 3-24
- **Poacher CBCS; Grantham** (0478) 62450; 24hrs; 3-24; M
- **Stockton QBBS; Stockton** (0642) 588889 24hrs; 3-12
- **Typesetter's Workshop; Bradford** (0274) 370381; 24hrs; 3/1275/12 Desk Top Publishing

The North West

- **The Co-op Board; Manchester** (061) 832 1961; 24hrs; 3-24
- **Diggertel** (0925) 411265 24hrs; 3-24
- **The Gaslamp Rochdale** (0708) 358331; 24hrs; 3-24
- **Liverpool Mailbox** (051) 428 8924 24hrs;

- 3-24 UK TBBS HQ system
- **Matrix; Liverpool** (051) 737 1882; 24hrs; 3/1275
- **Meltronic; Manchester** (061) 773 7739; 24hrs; 3-24
- **Merkinstead; Manchester** (061) 434 7059; 24hrs; 3-24 Desk Top Publishing
- **OBBS; Manchester** (061) 427 1596 24hrs; 3/1275
- **Road Runner; Manchester** (061) 456 4620; 8pm-8am 3-24
- **Stoke ITeC** (0782) 265078 24hrs; 12/25v
- **TeePee Link; Manchester** (061) 484 6938 24hrs; 3-24 Subscription
- **Ultimate Source; Manchester** (061) 678 9580; MF: 8pm-9am; WE:24hrs; 3-24

The South East

- **Acorn BBS; Cambridge** (0223) 243642 24hrs; 12/25v
- **Airtel TBBS** (0342) 717800 W Sussex; 24hrs; 3-24; Pilots' area
- **Andrew's Fido** (08444) 4833 & 4430; 24hrs; 3-24 M; IBM-based system
- **ASD Opus; Watford** (0923) 247637; 24hrs; 12/24
- **Audio Output; Weybridge** (0932) 244906; 24hrs; 3/1275 Viewdata & scrolling
- **Banet Board; Oxford** (0855) 882872 24hrs; 3-24 FidoNet UK coordinator multi-line TBBS
- **Basinstoke Opus** (0258) 726331; MF:8pm-8am WE:24hrs; 3-24
- **BBS09 II; Portsmouth** (0705) 738025 24hrs; 3/12/24; HST;M; OS9; Sci-Fi; Dragon
- **BITEC; Basildon** (0288) 22177 24hrs; 12/25v
- **BOOG BB; Fleet; Hants** (0252) 628233; 24hrs; 3/1275 Osborne; MS-DOS; CP/M areas
- **C View Rochford; Kent** (0702) 546373; 24hrs; 12/25v
- **Castle BBS; Camberley** (0276) 65741; 24hrs; 3-24
- **CATS BBS*; Maidenhead** (0628) 824852; 24hrs; 3-24
- **The Co-op Board; Bournemouth** (0202) 532701; 24hrs; 3-24
- **The Co-op Board; Portsmouth** (0705) 754841; 24hrs; 3-24
- **CP/M User Group; Wincor** (0753) 688196; 24hrs; 3-24 CP/M and MS-DOS software
- **Datasoft Opus; Ilminster** (04805) 4815; 24hrs; 3-24 Inc Datalink Support area
- **Dave's Opus; Addingham** (0843) 830820; 24hrs; 3-24
- **Dr Solomon's Fido; Amersham** (0494) 724948; 24hrs; 3-24 mostly for IBM programmers
- **Eddie's BBS; Newbury** (0635) 71324; 24hrs; 3-24
- **Eye-2; Camberley** (0278) 66212 24hrs; 3/1275; PC, Atari Amiga
- **Exchange Software** (0787) 50511; 24hrs; 3-24M
- **Fido UK 1; Reading** (0734) 713909; 24hrs; 12-24
- **Folkestone TBBS** (0303) 42680 24hrs; 3-24; Portable SIG
- **Frix; Reading** (0734) 420229 24hrs; 3-24
- **GABBS; Gosport Apricot BBS** (0705) 524805; 24hrs; 3-24
- **Grapevine; Basinstoke** (0258) 471787; 24hrs; 12/25v
- **Hawk's Castle; Bracknell** (0344) 411621; 24hrs; 3/12/24/HST; M (Leave details of your BBS here)
- **Ichthus; Reading** (0734) 484847; 24hrs; 3-24
- **ID2; Worthing** (0903) 700771; 24hrs; 3-24; games authors BBS
- **The Lamplight; Portsmouth** (0705) 811531; 24hrs; 3-24
- **MacTel Phoenix; Ipswich** (0473) 610139; 24hrs; 3-24 MU; Mac users
- **The Menor QBBS; Salisbury** (0980) 863031; 24hrs; 3-24; Node 251/24
- **Maptel; Southend** (0702) 552941 24hrs; 300; commercial system
- **Mirrorworld; Surrey** (0883) 844044/844184; 24hrs 3/1275; Multi-user games
- **Music World; Weybridge** (0932) 245593; 24hrs; 3/1275v Viewdata & scrolling
- **PD-SIG; Crowborough** (0892) 681149 24hrs; 3/1275 PD software interest group
- **PC Serve; Uxbridge** (0895) 420184 24hrs; 3-24; M also on 0895 52685
- **Reflex BBS; Southampton** (0703) 685527 24hrs; 3-24; Node 251/20
- **RSQB** (0707) 52242 24hrs; 12/25v
- **SBBS; Watford** (0923) 676644 9pm-11am

- plus 11pm-6am daily 3/1275
- **Sentinel; Maldenhead** (0628) 781429; 3-24 IBM PC; FidoNet
- **Shareware; Tonbridge** (0732) 770539; 24hrs; 3-12 Shareware Marketing's BBS
- **Sietel Viewdata; Southampton** (0703) 775566; 12/25v What's on, sports, notices etc
- **Sky Channel; Guildford** (0483) 275455; MF:8pm-8am WE:24hrs; 12/25v
- **Staines BDS** (0784) 65784 24hrs; 3/1275
- **Typenet** (0889) 50866 24hrs; 300; Budget Typsetting
- **Vampire's Coffin; Weybridge** (0932) 245593 24hrs; 12/25v Viewdata & scrolling
- **Wazzy's Opus; Worthing** (0223) 213784; 24hrs; 3-24
- **Wiggynet; Southampton** (0703) 287802; 10pm-7am; 3-24; ST system
- **Winchester Remote** (0982) 89322 24hrs; 3-24

The South West

- **ROS South West; Exeter** (0392) 53118 24hrs; 3-24
- **Cryton #1; Street Somerset** (0458) 47808; 24hrs; 3-24
- **FAL Opus; St Ives** (0736) 794827; MF:8pm-8am; WE:24hrs; 3/1275
- **Kernow BBS; Cornwall** (0209) 821670; 24hrs; 3-24
- **Light Fingers Place; Dorset** (0202) 485723; 24hrs; 3-24; Atari ST, QL
- **Microdeal; St Austell** (0728) 85422; 24hrs; 3/1275
- **Plybase; Plymouth** (0752) 870714; 8pm-9.30pm 300; Einstein oriented
- **Trinity 1; Exeter** (0392) 410210; 24hrs; 3-24 Christian, Infomat mag
- **Trinity 2; Farlington** (0367) 22784; 24hrs; 3/1275 Sponsored by Courtiers Consultancy Node 255/113
- **West Country BBS; Saltash** (0755) 58806; 8am-11pm 3/1275; Einstein oriented
- **World of Cryton; Street** (0458) 47808; 24hrs; 3-24

The West

- **Avon Opus; Weston-e-Mare** (0834) 29570; 24hrs; 3-24
- **Bubble BBS; Swindon** (0783) 851454; 24hrs; 3-24
- **Crow's Nest; Swindon** (0783) 813633; 7pm-7am; 3-24
- **Firefox; Swindon** (0783) 828780; 24hrs; 3-24
- **Lazer Tower; Bristol** (0272) 783733; 24hrs; 3-24
- **MIX; Bristol** (0272) 583818; 24hrs; 3-24 MIRROR II Support BBS
- **The Phoenix; Caine** (0249) 817704; 24hrs; 3-24
- **STABB BBS; Swindon** (0793) 855178; 24hrs; 3-12

The East

- **Amiga Board; Basildon** (0288) 510495; MF:8pm-8am; WE:24hrs; 3/12/24
- **Apple Crackers; Basildon** (0628) 781316; 24hrs; 3/1275
- **Armado BBS; Norfolk** (0362) 695314; 24hrs; 12/25
- **BABBS; Felixstowe** (0394) 276306; 24hrs; 3-24
- **Barnaby BBS; Upminster** (0708) 852526; 24hrs; 3-24
- **Bob's Bizarre; Felixstowe** (0394) 279644; 24hrs; 12/24
- **Eureka; Norwich** (0603) 250689; 24hrs; 3/1275/1275v; Archimedes
- **Felixstowe Opus** (0394) 873655; 24hrs; 3-24
- **Folkestone TBBS** (0303) 42680; 24hrs; 3-24
- **Index Linked; Whitstable** (0227) 770403; 24hrs; 3/12/24/HST; M
- **Ivory Tower; Chelmsford** (0245) 415321; 24hrs; 3-24
- **The Official Amstrad BBS; Brentwood** (0277) 231278; 24hrs; 3-24
- **Softmatic Innovations; Peterborough** (0733) 322540; 24hrs; 3/12/24

Channel Islands

- **Central Line Opus; Jersey** (0534) 58968; 24hrs; 3-24 PC, BBC, CP/M
- **Jersey Fido** (0534) 39 389 24hrs; 3/1275
- **Psychobabble Jersey** (0534) 52086;

- 24hrs; 3-24 PC & ST oriented
- **Master Control; Jersey** (0534) 58929; 24hrs; 3-24

Scotland

- **Aberdeen ITEC** (0224) 641585 24hrs; 12/25v
- **The Auld Reekie BBS; Edinburgh** (031) 663 9924; 24hrs; 3/1275/12
- **Boffin BBS; Edinburgh** (031) 664 2147 RB 3/1275/1275v
- **Beteigeuse 5; Inverness** (0463) 231339; 24hrs; 3/1275
- **Jock's Away; Edinburgh** (031) 225 5368; 24hrs; 3-24
- **Kirkless ITeC; Batley** (0924) 442598 24hrs; 12/25v Information Technology Centre
- **Lambda Board; Edinburgh** (031) 556 6318; 24hrs; 3/1275/1275v
- **Livingstone BBS; Livingstone** (0506) 38526 24hrs; 3
- **Megpie Opus; Glasgow** (041) 941 1333; 24hrs 3-24; Education oriented
- **People's Palace; Glasgow** (041) 958 8537 24hrs; 3/1275/1275v
- **SBBS Aberdeen** (0224) 781819 24hrs; 3
- **Scot Air; Paisley** (041) 884 7170; 24hrs; 3-24
- **Scottish Opus** (041) 880 7863; 24hrs; 3-24
- **Scottish Wildcat; (0357) 22582**; 24hrs; 3-24
- **South Side Wildcat; Glasgow** (041) 849 9043; 24hrs; 3-24

Wales

- **Bulletin 80; Swansea** (0792) 287845 MF:8pm-9am WE:24hrs; 3-24;
- **Cardiff ITeC** (0222) 484 725 24hrs; 12/25v
- **Cath Wylit; Llanelli** (0554) 770517; MF:8pm-8am WE:24hrs; 3/12/24; M
- **Communair; Powys** (0874) 711147; 24hrs; 300
- **Cymrutel; Colwyn Bay** (0492) 49194; 24hrs; 12/25v; Subscription
- **The Dark Side; Cowbridge** (04463) 3728; 22:00-08:00; 3/1275
- **Empyrion; Swansea** (0792) 580781; 8pm-8am 3/1275; Amiga
- **MGBBS Mid Glamorgan; Ferndale** (0443) 733343; 24hrs; 3/1275
- **Sunshine BBS; Tenby** (0834) 4562 24hrs; 3-24
- **WGBBS; Swansea** (0792) 203953; 24hrs; 3

Northern Ireland

- **Brede QBBS; Belfast** (0232) 645942; MF: 7pm-7am; WE: 24hrs; 3/1275
- **Deep Thought; Bangor NI** (0247) 270189; 24hrs; 3-24 Subscription
- **Toni Board; Londonderry** (0504) 283778; MF:8pm-8am WE:24hrs; 3/1275
- **The Wild One; Belfast** (0232) 58812; 5pm-9am; 3/12

Eire

- **DUBBS; Dublin** (0001) 885634 MF:8pm-8am; WE:24; 3-24 Amiga based; astronomy SIG
- **Infomatique; Dublin** (0001) 764 942 24hrs; 3-24; Amiga based + IBM
- **Sty's RBBS; Limerick** (0001) 332229 24hrs; 3/12; PC, BBC, CBM & Amiga

Abbreviations

- 3 V.21 (300 baud)
 - 1275 V.23 (1200/75)
 - 12 V.22 (1200/1200)
 - 24 V.22bis (2400/2400)
 - 3-12 V.21, V.22, V.23
 - 3/1275v, V.21, V.23
 - 3-24 V.21, V.22, V.23, V.22bis
 - 27 V.27 (4800/2400 baud)
 - 29 V.29 (9600 baud)
 - v viewdata
 - s scrolling (not viewdata)
 - h half duplex
 - HST Courier HST 9600 baud
 - M MNP error correction
 - MU Multi-user
 - RB Ring Back
 - = Fidonet node
- Most scrolling systems are 8 bits, no parity, 1 stop bit.
Most viewdata systems are 7 bits, even parity, 1 stop bit

END

Power to the people

Clubs which cater for special interests and power users attract Rupert Steele's attention.

Hear Ye! The UK now has an OS/2 Users' Group. The cynical ones among us may wonder whether there are any OS/2 users to join it, but rest assured that the group is not (yet) aimed at users like you or me. They see themselves as supporting developers, corporates, system builders and support personnel.

Membership of the group is priced accordingly: £85 + VAT for the first year's membership including joining fee. Special interest groups hold 'very focused' meetings with good speakers, and a conference is planned for 13 February.

The group's newsletter — sorry, 'information bulletin' — is described in the membership form as 'a comprehensive guide to the latest OS/2 information ... backed up by a fulfilment service to get this important data into your hands'. Unfortunately, they did not send me a sample copy, so I don't know if the product justifies the hype. Directory: Software/networks — OS/2.

Also for power users is the new RISC User Group which is aimed at the Acorn Archimedes. RISC User is in fact part of the BEEBUG empire run by Sheridan Williams (Directory: Machines — BBC Micro). Sheridan has been involved with the micro business since the beginning and so you can rely on an experienced team being involved.

The new RISC venture involves a journal which is specifically written for the Archimedes. The program listings which appear in this are also available on disk and there



there is a technical support team available to members. They can also fix your Archimedes or trade in your Beeb for one. Directory: Machines — Acorn.

Special interests

Turning our attention to special interests, I have recently received information on the Open Software Library and its associated bulletin board, Healthlink. The aims of the group are to promote the use of computers in health care with an accent on the training of health staff. Much of this is done through the bulletin board which uses the Fido system (Node 2:255/64 on FidoNet). There are several international conferences running, discussing AIDS, psychiatry and other topics.

As well as providing textual information, the group provides software covering health topics; this can be downloaded from the BBS. Directory: Special Interest — Health. You can also MBX them on Prestel 942712385 or call the BBS on (0942) 722984.

And locally...

As well as the activity in the national groups, the local computer clubs are busy in many parts of the country. The local scene is proportionately rather thin in London — no doubt because of the pace of life that tends to exist there — but elsewhere things are quite busy.

Starting from the west, Robert Gahan has written to me from 54 Riverside Drive, Castlepark, Dublin 14, to mention that he is running Ireland's new (and only?) Acorn users' club, called Acorn Power House. It meets on Saturday afternoons on the third floor of 60 Bolton Street, Dublin.

For more information, write to Robert or phone him on Dublin 905147.

Across the water, you can find the North Wales PCW/PC Club. The secretary is Brian Hall of 17 Cae Glas, Old Colwyn, Colwyn Bay, Clwyd LL29 9DL. The group meets every Tuesday evening at a school in Colwyn Bay, and the address is Ysgol Tan y Marian, Swn-y-Don, Penmaenrhos, Old Colwyn.

Meetings cover the two main Amstrad disk systems, namely the PCW and PC series. Cheap supplies of floppy disks, paper and other consumables are available. The club also has a newsletter which reached the finals of the Desktop Publishing Awards in 1987.

Why not write to Brian or call him on Colwyn Bay 514004?

Back in November, I mentioned the Swindon Psion Organiser User Group which was just starting up. Jeremy Holt, the 'organiser', has written to me reporting the success of the group's inaugural meeting and giving details of the next one. Unfortunately, the meeting will have taken place about six weeks before you read this. Please remember, in telling me about events, to give three months' notice so to be sure I can meet the copy deadline.

Contact Jeremy at 14 Belmont Crescent, Old Town, Swindon, Wiltshire SN1 4EY or on (0793) 619664.

Also in the M4 corridor is RUG — The Reading Computer Users' Group. They meet at 7.30pm on the first and third Thursday of each month in the Senior Common Room at Reading University. This group is aimed at users of all machines and there is a short newsletter. The issue they sent me has some clear material on programming in C as well as details of how to get cheap Beeb disk drives.

Contact Michael Mallett, 19 Knollmead, Calcot, Reading RG3 7DQ or call him on (0734) 410597.

If you would like your user group or club to have a mention in this column, or you wish to be considered for the Directory of User Groups, please write to Rupert Steele, 12 Philbeach Gardens, London SW5 9DY, or tel: (01) 370 0601.

DIRECTORY OF USER GROUPS

Machines

ACORN ARCHIMEDES

RISC User, Dolphin Pl, Holywell Hill, St Albans, Herts, AL1 1EX. (0727) 40303. Journal 10x/£14.50.

APPLE MACINTOSH

John Lewis, Macintosh User Group (UK), 55 Links Avenue, Oxford, OX2 8JE. (0865) 58027. £25. Professional.

APPLE SYSTEMS

Irene Flaxman, Apple2000, PO Box 3, Liverpool, L21 8PY. 051-928 4142. Was named BASUG. Local groups; newsletter; BBS.

APRICOT

Apricot File, TP Group, Unit 20,

11-17 Exmouth Place, Hackney, London, E8 3RW. 01-254 2245. Technical newsletter.

ATARI

N Lewis, Atari National User Group, 13 Weavers Walk, Courthouse Green, Coventry, CV6 7LG. Newsletter; SAE.

ATARI 8-BIT USERS

Atari Correspondence Club, 160 Newland Rd, Witley, Wokingham, Berkshire, RG21 2JZ. (0722) 647196.

ATARI LOCAL GROUPS

Association of Atari User Groups, 45 Coleburn Rd, Lakenham, Norwich NR1 2NZ. (0603) 661149.

ATARI SERIOUS USERS

Glenn Leader, Sigatari, 143 Rich-

mond Rd, Leytonstone, London, E11 4BT. 01-556 0395. £5.

ATARI ST

Paul Glover, The ST Club, 9 Sutton Place, 49 Stoney Street, Nottingham, NG1 1LX. (0602) 410241. Journal. PD software.

ATARI ST - FAST BASIC

Simon Rush, FaST, 42 York Road, Rayleigh, Essex, SS6 8SB. Uses Computer Concepts' Fast Basic.

BBC MICRO

BEEBUG, Dolphin Place, Holywell Hill, St Albans, Herts, AL1 1EX. (0727) 40303. Journal 10x/£14.50.

BBC & SIDEWAYS RAM

Ron Marshall, Solinet, 41 Westbrook Drive, Rainworth, Mansfield, Notts NG21 0FB. Disk Jmal. SAE.

CAMBRIDGE Z88

Roy Woodward, Z88 Owners' Club, 68 Wellington St, Long Eaton, Nottingham, NG10 4NG. £6. SAE.

COLECO ADAM

Keith Marner, UKAS, 33 Homer Road, Croydon, CR0 7SB. Bi-monthly journal. SAE.

COMMODORE ALL MICROS

Jack D Cohen, ICPU, 30 Brancaster Road, Newbury Park, Ilford, IG2 7EP. 01-346 0050 home; 01-579 1229 day. £10 +£1 to join.

COMMODORE AMIGA

UK Amiga Users Grp, 66 London Road, Leicester, LE2 0QD. (0533) 550993 voice; (0533) 550893 BBS.

COMPUCORP

Compucorp University Users

Group, c/o Compucorp, Cunningham House, Westfield Lane, Kenton, Middx, HA3 9ED.

EINSTEIN

Graham Bettany, UKEUG, 80 Dales Road, Ipswich, IP1 4JR. £15. Monthly newsletter. SAE.

ENTERPRISE

Martin Wallace, Indept Enterprise User Group, PO Box 13, Crowborough, E Sussex, TN6 1XQ. (08926) 3890 7pm-10pm. £15.

HP HANDHELD

HPCC Membership Secretary, Geggs Lodge, Hempton Road, Deddington, Oxford, OX5 4QG.

HITACHI MBE 16002 PC

Bruce Ainge, HICUPS, 16 Nine Acres Road, Cuxton, Kent, ME2 1EL. (0634) 715759

IBM PC

The IBM PC User Group, PO Box 360, Harrow, HA1 4LQ. 01-863 1191. £25 pers/£95 corp. Professional. BBS 01-863 6646.

JUPITER ACE

J R Charter, c/o Customers Mail, Barclays Bank, 27 Regent Street, London, SW1. (0246) 37555. SAE.

LYNX

R B Jones, Lynx User Group, 39 Ashton Close, Needingworth, St Ives, Cambs. £9/UK.

MATMOS PC/ADLER

Ron Drew, Matmos Users Group, Clattering Ford, Roadhead, Carlisle, CA6 6NT. (069) 78672. SAE. Bug guide.

MEMOTECH

Phil Eyres, Memotech Owners Club, 23 Denmead Road, Harefield, Southampton, SO2 5GS. SAE. (0703) 585106.

MOTOROLA 68xxx MICROS

Rick Applegate, 68 Microgroup, 8 Great Cob, Springfield, Chelmsford, Essex. BBS 01-316 7402.

MSX SYSTEMS

Craig Bell, MSX UK, North Lodge, Cairnhill Rd, Airdrie, Lanarkshire, ML6 9RJ. (0236) 64045.

MSX SYSTEMS

Keith Neal, MSX Link, Austerby House, 80 Austerby, Bourne, Lincs, PE10 9JL.

MSX SYSTEMS

Lee Simpson, MSX User Group, 3 Mayfair Pl, Tuxford, Newark, Notts, NG22 0JD.

MSX SYSTEMS

Memory Alpha, 16 Mayfield, North End, Portsmouth, Hants. SAE.

NASCOM/80-BUS/CPM

Scorpio Systems, PO Box 286, Aylesbury, Bucks, HP22 6PU. (0296) 624868.

NEWBRAIN

Gerald McMullon, NBUG, 36 Armitage Way, Cambridge, CB4 2UE. SAE.

NEWBRAIN

Ron Bury, OPEN#STREAM, 70 Cranberry Lane, Darwen, Lancs, BB3 2HL. (0254) 771891.

NIMBUS/RM AX/VX

Dr Martin Hatfield, NIMBUG, 13 Belle Vue Ave, Gosforth, Newcastle-upon-Tyne, NE3 1AH. 091-285 7806

ORIC

Gary Ramsay, IOUG, 1 Kingsway Crescent, Burnage, Manchester, M19 1GA. Newsletter. SAE.

OSBORNE/CPM/MSDOS

Jeremy Browne, BOOG, 102a Aldershot Rd, Hants, GU13 9NY. (0252) 621745 voice, 626233 BBS.

PSION ORGANISER

Mike O'Regan, IPSO, 130 Stapleford Lane, Beeston,

Nottingham, NG9 6GB. Monthly journal. (0602) 735482. SAE.

RESEARCH MACHINES

RM National User Gp, Tim Davey-Winter, Computer Teaching Centre, 59 George St, Oxford. (0865) 278826. All RM micros. £15.

SAMURAI S16

Andrew Lee, Samurai S16 Self-Help User Group, 55 Spencer Rd, Strawberry Hill, Wickham, TW2 5TG. SAE. S16= MSDOS non-PC.

SANYO MBC-550

M H Syed, Wistaria, 53 Acacia Grove, New Malden, Surrey, KT3 3BP. 01-942 9009. Informal group.

SHARP

Andrew Ferguson, Sharp User Group, 11 Harcourt Close, Henley on Thames, Oxon, RG9 1UZ. (0491) 574850. £6.3 mags/yr. Software. Sharp 'micromart'.

SINCLAIR QL & SIMILAR

Phil Borman, Quanta, 15 Grosvenor Cres, Grimsby, S Humberside, DN32 0QJ. (0472) 49850.

SINCLAIR QL & SIMILAR

Richard Turner, QL Super User Bureau, PO Box 3, Shildon, Durham, DL4 2LW. £15 (£30 business). Sample journal 50p.

SINCLAIR SPECTRUM

Chic Computer Club, PO Box 121, Gerrards Cross, Bucks, SL9 9JP. (0753) 884473.

SIRIUS

Simon Sheppard, ISSUE, PO Box 222, Brighton, BN1 3BR. Informal free news sheet.

SORD M-23

B Nicholson, Aberdeen Reservoir Interpretation Centre, Woodlands Dr, Kirkhill Ind Est, Dyce, Aberdeen. (0224) 771117. Informal gp.

TANDY/GENIE/MSDOS

Roger Storrs, NATGUG, Oakfield Ldge, Ram Hill, Coalpit Heath, Bristol, BS17 2TY. (0454) 772920. Journal. PD software.

TEXAS TI99/4a

Peter Walker, TI99/4a User Group (UK), 24 Bacons Drive, Cuffley, Potters Bar, Herts, EN6 4DU. (0707) 873778. £10. Software library. Newsletter.

TEXAS TI99/4a

Peter Brooks, International TI User Group, 96 Banbury Road, Oxford, OX2 6JT. £11. (0865) 510822. Monthly Newsletter.

TRANSPUTER

Howard Oakley, Transputer User Group, Brooklands Lodge, Park View Close, Wroxall, Ventnor, Isle of Wight, PO38 3EQ. £5.

Local clubs

FIND YOUR LOCAL CLUB

John Dale, British Association of Computer Clubs, Banc y rhoyn, 14 Bron Y Glyn, Bronwydd Arms, Carmarthen, SA33 6JB. SAE. 0267 230771.

Amstrad

AMSTRAD 1512/1640/PPC

PC Independent User Group, PO Box 55, Sevenoaks, Kent, TN13 1AQ. (0732) 63157. £22 (£24 bsn). 1700 PD disks. Journal.

AMSTRAD ALL MACHINES

National Indpt Amstrad User Club, 1 The Middle Way, Wealdstone, Harrow, HA3 7EG. £9 (specify machine). Discounts. A5 SAE.

AMSTRAD ALL MACHINES

Jeffrey Green, Advantage, West One Hse, St Georges Rd, Cheltenham, GL50 3DT. (0242) 222307 Newsletter; software lib; SAE.

AMSTRAD BUSINESS USRS

Amstrad Professional User Club, Enterprise Hse, PO Box 10, Roper St, Pallion Ind Estate, Sunderland, SR4 6SN. 091-510 8787. £39.95.

AMSTRAD CPC USERS

Gary Carter, United Amstrad User Group, 1 Magnolia Close, Fareham, Hants, PO14 1PX. (0329) 281324 evenings. SAE.

AMST. CPC HOME USERS

Steve Williams, WACCI, 59 The Green, Twickenham, TW2 5TU. 01-898 1090. £12. Newsletter. Special offers. Good fun.

AMSTRAD LOCAL GROUPS

Amstrad Groups Federation, 4 Sutton Road, Gorton, Manchester, M18 7PN.

AMSTRAD PC SHAREWARE

Colin Smith, COLBAR, 10 Penwood Cl, Westbury, Wilts, BA13 3LW. Info: A4 26p sae. + blink disk.

AMSTRAD PCW

Chris Bryant, PCW File, 11 Havenview Road, Seaton, Devon, EX12 2PF. (0297) 20456. £7. PD software. Big SAE.

Software/networks

ASHTON TATE SOFTWARE

Silvia Robinson, Baseline, Ashton-Tate, 1 Bath Road, Maidenhead, Berks. (0628) 33123. Prestel page *43221#.

C LANGUAGE

Martin Houston, CUG (UK), 36 Whetstone Close, Farquhar Road, Edgbaston, Birmingham, B15 2QN. £10. 021-454 3448.

C LANGUAGE

Expert User Group, FREEPOST, Grimsby, S Humberside, DN32 7BR. £9. 48pp journal 6x a yr.

COMPUNET

Independent Compunet Club, 148 Furzehill Road, Boreham Wood, Herts, WD6 2DX.

CPM MACHINES

PIP, 28 Gordon Mns, Torrington Pl, London, WC1E 7HF. Amstrad, Einstein, Osborne etc. BBS.

CPM & MSDOS USERS

Diana Fordred, CPM & MSDOS Users Group, 72 Mill Rd, Dartford, DA2 7RZ. (0322) 22669. PD softwr.

ECONET

Michael Ryan, Econet User Group, Balkeerie Cottage, Eassie by Forfar, Angus, DD8 1SR. £8.60. Newsletter.

ENET (like Econet)

T K Boyd, Enet (Amcom) User Gp, Seaford Cottage, Petworth, West Sussex, GU28 0NB. Info sheet (send SAEs to despatch).

FORTH Language

Douglas Neale, FIG (Forth Interest Group) UK, 58 Woodland Way, Morden, Surrey, SM4 4DS. Jnal £10/6 issues. London meetings.

LOTUS PRODUCTS

Lotus User Group, 79-80 Peasecod St, Windsor, Berks, SL4 1DH. (0753) 841686. £95. Magazine, helpline etc.

LOTUS PRODUCTS

World of Lotus, Telecom Gold, 60-68 St Thomas St, London, SE1 3QU. Online support £9.60/hr. Free macros, drivers etc.

OS/2

Karen Burns, OS/2 User Group, c/o QA Training Ltd, Cecily Hill Castle, Cirencester, Glos, GL7 2EF. (0285) 655888.

PC SOFTWARE

PC-SIG, ISD Ltd, PO Box 872, Sutton Coldfield, W Midlands, B75 6UP. £6/disk + donation to author. 700+ disks.

PC/APRICOT/CPM SFTWRE

PD-SIG Ltd, 90 Braybourne Clo, Uxbridge, UB8 1UJ. (0895) 51978 or 01-864 2611. BBS. PD software, disk conversions.

SMART SYSTEM USERS

Martin J Smith, Smart Users, 38 Chavey Down, Ascot, Berks, SL5 8RP. £20.

SOFTWARE VIA BBS

Frank Thornley, Compulink, 67 Woodbridge Rd, Guildford, GU1 4RD. BBS (0483) 573337 V21/23. Voice (0483) 65895.

UNIX USERS

UKUUG Secretariat, UKUUG, Owles Hall, Buntingford, Herts, SG9 9PL. (0763) 73039. £55 individual £105 corporate. European journal & software library.

VENTURA PUBLISHING

VPU (Ventura Publisher User grp), Stella Glass 01-251 8567 or Neil Maroni (0273) 430902.

Special interest

AMATEUR RADIO (CBM)

Simon Lewis GM4PLM, Commodore Radio Users Group, 69 Irvine Drive, North Clippens, Linwood, Paisley, PA3 3TB. £8. Software.

AMATEUR RADIO (COMMS)

Pat & John Beedie GW6MOJ /MOK, BARTG, Ffynnonlas, Salem, Llanello, Wales, SA19 7NP. (0558) 822286. MBX 558822286.

CHRISTIAN USERS

Philip Clark, Christian Micro Users Association, 138 Bramwell Gardens, Sheffield, S3 7PW.

CHURCH ADMINISTRATION

Rev Stoker Wilson, Church Computer Users Group, St John's Vicarage, Greenside, Ryton, Tyne & Wear, NE40 4AA. 091-413 8281.

COMMUNICATIONS

Comms File, TP Group, FREEPOST, London, N1 1BR. 01-833 3501. £75. Newsletter.

COMMUNITY COMPUTING

P Rowan, Community Computing Network, 5 Windmill St, Frindsbury, Rochester, ME2 3XQ. £5/£1 unwaged. Contacts. Left wing views.

DISABLED

Jeff Hughes, Special Needs User Group, 39 Eccleston Gardens, St Helens, WA10 3BJ. (0744) 24608.

GENEALOGISTS

Computer Grp, Society of Genealogists, 14 Charterhouse Buildings, London, EC1M 7BA. 01-251 8799. Using micros to trace ancestors.

GENERAL HARDWARE

Andy Leeder, Amateur Computer Club, Church Farm, Stratton St Michael, Norwich, NR15 2QB. Large SAE.

HEALTH WORKERS

Sue McKendrick, Healthlink, 164 Windsor Rd, Ashton-in-Makerfield, Wigan, WN4 9ES. Voice: (0942) 712385. Health stfwr etc BBS.

LOCAL AUTHORITIES

Local Authority Micro User Grp, John New, Borough Engineer's Dept, Municipal Offices, North Quay, Weymouth, Dorset, DT4 8TA. (0305) 785101 x 272.

PRESTEL

Andy Leeder, ClubSpot 810, Church Farm, Stratton St Michael, Norwich, NR15 2QB. *810# club area. Clubs may be able to edit.

SERVICES USERS

Major JF Huskinson, Services Personal Computer Association, Leros TA Centre, Sturry Rd, Canterbury, CT1 1HS. (0227) 61397. £3. Magazine. END



INTERNATIONAL COMMUNICATIONS SOFTWARE

FOR IBM PC, XT, AT and compatibles, PS/2, AMSTRAD, (and versions for Sirius & Apricot)

Now more than 40,000 copies sold in 12 countries!

EASE OF USE

TRANS-SEND is very easy to use. It has POPUP menus, help screens, user definable menu and function keys. You log on with just one key press!

MODEMS

Almost all modems are supported, including HAYES compatible, RTS pulse dial and non-buffered manual modems. All BAUD rates are supported from 300 to 38,400 including 1200/75.

VIDEOTEX EMULATION (PRESTEL)

TRANS-SEND gives perfect support for Videotex and Viewdata systems. All display attributes are fully implemented. All IBM screen types are supported: ie. EGA, PGA, VGA, PS/2, AMSTRAD, CGA,

MCGA, HERCULES, and MDA, Two Videotex pages may be viewed at once, or a page can fill the whole screen. Pages may be saved and printed in a choice of formats. DATAMASKING, offline mail box, and SOFTWARE DOWNLOAD (CET) are fully supported. Both 40 and 80 column Videotex systems are supported.

TERMINAL EMULATIONS

TRANS-SEND offers VT102, VT100, VT52, AN-SI, Videotex, and TTY terminal emulations. 'SEND BREAK', graphics, function keys, keypad application mode, and even the LEDs are reproduced by TRANS-SEND. In addition, TRANS-SEND offers more features via POPUP menus, and 30 user definable function keys.

FILE EXCHANGE

TRANS-SEND offers SLIDING WINDOWS SUPER KERMIT, XMODEM, ASCII, SOFTWARE DOWNLOAD, and its own protocol.

COMMAND FILES

TRANS-SEND has a large command file language, and a utility that will write command files for you. This powerful, yet easy to use language supports labels, conditional branches, nested subroutines, nested loops, and many functions.

LOCAL OFFICE FILE MOVING

TRANS-SEND can move files quickly (38,400

BAUD) and easily between your different office computers. This offers an excellent method for BACKUP, as well as a handy way to get files from one format to another; eg 3.5" to 5.25" and Apricot and Sirius. Wild cards are supported.

WORD EDITOR

TRANS-SEND's built in full screen text editor allows you to edit messages and command files very easily from within the program. You can transmit and print straight from the screen.

HOST MODE

This allows an unattended computer to be dialled into with two levels of password security.

LANGUAGES

Available in English, German, French, Italian, Danish, Swedish, Norwegian and Finnish.

* Colour needs a colour monitor.

PRICE £49.95 + £2 P+P PLUS VAT

NEW TRANS-SEND PLUS

VT220 Emulation, Protocol Analyser, Data Encryption, Supports Desq-View, Expanded Host System, Hex to Binary, Binary to Hex conversion. Price £99.90 plus £2 p&p plus VAT.

Available from MESSITER SOFTWARE 67, Crescent West, Hadley Wood, Herts. EN4 0EQ ENGLAND TEL: 01-449 2994 and 01-441 7250

... and Good dealers

RMS INTERNATIONAL

AMSTRAD		
4350	Advanced Basic 2 PC1512 & 1640	£12.95
3304	Amst PC Owners H/B	£19.95
3174	Amst PC Tech Ref Man-SOFT50011	£19.95
3190	Amstrad PC 1512 User Guide	£12.95
3973	Amstrad PC 1512/1640 Basic 2	£9.95
4397	Amstrad PC Hard Disk Guide	£12.95
3768	Amstrad PC Users Omnibus	£13.95
3744	An Introduction to Amstrad PCs	£5.95
4025	Business Computing Amst PC 1640	£12.95
4655	Communication with Amst PC	£12.95
3594	Comp guide PC vol2 PK 5	£12.50
3789	Get 90% More Amstrad 1512/1640	£8.95
2950	Introducing the Amst PC	£7.95
3163	Loco Basic II Amst PC 1512	£11.95
3732	PC 1640 Tech Ref Manual 50016	£19.95
3604	PC Compendium	£12.95
3343	Program Your Amst P.C.	£7.95
3895	Simple Basic 2 1640 2nd Ed	£9.95
BASIC		
1941	Basic Handbook	£22.95
0459	Basic Programs for Scien/Engin	£18.95
3687	Basic to C Conversion Manual	£19.10
4196	Basic Computer Adventures	£6.95
4445	Basic Step by Step Programming	£14.95
4448	Microsoft Basic Third Edition	£16.45
3865	New Basics Prog Tech & Lib Dev	£22.95
4451	Programmers Toolbox	£18.45
4500	True Basic Primer	£20.95
BASIC - QUICK		
4035	Advanced Quick Basic	£19.95
3523	Microsoft Quick Basic	£14.95
4046	Using Quick Basic incl V 4	£17.95
BASIC - TURBO		
4154	Advanced Turbo Basic	£20.95
3820	Introduction to Turbo Basic	£18.95
4466	Power of Turbo Basic	£14.00

3680	Turbo Basic Prog Scientist/Eng	£18.95
4085	Turbo Basic Instant Reference	£9.95
3761	Using Turbo Basic	£19.95
4664	Using Turbo Basic	£11.95
C		
2773	A Book On C	£8.95
2976	Advanced C Primer + +	£20.50
2887	C + + Programming Language	£18.95
3017	C At A Glance	£8.95
3864	C Chest Other C Treasures	£22.95
3328	C Primer Plus 2nd ed	£21.50
4562	Simple C-Beginners Book	£11.95
3438	Small C Handbook	£17.35
3685	Supercharging C Assembly Lang	£19.85
3686	Surefire Programming in C	£14.50
4321	The C Book Featuring ANSI C	£15.95
2798	The C Primer 2nd Edition	£17.95
1674	The C Toolbox	£17.95
3588	Topics In C Programming	£22.50
1020	Understanding C	£18.95
3944	Using Quick C	£18.95
CAD/CAM		
4625	ABCs of AutoCAD	£20.95
4181	Adv.Tech Autocad for Release 9	£25.95
3886	All About CAD and Manufacture	£9.95
4471	AutoCAD: Methods & Macros	£15.55
3702	Autocad Database	£36.95
3802	Autocad Data base Disk	£27.95
4043	Illustrating Autocad Release 9	£19.95
2999	Inside Auto Cad V 2.5	£32.45
4565	Inside Autocad V 2.6 Release 9	£32.45
3531	Introduction to CAD/CAM	£11.95
4209	Mastering AutoCAD 2nd Ed	£28.95
3996	Microcomputer Cad Manual	£25.95
3350	Understanding Cad/Cam	£14.95
3596	Work out with Autocad	£27.45

CHIP - 8086		
3960	8086 & Ass Lang Programming	£12.95
0294	8086 Book	£23.95
1957	8086/8088 Architecture & Prog	£10.50
1281	8086/8088 Assembly Lang Prog	£12.45
6002	8086/8088 Primer (2nd Edition)	£17.95
3138	Programming 8086/8088	£15.95
0792	Programming The 8086/8088	£17.95
DBASE III		
2979	ABC of dBase III Plus	£16.95
3719	Advanced Prog dBase III Plus	£18.45
2998	Advanced Techs DBase III Plus	£21.95
3534	Expert dBase III Plus	£21.95
3926	Illustrated dBase III Plus	£18.45
2997	Mastering dBase III Plus	£19.95
DESK TOP		
4301	Desktop Pub Xerox Ventura Pub	£14.50
4083	handbook of Desktop Publishing	£18.45
4075	Illustrated Pagemaker	£18.45
3700	Inside Xerox Ventura Publisher	£18.45
4281	Looking Good Print Desktop	£21.95
3505	Mastering Pagemaker IBM PC	£18.85
4185	Mastering Ventura	£21.95
4063	Ventura Publisher for IBM PC	£15.95
4012	Ventura Tips & Tricks	£18.95
4398	Working with Ventura Publisher	£18.45
MS-DOS		
4206	ABC's of MS-DOS 2nd Edition	£16.95
2943	Advanced MS-DOS (Microsoft)	£19.95
4090	DOS Que Cards Rapid Ref	£19.95
3458	DOS The Complete Reference	£21.95
3520	Exploiting MS-DOS	£12.95
4072	Illustrated MS-DOS 3.3	£18.45
3925	Illustrated MS/PC-DOS	£18.45
0982	MS-DOS & PC-DOS User's Guide	£12.95
4270	MS-DOS Bible 2nd edition	£18.95
3845	MS-DOS Quick Prog Ref Guide	£8.95

RMS INTERNATIONAL
36a ABBEY STREET
RUGBY, WARWICKSHIRE.
ENGLAND, CV21 3LH.

0788 71643

WE STOCK ABOUT 5 TIMES THIS MANY BOOKS AT OUR SHOWROOM AND LIST APPROX. 1500 TITLES. PLEASE SEND OR PHONE FOR A FREE BOOK CATALOGUE.

EDUCATIONAL, GOVERNMENT, AND PLC OFFICIAL ORDERS ACCEPTED. ALL PRICES ARE INCLUSIVE OF VAT AND P&P. WE ENDEAVOUR TO DESPATCH ALL ORDERS BY 4PM THE SAME DAY. PLEASE ALLOW UP TO 7 DAYS FOR DELIVERY. PLEASE PHONE OR WRITE TO NOTIFY OF NON DELIVERY WITHIN THAT TIME. WE USE THE P.O. TRAKBAK SERVICE.

TELEX NO. 312242 MIDTLX G



84 06

ACORN COMPUTERS



Archimedes A305 £755(£689)£765. Archimedes A310 £879(£805)£887. Archimedes A310M £940 (£859)£941. Archimedes A440 £2635(£2339)£2436. Mono monitor £72(£90)£135 Colour monitor £234 (£247)£330. Floppy disc £129(£124)£144 20Mb hard disc + podule £507(£488)£532. Podule back plane £44(£51)£65. Rom Podule £67(£68)£78. I/O Podule £92(£91)£101. Software - Amsl C, Isopascal, Fortran 77, Logo, View Professional each at same price of £90 (£81)£86. Twin £29(£28)£33. PC Emulator £74(£67)£75. 1st Word Plus £76(£68)£76. Artisan £44(£45)£53.

ATARI COMPUTERS

520STFM (ss version) £239(£230)£274. 520STFM (ds version) £290(£293)£338. 520STFM super pack £370(£367)£411. 1040STFM £460(£451)£495. 1040STFM + monitor £563(£578)£678. 2080STFM + monitor £907(£860)£964. 4160STFM + monitor £1203(£1129)£1237. Atari ST b/w monitor £136 (£149)£205. Archimedes 14" medium res colour monitor for use with Atari ST £244(£257)£340. We offer good discounts on most ST software for example: PC Ditto £71(£68)£75. Hisoft DEVPAK £43 (£41)£45. Hisoft Basic Compiler £66(£61)£65. First-word Plus £66(£61)£65. Metacombo Lattice C £84 (£75)£79. GFA Basic interpreter £38(£37)£42. GFA Basic compiler £38(£37)£42. GFA Basic V3.0 £56 (£52)£57. GFA Companion £26(£26)£31. Sublogic Flight Simulator 2 £35(£34)£44.

AMSTRAD PRODUCTS

PC2086 Computers (Must be bought with a monitor): single floppy £558(£539)£583. Dual floppy £683 (£652)£696. Hard disk £943(£888)£932. PC2086 Monitors: Mono £121(£152)£239. Colour £277 (£293)£380. 12HRC £381(£388)£475. 14HRC £485(£482)£569. PPC640D £671(£628)£685. PC1640: ECD single floppy £779(£782)£893. ECD dual £854(£852)£963. ECD hard disc £1062

(£1044)£1155. Mono display cable £571(£590) £701. MD dual £646(£660)£771. MD HD £854(£852) £963. PC1512: MD single £460(£488)£599. MD dual £554(£575)£686. CD single £554(£575)£686. CD dual £647(£661)£772. Miniscribe 30Mb hard card for PC1640 and PC2086 £274(£260)£267. DMP 3250 printer £190(£199)£239. PCW9512 computer £527(£528)£651. PCW8512 £491(£497) £620. PCW8256 £388 (£405) £528. Amstrad DMP2160 printer £154(£155)£191.

CAMBRIDGE COMPUTERS AND SINCLAIR PRODUCTS

Cambridge computers Z88 £274(£255)£268. Z88 All-In-One-Pack £326(£307)£321. Mains adaptor £10(£15)£25. 512k ram cartridge £191 (£168)£173. 128k ram cartridge £48(£44)£49. 32k ram cartridge £20(£21)£28. 128k Eeprom £48(£44) £49. Modern £167(£149)£159. Parallel printer cable £30(£28)£35. Z88 PC Link Mk2 £34(£32)£39. Phone for prices on all other Z88 accessories. Spectrum 128k Plus Two computer with joystick and software pack £139 (£140)£172.

COMMODORE COMPUTERS

Amiga A500 Computer + modulator £361(£355) £395. Modulator £25(£25)£30. Amiga A500 + Colour monitor + modulator £644(£658)£769. Amiga A500 + colour monitor + printer + modulator £783 (£781)£931. Disc drive for Amiga (Cumana CAX354 £101(£110)£140. Ram expansion £108(£99)£104. Commodore 64C + cassette + joystick + games £144(£151)£187. Commodore cassette recorder £30(£30)£36. 1541C disk drive £166(£176)£208. PC1 mono £349(£368)£446. PC1 colour £471(£485) £582. PC10 single mono £309(£309)£706. PC10 dual mono £729(£717)£817. PC20 HD mono £1063 (£1029)£1229. For colour add £177(£171)£191. For ecd add £345(£329)£359.

PSION ORGANISER

Organiser II XP £125(£110)£115. Datapack 128k £89(£78)£79. Datapack 64k £54(£48)£49. Datapack 32k £32(£29)£30 32k ram pack £49(£44)£45. Mains adaptor £12(£15)£20. Comms Link £54(£48)£54. Formatter £46(£46)£56. Phone for prices on all other Psion accessories

PRINTERS

Amstrad DMP3250 £190(£199)£239. Amstrad LQ3500 £310(£314)£354. Amstrad DMP2160 £154 (£155)£191. Amstrad DMP4000 £310(£314)£354. Epson L8X00 £209(£219)£259. Star LC10 £238 (£246)£286.

SWANLEY ELECTRONICS

The Computer Export Specialists.

Dept PCW, 32 Goldse Rd., Swanley, Kent BR8 8EZ, England

Tel: SWANLEY (0322) 64851. We give an additional discount of 2% to personal callers. Official orders welcome. UK prices are shown first and include post and VAT. The second price in brackets is for export customers in Eire and Europe and includes insured airmail postage. The third price is for export customers outside Europe (Including Australia etc) and includes insured airmail postage.

★ AMSTRAD 2086/2286/2386

NOW IN STOCK ★
Call for details

★ Faxcard ★
Send & Receive
£299

COMPUTERS

Amstrad PC1640 ECD 30Mb Miniscribe Card	£995.00
Packard-Bell PVX88 20Mb Mono - 12 months maintenance	£745.00
Packard-Bell 20Mb AT 10MHz Colour Display	£1162.00
BB Turbo XT CGA/Mon 640K 20Mb	£725.00
Commodore PCXT 640K 20Mb	£745.00

NETWORKS

2 Station Starter Pack 1.25Mbps/Sec CW Cable	£299.00
Software and installation instructions	£299.00
Complete system with non-dedicated file server	£2995.00
80286, 2 x 8088 XT SFD - cabling and Software	£2995.00

PRINTERS

Juki 5510 9-pin 185cps - Giveaway	£155.00
Amstrad LQ3500 24-pin 80col - To clear	£225.00
NEC P7+ 24-pin 80K buffer, 20 fonts, latest model	£650.00
NEC P6+ as above but 80 columns	£565.00
Micro-Peripherals MP165+ IBM/Epson	£175.00

SOFTWARE

Ability Plus	£118.40	Sage Fin Con	£215.00
Timeworks v1.12	£89.00	VW3	£150.00

ACCESSORIES

Logitech Mouse	£69.00	Logitech H/Res	£99.00
100 Cap Disk Box	£6.95	5.25 DS DD 25's	£7.80
2-Way Data Switch	£25.00	RFI Surge Protector	£44.00

BOOKS

Mastering Ventura	£22.95	Mastering Framework	£22.95
Smart Tricks & Traps	£22.45	ABC of 1-2-3	£16.95
2,000 titles available - phone for complete list.			

HARD DISKS

Miniscribe 20Mb Hardcard 65 m/s Access - pre formatted	£215.00
Miniscribe 32Mb Hardcard 65 m/s Access - pre formatted	£227.00
Seagate ST225 20Mb Kit - with controller	£195.00
Miniscribe 3650 40Mb Kit - with controller	£275.00

All prices exclude VAT and carriage except books which are VAT free, carriage is charged at cost - Please call for details - A.M. delivery available. Terms are strictly CASH with order. ACCESS or VISA accepted, or purchase orders from Plc's.

021-702 2167

BB BUSINESS SUPPLIES, 437 Shirley Road, Acocks Green, Birmingham B27 7NX.

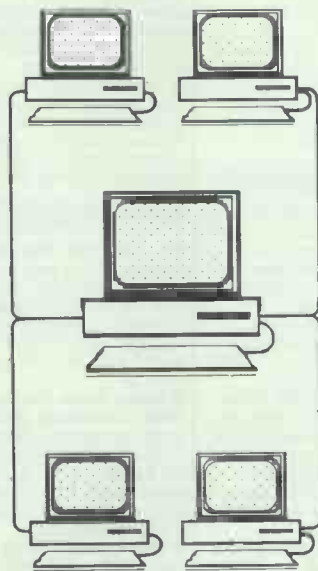
MIRRO MICRO-RENT PLC

Two new services from Micro-Rent

Novell network rental

- * The low-cost, no-risk way to try networking before you commit yourself.
- * Full Novell networks installed on 3-month rental. No further commitment.
- * After 3 months, choose to contract hire, lease, buy, plus any upgrades you want.
- * Expert installation, to suit your needs and hardware.

Further information from
Derek
Whitehead
01-700 4848



Contract Hire

- * 1,2,3,4 or 5-year contracts.
- * Rentals include all-risks insurance, plus cover for restitution of data.
- * Built-in flexibility provides a guard against obsolescence or system size constraints.
- * Rentals may be offset against tax, considerably reducing the net cost.
- * Leaves capital and existing credit lines free to generate profits.

For further information, please write or phone **01-700 4848**

Micro-Rent plc,
St Marks Studios,
Chillingworth Road,
Islington,
London N7 8QJ.



The power without the purchase

MICRO-RENT

Your chance to buy, sell or swap equipment.

Acorn

- **BBC-B Computer.** Dual 80T disk drives. Z80 2nd Processor. 12" mono monitor, original packing, loads of software, manual, etc. £500 ono. Tel: Colin Uxbridge (0895) 35129 evenings.
- **BBC Master 128/512.** Manuals, books, magazines. PC-Plus (total-1Mbyte.) 2x800k 3 1/2" drives, Taxan-III, Pace Linnet, Marconi Tracker-ball, Acorn Teletext. Cost £2,000+ Accept £1,000. Tel: (0843) 221922
- **Acorn Archimedes A310.** Arthur 1.2. Dual disk drives, colour monitor. Over £400 of software including C compiler, System Delta + Artisan, books. £1,100. NEC P2200 printer £240. Tel: (01) 948 6314

Amstrad

- **Amstrad 1640.** Dual disk drive and colour screen. As per original packaging & some business software £685. Tel: Bedford (0234) 67067.
- **Amstrad PC1512.** Dual drive, mono. Brother 1109 printer and Ability software. Good condition. £450 ono. With card modem £525 ono. Tel: (01) 572 7084 (day) (0483) 66773 (evening).

Apple

- **Macintosh Plus.** With 1Mbyte of RAM, internal Symbiotic 20 Mbyte hard disk. Limited home use only, good condition, £1,500. Tel: (0625) 530433 (eves)
- **Levco Prodigy SE Accelerator.** With MC68020 processor, 16MHz, 1Mbyte RAM. Brand new. £500. Tel: Ulla or Richard on (0904) 425545 after 6
- **Macintosh Plus (platinum).** With 30Mbyte hard disk. Only one year old. Some software included. £1,850 negotiable. Tel: (01) 960 5150.
- **Apple IIc.** Twin disk computer with mono monitor and various software, games. £200. Also Epson FX80 Printer, £100. Tel: Newark (0636) 605605
- **Macintosh 400K disk drive.** Intertangle modem and interface for Apple IIc. Vicoms Communications software for same — new, unused. £130 and £60. Contact Beth (0895) 59771 (ext 29) or (0372) 67784 eves
- **Apple II Europlus.** 64K, 128K RAMdisk, twin drives, mono monitor, FX80 printer, acoustic coupler, 80 column, serial, parallel and Z80 cards, Microsoft Basic, software, manuals. £400. Tel: Woking 64915 eves

- **Macintosh 512K.** 400K external drive, carry case, usual software plus Omniscan 2. MacBasic, MacPascal, MacForth, MacProject, Factfinder, TD1 Pascal, Manuals. £800. Tel: Rob. Woking 64915 eves

Apricot

- **Apricot XI.** 630K double drive. 256K RAM, green 9" screen, original software (including Superwriter and Supercalc). Manuals, printer cable. Well-behaved and much-loved. £500. Tel: M Lean (01) 828 6591 or (0883) 812756
- **Apricot.** Twin Floppy plus internal 10Mbyte hard disk, 768K RAM, Apricot ACT81 A4 plotter. Full set manuals, cases. Super series, database and graphics software. £650. Tel: (0633) 49253 eves
- **F1.** With internal modem and F2 keyboard. Superwriter, Supercalc, Fancy Font, Microsoft Pack, File and Find. Juki 6100 printer with Turkish daisywheel, all manuals. Apricot maintained. £600. Tel: (01) 691 8003
- **Apricot Xi20S.** 20Mbyte hard disk, 960K RAM, internal modem fitted. Original software and manuals WordStar, dBaseIII, SuperCalc. Home use only. Price £850. Tel: (021) 421 7052 after 6.30pm
- **Apricot XEN.** 20Mbyte hard disk, paper white monitor. All software and manuals. £895. Please Tel: (01) 953 8735 or (01) 958 8670
- **Apricot F2.** 2x720k floppy drives, 512k RAM, mouse and infra-red keyboard. 12" monitor Panasonic KX P1080 printer. Miscellaneous software + disks etc. £600. Tel: Richard (021) 475 5209

CP/M

- **Transtec business computer.** 1x400K 5 1/4 floppy, 1x5Mbyte Winchester 2x RS232 ports, 1x Centronics port. Lots of software. £300 ono. Also twin 400K floppy as above, no Winchester £100 ono. Tel: 691 9674 after 7pm

IBM & Compts

- **Amstrad PC1512DDMM.** 20Mbyte hard disk, full 640K memory, good condition with software and manuals. £425 ono. Tel: Dominic (01) 767 4844 after 6pm
- **Epson PC.** 640K RAM. Dual disk drive. Graphics board, mono monitor. £480 ono. Tel: (0223) 872555
- **AST Premium/286.** 28ms 40Mbyte hard disk, 2Mbyte fast RAM, EGA adaptor, MS-DOS 3.2 8 months old. Taxan Multivision 770+ monitor. £1,750 ono. Vega VGA adaptor unused. £125. Tel: (01) 444 8344
- **IBM Model 50, IBM Model 30-021.** Enhanced keyboards, 2 mono displays, Proprietary 2, Miracle Tech modem, includes all cables, cost £8,600 9 months ago, will separate. £5,000 ono. Tel: Bristol (0272) 428966

- **Bernulli Box.** Twin 8" 10 Mbyte removable hard disk drives, controller card and 5 disks. Less than one year old. Cost new £1,600. Offers in region of £750. Tel: (06284) 6888

Miscellaneous

- **HP-28C Calculator.** Including manuals. As new. Cost £209.50. Going for £130. Tel: (0532) 588228
- **Sirius.** 10Mbyte HD. 256K RAM. Single floppy 5 1/4" drive. Supplied with blank disks and various software. Offers around £500. Tel: Miles MacDonald (0753) 859221 ext 220 days
- **Sirius.** Twin 2.4Mbyte disk drives, 384K RAM, MS-DOS 1.25+2.11, MS-DOS 1.25 Toolkit, IEEE 488 driver software, Move-It and A-Sync communications software, dBase II, all manuals. £700 ono. Tel: Petersfield (0730) 64760 eves
- **PCW Back Issues.** From April 1980 (Sinclair ZX80 review) to December 1986. Some with binders. Offers for all or some issues to Malcolm on Bedford 219769 after 6pm.
- **Personal Computer World.** 1985 to present. Other Atari based magazines available. D Stock, 2 Grange Road, Bishop's Stortford, Herts CM23 5NQ

Monitors

- **NEC Multisync Plus.** Colour monitor, 15" FST screen. As new. EGA, VGA, PGA etc. Exchange for Multisync II plus cash adjustment or £440. Tel: (0394) 275083

Portables

- **IBM Portable.** Three years old, 640K RAM, 20Mbyte hard disk, CGA monitor, Comms port, MS-DOS and other software including wordprocessor, spreadsheet and database. £800 ono. Tel: (0932) 226495
- **Data General Model One.** IBM compatible laptop, full specification model, twin drives, 512K RAM, software, communications software. £400. Tel: (0908) 565 465

Printers & Plotters

- **Diablo 1640 Daisywheel Printer.** Sheet and tractor feeders, acoustic cabinet and full documentation. Currently connected to BBC system. New £2,000. Now only £350. Tel: BB on (0234) 750770
- **Aptec Ricoh Flowriter RP 1600 daisywheel printer.** 15" with Centronics interface. £150 ono. Cut sheet feeder for Epson LX-86. Boxed never used, £20. Contact Beth (0895) 59771 (ext 29) or (0372) 67784 eves
- **Mannesman MT85 80 Column Printer.** IBM, Epson compatible, parallel and serial interfaces, manuals, new ribbon as new condition. £250 ono. Tel: Hemel Hempstead 231454 after 7pm

- **Dyneer DW20 Daisywheel Printer.** With auto sheet feeder, RS232 interface 20cps, had very little use, ideal for WP work. £200 ono. Tel: Ken (01) 309 1456
- **Centronics PP8 Laser Printer.** 8 pages, min, HP Laserjet and Epson FX-80 emulation. £850. (£975+VAT new, with only one emulation) Tel: (0442) 55806
- **Tec F10 Daisywheel Wide Carriage Printer.** Acoustic hood & stand included. £100. Tel: Miles MacDonald (0753) 859221 days
- **Hewlett Packard LaserJet.** Font cartridges TMS RMN, Courier. New toner cartridge. Home use only. £850. Tel: (021) 421 7052 after 6.30pm
- **Brother HR-20 daisywheel.** 20 cps speed, serial/parallel. Hardly used. Price £350. Tel: (021) 421 7052 after 6.30pm
- **Qume Sprint 955 Daisy Wheel Printer.** Excellent condition. Offers around £300. RML research machine plus software, offers around £100. Tel: (0763) 49756

Sharp

- **Sharp MZ-80B Computer.** With CP/M, Microsoft Basic and compiler, dual disk drive, printer (MZ80-P6). Over £2,000 worth of business software including WordStar, SpellStar, Mail Merge, Supercalc Aurora Accounts. Offers around £500. Tel: (0472 86) 760 9am-9pm

Sinclair

- **CST Thor.** 2x3 1/4" 1.4Mbyte floppy drives, 640K RAM, 2-Microdrives fitted. Microvitec colour monitor. Eidersoft mouse with ICE. Psion Xchange suite software. Astracom 1000 modem. Rawcom comms software. £450 ono. Tel: Corbett (01) 441 0900
- **Complete QL system.** Comprising QL computer, Ferguson green monitor, Epson RX80 printer and centronics IF, games and other software, books & mags. £200. Tel: Martin on (01) 435 2468

Tandy

- **Tandy FP 215 A4 Plotter.** Plus Model I/III software. Visicalc, LDOS, Business Graphics, Series I Editor Assembler and 'Basic Faster and Better' book and disks. Offers invited. Tel: (063349) 253 eves

Wanted

- **Epson QX10 wanted.** Complete and working. And/or Peachtext, Peachcalc, Mailing List Manager, Spelling Proofreader, manual(s). Please state condition and when can be viewed. Mr Maxwell, 17 Watford Way, London NW14
- **Wanted for Tandy 100-102 Portable.** 8K RAMs, software ROMS, direct modem ROM, radio amateur software to decode RTTY, CW, ASCII, TOR, AMTOR, FAX. Other software & hardware. D Riordan, The Slip, Strangford, Co Down, N.Ireland. Tel: (039686) 303

Transaction File

Transaction File is where PCW readers can sell their unwanted computer hardware, software and peripherals. Adverts cost £5 each for a maximum of 30 words. Ads are not accepted from individuals or companies whose business involves selling computer products or services.

Print or type your ad as you wish it to appear, double-spaced on a sheet of A4 paper, indicating at the top of the sheet under which heading you wish it to be placed, with your address, if it is not included in the ad, at the bottom. Send this sheet together with your payment (cheques payable to VNU Business Publications) and the voucher alongside to: Chris Cain, Transaction File, PCW, 32-34 Broadwick Street, London W1A 2HG. We cannot guarantee to include an ad in any particular issue of the magazine. Illegible ads, those without a coupon, and those appearing to come from computer traders, will be returned.

Categories for ads

Acorn, Amstrad, Apple, Apricot, Atari, Commodore, CP/M & CP/M-86, IBM & Compatibles, Miscellaneous, Monitors, Peripherals, Portables, Printers & Plotters, Sinclair, Software, Sharp, Tandy, Wanted.



SIERRA Computer Consultants Ltd.

PC's

OLIVETTI

M240 20MB System
M280 20MB System
M280 40MB System
M290 40MB System
★★NEW★★
M380 40MB System

TANDON

PCX 20MB System
PCA 20MB 8MHz System
PCA 40MB 8MHz System
or PCA20 or PCA40 10MHz
TARGET 20 System
TARGET 40 SystemPAC 286
30Mb Removable

TULIP

PC Compact 2 20Mb System
AT Compact 20Mb System
AT Compact 40Mb System
AT 386 40Mb System
AT 386 155Mb System

PRINTERS

EPSON

FX850 £359
FX1050 £465
LQ850 £495
LQ1050 £670
SQ2500 Ink Jet £1049

NEC

P6+ £495
P7+ £685
P9XL £895
P220 £295

JUKI

6000 D/W range From £275
71000 Dot Matrix £825

LASERS From £1395

PLOTTERS From £475

SOFTWARE

WORD PROCESSING

Wordstar 2000 Plus £265
Wordperfect £268
Multimate Advantage £295
MS Word 4 £260

SPREADSHEET

Lotus 123 £265
Supercalc 4 £245
MS Excel £269

ACCOUNTING

Sage Accountant Plus £175
Sage Accountant £135
Sage Payroll II £125

DATABASE

DBase III Plus £355
RBase System £375
Paradox £295

INTEGRATED PACKAGES

Smart System £395
Symphony £385
Framework £365
Ability Plus £125

TRAINING

We can offer training in the following:

Wordstar
Wordperfect
Multimate
Lotus 123
DBase III PLUS
Sage Accounts
Sage Payroll

VENTURA DESK TOP PUBLISHING

CUSTOM WRITTEN SOFTWARE

We can offer our services to write packages to your specification using:

DBase II Plus
Clipper
Cobol

THE ABOVE ARE JUST SAMPLES OF THE WIDE RANGE OF PRODUCTS WE OFFER — PLEASE CALL

SIERRA COMPUTER CONSULTANTS LTD., Third Floor, Carrick House, Stakes Hill Road, Waterlooville, Hants PO7 7JB
Tel: 0705 256123

SHAREWARE

5 1/4" ANY 10 DISKS £15
Setting new standards?

Word Processors

PC-Write
PC-Type - (3)
Mindreader
Page One
New York Word (2)
Spelling Checker
Wordplan

Databases

PC-File + (3)
Instant Recall
Namepal
Dream (3)
File Express (2)
Wampum (2)
Freefile
Infobase
Mass Appeal
Label Maker
Catalist (2)

Utilities

Homebase (3)
Deskteam
PC-Outline
Still River Shell
Citydesk
PC DOS Help
Backup
Powermenu

Utilities (cont)

Imageprint
PC Menu
LQ
Automenu
Ram Test
30E-Utilities
PC-Ticker
Flashbak
New Key
Bakers Dozen
DBS Kat (2)
Forms Generator
Hard Disk Utilities (2)
dBase III + Tutorial
Magic Menus
Hard Disk Menu

Spreadsheets

As Easy As
Goal Seeker
PC-Calc + (3)
Freecalc
Expresscalc (2)

Financial Programs

Inventory Control
Cash-Trac (2)
PC-Accounting
Checkmate GL (2)
Freeway Accounts (3)

Communications

PC-Dial
QModem (2)
Procomm (2)
Kermit
Boyan VD3 (2)

Languages

Modula-2 Compiler (2)
Basic Interpreter
Prolog
Fig-Forth
A86 Macro Assembler
Quickbase Toolbox
Pascal Compiler

Graphics

PC-Key Draw (3)
PC-Graph
Kraft Paint
Finger Paint
Droege (2)

Games

3D Chess
Detective
Card Games
Bulgames
Amulet of Yendor
Cave Quest
Hack (2)
Trivia Towers (2)

Free catalogue on disk with each order
ALL PRICES INCLUDE VAT AND DELIVERY

3 1/2" ANY 10 DISKS £25



SMS



0276-681864



19 Carshalton Road, Camberley, Surrey GU15 4AQ

NEW but POWERFUL source

- * DIN PROFILE WITH DOUBLE SHOT MOLDED LEGENDS.
- * HIGH QUALITY, COMPETITIVE PRICES, RELIABLE SERVICE.
- * FOR IBM® PC/XT/AT, PS-2 COMPATIBLE.



**AGENT
Wanted**



Techmate inc.

624, MINCHUAN EAST ROAD, UNIVERSAL ENT.
CENTRE, 3F/5 TAIPEI, TAIWAN, R.O.C.
TEL: 7173842 (REP.) FAX: 886-2-7183242
TELEX: 12880 ATTN: TMT

COMPUTER SUPPLIES AND ACCESSORIES

MINIMUM ORDER VALUE £7.50



OVERSEAS MEDIA DISTRIBUTORS

WE HAVE MOVED

OM HOUSE
139-141 DOMINION ROAD
GLENFIELD, LEICESTER LE3 8JB

BUY DIRECT FROM DISTRIBUTORS AND IMPORTERS.



PRICES FULLY INCLUSIVE OF VAT & DELIVERY (UK ONLY)

CREDIT CARD HOTLINE (0533) 877733 (24 hours)

PERSONAL CALLERS WELCOME 9.30-5.00 pm

TOP BRAND DISKS

BRAND	3" AMSOFT CF2 £22.50			
	DSDD	DSHD	DSDD	DSHD
	135T	PS/2	48T	AT
SONY	3 1/2" £17.50	5 1/4" £38.50	5 1/4" £ 8.90	£17.50
DATALIFE	£16.50	£35.50	£ 8.90	£17.50
DYSAN	£17.50	£45.00	£10.50	£16.50
3M	£17.50	£45.00	£ 8.90	£17.50
MAXELL	£15.50	£39.50	£10.50	£18.50

Price per box of 10 disks

BULK DISKS Certified & Guaranteed

	25	50	100	200
5 1/4" DSDD 40/48T	£ 9.90	£18.90	£31.50	£ 59.90
DSDD 80/96T	£10.90	£20.90	£36.80	£ 68.90
DSHD AT DISK	£25.90	£49.50	£95.00	£180.00

Supplied with Envelopes, Labels & Write Protects

3 1/2" DSDD 135TPI	£24.50	£47.50	£89.00	£170.00
--------------------	--------	--------	--------	---------

Quality Disks all made in Japan
Supplied with Labels

OMD DISK & BOX OFFER

	48T	96T	DSHD
5 1/2" x 50 CAP BOX + 50 DISKS	£21.90	£25.90	£49.50
x 100 CAP BOX + 100 DISKS	£34.50	£39.50	£95.00
x 140 CAP BOX + 100 DISKS	£36.50	£51.50	£97.50
3 1/2" x 50 CAP BOX + 25 DISKS	£29.50	50 DISKS -	£51.50
x 100 CAP BOX + 50 DISKS	£52.50	100 DISKS -	£92.50

COLOURED 5 1/4" DSDD DISKS

	25	50	100
Red, Blue, Green, Yellow, White	£13.50	£28.90	£48.50

OMD - SPECIAL

100 x 5 1/4" DSDD 48 TPI DISKS
AND 100 CAPACITY DISK BOX £31.50

PRINTER RIBBONS

Amstrad 8256/8512	£3.95	NEC P2200	£4.50
Amstrad DMP 2000/3000	£2.75	Panasonic KXP 1081	£4.50
Citizen 120D	£4.25	Star NL10	£3.90
Epson FX/MX 80/FX 800	£2.90	Star LC10	£3.90
Epson LX 80/86	£2.40	Shinwa CP 80	£3.75

Most other makes of Ribbon available, phone for details.
Dust covers for above £4.50

COMPUTER PAPER

PLAIN FANFOLD PERF. EDGES	
11 x 9 1/2" 60 gsm 2000	£15.90
A4 11 1/2 x 9 1/2" 85 gsm 1000	£13.90

COMPUTER LABELS

SELF ADHESIVE, CONTINUOUS	
PACKED 2000 1, 2 or 3 across	
3 1/2 x 1 1/16"	£10.90
4 x 1 1/16"	£11.90

DISK HEAD CLEANER WITH FLUID

3"	£4.50	3 1/2"	£3.50	5 1/4"	£2.75
----	-------	--------	-------	--------	-------

DATA SWITCH BOX



Available in RS232 or Centronics
2-Way £19.50 4-Way £25.50
3-Way £22.50 Cross Over £27.50

DISK STORAGE BOXES



5 1/4"	50	£6.90
5 1/4"	100	£7.90
5 1/4"	140	£9.90
3 1/2"	50	£6.75
3 1/2"	100	£8.90

All Storage Boxes are with Lock and come with 2 Keys

SUPER MOUSE PAD

11" x 9" HIGH QUALITY MOUSE PAD WITH NON SLIP RUBBERISED BACKING £4.90

KEYBOARD STORAGE DRAWER



VDU ARM



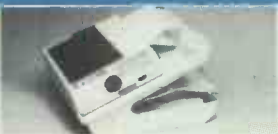
ATM601 Heavy duty height and reach adjustable VDU Platform. Maximum loading 65 lbs, complete with wall, desk or clamp mount fittings.
ORDER NOW £125.00

MONITOR MOVER

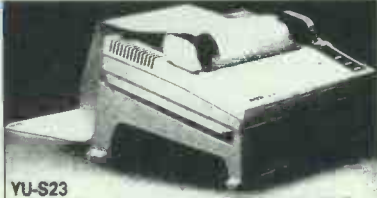


YU-M10 Solid steel structure with a finish that ensures stability and longevity. Expand work space. £75.00

PRINTER STANDS



YU-S25 K/D PRINTER STAND
Made of molded plastic. Feeds and refolds paper underneath the printer, takes up hardly more space than the printer itself
YU-S25A: for 80 col. printer. £27.90
YU-S25B: for 132 col. printer. £32.50



YU-S23 PRINTER STAND
Securely holds any printers wide or small. Made of molded plastic. £10.50

COPY HOLDERS



With adjustable arm
80 Column £14.50
132 Column £19.50
Desk Top £8.90

Stores keyboard under the CPU or monitor safely out of the way of dust and dirt.

YU-E21A accommodates PC/XT keyboard to 2 3/4" H x 20" W x 9 1/2" D £29.50
YU-E21B accommodates PC/AT keyboard to 2 3/4" H x 22 1/4" W x 9 1/2" D £34.50

MOBILE PRINTER STAND



Rugged steel frame. Height adjustable basket for output paper & base shelf for input paper. Self assembly - includes castors.
80 column £57.50
132 column £74.50

3M DATA CARTRIDGES

DC 1000	£13.50	DC 300XLPE	£19.50
DC 2000	£24.00	DC 600A	£20.50

PRINTER BUFFERS



Parallel printer buffer memory with copy bypass and reset

PB 64K 1 IN 1 OUT	£ 75.00
PB 64K 2 IN 1 OUT	£ 95.00
PB 256K 1 IN 1 OUT	£145.00
PB 256K 1/2 IN 2/1 OUT	£169.00

WIRE PRINTER STAND

80 col £12.50

PRINTER CABLES

IBM PC/Amstrad/Compatible	
25 PIN-36 PIN	£7.50
RS232M/M	£8.50
RS232M/F	£8.50
CENTRONICS/CENTRONICS	£8.50

CPU STAND

£12.50

LASER PRINTER TONER CARTRIDGE FOR CANON

HP/APPLE £75.00



OVERSEAS MEDIA DISTRIBUTORS

OM HOUSE,
139-141 DOMINION ROAD
GLENFIELD, LEICESTER LE3 8JB
TEL: (0533) 877733 (24 hours)

FAX: (0533) 873999
ORDER BEFORE 12 noon
FOR SAME DAY DESPATCH

EDUCATIONAL, GOVERNMENT AND PLC ORDERS ACCEPTED.
TRADE AND EXPORT ENQUIRIES WELCOME

TAS Financial Accounting

Integrated financial accounting systems are a vital part of effective business management. Choosing the right system is important for you and your company and like all decisions it must be carefully considered. TAS financial accounting offers benefits that make it totally different from all others on the market.

POWERFUL DATABASE

The accounting system was developed in TAS, the award winning high speed relational database that is the most modern alternative to traditional programming methods. So besides all accounting functions you get powerful database tools like program and report generators and database browsers included in the package. It is ready to run, straight out of the box, fully menu driven, easy to set-up and learn, and designed to be used by everyday people.

MODIFIABLE ACCOUNTING

Besides the database you also get the *source code*. That's the original database code the accounting modules were written in. Note that you or your staff need to know nothing about the database to operate the accounting system. But it is reassuring to know that, if you are inclined to do so, you have everything you could possibly need to tailor the software yourself or have this done for you by anyone in our nationwide dealer network.

COST EFFECTIVE

TAS Financial Accounting includes the relational database. Prices range from £499 for the three integrated ledgers with invoicing, up to £1399 for the multi-user network version including stock control and full sales and purchase order processing. 30 Day free hotline telephone support is included in the package followed up by an annual service and support program available at low cost.

SINGLE AND MULTI-USER

As supplied, the accounting modules are ready to operate in a multi-user environment. Since multi-user is a function of the database, you can upgrade to multi-user TAS at any time. Your accounting system and datafiles can then be simultaneously accessed by multiple users with full file and record locking which ensures data integrity. TAS financial accounting runs on any IBM or compatible micro computer and multi-user networks. A version for Concurrent CP/M is also available.

TEST DRIVE
FOR
ONLY

£30

Because even the best demonstrations are not as good as having hands-on experience, we have devised a low cost "testdrive". Now you can try the complete accounting system for only £30 plus handling and VAT. As a matter of interest, these "testdrives" are regularly purchased solely to teach computerised accounting. Here's what you get:

- **The TAS Relational Database.** Fully operational but limited to save a maximum of 250 records per file.
- **Excellent 200+ Page Accounting Tutorial.** A complete "how-to" guide with table of contents and multi-page index.
- **All TAS Financial Accounting Programs.** Fully operational but limited to a maximum of 10 customers, 10 suppliers, 60 nominal accounts etc.

This Financial Accounting "testdrive" is a fully operational system and will show you step-by-step how to implement a computerised accounting system and how to handle most accounting "events" that happen in business. And you can upgrade to the full system without having to re-enter your data.

Send for more information or contact your local dealer today and find out how TAS can be your 100% accounting solution.

TAS
your
the Accounting Solution!

Tailor Made Accounting

Whatever your needs, anyone of this nationwide network of dealers and software houses are perfectly suited to identify solutions and provide advice on hardware and software selection. They can help you choose the right financial accounting system, modify this software to your specific requirements and provide a complete installation and training service. So it will fit tomorrow as well as it fits today.

NORTH WEST

Tero Services Ltd
15 St Pauls Close
Low Moor, Clitheroe
Lancashire BB7 2NA

Telephone No.
and contact
0200-25392/23552

Mr Chris Wood

Castle Business Services
28c High Street House
Newmarket Street
Skipton BD23 2HR

0756-69610/68832

Mr John Leighton

Diamond Business Software
Ryecroft Hall
Manchester Road, Audenshaw
Manchester M34 5GJ

061-301 3888

Mr Ken J Wood

Cognisoft
Carrington Business Park
Manchester Road, Carrington
Manchester M31 4DD

061-776 4239

Mr Robin Lord

Neston Computer Services
Royal Shopping Arcade
Chester Road, Neston
South Wirral L64 9PA

051-336 6905

Mr Melvyn Goddard

HD Business Computers Ltd
187a Ashley Road
Hale, Altrincham
Cheshire WA15 9SQ

061-941 5205

Mr H Davies

CENTRAL

Games Unlimited
Unit 4/5 New Street
Holbrook Ind. Est., Halfway
Sheffield S19 5GZ

0742-470242

Mr Keith Holmes

J R Systems
17 Garratt Close
Heighington
Lincoln LN4 1RN

0522-790062

Mr Jonathan Green

Tower Systems Ltd
Glaston Road
Uppingham
Leicestershire LE15 9PX

0572-821373

Mr Barry Towers

Anchor Data Consultants Ltd
Premier House
43-48 New Street
Birmingham B2 4LJ

021-643 8899

Mr Peter Lane

WALES

V D U Technology
21 Newbridge Road
Pontllanfraith, Blackwood
Gwent, Wales

0495-224342

Mr Howard Kennedy

NORTH EAST

Data Management
(TAS Users Group)
Clark House, The Village
Haxby, York YO3 8HU

Telephone No.
and contact
0904-760847
(4 Lines)

Mr Geoff Protheroe

EAST ANGLIA

Kestrel Computing
O.I.S. House, Bessemer Way
Harfreys Industrial Estate
Great Yarmouth
Norfolk NR31 0LX

0493-655608

Mr Maurice Funnell

LONDON & HOME COUNTIES

Conway Office Technology
235 Chase Side
Enfield EN2 0RA

01-367 2747

Mr Barry Conway
Mr Gerald Coleman

Team Management Systems Ltd
Victoria House,
28-38 Desborough Street
High Wycombe
Bucks HP11 2NF

0494-26211

Mr P W Harding

Good Option Ltd
6-7 Dvorn Place
Hertford, Herts. SG14 1PA

0992-584909

Mr Alan Fitt

Decision Support Ltd
58 Brackenbury Road
London W6 0BD

01-748 2573

Mr John Bugh

Crystal Management Ltd
46 Theobalds Road
London WC1X 8NW

01-404 3153 / 4030

Mr Tim Buckfield

Clarendon Computer Services Ltd
Kingswick House
Sunninghill, Ascot
Berkshire SL5 7BH

0990-23491

Ms Sue Perrins
Mr Chris Drewery

Arrowflight Data Processing Services
Little House
32 Cullesden Road
Kenley, Croydon
Surrey CR2 5LR

01-660 6442

Mr Grahame Stanley

Dibcote Systems Ltd
Forest Down
Forest Road, Pyrford
Surrey GU22 8LU

09323-48305

Mr Victor Butler

SOUTH

Computer and Accounting Solutions
Pollards Farmhouse
Clanville, Andover
Hampshire SP11 9JE

0264-70300

Mr Richard Wright

Avon Business Computers
Bristol Service Centre
89 Stokes Croft
Bristol BS1 3RD

0272-46306/46488/
46378

Mr A J Williams

Redview Computers
Rosebury House
Red Shute Hill
Hermitage (Nr Newbury)
Berkshire RG16 9QW

0635-200491

Mr Tom Spence

HOW TO CHOOSE A

SEND FOR MORE INFORMATION

ORDER A "TESTDRIVE"

or contact your
local dealer today
to find out how TAS
can be your 100%
accounting solution.



TO: MEGATECH, 111-113 Wandsworth High Street, London SW18 4HY

Please send more information about

Card Name _____

TAS Financial Accounting _____

Card Address _____

Please supply _____ copies

TAS Level 2 & 3 Testdrives @ £30 _____

Add handling & shipping £6 _____

Add 15% VAT _____

I enclose a total of _____

Postcode _____

Payment:

Cheque

Access

Visa

Daytime Tel No: _____

Card No: _____

Signature _____

Card Expiry Date _____

A VAT invoice will be included in the Parcel. Enclose a company letterhead if invoice name and address needs to be different from card name and address.

MEGATECH

111-113 Wandsworth High Street
Wandsworth, London SW18 4HY
Tel: 01-874 6511. Fax: 877 1384

HIGH-SPEED PROGRAMMING

with **TAS** Professional

More and more programmers use TAS Professional as a development tool. The reason is simple. They create powerful applications in a fraction of the time compared with traditional programming methods. Applications with powerful capabilities built-in without any additional work. Programs with beautiful screens, windows, pull-down menus, boxes, on-line help and up to 128 dazzling colours. Programs that were easy to write but with that "look and feel" like they have cost thousands of pounds to develop.

TAS Financial Accounting, our all singing and dancing order processing and integrated accounting system (yes it's for sale and we include the source code so it's modifiable) was developed using TAS. Running on a network with full file and record locking, any one of us can instantly answer questions like who bought what, when and at what price.

Programmer Productivity

Get live results fast - even before you have written a line of code you create data entry screens with the screen painter and program generator. Define your record layouts on-the-fly and update the data dictionary from within the screen painter. Learning how *not* to do it becomes easy as subsequent file changes and restructures are automated and a simple (batch) recompile updates existing programs.

Program with the syntax-checking editor (expanded from the award winning TAS Plus version) or program in ASCII using your favourite editor. And compile it into tiny programs that protect your source code and are superfast to execute.

Most Powerful 4GL

Everything you need to develop complex applications fast. Arrays, powerful file search commands, 10-Level subroutine nesting and true recursion. Full comparison, structured constructs IF/THEN/ELSE, DO/WHILE, GOTO, GOSUB etc. You can even "pop" the stack (do a gosub without a return - nasty but convenient). All TAS utilities were written in TAS itself and the source code is included.

Time Saving Tools

Central Data Dictionary - Define file layouts only once. Change file layouts any time with automated file restructure.

Screen Painter - What you see is what you get. Powerful editing commands create screens fast with up to 16 screens per program. Change screens anytime.

Database Browser - Save time during program development. Instantly display any file in "row/column" format. Individual fields can be changed and the record saved back to disk.

Multi-file Report Generator - Design formats with the screen painter. Use up to 10 related files and it generates source code so you can edit it for super fine tuning.

Program Generator - Use the screen painter to generate multi-file data-entry programs in minutes rather than hours. Based on your own skeleton program, you subsequently edit and add to the source code.

Interactive Database Maintenance - Create instant testdata during program development and add, change or delete any field in any record in any existing database.

DEALER ENQUIRIES INVITED

Building on Btrieve

TAS Professional incorporates Btrieve, the heart of Novell's family of data management tools which is quickly becoming the industry standard. So your data can now also be accessed by traditional programming languages like Basic, Cobol etc. Btrieve's main features like sophisticated multi-user support, fault tolerance and cache buffering, make large networked applications even easier to create and maintain. Novell's latest XQL and SQL products will also be fully supported. So if you are a developer looking to create programs with that professional look, look at TAS Professional. The most powerful and complete application development system today.

Ultra-fast Compiler

Gives source code security. Every program you create is small and runs incredibly fast, even on a standard PC !

Unlimited Runtime

For resellers there is a special version which you can serialize giving you unequalled control over distribution of your software and no further royalties or licenses are required.

Money Back Guarantee

Don't just take our word for it. Try it. We know that the best way to develop applications fast is with TAS Professional. That's why TAS Professional comes with a 30-day, no quibble money back guarantee. If you like it you keep it. If not, just send it back and we'll give you your money back. No questions asked.

Act Now !

Order your copy today. Start developing tomorrow ! All goods are despatched using 1st Class Recorded Delivery on the same day we receive your order. Use the coupon below or phone our Sales Hotline number ☎ 01-874 6511.

TO: MEGATECH, 111-113 Wandsworth High Street, London SW18 4HY

Please supply _____ copies of TAS Professional under your no questions asked money back guarantee

Single-user @ £499 per copy: £ _____
Multi-user @ £799 per copy: £ _____
Handling & Shipping: £6.00 _____
Add 15% VAT: £ _____
I enclose a total of: £ _____
Please send more information: _____

Payment
Cheque Access Visa
Card No: _____

Card Expiry Date: _____

Card Name: _____

Card Address: _____

Postcode: _____

Daytime Tel No: _____

Signature: _____

A VAT invoice will be included in the Parcel. Enclose a company letterhead if invoice and address needs to be different from card name and address

MEGATECH

111-113 Wandsworth High Street
Wandsworth, London SW18 4HY
Tel: 01-874 6511. Fax: 01 877 1384

TAS Products are also distributed by GEM Distribution (0279-442842) and NEWSTAR Software (0245-265017)
In the BENELUX phone Switch Datasystems in the Netherlands on 010-435 0011 (Fax 010-435 0607)

PUBLIC APOLOGY

We at M.D. Office Supplies would like to take this opportunity to apologise to all our competitors. We shall with IMMEDIATE effect supply COMPUTER DISCS, STORAGE BOXES, etc, AT WHOLESALE PRICES

OUR SPECIAL OFFER PRICES ARE UNBEATABLE

5.25" DISCS & BOXES

25 Double Sided 96tpi with 50 capacity disc box.....	£13.49
50 Double Sided 96tpi with 50 capacity disc box.....	£17.49
75 Double Sided 96tpi with 100 capacity disc box.....	£23.49
100 Double Sided 96tpi with 100 capacity disc box.....	£29.49

3.5" DISCS & BOXES

20 Double Sided 135tpi discs with 40 capacity disc box.....	£21.95
30 Double Sided 135tpi discs with 40 capacity disc box.....	£31.95
40 Double Sided 135tpi discs with 80 capacity disc box.....	£36.95
50 Double Sided 135tpi discs with 80 capacity disc box.....	£44.95
60 Double Sided 135tpi discs with 80 capacity disc box.....	£51.95
75 Double Sided 135tpi discs with 80 capacity disc box.....	£64.95
100 Double Sided 135tpi discs with 120 capacity disc box.....	£82.95

All boxes come complete with dividers, two keys and are antistatic

PRICE AND QUALITY GUARANTEE

All our discs are top quality and are certified 100% error free. Should you ever see a comparable product advertised in this magazine at a lower price we will not match it we will beat it *Guaranteed*

BRANDED DISCS

		10	30	50	100
3M DS DD 48tpi 5.25"	£9.95	£28.90	£43.95	£79.95	
3M DS DD 96tpi 5.25"	£12.95	£37.90	£52.95	£119.95	
Verbatim DS DD 48tpi 5.25"	£9.45	£28.50	£42.95	£78.45	
Verbatim DS DD 96tpi 5.25"	£11.95	£36.50	£49.95	£114.95	
3M DS DD 135tpi 3.5"	£18.50	£49.95	POA	POA	
Verbatim DS DD 135tpi 3.5"	£19.50	£52.95	POA	POA	
Sony DS DD 135tpi 3.5"	£18.95	£49.95	POA	POA	

ACCESSORIES

3.5" Head Cleaner.....	£3.95
5.25" Head Cleaner.....	£3.95
Deluxe Mouse Mats.....	£3.95
Disc Notcher (Doublor).....	£3.95



Professional Printer Stand (Spacesaver) 80col £22.95/132col £23.95

STORAGE BOXES

3.50" Lockable — Holds 40.....	£5.95
3.50" Lockable — Holds 80.....	£6.95
3.50" Lockable — Holds 120.....	£8.95
5.25" Lockable — Holds 50.....	£5.95
5.25" Lockable — Holds 100.....	£6.95
5.25" Lockable — Holds 140.....	£8.95



THINSY — the revolutionary copy holder — £5.95



M. D. OFFICE SUPPLIES

18 Crescent Way, Farnborough, Kent BR6 9LS. Tel: 0689 61400 Fax: 0689 50628

All goods are supplied subject to availability. All prices inclusive of VAT and Carriage UK Mainland



FORTTRANSOFT LTD

PROFESSIONAL SOFTWARE FOR THE IBM PC/XT/AT AND COMPATIBLES, eg. OLIVETTI, COMPAQ, AMSTRAD, OPUS INCLUDING IBM PS/2 AND AMSTRAD PC2000 SERIES

BASIC is fine for short programs and when speed and portability are not important. Besides, you can draw pretty pictures on the screen with BASIC. However, if you are writing large programs and wish to protect all the hours (in some cases years) you spent in writing your software then Fortran comes into its own. Whilst most languages are 'here today — gone tomorrow', Fortran designed in the late fifties, still remain the dominant language for scientific and general purpose programming today. This means that programs you write today will work tomorrow on future generation of machines with little or no change.

Fortransoft now brings you an affordable ANSI77 Fortran Compiler. And you can still draw pretty pictures on the screen because the GRAPHKIT library comes with the compiler and is included in the price. Full manuals included with all software.

FS-Fortran 77 is now at level 3.17 (with 8087 support) and current users may obtain a copy of the compiler for £7 all incl.

FS-Fortran 77 with CGA, EGA, VGA, MCGA and Herc. mono graphics.....£34.95

FS-GRAPHKIT is a comprehensive suite of graphics and sound routines, including routines for drawing lines, circles, ellipses, painting, read/write to port, get time and date, reading a single key from the keyboard, screen dump, etc

FS-GRAPHKIT is available for use with Ryan McFarland Fortran, Lahey Fortran, IBM Professional Fortran, Lattice C, Zorland C, Prospero Fortran77 and all versions of Microsoft Fortran compiler.

FS-GRAPHKIT with CGA, EGA, VGA, MCGA and Herc. mono graphics.....£19.95

FS-Sortmerge is a suite of Fortran-callable routines for sorting/merging an unlimited number of records on multiple keys. Any combination of alphabetic and numeric keys may be specified.

FS-Sortmerge is available for use with FS-Fortran77, Prospero Fortran77, Ryan McFarland/IBM Professional Fortran, Lahey Fortran and all versions of Microsoft Fortran. (Please specify which compiler when ordering).

FS-Sortmerge.....£19.95

FS-Index is a suite of high performance Fortran-callable routines for creating/accessing indexed sequential files. The B-tree method of implementation is used with the advantages of fast access time and a self-reorganising index.

FS-Index is available for use with FS-Fortran77, Prospero Fortran77, Ryan McFarland/IBM Professional Fortran, Lahey Fortran and all versions of Microsoft Fortran. (Please specify which compiler when ordering).

FS-Index.....£29.95

FS-SourceMan a utility for keeping track of all Fortran routines and the files in which they reside. Also checks the number of arguments passed to subroutines/functions and consistency of calls for the WHOLE program and not just for a single file. Includes an interrogation feature for finding unused routines, routines which call a given routine, and many others. Can cope with thousands of subroutines and files.....£19.95

OS/2 PRODUCTS

FS-GRAPHKIT is also available for Microsoft Fortran 4.1 running under OS/2 Standard Edition 1.0. FS-Graphkit with CGA, EGA, MCGA, VGA, Herc mono graphics.....£34.95

Fortransoft acknowledges all trademarks and registered names in this advert. Please indicate Compiler and Computer type when ordering. All prices include packing, postage and VAT. Please add £3 for delivery outside Europe. All software comes on 5.25"/3.5" (please specify). COD's and purchase orders are NOT accepted. Overseas dealer enquiries welcome. Send cheque with order to: (or write for further details)

FORTTRANSOFT LTD

60 HARNESS WAY, ST. ALBANS HERTS AL4 9HB.
(Tel: (0727) 32409)

3 1/2" into 5 1/4" WILL go!!

LOOK TO THE FUTURE NOW BY INSTALLING A 3FIVE 3 1/2 INCH DISC DRIVE TODAY

15 minutes is all it takes to provide your PC or PC-compatible with the ability to read, write and format popular 3 1/2" discs giving you compatibility with the whole spectrum of computers using 3 1/2" disc technology, including the new IBM Personal/2 disc format.

OUTSTANDING FEATURES

- * Easily installed External or Internal version
- * Runs under any version of MS-DOS or PC-DOS, from 2.0 upwards
- * Reads, Writes and Formats most popular 3 1/2 inch formats, including Apricot and Hewlett Packard etc.
- * Gives an extra 720 Kb to 1.44 Mb of disc storage
- * Automatic format detection
- * Self powered or host powered
- * Complete with all necessary hardware and software

Available in Four Versions

Prices from £195.00

For further details contact:

Systems Constructors Ltd

30 Christchurch Road

Bournemouth

BH1 3PD.

Fax: 0202 28280

Tel: 0202 297315

Telex: 946240

MULTIPOINT BUFFERED DATA SWITCHES

The Multipoint Buffered Smart Automatic Switch can actually multiply the utility of PCs and laser printers by allowing several users to share printers automatically. The internal buffering system allows simultaneous access to users thus freeing the computers for other tasks. The printer can be selected either manually or by software control

BOTH PRINTERS PRINTING DIFFERENT DOCUMENTS SIMULTANEOUSLY

CENTRONICS					SERIAL				
Model	Memory	Inputs	Outputs	Price	Model	Memory	Inputs	Outputs	Price
PB12	64K(E)	1	2	£269(d)	SB31	256K	3	1	£375(d)
PB14	256K(E)	1	4	£345(d)	SB42(S)	256K	4	2	£495(d)
PB42(S)	256K	4	2	£415(d)					
(36 PIN) WITH SOFT CODE PB42(W/S) 256K 4 2 £365(d)					SB71 256K(E) 7 1 £655(e) SB71 1MB 7 1 £895(e) SB22 256K(E) 2 2 £375(d)				
WITHOUT SOFT CODE					CENTRONICS & SERIAL 256K EXPANSION - £80 (E) INDICATES EXPANDABLE				
PB22	64K(E)	2	2	£215(d)					
PB22	256K(E)	2	2	£295(d)					
PB71	256K(E)	7	1	£545(e)					
PB71	1MB	7	1	£785(e)					
PB41	256K	4	1	£340(d)					

SMART AUTOMATIC SWITCHES

IPXA	PARALLEL	2	2	£145(d)	V244A	SERIAL	4	1	£160(d)
IPSA4	PARALLEL	4	1	£130(d)	V248A	SERIAL	8	1	£200(e)
IPSA8	PARALLEL	8	1	£170(e)	V24-42A	SERIAL	4	2	£175(d)
APS42A	PARALLEL	4	2	£165(d)	V24-22A	SERIAL	2	2	£155(d)

INTELLIGENT PRINTER BUFFERS

SELF-TEST FUNCTION • BUFFER/PRINTER READY INDICATOR • BUFFER RAM STATUS INDICATOR • RESET AND MULTIPLE COPY FUNCTION • BUFFER BYPASS SWITCH •

PB64	64K	1	1	£150(d)	SB64	64K(E)	1	1	£170(d)
PB64P	64K	POCKET BUFFER		£100(d)	SB256	256K(E)	1	1	£285(d)
PB64Z	64K	1/2	2/1	£195(d)	SB512	512K(E)	1	1	£385(d)
PB256	256K	1	1	£215(d)	SB1M	1M	1	1	£585(d)
PB256Z	256K	1/2	2/1	£260(d)					
PB512	512K(E)	1	1	£325(d)					

UNIVERSAL BUFFER

SERIAL & PARALLEL INPUT AND OUTPUT • X ON AND X OFF SOFT AND DTR HARD HANDSHAKE • CENTRONICS • 2 FRONT PANEL T SWITCH INPUT AND OUTPUT • COPY • RESET • EXPANDABLE TO 256K •

UB (64K) £190(d)	UB (256K) £275(d)
------------------	-------------------

ACCESSORIES

KSM101	RS232 SERIAL TO PARALLEL CONVERTER WITH PSU	£65(a)	KSM110	SERIAL LINE DRIVER (3 MILES)	£80(b)
KSM101-B	ABOVE WITH 64K BUFFER	£160(c)	KSM111	MULTILINK SWITCH SELECTABLE SERIAL CABLE RS232 (250-M/F)	£24
KSM104	PARALLEL TO SERIAL CONVERTER WITH PSU	£70(a)	KSM112	SERIAL-PARALLEL-SERIAL BIDIRECTIONAL CONVERTER	£110(b)
KSM104-B	ABOVE WITH 64K BUFFER	£170(c)	KSM112-B	ABOVE WITH 64K BUFFER	£190(d)
KSM108	CENTRONICS DATA BOOSTER (100M)	£40(a)	KSM102	SERIAL GENDERCHANGER 25D	£10
KSM109	SERIAL RS232 DATA BOOSTER (100M)	£50(a)	KSM105	CENTRONICS GENDERCHANGER 36PIN	£10
			KSM103	SERIAL SURGE PROTECTOR 25D	£15

Add postage: (a) £2.00 (b) £4.50 (c) £5.50 (d) £6.50 (e) £8.50 + Cables £1.00 each + 15% VAT.

KEYZONE COMPUTER PRODUCTS LTD

454 Sunleigh Road, Alpertown, Wembley,

Middlesex HA0 4NW, (England)

Telephone: 01-900 1525 (4 lines) Telex: 8813271 GECOMSG Fax: 01-903 1486



Apple Dealer of the Year for Central London

Where delivery and installation is required, our Customer Service department will step in to provide the necessary facilities.

Staff training, an important element often ignored, can be conducted either on your premises, or centrally in Baker Street. Courses can be introductory or more specialised.

Should problems occur once the hardware has been installed, our in-house service department will be pleased to provide an efficient and speedy repair service, with on-site collection and return available if required. Our stock of spare parts gives a speedy turn-around.

Any software problems are handled by our Technical Support department, with a free 'hot-line' for customers queries. This department prides itself in its ability to solve the most involved problems with the minimum of delay, drawing on a wide base of in-house experience.

Our specialist departments can offer additional discount and service to Educational, Government and Corporate buyers.

If you would like more information on any of these services, please telephone or visit us, or ask us to send you our catalogue & price list.

Not the largest, nor the least expensive; not the oldest, nor the most stylish.

Just the most reliable, the best informed and the most helpful Apple Macintosh dealer in Central London.

We have been Apple specialists for six years, providing our services to all types of customer, from international business to cottage industries, from government departments to national newspapers, from universities to design agencies.

Our showroom in Baker Street is stocked with many of the latest products, (such as networks, scanners, printers, large screens etc), which are thoroughly tried and tested before being recommended to customers.

The wide range of software which we carry in stock means that we are able to demonstrate complete hardware and software systems to customers before purchase. In this way customers can see and understand the capabilities of any proposed system.

STIRLING MICROSYSTEMS

231 Baker Street London NW1 6XE 01-935 5262
The Specialist Centre for Apple Macintosh Systems

matmos

— THE NAME FOR LOW COST BRAND NEW BARGAINS

Matmos Ltd., 1 Church Street, Cuckfield, West Sussex RH17 5JZ.

Tel: (0444) 414484/454377

TRIUMPH-ADLER/ROYAL OFFICE MASTER 2000 DAISY WHEEL PRINTERS.

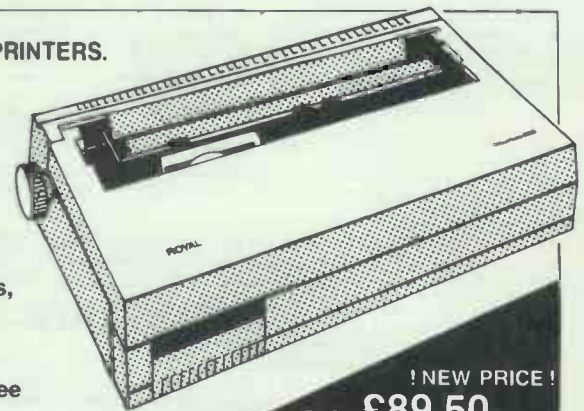
Our purchase of nearly 2000 of these printers direct from West Germany enables us to offer them at enormous savings!

Features include:

- * 20 cps operation
- * Full DIABLO 630 and IBM compatibility
- * CENTRONICS compatible parallel interface
- * 132 column with variable pitch capability including micro proportional spacing
- * Subscripts, superscripts, bold type, underline etc.
- * Manufactured to highest standards (rigid steel chassis etc) in West Germany by Europe's largest typewriter manufacturer

- * £ sign
- * Cables for IBM Amstrad, BBC Matmos, Centronics, £7.95

- * 6 month full guarantee
- * Ribbon & typewheel included



! NEW PRICE !
FROM £89.50 FOR 10
! UNBEATABLE !
£99.50 FOR 1 (Carr. £6.50)

POWER SUPPLY

Aztec 65w switchmode p.s.u. 5V at 8 Amp, +12V at 3 Amp, -12V at 1 amp.

£14.50 (Carr. £3)

MONITOR

Duplex 12" green screen high resolution composite video. Suits IBM, BBC Etc.

£29.50 (Carr. £5)

ACOUSTIC COUPLER

Transdata 307 RS232 modems. Mains powered 300 Baud. Fits all phones

£9.95 (Carr. £3)

■ ACCESS/VISA TELEPHONE SERVICE (24 HRS)

■ PROMPT DESPATCH

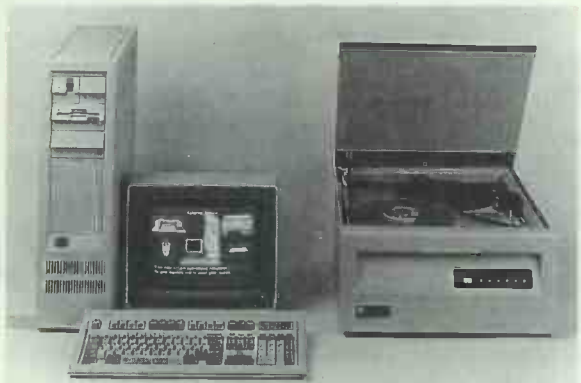
■ CARRIAGE AND VAT MUST BE ADDED TO ALL ITEMS

DIGI-DATA

2000/PC

9 TRACK
TAPE SYSTEM

PC/Mainframe Data Interchange



High Performance Tape System ...

... That means you can read and write any IBM standard PE format tape with your AT or PS/2.

- 2000 PC for AT Bus.
- 2000 PC/XL for PS/2 with MCA.
- Reads/Writes Industry Standard IBM/ANSI Tapes.
- 1600 bpi PE Format.
- Data Exchange Program to read Industry Standard Tape.
- FLASHBACK program for fast File back-up.
- Device DRIVER and Xenix DRIVER.
- FDUMP — view utility.
- 6250/1600 bpi system available. Model 2620 PC.



DIGI-DATA LTD
Unit 4, King's Grove,
Maidenhead, Berks,
England SL6 4DP
Tel: 0628 29555
Fax: 0628 770889

COMPLEX

NEVER BEATEN ON PRICE

ORDER YOUR NEW AMSTRAD 2086 NOW TO AVOID
DISAPPOINTMENT

THE COMPLEX AT-286 RANGE 12MHz
Systems supplied with 1.2Mb Floppy 14" Flat Screen Mono Monitor

Comlex AT-286 20Mb hard disk drive.....	£849
Comlex AT-286 40Mb hard disk drive 40ms.....	£929
Comlex AT-286 40Mb hard disk drive 28ms.....	£989
THE COMPLEX AT-386 16-20MHz	
Comlex AT-386 20Mb hard disk drive.....	£1499
Comlex AT-386 40Mb hard disk drive 40ms.....	£1559
Comlex AT-386 40Mb hard disk drive 23ms.....	£1659
Comlex AT-386 1 Meg upgrade for the above.....	£325
THE COMPLEX AT-386 20-24MHz	
Comlex AT-386 20Mb hard disk drive.....	£1849
Comlex AT-386 40Mb hard disk drive 40ms.....	£1899
Comlex AT-386 40Mb hard disk drive 28ms.....	£1999
Comlex AT-386 1 Meg upgrade for the above.....	£399

ATARI

520STFM.....	£229
1040STF.....	£385
1040STFM.....	£385
1040STF Mono Monitor.....	£459
1040STF Colour Monitor.....	£745
520STFM Sum/Pack.....	£289
PC1 SD base unit.....	£379
PC1 SD Mono Monitor.....	£450
PC2 SD base unit.....	£450
PC2 DD Mono Monitor.....	£565
PC2 DD base unit.....	£475
PC2 HD Mono Monitor.....	£759
PC2 HD base unit.....	£735
Mega ST2 Mono.....	£735
Mega ST4 Mono.....	£955
SL1804 Atari Printer.....	£955
Mega ST 2 DTP package.....	£1695
Mega ST 4 DTP package.....	£2295

AMSTRAD COMPUTERS

PCW 8256.....	£315
PCW 8512.....	£405
PCW 8512.....	£449
PPC 512S.....	£385
PPC 512D.....	£469
PPC 640S.....	£469
PPC 640D.....	£569
1512 DD Colour.....	POA
1640 DD Colour.....	POA
1640 HD Colour.....	£819
1640 DD ECD.....	£815
1640 HD ECD.....	£1099

AMSTRAD 8086 COMPUTERS

SD 12MD SD 12" Mono.....	£345
SD 12DD SD 14" Colour.....	£675
SD 12HRCD SD 12" Hi-Res.....	£755
SD 14HRCD 14" Hi-Res.....	£835
DD 12MD DD 12" Mono.....	£769
DD 14CD DD 14" Hi-Res.....	£869
DD 16HRCD 14" Hi-Res.....	£935
HD 12MD SD 30MG Mono.....	£869
HD 14CD SD 30MG 14" Col.....	£1015
HD 12HRCD SD 30MG Hi-Res.....	£1069
HD 14HRCD 30MG Hi-Res.....	£1225

COMMODORE

Amiga 500.....	£315
Amiga 500M.....	£525
Amiga 500 Business Pack.....	£659
Commodore PC1SD Mono Mon.....	£285

EPSON PC'S

PCF 20Mb Mono.....	£945
PCAX 20Mb.....	£1270
PCAX 40Mb.....	£1490
PCAX 80Mb.....	£1865
Epson 20mg 640k RAM.....	£345
+ PCAX 20mg Mono.....	£1305
+ PCAX 40mg Mono.....	£1575
+ PCAX 80mg Mono.....	£1935

EPSON PORTABLES

EPSON PC 2DD.....	£1046
EPSON PC 20mg.....	£1646

TANDON SYSTEMS

Tandon PCA.....	£849
Tandon PCA+.....	£899
Tandon PCA 20.....	£999
Tandon PCA 20+.....	£1049
Tandon PCA 40.....	£1199
Tandon PCA 70+.....	£1399
Tandon Target 20 MG.....	£1249
Tandon Target 20+.....	£1349
Tandon Target 40+.....	£1499
Tandon 386 16.....	£1995
Tandon 386 16/40.....	£2295
Tandon 386 20.....	£2495
Tandon 386 20/40.....	£2795
Tandon 386 20/70.....	£2995
Tandon 386 20/110.....	£3295
Tandon 386 26/10 Edd.....	£3495

PAC

PAC Plus.....	£799
PAC 1.2.....	£849
PAC 1.2 Plus.....	£849
Data Pac 30Mb.....	£165

SAMSUNG COMPUTERS

S300 SD Mono.....	£499
S300 20 Mono.....	£665
14" screen add £14. 30MD HD add £16. 42Mb add £51.	
S300 SD EGA Paradise Card.....	£799
S300 20 EGA.....	£925
S300 40 EGA.....	£999

SAMSUNG AT 286

SD Green/Amber.....	£849
SD 20MG Mono.....	£999
SD 40MG Mono.....	£1069
SD 20MG EGA Paradise Card.....	£1299
SD 40MG EGA Paradise Card.....	£1399
SAMSUNG AT 386	
1x3.5/1x5.25 54MG 28ms Mono.....	£2349
1x3.5/1x5.25 60Mb 28ms Mono.....	£2399
1x3.5/1x5.25 70Mb 28ms Mono.....	£2499
EGA 54MG 28ms.....	£2549
EGA 60Mb 28ms.....	£2649
EGA 70Mb 28ms.....	£2749

ZENITH

ZF 192 Mono.....	XT S
ZF 192 Colour.....	£829
Z 1583 Mono.....	£869
Z 1583 Colour.....	£1089
ZF 15912.....	£899
ZW 15913.....	£1179
ZENITH AT'S	
ZW 28625.....	£1229
Z 286.....	£1299
ZLP 28023.....	£1599
ZLP 28643.....	£1899

PORTABLE COMPUTERS

Amstrad PPC 1512S.....	£369
Amstrad PPC 512D.....	£479
Amstrad PPC 640S.....	£459
Amstrad PPC 640D.....	£569
Cambridge.....	£219
Compag.....	POA
Epson PCDD.....	£899
Epson PC 20MG.....	£1449
TOSHIBA P.O.A.	
Zenith 2 x 3.5 DD.....	£999
Zenith 20MG.....	£979
Zenith 286 40MG.....	£2349
Zenith 286 40 MG.....	£2999
Zenith 386 40MG.....	£3799

ARCHIMEDES

A305 Base.....	£599
A305 Mono.....	£649
A305 Colour.....	£799
A310 Base.....	£729
A310 Mono.....	£899
A310 Colour.....	£899
A410 Base.....	£799
A410 Mono.....	£859
A410 Colour.....	£979
A440 Base.....	£2159
A440 Mono.....	£2199
A440 Colour.....	£2299

ACORN MASTER

Master 128.....	£369
-----------------	------

HARD DISKS

Tandon 20 mg hard disk kit.....	£169
HD232 20mg hard card.....	£185
HD232 32mg hard card.....	£219
HD242 42mg hard card.....	£255
HD252 54mg hard card.....	£289
HQ 20mg hard disk kit.....	£169
HQ 40mg hard disk kit.....	£239
HQ 54mg hard disk kit.....	£379
Western Digital 21mg hard cd.....	£199
Western Digital 32mg hard cd.....	£239

AMSTRAD PRINTERS

Amstrad DMP 3250.....	£155
Amstrad DMP 4000.....	£259
Amstrad LD 3500.....	£259
Amstrad LD 5000.....	£339

BROTHER PRINTERS

M1109.....	£144
M1209.....	£189
M1409.....	£295
M1709.....	£355
M1724.....	£485
M2518.....	£715
M4018.....	£1055
M3524.....	£1149
HR40.....	£219
HR40.....	£695

CANON PRINTERS

PW1080A.....	£236
A55.....	£385
A60.....	£405
BJ80 Bubble Jet.....	£405
PB1080A Ink Jet.....	£405
M1724.....	£485
BJ 130.....	£715

CITIZEN PRINTERS

120D.....	£109
180S.....	£149
MSP15E.....	£189
MSP40.....	£269
MSP45.....	£339
MSP50.....	£345
MSP55.....	£459
HQ440.....	£337
HQ445.....	£379
P35.....	£369

EPSON PRINTERS

LX800.....	£165
FX850.....	£289
FX1050.....	£385
EX800.....	£439
EX1000.....	£569
EX1050.....	£589
LQ1050.....	£429
LQ1050.....	£549
LQ2500+.....	£689
LQ2550.....	£859
FX5000.....	£999
SQ2500.....	£889

HP PRINTERS

Thinkjet.....	£309
Quietjet.....	£365
Quietjet +.....	£425
Deskjet.....	£359
Paintjet.....	£689
Rugged Writer.....	£899

JUKI PRINTERS

6100.....	£259
6200.....	£349
6300.....	£569
6500.....	£689

MICRO PERIPHERALS PRINTERS

MP135.....	£139
MP165.....	£169
MP200.....	£245
MP210.....	£265
MP480.....	£399
MP700.....	£429
MP135+.....	£119

NEC PRINTERS

2200.....	£259
P6+.....	£419

P7+.....	£535
P960 Parallel.....	£795
P965 Serial/Parallel.....	£835
8810 Spinwriter RS232.....	£850
8815 Spinwriter RS232 Diablo.....	£850
8830 Centronics.....	£850
8850 IBM Parallel.....	£850
LC866 Silentwriter.....	£2150
LC890 Silentwriter.....	£3230

PANASONIC PRINTERS

Panasonic KXP3151.....	£339
------------------------	------

STAR PRINTERS

LC10.....	£167
LC10 Colour.....	£299
NK15.....	£269
ND10.....	£279
ND115.....	£325
NR10.....	£345
NR15.....	£385
LC 24-10.....	£269
NB 24-10.....	£425
NB 24-15.....	£509
NB 15.....	£569

LASER PRINTERS

Brother HL8.....	£1479
Brother HL60S.....	£3799
Canon LBP 8-11T.....	£1329
Canon LBP 8-11T.....	£1799
Canon LBP 8-11R.....	£1999
Citizen 106.....	£1145
Citizen 110.....	£1179
Citizen 112.....	£1759
HP Laserjet II.....	£1339
Kyocera F1000.....	£1599
Kyocera F1200.....	£2299
Kyocera F2220.....	£3399
Kyocera F3000.....	£3999
M.Tally 910.....	£2099
M.Tally 910 Emulation.....	£2399
M.Tally 910 SC.....	£2669
M.Tally 910 DIP.....	£2899
OKI Laser.....	£1279
Panasonic KXP 4450.....	£1579
DMS PS 810 + Postscript.....	£2679
Star LPB.....	£1389

PLOTTERS

CCALCOMP.....	£3379
Calcomp Colour Master.....	£4119
A4 Plotmaster.....	£329
1043 GTA.....	£329
1044 GTA.....	£11699

HP

7440A.....	£709
7475A.....	£1029
7550A.....	£2769
7570A.....	£2789
RDLAND	
DX11100.....	£569
DX11200.....	£799
DX11300.....	£950
DPX 2200.....	£2389
DPX 3300.....	£3199
RRX 300.....	£3225
GRX 400.....	£4399

PROCESSORS

8087 5MG.....	£69
8087 8MG.....	£99
8087 10MG.....	£105
80287 5MG.....	£105
80287 8MG.....	£159
80287 10MG.....	£179
80387 16MG.....	£389
80387 20MG.....	£419

FAXES</

THE CAS PC COMPATIBLES RANGE

BREAKING THE PRICE BARRIERS ...

ALL SYSTEMS CAN BE CONFIGURED TO CUSTOMER REQUIREMENTS



YOU CANT BUY BETTER!

£840
20 MB 640K
MONO
PC-AT

model code: CAS2T12, 3C16, 3C20, 3C25.

DSC® TURBO AT

· 12MHz 80286 CPU · 80287 option · 1MB RAM · AMI BIOS · 1.2MB FD · 20 MB HD · 8 slots (6x16bit, 2x8bit)

CAS2T12	MONO	EGA	VGA	LM
20 MB	900	1200	1300	11.7
40 MB	970	1270	1370	
80 MB	1250	1550	1650	



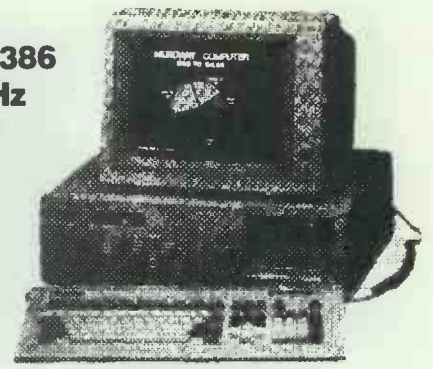
***** NEW *****
SuperFast 33MHz 386
LandMark-50 MHz
Available Now

model code: CAS3S16, 3S20, 3C16, 3C20, 3C25, 3C33.

CAS 386S & CAS 386C

· 16/20 /25/33 MHz 80386 · 1MB RAM exp. to 8 MB on motherboard · Up to 24 MB on 32 bit RAM card · shadow RAM or cache memory technology · support for 80287/80387 and weitek maths coprocessor · AMI BIOS · 1.2 MB 5.25" or 720K 3.5" FD · 8 slots 200W power.

20 MB	MONO	EGA	VGA	LM
CAS 386S (Japanese motherboard)				
CAS3S16	1500	1800	1900	20.0
CAS3S20	1650	1950	2050	22.6
64K cache 386 (U.S.A. motherboard)				
CAS3C16 16 MHz 386 45nsec Cache				
20 MB	1550	1850	1950	25.0
40 MB	1650	1920	2020	
CAS3C20 20 MHz 386 25nsec Cache				
20 MB	1700	2000	2100	30.0
40 MB	1750	2070	2170	
CAS3C25 25 MHz 386 25nsec Cache				
20 MB	2400	2700	2800	42.0
40 MB	2470	2770	2870	
CAS3C33 33 MHz 386 25nsec Cache				
20MB	2750	3050	3150	50.0
40 MB	2820	3120	3220	



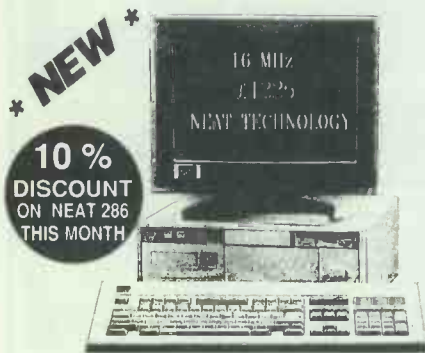
model code: CASXT8, XT10.

DSC® TURBO XT

· 4.77/8 8088 CPU (10 MHz opt.) · 640K RAM · 360K FD · 20MB HD · 8 slots · RS232 serial and parallel ports · battery-backed clock calendar AT style keyboard.

CASXT8	MONO	CGA	EGA	SI
20 MB	£600	£700	£900	3.0
40 MB	£670	£770	£970	

®DYNAMIC SPEED CONTROL



*** NEW ***
10% DISCOUNT
ON NEAT 286
THIS MONTH

model code: CAS2N12, 2N16, 3C20, 3C25.

CAS NEAT 286

12 and 16 MHz 80286-16 CPU · 8 or 10 MHz Maths coprocessor option · 1MB RAM (expandable to 8 MB on motherboard) · Zero-wait state operation using latest NEAT technology. Extended memory can be configured as EMS 4.0 RAM.

20MB	MONO	EGA	VGA	LM
CAS2N12	1000	1300	1400	16.7
CAS2N16	1225	1525	1625	20.0
40MB				
CAS2N12	1070	1370	1470	16.7
CAS2N16	1295	1595	1695	20.0

PC COMPATIBLE SERIAL MOUSE £30

Hard disk Upgrades:

40 MB 65ms to 40 MB 28 ms	£80
40 MB 65ms to 80 MB 28 ms	£350



model code: CAS2LCD, 3LCD.

CAS2LCD & CAS3LCD

80286 or 80386 CPU · 1MB RAM · 1.2MB FD · 20MB HD · 640x200 LCD MONO & CGA emulation. Option of plasma & 640x400 display.

Model	20 MB	40 MB	60 MB
CAS2LCD	1200	1270	1420
CAS3LCD	1950	2020	2170



Printer model & specs.	Price
EPSON LX800 180cps 30NLQ	160
EPSON LQ500 180cps 60LQ	275
NEC P2200 168cps 56LQ	270



CAS COMPUTERS (UK) LIMITED

Competitive supplier of high quality PC systems since 1983.

Unit 14-15, Malham Industrial Estate, Malham Road, London SE23 3AH

FAX: 01-291 4837

See us at Which Computer Show, NEC Birmingham 1989 stand no. 2750

TLX: 8952387 ANSWER G

☎ 01-291 5777 (10 Lines)

CAS has a policy of continually improving its product range, therefore specification is subject to change without prior notice.

SHOPPING AT MPD MICRO WORLD!!

0932 221212

WE HELP YOU TO SPEND LESS FOR MORE...!!

★★★ Choice of Starters ★★★

MPD88

- CPU 8088-1 4.77/8Mhz
- RAM 640Kb
- Mono Graphic board
- 1 x 360Kb FDD
- Standard keyboard

MPD286

- CPU 80286-12 6/12Mhz
- RAM 640Kb
- Mono Graphic Board
- 1 x 1.2Mb FDD
- HDD/FDD controller
- Enhanced keyboard

MPD386

- CPU 80386-20 20/24Mhz
- RAM 1 Mb
- Mono Graphic Board
- 1 x 1.2Mb FDD
- 20Mb HDD
- Enhanced keyboard

• For 8088 and 80286 systems. They come with a small foot print cabinet which will adopt 2 x 5.25" FDD and 2 x 3.5" FDD. There's a standard cabinet for 386 system.



★★★ Choice of Main Courses ★★★

- ★ MPD88 MH2 Basic model with 20Mb HDD £549.00
- ★ MPD286 MH2 Basic model with 20Mb HDD £789.00
- ★ MPD386 VH4 Basic model with VGA board and 40Mb HDD £1859.00

★★★ Choice of Desserts ★★★

- ★ Tower cabinet kits upgrade £249.00
- ★ Video Display Adaptors
- MGP Mono graphic with printer port..... £34.00
- EGA EGA/CGA/MGA modes £99.00
- VGA Supports VGA/800 X 600/EGA/CGA/TTL..... £169.00

- ★ Monitors :
- MD12 Samsung 12" TTL FST..... £60.00
- MD14 Samsung 14" TTL FST..... £80.00
- CD14 Samsung 14" CGA..... £189.00
- ED14 Samtron 14" EGA/CGA £289.00
- VD14 MPD 14" VGA Multisync..... £389.00

- ★ Hard Disk
- HD20 20Mb HDD..... £159.00
- HD40 40Mb HDD..... £299.00
- ★ Tape Backup
- TP60 Archive 60Mb internal with I/F and SW..... £399.00

★★★ Comparison between MPD PC range and AMSTRAD PC 2000 series ★★★

Product Model	MPD88 MH2	PC2086 HD12MD	MPD286 VH4	PC2286 HD12MD	MPD386 VH4	PC2386 HD12MD
CPU	8088	8086	80286	80286	80386	80386
Clock Speed	8Mhz	8Mhz	12Mhz	12Mhz	20Mhz	20Mhz
RAM	640K	640K	640Kb	640Kb	1Mb	4Mb
Video adaptor	MGA	VGA	VGA	VGA	VGA	VGA
Serial Parallel	1/1	1/1	2/2	2/1	2/2	2/1
FDD	360K	360K	1.2Mb	1.4Mb	1.2M	1.4M
HDD	20Mb	30Mb	40Mb	40Mb	60Mb	65Mb
Keyboard	102	102	102	102	102	102
Keyboard lock	Yes	Yes	Yes	Yes	Yes	Yes
MS/DOS 3.3 GWBASIC	No	Yes	No	Yes	Yes	Yes
Monitor	Mono	Mono	Mono	Mono	Mono	Mono
Price	£609	£999	£1139	£1349	£2019	£2649

AMSTRAD PC 2000 is the trademark of Amstrad PLC.
All prices quoted are exclusive of carriage and V.A.T.

M.P.D.

Terminal House, Station Approach
Shepperton, Middlesex TW17 8AF

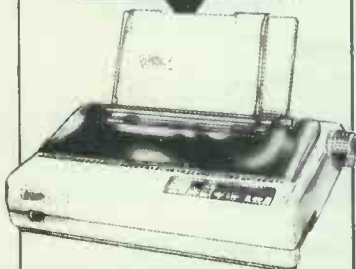
0932 221212

TIME TO TALK

PRINTERS

from **£130.39**

+ 15% VAT = **£149.95**



Printers to suit every pocket and every computer - from 9-pin to laser printers, normal or wide carriage. Free connection cable with every printer sold.

The Star LC10 in mono or colour with paper-park and font-select buttons.

The Citizen 120D - sold to 70% of UK schools. The new 180E - faster printing, font select, 2 year guarantee.

Typical prices (inc. VAT)

Star LC-10	£239.95
Star LC-10	£269.95
Citizen 120D	£149.95
Citizen 180E NEW	£199.95
Citizen MSP 15E (wide carriage)	£299.00
Citizen HQP 40 (24-pin)	£499.00
Citizen Overture 110+	£1449.00

(laser printer running at 10 pages per minute = 900 CPS with 12 months on-site warranty)

Ask for our detailed brochures on these and other printers in our range

MGT DIRECT

It's time to talk about quality of service. Lots of companies are advertising lots of products at excellent prices. But we believe that our customers deserve more than that. We believe that you have the right to demand an honest, in-depth appraisal of a product's strengths and weaknesses before you buy. We believe you should get a description in terms that you can understand and perhaps an expert comparison with rival products. And if you decide to buy, you need to be assured of first-class service afterwards. Not just if a product is faulty, but also if you need help in installation or if you simply come up against a problem that stumps you.

At MGT we've got the time to talk to you. We only sell products that we like and use ourselves. We understand what we sell, and every one of our sales team is trained to help you, whether before you buy or after. And even if we don't know the answer to your question, or if we don't stock the product you're looking for, we'll find out about it for you.

And the time to talk can be almost any time. Our phone lines are open till 7p.m. Monday to Friday in case you want to call us after work - even after that, there's an answer-phone. Just leave a message and we'll call you back.

It's time to talk to MGT first!

HANDY SCANNER

from **£173.87**

+ 15% VAT = **£199.95**

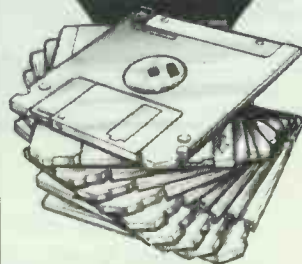
NEW

The size of a mouse but the capabilities of a photocopier. Just slide the scanner over text or graphics to copy onto your screen. Includes software for converting scanned text to ASCII file & graphics editing.

Type 2 (b/w scanning only) £199.95 inc. vat
 Type 3 (16 grey scales) £299.95 inc. vat
 (with window to view the scanned page, and start/stop button for editing).
 4 Full-Page Scanner £590.00 inc. vat
 (for documents and books)
 Special package deals on laser printers with Full-Page Scanner.



MGT BRAND 3.5" DSD DISCS



MGT Name - MGT quality, with a lifetime guarantee! Sold individually or in plastic boxes of 10 with labels.

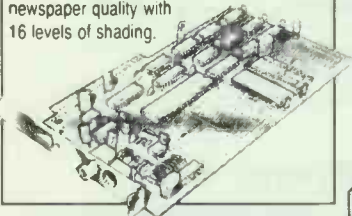
	Ex-Vat	W/Vat
1 Disc	£ 1.47	£ 1.69
10 Discs	£13.00	£14.95
20 Discs	£24.30	£27.95
30 Discs	£33.00	£37.95

VIDI-PC DIGITISER

£86.91

+ 15% VAT = **£99.95**

Transfer images from a video camera or video recorder to your screen, save the image as a file or print it in newspaper quality with 16 levels of shading.



MGT MINISCRIBE HARDCARD

£262.82

+ 15% VAT = **£299.95**

Suitable for Amstrad 1512, 1640 or any IBM compatible, the MGT Hardcard gives you 32 Megabytes of formatted storage space. Boot your PC without a floppy disc! Work with huge volumes of data without having to change disc. And so much speed you'll wonder how you ever got along without it!



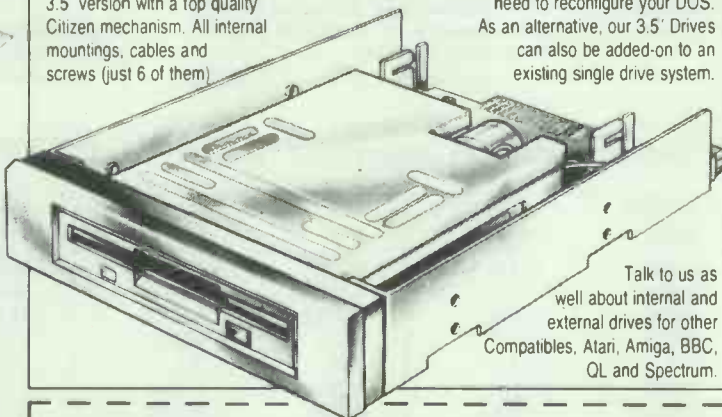
3.5" DRIVES for the 1512/1640

£86.91

+ 15% VAT = **£99.95**

Suddenly everyone's turning from 5.25 to 3.5" drives. Now MGT offers you a neat, easy-to-install solution to convert your internal Amstrad drive to a 3.5" version with a top quality Citizen mechanism. All internal mountings, cables and screws (just 6 of them)

are supplied with a simple instruction sheet. All you'll need is a screwdriver, and you'll be able to use 3.5" discs immediately. You won't even need to reconfigure your DOS. As an alternative, our 3.5" Drives can also be added-on to an existing single drive system.



Talk to us as well about internal and external drives for other Compatibles, Atari, Amiga, BBC, QL and Spectrum.

If you wish to receive specific product details or a catalogue from MGT, please fill in this coupon and send it with a large SAE to:

MGT DIRECT, Lakeside, Phoenix Way, Swansea Enterprise Park, Swansea SA7 9EH Tel: 0792 791100 Fax: 0792 791175

Name: _____
 Address: _____
 Telephone No.: _____
 Information required on: _____

MGT
 MILES GORDON
 TECHNOLOGY



LOWEST PRICES IN UK?

MICROS		CASIO		TYPEWRITERS	
Amstrad PCW8256	£322	Scientific		Typetar 5	£120
Amstrad PCW8512	£415	PB100	£121	Typetar 6	£139
Amstrad PCW9512	£449	PB700	£104	Typetar 80	£113
Amstrad PC1512SD/MM	£369	FX580P	£78	Typetar 90	£148
Amstrad PC1512SD/CM	£461	FX790P	£52	Canon S200	£130
Amstrad PC1512DD/MM	£461	FX730P	£43	ANSWERING M/C	
Amstrad PC1512DD/CM	£555	FX5000P	£30	Panasonic 1406	£87
Amstrad PC1640SD/MM	£451	FX4000P	£26	Panasonic 1416	£104
Amstrad PC200/PC2086	P.O.A.	FX3900P	£17	Panasonic 2406	£130
Amstrad PC1640 SD/EC/D	£647	FX580	£21	Panasonic 2416	£147
Amstrad PC1640DD/MD	£554	FX570P	£13	Panasonic 2386	£87
Amstrad PC1640 Business Pack	£830	FX100	£12	BT Report 20	£113
Amstrad PC1640DD/EC/D	£739	FX82	£7	TELEVISIONS	
Amstrad PC1640HD/MD	£739	FINANCIAL		Canon T10	£950
Amstrad PC1640HD/EC/D	£924	BF80	13	Canon T20	POA
Amstrad PPC512S	£369	BF100	14	Betacom F20	£755
Amstrad PPC512D	£499	FC100	17	BT C9	£750
Amstrad PPC640S	£461	FC200	35	COPIERS	
Amstrad PPC640D	£600	POCKET TV		Canon FC3	£399
Commodore 128 Pack	£173	TV 7500	£173	Canon F25	£499
Commodore 64C Hollywood Pack	£126	TV1500	£130	WORDLESS PHONES	
Amiga 500 Business Pack	£646	TV400	£87	Freeway	£58
Amiga 500 (software)	£329	TV200	£43	Esprit	£87
Atari 520 Special Pack	£329	DATA BANK		Envoy	£109
PRINTERS		SF4000	£65	VIDEOS	
Amstrad DMP3160	£169	IF8000	£69	Amstrad 6000	POA
Amstrad DMP2160	£135	PF3700	£35	Amstrad 6100	POA
Amstrad DMP4000	£260	DC810	£15	JVC HRD320	POA
Amstrad LC3500	£299	DC750	£7	JVC HRD400	POA
Amstrad LC5000	£385	CASIO ADD ONS		Panasonic NVG40	POA
Epson LX 800	£189	FA3	£20	Panasonic NVG45	POA
Siar LC10	£189	FA11	£28	Panasonic NVG48	POA
Citizen 120D	£130	FA5	£17	Hitachi 518	POA
Citizen 120D (for Commodore)	£130	FA6	£59	Hitachi 518DS	POA
Citizen 120D (Serial I/Face)	£150	FA7	£60	Akai VS22EV	POA
Panasonic 1081	£140	FA10	£159	Akai VS35EK	POA
Siar LC10 colour	£227	RP8	£12	TELEVISIONS	
PSION		RP16	£29	JVC CX60	POA
Travel Syst	£173	RP32	£34	JVC C210KM	POA
Psion AP	£121	RP39	£34	Sony	POA
Psion CM	£86	RC2	£17	Panasonic	POA
DATA PACK		RC4	£26	Sanyo	POA
8K	£11	RC8	£52	GENERAL	
16K	£17	GENERAL		Computer Disks	POA
32K	£30	Ribbons	POA	Computer Software	POA
64K	£52	Ram Cards	POA	Audio Cassettes	POA
128K	£86	Typistyles	POA	Video Cassettes	POA
32K Rampac	£47	Adaptors	PDA	DISK DRIVES	
ADD ONS		Commodore 1541C	£147		
Mains Adapt	£11	Commodore 1571	£179		
Comms Link	£52	Amstrad PD1/FD2/FD4/DD1	POA		
Diary Link	£11	Amiga External Drive	£124		
Games Drg	£30				

Complete range of Casio, Commodore & Amstrad add ons at discount prices. Prices/Goods subject to availability and change without notice. ALL PRICES EXCLUDE VAT. P&P £5 (within UK). Export Enquiries welcome. FAX: 01-724 8243



K.K. STATIONERS

187 Edgware Road
Marble Arch
London W2 1ET
Tel: 01-723 1436

Open Mon-Sat
9.30am-6.30pm

126 Edgware Road
Marble Arch
London W2 2D2
Tel: 01-402 4592

STORTON COMPUTERS TELEPHONE 01-348 4123

HARDWARE: also Epson, Amstrad PC and Amstrad 2000 series, Zenith and Kaypro 386s.

Kaypro PC 30Mb 10MHz	£1012.00	Kaypro K2000 and Laptop	£1166.10
Kaypro 286 20Mb 12MHz	£1679.00	Kaypro 286 40Mb 12MHz	£1817.00
Kaypro 286 20Mb 16MHz	£1817.00	Kaypro 286 40Mb 16MHz	£2000.00
Vega EGA Card	£123.74	Hitachi VGA and Vega VGA	£649.75
Hitachi 14" EGA Monitor	£448.50	Everex 3Mb Ram Card AT	£152.95

LASER PRINTERS: also Epson, Olivetti, Honeywell, Ricoh and Texas.

Qume Chrystal Print WP	£1075.25	Qume Scripten Laser	£4381.50
Qume Chrystal Print Series II	£1398.63	Panasonic 4450	£2047.00
HP Deskjet (Inkjet)	£724.50	HP Laserjet 2	£2001.00
Canon LBP-8 II	£2001.00		

SOFTWARE & MISC: also complete Microsoft range inc Languages.

Microsoft Mouse	£112.70	Microsoft Mouse & Windows	£129.95
Microsoft Windows V2.03	£83.95	Crosstalk MkIV	£111.55
IBM Parallel Cables	£16.68	Serial Cables (your spec)	£20.13
Dbase III Plus	£382.95	Dbase IV	£440.45
Rbase	£267.95	Aldus Pagemaker V3.0	£561.20
Xerox Ventura	£681.95	Microsoft QuickBasic	£78.20
Lotus 1-2-3	£342.70	Microsoft Excel V1.0	£336.95
Norton Utilities Advanced	£88.55	PC Tools Deluxe	£65.55
Wordstar Express	£88.55	Junior WordPerfect	£88.55
Wordstar 2000 rel 3	£313.95	Wordstar Prof V4	£262.20
Multimate Advantage	£336.95	Sidekick Plus	£157.55

Also Consumables, more Hardware, Software, Memory etc. Call for availability.

All prices include P&P and VAT

Unit 3, 23 Endymion Rd., London N4 1EE

All PC's shipped as mono and all printers shipped as parallel unless otherwise stated. All cheques - Postal Orders should be payable to Storton Computers Ltd.

NETWORK

ASSOCIATES

Tel: 0905 794 364

2 St Andrew's Court

St Andrew's Road, Droitwich

Worcs WR9 8DN

386 MINI

£2200

2Mb RAM, 16-20MHz, 20Mb hard disk. 1.2Mb floppy, serial/parallel, hi-res monographics, 8 expansion slots, clock calendar, 101 UK keyboard.

286 MINI AT

£1250

1Mb RAM, 12-16MHz, 20Mb hard disk. 1.2Mb floppy, serial/parallel, hi-res monographics, 8 expansion slots, clock calendar, 101 UK keyboard.

XT TURBO

£725

512K RAM, 4.77-10MHz, 20Mb hard disk. 360K floppy, serial/parallel, hi-res monographics, 8 expansion slots. 84 UK keyboard.

All systems with 14" amber monitor, tilt and swivel, MS-DOS 3.2, GW Basic, manuals.

Options: 40Mb 40ms hard disk	£100
40Mb 28ms hard disk	£150
EGA card and 14" monitor	£300

12 months parts and labour warranty. Add £18 carriage and VAT. Call with your exact specification. Printers, tape streamers, cards also available. Bespoke software - specialists in networking.

YOUR MIDLANDS SUPPLIER

Seal 'n Type

Unique and Ingenious Spill Cover



The Protective keyboard cover through which you can type freely and easily.

Accidents can happen! Protect against spills, dust, ash & grime. Available for popular computer keyboards. Can be custom-made for any push-button machine. Manufactured in the UK.

Pat. Pending & Reg. Designs.

PEACE 'n QUIET: Acoustic Box & Printer Stand

NOW you can hold a telephone conversation while your printer stays on!

- ★ Lightweight, compact in silver grey
- ★ Stand is 7cm high
- ★ See through lid
- ★ Paper slots for single and continuous paper
- ★ Easy DIY ★ Simple to use
- ★ Available for most printers



From £38.95

DEXETTE COPYHOLDER



The 3 in 1 copyboard
A4 size £8.50
A3 size £10.00
★ Copy Holder
★ Clip Board
★ Write Wipe Board

All attachments removable

RE-INKING SERVICE

★ All types of fabric ribbons

eg £1.90
★ Amstrad/Epson

Same day service.
Ring for Free transporter SAE

CONTACT US AT

KADOR
Unit 4
Pontcynon Ind. Est.
ABERCYNON
M10 GLAM. CF45 4EP
Tel: 0443 740 281

Cheques Payable to Kador

kador

Prices fully inclusive.

Ring or Write for our FREE comprehensive catalogue



PEOPLE

3-D OBJECTS

X-RAY FILM OR PHOTOGRAPHIC SLIDES

MICROSCOPE

PHOTOGRAPH

VISUAL IMPRESSIONS CREATE THE BEST IMPRESSIONS

Using VISUAL IMPRESSIONS video capture system on a PC compatible computer, we took these images direct from a video camera and prepared them as half-tone print files for output by desk top publishing software to a 300 dots per inch laser printer.

We have used Visual Impressions with Aldus Pagemaker, Xerox Ventura Publisher, Gem DTP, Fleet Street Editor, Fontasy, Page Ability, Word Perfect 5, and Timeworks DTP and we guarantee that high quality images can be placed into programs that accept the file formats TIF, EPS, IMG, PCX, ART, MAT, or PIC. If your software can import image files in any one of these formats then you can use VISUAL IMPRESSIONS to give maximum impact to your computer generated documents.

VISUAL IMPRESSIONS (comprising PC Interface card and software) **only £375**

VISUAL IMPRESSIONS (with high resolution monochrome camera) **only £599**

VISUAL IMPRESSIONS (with Camera and height adjustable stand) **only £749**

Visual Impressions is designed and manufactured in the United Kingdom by

The Electric Studio Products Limited

Unit 8 The Cam Centre, Wilbury Way, Hitchin SG4 0TW

Telephone : 0462 420222

Facsimile : 0462 420111



MIGHTY MICRO

Sherwood Centre, 268 Wilmslow Road
Fallowfield, Manchester M14 6WL
Tel: (061) 224 8117 Fax: 061 257 2803

Established 1983

AMSTRAD BUSINESS CLUB

We are one of the very few Amstrad Dealers to have both the Amstrad System Centre and the Amstrad Business Club status. ASC indicates expertise to sell and install 286/386 networks and ASC indicates that we are their preferred dealers for the region.

NEW LOWER PRICES PLEASE RING



Full range in stock. Appointed by Commodore for supplies to Educational Establishments

We support and stock all the major add-ons for the Amiga 500 and 2000. Items such as the video GenLock PC/XT/AT bridgeboards, disk drives and sound samplers/MIDI interfaces are often on demonstration. A wide range of Virus-free software is stocked and checked again on request. **SPECIAL DISCOUNT FOR EDUCATION.**

COMMODORE PC

We proudly announce that we have been appointed as the specialist educational dealers. Large discounts to education/local authority/hospitals.

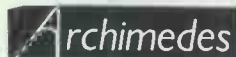


Examples: 20Mb (Mono) £1125
70Mb (Mono) £1499

PAC TARGET

ALL AVAILABLE PLEASE RING

OTHER MICROS WHICH WE STOCK



PC compatible cards

Expansion cards to meet all your needs can be obtained from us. Product lines stocked include Intel boards, Everex, Orchid and numerous other makes. One of the most popular upgrades is the Miniscribe 30Mb hard card. Please phone if you have a specific need.

Printers

All major printers are stocked and most can be viewed for demonstration. Brother, Canon, Citizen, Epson, Juki, Panasonic and Star are several of the makes we hold.

Laser Printers

We deal with five major types of Laser printer. Brother, Epson, Kyocera, Hewlett Packard, and Star. Complete systems for DTP applications can be provided. Tell us the requirement, and we'll supply the system.

Stop Press: Have you seen the new Panasonic?

Communications

We sell a wide range of modems (Miracle, Dowty, Pace, etc) and the required software. Assistance on the interfacing of such equipment is always available from our technical support.

NETWORKS

We have installed networks at several prestige sites. From 2 micros to 256 micros, no job too small or too big.

AMSNET

CORVUS

NOVELL

SAGE

KNOWLEDGE

SOFTWARE

Over 1000 titles in stock. From Games to Accounts to Languages.

FAX

EXTENSIVE SELECTION PROMOTIONAL PRICES

SPECIAL OFFERS

Amstrad DMP4000 Printers	£250
Citizen HQP45 24 pin wide carriage printer	£385
Star LC10 colour printer	£242
Opus IV 20Mb with EGA monitor	£899
Ventura V1.0 DTP Software	£199
Panasonic Laser printer KX4450	£1299
Apple Macintosh 20Mb drive	£350
Fujitsu Photocopy board — any offer over £100. Buyer to arrange for transport.	

Export Orders Welcome: We exported to over 70 countries in 1987.

After Sales Support: Full support is given to products bought from us including the full installation of selected items of software or hardware.

Easy Access: Located near to M6, M56, M602 and M62 motorway network.

Postage and Packing: Free delivery anywhere in the UK for orders over £100.

VAT: Add 15% to all prices.

We accept Access, Visa, Bankers drafts, Eurocheques, Building Society cheques and of course Cash! For personal callers with cheque cards and further I.D. (i.e driving licence or passport) we can accept cheques up to £500.

OLIVETTI LAPTOP M15

- 2 x 720K
- 512K RAM
- Supertwist LCD
- Rechargeable
- Mains power



AT HALF NORMAL PRICE!!!

IBM compatible laptop computer, supertwist LCD screen, full 80 x 25 display, IBM style keyboard, RS232 and parallel ports

Carry case £15.
New and boxed.

£495

1000'S OF COMPUTER AND PRINTER BARGAINS AT UP TO 90% OFF RRP. ACCESS/VISA ACCEPTED. VAT EXTRA

Morgan Computer Co.

64-72 NEW OXFORD STREET, WC1. 01-255 2115
179 TOTTENHAM COURT ROAD, W1. 01-636 1138

STOP

Don't throw that toner cartridge away...

Recharge it and halve your toner costs!



SIX GOOD REASONS TO TRY THE SUPERCHARGE SERVICE:

- We only use **premium quality 'Super Black' graphics toner.** It's blacker.
- **You get your own cartridge back:** you take care of your cartridges and so do we.
- **You get more copies:** we put in 30% extra toner.
- **Carriage is free,** both ways.
- All our new and recharged cartridges are **guaranteed.**
- **Best of all, you save money!**

*Phone or write for our information pack...

SUPERCHARGE
TONER TECHNOLOGY

FREEPOST 23 CITY ROAD CAMBRIDGE CB1 1BR
TELEPHONE CAMBRIDGE (0223) 350136

HUBCOURT LIMITED - BUSINESS SYSTEMS

ESTABLISHED 1980

A limited supply from our wide stock. Phone for best prices on all hardware/software.

SPECIAL LIMITED OFFERS

Please call for prices on XT-AT 386 Computers all with one year on-site maintenance.

XT 4.7/8 Twin 360K 12" Mono Monitor or 14" EGA	£Call
AT 8/10 1Mb 1.2FDD 12" Mono Monitor or 14" EGA	£Call
AT 8/12 1Mb 1.2FDD 12" Mono Monitor or 14" EGA	£Call
386 8/16 2Mb 1.2 720/1.44 FDD 14" Mono Monitor or 14" EGA	£Call
VGA Monitor available on the above	£Call

Any size of hard disk supplied - fitting free.

HARD DISKS

All prices include fitting instructions, cables and Western Digital XT Controller (add £50 for AT Controller). All disks are pre-formatted and ready for installation. Full range of hard disks from 20Mb to over 500Mb.

Man.	Model	Capacity	Speed	Price Complete With Controller
Seagate	125	20Mb	40MS	£230
Seagate	225	20Mb	65MS	£199
Seagate	238	30Mb	65MS	£215
Seagate	251	40Mb	40MS	£300
Seagate	251-1	40Mb	28MS	£375
Seagate	4096	80Mb	28MS	£559
Miniscribe	8425	20Mb	65MS	£199
Miniscribe	8438	30Mb	65MS	£215
Filecard	20Mb	65MS	Miniscribe	£210
Filecard	30Mb	65MS	Miniscribe	£220
Filecard	20Mb	40MS	Seagate	£270
Filecard	49Mb	40MS	Seagate	£395

We are authorised MULTISOFT dealers experienced with XENIX MULTIUSER SYSTEMS.

SUNDRY

Large selection of printer, expansion, upgrade cards etc. available.

MONITORS & GRAPHIC CARDS

14" EGA Screen & EGA Card	£399	£299 Monitor only
13" Colour VGA & VGA Card	£479	£339 Monitor only
14" Grey VGA & VGA Card	£269	£129 Monitor only

VGA Card, Bios & Register compatible also runs TTL Mono, CGA & EGA Monitors	£199
Paradise Auto Switch EGA Card	£109
High Speed Hercules Mono Card (up to 20MHz)	£49

FLOPPY DISKS & CONTROLLERS

Muw Card & Software, runs all 5.25" & 3.5" Disks on all machines & version of DOS, including AMSTRADS 2 internal & external ports	£79
External 3.5" Drive in Case with Cables	£149
3.5" Drives with free 5.25" Frame 720K	£99 (NEC)
3.5" Drives with free 5.25" Frame 1.44Mb	£172 (TRAC)
5.25" Drives 360K £75 1.2Mb	£90
Controller Cards - XT-2 Port £25 XT-4 Port	£30
XT-AT 360/1.2Mb (5.25") 720/1.44 (3.5") Justin	£59

All prices exclude carriage and VAT. 12 months Warranty on all goods, with full technical backup. Access accepted.

Phone: 0702 551450 Now. Fax: 0702 551628
Address: 599/601 London Road, Hadleigh, Essex SS7 2EB.

VENTURA 2.0?

EASY

Wouldn't it be nice if you could buy a Ventura based System which came with a pool of experts to help you? A pool of experts with experience in producing documents from single page sales brochures to complete books, right there in your office.

- While you were going through the learning curve they would be there to guide you.
- When you had a deadline to meet and something went wrong they would be there to help you.
- When someone new joined you could leave them alone with the system knowing these experts were there to help him/her out with any problems, while you got on with more important things.

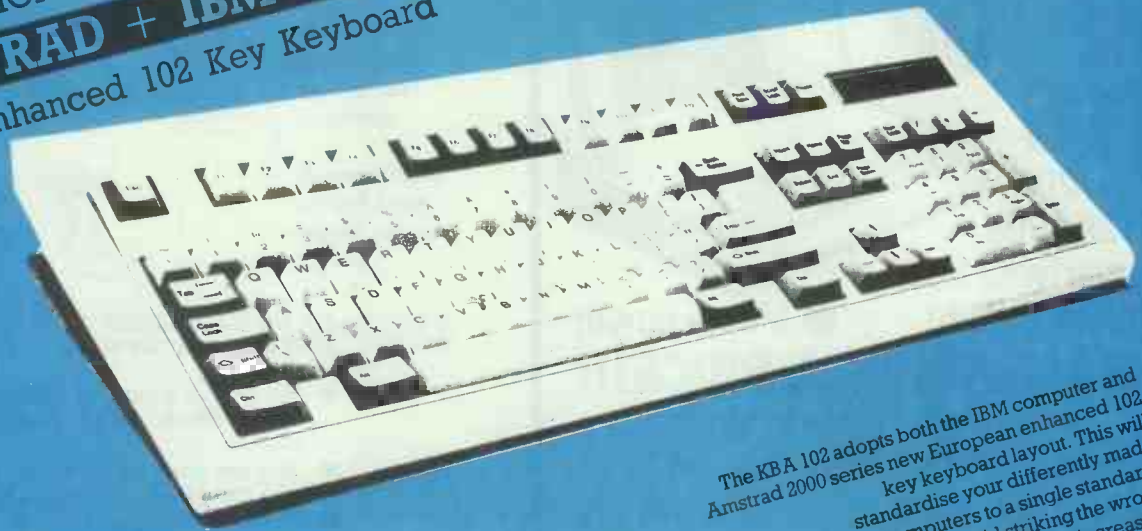
Well now you can. Here at Farrukh Systems Ltd we now offer a modem support line with our systems which effectively puts our pool of experts in your office. At the press of two keys your system would connect itself to our support system, enabling our pool of experts to run your system from our office just as if they were sitting there right next to you.

Farrukh Systems Ltd making DTP easy.

For further information contact:

Farrukh Systems Ltd
The Desktop Publishing Specialists
35 Hillside Avenue
Borehamwood
Herts WD6 1HQ
01-207-4249 or 0836-253-888

NAGA HIGH-TECH KEYBOARDS
AMSTRAD + IBM COMPUTERS
 New Enhanced 102 Key Keyboard



The KBA 102 adopts both the IBM computer and Amstrad 2000 series new European enhanced 102 key keyboard layout. This will standardise your differently made computers to a single standard, helping to avoid striking the wrong key and therefore increasing efficiency.

- KBA 102 — For Amstrad 1640/1512 Computers
- KBIBM 102 — For IBM or IBM compatible machines
- European languages available
- Dealers are welcome
- Tailor-made welcome
- Other keyboards — Please enquire

£59
£59

Monday-Saturday 10am-8pm

Please include £6 P&P and VAT in your order (Sorry, we do not accept credit cards)

NAGA ELECTRONICS LTD

(A Member of the Nagamitsu Group)

19 Claremont Road, London NW2 1BP England. Tel: 01-208 0567/0616/0628. Telex: 938 036 NAGA G. Fax: 01-208 0602
 COLLECTION AVAILABLE BY ARRANGEMENT



MORLEY MOUSE PACKAGE £39.95

+ £1.00 p&p

- MOUSE
- DR HALO DESIGN SOFTWARE
- COMPREHENSIVE MANUALS
- MOUSE MAT
- MULTI POCKET STORAGE SYSTEM FOR MOUSE, COPY DISC & MANUALS

INTERNAL DRIVES

FOR ALL IBM/AMSTRAD COMPATIBLES

5 1/4" 1.2 MEG £139
 3 1/2" 720 k £99

INCLUDING FULL FITTING KIT & INSTRUCTIONS + £3.00 p&p

All Prices Exclude VAT @ 15%



MORE from MORLEY ELECTRONICS

EXTERNAL DRIVES

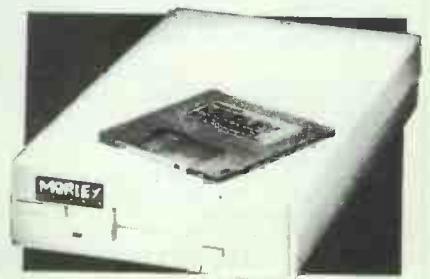
FOR AMSTRAD PC2086 RANGE

5 1/4" 720 k £119
 5 1/4" 360 k £99
 3 1/2" 720 k £109
 + £3.00 p&p

- ALL TOP QUALITY JAPANESE MECHANISMS
- SIMPLY PLUG IN & RUN



Morley Electronics Limited · Morley House
 West Chirton · North Shields · Tyne & Wear NE29 7TY
 Tel: 091 257 6355 Fax: 091 257 6373



Cambridge Computer Store

Division of CCA Computer Group Plc

**Established
Over 10 years**

**NLQ
CITIZEN 120D
DOT MATRIX PRINTER**

£109.95 !

**130 CPS
Including Pull Traction Feed
IBM/EPSON Compatible**

COMPUTERS

AMSTRAD

	S/D	S/D
	21meg	32 meg
1512 Mono	£589.00	£619.00
1512 Colour	£719.00	£759.00
1640 Mono	£689.00	£719.00
1640 EGA	£975.00	£1010.00

BUNDLE

PC 1640
PC 1640 (Dual Drive) with mono monitor,
DMP 4000 printer, 21 meg Hard Disc.
Software: Wordstar 1512, Supercalc 3.1,
Accounts Master D/D

£929.00

SOFTWARE

WORD PROCESSOR	
Microsoft Word 4	£299.00
Wordperfect 5	£199.00
Wordstar 2000	£219.00

SPEADSHEETS	
Quattro	£119.00
Lotus 123	£229.00
Supercalc 4	£199.00

DATABASE	
DBXL	£69.00
DBase III +	£319.00

(Many other titles available)

Support line available on all above packages,
please phone for details

PRINTERS

CITIZEN

LSP 100	80col 150cps	£139.00
180E	80col 180cps	£169.00
MSP15E	136col 160cps	£229.00
MSP40	80col 240cps	£319.00
MSP45	136col 240cps	£409.00
HQP40	24pin 80col 200cps	£329.00
HQP45	24pin 136col 200cps	£339.00
Overture 106+	6 pages per minute	£1295.00

STAR

LC 10	Mono	£179.00
LC 10	Colour	£209.00
LC 24-10		£289.00
Star Laser 8ppm	300dpi	£1495.00
(1 year on site maintenance)		

IBM
COMPAQ
APPLE
EPSON
AMSTRAD
ZENITH
BLUE CHIP
OPUS
ATARI
STAR
CITIZEN
SHARP

GUARANTEE

If you can buy any
advertised product cheaper
within 7 days we will refund
the difference

HARDCARDS

WESTERN DIGITAL FILE CARD

- * Simple fitting
- * Full year warranty
- * Suits Single Drive or Dual Drive PCs
- * Access time 68ms.
- * Supplied with XTREE
- * Supplied tested and configured

21meg	32meg
£199.00	£239.00

SEAGATE INTERNAL 20meg kit £189.00

HOW TO ORDER

0223 247111 (10 Lines)

ACCESS, BARCLAYCARD

**YOU CAN COLLECT FROM OUR SHOPS UP
TO 6.30 MOST NIGHTS, OR WE WILL
DESPATCH THE SAME DAY WHENEVER
POSSIBLE**

(ALL PRICES EXCLUDE VAT)
AND ARE SUBJECT TO CHANGE WITHOUT NOTICE

CARRIAGE FREE

**MAIL ORDER DEPARTMENT
1 & 4 EMMANUEL ST. CAMBRIDGE CB1 1NE**

It's **TIME** for

Tandon

Time Computers are the leading Authorised Tandon Dealers in the UK.

We invest a good deal of time & resources to maintain the highest possible standards.

We have extensive showrooms demonstrating Tandon computers.

We supply many of the UK's leading corporate & public sector organizations.

Our customers are free to ring our Tandon Technical Support if they have any problems with their Tandon computers.



If you are looking for a powerful business system, look no further. Tandon computers are unbeatable for performance, reliability & value.

All Tandon computers come formatted and installed with Microsoft Windows.

All Tandon 286 & 386 models come with 102 enhanced keyboards, serial & parallel ports. Hercules graphics 14" mono monitor. 1 Meg Ram. Clock. MS-DOS 3.3 & Microsoft Windows.

PCA Plus

80286 8/10 Mhz. Optional 80287. 1.2 Meg floppy PC & AT formats 8 Expansion slots. 5 drive mountings 20, 40 or 70 Meg hard disc options

Target Plus

Compact 80286 AT system 20 or 40 Meg hard disc versions

PAC286 Plus

Revolutionary data pac technology 80286 8/10 Mhz. Optional 80287. 2 data pac receptacles. Opt. floppy

386-20

80386 8/20Mhz. with cache for zero wait state performance. Windows 386 40, 70 & 112 Meg hard disc versions

FREE ONSITE MAINTENANCE

All Tandon computers sold by us come with 6 months FREE onsite maintenance.

This normally costs £150-£300-

An engineer will attend to your computer within 12 working hours should it become faulty.

PCA 40 Plus shown above **£1249**

Complete Mono System with 40 Meg hard disc. Tested, ready to use & with Free onsite maintenance

Ring (0254) 682 343

and ask for Tandon sales department

Prices for full mono systems.

All prices subject to change. Please ring for latest prices before ordering.

Delivery £15

All prices exclude VAT

Visa /Access welcome.

Official PLC, Government & local authority orders welcome.

Fax your orders!

Fax (0254) 664 053

PCA single floppy	£ 949	Target 20 20 Meg	£1299
PCA20 20 Meg	£1059	Target 20 plus 20 meg	£1449
PCA plus single floppy	£ 999	Target 40 plus 40 meg	£1599
PCA20 plus 20 Meg	£1119	386/16 SF single floppy	£1839
PCA40 plus 40 Meg	£1249	386/16-40 40 Meg	£2059
PCA70 plus 70 Meg	£1429	386/20 SF single floppy	£2349
PAC 286 no floppy	£ 899	386/20-40 40 Meg	£2699
PAC 286 plus no floppy	£ 949	386/20-70 70 Meg	£2999
PAC 286 1.2	£ 999	386/20-110 112 Meg	£3199
PAC 286 1.2 plus	£1049	386/20-110DP 112Meg + inpac	£3399

Monitor Options (Extra)

EGA monitor & card £319

VGA mono monitor & card £179

VGA colour monitor & card £399

Optional Extras

720K 3.5" floppy drive £ 99

1400K 3.5" floppy drive £129

40 Meg internal tape streamer £299

30 Meg Data pacs £199

Add pac & interface for your PC £359

TIME computers

Authorised Dealers
Tandon, AST, Epson, Unisys,
Tandy, Opus & Amstrad.

Time House, 207 Preston New Road. Blackburn. BB2 6BS.
Tel (0254) 682 343 Fax (0254) 664 053

SEMAPHORE CARDS

QUALITY ▼ RELIABILITY ▼ PERFORMANCE

2Mb Memory Card

High speed memory card for the PC AT offering upto 2Mb of Extended Memory and full compatibility with the Lotus/Intel Expanded Memory Specification

- ▼ Ideal for all 286/386 systems
- ▼ Extended or EMS memory selectable
- ▼ Start address from 512K up to 16Mb in 128K steps
- ▼ Low profile design

Unpopulated **£149**

2Mb Memory Card for the PC, XT available at £129

3Mb Multifunction Card

Up to 3Mb of Extended Memory and standard input/output functions for the PC/AT

- ▼ Start address from 512K up to 16Mb in 128K steps
- ▼ Parallel printer port
- ▼ One serial port, 2nd optional
- ▼ Games port

Unpopulated **£175**

Add £15 for 2nd serial port

384K Memory Card

The cost effective solution for topping up the base memory from 256K to 640K on your PC or XT

- ▼ Short card 4 x 5"
- ▼ 384K memory installed

£149

Also 384K Memory Card with serial, parallel, games, clock. £215

PC, XT Speedcard

Supercharge your IBM PC, XT or 8088 compatible to AT performance at a fraction of the cost of a new machine

- ▼ Fits in a short slot
- ▼ 80286 running at 8MHz
- ▼ Super-fast memory cache
- ▼ Socket for maths coprocessor
- ▼ Switch between 8088 & 80286

£265

Also 12MHz 286 Speedcard £375
Also 16MHz 386 Speedcard with 1Mb Memory on board £725

Fax Card

At last! A quality Fax Card for sending & receiving fax documents from your PC

- ▼ Half Card
- ▼ Fax Group III
- ▼ Creates near letter quality transmissions
- ▼ Simple to use with friendly pop-up menus
- ▼ Telecom approved

£275



Multi I/O Card

A short size card providing standard input/output functions

- ▼ Printer port
- ▼ One serial port, 2nd optional
- ▼ Clock-Calendar (XT version only)
- ▼ Games port

£69

Add £15 for 2nd serial port

Please specify XT or AT version when ordering

Dual Serial Card RS 422

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

- ▼ Short card
- ▼ 2 RS422 serial ports
- ▼ COM1 to COM4 selectable
- ▼ IRQ3 or IRQ4 selectable

£89

4-Port Serial Card

The simple solution to your serial port expansion needs

- ▼ Short card
- ▼ 4 RS232 serial ports
- ▼ COM1 to COM8 selectable
- ▼ IRQ2 to IRQ5 selectable

£119

8-Port Serial Card £199
4-Port Serial Xenix/CDOS £150

4-Port Intelligent Card

Transform your 286/386 PC's into high performance multi-user systems

- ▼ On-board 80186
- ▼ Direct Memory Access
- ▼ Supports Xenix, Unix, PC-MOS, CDOS & BOS

£499

Also 8-Port Intelligent £699
and 16-Port Intelligent £1050

Super VGA Card

The ultimate graphics card for the professional user

- ▼ Supports VGA, EGA, CGA, MDA, MCGA & Hercules displays
- ▼ Supports 800x600 16 colours
- ▼ Supports 132 columns
- ▼ Library of software drivers
- ▼ Graphics RAM 256K

£229

Monographics Card

High resolution graphics for your monochrome display monitor

- ▼ Short Card 4x6"
- ▼ Text mode:80x25
- ▼ Graphics mode:720x348
- ▼ Printer port
- ▼ Full compatibility with Hercules monochrome graphics card

£69

EGA Multimode Card

Powerful multimode graphics short card for all your display needs

- ▼ Supports EGA, CGA, MDA & Hercules displays
- ▼ Additional mode: 640x480 16 colours
- ▼ Library of software drivers
- ▼ Graphics RAM 256K

£129

1200/1200 Modem Card

Remarkable high performance short size modem card

- ▼ V21/V22 Full Duplex
- ▼ Compatible with Hayes AT command set
- ▼ Auto dial & Auto answer
- ▼ COM1 to COM4 selectable
- ▼ Built-in speaker
- ▼ Telecom approved

£149

80386 Motherboard

Complete Motherboard replacement for your IBM PC/XT. Superb build quality. Takes 20 minutes to fit and works with existing hardware.

- ▼ 80386 16MHz processor
- ▼ 1Mb Memory on board
- ▼ Powerful software for enhancing screen and disk performance
- ▼ 8 slots, 5x8 bit, 2x16 bit, 1x32 bit
- ▼ Clock-calendar
- ▼ Socket for 80387

£995

Other Products in range

128K Memory Card (XT) 128K £89
128K Memory Card (AT) 128K £99
4Mb Memory Card (AT) 4M £175
Floppy Contr 360K/1.2Mb (XT) £69
Hard Disk controller (XT) £69
Hard/Floppy controller (AT) £99
Network Card + 80186 £195
CGA Colour Card £59
Serial Card (XT/AT) £39
Memory Chips £Call
Maths 8087 8 MHz £135
Maths 80287 8MHz £180
Maths 80387 16MHz £325

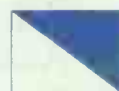
Lab Card Series

Digital I/O Card £69
AD/DA 12bit 20KHz £99
AD/DA 14bit 20KHz £175
Digital I/O & Timer (D/T) £129
AD/DA 12bit 33KHz & D/T £229
AD/DA 12bit 60KHz & D/T £595
AD/DA 14bit 25KHz & D/T £375
Relay Output & D/I Card £175
Opto-Isolated D/I Board £129
Solid State Relay Board £139
IEEE-488 Interface Card £250

We offer a full 12 months warranty and if you have any problems or questions you can call us for Technical Support.

All prices exclude VAT.
Access & Visa accepted.
Free Delivery Mainland UK.

Call us for a catalogue of product range and for further information.



SEMAPHORE SYSTEMS LIMITED
7 Moreland Court, Finchley Rd,
London NW2 2PJ
Tel 01-435 6315/01-433 1255



There is only one option.

Whether you are planning to buy a new computer system or upgrading your existing equipment, What Micro? is the only option for help and advice. With its unique directories, What Micro? gives a comprehensive guide to all the major hardware, software packages and peripherals on the market.

Every month What Micro? brings you in-depth reviews, direct comparisons, informed opinion and

news of all the latest products to help you make the right purchasing decision. As a bonus, What Micro? also gives away free business demonstration software.

Recent exclusive giveaways have included Lotus' Symphony, Ashton Tate's Rapidfile, Microsoft's Works and Migent's Ability.



What Micro? – Your Only Option
Available from all good newsagents every month.

If you're losing ground to your computer, put it smartly in its place with the new System-Solver desk from Opus Technology Ltd.

At only £149.95+VAT we've thought of just about everything, including a free matching swivel chair.

System-Solver is British-built, designed for all leading PC systems and offers an unbeatable range of features:

- Spacious desktop with clever keyboard cable management
- Smooth-flow paper feed channels
- Space-saving top shelf for both monitor and printer
- Separate shelves for computer and manuals
- Secure lockable diskette box and tidy tray
- Sturdy steel underframes and heavy-duty castors
- Simple self-assembly

To order your System-Solver call us on 0737 765080 or simply post the coupon below. Delivery in mainland Britain is free and we offer generous education and government discounts.

Desk measurements: Height 27"; Width 47"; Depth 32".

To: Dept. 5P Opus Technology Ltd., 53 Ormside Way, Holmehorpe Industrial Estate, Redhill, Surrey. Please send me the following:
 System-Solver Desk(s) at £172.44 each (incl. VAT).
 I enclose a cheque for £ _____ or please debit my credit card account with the amount of £ _____
 My Access Barclaycard (Please tick)
 No. is: _____
 Name _____
 Address _____
 Telephone _____

£149.95

+ VAT

System-Solver



FREE CHAIR

Opus Technology Ltd

* (Extension lead required with certain models, e.g. Amstrad)

ALL OUR PRICES INCLUDE CARRIAGE & VAT

HSV COMPUTER SERVICES LIMITED (PCW)

23, Hampstead House, Town Centre, Basingstoke, RG21 1LG

Diskette Storage Boxes	Price Each
50x5 1/4" Hinged Lid Lockable	6.95
100x5 1/4" Hinged Lid Lockable	8.95
120x5 1/4" Hinged Lid Lockable	10.95
40x3 1/2" Hinged Lid Lockable	6.95
80x3 1/2" Hinged Lid Lockable	8.95
10x3" Hinged Lid (Ams)	5.95
20x3" Hinged Lid Lockable (Ams)	9.95

Continuous Stationery	Quantity		
	500	1,000	2,000
Micro Perf All Edges			
9.5" x 11" 60 GSM		9.50	14.95
True A4 90 GSM	8.75	14.95	27.95
True A4 100 GSM BOND		15.95	
White, Cream, Blue or Grey.			
Labels 3.5" x 1.5" (1 across)		29.95	
Labels 4.0" x 1.5" (1 across)		5.25	9.50
Labels 4.0" x 1.5" (2 across)		5.75	10.50
Labels 2.75" x 1.5" (3 across)		6.75	11.95
		4.75	8.50

Diskettes	Quantity	Price Each				
		10	20	30	40	50
3 1/2" SS/DD	135 TPI	9.50	18.75	27.90	36.25	44.95
3 1/2" DS/DD	135 TPI	9.95	18.95	27.95	36.95	45.95
5 1/4" DS/DD	48 TPI	5.95	8.95	11.95	14.95	17.95
5 1/4" DS/QD	96 TPI	6.95	9.95	13.95	16.95	19.95
5 1/4" DS/HD	1.6Mb	10.95	20.95	30.95	46.95	50.95
AMSTRAD						
AMSOFT 3"	CF2	1-£2.50	5-£11.95	10-£22.95		

Dust Covers	Price Each
Grey Anti-Static	8.95
Nylon with Blue Piping	8.95
Amstrad PC 1512/1640	4.50
Amstrad PCW 8256/8512 3Pcc	4.50
Amstrad DMP 2000/3000/3160	4.50
Amstrad DMP 4000	4.50

Minimum order of £8.00

Credit Card Hotline (0256) 463507

Faxline (0256) 841018



S&S Enterprises Ltd

DR SOLOMON'S DATA RECOVERY SERVICE

We can tackle anything!

Phone us if you've lost data, and never assume we can't help you. We can do things you thought were impossible.

We can patch up broken disks in our clean environment.

We can rescue data from hard disks, floppy disks, tapes and cartridges; whether they are formatted, corrupted, have bad directories or even claim not to be there. Deleted files and directories are just routine. Parked head disks can be fixed.

Our data extractor will extract the data from almost any magnetic media.

We begin where Norton can't cope.

Its not cheap, — but no fix no fee. - 97% success rate!

Phone for a quote. (0494) 791900

PINCH AND PUNCH

Captures graphics or text screens from other programs saving them to disk for later use in display or with DTP packages. £20

UNDELETE

Lets you recover files that you have accidentally deleted from floppy or hard disk. £15

QPRINT

Lets your printer run while you use your PC for other jobs. £10

FASTHELP

You can design your own help screens, which are just a keystroke away, even when running a program. Also has cut-and-paste from one program to another. £10

REDIRECT

Lets you redirect printer output to a file. £10

REDPOP

A pop up version of Redirect. £15

BURN

Blanks the screen after a given time to prevent burn-in. £10

FASTKEYS

Makes your keyboard repeat keys much faster. Speeds up moving around in spread sheets, word processors etc. £10

TYPEWRITER

Turns your computer into a typewriter. Works with all printers. £10

SUBSTLPT

Lets your parallel printer substitute up to 7 desired symbols for 7 unwanted ones. eg a } for a £. £10

POPCMND

From within your application, or at the Dos prompt, popup menu drive interface to Dos. Allows Create/print/copy/ rename/delete/ MKDIR/DIR etc. £10

SUPERSORT

A super-fast sorter for text or binary files, callable from DOS or via an interrupt from your program. £10

Over 200 Programs
Now Available!!!
on 3 1/2" and 5 1/4" disks

PLEASE PHONE FOR
FREE CATALOGUE

S&S ENTERPRISES
(AMERSHAM) LTD.

Tel: (0494) 791900

HOLDFAST

Backs up your data fast. A daily back up takes about a minute and can be run with a one word command. £20

IANKEY 1

Crash course in typing for beginners. £26

IANKEY 2

Two fingers to touch typing conversion course. £26

UNFORMAT/RESCUE

Recovers data from formatted hard disks and data from corrupted hard or floppy disks. ASCII text only. £15

FILEAID

Lets you create an index of files, each with descriptive text; lets you sort, search, tag for deletion etc. £10

EASYSIGN

Provides a fast and simple method of creating large lettered text for signs and title pages, supports both Epson compatible and HP Laserjet printers. £15

DOS ENVIRONMENT UTILITIES

5 programs to display and edit the DOS Environment. Menu drive. Includes memlist which displays current memory usage and lists memory resident programs. £10

QUALIPRINT

Lets a cheap dot matrix do high quality printing. Works with Epson and Compatible printers. Includes 11 fonts. £15

GRAFPLUS

Prints a screen image with the touch of a key. Works with all monitors and printers. £45

LABELWRITER

Prints identical labels, using all Epson type styles. Labels can be any size, several across the page. Prints logos and will sequentially number labels. £10

AUTOKEY

Records and saves your key presses so you can replay them time and time again. £10

DOSMENU

A menu driven front end for DOS, lets you choose any application (e.g. 123 or Word Star) or DOS command with a single key stroke command from a menu. £10

ANTI-VIRUS SERVICE

Fast, confidential virus eradication service, using our new portable anti-virus hardware (deals with 700 floppy disks per hour).

DETECTORS AND CURES FOR THESE VIRUSES:

Stoned, 1813, 1701, 648, Brain, Italian and others as required.

CHKVIRUS

Alerts you as soon as your disk has been infected by a virus, so that you can take immediate action. £5

ANTIVIRUS

Contains 2 programs: Notrojan write protects your hard disk. Nobrain is a specific cure for the Brain and Italian Viruses. £5

CHOOSE ANY FIVE
FOR £40! + VAT
£10 & £15 Programs only

These programs cost £10.00 (except where stated) + VAT
You can buy a package of any nine programs for £65.00 or any five for £40.00.

This offer includes only our £10.00 and £15.00 programs.

PLEASE ADD VAT TO ALL ORDERS.

Send your orders to: Micro Division
S&S Enterprises, Weylands Court, Water Meadow,
Germain Street, Chesham, Bucks HP5 1LP



TOP DECK SYSTEMS

LOWEST UK PRICES
FOR A GREAT DEAL

TEL: 01-689 6170
0752 791800
01 689 2299
FAX 0752 702239



DOT MATRIX PRINTERS

AMSTRAD	HEWLETT-PACKARD
LQ3500.....£255	THINKJET.....£305
DMP4000.....£194	QUIETJET.....£350
LO5000.....£338	QUIETJET +.....£420
BROTHER	DESKJET.....£555
M1109.....£139	PAINTJET.....£690
M1209.....£189	RUGGED WRITER.....£895
M1409.....£290	NEC
M1709.....£350	P2200.....£255
M1724.....£480	P6+.....£420
M2518.....£649	P7+.....£535
M4018.....£1030	P9XL.....£795
M3524.....£1030	OKI
TWINWRITERS 5.....£799	182.....£180
CITIZEN	192.....£280
130D.....£108	193.....£360
LSP100.....£126	292.....£340
MSP10E.....£190	293.....£545
MSP15E.....£192	294.....£790
MSP40.....£270	353.....£875
MSP45.....£339	PANASONIC
MSP50.....£315	1081.....£128
MSP55.....£457	1083.....£292
HQP40.....£330	1592.....£275
HQP45.....£370	1595.....£365
OICDNIX	1540.....£415
INKJET.....£758	STAR
EPSON	LC10.....£200
LX800.....£185	LC10 COLOUR CALL
FX850.....£290	LC2410.....£280
EX800.....£445	NX15.....£255
LQ500.....£258	NO10.....£275
LQ850.....£410	NO15.....£320
FX1050.....£385	NR10.....£340
EX1000.....£480	NR15.....£379
LQ1050.....£549	NB24-10.....£420
LQ2550.....£865	NB24-15.....£499
DPX5000.....£1139	
SQ2500.....£899	

DESKTOP COMPUTERS

FREE CPW FLOOR STAND WITH ALL 386 MODELS

ZENITH	Z-159 SUPER XT DUAL DRIVE.....£895
	Z-159 SUPER XT 20Mb HD.....£1095
	Z-286 20Mb INC PAPER WHITE MONITOR.....£1346
	Z-286 20Mb INC 14" FTM HR COL MONITOR.....£1572
	Z-286 LOW PROFILE 20Mb.....£1495
	Z-286 LOW PROFILE 40Mb.....£1720
	Z-248 12MHz 40Mb.....£2095
	Z-248 12MHz 72Mb.....£2556
	Z-248 12MHz 120Mb.....£3349
	Z-386 16MHz 40Mb INC 14" FTM HR MONITOR.....£2620
	Z-386 16MHz 72Mb INC 14" FTM HR MONITOR.....£3072
	Z-386 16MHz 120Mb INC 14" FTM HR MONITOR.....£3995
TANDON	PCX20 MONOCHROME.....£889
	PCA20 MONOCHROME.....£1099
	PCA20 PLUS MONOCHROME.....£1149
	PCA40 PLUS MONOCHROME.....£1249
	PCA70 PLUS MONOCHROME.....£1399
	TARGET 20 MONOCHROME.....£1318
	TARGET 20 PLUS MONOCHROME.....£1424
	PAC286.....£949
	PAC286 PLUS.....£999
	30Mb DATA PAC.....£179
	386 16MHz 40Mb.....£2110
	386 20MHz 40Mb.....£2704
	386 20MHz 70Mb.....£2968
	386 20MHz 110Mb.....£3166
	386 20MHz DP.....£3364
EPSON	PCE 20Mb MONOCHROME.....£825
	PCAX20 20Mb.....£1150
	PCAX40 40Mb.....£1425
	PCAX80 80Mb.....£1850
AMSTRAD	PC1512 SDMD.....£358
	PC1512 SDCD.....£473
	PC1512 DMD.....£473
	PC1512 DDCD.....£594
	PC1640 SDMD.....£445
	PC1640 DMD.....£545
	PC1640 20Mb HDMD.....£795
	PC1640 SD ECD.....£715
	PC1640 DD ECD.....£812
	PC1640 20Mb HD ECD.....£795
	PC2086 SD 12MD.....£383
	PC2086 SD 14CD.....£743
	PC2086 SD 12HRCD.....£843
	PC2086 SD 14HRCD.....£943
	PC2086 DD 12MD.....£738
	PC2086 DD 14CD.....£888
	PC2086 DD 12HRCD.....£988
	PC2086 DD 14HRCD.....£1088
	PC2086 HD 12MD.....£988
	PC2086 HD 14CD.....£1138
	PC2086 HD 12HRCD.....£1238
	PC2086 HD 14HRCD.....£1338
	PC2286 DD 12MD.....£384
	PC2286 DD 14CD.....£1134
	PC2286 DD 12HRCD.....£1234
	PC2286 DD 14HRCD.....£1334
	PC2286 HD 12MD.....£1334
	PC2286 HD 14CD.....£1484
	PC2286 HD 12HRCD.....£1584
	PC2286 HD 14HRCD.....£1684
OPUS	PCV 30Mb MONOCHROME AT.....£1295
	PCV 30Mb EGA AT.....£1549
	COMPLETE RANGE PCIII & PCIV ALSO AVAILABLE EPDA
	COMPAG ** SBC.....** ALL
	OLIVETTI ** BLUE CHIP.....** AVAILABLE
	VICTOR ** APRICOT.....** EX STOCK

PORTABLE COMPUTERS

THIS MONTH'S SPECIAL OFFER

FREE £50 CARRYING CASE WITH ALL SUPERSPORT 286 MODELS

LOWEST UK PRICES ON ZENITH PORTABLES

ZENITH	SUPERSPORT QUAL DRIVE.....£335
	SUPERSPORT 20Mb.....£1719
	SUPERSPORT 286 20Mb.....£2075
	SUPERSPORT 286 40Mb.....£2599
	TURBOSPORT 386 40Mb.....£3199
	FULL RANGE OF ACCESSORIES AVAILABLE
TOSHIBA	T1000.....£590
	T1200 HB/FB.....£ PDA
	T1600 NEW.....£ PDA
	T3100/20.....£ PDA
	T3200.....£ PDA
	T5100.....£ PDA
	T5200 NEW.....£ PDA
EPSON	OVAL DRIVE PORTABLE.....£1035
	20Mb PORTABLE.....£1639
AMSTRAD	PPC512S.....£355
	PPC512D.....£445
	PPC640S.....£436
	PPC640D.....£535
PHILIPS	7513 12" MONO.....£72
	8833 14" CGA.....£213
	9053 14" EGA.....£330
	9073 14" EGA.....£390
	8873 14" M/SYNC.....£445
TAXAN	KX123 12" MONO.....£91
	620 12" CGA.....£260
	660 12" EGA.....£398
	760 14" EGA.....£390
	770 + 14" M/SYNC.....£445
	780 14" VGA.....£385
	980 20".....£1759
	990 20".....£1835
NEC	M/SYNC GS.....£135
	M/SYNC 14" II.....£425
	M/SYNC +.....£625
	M/SYNC 20" XL.....£1356
AMSTRAD	MC2400 V21/V22/V22BIS/V23 + SOFT.....£155
DOWDY	QUATTRO PLUS PC V21/V22/V22BIS/V23.....£545
MIRACLE TECHNOLOGY	WS4000 V21/V23.....£93
	WS4000 V21/V22/V23.....£297
	WS3000 V21/V22.....£198
	WS3000 V21/V22/V23.....£207
	WS3000 V21/V22/V22BIS/V23.....£297

WE CAN ALSO OFFER THE FOLLOWING AT THE LOWEST UK PRICES

DATAFLEX TRICOM PAGE PHONE FOR FABULOUS PRICES AND QUANTITY DISCOUNTS.

LASER PRINTERS

6PPM	EPSON GQ2500.....£1099
	OKI LASERLINE 6 ELITE.....£1290
	QUIME CRYSTAL PRINT WP.....£799
	SBC SPEED LASER.....£1285
8PPM	AST TURBO POSTSCRIPT.....£2475
	BROTHER HL8.....£1449
	BROTHER HL8 POSTSCRIPT.....£3699
	CANON LBP8-11.....£1342
	CANON LBP8-11T.....£1730
	CANON LBP8-11R.....£1845
	HEWLETT-PACKARD LASERJET 11.....£1320
	H.P. LASERJET IID NEW!.....£2395
	QMS PS810 + POSTSCRIPT.....£2699
	STAR LP8.....£1339
10PPM	CITIZEN OVERTURE 110+.....£1145
	KYOCERA F-1000.....£1675
	KYOCERA F-1200.....£2489
	KYOCERA F-2200.....£3445
	PANASONIC KXP4450.....£1439
	QUIME SCRIPT TEN.....£2979
18PPM	KYOCERA F-3000.....£4885

FACSIMILE

BRITISH TELECOM	CF9.....£799
PANASONIC	UF150.....£1099
	UF250.....£1450
	UF600B.....£1280
	UF600SF.....£1880
	UF640-60.....£2477
	UF640-120.....£2597
MURATA	IMAGEMASTER.....£1675
	IMAGEMASTER-30.....£1850

HARD DISK UPGRADES

21Mb HARDCARD.....£195
32Mb HARDCARD.....£225
30Mb DRIVE + CONTROLLER.....£185
40Mb DRIVE 40MS.....£260
40Mb DRIVE 28MS.....£325
TANDON BUSINESS CARD 21Mb.....£195
TANDON BUSINESS CARD 41Mb.....£325

PLOTTERS

HEWLETT-PACKARD	7440A.....£709
	7475A.....£990
	7550A.....£2660
	7570A.....£2779
DRAFTPRO DXL.....EPDA	
DRAFTPRO EXL.....EPDA	
ROLAND	DXY880.....£560
	DXY1100.....£580
	DXY1200.....£815
	DXY1300.....£985
	OPX2200.....£2460
	OPX3300.....£3760
	GRX3000.....£3055
	GRX400.....£4360
TAXAN	KPL715.....£695

SCANNERS

CANDON	1x12 SCANNER.....£619
	1x12 SCANNER.....EPDA
	1x12 OCR.....£329
	FLATBED SCANNER.....£735
HEWLETT-PACKARD	SCANJET.....£859
	SCANJET.....£275
	OCR SOFTWARE.....£325

DAISYWHEEL PRINTERS

BROTHER HR20.....£299
BROTHER HR40.....£689
CITIZEN PREMIER 35.....£372
JUKI 6100.....£252
JUKI 6200.....£349
JUKI 6300.....£577
JUKI 6500.....£689
PANASONIC KXP3151.....£359

MONITORS

PHILIPS	7513 12" MONO.....£72
	8833 14" CGA.....£213
	9053 14" EGA.....£330
	9073 14" EGA.....£390
	8873 14" M/SYNC.....£445
TAXAN	KX123 12" MONO.....£91
	620 12" CGA.....£260
	660 12" EGA.....£398
	760 14" EGA.....£390
	770 + 14" M/SYNC.....£445
	780 14" VGA.....£385
	980 20".....£1759
	990 20".....£1835
NEC	M/SYNC GS.....£135
	M/SYNC 14" II.....£425
	M/SYNC +.....£625
	M/SYNC 20" XL.....£1356

MODEMS

AMSTRAD	MC2400 V21/V22/V22BIS/V23 + SOFT.....£155
DOWDY	QUATTRO PLUS PC V21/V22/V22BIS/V23.....£545
MIRACLE TECHNOLOGY	WS4000 V21/V23.....£93
	WS4000 V21/V22/V23.....£297
	WS3000 V21/V22.....£198
	WS3000 V21/V22/V23.....£207
	WS3000 V21/V22/V22BIS/V23.....£297

QUANTITY DISCOUNTS



OVER 1000 PRODUCTS AT OUR DISPOSAL
PLEASE CALL FOR ITEMS NOT LISTED

ALL PRICES EXCLUDE VAT E & OE
ALL PRICES CORRECT AT COPY DATE

TOP DECK SYSTEMS

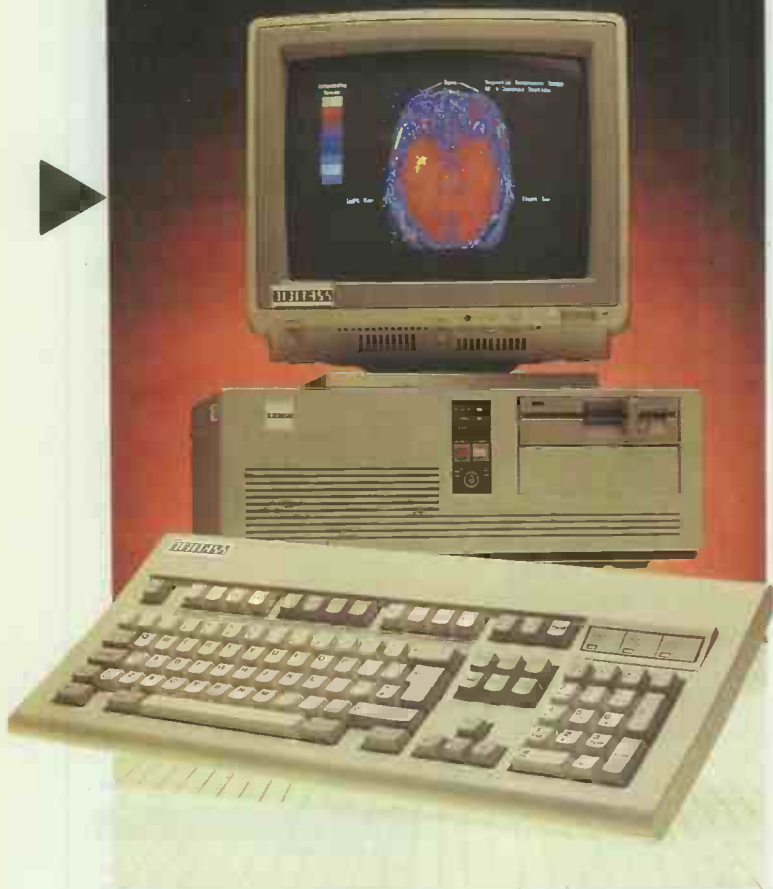
TEL: 01-689 6170
0752 791800
01 689 2299
FAX: 0752 702239

CROYDON HOUSE, 1 PEALL ROAD, CROYDON CR0 3EX

HEAD OFFICE: ROADWAY HOUSE, TRANSIT WAY, CROWN HILL, PLYMOUTH, DEVON PL5 3TW

COMPUTERS-PRINTERS-PERIPHERALS-CHIPS-CARDS-CONSUMABLES-MAINTENANCE

Quality... at a sensible price.



Our popular desktop systems support 3 half height devices vertically and are ideal for both home and office environments.

Digitask is a British company. The Axiom range is researched, tested and built by our engineers in the United Kingdom.

Our XT/286/386 based systems are available in four case styles to suit your requirements. From a floor standing enclosure as a Server to the mini portable all units have precisely the same computing power while providing a housing to suit your needs. Call us for your custom configuration.



Digitask's LCD portable includes a superb 640 x 400 resolution blue screen, 2 half height drives and an 88 key keyboard.

AXIOM XT-PLUS/30

- V-20 processor running at 4.77 / 7.1 / 9.54 MHz software or hardware switchable
- AMI BIOS
- Socketed for 8087 co-processor
- Full 640KB RAM memory
- 7 expansion slots
- 2 parallel, 1 serial (2nd optional) port, clock/calendar with battery backup, games port, light pen interface.
- Choice of 360KB 5.25 or 720KB 3.5" floppy drive
- 30MB Winchester drive

FROM
£995

AXIOM 286-16-NEAT/40

- 80286-16 processor running at 6/16MHz software / hardware switchable
- AWARD ver 3.03 BIOS with built in setup
- Socketed for 80287-10 co-processor
- FULL 2MB RAM Memory (expandable to 4MB on board)
- Paged, Interleaved RAM mode supported
- 2 parallel, 1 serial (2nd optional) port, clock/calendar with battery backup, games port, light pen interface.
- On board RAM above 640KB may be configured as EMS ver.4
- Shadow RAM mode for fast BIOS access
- Programmable NEAT Chips & Technologies chip set
- NEAT parameters may be saved to disc
- 5x16 bit + 2x8 bit expansion slots
- Choice of 1.2MB 5.25" or 1.44MB 3.5" floppy drives
- 40MB 28ms Winchester drive

FROM
£1995

AXIOM 386-20/40

- 80386-20 processor running at 6/20MHz
- PHOENIX BIOS with built in setup
- Support for File Server mode (less K/B & display)
- Socketed for 80287-10 or 80387-20 co-processors
- FULL 2MB RAM memory (expandable to 8MB on board), optional daughter board for up to 16MB
- Paged, interleaved RAM mode supported
- Shadow RAM for fast BIOS access
- Programmable Chips & Technologies chip set
- C & T parameters may be saved to disc
- 6x16 bit + 1x8 bit + 1x32 bit expansion slots
- 2 parallel, 1 serial (2nd optional) port, clock / calendar with battery backup, light pen interface
- Choice of 1.2MB 5.25" or 1.44MB 3.5" floppy drives
- 40MB 23ms Winchester drive

FROM
£2995

All systems are supplied with the following as standard:

High Resolution Monochrome / graphics display adapter
14" Amber / Paper White TTL display
200 WATT Switch Mode power supply
102-key Extended UK / European Keyboard
GENIUS opto-mechanical (MICROSOFT / MOUSE SYSTEMS compatible) mouse
Mouse pocket, cutting board / mouse pad

Plus FREE software:

DR. HALO III professional graphics and slide-show software
MICROSOFT MS-DOS operating system and GW-BASIC
Menu Maker Software
Menu Library Software
WORDprocessor, DATAbase, COMMunications,
SPREADsheet and a UK origin ACCounts package

Digitask offer FREE HOTLINE SUPPORT by qualified professionals on all systems. All systems carry a 12 MONTHS back to base WARRANTY as standard. This may be converted to ON SITE at just £50 if purchased with the system. Extended on site warranty contracts are available.

*The prices quoted are for desktop configurations.

The prices you see are based on C.W.O. or Credit Card orders.

Price Does Not Include RAM Surcharge

Prices do not include VAT or carriage

Nationwide Delivery Service





Our specialist luggable systems support up to 3 half height drives vertically and are available with either MDA or CGA emulations.



▲

DIGITASK

Digitask Business Systems Ltd, Unit 2, Gatwick Metro Centre
Balcombe Road, Horley, Surrey RH6 9GA
Telephone (0293) 776688 Fax: (0293) 786902 Telex: 878761 DIGIT G

Digitask's latest tower systems offer up to 6 half height devices. single or dual screen versions. Ideal for CAD/workstation/file server applications.





DIGITASK PERIPHERALS

MEMORY EXPANSION BOARDS:

(All RAM adapters with OKB unless stated)	
AT-128 Bridging adapter (512 - 640) for AT	45
DT-133 MCA compatible for PS/2 2MB Ext/Exp	229
DT-138 576KB RAM adapter with high start address	69
DT-158 10MB Ext/Exp RAM w/backfill (AT ONLY)	269
DT-165A 2MB EMS adapter w/backfill XT/AT	124
DT-171 2MB Ext/Exp RAM adapter (AT ONLY)	119
DT-777 Enhanced EMS OKB (2MB max) LIM/EMS	149
EMSPAGE 2MB EMS adapter XT/AT	95
MEMO-2000A 2MB Ext/Exp RAM adapter (AT ONLY)	179
RAMASTER 576K max capacity for XT	45
SUPERAM AT/386 2MB useable to 20MHz EXT ONLY	119

I/O & M/FUNCTION ADAPTERS:

640K M/Function 1s.1p.1c.rtc with bb	97
ASYNC adapter (XT/AT) 1s.2s opt	37
CLOCK / CAL (XT) real time 1c	39
DIO-200X (XT) 1s.2s opt.1p.1g.1c	69
DIO-500A (AT) 1s.2s opt.1p.1g	79
DT-125 2MB Ext RAM (AT) 1s.1p.1g	159
DT-173A (AT) 1MB Exp RAM 1s.1p.1g w/backfill	149
DT-173X (XT) 1MB Exp RAM 1s.1p.1g w/backfill	159
GAMES adapter (XT/AT) 2g	24
I/O Plus II (XT)1p.1s.2s opt.1g.1c.rtc with bb	89
MS-400A (AT) 4prt ASYNC (DOS) adapter 4s	169
MS-400X (XT) 4prt ASYNC (DOS) adapter 4s	109
MS-422A (AT) 2prt RS232/RS422 ASYNC adapter	109
MS-422X (XT) 2prt RS232/RS422 ASYNC adapter	97
MU-440 (XT/AT) 4prt ASYNC (XENIX/CDOS)	179
MULTI 8255 I/O (XT/AT) 48 I/O • 3counters	119
MULTI-I/O (XT) 1s.2s opt.1p.1g.2f.1c.rtc with bb	89
Parallel / Serial adapter (AT) 1p.1s.2s opt	69
Parallel Printer buffer (XT/AT) 16-64K RAM	79
Parallel printer adapter (XT/AT) 1p	22

DISPLAY ADAPTERS:

EV-1024 VGA/PGA/EGA/CGA/MDA/HERC to 1024x768	379
DT-233 GRAPHICS PLUS emul.HERC+ with d/load chars	119
DT-660 True IBM-PGA emul 256 of 4096 palette	967
DT-673 (EVGA) True VGA emul	259
DT-235 ULTRA GRAPHICS 1660 x 1200	249
VEGA-VGA VGA/EGA/CGA/MDA/HERC • 800x600 256 of 256K	237
CGA/PRINTER adapter (XT/AT) 1v.1p	59
CGA adapter (XT/AT) 1v	69
MONOGRAPHIC/PRINTER adapter (XT/AT) 1v.1p	59
MG-132 mono/graphics/printer 132col 1v.1p	89
A-100 PAL/CGA adapter 1v.1UHF.1comp.1p	129

EPROM PROGRAMMERS:

DT-901 Single gang 2716 - 27512 12/21/25v	129
DT-3000 PAL/EPROM programmer 2716/512 12/21/25v and PALS 10/14/16/18/20 - H or L - R,RP,X,S	369
DT-6000F 4-gang EPROMs 2716/512 12/21/25v	179
DT-6000S 6-gang EPROMs 2716/512 12/21/25v	199
DT-6000E 8-gang EPROMs 2716/512 12/21/25v	229
DT-6000X 10-gang EPROMs 2716/512 12/21/25v	259
DT-6000T 12-gang EPROMs 2716/512 12/21/25v	299

PROTOCOL CONVERTERS:

SP-100 Serial to Parallel	45
PS-100 Parallel to Serial	45
BE-155 PSU for above	10
DT-SP Serial to Parallel converter (on OFFER!!)	29

DATA SWITCHES:

Mini Parallel DATA T-SWITCH	39
MINI Serial DATA T-SWITCH	39

BRANDED PERIPHERALS

MULTIFUNCTION/RAM

AST Advantage Premium 512K (1MB max) 1S. 1P. SW. EEMS	399
AST six pack Plus 64KB (384K max) 1S. 1P. 1C. SW	195
AST six pack Premium 512K (2MB max) 1S. 1P. 1C. SW. EEMS	339
AST Rampage/EGA (AT only) 512K (2MB max) SW. EEMS	529
AST Advantage/2 - 386, MCA, PS/2 Mod 70/80 1MB (8MB max)	519
AST Rampage 286 512K (2MB max) SW. EEMS	375
AST Rampage/2 - 286, MCA, 512K (2MB max) SW. EMS4, EEMS	379
AST Rampage XT 256K (2MB max) SW. EEMS	265
IDEAMAX - 170 Dual serial adapter (async) PS/2 Mod 50/60/70/80	99
IDEAMAX - 160 512K (12MB max), PS/2 Mod 50/60/70/80	299
Intel Aboveboard PS/286 512K exp to 2MB	335
Intel Aboveboard 2 for PS/2 EMS4 512K exp to 2MB	237
Interquadram Quadmem PS/2 4MB PS/2	1319
Monolithic JUSTRAM up to 16MB max 286/386	CALL
Orchid RAMQuest Extra 1Mb. 25 (max 8MB) PS/2 Mod 50/60/80	568
Orchid Conquest M/F 1P, 1S, 64K exp to 2MB	125
Tecmar New Captain 286 2MB (16MB max) EMS	CALL
Tecmar Microram Memory M/function PS/2 Mod 80 512KB (8MB max)	CALL
TERMINAL EMULATION	
Idea Associates 5251 for IBM System 3(XXX)	449
IRMA 3270/3279 Terminal Emulation	779
IRMA—ALL BOARDS—Full range available	CALL
Smart Alec DCAs 5250 emulation	CALL
Smart Alec (MCA) for PS/2 Models 50/60/80	650
COMMS	
K-BYTE Ceefax/Oracle/Viewdata adapter with Software	219
Specialex SI-4/8/16 multiport comms (38.4K Baud max)	CALL
GO-FASTER BOARDS	
Intel Inboard 386/AT 1MB with 32bit mem addressing	1245
Intel Inboard 386/PC 1MB with 32bit mem addressing	745
Orchid JET-386 16MHz (3 x AT speed)	520
Orchid Tiny Turbo 286/12MHz	399
Orchid Tiny Turbo 286	250
MISCELLANEOUS	
Polaroid Palette PLUS EGA/Slide & print creation	1935

FAX MACHINES & ADAPTERS

British Telecom CF9 portable compact fax	879
Canon 110 desktop (includes 1 yr on site warranty)	1045
Dowly Microfax adapter card with s/ware	745
Quadram J.T. Fax internal short card	259
Sanyo SANFAX (includes 1 yr on site warranty)	1079
EZ-FAX / EZ-FAX LAN / EZ-SCAN / EZ-PUBLISH	CALL

TELEX ADAPTERS

Braid Telex Manager System (modem & s/ware) complete	CALL
Braid Telex Manager Multi-user system	CALL
Dowly Telex System (Modem & s/ware)	819

TERMINALS

WYSE 60 Terminal + Keyboard G/A/White	365
WYSE WY-120 78MHz ASCII VT-100/52 ANSI	375
QUME Full Range	CALL
SUN RIVER fibre optic station 80386 DOS EGA graphics UNIX/XENIX mapped graphics. 101 key style keyboard. 32bit CPU/32MB per second	CALL
SUN RIVER fibre optic host adapter. Four full duplex fibre optic ports. Secure communications. Full 16bit AT slot	CALL

UNINTERRUPTABLE POWER SUPPLIES

500VA - Quasi Sinewave - 5mins backup at FULL load —typical 15mins running standard PC/AT. Regulated & Filtered 240volt operation—a must for valuable hardware & data	478
Prices available on units up to 1200VA—Please call	

MAIN SYSTEM BOARDS

XT VLSI 4.77/7.1/9.54MHz OKB (640 max) 7-slot	79
DTM-286-16-NEAT: 16MHz (HW/SW select 6/16MHz) using C&T NEAT set - socket 80287 exp to 4MB on board RAM configurable as LIM4 spec - Shadow RAM AWARD BIOS - on board 8B clock/cal - 6x16 + 2x8 exp slots - Landmark 21 / Norton 18 typical - Fully XENIX/CDOS/DOS/OS-2 compatible - Standard XT size for replacement - OKB	495
DTM-386-20: 20MHz (selectable 6/20MHz) using 80386-20 socketed for both 80287-10 and 80387-20 co-processors - exp to 8MB onboard - optional daughter board for total 16MB with full 32bit addressing - Paged interleaved RAM - Shadow mode - PHOENIX or AMI BIOS - Programmable C&T chipset - on board BB clock/cal - Support for File Svr Mode (no mon/kybd) - 6x16 + 1x8 + 1x32 bit exp slots - Landmark 26.7 / Norton 23.8 typical - Fully XENIX/CDOS/DOS/OS-2 compatible - Std XT footprint - OKB	927
DTM 286-24 NEAT: 24 MHz 40286. 80628b-16 main processor. Socketed for 80287-10 co-processors. Uses 256K x 1 (up to 1MB) or 1024K x 1 DRAM (up to 4MB) or 1024 Sims (up to 8MB). AMI BIOS with Built-in set up - Speed selectable (MW or SW) between 8/16/24 MHz. 6 x 16 bit expansion slots. 2 x 8 bit.	779

TAPE STREAMERS

40MB Goldstore Internal XR4 PC/XT/AT/386	425
40MB Goldstore Internal XR4 PS/2	425
Goldstore XR4 optional driver board	69
40MB Goldstore External XR4 PC/XT/AT/386	545
40MB Goldstore External XR4 PS/2	545
60MB TEAC Int. DIC-60 PC/XT/AT/386 DOS/XENIX/CDOS	CALL
60MB WANGTEK Internal DOS/XENIX	619
155MB TEAC 3.5" (5.25" opt.) DOS/XENIX/CDOS	CALL

NEW! SPECIALS **NEW!**
DATAFLEX POCKET STRAOCOM
 UK BAPT APPROVAL
 V21/V22 + HAYES. POWER Batt. or Mains
 £179

NEW! SPECIALS **NEW!**
HP DESKJET
LASER QUALITY 100 SHEET INPUT TRAY
DRAFT QUALITY AT 240cps
DUAL INTERFACE
 £579

ALSO AVAILABLE—ALL RELATED ACCESSORIES INCLUDING PRINTER STANDS, COPYHOLDERS, ACOUSTIC HOODS, CABLES, RIBBONS, SHEETFEEDER AND COMPUTER FURNITURE, ETC.

OUR PRODUCT RANGE IS TOO EXTENSIVE TO ADVERTISE IN ITS ENTIRETY, SO IF YOU DON'T SEE WHAT YOU WANT—CALL FOR MORE DETAILS.

BOOKS We now distribute an incredible list of titles by reputable authors on PC Hardware and Software. Ask for our Book List.

EXPORT ENQUIRIES WELCOME

DIGITASK

SOFTWARE

BEST SELLING PROGRAMS

DATABASE	
CLIPPER COMPILER	297
CDMSOFT DELTA V	367
CORNERSTONE	61
DATA PERFECT	247
D.BASE III+	340
D.BASE IV NEW!	375
FOXBASE + V.2.1	243
JAVELIN PLUS	220
MATHPLAN by SENTINEL	238
PARADOX II	247
PARADOX DS/2 VERSION	345
PARADOX LAN (6usr) VERSION	389
RBASE SYSTEM V	279
RAPIDFILE	189
REFLEX	57
VP INFO	62
WORD PROCESSORS	
BORLAND SPRINT	182
GEM 1st WORD PLUS	159
HARVARD PROFESSIONAL WRITE	CALL
LOTUS MANUSCRIPT	228
MULTIMATE ADVANTAGE II	259
PROTEXT	42
SAMNA WORD IV	272
WORD IV (MICROSOFT)	238
WORDPERFECT LIBRARY	120
WORDPERFECT V	242
WORDPERFECT V LAN (+128/NDDE)	645
WORDSTAR	144
WORDSTAR 2000 REL2	228
WORDSTAR PROFESSIONAL REF 5	193
DTP/GRAPHICS/CAD	
ALDUS PAGEMAKER	469
APPLAUSE by MICROSOFT	CALL
AUTOSKETCH	47
BYLINE by ASHTON TATE	169
CHART v.3.0 by MICROSOFT	172
CHARTMASTER by ASHTON TATE	163
DESIGN CAD	328
DRAW APPLAUSE by ASHTON TATE	458
FONTSAY	47
FONTWARE by BITSTREAM	CALL
FREELANCE +	258
GEM ARTLINE NEW!	396
GEM DESKTOP PUBLISHER	276
GEM DRAW PLUS	179
GEM GRAPH	159
GEM SCAN	79
GEM WORDCHART	119
GEM PRESENTATION TEAM (drw/gph/wcht)	239
GEM 1st WORD PLUS	159
HARVARD GRAPHICS	243
HARVARD GRAPHICS LAN (5usr) VERSION	969
MASTER GRAPHICS by ASHTON TATE	328
MATHCAD v.2.0	238
MICROGRAFIX DESIGNER	392
MICROSOFT WINDOWS	57
PAGE PERFECT	375
PC PAINTBRUSH	53
PFS BUSINESS SYMBOLS	34
PFS FIRST PUBLISHER	103
PICTURE PERFECT	208
TURBOCAD SYSTEM	CALL
TURBOCAD (ENTRY LEVEL SYSTEM)	83
VENTURA DESKTOP PUBLISHING	538
VUTRAX 6	CALL
SPREADSHEETS	
EXCEL (MICROSOFT)	242
LOTUS 123	249
LOTUS HAL	74
PLAN PERFECT	199
SUPERCALC V NEW!	245
VP PLANNER PLUS	92

PERSONAL PRODUCTIVITY

ABILITY+	110
BORLAND QUATTRO (Spread sheet)	88
FRAMEWORK III	432
LOTUS AGENDA	247
LOTUS SYMPHONY	332
OPEN ACCESS II v.3	319
Q&A SYMANTEC v.3	219
SIDEKICK PLUS	149
SMART v.3.10 inc S/SC	375
SUPERPROJECT +	290
ACCOUNTS	
ACCOUNTABILITY	68
MULTISOFT ACCOUNTS Per Module	CALL
MULTISOFT MICROSYSTEMS INTEGRATED ACCTS	345
MULTISOFT MICROSYSTEMS PAYROLL	145
MULTISOFT MICROSYSTEMS STOCK CONTROL	95
SAGE ACCOUNTANT	105
SAGE ACCOUNTANT + v.3	122
SAGE BOOK-KEEPER	71
SAGE FINANCIAL CONTROLLER	187
SAGE PAYROLL II	92
PROGRAM DEVELOPMENT & LANGUAGES	
MICROSOFT QUICK BASIC	59
TURBO BASIC	41
TURBO C	41
TURBO PASCAL V4	41
TURBO PROLOG	41
TURBO TUTOR	23
COMMUNICATIONS	
CROSSTALK MARK 4	107
DATATALK	103
SAGE CHIT-CHAT (S/WARE)	68
SMARTERM 240	178
TRANS END	45
OTHERS	
FLIGHT SIMULATOR II M/S	34
LOTUS METRO v. 1.1	48
MICROSOFT WORKS	122
UTILITIES/SCIENTIFIC	
BROOKLYN BRIDGE	79
COPY II PC	29
DESQVIEW by QUARTERDECK	68
EUREKA by BORLAND	53
LOTUS MEASURE	293
MACE UTILITIES v.4.2	57
MICROSTAT II by ECOSOFT	CALL
NORTON ADVANCED	69
NORTON UTILITIES	50
PC TOOLS DELUXE	53
TURBO LIGHTNING by BORLAND	41
XTRÉE	61
PROJECT PLANNING	
HARVARD TOTAL PROJECT MANAGEMENT II	418
MICROSOFT PROJECT IV	243
PERTMASTER ADVANCED RELEASE II	CALL
SUPERPROJECT EXPERT	475
OPERATING SYSTEMS	
CONCURRENT DOS 386 MGE	636
CONCURRENT DOS 386 (1-10 users)	396
CONCURRENT DOS 386 (1-3 users)	316
CONCURRENT DOS XM (1-6 users)	316
CONCURRENT DOS XM (1-3 users)	236
UPGRADE FROM 3-USER SYSTEMS	120

NETWORKING

NOVELL	
FILE SERVER CARD (16 BIT)	675
NETWORK CARD (8 BIT)	297
NETWARE SOFTWARE	From 1,658
3 COM	
3S/200 DEDICATED FILE SERVER	
100MB HD, 2MB RAM, 186 BASED FILE SERVER	6475
3C501 ETHERLINK NETWORK ADAPTER	358
3C503 ETHERLINK II NETWORK ADAPTER	323
3C505 ETHERLINK PLUS ADAPTER	648
3+ SHARE SOFTWARE (1-5 users)	385
3+ SHARE SOFTWARE Ver 1.3.1 (Unlimited users)	1334
ALSO Token Link compat. 3COM products available	POA
D-LINK (DN001) TWISTED PAIR 1MB/SEC	
NOVELL-NETWARE/NET BIOS COMPATIBLE	
D-LINK (DE001) COAX 10MB/SEC NOVELL-ETHERNET-NE-1000 & 3COM, 3C501 COMPATIBLE	198
PC-MAINFRAME	
ICL	
TANGOGATE for DOS or CDOS	
SINGLE NODE 4 SESSIONS	From 739
NETWORKED 4 SESSIONS	From 1111
V24 PC CLUSTER 8 SESSIONS	From 2599
ICL FILE TRANSFER FACILITY (FTF)	From 232
ICL APPLICATIONS DATA INTERCHANGE	From 232
IBM	
AMETHYST for PC-IBM	
SINGLE NODE 4 L U's	739
ADDITIONAL GARNET CARDS	181
TANGOLAN MAC-BOX	275
TANGOLAN GATEWAY & SOFTWARE 4 SESSIONS	925

SCIENTIFIC SOLUTIONS

IEEE-488 (GPIB) Interface PC/XT/AT	267
IEEE-488 I/face PC/XT/AT (orig IBM IEEE-488 spec) with cable	238
LABTENDER. 8bit A/D 32single/16diff in - 50KHz sampling - 16x8 bit D/A out - 24 lines TTL I/O - 5 Hi.Speed 16bit counters - with cable - opt.	
LABPACK utilities software available.	529
BASEBOARD - digital I/O 96 TTL lines (multi 8255 I/O)	375
LABMASTER DMA - 12bit A/D 16single/8diff in - 60KHz sampling - 24 lines buffered TTL I/O - 2x12bit D/A conv - 5 Hi. Speed counters - wait state generator with LABPACK util s/ware & cables avail.	995
LABMASTER DMA PGH - as above but programmable gain at High levels	1235
LABMASTER DMA PGL - as above but programmable gain at Low levels	1235
LABMASTER TM-100 - as above but 125KHz sampling rate	1424
DADIO Board - Digital A/D In/Out - 4x12bit D/A conv double buffered - 24 lines digital I/O - including cables.	399
ROUTE-488 - Advanced IEEE-488 s/ware language i/face modules	97
LABPACK - data acquisition / control software	468
LABTECH NOTEBOOK - menu driven version of above for non-programmers	724
DUAL STEPPER MOTOR CONTROLLER Board	269

NEW PRODUCT

- FASTEST AT/80286 CARD AVAILABLE
- 16 MHz NEAT UP TO 5MB RAM
- VGA INTERFACE/DRIVES TTL/ANALOG
- BUS MOUSE INTERFACE
- 1 SERIAL/1 PARALLEL PORT
- 80287 co. pro. OPTION

£899

NEW!

SPECIALS

NEW!

- QUADRAM J.T. FAX SHORT CARD
- UK BABT APPROVED VERSION
- PC XT-AT and TRUE COMPATIBLES
- GROUP 3 COMPATIBILITY
- £259

PHONE 0293 776688 NOW

or Contact Digitask, Unit 2, Gatwick Metro Centre, Balcombe Road, Horley, Surrey RH6 9GA. Telex 878761 DIGIT G Fax 0293 786902

PRICES MAY CHANGE. ALL THE ABOVE PRICES DO NOT INCLUDE VAT AND CARRIAGE. MINIMUM ORDER VALUE OF GOODS EXCLUDING CARRIAGE AND VAT IS £15.00 THE PRICES YOU SEE ARE BASED ON C.W.O. OR CREDIT CARD ORDERS.

*Subject to contract.

EXPORT ENQUIRIES WELCOME

DIGITASK

DOT MATRIX PRINTERS

9 PIN PRINTERS

	Our Price
BROTHER M1209 80 col 140cps 35NLQ F/T P&S	193
BROTHER M1409 110col 180cps 45 NLQ F/T P&S	300
BROTHER M1709 136col 240cps 50 NLQ F/T P&S	358
CITIZEN 1200 80col 120cps 25 NLQ F/T P	129
CITIZEN MSP 55 132col 300cps 60 NLQ T P	512
EPSON LX-800 80col 160cps 25 NLQ F/T P	195
EPSON FX-850 80col 200cps 40 NLQ F/T P	283
EPSON EX-900 80col 300cps 50 NLQ T P	425
EPSON FX-1050 136col 200cps 40 NLQ F/T P	412
EPSON EX-1000 136col 180cps 60 NLQ F P	560
EPSON DFX5000 136col 533/80 NLQ 6 part screen	1175
FUJITSU DX2100 80col 220cps 44 NLQ F/T P (S OPT)	345
FUJITSU DX2200 136col 220cps 44 NLQ F/T P	389
OKI ML 182 80col 120cps NLQ F P	183
OKI OK 193 132col 160cps 33 NLQ F/T P or S or I	344
STAR LC10 80col 120cps 30 NLQ F/T P	175
STAR LC10 Colour 80col 120cps 30 NLQ T/F P	199
STAR NX15 132col 120cps 30 NLQ T/F P or S	277
PANASONIC KXP1081 80col 120cps 28 NLQ	139
PANASONIC KXP1592 132col 180cps 38 NLQ	323
PANASONIC KXP1595 132col 240cps 51 NLQ	445

18 PIN PRINTERS

BROTHER 2518 136col 360cps 75 NLQ T/F P	651
BROTHER 4018C 136col 480cps 100 NLQ T/F P/S	1050
OKI ML292 80col 200cps 100 NLQ P or S or I	413
OKI ML293 132col 200cps 100 NLQ P or S or I	551

24 PIN PRINTERS

BROTHER M1724 132col 240/72cps P&S	487
BROTHER 3524 136col 432cps 108 LQ T/F P/S	1155
EPSON LQ500 80col 150/50cps, P	265
EPSON LQ-850 80col 180cps 60 NLQ F P	418
EPSON LQ-1050 136col 180cps 60 NLQ F P	562
EPSON LQ-2500+ 136col 270cps 90 NLQ T P	679
EPSON LQ-2550 132col 400/133cps, 7 fonts, colour std. Hi. Res. 360x360 dpi, 6 part stationery F/T P&S	889
FUJITSU DL2600 132col 240/80cps P&S	1074
FUJITSU DL3300 80col 240cps 180 NLQ T/F P	489
FUJITSU DL3400 136col 240cps 180 NLQ T/F P	569
FUJITSU DL5600C 136col 486cps 162 NLQ T/F P/S	1276
HP RUGGED WRITER 480cps 240 LQ T/F P/S opt	934
NEC P2200 80col, 140/56cps P	265
NEC P6 PLUS 80col 265cps 90 LQ F/T P/S opt	425
NEC P7 PLUS 136col 265cps 90 LQ F/T P/S opt	539
OKI-390 80col 270/90cps 64K F/T P&S	432
OKI-391 132col 270/90cps 64K F/T P&S	589
OKI-393C 132col 450/120cps F/T P&S	899
PANASONIC 1540 136col 240cps 80 LQ T/F P/S	419
STAR NB 24-10 80col 216cps 72 NLQ F/T P 360 dpi	429
STAR LC24/10 80col 170cps 57 LQ T/F P	265
STAR NB 24-15 136col 216cps 72 LQ T/F P	524

INKJET PRINTERS

EPSON SQ2500 132col 540/180cps F S&P	888
HP QUIET JET 80col P/S	361
HP QUIET JET PLUS 132col P/S	434
HP DESKJET 240cps 120 LQ P/S	578
HP PAINT JET (COLOUR) 30 colours 167 LQ P or S or I	788

DAISY WHEEL PRINTERS

BROTHER HR20 117col 22cps F P & S	327
BROTHER HR40 136col 40cps T/F P/S	698

LASER PRINTERS

5 PAGE PER MINUTE [ppm]	
FUJITSU RX7100 LED Tech HP+ NEW	1135
6 ppm	
EPSON G03500 LJ+ / D	1169
OKI Laserline 6, HP Series II std. Diablo, Qume, IBM options	1299
8 ppm	
BROTHER HL8 HP+ / Diablo / FX / IBM	1499
CANON 8 SERIES II	1625
CENTRONICS PP8 LJ+	1450
HP SERIES II	1459
NEC LC-890 LED-Tech Adobe-P.Script 3MB	2825
STAR LASERPRINTER HP / IBM / EPSON / DIABLO	1469
10 ppm	
CITIZEN OVERTURE 110 FX / DIABLO	1332
KYOCERA F1000 LJ+ / FX / DIABLO / QUME	1749
KYOCERA F-1200 1.5MB S&P	2620
QUME LJ+ / FX / QUME / IBM	2576
11 ppm	
PANASONIC (DUAL BIN) HP+ / FX / DIABLO / IBM	1585
KXP 4450	
18 ppm	
FUJITSU RX7300E HP+ / FX / DIABLO / QUME / IBM	4195
KYOCERA F-3000 Dual Bin 1.5MB/3.5MB Opt. S&P	4875

PLOTTERS & SCANNERS

AST TURBOSCAN	1195
CANON IX-12 Scanner + Interface + OCR S/W	1163
CHEERY A3 GRAPHICS TABLE MKIII	424
HEWLETT-PACKARD SCANJET + PC/PS2 IF + OCR S/W	1539
HEWLETT-PACKARD HP7550 + DRAWING GALLERY	2834
HEWLETT-PACKARD SKETCHPRO GRAPHICS TABLE	489
HP 7440A A4 8 pen	795
HP 7475A A3/4 6 pen	1189
RIEHO RS311 FLATBED SCANNER + I/F SOFTWARE	1323
ROLAND 885 A3 8 pen NEW	735
ROLAND 990 A3 8 pen NEW	995
ROLAND DPX-3300 A1 8 PEN 15KB EPH + STAND	3799
ROLAND DPX 2200 A2 8 PEN 45CMS	2662
ROLAND DXY 1100 A3	637
ROLAND DXY 1200 A3	899
ROLAND DXY 1300 A3	1029
ROLAND GRX300	3289
ROLAND GRX400	4435
SUMMASKETCH PRO 18 x 12 GRAPHICS TABLE	532
TAXAN KPL715 P/S 8 PEN A3/A4	635
SUMMASKETCH 12 x 12 / GEMDRAW +	475
SUMMASKETCH BIT PAD+	255

MODEMS

EXTERNAL		
DATAFLEX POCKET STRADCOM	V21/V22	179
DOWTY TRIO	V21, V22, V23	489
QOWTY QUATTRO	V21, V22, V23, V22bis.	639
MIRACOM WS2000	V21, V23	89
MIRACOM WS4000	V21, V23	125
MIRACOM WS4000	V21, V22, V23	299
MIRACOM WS3000 2123	V21, V23	205
MIRACOM WS3000 22	V21, V22, V23	275
MIRACOM WS3000 22bis.	V21, V22, V22bis, V23	345
INTERNAL		
AMSTRAD 2400	V12, V22, V23, V22bis NEW!	179
DATAFLEX STRADCOM	V21/V22	139
DATAFLEX BISCOM	V21/V22/V22 bis	199
DATAFLEX QUADCOM	V21/V23/V22/V22 bis	239
DOWTY TRIO CARD	V21, V22, V23	495
DOWTY QUATTRO CARD	V21, V22, V22bis, V23	639
MIRACOM KEYCARD 3000	V21, V23	199
MIRACOM KEYCARD 3000	V21, V22, V23	295
MIRACOM KEYCARD 3000	V21, V22, V22bis, V23	365

MONITORS

MONOCHROME	
NEC M/SYNC-GS 14" X/A/PS2 to VGA	145
720 x 480 max White	112
PHILIPS BM7723 14" Amber TTL FST	95
SAMSUNG MA4575 14" FST TTL PLA Amber T&S	99
SAMSUNG ML2611 12" Paper White Analog PS/2	87
SAMSUNG MA4751 14" FST TTL WD White T&S	87
SAMSUNG MA2575 12" FST TTL PLA Amber T&S	87
TAXAN VIKING 14" 1280 x 960 MONO inc Adapter/Driver S/W	1759
TAXAN VIKING As above PS/2 version	1895
COLOUR	
HITACHI MULTI 560 14" to 3KHz PC/PS2	399
HITACHI AUTO 480 14" Analog Dedicated Sync	415
MICROVITEC AUTOSCAN 20" with T&S	1355
NEC M/SYNC-II 14" PC/PS2/MAC TTL/Analog 36KHz T&S	429
NEC M/SYNC-PLUS 15" as-PLUS to 50KHz	1369
NEC M/SYNC-PLUS 15" as-II to 48KHz	
1024 x 768 max FST	655
PHILIPS CM8833 14" Med Res TTL/Comp/Audio CGA	219
PHILIPS CM9053 EGA 14" 850 350	349
QUADRAM MULTISCAN 14" 800 x 600	355
TAXAN MULTIVISION 770+ MULTISCAN	449
TAXAN SV780 VGA 14" IBM/PS/2	399
TAXAN SUPERVISION-620 UII. Hi. Res TTL GCA	345

MICE, JOYSTICKS & KEYBOARDS

GM-6 GENIUS MOUSE Mouse systems and Microsoft mouse compatible, intelligent, powered via serial port, 500mm/sec, 200 Dpi, Drivers supplied with test program, output via 1.5m cable, 25DF connector	49
GM-6 PLUS GENIUS MOUSE as above but include mouse pocket, mouse pad and cutting board, Dr Halo III software, with menu maker and slideshow.	55
FK-555 102 key extended tactile touch (UK) KEYBOARD, AT/XT switchable, separate numeric keypad and cursor keys, functions F1-F12	95
LOGIMOUSE & SOFTWARE (SERIAL)	75
LOGIMOUSE & SOFTWARE (BUS)	83

CHIPS & PROCESSORS

4164-12 DRAM	1.98
4464-12 DRAM	9.85
41256-15 DRAM	8.05
41256-12 DRAM	9.25
41256-10 DRAM	9.85
41256-6 DRAM	9.04
41000-12 DRAM	26.47
8087-3 5MHz	87
8087-2 8MHz	105
8087-1 10MHz	149
80287-6 6MHz	115
80287-8 8MHz	164
80287-10 10MHz	199
80387-16 16MHz	315
80387-20 20MHz	445
80387-25 25MHz	726
80386 20MHz Processor	347
NEC V20 (8088 equiv)	10
NEC V30 (8086 equiv)	13

EGA ADAPTORS

VEGA VGA H/M/C/E/VGA 800x600 256 col PS/2 comp	237
EG 2000 (genoa) H/M/C/E/P&A + 132 + 43	139
EGAMAX (genoa) M/C/E/P&A + 800 x 600 NEW	179

ALSO AVAILABLE—ALL RELATE . ACCES . S INCLUDING PRINTER STANDS, COPYHOLDERS, ACOUSTIC HOODS, CABLES, RIBBONS, SHEETFEEDER AND COMPUTER FURNITURE, ETC.

PHONE 0293 776688 NOW

or Contact Digitask, Unit 2, Gatwick Metro Centre, Balcombe Road, Horley, Surrey RH6 9GA. Telex 878761 DIGIT G Fax 0293 786902

PRICES MAY CHANGE. ALL THE ABOVE PRICES DO NOT INCLUDE VAT AND CARRIAGE. MINIMUM ORDER VALUE OF GOODS EXCLUDING CARRIAGE AND VAT IS £15.00 THE PRICES YOU SEE ARE BASED ON C.W.O. OR CREDIT CARD ORDERS.

*Subject to contract.

EXPORT ENQUIRIES WELCOME

DIGITASK

COMPUTER SYSTEMS

DIGITASK PC's	
★ AMSTRAD	★ see other advertisement
★ EPSON	★ AST
★ TANDON	★ OLIVETTI
	★ SHARP
	★ TOSHIBA
AST PREMIUM 286, 10MHz 20MB MOD 120 exc Montr	1469
AST PREMIUM 286, 10MHz 40MB MOD 140 exc Montr	1769
AST PREMIUM 386 20MHz MODEL 340 40MB exc Montr	3269
AGER AT 40MB HD (28MS) 640K KB MONO MONITOR	1800
EPSON PCAX40 40MB 8 & 10MHz 640K exc Montr	1499
EPSON PCAX80 80MB 8 & 10MHz 640K exc Montr	1885
EPSON PCE 20MB HD 40MS 640K Mono Monitor DOS	875
SAMSUNG MFC6000/2 80286-6/10MHz 20MB 10SW	1240
SAMSUNG SPC3000/3 640K 20MB HD Hi-Res 1 YR DSW	765
ZENITH SUPERSPORT 20 720FD 20MB HD 640K RAM	1850

LAPTOP/PORTABLES

ZENITH SUPERSPORT 80C88/4.77-8MHz/720K FD/20MB HD/640KB RAM	1835
SUPERSPORT 286-40/6-12MHz/1.44M FD/40MB HD/1MB RAM	3055
SUPERSPORT 286-20 AS ABOVE BUT 20MB	2395
TURBOSPORT 386/6-12MHz/1.44 FDD/40MB HD/2MD RAM	3795
EPSON PC PORTABLE V30/4.77-10MHz/2 x 720K FDD/640K RAM	1295
SHARP PC 7100 80C86/7.37MHz/360KB FD/20MB HD/320KB RAM	1499
SHARP PC 7221 80286/6-8-10MHz/1.2MB FD/20MB HD/640KB RAM	2075
SHARP PC 4521 80188/7.16MHz/720KB FD/20MB HD/384KB RAM	1495

DTP COMPLETE SYSTEMS

POSTSCRIPT SYSTEM: AXIOM-286/NEAT-16 computer. Mono Hi-Res 20MB (40ms) Winchester 2MB RAM. Turbo Laser with Postscript Aldus Pagemaker + Mouse	4875
AST PREMIUM PUBLISHER II: AST 286 40MB. Mono Turbolaser Printer. Ventura Publisher by Xerox	5275

DTP MONITORS

WYSE-700 1280 x 800	573
GENIUS A4 1008 x 736	949
GENIUS A3 1280 x 1024	1645

NEW!

APPLE-MAC COMPATIBLES

HARD DISKS	
RODIME 520+ EXT (Plus/SE/II)	495
RODIME 545+ EXT (Plus/SE/II)	699
RODIME RX45 INT (SE/II)	555
RODIME RX100 INT (SE/II)	899
FOR LARGER CAPACITIES	CALL
TAPE STREAMERS	
40MB EXT	699
60MB EXT	1199
EXPANSION BOARDS	
MICRON 2MB EXT/EXP (Plus/SE)	745
MICRON 4MB EXT/EXP (Plus/SE)	1399
MICRON 4MB EXT/EXP (II)	1345
MICRON 8MB EXT/EXP (II)	2699
PRINTERS	
NEC LC-890 8ppm LASER with Appletalk I/F MONITORS	2849
NEC MULTISYNC II 14" (II)	445
NEC MULTISYNC PLUS 15" (II)	659
NEC MULTISYNC XL 20" (II)	1369
VIKING I Mono 19"	
SCANNERS	
TAXAN TXF300A (Microtek) FLATBED	1199

WINCHESTER DRIVES & CONTROLLERS

SEAGATE 20MB (40ms—low power) Hardcard	225
SEAGATE 20MB H.H.T ST125 (40ms) 3.5" in 5.25"	199
SEAGATE 20MB H.H.T ST125-1 (28ms) 3.5" in 5.25"	209
SEAGATE 20MB H.H.T ST225 (65ms)	167
SEAGATE 30MB (40ms—low power) Hardcard	239
SEAGATE 30MB F.H.T ST4038 (40ms)	349
SEAGATE 30MB H.H.T ST238R (65ms) RLL	175
HITACHI 40MB H.H.T DK-S21 (22ms)	429
SEAGATE 40MB H.H.T ST251 (40ms)	269
SEAGATE 40MB H.H.T ST251-1 (28ms)	319
SEAGATE 50MB (40ms—low power) Hardcard	389
SEAGATE 65MB H.H.T ST277R (40ms) RLL	339
SEAGATE 80MB F.H.T ST4056 (28ms)	499
HITACHI 87MB H.H.T DK-S22C (25ms) SCSI	579
HITACHI 91MB H.H.T DK-S22-10 (25ms) ESDI	599
SEAGATE 122MB F.H.T ST4144R (28ms) RLL	729
SEAGATE SCSI Host adapter XT/AT	84
W-DIGITAL WD-1002-27X XT Hard RLL Cont	65
W-DIGITAL WD-1002-WX1 XT Hard Cont	59
W-DIGITAL WD-1003-RA2 AT Hard/FD RLL Cont	165
W-DIGITAL WD-1003-WA2 AT Hard/FD RLL Cont	119
W-DIGITAL WD-1003-WAH AT Hard Cont	97
W-DIGITAL WD-1006-WAH AT Hard Cont 1:1 Interleave	155
W-DIGITAL WD-1007-WA2 AT Hard/FD ESDI Cont	159
OMTI 8620 AT Hard/FD ESDI/ST506 1:1 Interleave	155
OMTI 8627 AT Hard/FD RLL ESDI/ST506 1:1 Interleave	175
DIGITASK XT/AT Hard drive cable sets	15

CABLES/CONNECTORS ETC.

XT FDD 2nd Port Drive Cable (37-way D to dual)	15
C-006 RS232 Interface Cable	15
C-010 RS232 Modem Cable	15
C-011 9-Pin Extension Cable for IBM B/W Monitor	9
C-015 RGB Monitor Cable	9
G3011 RGB Monitor Cable	9
GA 1001-AMT (3036-N) Printer Cable	14
GA 3004 Keyboard Extension Cable	5
GA 3016 FF RS232 Jumper Box	7
GA 3016 MF RS232 Jumper Box	8
GA 3016 MM RS232 Jumper Box	7
GA 3018-15 FF 15-Pin Gender Changer	7
GA 3018-15 MM 15-Pin Gender Changer	7
GA 3018-25 FF RS232 Gender Changer	7
GA 3018-25 MM 25-Pin RS232 Gender Changer	7
GA 3018-9 FF 9-Pin Gender Changer	7
GA 3018-9 MM 9-Pin Gender Changer	7
GA 3019 MF Null Modem	7
GA 3019 MM RS232 Null Modem	7
GA 3020 RS232 Surge Protector	12
GA 3027 FF Centronic Gender Changer	14
GA 3027 MM Centronic Gender Changer	14
RS232 Loopback Tester	9
RS232 Mini Tester	9
RS232 Reverser (Test adaptor)	7

FLOPPY DRIVES AND CONTROLLERS

Quad Floppy controller XT/AT (360/720K)	54
Quad Floppy controller XT/AT (360/720/1.2/1.44)	89
INTERNAL	
TEAC 5.25" 360K Half Height	79
TEAC 5.25" 12MB Half Height	99
TEAC 3.5" 720K 1 inch Height	89
TEAC 3.5" 720K/1.4MB 1 inch Height	109
TEAC 5.25/3.5" Adaptor Kit	19.95
EXTERNAL	
SYSGEN 5.25" 360K/1.2MB + Adaptor Card	299
SYSGEN 3.5" 720K/1.44MB + Adaptor Card (Please specify XT / AT / PS/2 model)	299
SEPARATE ADAPTOR CARDS	49.95

PORTABLE PRINTERS

DICONIX 150 Mains/Batt IBM/Epson comp. 150cps. inc. Batt. and Print Head	295
DICONIX 300 Mains/Batt. IBM/Epson comp. 258cps. inc. Batt. and Print Head	395
DICONIX 300W Mains/Batt. IBM/Epson comp. 258cps. inc. Batt. and Print Head	495
THINWRITE 100 Battery powered impact printer. 75 pages before recharging. Dual interface.	
100cps/25 NLQ. AC Adaptor provided. Multiple copy.	359

DUST COVERS

We have a full range of dust covers to suit most monitors systems and keyboards. Custom made dust covers on application. For prices please call.

HARDWARE

150 Watt (XT size) switching PSU	79
180 Watt (cube type) switching PSU	89
200 Watt (AT size) switching PSU	109
Mini AT swingtop case (with kit)	74
XT flip top swingtop case (with kit)	55
Tower case	279
EPROM eraser (bulk)	89
FR-5/35 5.25" chassis for 3.5" device	15
Temperature controlled soldering stations, 300-800 deg F variable, LED power & heater indicators, coil spring iron holder and cleaning sponge fitted.	
Model SL-10 front slide control	49
Model SL-20 rotary control	59
Model SL-30 digital readout	79

ACOUSTIC HOODS

Quotations are available for most printers, please state model and make when you call.

DISKETTE STORAGE BOXES & ACCESSORIES

YU-DD080L Lockable disk box for up to eighty 3.5" diskettes with smoked perspex top	14
YU-D100 Lockable disk box for up to 100 5.25" diskettes with smoked perspex top	17
YU-HC12 3.5" Disk drive head cleaning kit with fluid	6.95
YU-HC10 as above for 5.25"	5.95
VK-1 Video lead kit comprising 2 x 5 pin DIN to phono lead; 1 x 5 pin DIN to 5 pin DIN mirror image lead; 1 x phono to phono lead; 2 x PL259 to phono adapter; 2 x BNC to phono adapter; 2 x 3.5mm jack to phono socket	14.95
YU-S30 Computer floor stand—stand your computer end-on! Solid steel, adjustable for most sized cases.	26.95
YU-M15 Monitor Mover Arm. Solid construction, clamps to desk surface allowing monitor and keyboard to be positioned with ease.	69.95
YU-KC10B Smoked perspex cover for EXTENDED (101/102 key) keyboards	9.95
YU-H32 Copy holder (A4) with adjustable arm and built-in rule. Clamps to desk surface	17.95
YU-H33 Desktop copy holder (A4) with built-in rule	15.95
YU-H34 Desktop copy holder (A3) with built-in rule and fully adjustable arm	23.95
YU-S22A (80 col)/YU-S22B (132 col) Smoked acrylic printer stands, paper feeds from stand. Capacity for approx 800 sheets fan fold paper.	32
YU-S25A (80 col)/YU-S25B (132 col) Space saver printer stand with room for paper in and out—capacity approx 500 sheets fan fold paper	47

NEW! SPECIALS
QUADRAM QUAD GTI VGA BOARD
ALL 17 VGA MODES 16 BIT BUS
Exp. 1024 x 768 + 512K Mem.
IDEAL FOR HIGH SPEED GRAPHICS
£259

NEW! SPECIALS
QUADRAM MULTI-SCAN MONITOR
14" IBM PC and PS/2 COMPATIBLE
800 x 560 RESOLUTION
TTL & ANALOG
£325

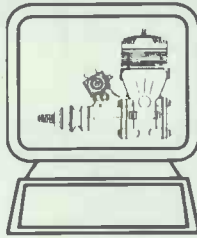
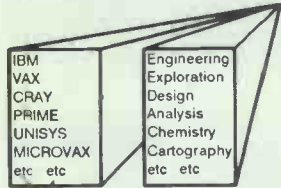
BOOKS We now distribute an incredible list of titles by reputable authors on PC Hardware and Software. Ask for our Book List.

EXPORT ENQUIRIES WELCOME

PC to Host communications for Colour Graphics

with.....

EMU-TEK Seven Plus



- Most host graphics software supports Tektronix™ 4107 terminals
- EMU-TEK supports all 4107 applications AT YOUR PC
- Includes VT100 emulation and all common 4205-4208 functions
- Runs on PC, XT, AT, PS/2 and all good compatibles
- Supports EGA, VGA, hi-res screens, printers, mice, plotters

Phone, write or fax us for full technical details, prices, multicopy discounts, special terms for academic establishments, and demo disk

MENTECAPTUS Limited

20 Woodcote Green Road, Epsom, Surrey KT18 7DH
Phone: 03727 29961 Fax: 03727 45454

NEW UK LOW! TOSHIBA 3-IN-ONE £295



P341e 24 PIN DOT MATRIX PRINTER

24 pin letter quality dot matrix; 216 CPS draft, 72 CPS LQ, 132 column, IBM codes and bit image graphics capability. The P341 offers professional paper handling plus full front panel control, two resident fonts, extra type fonts on cartridge, parallel and RS232 I/F.

Brand new and boxed

£295

Morgan Computer Co.

64-72 NEW OXFORD STREET, WC1. 01-255 2115
179 TOTTENHAM COURT ROAD, W1. 01-636 1138

WESTERN RESEARCH Computers from USONICS

TURBO XT MONO SYSTEM (4.77-8MHz) £465

- 256k, expandable to 640K
- 1 x 360K Floppy Drive
- Floppy Drive Controller
- Multi I/O Card
- 8 Expansion Slots
- 150W Power Supply
- AT Style Case with Keylock protection
- AT Style Keyboard
- Mono Graphics Card with Printer Port
- 12" Hi Res Monitor

TURBO AT 286 MONO SYSTEM (10MHz) £855 (12MHz) £915

- 512K, expandable to 1Mb
- 1 x 1.2Mb Floppy Drive
- Dual FD/HD Controller
- Multi I/O Card
- 8 Expansion Slots
- 200W Power Supply
- 101 Key Enhanced Keyboard
- Mono Graphics Card with Printer Port
- 12" Hi Res Monitor

TURBO AT386 MONO SYSTEM (16MHz) £1695 (20MHz) £1850 (25MHz) Call

- 1Mb, expandable to 4Mb with 64K RAM Cache Memory
- 1 x 1.2Mb Floppy Drive
- Multi I/O Card
- Dual FD/HD Controller
- 8 Expansion Slots
- 200W Power Supply
- AT Case with Keylock Protection
- 101 Key Enhanced Keyboard
- Mono Graphics Card with Printer Port
- 12" Hi Res Monitor

SOFTWARE

- MS DOS 3.3 with GW Basic £75
- Lotus 1-2-3 V2.01 £250
- Lotus Symphony 1.2 £380
- Wordstar 2000 + 3.0 £210
- dBase III + £340
- Norton Utilities-Advanced £75

PRINTERS

- Epson LX-800 £175
- Star NX-10 £299
- Star NX-15 £280
- Star NX-1000 £160
- NEC P6 P80 24 218 £335
- NEC P2200 £280

UPGRADE OPTIONS

- Upgrade your XT to an AT-286 without sacrificing your cards and memory tips from £145
- 360KB 5.25" FD with F/DC £65
- 1.2Mb 5.25" FD with F/DC £90
- 1.4Mb 5.25" FD with F/DC £105
- 720KB 3.5" FD with F/DC £90
- AT Serial/Parallel Card £35
- 101 Key Enhanced Keyboard £47
- 1200 Baud Int. Modem £65
- 2400 Baud Int. Modem £85
- 80287 & 387 Co-Pros from £140
- Extra RAM, 512Kb £Call
- For 20Mb HD, Seagate ST225 add £195
- For 40Mb HD, Seagate ST251 add £295
- For Colour System with: Colour Graphics Card plus Printer Port and 14" RGB Monitor add £185
- For EGA System with: Enhanced Graphics Adapter plus Printer Port and 14" EGA Monitor add £345
- For VGA System with: VGA-Card-Plus Ultra Hi-Res 14" Colour Monitor £Call

All systems are assembled and tested in the UK, motherboards and all additional cards are manufactured in the USA by WESTERN DIGITAL and other leading American manufacturers

CHEAPER OPTIONS FROM THE FAR EAST ARE ALSO AVAILABLE
All prices are exclusive of VAT. Call or write to

USONICS

133 Notting Hill Gate, London W11 3LB. Tel: 01-229 8260
Fax: 01-727 6045. Telex: 264919 TIGER G

10 YEARS OF INTERFACE TECHNOLOGY



DATA ACQUISITION AND MOTION CONTROL CARDS FOR IBM PC/XT/AT

1. 8/16 Channel 13 bit ADC, 100µsec, PGA, 4 Channel 12 bit DAC, 6TTL I/P 8 relay control
2. 8 Channel 13 bit ADC, 100µsec, 16 relay control, 8TTL I/P, 3 16 bit Timer/Counter
3. 72 TTL input/output fully programmable
4. 8 Channel 8 bit ADC, 4 Channel 8 bit DAC, 8 relay control, 8TTL I/P, 3 16 bit Timer/Counter
5. 4 Axes Intelligent stepper motor controller 10,000 sps
6. 4 Channel 16 bit DAC with 64K RAM, 1 Channel 12 bit ADC, 500KHz through rate and 64K RAM

Phone or write for FREE demo diskette & literature



3D Digital Design and Development Ltd,
Interface House, Chelmsford Road,
Southgate, London N14 4JN
Telephone 01-886 3668 Telex 8953742

Interrupted power supplies are damaging and worse.

Interrupted power supplies and dirty mains bring problems to sensitive electronic equipment. Circuit damage, memory corruption, data errors, inconsistencies, followed by the inevitable downtime and costs.

Computers and other voltage sensitive electronic equipment, need clean, reliable power. Power from a Galatrek Powerbak™ Uninterruptible Power Supply — a power source that's incorruptible.

Energy saving and reliable, full no-break auto-transfer on mains failure. TST Range from 120VA to 5kVA, S & T Pulse Width Modulated Range up to 600kVA, single or three phase, with static by-pass.

Also available from Galatrek, a wide range of Line Conditioners, for stabilising voltage fluctuations and suppressing transient noise and spikes. For low power applications requiring suppression of mains borne interference only, Galatrek can supply a range of Filters and Filter Plugs.



TST Series —
5kVA, 4kVA, 3kVA, 2kVA, 1kVA,
500VA, 250VA, 120VA.

Rack mounted range
also available.

Designed and manufactured
by Galatrek in Wales.

For our NEW FREE catalogue on our
Advanced Technology UPS.

FREEPHONE
0800-269-394

Ext. 3124

GALATREK INTERNATIONAL LTD

Scotland St, Llanrwst, Gwynedd LL26 0AL, N.Wales,
Telephone 0492 640311
Telex: 617114 Fax: 0492 641828

FREE OVERNIGHT DELIVERY!*

01-455 9823

COMPUTERS/CALCULATORS/PLOTTERS

LASER PRINTERS		EPSON PC AX WITH 20MB H.O.	POA
SCANNERS TAXAN	£1199.00	EPSON PCE	£925.00
CANON LBPS II	£1575.00	HP DESK JET	£599.00
QUME CRYSTAL	£1795.00	HP 7440 (A4 8 PEN PLOTTER)	£799.00
PANASONIC KXP 4450	£1595.00	HP 745A (A3 6 PEN PLOTTER)	£1360.00
BROTHER HL8	£1595.00	HP 7550 (8 PEN A4 A3)	£3220.00
EPSON G03500	£1249.00	HP75808 (A1)	£7500.00
NEC L08	£1885.00	APRICOT RANGE	EPDA
HP LAZERJET II	POA		
AST TURBO-LASER	£2695.00		
OKI LASERLINE	£1325.00		
COMPUTERS			
M290 (40Mg 1.2Mb)	£2600.00		
MICROTEK MSF300 SCANNER	£1195.00		
DATA-COPY SCANNER	£1495.00		
AST TURBO SCAN	£995.00		

ALL HP RANGE STOCKED

HITACHI 672KD (HP7475A EMULATION)	£595.00
ROLAND 980 (A3/8 PEN)	£925.00
TAXAN 710 (A3/6 PEN)	£895.00
CHERRY A3 DIGITiser	£455.00
AMSTRAD PC1512/1640/2086/2000	£3200.00
MONOCOLOUR/DISC 20Mb FROM	£399.00
AMSTRAD SOFTWARE, SAGE ETC IN STOCK	

FAX-NEC/INTERSCAN SPECIAL INTRODUCTORY OFFER

BRITISH TELECOM C F9 £870.00
CANON 110/SANYO 100 (INCL. ON-SITE WARRANTY) £1350.00
RICOH 10 (almost portable) ON-SITE WARRANTY £1150

MONITORS/PRINTERS

MICROLINE 390 (24 PIN 80COL)	£455.00	TOSHIBA/FUJITSU TAXAN — PRINTERS AND PLOTTER RANGE HELD	
MICROLINE 391 (24 PIN 132COL)	£760.00	LQ 500	£299.00
MICROLINE 84T F (200 CPS)	£620.00	EX800	£375.00
OKI 294 (400 CPS)	£899.00	LQ1050	£579.00
OKI COMPLETE RANGE IN STOCK		LQ850	£475.00
NEC 7 PLUS	EPDA	LQ2550	£1170.00
NEC 6 PLUS	EPDA	EX8000	£375.00
NEC P222 (24 PIN)	£277.00	EX1000	£499.00
NEC COMPLETE RANGE IN STOCK		SQ2500 (NEW)	£324.00
DISK DRIVESTAPE STREAMER POA		EPSON COMPLETE RANGE IN STOCK	
QUME CRYSTAL PRINT II	£1225.00	BROTHER HR20	£355.00
LETTER PRO PLUS QUME	£599.00	HR40 (35CPS)	£830.00
QUME 1190 (90 CPS)	£1355.00	AMSTRAD LEARNING CENTRE INDIVIDUAL TRAINING ON MOST SOFTWARE SITE TRAINING ALSO ARRANGED EPDA	
QUME COMPLETE RANGE IN STOCK		MONITOR TERMINALS	
STAR NB 24/10	£385.00	ZENITH	FROM £425.00
STAR 24/15	£485.00	TELEVIDEO	FROM £280.00
MODEMS		WYSE	FROM £360.00
MODULAR TECH 00WTY		QUME	FROM £360.00
NIGHTINGALE INTERLEKT DACOM MASTER		HAZLETINE SPRIT	FROM £425.00
EPSON STEEBAK ANSWERCALL ETC		TAXAN PHILIPS ZENITH	FROM £65.00
SMART MODEM AMSTRAD	POA	NEC MULTISYNC COLOUR (III)	POA
MANNESMANN TALLY (full range) STOCKED		TAXAN MULTISYNC	POA
MT290 (1MB EPSON COM)	£600.00		
MT90 (INKJET 220 110CPS)	£395.00		
MT80 PC+ (135CPS 27NLO)	£215.00		
MT910 LASER	£2800.00		
MT340 (600CPS 120x40)	£1295.00		

CAN YOU FIND A LOWER PRICE PHONE US FOR BEST DEAL

SOFTWARE

IBM COMPAQ OLIVETTI AMSTRAD		SOURCE WRITER	£895.00
LOTUS 1-2-3 V3	£295.00	DGE GRAPHICS (FOR FOX D BASE)	£175.00
SYMPHONY 2	£395.00	SMART SYSTEM	£385.00
GRAPHWRITER COMBO PAK	£339.00	DELTA 5	£320.00
CHARTMASTER	£295.00	SAPPHIRE DATA-EASE	£435.00
MAP MASTER	£285.00	DATA MANAGER	£299.00
PFS PROF WRITE 2	£250.00	MICROSOFT PROJECT	£275.00
PFS PRO FILE	£229.00	SUPERALC 5	£238.00
PFS PROF PLAN	£250.00	TURBO CAD	£330.00
FREELANCE + 3	£315.00	MULTIPLAN 3	£149.00
FRAMEWORK IV	£345.00	QUICKCODE III	£179.00
O/BASE IV PLUS	£375.00	SAGE ACCOUNTS	£135.00
O/BASE CLIPPER	£369.00	CROSTALK	£120.00
EXCEL	£195.00	GEM PAINT/WRITE	£125.00
BYLINE	£175.00	BORLAND TURBO RANGE	£35.00
LOGISTIX	£95.00	DAULRELE GRAPHICS	£495.00
UNIXZENIX SOFTWARE NOW AVAILABLE POA		SAMNA PLUS	£498.00
HARVARD PRESENTATION		MULTIMATE ADVANTAGE II	£285.00
GRAPHICS (III)	£315.00	DRAW APPLAUSE	£375.00
MS WINDOWS 2	£75.00	LATTICE C COMPILER	£245.00
COBOL COMPILER	£495.00	VP INFO	£62.00
PASCAL COMPILER	£190.00	LOTIS MANUSCRIPT	£269.00
FORTRAN COMPILER	£220.00	VENTURA DESKTOP PUBL 1.2 (UK)	£583.00
VOLKSWRITER 3	£169.00	WORD III	£243.00
MICRO SOFT MOUSE WINDOWS 2	£125.00	WORDCRAFT 5	£309.00
LOTUS HAL	£115.00	WORD PERFECT 5 (UK)	£269.00
FUNK SIDEWAYS 3	£68.00	WORD PERFECT LIBRARY	£124.00
RBASE SYSTEM 5 PLUS GRAPHICS	£395.00	WORDSTAR	£144.00
PEGASUS RANGE	POA	WORDSTAR 2000 + (R3)	£249.00
Agenda (SELECTION OF EXTENSIVE RANGE)	£275.00	WORDSTAR PROFESSIONAL 5	£225.00
OPEN ACCESS II	£295.00	MULTIPLAN	£109.00
PARADOX II	£395.00	VP PLANNER PLUS	£115.00
FOXBASE PLUS	£275.00	ABILITY PLUS	£119.00
MICRO-FOCUS IN STOCK	POA	O&A (Inc S/CHECK)	£199.00
		ALDUS PAGEMAKER 3	£495.00

NETWORK 'LAN' VERSIONS AVAILABLE POA
GOODS GUARANTEED. PRICES EXCL VAT (P&P EXTRA ON GOODS UNDER £300)

Company and Government orders accepted by telephone
Barclaycard/Access/Visa accepted by phone
E & OE — The prices may be altered without notice

Tel: 01-455 9823

Fax Orders: 01-251 4155

MOUNTAINDENE

665 Finchley Road, London NW2 2HN

DELTA GOLD

SPRINT 88

640K RAM IBM compatible PC, single 3½" 720K drive, 10MHz clock speed, hi-res 12" amber monitor inc tilt & swivel stand and full IBM style 84 key keyboard. Includes real time clock, dual Hercules/CGA card, two serial and one parallel port and dual voltage PSU.



£295

ELITE XT

Full featured 512K IBM compatible PC; single 5¼" 360K disk drive, RAM expandable to 768K on board, 12" tilt & swivel mono monitor, switchable Hercules/CGA display adaptor and selectric IBM style keyboard. Standard model offers 4.77/10MHz speed, real time clock/calendar, parallel & RS232 ports and 4 expansion slots. c/w integrated software, DOS 3.2, GW BASIC, extensive documentation and 30 minute tutorial videotape.



£450

DELTA PREMIER 386

Top spec 16MHz 80386 based PC; 1Mb RAM on board, 1.2Mb floppy disk drive, mono monitor with tilt & swivel stand and AT enhanced keyboard. The Premier offers space for up to 5 half height drives, socket for 80387, real time clock/calendar, 8 full expansion slots, dual RS232 ports & one parallel printer port, 110/240V power supply and includes MS-DOS 3.2, GW BASIC and manuals.



£1295

PLEASE PHONE FOR PRICES AND DETAILS OF



FULL DELTA GOLD RANGE.
VAT AND CARRIAGE EXTRA




Morgan Computer Co.

64-72 NEW OXFORD STREET, LONDON WC1. 01-255 2115
179 TOTTENHAM COURT ROAD, LONDON W1. 01-636 1138

ONLY
£ 99.00

For
dPix dBASE III
(and compatibles)

			EMPLOYEE INFORMATION		
ADDRESS...: 17A OXFORD STREET			DEPARTMENT: BROMSGROVE		
ADDRESS...: WORCS RT5 6TR			INT. PHONE...: 86-887679		
ADDRESS...: PERSONEL			JOB DESC...: SECRETARY		
ADDRESS...: 3214			CONTRACT...:		
TELEPHONE: 28 C23 1981761 WEA			HOLIDAY...: 28		
SOCIAL SEC No...: C23		PAY SCALE...: 15767.77		BLANK...: 5542.37	
TOTAL PAY...:		TOTAL PAYE...: 87.00		TRAVEL...:	

'THE ULTIMATE dBASE UTILITY'

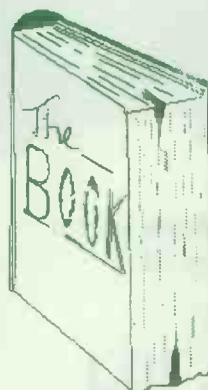
dPix is the only software system which enables the user to manipulate images from within a dBASE III application using the standard dBASE command language.

- Supports dBASE II/III/III+/IV, dBase, FoxBASE +, etc
- Uses images from (hand) scanners, video digitisers, CAD/drawing packages, etc
- Supports 9/24-pin dot matrix and HP LaserJet printers
- CGA/EGA/Hercules video systems support
- Detailed user guide, example applications.
- dPix standard only £ 99 + VAT
- dPix plus (includes video digitiser) £295 + VAT

CLIPHON

9 Canada House
Blackburn Road
London NW6 1RZ
(01-328-0274)

FREE! FROM SHAREWARE



THE SHAREWARE (& Public Domain) Book

150+ pages describing hundreds of Shareware & Public Domain programs for IBM PC's & Compatibles only in our library from £3.25 per disk. Illustrated.

GET YOURS NOW!

SHAREWARE MARKETING are now the leading suppliers of Shareware software in the UK. We represent many of the leading authors and are able to supply the most recent versions of programs earlier than most of our competitors.

Name _____

Address _____

PCW

Please send to: Tel. 0732 771344
Shareware, FREEPOST, Tonbridge, Kent. TN9 1YZ
(Stamp required if posted outside of Great Britain)

Lapcount Ltd.

7, Hunstanton Rd, Dersingham, Kings Lynn, Norfolk

PE31 6HH. Tele: 0485 42361 Fax: 0485 42213

apricot

Xen-i 286/30 1mb Ram 30mb Disk 12.5mhz	£ 1599.00
Xen-s PC 1mb Ram 30mb Disk 386sx 16mhz	£ 1749.00
Xen-s 240X 1mb Ram 44mb Disk 386sx 16mhz	£ 2499.00
Xen-i 386/50 2mb Ram 45mb Disk 386 16mhz Tower	£ 3199.00
Xen-i386/100 2mb Ram 104mb Disk 386 16mhz Twr	£ 3899.00
Qi330 1mb Ram 47mb Disk 386sx 16mhz MCA	£ 2199.00
Qi350 2mb Ram 47mb Disk 386sx 16mhz MCA	£ 2399.00
Qi650 1mb Ram 47mb Disk 80386 20mhz MCA	£ 2849.00
Qi660 1mb Ram 65mb Disk 80386 25mhz MCA	£ 3299.00
Qi660i 1mb Ram 118mb Disk 80386 25mhz MCA	£ 3999.00
All models include VGA 14" paper white monitor (inc.)	
Extra for VGA colour - all models	£ 225.00
Extra for internal 40mb Tape - Qi range only	£ 399.00
All inc 1.44mb 3.5" floppy - Extra for Ext 5.25"	£ 299.00
PS2 mouse, Windows presentation manager etc.	£ 199.00
1 year manufacturers warranty-on site Qi only.	Plus VAT.

Tandon

PCX 640k Ram 20mb Disk 8088 4.77 mhz	£ 799.00
PCA Plus 1mb Ram 20mb Disk 80286 10mhz	£ 999.00
PCA Plus 1mb Ram 40mb Disk 80286 10mhz	£ 1199.00
PCA Plus 1mb Ram 70mb Disk 80286 10mhz	£ 1349.00
Target Plus 1mb Ram 20mb Disk 80286 10mhz	£ 1399.00
Target Plus 1mb Ram 40mb Disk 80286 10mhz	£ 1599.00
386/16-40 1mb Ram 40mb Disk 80386 16mhz	£ 2199.00
386/20-40 1mb Ram 40mb Disk 80386 20 mhz.	£ 2799.00
386/20-70 1mb Ram 70mb Disk 80386 20 mhz.	£ 3099.00
386/20-110 1mb Ram 110mb Disk 80386 20mhz	£ 3399.00
Includes keyboard,14" Mono Monitor,1.2mb Floppy (inc.)	
Extra for 14" EGA Colour Monitor and interface.	£ 299.00
Extra for 14" VGA Colour Monitor and interface.	£ 399.00
Six months manufacturers warranty.	Plus VAT.

Epson

PCe 640k Ram 20mb Disk 8086/8 Turbo 360k Floppy	£ 899.00
PC Portable 640k Ram 20mb Disk V30 LCD	£ 1699.00
1 year manufacturers warranty	Plus VAT.

Liberty

XT Turbo 10 256k RAM 20mb Disk 12" Mono	£ 549.00
Baby AT 512k Ram 20mb Disk 14" EGA Monitor	£ 1149.00
LapTop 286 12mhz 640k Ram 20mb Disk Gas Plasma	£ 1999.00
1 year manufacturers warranty.	Plus VAT.

Laser Printers.

Apple Laserwriter 8ppm 2mb Ram Inc. Toner	£ 2995.00
Brother HL8 8ppm 512k Ram Inc. Toner	£ 1625.00
Memory Upgrade Brother HL8 1 megabyte.	£ 299.00
Memory Upgrade Brother HL8 2 megabyte.	£ 599.00
1 year manufacturers Warranty.	Plus VAT.

February Special Offer

Sage Chit Chat cw Software and Modem FREE with all orders over £1,500 ex.VAT in February 89

Dot Matrix Printers.

MT 80 135/27cps NLQ 9 pin	£ 179.00
Epson LX800 150/25cps 9pin	£ 219.00
Epson FX1000 200/40cps 9pin	£ 475.00
Epson LQ850 220/73cps 24pin	£ 515.00
Epson EX800 250/50cps 24pin	£ 499.00
Epson LQ1050 220/73cps 24pin	£ 655.00
Epson LQ2500 270/90cps 24pin	£ 769.00
Manufacturers 1 year warranty	Plus VAT.

D. T. P.

Xerox Ventura Publishing v12	£ 499.00
Aldus Pagemaker v3 Windows	£ 439.00
Timeworks DeskTop Publisher	£ 85.00
Apricot Flatbed Scanner	£ 1199.00
ReadRight OCR Software	£ 349.00
All are latest versions.	Plus VAT.

Specialist Software.

Hard Disk Manager.	£ 29.95
Leads,Quotes,Invoices,Stock.	£ 99.95
Property Management System.	£ 495.00
Mail Order Processing System.	£ 495.00
Full Specification on request.	Plus VAT.

Miscellaneous.

MS Flight Simulator 2.13.	£ 35.00
MS Quick Basic Compiler.	£ 60.00
MS Quick "C" Compiler.	£ 60.00
Most Languages Available POA	Plus VAT.

Authorised Dealers for: Apricot SageSoft

Tandon Pegasus

Epson Tetra

Acer Anagram

FREE delivery U.K. Mainland.**Hard Disk Manager FREE with all machines****Accounts.**

SageSoft Accountant/Payroll II	£ 99.00
SageSoft Accountant Plus	£ 135.00
SageSoft Financial Controller	£ 199.00
Pegasus Standard per Module	£ 180.00
Pegasus Senior per Module	£ 275.00
Tetra Professional per Module	£ 239.00
Tetra Plan per Module	£ 349.00
Modules vary by Company.	Plus VAT.

Spreadsheets.

Lotus 1-2-3 Release 2	£ 235.00
Excel v 2.0 (Windows)	£ 235.00
Supercalc 4 Rel 1.1	£ 235.00
SC 5 replaces SC 4 A.S.A.P.	Plus VAT.

Databases.

Ashton Tate Dbase III Plus	£ 349.00
Delta Professional (4.3)	£ 375.00
Dataease	£ 395.00
Clipper Dbase Compiler	£ 399.00
Dbase 4 replaces III + ASAP	Plus VAT.

Word Processing.

Wordstar Professional 5.0	£ 199.00
Wordstar 2000 Plus 3.0	£ 239.00
Word Perfect 5.0	£ 229.00
Word Craft 3.0	£ 249.00
Microsoft Word IV	£ 229.00
LAN Packs Available POA.	Plus VAT.

All prices based on Manufacturers List - Subject to Change.

We are suppliers of most commercially available hardware, software, peripherals and consumables. The above is simply an indication of the products we handle. Please request a fully detailed price list of the manufacturer or type of product you require. Our group services range from bespoke programming to full on site maintenance and support including MS DOS and Xenix Networks. Whatever your needs contact us and we will direct you to the appropriate Company within the Group.

All orders to the above address - Terms strictly cash with Order - Access, Barclaycard and American Express accepted subject to clearance. All prices include for packaging and delivery to UK mainland. Add VAT @ 15% Allow 7 to 10 days for delivery. Trade Enquiries Welcome.

Lapcount Limited is a member of the **NEWMAN** Group

When you choose to rent - Micro-Rent

Excellent service • Full technical support • Immediate delivery • Wide choice of computers, printers and other peripherals • Ex-rental machines available for purchase.

And the most competitive rates for rental by the day, week or month.

*Prices quoted are based on 3-month rental, excluding VAT.

COMPAQ PORTABLE 386



01-700 4848

Northern Office: 051-236 1673

MIR
MICRO-RENT

Micro-Rent plc, St Marks Studios,
Chillingworth Road, Islington, London N7 8QJ

IBM PS/2 ALL MODELS



TANDON PCX

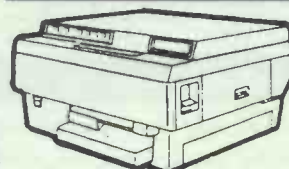


MAC II 40MB



H-P
LASERJET

£62 PER WEEK*



IBM XT, AT, PS/2, COMPAQ, APPLE, MACINTOSH, TANDON, LASER PRINTERS, DESK-TOP PUBLISHING, NETWORKS

PROSPERO GO ONE STEP FURTHER

One step further than what?

Prospero have always produced high quality compilers with a reputation for reliability. We have also quietly notched up a number of 'firsts' whilst still producing the workhorse products which our customers know and love. Recently we have set new standards in the lower end of the market by selling professional compilers at prices which home users can afford. We have also introduced a fully integrated workbench including a multi-window editor to speed up the edit-compile-link-debug cycle. (By debug we of course mean full source level debugging which has been standard on our PC products for a number of years). Until now the operating systems we have supported (and indeed still do support, Prospero doesn't neglect its past customers), are CPM-80 (inc PCW), CPM-86, QDOS (QL), (Atari)TOS and MS-DOS/PC-DOS.

So what's new?

We are launching two new Pascal compilers, one for OS/2 and one for Helios (running on the T800 transputer). Like all of our previous compilers they conform to ISO standards which means they will work, and they contain a host of extensions which means they can be used for serious programming as well as teaching. Unlike our previous compilers they allow for concurrent programming.

Concurrent programming?

Concurrent programming is a technique that allows you the programmer to write procedures and get them to appear to run at the same time. This means that you could, for example, have a procedure which spends its time looking at the keyboard while the main procedure does a calculation. Or, you could write a chess program which thought up its next move by examining several lines of play

at the same time. Or.. well the possibilities are endless, what's important is that you can now do it quickly and easily using Prospero Pascal.

But I don't need all that yet!

Quite obviously our new products are a little ahead of the mass market, we just thought you would like to know that when you buy a Prospero compiler and choose to upgrade, Prospero will be there ready and waiting with a compiler that will compile the programs you already have.

In the meantime we have a large range of Pascal and Fortran compilers available for the above mentioned operating systems and we will happily send full details. Our Atari ST and PC products have demo disks which will be sent on request.

OS/2 and Helios FORTRAN?

Coming soon.

Prospero Software

LANGUAGES FOR MICROCOMPUTER PROFESSIONALS

190 CASTELNAU, LONDON SW13 9DH, ENGLAND TEL 01-741 8531 TELEX 8814396

•See us at the WHICH computer show.

MORGAN COMPUTER CO.

DISPOSAL OF SURPLUS INVENTORY, LIQUIDATED, DEMO & USED STOCK.

EPSON

SQ-2000 ink jet, demo	£350
Sheetfeeder for SQ-2000	£55
Dual bin s/feeder SQ-2000	£175
P40 printer, parallel, demo	£40
P80 printer, RS232	£65
LX-800, 160 CPS, NLQ	£150
LQ-1000, 24 pin dot matrix	£350
Sheetfeeder 8334 (LQ-1500)	£55
RS-232 interface LQ/SQ	£25
Parallel interface LQ/SQ	£25
64K parallel interface LQ/SQ	£45
TF-20 dual floppy	£150
DX-100 tractor feed	£25
Taxi 1 mouse system	£35
Taxi mouse for QX 16	£35

PRINTERS

Olivetti DY800 d/wheel	£600
Honeywell L34 CQ	£95
Ricoh RP1600 parallel d/whl	£195
HP 7470A plotter, HP-IL	£295
Dataproducts 8010, parallel	£110
Dataproducts 8012, IBM	£125
Dataproducts 8020 132 col	£135
Dataproducts 8022, IBM	£150
Dataproducts 8050, parallel	£275
Dataproducts 8052, colour	£325
Dataproducts 8072, fast colour	£395
Sheetfeeder DP 8072	£150
Olivetti DM 100 for Mac	£95
Olivetti DM 280 for Mac	£100
Olivetti DM 290 for Mac	£125
Olivetti DM 580 132 col RS232	£175
Olivetti DM 590 6 colour	£250
Olivetti DY 250 daisywheel	£295
Olivetti DM 105, colour	£195
Olivetti DM 296, parallel	£275
Olivetti DM 600, 24 pin	£275
Samleco DX 85, dot matrix	£75
Juki 6300 daisywheel	£150
C-Itoh 1550 dot matrix	£95
BDT S/F for Ricoh 1300	£25
Oki sheetfeeder (292/293)	£150
Brother tractor feed HR 25	£75
Brother sheetfeeder HR 25	£125
Brother 2024L, 24 pin	£250
IBM Wheelprinter	£295
Infoscribe 500 fast dot matrix	£250
Oki Laserline 6	£695
Amstrad DMP-4000	£150
Panasonic 3151, d/whl	£175
Oki 294 fast dot matrix	£295
Diablo 630 API ECS	£350
QMS K8 laser printer	£650
Çopal SC 5500 132 column	£95
Sanyo PR 5200 d/wheel	£75
Epson RX-80 dot matrix	£75
Dataproducts DP 55 d/wheel	£295
Çopal SC 1000 dot matrix	£65
Fujitsu DX2100 dot matrix	£125
Olivetti PG 101 Laser	£950
Sharp ZX 510 typewriter	£250
Star SR-10, 200 CPS, NLQ	£99

SANYO

MBC 775, colour portable	£395
MBC 885, twin drive PC	£295
MBC 16 plus, 2 x 360K	£425
MBC 16 plus HD 20	£525
MBC 990 20Mb AT compat	£895
CRT 36 mono monitor	£45
DM 4112 mono monitor	£35
CRT 40 hi-res mono monitor	£75
CRT 50 colour display	£95
CD 3125 hi-res colour display	£135
CD 3115 colour display	£110
MBC 1150, sold for spares	£50
MBC 4050, CP/M 86	£195

IBM SOFTWARE

Silk, Lotus 123 clone	£45
Logotron 3 in 1, inc WP etc	£10
Knowledgeman II database	£45
Trigger business analysis	£35
IBM Displaywrite 3	£95
IBM OS/2 system	£125
IBM Xenix system	£250
IBM BASIC compiler 2.0	£65
IBM BASIC compiler 3.0	£95
IBM EZ-VU editor	£65
IBM Planning assistant	£35
IBM Reporting assistant	£35
IBM Professional Editor	£45
Lotus Symphony Link	£35
Sage Bookkeeper	£45
Sage Deskset pop up utilities	£25
Hayes Please database	£25
Compsoft Bookworker	£95
Compsoft Budget Delta 4	£35
Amstrad Reflex 1512	£25
Amstrad Wordstar 1512	£35
Amstrad Supercalc 3	£25
Samna Word III	£50
Microsoft Pascal compiler	£175

IBM CARDS

Mislink internal modem	£125
AST Flashpak	£50
AST PC net II starter kit	£150
AST 5251 emulation card	£150
AST Rampage EGA AT, no RAM	£95
Quad board AT	£150
IDEA Overboard EGA, I/O	£225
IDEA All Aboard 286	£250
IDEA Supermax m/function AT	£150
IDEA comm 3278 card	£95
AST 3270 card & software	£150
IRMA board	£195
IBM Token ring adpt PS/2	£195
IBM Cluster adaptor	£150
IBM Network adaptor	£150

PC'S

Multitech XT, 20Mb mono	£595
Olivetti M24, 20Mb colour	£795
Olivetti M15 laptop	£450
Datavue 25 portable	£250
NEC PC-8801A desktop	£250
NEC PC-8401A laptop	£150
Apricot Portable	£175
Apricot PC, 256K d/sided	£495
Apricot F1 complete	£195
Unisys AT, 20Mb, mono	£950
Unisys 386, 20Mb, mono	£1295
IBM XT SFD, 20Mb, mono	£995
Amstrad 1512 DD, colour	£450

MISCELLANEOUS

Apple Mac 512, 1 x 800K	£895
Toshiba expansion box	£195
Apple IIc CPU only	£195
Thomson mono display for IBM	£40
AT & T multi-user system	£2500
Davong 10Mb for Mac	£195
Apple I'writer II sheetfeed	£125
Apple 5 1/4" disk drive	£75
Acer 84 key enh. keyboard	£45
Apple II europlus CPU only	£75
Apple IIe CPU only	£95
KT-12 Kimtron compat terminal	£95
128K RAM chips (each)	£3
Amstrad FD 2, 1Mb for 8256	£75
Amstrad FD 4, 1Mb for 9512	£75
Acoustic hoods, various	£25
Apple Duodisk, no card	£75
5 1/4" DS/DD disks, per 100	£45
200Mb WORM drive for PS/2 80	£500
IBM 6170 typewriter	£395

E & OE

THE 'ST-SERIES'

A Natural Choice for the discerning

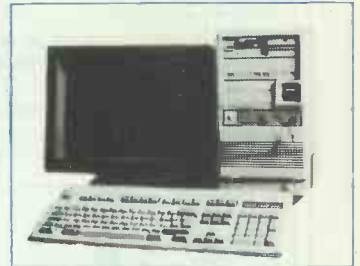


Our 1989 specifications leave the competition standing at a price even the largest mass producer would consider magic. Compare for yourself today!

£799!

ST200

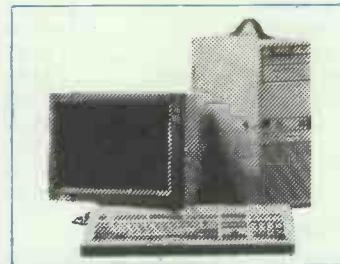
BABY VERTICAL XT 30MB 12MHz



The ultimate in exclusive design, latest technology and performance. Our amazing ST200 pushes back the PC barriers.

- Baby vertical Styling measuring only an amazing 7 x 13 x 16"
- 1MB Parity checked User Ram
- Free 5.25" and two 3.50" slots
- Real time clock & battery backup
- Auto switching Hercules mono and colour display adaptor built in
- Two keyboard connecting sockets
- 12" High Resolution mono monitor
- Five expansion slots
- CGA, EGA, VGA colour options
- Fully documented
- V20-8 CPU (4.77-12MHz) Clock
- Zero Wait State
- 360K Floppy Disk Drive 5.25"
- 30MB Winchester Hard Disk
- Dual Printer Ports
- Serial and Games Ports
- 102 Key enhanced Keyboard
- Keylock, Reset and Turbo selector facilities provided
- CPU stand included in price
- Word Processor, Data Base & Spreadsheet included

(QUOTED PRICES EXCLUDE VAT + DELIVERY)



£1495!

ST500

BABY VERTICAL AT 60MB 17MHz

One of our best sellers during 1988 and now with further enhancement for 1989.

- 80286 CPU (8-17MHz) Clock
- 80287 Co-Processor Slot
- 1.44MB Floppy Drive 3.50"
- 60MB Winchester Hard Disk formatted to 63.9MB
- 4/5 Free expansion slots
- 102 Key enhanced keyboard
- Dual Parallel Printer Ports
- Keylock, Reset, Speed select facilities built in
- 12" High Res Mono monitor on swivel/tilt base provided
- Convenient fold away legs and carry handle
- Baby vertical styling measuring only 17 x 16 x 7"
- 1.2MB Floppy Drive 5.25"
- 1MB Parity checked Ram expandable on motherboard to 4MB
- Real time clock & battery backup
- 200W enhanced power supply
- Dual RS232 Serial Ports
- Games Port
- Built in CMOS setup
- High Res mono display adaptor
- CGA, EGA, VGA options available
- Fully documented
- Side doors for instant access

ALL ST-SERIES COMPUTERS INCLUDE MS-DOS v3.3, GW BASIC AND 12 MONTHS ON-SITE MAINTENANCE ANYWHERE ON THE U.K. MAINLAND (Specifications subject to change without notice)

Morgan Computer Co.

64-72 NEW OXFORD STREET, LONDON WC1. 01-255 2115
179 TOTTENHAM COURT ROAD, LONDON W1. 01-636 1138

SCREENS



MICROCOMPUTERS &
ELECTRONICS

MAIN AVENUE · MOOR PARK ·
SALES 09274 20527 EXPORT 09274 20664

MIDDLESEX · HA6 2HJ · ENGLAND
TELEX: 929224 SCREEN G FAX: 0923 835421

Just Follow The Swallow

The Computer Industry's Best Kept Secret''

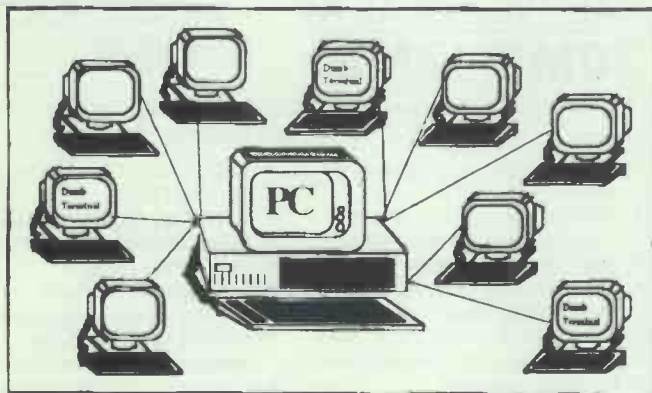
ANSI-Standard MUMPS

For the IBM-PC, Amstrad-PC and all Compatibles

The Massachusetts General Hospital Utilities Multi-Programming System is now available for Personal computers. This system now allows you to create Multi-user, Multi-tasking software on your PC. If you can program in BASIC, you can easily learn to program in MUMPS!

Features:

- ★ Fully ANSI-Standard. Write MUMPS programs on your PC and transfer them to run on DEC-VAX, PDP-11, IBM main-frame etc... WITH NO CONVERSION!
- ★ Multi-tasking on a single PC. Runs many background jobs with no degradation in performance!
- ★ Multi-user systems provide response times to rival that of many mini-computer systems. Up to 32 users on a single PC — really!
- ★ Full Networking support. Create multi-user systems for hundreds of users with just a handful of personal computers! We'll show you how!



Discover why...

1. Some of the world's biggest companies, Software houses, governments and other famous institutions are all using MUMPS.
2. Japanese scientists are using MUMPS as an aid to develop software for the Fifth Generation project!
3. Computer manufacturers such as IBM, DEC, Hewlett-Packard and Pyramid are all offering MUMPS implementations for their machines.

Start developing your applications in **MUMPS** today!

Products for IBM PCs and compatibles

CCSM Single User MUMPS.....	£65.00
CCSM Single User, Multi-Tasking MUMPS.....	£110.00
CCSM Multiuser MUMPS (up to 31 users!).....	£325.00
CCSM Multiuser MUMPS (80386 version).....	£495.00
Cookbook of MUMPS (Book, 173 pages).....	£19.95
Computer Programming in Standard MUMPS (Book).....	£24.95
Programmers Utilities.....	£35.00
Windowing for CCSM.....	£35.00
Graphics extensions for CCSM.....	£35.00
Programmers Toolkit I.....	£65.00
VA Filemanager (version 17).....	£35.00

TKGraph.....	£65.00
TKCalc Spreadsheet (1 to 5 users).....	£175.00
TKCalc (6 or more users).....	£285.00
TKForm (1 to 5 users).....	£215.00
TKForm (6 or more users).....	£425.00
TKWriter Wordprocessor (1 to 5 users).....	£285.00
TKWriter (6 or more users).....	£650.00
Products for Apple Macintosh	
MacMUMPS.....	£139.00
MacMUMPS II - MUMPS for Macintosh II.....	£285.00
Cook book of MUMPS (Book).....	£19.95
VA Filemanager (version 17).....	£35.00

- Prices shown above are in UK Pounds Sterling.
- Please add £6.00 postage and packing + 15% VAT on all orders. Do not add VAT when ordering books.
- The U.K. MUMPS USERS GROUP offers six months free membership to new users of MUMPS SYSTEMS. Details available upon request

Post, phone or Fax your orders to:
MUMPS Software Consultants (Europe) Ltd.,
 Bryson House, 131 Church Elm Lane,
 Dagenham, Essex RM10 9RR.

● Alternatively, to place an order just dial 100 and ask for Freephone MUMPS
 ● or write to: MUMPS Software Consultants, FREEPOST, Romford, RM3 1BR



MacMUMPS Only MGlobal has ANSI MUMPS for the Apple Macintosh with Menus, Multi-tasking, Dialog Boxes, Graphics Interface, and Laserwriter support.

DEALER ENQUIRIES WELCOME
 Access, Visa/B-Card, American Express, Euro Cards Welcome.
 CCSM Single User MUMPS for PC, no multi-tasking, only:

Telephone: 01-593 5243
 Fax: 01-593 4743



Please state whether 3 1/2 or 5 1/4 inch disk.

£65.00

MUMPS SOFTWARE CONSULTANTS



IBM AT-X



Complete 30Mb system

Brand new, complete system with full IBM Warranty. Featuring IBM AT-X 30Mb System Unit, 512K RAM, IBM Monochrome Display, IBM Display and Printer Adaptor and IBM Enhanced Keyboard. Upgrade to EGA display system £250. Upgrade to VGA system £425. RRP £3090.

Now **£1250**

Ex-Demonstration and Surplus

IBM	TOSHIBA
IBM PS/2 Model 60-041. (£3121) 1695.00	T3100/20 Portable, 640K RAM, 20Mb & 720K drives (£2695) 1695.00
IBM 200Mb Optical Drive (£2315) 1395.00	P321 SL Printer NLQ..... (£629) 350.00
IBM Token Ring Card (£653) 375.00	1.5Mb RAM for PageLaser (£599) 389.00
IBM Quietwriter II (£899) 595.00	Floppy Link (£110) 50.00
IBM QW III Dual Bin Feeder (£637) 425.00	
IBM QW III Envelope Feeder (£750) 200.00	MISCELLANEOUS
IBM Multiprotocol Adaptor (£225) 150.00	Epson FX-1000 (£599) 395.00
IBM Proprietary II (£322) 199.00	Epson LQ-2500 CSF (£225) 149.00
IBM Proprietary X24 (£600) 295.00	Bridgefile 3½" External Disk (£395) 250.00
COMPAQ	Irwin Tape Back-up (£995) 300.00
Portable III 40Mb (£3975) 2595.00	Quattro Modem (£795) 550.00
Portable 386 40Mb (£4695) 3250.00	Prices in brackets are original RRP's. All prices subject to 15% VAT. E. & O.E.
Portable 386 Tape Unit .. (£745) 495.00	

MORSE

Morse Computers Ltd, 78 High Holborn, London WC1.
Telephone 01-831 0644. Telex 262546. Fax 01-831 1310.

JetSetter

Desktop Publishing

for IBM PC/XT/AT and compatibles

Over 500,000 Font Variations
on standard Laser Printer

No Need for Postscript!

No Need for Font Cartridges!

Now also supports HP DeskJet

- Fully WYSIWYG including Full Page View
- Simple to use/easy to learn - Single Menu
- 10 Basic Font Styles + Symbols
- Many Font Enhancements e.g. **Bold Italic Bold/Italic V.Bold Inverse OUTLINE** etc.
- 4pt to 108pt incl. condensed & extended
- Input from Word Processors & Keyboard
- Multi Columns - Leading - Auto Kerning etc.
- Graphics/Scanner input via .PCX/.IMG/.PIC files
- Line Drawing & Shading
- Full Formatting/Editing functions
- Hotline Support

THIS AD WAS SET & PRINTED WITH JETSETTER

Only **£295** (+P&P and VAT total £345) Demo Disk £5.75

Send your order stating disk format required and including cheque to:
GARBO Systems Ltd, Champion's Yard, Causewayhead,
PENZANCE, TR18 2SP, ☎ (0736) 67166

DEALER ENQUIRIES WELCOME



RAGLEY DATA SERVICES SPECIALIST COMPUTER BROKERS

WHY SHOP AROUND?
R.D.S. PRICES ARE THE BEST.....

COMPUTERS

Apricot	RAM MHZ	VGA P/W	Colour	Tandon	RAM MHZ	VGA	Mono	Colour
Xen1286/30	1 12	1500	1785	PCA20+	1 10	1225	1425	
Xen386/50	1 16	2970	3175	PCA40+	1 10	1325	1525	
Xen-S240/44	1 16	2375	2595	Target 20+	1 10	1485	1685	
Xen-S250/44	1 16	1980	2195	PAC 286+	1 10	1075	1280	
Xen-SPK/30	1 16	1650	1865	386/16/40	1 16	2155	2365	
Q1300/47	1 16	2045	2265	386/20/40	1 20	2740	2940	
Q1650/47	1 20	2725	2925	386/20/110	1 20	3200	3400	
Q1660/65	1 25	3125	3325	386/20 D.P.	1 20	3375	3600	
Packard Bell				Acer				Mono Colour
PB500 T/F	640 10	655	Mono	PC500 32	256 8	650	925	
PB500/20	640 10	785	Mono	PC710/32	512 10	1000	1215	
PB286/40	1 10	1230	Colour	Acer 1030/32	640 10	1150	1300	
PB286/20	1 12	1275	Mono	PC513/20	1 12	1325	1490	
PB286/40	1 12	1375	Mono	PC1116/40	2 16	2385	2590	
PB386/44	1 20	2875	Mono	SY32/2/80	2 20	2655	2970	

* CALL FOR BEST PRICES ON MITAC - ZENITH - COMPAQ - WYSE 25% + DISCOUNT

PORTABLES

Sharp 4501	585	Sharp 4521	1325
Sharp 4502	750	Sharp 7221	1955

ENHANCEMENTS

Network/Multiruser	Call	Calcomp	2312	12+12	415
W. Digitalfile Card 20MB	205	Calcomp	23180	12+18	669
W. Digitalfile Card 32MB	235	T.D.S.	LCA4	12+12	506
Apricot 256K RAM	105	T.D.S.	LCA3	12+17	725
Apricot 512K RAM	129				

DIGITIZERS

TERMINALS

Wyse	240	905	Televideo	245	125	Link	315
30	320	955		325	220		520
60	370	9220		355		Amplex	
85	360	965		340	210+		255
120	385	9550		315	230+		315
700	600						
350	635						

* Call for Quantity Discount

BARGAIN BASEMENT

Apricot Xi 10	600	Installation and introductory familiarization on
Apricot Xen HD 20	1050	hardware/software from 185 per day computer repair
Toshiba 1200/20	1250	service on site or return to r.d.s.
IBM ATX 30 Mono	1250	* APRICOT our speciality
Printers	Call	

* Call or write latest update also wanted computers for cash

TRAINING - MAINTENANCE

HOTLINES

0789-765295-765583
RAGLEY DATA SERVICES
82 EVESHAM ROAD
WEETHLEY
WARWICKSHIRE B49 5NB

DEALER INQUIRIES INVITED

SAME DAY DELIVERY

prices exclude v.a.t. delivery

PAY OVER 3 MONTHS

OPEN 7 DAYS mon-fr 8.00-7.00
sat-sun 8.00-5.00

VAT No. 478 5400 24

82 EVESHAM RD, WEETHLEY, ALCESTER, WARWICKSHIRE B49 5NB TEL: 0789-765295

NOW YOU CAN HAVE POSTSCRIPT™ FOR £195

GoScript™ - a unique new IBM compatible software utility gives your Laser, 9 pin or 24 pin Dot Matrix, or Ink Jet printer the power of Postscript™ and the DTP benefits previously reserved for expensive Lasers.



GoScript is easy to install and use, comes complete with 13 scalable fonts and will revolutionise the output capability of your printer.



Yesterday, PostScript™ cost around £2000.

Today it costs just £195 (+ VAT).

Order your copy today.



Laserink

Tel: 0708 730259



As important to your printer as the paper it prints on.

We recognise all registered trademarks Trade Enquiries to Midbank 01-847 4151

CAVENDISH DISTRIBUTORS LTD

209-212 TOTTENHAM COURT ROAD, LONDON W1 9AJ Telephone: 01-323 4761 Fax: 01-255 1591

Amstrad PC1512

PC1512 SD Mono	£380.00
PC1512 DD Mono	£499.00
PC1512 SD Colour	£499.00
PC1512 DD Colour	£599.00

Amstrad PC1640

PC1640 SD Mono	£479.00
PC1640 SD Colour	£599.00
PC1640 SD EGA	£749.00
PC1640 DD Mono	£599.00
PC1640 DD Colour	£699.00
The new 2086, 286, 386	Call

Toshiba

T1100	£POA
T1200	£POA
T3100	£POA
T3200	£POA
T5100	£POA
Call for new T1600 and T5200	

Opus

Opus III Mono	£POA
Opus IV or	£POA
Opus V EGA	£POA

Zenith Portables

Ring for details

Olivetti Computers

Ring for details

**32MB Hard Cards
for Amstrad £235**

Fax Machines

New Canon 120	£POA
Panasonic UF150	£1139.00
Panasonic UF250	£1270.00
Panasonic UF640	£POA

Olympia 320 - with free phone £925

Philips 3100 (new)	£915.00
Philips 3200	£999.00
Philips 3300	£POA
BT CF9	£800.00

Printers

NEC Pin Writer P2200 with FREE sheet-leader	£275.00
Epson LX800	£180.00
Panasonic 1081	£139.00
Star LC-10	£168.00
Star LC-2410	£299.00
Star LC-10 Colour	£215.00
Diconix Portable 150	£299.00

Laser Printers

Panasonic KX P4450	£1695.00
HP Laser Jet II	£1599.00
Brother HL8	£1700.00
Epson GQ3500	£1250.00
Atari Laser	£999.00

Modems

Dowty Quattro	£POA
Breakout 2400	£POA
Other Available	£POA

New Olympia Laserstar 6

Standard Features include:

- A huge 1.5 Mb memory for quality full page graphics
 - H-P Laser Jet+/Diablo compatible
 - 60 resident fonts, including both portrait and landscape
 - Parallel and RS232 interface
 - Prints at 6 A4 sheets per minute
 - Exceptional features at low cost
- Options**
- 1/2Mb memory upgrade
 - Second 250 sheet paper feed
 - Customised font cards for form filling and letter heads

Discs

5.25" DS/DD	per 10
3M	£5.99
JVC	£5.99
Sony	£5.99
Maxell	£5.99
Philips	£5.50
3.5" DS/DD	per 10
Sony	£12.95
Maxell	£12.95
JVC	£12.95
Philips with case	£12.95

Ring for prices for all other discs

NEC 24 Pin Head Printers

P2200 (168/56) P+Feeder	£POA
P660+ (265/90) P*NEW*	£POA
P760+ (265/90) P*NEW*	£POA
P960XL (384/128) P 136	£POA

Amstrad

1512 SD 20MB Colour	£POA
1640 SD ECD	£POA
1640 SD 20MB ECD	£POA
1640 HD ECD	£POA
1640 GTI EGA	£POA
PPC 640 DD + Modem	£POA
LO 3500 Printer	£POA
LO 5000 Printer	£POA

Compaq

Deskpro 286 M1	£POA
Deskpro 286 M40	£POA
Deskpro 386S/M20	£POA
Portable II M4	£POA
Portable 386 M100	£POA
Portable III M20	£POA

Olivetti

M240 40MB S	£POA
M280 20MB	£POA
M280 40MB S	£POA
Olivetti HP Compact Laser	£POA
Olivetti Scanner	£POA
Olivetti DY 300 Printer	£POA

Epson

PCE 20	£POA
PC AX40	£POA

Star Dot Matrix Printers

LC10 (120/30)	£POA
NR10 (240/80)	£POA
NX15 (120/30)	£POA
NR15 (240/60)	£POA
ND15 (180/45)	£POA
NB15 (300/100) 24 Pin	£POA
NB24/10 (216/72) 24 Pin	£POA
NB24/15 (216/72) 24 Pin	£POA

Epson Dot Matrix Printers

LX800 (150/25 cps)	£POA
FX850 (240/40cps)	£POA
FX1050 (240/40cps)	£POA
LQ500 (150/50cps) 24 pin	£POA
LQ850 (220/73cps) 24 pin	£POA
LQ1050 (220/73cps) 24 pin	£POA
LQ2500+ (270/90cps)	£POA
SQ2500 (270/90cps) P/S	£POA
EX800 (300/50cps)	£POA
EX1000 (300/50cps)	£POA

Juki Daisywheel Printers

6200 (30cps) P	£POA
6300 (40cps) P/S/IBM	£POA
6500 (60cps) P	£POA

Laser Printers

Brother HL-8 Laser	£POA
Canon Series II excl. Toner	£POA
Canon Series IIT excl. Toner	£POA
Canon Series IIR excl. Toner	£POA
Citizen Overture 110 P&S	£POA
Epson GQ3500	£POA
Hewlett Packard Series II	£POA
OKI Laserline 6	£POA
Panasonic KXP4450	£POA
Qume Crystal Print WP	£POA
Qume Crystal Print Series II	£POA
Qume Laser Ten+	£POA
NEC LC866 LED	£POA
Star Laser	£POA
NEC LC890 LED (Postscript)	£POA
QMS PS810 (Postscript)	£POA
Qume ScripTen (Postscript)	£POA

MAIL ORDER - PHONE 01-323 4761 EDUCATION CORPORATE & GOVERNMENT ORDERS WELCOME

209-212 TOTTENHAM COURT RD, LONDON W1 9AJ WE ALSO PROVIDE TRAINING OF SOFTWARE

**THE FOLLOWING RANGE OF LAN UTILITY PRODUCTS
ARE NOW AVAILABLE TO ENHANCE THE
CAPABILITIES OF YOUR NETWORK**

Description	Rapid Price
PS-Station	£607.00
Lan Traffic	£360.00
Lan Batch	£305.00
Lan Map	£120.00
Lan Shadow	£1435.00
Manylink	£280.00
PS-Server	£607.00
PS-Print	£607.00
PS-Upgrades (Upgrades PS-Station or PS-Server to PS-Print)	£216.00
Netmanager	£1165.00
Netremote	£270.00
Lantrail	£495.00
Arc Monitor	£265.00
E-Monitor	£112.00
Wings (5 modems)	£495.00
Wings Extender	£162.00
Lan-Shell	£585.00
Reference Point (20 user)	£1295.00
Reference Point (each additional 10 users)	£535.00
CC Mail Lan Pac - 25 user	£954.00
CC Mail Expand (to UNLTD)	£954.00
CC Mail Gateway	£2074.00
CC Mail Import/Export	£1593.00
Telephone Note Taker	£243.00

FREE DEMONSTRATION AVAILABLE UPON REQUEST

NOVELL

AUTHORISED DEALERS

NETWORKS

RAPID NETWORKS DIVISION are pleased to announce the introduction of the Mina range of Lan enhancement products.

Many of these utilities are capable of running on 3 com, Banyan Vines, and IBM networks, as well as the Novell operating system.

A multi page brochure giving details of all these products is now available.

NETWORK MANAGEMENT MADE EASY
Ring 0342 410284 for further details

RAPID NETWORKS a division of
RAPID COMPUTER SYSTEMS Pic

151 London Road, East Grinstead, West Sussex RH19 1ET
Telephone No: 0342 410284 (8 lines) Fax No: 0342 311215



Unlock your desktop with Publisher's Paintbrush.™

Finally, a paint package designed for desktop publishing! When you create or scan a 300 dpi page, you'll get a 64-screen computer image. That's why Publisher's Paintbrush lets you zoom out and work on the big picture. So you get ultra-sharp resolution without ultra-tedious labor.



One screen of a 64-screen image.



Shrink down to a manageable size.



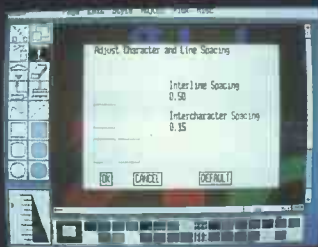
Next, cut-and-paste . . .



ATLS Provides
Overnight Service
to 40 Major
Metropolitan
Areas

A few edits later . . . VOILA!

New typography frontiers: continuously adjustable point sizes, text slope, line and character spacing, extended and condensed type, and letter slant.



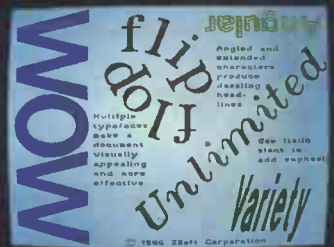
Easy-to-use menus.



Slant and angle text 1° - 359°.

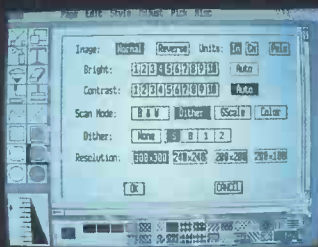


4- to 250-point type.

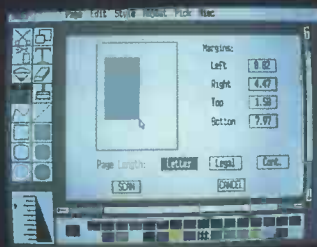


Adjustable everything!

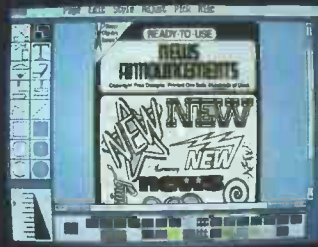
Publisher's Paintbrush adapts to most scanners with absolute simplicity. Scan in existing art, logos and diagrams to save many hours of work!



Full use of scanner features.



Scan all or part of a page.



Combine art and type . . .



. . . from several sources!

Publisher's Paintbrush is a quantum leap in power beyond our top-selling PC Paintbrush®. In fact, it's the dawn of a new era for desktop publishing. With it, you can produce pictures of super-high resolution (many times sharper than your screen!) and marry them into text pages. With it, you can take full advantage of desktop publishing packages, laser printers and image scanners. Without it, you're stuck with ragged edges and tedious multi-screen editing.

Publisher's Paintbrush supports major-brand image scanners and hundreds of printers and video display boards. And most desktop publishing packages have built-in links to Publisher's Paintbrush.

Say goodbye to the old boundaries. Say "Show me" to your ZSOFT dealer. Or call our corporate offices for more information.

➔ **SOFTWARE FORWARD LIMITED**
7 ALBERT TERRACE, UNION ST., BEDFORD MK 40 2SF. TEL: (0234) 272474 FAX: (0234) 272433
DEALER ENQUIRIES WELCOME



From R&D TECHNOLOGY

NETWORKING



COMPUTERS FOR NETWORKS

THE TWINHEAD SUPERSET RANGE
IBM & NOVELL COMPATIBLE FOR A COMPLETE NETWORKED OFFICE SYSTEM

- PC/XT Compatible 10mhz From **£599.00**
- PS/2:30 Compatible 10mhz From **£919.00**
- 286 AT Compatible 12/16mhz From **£1180.00**
- 386 AT Compatible 16/24mhz From **£2595.00**

THE NETWORK SOLUTIONS

- NOVELL
- IBM PC LAN
- ETHERNET
- R.P.T.I. NET
- SAGENET

FREE
MULTI USER NETWORK OPERATING SYSTEM WITH R.P.T.I. CARDS

THE PRICES

HARDWARE

- COMPLETE KIT FOR COST EFFECTIVE 2 STATION NETWORK: (INC: 2 x 1MB INTERFACE CARDS, CABLE, CONNECTORS, FULL SET OF MANUALS, NETWORK SOFTWARE & CRIMPING TOOL). **£369.00**
- ADDITIONAL WORKSTATION NETWORK CARDS **£149**
- COMPLETE KIT FOR 2 STATION ETHERNET NETWORK: (INC: 2 x 10MB ETHERNET CARDS, RG58 CO-AXIAL CABLE, TERMINATORS, BNC CONNECTORS & NETWORK SOFTWARE) **£537.00**
- ETHERNET CARD (INCLUDING NETWORK SOFTWARE) **£249.00**

SOFTWARE

- NOVELL NETWARE 286 VER 2.12 HIGH SPEC. INDUSTRY STANDARD NETWORK OPERATING SYSTEM (100 USERS) **£1749.00**
- NOVELL ENTRY LEVEL SOFTWARE (A DE-FACTO INDUSTRY STANDARD SOFTWARE FOR UP TO 4 USERS) **£499.00**
- NETWORK O.S. PER STATION (NETBIOS COMPATIBLE NETWORK OPERATING SYSTEM MANUAL £49.00 EACH) **£110.00**
- MULTI USER SOFTWARE: WORD PERFECT, WORDSTAR, PROF 4.0 FOXBASE, PARADOX, SMART, SAGE, PEGASUS ETC. **£CALL**

FOR FURTHER INFORMATION:



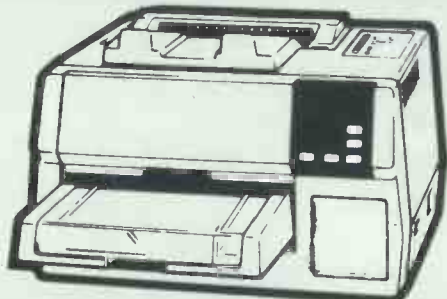
R&D TECHNOLOGY LIMITED.

226 MUNSTER ROAD
FULHAM,
LONDON SW6 6AZ.

FAX: 381 5356
TEL: 385 1877/736 9641
TELEX: 94013177 RNDT G

Please add 15% VAT

"FAMOUS NAME" POSTSCRIPT LASER



MANUFACTURERS OVERSTOCK OF 8 PPM POSTSCRIPT LASER PRINTER

Industry standard Postscript laser printer including 35 resident Adobe fonts; 8 pages per minute printing, 300 dpi resolution, 3Mb RAM, 1Mb ROM, 250 sheet capacity, parallel, RS232 and Appletalk interfaces.

On site maintenance available £300 p/a.
Limited supply.

£1995

Morgan Computer Co.

64-72 NEW OXFORD STREET, WC1. 01-255 2115
179 TOTTENHAM COURT ROAD, W1. 01-636 1138

SKYLAKE RENTALS

FROM A DAY TO A YEAR AND BEYOND

SYSTEMS
COMPAQ
IBM PS/2
TOSHIBA PORTABLES

PERIPHERALS
HEWLETT PACKARD
EPSON
IBM

**SPECIALISED & UNUSUAL PERIPHERALS
CALL US FREE WITH YOUR
SPECIFIC REQUIREMENTS
FOR A QUOTE
NOW**

0800 373118

FAST FLEXIBLE FRIENDLY
OR PHONE 0703 211623

PROGRAMMING TOOLS

Ada Compilers	Algol Compilers
Assemblers & Libs	AWK
Basic Compilers	Basic Interpreters
Basic Utilities	Basic Libraries
BCPL Compilers	C Compilers
C Interpreters	C Libraries
C Utilities	Cobol Compilers
Comms Libraries	Cross Assemblers
Database Libs.	Debuggers
Dis-assemblers	Editors
Engineers Libs.	Expert Systems
Forth	Fortran Compilers
Fortran Libraries	Graphics Libraries
Icon	Linkers/Locaters
Lisp	Modula-2
Nial Interpreters	OPS 5
Pascal Compilers	Pascal Libraries
Prolog	Rexx
Risc	Screen Libraries
Smalltalk	Snobol

We stock many items for which there is no space in these advertisements.

PRICES & DELIVERY

Prices do not include VAT or other local taxes but do include delivery in UK and Europe. Please check prices at time of order, ads are prepared some weeks before publication.

This page lists some of our products. Call us for a complete pricelist.

Order by phone with your credit card.

THE C LANGUAGE

New version of Turbo C with sourcelevel debugger now available

C COMPILERS

Advantage C++	MS-DOS	£395
Aztec C86 Professional	MS-DOS	£110
Aztec C86 Developer	MS-DOS	£165
Aztec C86 Commercial	MS-DOS	£250
CI C86 Plus	MS-DOS	£290
CI Optimizing C86	MS-DOS	£210
De Smet C Programmer	MS-DOS	£ 95
De Smet C Professional	MS-DOS	£165
ECO-C88 V4.0	MS-DOS	£ 70
HIGH C (Metaware) v1.4	MS-DOS	£380
HIGH C 386 v1.4	MS-DOS	£545
Hi-Tech C	MS-DOS	£115
Lattice C v3.3	OS/2&MS-DOS	£240
Mark Williams LETS C v4	MS-DOS	£ 60
Microsoft C v5.1	OS/2&PC-DOS	£275
Microsoft Quick C v1.0	PC-DOS	£ 60
MIX C	MS-DOS	£ 20
MIX Power C & lib s'ce	PC-DOS	£ 29
Turbo C v1.5	PC-DOS	£ 50
Turbo C v2	PC-DOS	£ 75
Toolworks C v3.2	MS-DOS	£ 40
Watcom Express C	PC-DOS	£ 60
Watcom v6.5 Opt comp	PC-DOS	£220
Zortech C v2	PC-DOS	£ 29
Zortech C Power Pack v2	PC-DOS	£ 59
Zortech C++	PC-DOS	£ 90
Aztec C86 Developer	CP/M-86	£230
Aztec C86 Personal	CP/M-86	£130
CI Optimizing C86	CP/M-86	£210
De Smet C Starter	CP/M-86	£ 85
De Smet C Programmer	CP/M-86	£125
De Smet C Enhanced	CP/M-86	£165
Hi-Tech C	CP/M-86	£115
Lattice C	CDOS	£330

HIGH C (Metaware) Flex OS 286 £380

Aztec C Personal 1.06D	CP/M-80	£110
Aztec Commercial 1.06D	CP/M-80	£180
BDS C 1.60	280 + CP/M-80	£ 65
Eco-C v3.5.0	280 + CP/M-80	£ 45
Hi-Tech C	280 + CP/M-80	£ 99
Mix C	280 + CP/M-80	£ 35
Toolworks C/80 v3.1	CP/M-80	£ 40
Aztec C65 V1.05	Apple DOS	£180
Aztec C65 V3.20	Apple PRO-DOS	£230
Aztec C68K MPW	MACINTOSH	£ 85
Aztec C68	MACINTOSH	£ 55
Aztec C68 Commercial	AMIGA	£250
Aztec C68 Developer	AMIGA	£165
Hi-Tech C	ATARI	£ 99
Lattice C	ATARI	£ 85
Mark Williams C v2	ATARI	£110
Laser C	ATARI	£150

C CROSS COMPILERS

We supply 2500AD, Aztec, Lattice, IAR and Hi-Tech Cross Compilers hosted on MS-DOS and targeted on Z80, 8085, 6502, 6801, 68HC11, 6301, 6809, 8051, 68000 & 68020. Please call for information or advice.

C INTERPRETERS

Latest v3.00 of C-terp has improved debugging facilities.

C-terp V3.0X	PC-DOS	£155
Interactive C	PC-DOS	£195
Introducing C	PC-DOS	£ 85
Living C Plus	PC-DOS	£135
Instant-C v3	PC-DOS	£380
RUN/C	MS-DOS	£ 60
RUN/C Professional	MS-DOS	£110

DISK COPYING SERVICE

We can copy files to and from 600 disk formats including CP/M, CP/M-86, MS-DOS, PC-DOS, ISIS, APPLE, SIRIUS, BBC, TORCH, APRICOT, HP-150, TRSDOS, DEC RT-11, IBM BEF, ATARI ST, AMSTRAD, MACINTOSH.

Our charge is £10.00 + disk + VAT with discounts on small quantities and disks are normally despatched within 24hrs of receipt. For more information call us.

ASSEMBLERS

Macro-86 for OS/2 is here. Use Phar Lap for the 386. Optasm assembles Macro-86 code very quickly

2500AD 8086 Asm.	MS-DOS	£ 70
Dig. Res. RASM-86	MS-DOS	£180
MS Macro-86 v5.1	OS/2&MS-DOS	£ 95
PharLap 386 ASM.LINK	MS-DOS	£380
PharLap 386 ASM/Linkloc	MS-DOS	£535
Optasm	MS-DOS	£105
2500AD 8086 Asm.	CP/M-86	£ 70
Dig. Res. RASM-86	CP/M-86	£180
2500AD Z80 ASM	CP/M-80	£ 70
Dig. Res. RMAC	CP/M-80	£180
SLR Z80ASM	CP/M-80	£ 40
SLR Z80ASM-PLUS	CP/M-80	£140
SLR MAC	CP/M-80	£ 40
SLR MAC-PLUS	CP/M-80	£140
SLR 180 (Hitachi)	CP/M-80	£ 40
SLR 180-PLUS (Hitachi)	CP/M-80	£140

Not all assemblers are supplied with a linker. Check before ordering.

CLIBRARIES

Microsoft OS/2 programmers toolkits are now in stock.

DATABASE

Btrieve	OS/2	£370
Btrieve v4.11B	MS-DOS	£160
Btrieve/Multi-tasking	MS-DOS	£370
Btrieve/Network	MS-DOS	£370
XQL	PC-DOS	£510
CBTREE (source any C)		£100
C-Index/Plus (source any C)		£175
C-ISAM (L,MS)	MS-DOS	£210
C-to-dBase (source CI)	MS-DOS	£120
C-tree (source any C)		£210
R-tree	MS-DOS	£155
db-VISTA III s'gle user	PC-DOS	£520
db-FILE (most C's)s'gle	MS-DOS	£295
db-RETRIEVE single-user	MS-DOS	£295
Lattice dBCIII (L,MS)	MS-DOS	£160
Lattice dBCIII+ (L,MS)	MS-DOS	£445
SftFucus Btree&Isam (sce any C)		£ 80
Virtual Memory File Man.	PC-DOS	£150

GRAPHICS

Enhanced Graphics Tlkt	PC-DOS	£185
Essential Graphics v2	PC-DOS	£150
GFX Graphics	PC-DOS	£ 70
GraphiC v4.1 (CI, L, DS, MS)	PC-DOS	£270
GSS Kernel system	PC-DOS	£350
GSS Lattice Binding	PC-DOS	£110
GSS Graph Dev Toolkit	PC-DOS	£350
GSX Prog. Toolkit (DR)	PC-DOS	£270
HALO '88 (MSC5, LAT, TC)	PC-DOS	£175
MetaWINDOWS (CI, L, MS, T)	PC-DOS	£105
MetaWINDOWS Plus	PC-DOS	£150
Turbo WINDOWS/C (Turbo)	PC-DOS	£ 55
Quick Windows/C (QC)	PC-DOS	£ 55

SCREEN & WINDOWS

Vitamin C (MS5.1)	OS/2&PC-DOS	£225
Blaise Power Scrn(MS&TC)	PC-DOS	£ 80
Blaise View Mngr. (s'ce)	PC-DOS	£245
Curses Screen Mngr. (L)	PC-DOS	£120
Entelekon Windows (s'ce)	PC-DOS	£105
Multi-windows (MS, L)	PC-DOS	£220
Panel Plus (source)	PC-DOS	£270
Vitamin C (source)	PC-DOS	£150
Windows for Data (most)	PC-DOS	£200
Windows for C (most C)	PC-DOS	£135
Greenleaf Datawindows	MS-DOS	£135
C-Scape v3 (MS, L, TC)	MS-DOS	£300

GENERAL FUNCTIONS

CQL (CTREE&BTRIEVE)s'ce	PC-DOS	£250
C-Worthy Int.Lib (L,MS)	MS-DOS	£165
D-Tree (source)	PC-DOS	£320
Greenleaf (source)	PC-DOS	£ 85
G'leaf Super Functions	PC-DOS	£120
G'leaf C Sampler (TC, QC)	PC-DOS	£ 55
Smorgasbord (source)	PC-DOS	£ 65
Blaise Tools Plus (s'ce)	PC-DOS	£ 80
Blaise Tools Plus/5.0	PC-DOS	£ 80
Blaise Turbo C Tools	PC-DOS	£ 80
Blaise Light Tools (ZOR)	PC-DOS	£ 65
ESI Utility Lib (source)	PC-DOS	£105
Entelekon Funct (source)	PC-DOS	£105
Phoenix Pforce (source)	PC-DOS	£205
Pro-C (most C)	PC-DOS	£720
Security Library object	MS-DOS	£ 95
Resident-C (MS, L) (s'ce)	PC-DOS	£120

COMMS LIBRARIES

Blaise C Asynch (source)	PC-DOS	£105
Essential Comms (L, MS, T)	PC-DOS	£110
Greenleaf Comms (source)	PC-DOS	£100
Multi Comms (L, MS)	PC-DOS	£105
Zortech Comms (QC&TC)	PC-DOS	£ 39

SCIENTIFIC LIBRARIES

Wiley Scientif. Lib. v2	ANY C	£145
Mathpak 87 (L, MS)	MS-DOS	£ 80

PROGRAMMERS UTILITIES

PC-Lint	OS/2&MS-DOS	£ 75
Pre-C (Phoenix Lint)	MS-DOS	£175
C-Documentar	PC-DOS	£195
C-Scan	PC-DOS	£195
C Toolset	MS-DOS	£ 90
Lattice Cross Ref.	MS-DOS	£ 40

PROGRAM EDITORS

So many good editors, more than we can list here, you must be spoilt for choice

Kedit v4	OS/2	£110
Epsilon	OS/2	£140
BRIEF v2	PC-DOS	£135
EC Editor v2.1	PC-DOS	£ 40
Epsilon v3.2	PC-DOS	£110
FirstTime for Pascal	PC-DOS	£180
FirstTime for Turbo-P	PC-DOS	£ 55
Kedit v4	PC-DOS	£ 90
ME v2.00 (w.C source)	PC-DOS	£120
MKS VI	PC-DOS	£ 65
Multi-Edit	PC-DOS	£ 65
Norton Editor V1.3	PC-DOS	£ 65
Pmate PC v4	PC-DOS	£105
RED v6.6 (with C S'ce)	PC-DOS	£ 65
XTC (with Pascal source)	PC-DOS	£ 65
Vedit-Plus v3	PC-DOS	£105
CSE (with C source)	MS-DOS	£ 75
MIX Editor	MS-DOS	£ 20
Pmate 86 v4.00	MS-DOS	£105
Vedit-Plus (CRT)	MS-DOS	£105
Vedit-Plus	CP/M-86	£120
CSE (With C source)	CP/M-80	£ 75
MIX Editor	280 + CP/M-80	£ 25
Vedit-Plus v2.33	CP/M-80	£110

For more information please call us.

CROSS ASSEMBLERS

We supply cross-assemblers by Avocet, 2500AD, IAR Systems and Pecan hosted on MS-DOS, CP/M-86 and CP/M-80 with over 30 target processors. In total over 200 products with no space to list them here. We hold some stock but you should allow 10-14 days for delivery. Please call for information or advice.

GREY MATTER

4 Prigg Meadow, Ashburton, Devon TQ13 7DF.
TEL. (0364) 53499

GREY MATTER

4 Prigg Meadow, Ashburton, Devon TQ13 7DF.
TEL. (0364) 53499

GREY MATTER

4 Prigg Meadow, Ashburton, Devon TQ13 7DF.
TEL. (0364) 53499

ADVERTISERS INDEX

3	3D Digital Design & Development Ltd	279	Dimension Computers Ltd	22	Matrix North Ltd	56	Roderick Manhattan & Associates	233
A	ATT Corporation Ltd	8	Dimension Computers Ltd	23	Matrix Software Technology Ltd	139	Rugby Micro Spares	242
	ATT Corporation Ltd	9	E		Mayfair Micros	171	S	
	Advent Computers	62	Electrone	98	Mentacaptus Ltd	274	S & S Enterprises	266
	Akin Computer Services	63	Elonex	59	Messiter Software	242	SCS Computer Sales plc	34
	Akin Computer Services	47	Everex Systems (UK) Ltd	73	Micro General	40	SCS Computer Sales plc	35
	Alfprint Ltd	91	Express Technology Inc	11	Micro Peripherals	243	SCS Computer Sales plc	36
	Almo Computer System	10	F		Micro Rent	278	SCS Computer Sales plc	37
	American Research Corporation (UK)	157	Faber Electronics Ltd	69	Micro Rent	86	SL Data Ltd	91
	Amstrad Consumer Electronics plc	133	Farroukh Systems Ltd	259	Micro Systems (Distributors) Ltd	96	SMT International (Holdings) Ltd	6
	Amstrad Consumer Electronics plc	77	Findnice Ltd	97	Microrim (UK) Ltd	255	Sage Systems Ltd	112
	Ansible Information	84	Firdata	85	Microsource Product Distribution Ltd	258	Sage Systems Ltd	113
	Apolonia Software	84	Fortransoft	251	Mighty Micro	256	Sajanka Computer Ltd	24
	Applekart	147	Fraser Associates Ltd	147	Miles Gordon Technology	256	Schneider (UK) Ltd	173
	Arche Technology UK Ltd	111	Fujitsu Europe	194	Mission Computers Ltd	116	Screens Microcomputers	274
	Arkel Computer Services Ltd	46	G		Morgan Computer Company	259	Semaphore Systems Ltd	263
	Avotec Office Automation Ltd	75	GT Soft	276	Morgan Computer Company	274	Sentinel Software Ltd	181
	Aztech Computer Systems	80	Galatrek International Ltd	275	Morgan Computer Company	276	Shareware Marketing	276
	Aztech Computer Systems	81	Garbo Systems Ltd	281	Morgan Computer Company	279	Sierra Computer Consultants Ltd	246
B			Goto Computer	26	Morgan Computer Company	284	Silicon Croft	114
BB Business Suppliers	243		Goto Computer	27	Morgan Computer Company	82	Skylake Holdings	246
Borland International (UK) Ltd	1		Greymatter	285	Morgan Computer Company	92	Slough Computers	78
Borland International (UK) Ltd	291		Greymatter	287	Morse Computers	260	Software Forward	283
Borland International (UK) Ltd	292		H		Mountaineire Ltd	281	Solidisk Technology Ltd	236
Borland International (UK) Ltd	292		HM Systems	163	Mumps Software Consultants	280	Solidisk Technology Ltd	237
Bridgen Technology	47	IFC	HVS Computer Services	265	N		Star Micronics (UK) Ltd	187
C			Hi Voltage	44	Naga Trading Ltd	260	Stem Computing	84
CAS	254		Hi Voltage	45	Ness Users Club Ltd	82	Stirling Microsystems	252
CPI Multi-Tech Computers	149		Hi-Grade Computers Ltd	208	Network Associates	257	Storton Computers Ltd	257
Cambridge Computer Store	261		Hubcourt Ltd	259	Newman Computer Services Ltd	277	Super Money Savers	246
Camelot Computing	39		Hughes PCs Ltd	82	Newtons Laboratories	248	Supercharge Toner Technology	259
Cansure Ltd	67	I			Newtons Laboratories	249	Swanley Electronics	243
Cavendish Distributors Ltd	282	ISC Ltd		4	Newtons Laboratories	250	System Science (Systematika)	97
Cherry Mikroschalter GmbH	66	ISC Ltd		5	Nextbase Ltd	124	Systems Constructions	251
Cherry Mikroschalter GmbH	67	In Touch Tutorials Ltd		65	Northern Technology Systems Ltd	60	T	
Chipboards Ltd	24	Invicta Exhibitions		50	Northern Technology Systems Ltd	61	Taxan (UK) Ltd	103
Citadel Products Ltd	94	Iris Products		52	O		Technate Inc	246
Citadel Products Ltd	95	J			Optimun Technology Ltd	12	Technomatic Ltd	70
Computacenter Ltd	7	JT Porter Consultants		66	Optimun Technology Ltd	13	Technomatic Ltd	71
Computer Bookshops Ltd	199	Javelin Computers		68	Opus	167	Technomatic Ltd	72
Computer Express Ltd	28	Jensen & Partners		201	Opus	189	Telefax (UK) Ltd	47
Computer Express Ltd	29	Jilu Tech		38	Opus	196	The Electric Studio	258
Computer Express Ltd	30	K			Opus	265	The Image Connection	76
Computer Express Ltd	31	KK Stationery Ltd		257	Overseas Media Distributors	247	Time Computers	262
Computer Precision Ltd	15	Kador		257	P		Topdesk Systems	267
Computers by Post	87	Kao Corporation GMBH		137	Peripherals Enterprises	97	Transform Ltd	68
Computers by Post	88	Keele Codes Ltd		10	Piccadilly Micros	25	U	
Computers by Post	89	Keyzone Computer Products Ltd		252	Power Computing	93	U Microcomputers Ltd	58
Crown Computer Products	42	Kudos Systems Ltd		108	Prospero Software Ltd	278	V	
Crown Computer Products	43	Kyocera Electronics (UK) Ltd		127	Pyramid Microsystems Ltd	83	VMS Enterprises Ltd	74
Compstand	48	L			PW Computer Supplies	91	VNU Business Publications by	264
Compstand	49	Laserlink Ltd		281	R		VNU Business Publications by	90
D		Laserlink Ltd		281	R & D Technology Ltd	284	Viglen Computer Supplies	51
DGA Software	253	Leigh Computer Systems		253	R J Langman Insurance Brokers Ltd	183	Viglen Computer Supplies	53
Da Vinci Computers Ltd	54	Locland Computer Ltd		99	RD Services	281	Viglen Computer Supplies	55
Data Encryption Systems Ltd	58	Lotus Development Corporation		120	RSC Ltd	16	Viglen Computer Supplier	57
Dataflex Design Ltd	119	Lotus Development Corporation		121	RSC Ltd	17	W	
Dell Computer Corporation	104	M			RSC Ltd	18	Walters International Ltd	207
Dell Computer Corporation	105	MD Office Supplies		251	RSC Ltd	19	Webb Communications Ltd	79
Digi-Data Ltd	253	Magstart Ltd		279	RSC Ltd	20	Wells American	41
Digitask Business Systems Ltd	268	Mass Business Systems		14	RSC Ltd	21	X	
Digitask Business Systems Ltd	269	Matmos Ltd		252	RTM Systems	32	Xitek	74
Digitask Business Systems Ltd	270	Matrix Communications Systems Ltd		74	RTM Systems	67	Z	
Digitask Business Systems Ltd	271				Rapid plc	282	Zortech	33
Digitask Business Systems Ltd	272				Reeves Business Computing Ltd	64		
Digitask Business Systems Ltd	273				Ringdale Engineering Company Ltd	202		

MICROMART ADVERTISERS INDEX

A	AL Downloading Services	192	D	Dacol (Synetics) Ltd	217	K	Kaczer Ltd	216	Q	Queensdown Graphics	229
	AL Downloading Services	193		Damson Computing Ltd	233		Kosmos Software	226			
	Acorn Mail Order	226		Datapro Computer Supplies	220						
	Aejis	216		David Pollard Associates	225						
	Altek Instruments	193		E							
	Amber Logic Ltd	225		Enveform Ltd	222						
	American Micro Computers	218		Eskar Trading Company Ltd	228						
	Ashling UK	191		F							
	Athene Consultants (disks)	191		Fullspeed Ltd	209						
	Athene Consultants (branded disks)	192		G							
	Atom Style Ltd	209		Gaascom Ltd	231						
				Gold Computer Services Ltd	231						
B				H							
Barsoft	233			Hobourne Consultants Ltd	227						
Bits Per Second Ltd	215			I							
Budget Typesetting Ltd	192			Industrial Process	213						
				Innovation Ltd	221						
C				Intraset Ltd	209						
CE Systems	209			M							
Candid Computer Technology Ltd	213			Mensco Electronics & Computer Systems	222						
Cheshire Computers	213			Microcosm Ltd	219						
Colmar (Kent) Ltd	217			Microtech Business Systems	221						
Computer Exchange	232			Multi World Trading Co	215						
Computer Music Systems	215			N							
Crofton Electronics	221			Netland	232						
				P							
				PBA Software	217						
				PVS Electronic Components	229						
				Paragon Technology	224						
				Public Domain Software Library Ltd	209						
				R							
				RCW Colour Slides	228						
				Rovoreed Limited	219						
				S							
				SPElectronics Ltd	225						
				Scientific PC User Group	233						
				Shirechase Ltd	227						
				Sigma Press	227						
				Softmachine Distribution	229						
				Summit Computers	219						
				T							
				TK Computerware	226						
				Trilogic	193						
				W							
				Western Intelligence Ltd	191						
				Wight Scientific	232						

PASCAL LIBRARIES

TURBO PASCAL LIBRARIES

Blaise Power Tools Plus	PC-DOS	£ 80
Blaise Turbo Asyn.Plus	PC-DOS	£ 80
Mathpak 87 (TP3&4)	MS-DOS	£ 60
Paragon Supertools (TP3)	PC-DOS	£ 65
RM Graph (TP3) Nimbus +	MS-DOS	£ 49
Science & Eng.Tools	MS-DOS	£ 50
Report Builder (TP3)	MS-DOS	£ 70
System Builder (TP3)	MS-DOS	£ 90
TP4 Developers Library	PC-DOS	£190
Turbo Halo Univ.Graph.	PC-DOS	£ 75
T-Debug Plus v4 s'ce	PC-DOS	£ 49
Turbo Database	PC-DOS	£ 45
Turbo Editor Toolbox	PC-DOS	£ 45
Turbo Extender (TP3)	PC-DOS	£ 55
Turbo Gameworks (TP4)	PC-DOS	£ 45
Turbo Graphix Toolbox	PC-DOS	£ 45
Turbo Advantage (Lader)	MS-DOS	£ 60
Turbolink + v3.15A (TP3)	PC-DOS	£ 60
Turbopower Utils (TP3)	PC-DOS	£ 60
Turbo Optimiser (TP3)	PC-DOS	£ 45
Turbo Overlay M'ger (TP4)	PC-DOS	£ 29
Turbo Professional	PC-DOS	£ 60
Turbo Screen	CP/M,MS,PC-DOS	£ 55
Turbo Tutor	PC-DOS	£ 30
TurboWINDOWS/Pasc. (TP4)	PC-DOS	£ 55

ADA COMPILERS

AdaVantage v2.1	PC-DOS	£1065
AdaVantage Opt compiler	PC-DOS	£1255
Janus Ada C-Pack	PC-DOS	£ 100
Janus Ada ED-Pack v2.0.2	MS-DOS	£ 340
Augusta (with source)	CP/M-80	£ 75
Janus Ada C-Pack	CP/M-80	£ 80

PASCAL LANGUAGE

New version of Turbo Pascal with support for the Borland debugger is available

MS Pascal v4.0	OS/2&PC-DOS	£190
ALICE Pascal Intrprtr.	PC-DOS	£ 80
Dr Pascal Interpreter	MS-DOS	£ 39
Metaware Prof.Pascal	MS-DOS	£380
Metaware Prof.Pas/386	MS-DOS	£545
Mystic Pascal v1.6E	PC-DOS	£ 29
Oregon Pascal-2	MS-DOS	£295
Prospero Pascal v3.15	MS-DOS	£240
Prospero Pascal for GEM	MS-DOS	£ 75
Prospero PC Pascal	PC-DOS	£ 75
Turbo-Pascal v4	PC-DOS	£ 50
Turbo-Pascal v5	PC-DOS	£ 75
Pecan P-Sys w.UCSD Pas.	IBM-PC	£ 80
Pecan P-Sys Pascal Prof.	IBM-PC	£155

PROGRAMMING TOOLS

Ada Compilers	Algo Compilers
Assemblers & Libs	AWK
Basic Compilers	Basic Interpreters
Basic Utilities	Basic Libraries
BCPL Compilers	C Compilers
C Interpreters	C Libraries
C Utilities	Cobol Compilers
Comms Libraries	Cross Assemblers
Database Libs.	Debuggers
Dis-assemblers	Editors
Engineers Libs.	Expert Systems
Forth	Fortran Compilers
Fortran Libraries	Graphics Libraries
Icon	Linkers/Locaters
Lisp	Modula-2
Nial Interpreters	OPS 5
Pascal Compilers	Pascal Libraries
Prolog	Rexx
Risc	Screen Libraries
Smalltalk	Snobol

We stock many items for which there is no space in these advertisements.

LINKERS

The new Link & Locate++ is specifically for Microsoft C v5 & MASM v5. Phar Lap LinkLoc for 286 & 386 protected ROM targets.

OPTLINK offers very fast linking

Phar Lap LinkLoc	PC-DOS	£285
Link & Locate++ (MSC5)	PC-DOS	£265
Plink-86 Plus v2.24	MS-DOS	£260
Link & Locate	MS-DOS	£265
OPTLINK	MS-DOS	£105
SLRNC (Z80)	CP/M-80	£ 40
SLRNC-PLUS (Z80)	CP/M-80	£140

GENERAL PASCAL LIBRARIES

Blaise Tools/Tools2 (MS)	PC-DOS	£160
Blaise Asynch (s'ce MS)	PC-DOS	£120
Btrieve (MS&TP4)	PC-DOS	£160
MetaWINDOWS (MS&TP)	PC-DOS	£105
HALO '88 (MS,TP4)	PC-DOS	£175
Blaise View Mngr. (MS)	PC-DOS	£205
Shark database (Propas)	MS-DOS	£250
Prospect v2 (Pro)	MS-DOS	£ 80
Shark database (Propas)	CP/M-86	£250
Prospect Graphics (Pro)	CP/M-86	£ 80
Shark database (Propas)	CP/M-80	£150

BASIC LANGUAGE

Microsoft Basic v6.0 for PC-DOS and OS/2 is in and Quickbasic compatible

BASIC INTERPRETERS

BBC Basic (86)	PC-DOS	£ 95
Professional BASIC	PC-DOS	£ 70
TrueBasic v2.0	PC-DOS	£ 80
MEGABASIC v5.404	MS-DOS	£210
BBC BASIC	Z80+CP/M-80	£ 95

BASIC COMPILERS

Microsoft QuickBASIC v4	PC-DOS	£ 60
Microsoft Basic v6 OS/2&PC-DOS	£180	
Turbo Basic v1.1	PC-DOS	£ 60
ZBASIC v4	PC-DOS	£ 69
Microsoft MS-BASIC v5.36	MS-DOS	£235
Dig.Res. CBASIC	MS-DOS	£390
Dig.Res. CBASIC	CP/M-86	£390
Dig.Res. CBASIC	CP/M-80	£390
ZBASIC	Z80+CP/M-80	£ 75

OBJECT ORIENTATED LANGUAGES

The increasing acceptance of object-oriented programming has prompted this new section

C SUPERSETS

Advantage C++ (L,MS)	PC-DOS	£395
Guidelines C++ (MS)	PC-DOS	£260
Zortech C++	PC-DOS	£ 90
C-Talk	PC-DOS	£105

SMALLTALK

Smalltalk/V	PC-DOS	£ 75
Smalltalk/V 286	PC-DOS	£140

OTHERS

Actor	PC-DOS	£370
RisC	PC-DOS	£ 55

LIBRARIES & UTILITIES

Database

CADSAM (source) (MS,QB4)	MS-DOS	£ 75
Btrieve (MS&QB4)	MS-DOS	£160
Btrieve/N (MS&QB4)	MS-DOS	£370
Multikey	MS-BASIC + MS-DOS	£145
T.Basic database tlbx.	PC-DOS	£ 49

Graphics

Enhanced Graph.Tlkt QB +	MS-DOS	£185
HALO '88 (MS&QB4)	PC-DOS	£175
GSS Graph.Dev.Tkt	PC-DOS	£350
Finally XGraf (QB4)	PC-DOS	£ 80

Sundries

Finally Quickbasic +	PC-DOS	£ 70
ProBas (QB4)	PC-DOS	£ 85
ProBas Toolkit (QB4)	PC-DOS	£ 85
ProBas Telecomm Toolkit	PC-DOS	£ 65
Wiley Scientific Lib.	PC-DOS	£ 90
T. Basic Editor Toolbox	PC-DOS	£ 49

Tuning & Debugging

Betatoools Dev.System	PC-DOS	£100
Vicar (MS&QB&TB)	MS-DOS	£ 45
Vicar (CBasic)	MS-DOS	£ 65

Screen

Blaise Power Screen (QB4)	PC-DOS	£ 80
PANEL Screen Manager	MS-DOS	£ 80
Pro Screen (QB4)	PC-DOS	£ 85
Screen Maker	PC-DOS	£120

MODULA-2 COMPILERS

The new Taylor Modula-2 challenge* JPI object code quality

Pecan P-Sys. w.Mod-2	PC-DOS	£ 80
Farbware Modula-2	MS-DOS	£ 70
FTL Modula-2 (sml.mem)	MS-DOS	£ 45
FTL Modula-2 (lge.mem)	MS-DOS	£ 55
FTL Modula-2 Developer	MS-DOS	£ 85
Interface M2-SDS	PC-DOS	£ 75
Interface M2-SDS-XP	PC-DOS	£185
JPI Topspeed Modula-2	PC-DOS	£ 59
Mod-2/86 Compiler v3	PC-DOS	£ 58
Mod-2/86 Dev.system	PC-DOS	£145
Modula Corp.PC Mod.2	PC-DOS	£150
Taylor Modula-2 Dev Sys	PC-DOS	£505
FTL Modula-2	Z80/CP/M-80	£ 45
Hochstrasser Mod.2	Z80/CP/M-80	£100
Turbo Modula-2	Z80/CP/M-80	£ 50
Modula-2 (Mod S/W)	ATARI 520ST	£ 75
MacModula-2 v4.1	MACINTOSH	£100

PRICES & DELIVERY

Prices do not include VAT or other local taxes but do include delivery in UK and Europe. Please check prices at time of order, ads are prepared some weeks before publication.

This page lists some of our products. Call us for a complete pricelist.

Order by phone with your credit card.

DISK COPYING SERVICE

We can copy files to and from 600 disk formats including CP/M, CP/M-86, MS-DOS, PC-DOS, ISIS, APPLE, SIRIUS, BBC, TORCH, APRICOT, HP-150, TRSDOS, DEC RT-11, IBM BEF, ATARI ST, AMSTRAD, MACINTOSH.

Our charge is £10.00 + disk + VAT with discounts on small quantities and disks are normally despatched within 24hrs of receipt.

For more information call us.

PROLOG LANGUAGE

Arity Standard	PC-DOS	£ 79
Arity Prolog Int. v5	PC-DOS	£225
Arity Int. & Comp. v5	PC-DOS	£495
LPA PROLOG Prof v2.0	PC-DOS	£755
Micro-PROLOG v3.1	MS-DOS	£ 75
Prolog-86 plus v1.0	MS-DOS	£195
Prolog-2 Personal	PC-DOS	£145
Prolog-2 Programmer	PC-DOS	£495
Prolog-2 Professional	PC-DOS	£995
Turbo-Prolog v2	PC-DOS	£ 75
ADA Educ.Prolog	MS-DOS	£ 26
ADA FS Prolog	MS-DOS	£ 45
ADA VMI Prolog	MS-DOS	£ 70
ADA VML Prolog	MS-DOS	£150
Prolog-1 v2.2	CP/M-86	£299
Micro-Prolog v3.1	CP/M-86	£ 75
Micro-Prolog v3.1	CP/M-80	£ 60
Prolog-1 v2.2	CP/M-80	£225
LPA Mac Prolog v2 Apple Mac Pls	£445	

FORTRAN COMPILERS

Microsoft Fortran for OS/2 is in stock now and new Lahey for the 286. New low price PC Fortran by Prospero.

Lahey F77L v2.21	MS-DOS	£320
Lahey Personal Fort-77	PC-DOS	£ 70
RM/FORTRAN 77 v2.42	MS-DOS	£430
MS-FORTRAN 77 v4.1 OS/2&MS-DOS	£275	
Pro Fortran 77 v1.22	MS-DOS	£240
Pro Fortran for GEM	MS-DOS	£ 95
Prospero PC Fortran	PC-DOS	£ 95
Utah Fortran	MS-DOS	£ 35
FS-Fort. (CGA & Herc)	MS-DOS	£ 39
Pro Fortran v2.1	CP/M-86	£240
Pro Fortran v1.25	CP/M-80	£240
Nevada Fortran v3.3	CP/M-80	£ 35
Pro Fortran 77	ATARI 520ST	£ 95

We have Fortran Libraries in stock.

Justifiably worried about the prospect of one or two Tory MPs ending up with the best part of British Steel's share issue, the government appointed a team of hi-tech investigators to track down the culprits from this and, by inference, other share issues. To help them in their task they were given, according to the ITN team, 'sophisticated software' and a new 'supercomputer'. Supercomputer? The PS/2 Model 50? Really...

Three account managers at Frontline Distribution have collectively won a Suzuki Jeep. Must be something to do with their turnover...

Walters International will launch a new Laptop 286 machine at the Which? Computer Show in February and on the stand will be the current Miss World, Linda Petersdottir from Iceland.

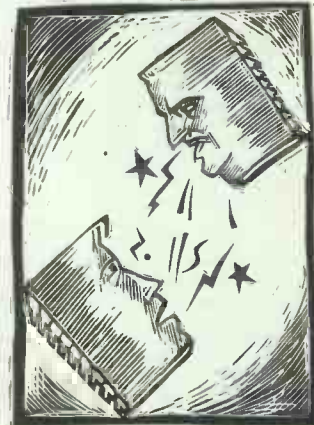
Walters' top executives are so enchanted with the Icelandic tradition of naming sons and daughters after their fathers (Petursson and Petersdottir, for example) that the new machine is to be named the 286 Arfurdalisdottir...

Epson is understandably proud of the excellent (it says here) GQ3500 laser printer range. At least, we think that's the case. Unfortunately, the press release (at least fifth generation photocopy. Still, from a Japanese company...) is so badly printed it's difficult to tell exactly what it's talking about. Try using the GQ next time...

It's incredible! Those wonderful money-saving people at Inmac have come up with a revolutionary device! Struggle no more with unwieldy grey boxes! Be rid of unsightly cables! It may look like an ordinary VDU arm but their incredible £99 device not only serves to 'create space and clear bulky equipment off the desk', but also acts as a replacement for



At last! The solution to all the waste paper that piles up around the office. Feed the output from your dot-matrix printer directly into a shredder and use the result as a valuable fossil fuel substitute... or packing/nesting material... answers on a postcard...



week for Sprint...

There is a new virus. It is potentially more serious than any of the previous strains. It eats shelf space. The Computer Virus Book virus was first noticed late last year, the first symptom being an innocent-looking book from Abacus. The disease spread, the latest outbreak centred on publishers Von Nostrand Reinhold. Valuable manual space (we interrupt this joke for a cheaper one: 'Coming soon from Inmac! Automatic space. Takes up less of your desk by automatically redistributing itself') is taken up as the dBase handbooks make way for another book on the stimulating subject of computer viri...

Finally, many thanks to the hundreds of people who phoned in to tell us that Lunn Poly is a chain of travel agents and not, as we suggested last month, the Marie Celeste of the educational world. In particular we would like to thank a Mr Thomas Cook...

an IBM PS/2 machine! At least, we assume it does. The picture attached to the press release showed a fully functioning PS/2 monitor but no sign of a PC to drive it. Maybe ITN could run a feature on this incredible, compact supercomputer...

Perhaps Inmac could use the machine to sort out its mailing lists. No, this isn't going to be the standard 'I get 24 Inmac catalogues every month, isn't that funny?' story. It's the non-standard 'I get 24 Inmac catalogues every month and I'll tell you what's funny' story. A member of the staff in VNU Towers (a rather shifty character who moves from magazine to magazine) built up, over the years, the standard set of Inmac mailing list entries and, until recently, received around ten copies of that company's ubiquitous catalogue, all to the same name, at the same address, but in different departments. Someone at Inmac noticed. What a waste of money, Inmac finally decided. Why send so many copies to what was, apparently, the same person in different departments. Ah, the wonder of database search functions. So now he isn't haunted by dozens of Editorial Assistants tossing catalogues at him. Inmac bundles ten together...

It's alright, you can come off the valium now. The sleepless nights are over. No more need to spend hours wondering how to swap dates with people. The BSI, that most august of bodies, has finalised BS 6957 the 'Guide to construction and use of 130mm' (that's 5 1/4 in to you) 'flexible disk cartridges for date interchange'. Once you've

worked out that they mean data interchange, you're ready for Part Two. Part Two of this vital attempt at standardising the 5 1/4 in disk, an area in which there is such fierce competition, contains a track format for 77 track disks. Yes, 77 track disks, as used by the Ministry of Housing...

The Unix software for Van Diemen International Racing Services' production control system may turn out to be a little difficult to use. Christian Gobbe of Prosys, the company responsible for the code, is described by Convergent (supplier of the hardware) as 'himself and ex-formula ford driver'. Schizophrenic software. Who knows? It might catch on. Maybe it could even be Borland's excuse this

This month

This month's hardware feels like a set of fugitives from *Gulliver's Travels*. We have an AT in a storage heater sized box, a 68030-based Mac in a small footprint case and power for the pocket in the Agenda. All exciting stuff. And on the software side, Mathematica knocked Jack Weber's socks off.

We're getting plenty of response to the new features we've added to PCW, but more letters and electronic mail are welcome.

PCW is to gain a new partner. From next month we will be bundling a second magazine free with each issue, with each supplement focusing on a particular area of hardware or software. These magazines will build up into a reference work of invaluable reviews and tables of information for anyone buying computer products for the first time or upgrading their system.

The first issue will look at buying a computer system and take you through the process of deciding what sort of computer best suits your needs, be it PC compatible, Macintosh, Atari or whatever. It will be accompanied by what we expect will be the most comprehensive listing of PCs yet published anywhere.

In addition, there will be a feature on the pros and cons of integrated software packages accompanied by a survey of products available.

See you then!

STOP PRESS

Apple has now informed PCW that its Mac SE/30, reviewed on page 128, will be available in the UK in two separate configurations, both with a 40Mbyte hard disk. The differences are that one model will have 2Mbytes of RAM, the other, as in the review, will have 4Mbytes. Final prices are not fixed but will be in the range £3900 to £4500.



Bold Printing

Clean up the quality of your printout with the Juki 6200 daisy wheel printer. With its speed of 30cps, you can create a deep and lasting impression on paper in more ways than one!

Whatever your printing requirement, the Juki 6200 will produce clean crisp copy everytime and like all of the versatile Juki range, the cost of the Juki 6200 is so economical that the price will wash with just about everybody.

Whilst we wouldn't try to soft soap you into believing that the Juki 6200 can lighten your work load like Bold! We can say that

you will be bubbling over with the sparkling printout on your sheets (of paper!)

 **Micro Peripherals Ltd**

Intec 2, Unit 3, Wade Road, Basingstoke,
Hampshire RG24 ONE. Tel:(0256) 473232.
Telex:859669 MICROP G.
Facsimile:(0256) 461570.

4 Petre Road, Clayton Park, Clayton-le-Moors,
Accrington, Lancashire BB5 5JP.
Tel:(0254) 871717. Tel:(0706) 217799.
Telex:635153 MICROP G. Facsimile:(0254) 653153.



6200
This performance daisy wheel printer gives quality printing for all office use. 3K buffer, proportional spacing, parallel interface.
Optional: Sheetfeeder, tractor and serial interface.
Speed: 30cps.
Compatibility: Diablo 630.
Price: £399



6300
A professional wide bodied daisy wheel printer. 3k buffer, proportional spacing, parallel interface.
Optional: Sheetfeeders and tractor.
Speed: 40cps.
Compatibility: Diablo 630API.
Price: £699



6500
A high speed daisy wheel printer designed specifically for high speed office use. 3k buffer, proportional spacing, parallel interface.
Speed: 60cps.
Compatibility: Diablo 630API.
Price: £899

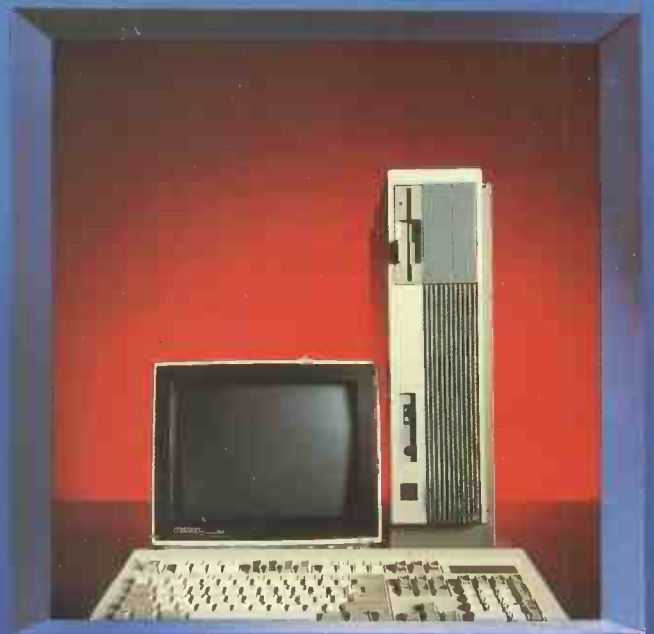


7100
The 24 pin LQ matrix printer. Dual interfaces, 7k buffer, colour, LCD display.
Optional: Sheetfeeders, tractor and font cards.
Speed: 288cps.
Compatibility: IBM or Diablo 630 or Epson.
Price: £899



7200
The total printing machine. Colour or B/W, 360dpi. Dual interfaces, A3 printing.
Optional: Sheet and envelope feeders and font cards.
Speed: 324cps.
Compatibility: IBM or Diablo 630 or Epson.
Price: £1625

MISSION TECHNOLOGIES



MISSION FlexCache

Since its launch of the World's first 20MHz 386 PC, Mission has enjoyed a very special position in the field of serious micro-computing.

Now, Mission brings you the "state-of-the-art" in compatible computing with the new FlexCache 386. The Mission FlexCache delivers zero wait-state CPU performance, together with unique high performance intelligent disk subsystems with up to 10MB of disk caching!

This ultimate Mission engine carefully optimises the performance of processors and peripherals for intensive applications in environments such as file servers, multi-user systems and engineering workstations.

For information on the full range of Mission PCs and peripherals Phone: 0480 52777 or Fax: 0480 432777

