

Personal Computer

US\$2.95/SF14 81/E1 76/BF1127
Lire4,500/DK131.00

World December 1987 £1.20

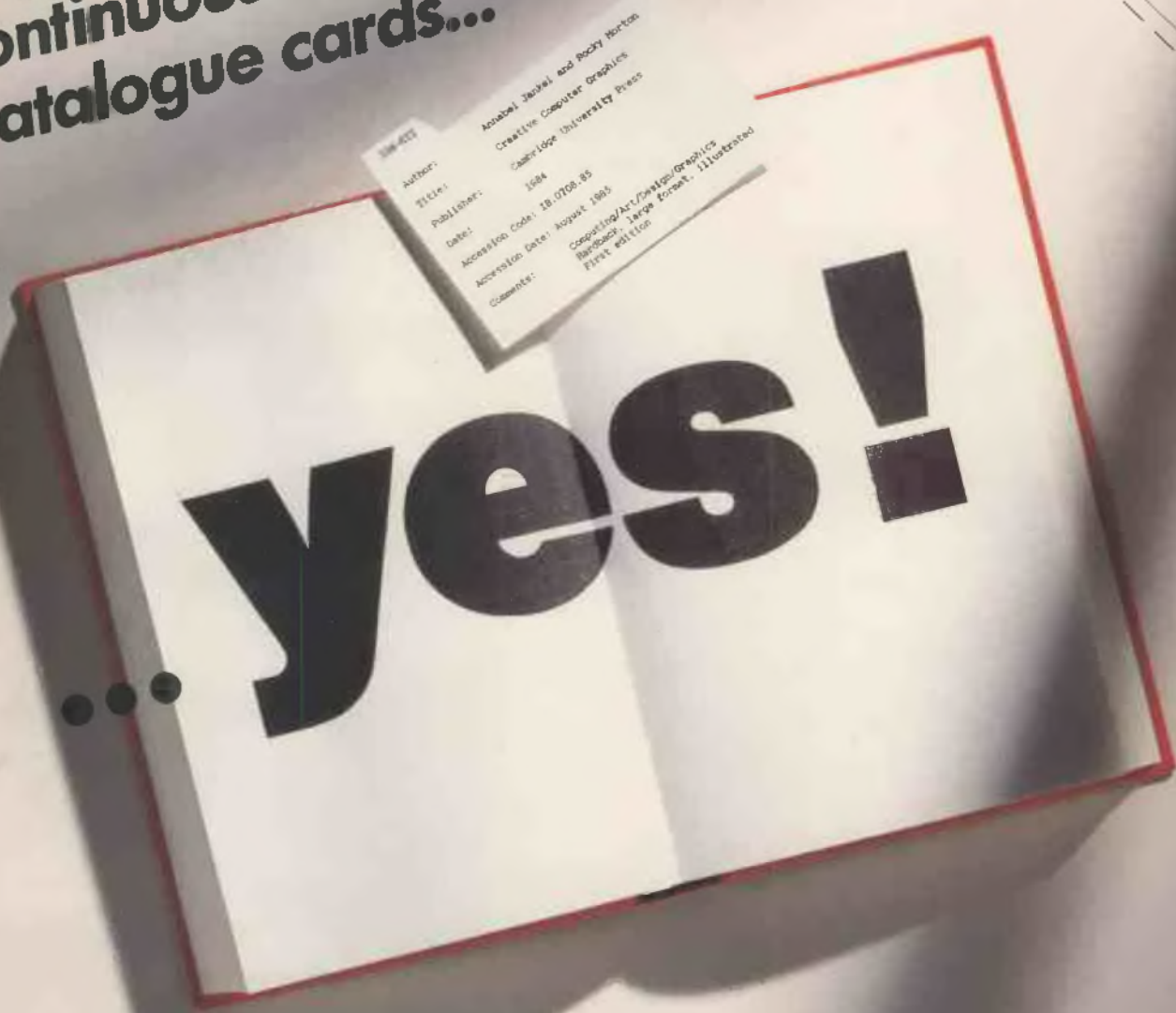
*HP's Portable
Vectra CS
on test*

BRITAIN'S BIGGEST MICROCOMPUTER MAGAZINE



ATARI SMASHES CD-ROM PRICE BARRIER
World Exclusive Benchtest

single sheets. yes
continuous stationery. yes
catalogue cards...



The JUKI 7200 is one of the most versatile dot matrix printer of its kind in the world. It handles automatically just about every type of stationery you'll ever use. Including catalogue cards, OHP slides, envelopes and multi-part sets all the way up to size A3. And it does so at a maximum speed of 324 cps.

It will also print cheques and paying-in slips (and their counterfoils), labels, tickets, compliment slips, ledger leaves, and customs and lading documents. Together with multi-part sets.

What's more, you won't have to keep loading and unloading tractors, trays and feeders. For the JUKI 7200 comes complete with a tractor for continuous stationery, and an AMF (Automatic Multi-Part Feeder) for multi-part sets, cards and envelopes.

And because the JUKI 7200 even has a built-in automatic document thickness sensor, it prints on card as easily as it does on paper. Producing a perfect result every time.

JUKI
The Master Printers

JUKI (EUROPE) GMBH
Elfenstraße 74 · 2000 Hamburg 26 · F. R. Germany
Tel.: (0 40) 2 51 20 71-73 · Telex: 2163 061 (JUKI D) · Fax.: (0 40) 2 51 27 24

Sole Distributor: Intec 2, Unit 3 + 4, Wade Road., Basingstoke,
Hampshire RG 24 0NE Telephone: 0256 47 32 32.
Micro Peripherals Ltd Telex: 8 59669 MICRO PG Facsimile: 0256 461570.



To: Micro Peripherals Limited
Intec 2, Unit 3 + 4, Wade Road, Basingstoke, Hampshire RG 24 0NE
Telephone 0256-473232
I would like to know more about the world's most versatile dot matrix printer. Please send me details of...
Name: _____
Company: _____
Postcode: _____
Address: _____
Telephone: _____
Position: _____

BASIC LANGUAGE

New Quickbasic V3.0 updates the competition with TURBO-BASIC.

BASIC INTERPRETERS

BBC Basic (86)	PC-DOS	£ 95
Professional BASIC	PC-DOS	£ 70
TrueBasic v2.0	PC-DOS	£ 95
Microsoft MS-BASIC	MS-DOS	£210
MEGABASIC v5.2	MS-DOS	£235

Dig. Res. CBASIC	CP/M-86	£290
MEGABASIC	CP/M-86	£235
MEGABASIC	MP/M-86	£365

BBC BASIC	280+CP/M-80	£ 95
Dig. Res. CBASIC	CP/M-80	£130
Microsoft MBASIC	CP/M-80	£ 60
MEGABASIC	CP/M-80	£195

BASIC COMPILERS

Microsoft QuickBASIC	PC-DOS	£ 60
Softaid MTBASIC	PC-DOS	£ 60
Turbo Basic	PC-DOS	£ 60
ZBASIC	PC-DOS	£ 75
Alcor Multi-Basic	MS-DOS	£ 75
Microsoft MS-BASIC	MS-DOS	£235
Dig. Res. CBASIC	MS-DOS	£390

Dig. Res. CBASIC	CP/M-86	£390
------------------	---------	------

Dig. Res. CBASIC	CP/M-80	£435
ZBASIC	280+CP/M-80	£ 75
Softaid MTBASIC	280+CP/M-80	£ 60
Alcor Multi-Basic	280+CP/M-80	£ 85

FORTRAN COMPILERS

New V4.00 from Microsoft now mean four excellent 77's to choose from.

Lahey F77L v2.20	MS-DOS	£360
RM/FORTRAN 77 v2.11	MS-DOS	£400
MS-FORTRAN 77 v4	MS-DOS	£250
Pro Fortran 77 v1.22	MS-DOS	£220
Pro Fortran v2.144	MS-DOS	£220
Utah Fortran	MS-DOS	£ 35
FS-Fort. (GGA & Henc)	MS-DOS	£ 35
Pro Fortran v2.1	CP/M-86	£220
Pro Fortran v1.25	CP/M-80	£220
Nevada Fortran v3.3	CP/M-80	£ 35
Pro Fortran 77	ATARI 520ST	£120

We have Fortran Libraries in stock.

PASCAL LANGUAGE

Metaware excellence now on Concurrent Dos 286 and on the 386.
Better Turbo compatibility on new version Pro Pas

ALICE Pascal Interpreter	PC-DOS	£ 80
Dr Pascal Interpreter	MS-DOS	£ 39
Marshall Pascal v2.01	MS-DOS	£150
Metaware Prof. Pascal	MS-DOS	£415
Metaware Prof. Pas/386	MS-DOS	£610
Microsoft Pascal v3.32	MS-DOS	£180

PROGRAMMING TOOLS

Ada Compilers	Algol Compilers
Assemblers	Assembler Libs.
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
Lisp	Modula-2
Nial Interpreters	OPS 5
Pascal Compilers	Pascal Libraries
Prolog	Rexx
Screen Libraries	Smalltalk
Snobol	

We stock many items for which there is no space in these advertisements.

LIBRARIES & UTILITIES

CADSAM (source code)	MS-DOS	£ 75
Btrieve	MS-BASIC + MS-DOS	£180
Btrieve/N	MS-BASIC + MS-DOS	£430
Multikey	MS-BASIC + MS-DOS	£145

CADSAM (source code)	CP/M-80	£ 75
----------------------	---------	------

Graphics

Halo	MS-BASIC + MS-DOS	£175
GSS Graph.Dev. Tkt	PC-DOS	£335

Sundries

Finally Quickbasic +	PC-DOS	£ 75
PANEL Screen Manager	MS-DOS	£100
Wiley Scientific Lib.	PC-DOS	£110

Tuning & Debugging

Betatools Dev. System	PC-DOS	£100
Vicar	MS-DOS	£ 35

PASCAL LIBRARIES

TURBO PASCAL LIBRARIES

Blaise Power Tools Plus	PC-DOS	£ 70
Blaise Turbo Asyn. Plus	PC-DOS	£ 70
Mathpak 87 (TP)	MS-DOS	£ 60
Paragon Supertools	PC-DOS	£ 65
RM Graph Nimbus +	MS-DOS	£ 49
Science & Eng. Tools	MS-DOS	£ 50
Report Builder	MS-DOS	£ 70
System Builder	MS-DOS	£ 90
Turbo Halo Univ. Graph.	PC-DOS	£105
T-Debug Plus v2	PC-DOS	£ 35
Turbo Database	CP/M & MS-DOS	£ 45
Turbo Editor Toolbox	PC-DOS	£ 45
Turbo Extender	PC-DOS	£ 55
Turbo Gameworks	PC-DOS	£ 35
Turbo Graphics Toolbox	PC-DOS	£ 49
Turbo Advantage (Lader)	MS-DOS	£ 60
Turbolink Plus v3.15A	PC-DOS	£ 60
Turbopower Utilities	PC-DOS	£ 60
Turbo Optimiser	PC-DOS	£ 45
Turbo Professional	PC-DOS	£ 45
Turbo Screen	CP/M, MS, PC-DOS	£ 60
Turbo Tutor	CP/M & MS-DOS	£ 29
TurboWINDOWS/Pasc. (TP)	PC-DOS	£ 55

GENERAL PASCAL LIBRARIES

Blaise Tools (s'ce) (MS)	PC-DOS	£ 85
Blaise Tools 2 (s'ce)	PC-DOS	£ 80
Blaise Asynch (s'ce) (MS)	PC-DOS	£120
Btrieve	(MS) PC-DOS	£180
MetaWINDOWS	(MS) PC-DOS	£110
Halo	(MS) PC-DOS	£175
Blaise View Mngr.	(MS) PC-DOS	£205
Shark database (Propas)	MS-DOS	£250
Prospect Graphics (Pro)	MS-DOS	£ 80
Panel (Screen)	(MS) MS-DOS	£205
Shark database (Propas)	CP/M-86	£250
Prospect Graphics (Pro)	CP/M-86	£ 80
Shark database (Propas)	CP/M-80	£150

DISK COPYING SERVICE

We can copy files to and from 400 disk formats including CP/M, CP/M-86, MS-DOS, PC-DOS, ISIS, APPLE, SIRIUS, BBC, TORCH, APRICOT, HP150, TRSDOS, DEC RT-11, IBM BEF, ATARI520, AMSTRAD.

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.

MODULA-2 COMPILERS

New Farware compiler. FTL is an excellent value learning tool.

Pecan P-Sys. w. Mod-2	PC-DOS	£ 80
Farware Modula-2	MS-DOS	£ 70
FTL Modula-2 (sml.mem)	MS-DOS	£ 45
Interface M2-SDS	PC-DOS	£ 75
Interface M2-SDS-XP	PC-DOS	£125
Modula-2/86 Apprentice	PC-DOS	£ 70
Modula-2/86 Wizard	PC-DOS	£140
Modula Corp. PC Mod. 2	PC-DOS	£150
Modula 2/86	CP/M-86	£410
FTL Modula-2	280/CP/M-80	£ 45
Hochstrasser Mod. 2	280/CP/M-80	£100
Turbo Modula-2	280/CP/M-80	£ 55
TDI Modula-2	ATARI 520ST	£ 75
MacModula-2	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.

GREY MATTER

J 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

CONTENTS

Vol 10 No 12 December 1987



Cover photography by Chris Bell
Cover story begins on page 98

BENCHTESTS & REVIEWS

ATARI CD-001

Suddenly, CD-ROM drive players are affordable as Atari launches a combined data/audio player. Nick Walker gives it a spin.

98



386 TOWERS

Peter Jackson weighs up the advantages of buying IBM's 386-based PS/2 Model 80 against a Taiwanese machine of similar specifications.

104

TEKTITE GRAPHICS BOARD

What happens when you harness the raw processing power of Intel's 87286 graphics chip? Dick Pountain draws some fast conclusions on this plug-in PC card.

110

HP PORTABLE VECTRA CS

Hewlett Packard's kit is famed for its quality of manufacture. Martin Wren-Hilton assesses the worth of the company's latest entry into the laptop PC market.

116



MASTERSCAN

Pop a drawing into your PCW8256 printer and MasterScan will digitise it into a print or desktop publishing program. Justin Moffitt tries this cheap input device.

122

MICROSOFT EXCEL

Will this extremely powerful and flexible Windows-based spreadsheet win users away from text-based programs such as Lotus 1-2-3? Anthony Meier counts up its winning points.

136

AMIGA SOUND SAMPLERS

If you want to include your favourite sound effect in your own programs, you'll need a sound sampler to pull them in. Roger Howorth looks at two add-ons to sample and manipulate noise.

142

TURBO PASCAL 4

Borland's Turbo Pascal 3.0 set a standard for language compilers but has been overtaken by even Borland's own recent products. Owen Linderholm decides whether this latest release can regain its lead as the best programming environment.

152

Founder Angelo Zgorelec Editor Derek Cohen Deputy Editor Nick Walker Production Editor Ginny Conran Deputy Production Editor Lauraine Danker Technical Editor Owen Linderholm Staff Writer Robert Schiffron Editorial Assistant Chris Cain Consultant Editors David Tebbutt, Dick Pountain Art Director Martyn J Rowbotham Art Assistant Stephen Holmes Publishing Director Mike Agate Publisher David Mankin Production Controller Judith Middleton Production Manager Jane Beckham Production Assistant Mark Levy Group Advertisement Manager Jan Pitt Advertisement Manager Moira Thomson Deputy Advertisement Manager Nick Ascough Sales Executives Stephen Babb, Sally McLeister, Anthony Lavelle, Helen O'Driscoll, Alan Gonslaves, Mary de Sausmarez, Clair Wheaton Advertisement Assistant Kerry Sharp

FEATURES

PICTURE SHOW

Derek Cohen rounds up the more exciting or novel sights of this year's PCW Show.



ALAN KAY: FACE VALUES

Ten years ago, Alan Kay was developing the windows/mouse/

124

icons/pull-down menus style of computing. In an exclusive interview, Robin Webster discovered what this 'father' of modern computing has in store for the next ten years.

HELPING WITH ENQUIRIES

146

Robert Schifreen takes a walk down to the local police station and discovers how crime detection is benefiting from the application of the humble micro to identifying and cataloguing criminals.

FIRST WORDS

160

The first in a series of Teach Yourself Smalltalk articles introduces the language which started the now common windows and icons environments. Carl Philips is your guide to the world of objects, messages, classes and methods.

REGULARS

NEWSPRINT

70

Alan Sugar's latest surprise, linking your micro to a satellite dish, and monumental hard disks are among Guy Kewney's fascinating discoveries this month.

WEST COAST CONNECTION

85

Whatever happened to the laptop computer market? And how are the next generation of printers shaping up? Tim Bjarin's low-down on Stateside high tech.

LETTERS

91

New wonders created on an Amstrad PCW8256 and a heretic who believes he doesn't need an 80386. Readers share their latest discoveries.



BANKS' STATEMENT

94

Martin Banks goes fishing in the murky waters of software copyright and encounters many different pirates.

COMPUTER ANSWERS

166

Steve Gold answers queries on

hidden Apple II features, outline processors for PCs and DOS command lines.

SCREENPLAY

168

Mills & Boon meets the micro as Stephen Applebaum reviews the first romantic fiction adventure game.

BIBLIOFILE

172

Desktop publishing is this month's focus, with books aimed at both the novice and the skilled user.

MAILBOX

178

Armchair shopping takes on a new meaning when your modem does the purchasing, discovers Peter Tootill.

SUBSET

180

How fast can you multiply two numbers? David Barrow presents some low-level solutions.

PROGRAM FILE

182

The Program of the Month allows you to harness the power of the Amiga's graphics, with Turbo Pascal, Zorland C and Atari ST routines completing this month's listings.

END ZONE

210

A new-style user groups directory, small ads, micro music — almost a magazine in its own right.

ADVERTISERS' INDEX

CHIPCHAT

Tired of taking computers too seriously, PCW's editor shares some lighter moments.

PCW Subscription Enquiries Stuart Cruickshank Subscription Rates UK £15, Overseas £33 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 1987. 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

STATIONERY

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

2 PART STATEMENTS	26
3 PART STATEMENTS	27
2 PART INVOICES	29
3 PART INVOICES	33
4 PART INVOICES	45
SECURITY PAYSLEIPS	48
PAYSLEIPS	21
REMITTANCE ADVICE	18
BANK GIRO	15
P14/P60	34
P35	34
STATEMENT ENVELOPES	21
PAYSLEIP ENVELOPES	21

CALL FOR FREE SAMPLE SETS

NETWORKING

ISC support the high performance Novell Netware, with industry standard Network Cards we offer Professional installation services and qualified support staff. Example Configurations include -

Three Network cards (for server & two workstations)
Novell Netware v2.0a and cables
12 month guarantee

G/NET 86 (MAX 8 USERS)	1595
ETHERNET + 286 (MAX 30 TO 40 USERS)	2785
TOKEN RING 286 (MAX 30 TO 40 USERS)	2785
ADDITIONAL WORKSTATION CARDS	295
INSTALLATION	350
PER METRE CABLING	1
SITE SURVEY	FREE

(Installation includes site survey, quotation for extensive wiring if required, installation of cards in systems, network configuration and full testing)

MAINTENANCE

ISC now offer ON SITE 24 HOUR response support on all the products we supply using our own qualified staff.

As with all our services we GUARANTEE the LOWEST prices and the HIGHEST level of support.

We also will contract equipment not originally supplied by ourselves - example pricing below.

PRODUCT	CONTRACT PRICE	RESPONSE
TANDON PCA 20	180 PER ANNUM	24 HOURS
EPSON FX1000	53 PER ANNUM	24 HOURS
PEGASUS ACCOUNTS	0 BI ANNUAL	HOTLINE

As a guide, allow 10% of the RRP for contracts

U.K.s BEST SERVICE

COMPUTER SOFTWARE

Head Office:

**FORRESTER HOUSE
BRAMLEY ROAD,
ST IVES
CAMBRIDGESHIRE
PE17 4WS.**

**HOT LINE (16 lines)
0480 300530**

SCOTTISH OFFICE:

19 CARDEN PLACE, ABERDEEN AB1 1UQ
TEL: (0224) 639944 (8 LINES)

COMPUTER & OFFICE SUPPLIES

ISC now offer 2 new catalogues of supplies ranging from paper clips to office desks at discounts unobtainable at any office supplies stockists - call now for free catalogues and overnight FREE delivery.

TRAINING

We offer Introductory or Advanced level training at your premises on a wide range of products some of which are listed below

Pegasus Wordstar Wordperfect Word
DBase2/3/ Delta 4 R:Base Dataease Lotus 1-2-3
MSDOS Supercalc Symphony Smart Novell
Xenix Framework & Hardware Training

Prices are 175 pounds per day for up to 6 people on most courses, call today to discuss your requirements with our training manager

PEGASUS ACCOUNTING

PEGASUS ACCOUNTING (2YRS FREE SUPPORT INCLUDED)

We are the largest independent Pegasus dealer in the U.K. with over 2200 modules installed to date

PEGASUS SINGLE USER 160
MULTI COMPANY WITH 8 MODULE
INTEGRATION - THE STANDARD FOR MORE
THAN 50% OF COMPUTERISED BUSINESSES IN
THE U.K.

PEGASUS SENIOR V3 POA
THE ENHANCED VERSION OF SINGLE USER
WITH MULTI CURRENCY, COST CENTRES,
FULL ORDER PROCESSING AND MANY
OTHER FEATURES

PEGASUS SENIOR MULTI USER V3 POA
THE MULTI TERMINAL VERSION OF SENIOR,
RUNS ON A MULTI USER XENIX, CONCURRENT
AND NETWORK SYSTEMS

ELITE/ELITE SENIOR 345
COMPREHENSIVE DATABASE WITH THE
ABILITY TO READ AND WRITE PEGASUS DATA
FILES FOR SPECIAL USES

WORK INVOICING 295
INTEGRATES WITH SINGLE USER FOR
COMPLEX INVOICING AND REPEAT BILLING

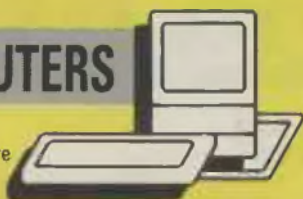
SUPPORT CONTRACT (PER MODULE) 50
ISC WILL SUPPORT YOUR PEGASUS FOR
2 YEARS EVEN IF IT WAS PURCHASED
ELSEWHERE

Also available: Data transfer/Upgrades/
Bespoke Training/Installation

THE **ISC** GROUP

IF YOU PROVIDE A CURRENTLY ADVERTISED LOWER PRICE

COMPUTERS



All computers are inclusive of:

DOS keyboard mono screen Hercules graphics serial & parallel ports & full test prior to delivery

TANDON (Pcx=4.77mhz, PCA=6/8mhz switchable & 640K Ram)

Target	20MB 1.2MB FLOPPY	12.95
PCX20	20MB 360K FLOPPY (No Serial)	8.95
PCA20	20MB 1.2MB FLOPPY	11.95
PCA30	30MB 1.2MB FLOPPY	14.95
PCA40	40MB 1.2MB FLOPPY	16.95
PCA70	70MB 1.2MB FLOPPY	19.95

TO REPLACE MONO WITH E.G.A. COLOUR ADD	295
INTERNAL 20mb TAPE STREAMER ADD	595

APRICOT (XEN 286 Models=10mhz, 386=16mhz)

Choice of 1.2mb 5.25 inch or 1.44mb 3.5inch floppy

all Xen computers have WINDOWS as standard

XENi286	30MB 1MB RAM 80286 GEM	1895
XENi286	45MB 1MB RAM 80286 GEM	2795
XEN 386	30MB 1MB RAM 80386 VP Planner	2695
XEN 386	45MB 2MB RAM 80386 VP Planner	3495

TO REPLACE MONO WITH PAPER WHITE ADD	145
TO REPLACE MONO WITH E.G.A. COLOUR ADD	750

AMSTRAD (8mhz, 512k Ram standard)
all Amstrad computers have GEM as standard

PC1512HD	20MB 360K FLOPPY	845
PC1640SD	360K FLOPPY EGA STANDARD	695
PC1640DD	TWIN FLOPPY EGA STANDARD	795
PC1640HD	20MB 360K FLOPPY EGA STANDARD	995

TO REPLACE MONO WITH C.G.A. COLOUR ADD	165
--	-----

I.B.M. (call for different configurations)

SFD	20MB 360K FLOPPY 640K RAM	1595
ATX	30MB 1.2MB FLOPPY 512K RAM	2995
M30-021	20MB 720K FLOPPY 10MHZ 640K RAM	1695

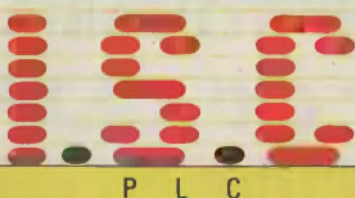
TOSHIBA (Powerful Portables)

T1100	SINGLE FLOPPY (CLEARANCE SALE)	795
T1200	20MB 80286 PROCESSOR 640K RAM	1945
T3100/10	10MB 80286 PROCESSOR 640K RAM	2395
T3100/20	20MB 80286 PROCESSOR 640K RAM	2695
T5100	-*-NEW 386 PORTABLE--*	3795

TULIP (High Grade Compatibles with Small Footprint)

(PC2 = 9.5Mhz, AT=10Mhz, 386=16Mhz)

PC2	20MB 360K FLOPPY 640K RAM	995
AT20	20MB 1.2M FLOPPY 640K RAM	1495
AT40	40MB 1.2M FLOPPY 640K RAM	1795
AT386	30MB 1.2M FLOPPY 2MB RAM	2595
Additional for EGA Multisync monitor		595



U.K.s LOWEST PRICE

COMPUTER SYSTEMS

Head Office:

**FORRESTER HOUSE
BRAMLEY ROAD,
ST IVES
CAMBRIDGESHIRE
PE17 4WS.**



**HOT LINE (16 lines)
0480 300530**

SCOTTISH OFFICE:

19 CARDEN PLACE, ABERDEEN AB1 1UQ
TEL: (0224) 639944 (8 LINES)

We also supply COMPAQ (Deskpro & Portables)
AST (10Mhz EGA systems)
Olivetti & Zenith ranges
Tulip AT Compatibles

PRINTERS



EPSON

80 COLUMN (A4 SIZE)		
LX800	150CPS 25NLQ TRACTOR	195
FX800	200CPS 50NLQ TRACTOR	305
EX800	300CPS 50NLQ TRACTOR	395
LQ800	180CPS 60NLQ 24PIN HEAD	415
132 COLUMN (WIDE LISTING)		
FX1000	200CPS 50NLQ TRACTOR	385
EX1000	300CPS 50NLQ TRACTOR	495
LQ1000	180CPS 60NLQ 24PIN HEAD	555
LQ2500	270CPS 90NLQ 24PIN HEAD	725

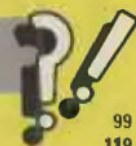
LASER

EPSON GQ3500 (6 PPM)	1495
CANON LBP SERIES 2 LASER (8 PPM)	1595
HEWLETT PACKARD SERIES 2 (8 PPM)	1895

OTHER

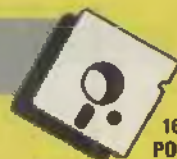
PANASONIC 1081	120CPS 30NLQ 80COL TRACTOR	155
CANDN A55	180CPS 45NLQ 132COL TRACTOR	375
FUJITSU DX2100	220CPS 55NLQ 80 COL TRACTOR	295
FUJITSU DX2200	220CPS 55NLQ 132 COL TRACTOR	395
JUKI 6100	15CPS DAISYWHEEL	275
JUKI 6200	30CPS DAISYWHEEL	425
JUKI 6300	35CPS DAISYWHEEL	635

SPECIALS



APRICOT 256K RAM	99
APRICOT 512K RAM	119
IBM 256K RAM	119
IBM 512K RAM	139
3.5 INCH 720K DISKS	27
20MB UPGRADE FOR IBM	345
EGA CARD & MONITOR	595

SOFTWARE



PEGASUS SINGLE USER	160
PEGASUS SENIOR V3	POA
PEGASUS MULTIUSER V3	POA
SAGE ACCOUNTANT	120
SAGE ACCOUNTANT PLUS	150
SAGE PAYROLL	85
DBASE 3+	415
DBASE 2	255
DELTA 4 PROFESSIONAL	335
WORDSTAR PROFESSIONAL V4	205
WORDSTAR V4	190
WORDSTAR 2000 + REL 2	259
MS WORD	270
WORDPERFECT	295
WORDCRAFT	345
LOTUS 1-2-3 V2	249
LOTUS SYMPHONY	359
SMART INTEGRATED V3	385
SUPERCALC 4	225
GRAFOX LOGISTIX	95
OPEN ACCESS	335
ABILITY	99
ABILITY PLUS	129
VENTURA DESKTOP PUBLISHING	595

5000 other titles available, please call for prices.

**GUARANTEE
WITHIN 7 DAYS, THE DIFFERENCE WILL BE REFUNDED**

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.

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

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.

Only the best will do for backup.

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. or Access



KEELE CODES LTD

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

Almo Computer Systems

New Number
More Lines
0730 68877

THIS MONTHS SPECIALS : Panasonic P1081 - £142 / P1082 - £191 / P1083 - £302

TOSHIBA 24 Pin Head Printers

P321	(216/72cps)	£412
P341E	(216/72cps)	£485
P351	(288/100cps)	£731
P351C	(288/100cps) Col	£981

EPSON Dot Matrix Printers

LX800	(150/25cps)	£201
FX800	(240/40cps)	£307
FX1000	(240/40cps)	£393
LQ800	(180/60cps)	£447
LQ1000	(180/60cps)	£597
LQ2500	(270/90cps)	£747
SQ2500	(270/90cps) P/S	£962
EX800	(300/50cps)	£397
EX1000	(300/50cps)	£533

YUKI Daisywheel Printers

6100	(20cps)P	£261
6200	(30cps)P	£388
6300	(40cps)P/S/IBM	£602
6500	(60cps)P	£738

QTC High speed Dot Matrix Printers

850XL	(850cps)P&S	£1515
-------	-------------	-------

DICOMAX PORTABLE INK JET

Portable Ink Jet Bat/Main	£339
---------------------------	------

BROTHER Daisywheel Printers

HR20	(20cps)P/S	£343
HR25XL	(25cps)P/S	£535
HR40	(40cps) P/S	£766
TwinWriter Daisy/O. Mat		£997

BROTHER Dot Matrix Printers

2024L	(160/96cps) P/S	£612
M1409	(180cps)	£327
M1509	(180/45cps) P&S	£381
M1709	(240/50cps) P&S	£458
M4018	(480/67cps) P&S	£1151

OKI Microline Dot Matrix Printers

182	(120/60cps)P/I	£203
182S	(120/60cps)S	£228
182HS	(H/Speed Ser)	£245
192	(160cps)P/I	£287
192	(160cps)S	£328
193	(160cps)P/I	£372
193	(160cps)S	£417
292	(200/100cps)Col	£446
293	(200/100cps)Col	£595
294	(400/100cps)Col	£816

MICRO P Daisywheel Printers

MP26	(26cps) P&S	£197
MP40	(40cps) P&S	£264

CANON Dot Matrix Printers

PW1080A+	(160/27cps)	£199
A55	(180/34cps)	£380
A60	(200/100cps)P	£370
A65	(200/100cps)P	£434

LASER PRINTERS (*Excl Toner)

Canon LBP-8A1 (8pm)P/S*	£1387
Canon LBP-8A2 (8pm-Gr)*	£2612
Canon Series II *	£1580
HP Laserjet	£1466
HP Laserjet 500 Plus (P&S)	£2946
HP Series II	£1937
Epson GQ3500 Laser	£1292
QMS PS800 (Postscript)	£2979
QMS PS800+ (Postscript)	£3528
Citizen Overture 110 P&S	£1260
Brother Laser	£1748
Qume LaserTen +	£2066
Qume ScriptTEN	£3846

MICRO P Dot Matrix Printers

MP135	(135/27cps) P	£130
MP165	(165/35cps) P	£161
MP200	(200/40cps) P	£245
MP201	(200/40cps) P	£254
MP480	(480/74cps) P	£269

P=parallel, S=serial, I=IBM, col=colour

CITIZEN Dot Matrix Printers

120D	(120/25)P	£133
120D	(120/25)S	£143
LSP10	(120/25)P	£167
LSP10	(120/25)S	£203
MSP10E	(160/40)P	£200
MSP10E	(160/40)S	£220
MSP15E	(160/40)P 136	£234
MSP15E	(160/40)S 136	£254

CITIZEN 24 Pin Head Printers

HPO45	(200/66)P&S	£533
-------	-------------	------

CITIZEN Daisywheel Printers

Premier 35 (35)P 136	£401
----------------------	------

NEC 24 Pin Head Printers

P660	(216/72)P/I	£379
P665	(216/72)S	£413
CP660	(216/72)P/I Col	£438
CP665	(216/72)S Col	£480
P760	(216/72)P/I 136	£448
P765	(216/72)S 136	£482
CP760	(216/72)P/I 136 Col	£517
CP765	(216/72)S 136 Col	£551
P565XL	(264/88)P&S 136	£736
P960XL	(384/128)136	£963
8800	(55)P/I/S/Diablo 136	£825

Amstrad PC1512 & PC1640 available + Dictaphone 12 months on-site maintenance

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

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

Terms cash with order - Mail order only

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

Quark Xpress

- Fast and Easy to use Desk-Top Publishing Program
- With Word-Processing, Page layout & Typesetting
- Single or Multiple Column Formats
- £695.00 (excl VAT) - Full Support & Training available

Run your text in columns around graphic boxes which overlap, in sizes from 2 - 500 point. Link text boxes, so that text runs from one box to the next but it can all be edited from a single block.

The horizontal spacing of text can be controlled in three ways:
Tracking
Kerning
Scaling

- Graphics Imports From 'Pic'. Format graphics and Encapsulated Postscript files.
- Frame Editing Frame Borders can be added to a library for use in any document.

- Spelling Checker Built-in dictionary and Word Count, with facilities for auxiliary dictionaries.
- Auto-Hyphenation routines, controlled by an 'Hyphenation Exception' list

- Printer Support Apple LaserWriter & LaserWriter Plus; Apple ImageWriter; (A4 Printing) DataProducts LR22665 (A3 Printing) Unotronic 101 or 300 (1270 or 2450 D.P.I.)

- Colour Facilities Blue, Cyan, Green, Magenta, Red, Yellow, plus Black and White. Produce spot colour separations on any printer, with colour printing available on the Apple ImageWriter II.

In Store

Apple Macintosh II Colour System

Call in and let us show you the Apple Macintosh II Computer. Test out Cricket Graph, Cricket Draw, VideoWorks II and GraphicWorks in brilliant colour.

Mac II Colour System, with 1Mb RAM, 40 MByte Hard Disk, 4 Bit Video Card with 8 bit Expansion, Apple IIx colour monitor with swivel stand, standard keyboard and mouse. £595.00
Cricket Graph £175.00
Cricket Draw £295.00
GraphicWorks I.I £69.48
VideoWorks II £195.00

Now in Stock - 4th Dimension, from ACL, the full feature, relational database that the Mac has been waiting for. For MacPlus, SE and Mac II (colour) Single User Version £645.00 Multi-User (First User) £645.00 Multi-User (Other Users) £170.00

By Mail

Macintosh Carry Case £39.90 For 512, Plus, SE & Hard Drive ImageWriter Carry Case £36.50 For ImageWriter I or II ImageWriter Ribbons £15.65 Box of 6 Black Ribbons Sony Single Sided Disks £13.04 Box of Ten 3.5" disks Sony Double Sided Disks £20.00 Box of Ten 3.5" disks Post & Packing per item £1.00

Prices include VAT. Offers are subject to availability. Telephone Orders: 01-935 5262 Monday to Friday 9:30 am - 6:00 pm Credit Cards Welcome

STIRLING MICROSYSTEMS

The Specialist Centre for Apple Macintosh Systems

231 Baker Street, London NW1 6XE 01-935 5262 • Authorised Apple Dealer

MACINTOSH SE/800	£1795
MACINTOSH SE/HD	£2350
MACINTOSH PLUS	£1275
MACINTOSH 11	£P.O.A
LASERWRITER PLUS	£3850
IMAGEWRITER 11	£365
IMAGEWRITER LQ	£850
APPLE HD20scsi	£850
PAGEMAKER 2.0	£375
WORD 3.01	£250
JAZZ 1A	£250

APPLE COMPUTERS

EX DEMO

LASERWRITER PLUS £2995

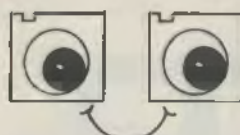
Computer Line

0525 240 243

WANTED ALL TYPES OF COMPUTERS

Prices are excl of VAT & CARR

LOOK
LOWER
PRICES



LOOK
QUALITY
DISKS

Same Day
Despatch

WE WILL NOT BE BEATEN!
We'll Better Genuine Lower Prices
Advertised in this Edition of PCW

CAN YOU AFFORD TO BUY ELSEWHERE?

We sell Factory Sealed - No Repacking
We sell Top Quality - No Seconds
We sell Quality Brands - No Unknown Names

3 1/2" DISKS

BOXES OF 10 DISKS			Prices per Box (£)		
			1-4	5-9	10-29
DATALIFE	• Inc Free	MF350	S/Slide D Dens	16.49	15.99
	Lib Box	MF360	D/Slide D Dens	20.99	20.25
		MF40	D/Slide H Dens 2MB	42.99	41.99
MEMOREX	3450	S/Slide D Dens	17.75	16.99	15.99
	3460	D/Slide D Dens	20.99	20.25	19.25
SONY	10MF0-100	S/Slide D Dens	15.99	15.25	14.99
	10MF0-200	D/Slide D Dens	20.99	20.25	19.25
BASF	10MF0-HD	D/Slide H Dens 2MB	45.00	44.00	43.00
	F05.5	S/Slide (Boxed In 5)	8.99	8.49	8.25
AMSOFT 3"	CF2	D/Slide Rev.	26.50	25.75	25.25
	SID-3.5	SEE-10 Library Box for 10 Disk	2.15	2.00	1.75
LB30-3.5	ABA Box 30 Cap Inc Disk Pen		7.99	7.25	6.99
	LB60-3.5	ABA Lockable Box 60 Cap Inc Disk Pen	14.25	14.00	13.50
VCK-3.5	Verbatim Head Cleaner Kit		9.25	8.75	8.50

5.25" DISKS

VERBATIM - VEREX	MD200-01HR	S/Slide D Dens	7.15	6.89	6.65
	MD250-01HR	D/Slide D Dens	8.29	7.95	7.55
	MD257-01HR	D/Slide Q Dens	11.19	10.69	10.19
VERBATIM - DATALIFE	MD525-01HR	S/Slide S or D Dens	9.75	9.45	9.25
	MD550-01HR	D/Slide S or D Dens	12.75	12.35	12.15
	MD577-01HR	S/Slide Q Dens	13.50	12.99	12.75
	MD577-01HR	D/Slide Q Dens	16.75	16.25	15.75
	MD40	D/Slide H Dens 1.6MB	21.99	21.49	20.99
	Hard sectors add £2.				
BASF	1D	HR S/Slide D Dens	8.49	8.25	8.05
	2D	HR D/Slide D Dens	10.89	10.49	10.25
	1D/96	HR S/Slide Q Dens	12.19	11.69	11.19
	2D/96	HR D/Slide Q Dens	13.25	12.99	12.50
	5.25 2HD	D/Slide H Dens 1.6MB	19.89	19.15	18.15
DYSAN	104/10	HR S/Slide D Dens	10.49	10.25	9.99
	104/20	HR D/Slide D Dens	13.49	12.99	12.75
	204/10	HR S/Slide Q Dens	14.99	14.49	13.99
	204/20	HR D/Slide Q Dens	17.75	17.25	16.25
	UH111	D/Slide H Dens 1.6MB	20.99	20.49	19.99
MEMOREX	5151	HR S/Slide S Dens	9.35	9.25	8.99
	5210	HR S/Slide D Dens	9.49	9.25	8.99
	5220	HR D/Slide D Dens	11.99	11.49	10.99
	5410	HR S/Slide Q Dens	12.45	11.99	11.49
	5420	HR D/Slide Q Dens	14.25	13.99	13.50
HR denotes Hub Rings			5660	D/Slide H Dens 1.6MB	21.49
LC85	Library Box for 10 Disks				
LB40-5	ABA Lockable Box 40 Cap Inc Disk Pen		1.60	1.55	1.50
LB50-5	ABA Lockable Box 50 Cap Inc Disk Pen		12.25	11.75	11.25
LB60-5	ABA Lockable Box 60 Cap Inc Disk Pen		13.75	13.50	13.25
LB90-5	ABA Lockable Box 90 Cap Inc Disk Pen		16.50	16.00	15.50
LB100-5	ABA Lockable Box 100 Cap Inc Disk Pen		18.25	17.75	17.50
VCK-5	Verbatim 5" Head clean kit		4.99	4.49	3.99
VCK-5	Verbatim 5" W/C disks (per 10)		4.99	4.49	3.99
DM-5	Disk Mailers 4 disk cap (per 100)		21.00	19.50	18.50

PAPER-LABELS

PAP1	11"x9.5" 60gsm 2000 Sheets Micro Perf Clean Edge	10.75	10.25	9.75
PAP17	11"x9.5" 80gsm 2000 Sheets Micro Perf Clean Edge	15.99	15.25	14.50
PAP2	A4 Bond 70gsm 2000 Sheets Micro Perf Clean Edge	14.35	13.75	13.25
PAP3	A4 Bond 90gsm 2000 Sheets Micro Perf Clean Edge	22.75	21.99	21.25
PAP4	A4 Bond 90gsm 1500 Sheets Micro Perf Clean Edge	17.98	17.25	16.48
LAB9	89mmx36mm 1 on web 2000 labels	10.08	9.72	9.18

8" DISKS-RIBBONS-PRINTWHEELS-SOFTWARE-PRINTERS

Please telephone for very competitive prices on a large range of goods.

OFFICIAL ORDERS ACCEPTED FROM GOVERNMENT OR EDUCATIONAL ESTABLISHMENTS. Please contact us for Quantity Discounts (30+ boxes) and Trade Accounts.

Description	Quantity	Amount
Postage/Packaging (UK)		
5.25/3.5 Disks, VCK3.5	£1 /Box* (75p 5+, £5 Max)	
3" Disks	£1.5/Box* (95p 5+, £5 Max)	
LBS, VCK5, VCK5, S10	50p/pack (35p 5+, £5 Max)	
Lockable Box, Labels	£2.5/Box (£2.25, £5 Max)	
Paper, DM5	£3.75/Box (£2.5 3+)	
* Add 30p for First Class Post		
Name	Tel. No.	
Address	Post Code	
Access/Barclaycard/Cheque No.		

Orders Anytime 01-868 9548 01-866 2258

Pinner Wordpro



DAWLISH DRIVE PINNER
MIDDX HAS SLN



ATT peripherals

CORPORATION

SPECIALISTS IN EXPORT

PRINTERS

EPSON LX 800	£205	NEC P5	£799
EPSON FX 800+	£305	NEC P6	£425
EPSON FX 1000			£395
EPSON EX 1000			£515
EPSON LQ 1000			£575
EPSON LQ 2500			£765
BROTHER HR20			£355
BROTHER HR25 XL			£532
BROTHER M1509			£385
BROTHER M1409			£299
BROTHER TWINWRITER			£975
FULL RANGE OF SIEMENS PRINTERS AVAILABLE			

MODEMS

HAYES SMART MODEM	£360
DOWTY QUATRO	£612
DOWTY MINIMO + 2	£209
DACOM DSL 2123	£172
MIRACLE WS2000	£105
PC COMMS QUATROCARD	POA
RACAL MILGO	POA
THORN DATATECH	POA
PAGE SERIES IV	POA

MONITORS + ADD-ON BOARDS

NEC MULTISYNC	£544
SONY 10" COLOUR	£495
TAXAN EGA	£418
INTEL INBOARD 386	£1260
ORCHID JET 386	£740
AST PREMIUM/RAMPAGE	POA
HERCULES MONO	£199
HERCULES COLOUR	£105

DRIVES + TAPE BACK UP

SEAGATE 20Mb ST225 Inc WD Cont	£372
SEAGATE 30 Mb ST238 + Cont	£504
SEAGATE 40Mb ST251	POA
RODINE	POA
EVEREX INT 20 Mb T/S	£665
EVEREX INT 60 Mb T/S	£890
EVEREX EXT 20 Mb T/S	£746
EVEREX EXT 60Mb T/S	£970

MOUSE DEVICES + SOFTWARE

MS MOUSE	£142
PC MOUSE	£130
LOGIMOUSE	£76
SUMMA MOUSE	£89
MS WORD	£245
DB3+	POA
LOTUS 123	POA
SUPERCALC	POA
MULTIMATE ADV	POA
SMART	POA

LAP TOP COMPUTERS AND ACCESSORIES

NEC MULTISPEED	POA
KAYPRO 200	POA
DRAMS 64K	£1.50
DRAMS 256K	£5.00
DRAMS 128K	£9.00
MATHSCO-PRO 80287 - 6MHz	£175
MATHSCO-PRO 8087 - 5MHz	£105
MATHSCO-PRO 8087 - 8MHz	£140

SPECIAL OFFERS

PARALLEL PRINTER CABLES	£12.50
EP TONER CART	£74.95

RING NOW: 01-739 4596

**ATT
peripherals**

Corporation Ltd

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



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

APPLE

	POA
MACINTOSH II	£1875
MACINTOSH SE 2x800	£2450
MACINTOSH SE 1x800/20MB	£75
Keyboard for the above	£1550
MACINTOSH PLUS	£365
IMAGEWRITER II	£310
MAC DRIVE 800K	£850
HARD DISK 20Mb	£3400
APPLE LASERWRITER	£3900
LASERWRITER PLUS	

★ PROFESSIONAL DESKTOP PUBLISHING ★

Apple Mac SE 1 x 800 HD20
Laser/Writer Plus
Two Appletalk Cables
Aldus Pagemaker
640k RAM
Adobe Illustrator
Mac Draw
Mac Paint
Cricket Draw
Microsoft Word

★ £6995 ★

APRICOT

★ SPECIAL ★

XEN XI/512k/20Mb/1.2Mb	£1695
XEN I/1Mb RAM/20Mb/1.2Mb	£1995
XEN XD/1Mb RAM/40Mb/1.2Mb	£2495
XEN 80386/1Mb RAM/30Mb/1.2Mb	£2350
XEN 80386/2Mb RAM/45Mb/1.2Mb	£3150
P/WHITE MONITOR	£280
GREEN MONITOR	£140
MONO CARD	£160
EGA CARD	£299
EGA COLOUR MONITOR	£625

AFFORDABLE DESKTOP PUBLISHING

COMPUTER-APRICOT-28630
80286 Processor 10Mhz
Lan Card fitted 30Mb HD 1.2/1.44
LASER PRINTER — HEWLETT-
PACKARD (SERIES II)
8 Pages per minute
300 DPI
512k RAM to 4 Parallel or Serial Ports
Including Cable Toner

SOFTWARE

Ventura Publishing
Microsoft Word V3

★ £4200 ★

LASER PRINTERS

★ SPECIAL PRICES ★

EPSON GQ LASER 3500	£1300
T.I. OMNILASER MODEL 2015	£4500
CANON LBP SERIES II P&S Ports	£1575
HP LASER JET	£1450
HP LASER JET II P + S Ports	£1795
HP LASER PLUS	£2100

FINANCE

LEASE RENTAL
CASH
LEASE PURCHASE
HIRE PURCHASE
INSTANT CREDIT (Subject to Status)

products carry a 12 months Full
Guarantee with HOTLINE Phone Support

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 GEOMS G

RSC Ltd

(0923) 243301
(24 hrs)
(0923) 241921

ALL PRICES EXCLUDE VAT
Export, Government & Educational Orders Welcome
All enquiries & payments to
RSC Ltd, 75 Queens Road, Watford WD1 2QN
Tel: Watford (0923) 243301 - 241921
Callers Welcome

All prices subject to change without notice - all goods subject to availability
Carriage Free

AMSTRAD PCW RANGE

Amstrad R256	£285.00
Amstrad R512	£379.00
Amstrad R512	£478.00

AMSTRAD PC1512

Amstrad PC 1512 SD Mono	£375.00
Amstrad PC 1512 DD Mono	£469.00
Amstrad PC 1512 SD Colour	£315.00
Amstrad PC 1512 DD Colour	£310.00

PC 1512 Range includes Ability and Four U.S. Gold games

AMSTRAD PC1640

Amstrad PC 1640 SD/M Mono	£469.00
Amstrad PC 1640 DD/M Mono	£565.50
Amstrad PC 1640 HD 20MD Mono	£545.00
Amstrad PC 1640 SD/DD Colour	£510.00
Amstrad PC 1640 DD/DD Colour	£705.00
Amstrad PC 1640 HD 20CD Colour	£599.00
Amstrad PC 1640 SD/DD Enhanced	£749.00
Amstrad PC 1640 DD/DD Enhanced	£845.00
Amstrad PC 1640 HD 20CD Enhanced	£1125.00

RSC's OWN COMBINATIONS

PC 1512 SD Mono + 32MB Card	£545.00
PC 1512 SD Colour + 32MB Card	£785.00
PC 1512 DD Mono + 32MB Card	£735.00
PC 1512 DD Colour + 32MB Card	£880.00
PC 1640 SD/M Mono + 32MB Card	£735.00
PC 1640 SD/DD Mono + 32MB Card	£835.00
PC 1640 SD/DD Colour + 32MB Card	£880.00
PC 1640 DD/DD Colour + 32MB Card	£1075.00
PC 1640 SD/DD + 32MB Card	£1018.00
PC 1640 DD/DD + 32MB Card	£1115.00

EPSON IBM COMPATIBLE

Epson PLE	£999.00
8088, 10MHz, MSDOS 3.2 (incl. Diagnostics), 640K Ram, 1x20 Mb Hard Disk, 1x360K Floppy Disk, 5 slots, Monochrome Monitor and Adapter, PC AT Keyboard, Small Footprint (PC/XT)	
Epson PC A2	£1450
80286, 10MHz, MSDOS 3.2 840K Ram, 1x20 Mb Hard Disk, 1x1.2 Mb Floppy Disk, 4 slots, EGA Adapter - no Monitor supplied, PC AT Keyboard, Small Footprint (PC/XT)	
Epson PC AX	
80286, 10MHz, MSDOS 3.2 840K Ram, 1x40 Mb or 80 Mb Hard Disk, 1x1.2 Mb Floppy Disk, 9 slots, No Video Adapter or Display supplied, AT Keyboard, Floor stand optional	
40Mb	£1845
80Mb	£2745

ACCESSORIES

Tandon 20Mb Hard Card	£345.00
Hi-riser for 32MB Card	£285.00
Type streamer - 5 1/4" 15.25 (for Amstrad PC 15)	£275.00
Type streamer - 5 1/4" 15.10 (for All PC's)	£475.00
Intel 80287 - 28.7nm math co-processor	£135.00
Intel 80287 - 48.7nm math co-processor	£185.00
8MB DRAM Chips (nine to make 8MB)	£1.08 each
256K DRAM Chips (nine to make 256K)	£3 each

DOT-MATRIX PRINTERS

EPSON	
Epson LX800 (NEW - LATEST)	£190.00
Epson LQ800 180 cps/80 NLD/80 col	£420.00
Epson LQ1000 180 cps/60 NLD/132 col	£570.00
Epson EX800 300 cps/50 NLD/80 col	£374.00
Epson EX1000 300 cps/50 NLD/136 col	£499.00
Epson FX800 700 cps/50 NLD/80 col	£284.00
Epson FX1000 700 cps/50 NLD/132 col	£365.00
Epson LQ2500 270 cps/50 NLD/136 col	£680.00
Epson S02500 Ink Jet	£970.00
CANON	
Canon PW1000A1 160 cps/27 NLD/80 col	£234.00
Canon A55 180 cps/45 NLD/132 col	£399.00
Canon A50 200 cps/100 NLD/80 col	£399.00
Canon A55 200 cps/100 NLD/132 col	£491.00

AMSTRAD

DMP4000 136col - 200cps FTNLD	£275.00
DMP1500 100col - 150cps FTNLD	£156.00
LQ3500 24 pin/60 cps/50 NLD	£219.00

Panasonic

Panasonic RX-P1081 80col, 120cps + 120cps NLD	£149.00
Panasonic RX-P1592 136col, 180cps + 180cps NLD	£365.00
Panasonic RX-P1595 136col, 240cps + 51cps NLD	£485.00
Panasonic RX-P1082 160cps/160 NLD col	£199.00

Micro Peripherals

MICRO PERIPHERALS	
MP 135 80col/135cps FTNLD	£147.00
MP 165 90col/165cps FTNLD	£176.00
MP 200 80col/200cps FTNLD	£259.00
MP 201 132col/200cps FTNLD	£294.00
MP 400 80col/400cps FTNLD	£369.00



Star NL10 120cps/300 NLD/80col	£189.00
Star NL15 120cps/300 NLD/136col	£288.00
Star NL24 - 1024pin/216cps/72 NLD/80col	£414.00
Star NL24 - 1524pin/216cps/72 NLD/136col	£518.00
Star NL15 Same as above but 200cps	£595.00

NEW STAR PRINTERS

Star NR10-240 cps/80 NLD/80 col	£359
Star NR10-180 cps/45 NLD/80 col	£279

NEC

NEC P6	£375.00
NEC P7	£439.00
NEC P563XL	£740.00

DAISYWHEEL PRINTERS

Panasonic RX-P5131U 17cps (recommended)	£240.00
Micro-P 26 26cps	£225.00
Micro-P 40 40cps	£330.00
Juki 6100 20 cps	£257.00
Juki 6200 30 cps	£394.00
Juki 6300 40 cps	£640.00
Juki 6500 60 cps	£955.00
Brother NR70	£375.00

BROTHER DUAL PRINTER TWIN WRITER Twin Head - Daisywheel + Dot Matrix "£875"

DATA SWITCHES

A range of high quality data switches in Centronics or RS232 Interface Rotary type with inter cases compatibility	
RSC DSC1 - (Parallel)	
2 Device 2 Switch - 3 female connections	£34.00
RSC DSC2 - (Parallel)	
4 Device 2 Switch - 5 female connections	£52.00
RSC DSR1 - (Serial)	
2 Device 2 Switch - 3 female connections	£30.00
RSC DSR2 - (Serial)	
2 Device 2 Switch - 5 female connections	£44.00

LASERS

Epson GQ3500 (latest)	£1345.00
Canon LaserJet BPB Mark II	£1795.00
Hewlett Packard Jet II	£1945.00
Brother HL-B - Latest	£1750

LASERS ACCESSORIES

GQ3500 Font Cards	£115.00
GQ3500 1.5Mb Memory Expansion	£799.00
GQ3500 Serial Interface	£80.00
GQ3500 Drum Cartridge	£739.00
GQ3500 Collector Unit	£79.00
GQ3500 Toner Cartridge	£18.00
Canon Toner Cartridge	£89.00
Canon Mx II 1Mb upgrade	£425.00

HP Toner Cartridge Jet II	£35.00
HP 1Mb Upgrade Jet II	£350.00
HP 2Mb Upgrade Jet II	£695.00
HP 4Mb Upgrade Jet II	£1400.00
HP Fonts	£120.00

PLOTTERS

Epson M80	£350.00
NEW LOWER PRICES ON ROLAND A3 X-Y PLOTTERS	
DXY200A	£599.00
DXY900A	£690.00

BLANK DISCS



	Per Box	5 or more
TDK MFD DVS D/D	£12.00	£11.50

TDK M2 DD D50/50 (9614)	£15.00	£14.00
TDK M2 HD D50/50 (1.6M H. Density)	£23.00	£22.00
TDK MF 2HD D50/50 (3.5 Inch 135psi)	£24.00	£23.00
TDK M2 ZHD D50/50 (3.5 Inch H. Density)	£35.00	£34.50

RSC's OWN BRAND

Fully Guaranteed
(With free plastic box as drawing above)

	Per Box	5 or more
RSC RM20 DVS D/D	£9.00	£8.00
RSC RM40 (961psi)	£11.00	£10.00
RSC RM40 (High Density)	£18.00	£16.00
RSC 3 1/2" DVS (135psi)	£18.00	£16.00

D.T.P. & GRAPHICS

Rupa Xerox Ventura	£325
First Street Edition	£79
Fantasy	£59
Gem Desktop Pub.	£229
Page - Ability	£179
Autoset	£59
Turbo cad	£79
Turbo cad (full version)	£249
Cherry digitiser	£399
Electing studio video digitiser	£999

NEW ADDITIONS

Sage Net	£285
Handy Scanner	£325

CLASSIC RANGE

Lotus 1-2-3 Ver 2.1	£230.00
Lotus Symphony	£330.00
dBase III Plus	£399.00
Supercalc 4	£199.00
Wordstar 2000 ver 2	£228.00
Framework II	£330.00
Javelin	£89.00
Wordstar Professional V4	£235.00
Word Perfect V4.2	£249.00
Microsoft Word	£249.00
Smart System	£395.00
Amn database Paradise II	£375.00

PROGRAM DEVELOPMENT

Turbo Pascal	£50.00
Turbo Tutor	£25.00
Turbo Database Toolbox	£39.00
Turbo Editor Toolbox	£39.00
Turbo Graphic Toolbox	£39.00
Turbo Project	£40.00
Turbo Basic	£50.00
Turbo Lighting	£50.00
Turbo Word Wizard	£39.00
Quick Basic Compiler (M-crosoft)	£67.00

Learning DOS (Microsoft)	£26.00
Turbo C	£55.00
Turbo Europe	£55.00
Zorland Powerpack	£52.00

AMSTRAD PROFESSIONAL SOFTWARE

For IBM & PC compatibles	
Intelligent Mail (database)	£59
SuperCalc 3.2.1	£35
Worldstar Express	£35
Accounts Master	£115
Paymaster	£35

INTEGRATED

Abie Line	£67.00
Ability	£67.00
Ability Plus	£70.00
Page-Four	£54.00
Logopak	£67.00
Rep Framework	£69.00
First Choice	£130.00
ABC	£115.00

ACCOUNTS

Sage Bookkeeper	£72.00
Sage Accountant	£110.00
Sage Accountant Plus	£150.00
Sage Payroll	£70.00
Sage Fin. Controller	£240.00
DAC - Easy Accounting	£60.00
Ability Accounts	£79.00

DATABASES

Sage Retrieve	£72.00
Tas +	£66.00
VP Info	£67.00
PC Promise	£45.00
Cardbox	£38.00
Supabase Personal	£69.00

WORD PROCESSING

Sage PC Writer	£68.00
Wordstar 1512 (Amstrad)	£48.00
Word Perfect Junior	£73.00
Word Perfect Personal	£155.00
Wordstar 5	£160.00
Gem 1st word	£95.00

SPREADSHEETS

Multplan Jnr	£30.00
VP PLANNER	£67.00
Words & Figures	£73.00
Microsoft Multiplan	£130.00
Sage PC Planner	£72.00

GENERAL & GRAPHICS

Gem Draw (Amstrad)	£69.00
Gem Graph (Amstrad)	£69.00
Delta Graph	£52.00
Newton Utilities 4.0	£55.00
Gem WordChan (Amstrad)	£69.00
Gem Font Editor (Amstrad)	£73.00
Pointe	£82.00
Microscan Windows	£59.00
VP Expert	£67.00
Copy II PC	£29.00
Microsoft Module	£139.00
Sharemaster	£99.00
Sageways	£42.00

COMPUTART

WATFORD (0923) 55633

YOU WILL NOT FIND BETTER PRICES!

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

IBM

System Units

Model 30 2 x 720k disks, 640k, 8MHz	£752.00
Model 30 720k & 20Mb disks, 640k, 8MHz	£1060.00
Model 50 1.44Mb & 20Mb disks, 1Mb, 10MHz	£1806.00
Model 60 1.44Mb & 44Mb disks, 1Mb, 10MHz	£2640.00
Model 60 1.44Mb & 70Mb disks, 1Mb, 10MHz	£2907.00
Model 80 1.44Mb & 44Mb disks, 1Mb, 10MHz	£3214.00
Model 80 1.44Mb & 70Mb disks, 2Mb, 10MHz	£3786.00
Model 80 1.44Mb & 115Mb disks, 2Mb, 20MHz	£4798.00

Keyboard & Displays

PS/2 Enhanced Keyboard	£128.00
6503 Monochrome Display, 12"	£136.00
6512 Colour Display, 14"	£349.00
6513 Colour Display, 12"	£396.00
6514 Colour Display, 16", 256 col's	£618.00
6514/A High Resolution 1024 X 768 adaptor	£567.00

TOSHIBA

Lap Held & Options

T1100 720k disk, 512k	£676.00
T1100 & 2 x 720k disks, 640k, Superwrite LCD display	£1152.00
T1200 720k & 20Mb disks, 1024k	£1764.00
T3100/FF 2 x 720k disks, 640k, 8MHz	£1832.00
T3100/20 720k and 20Mb disks, 640k, 8MHz	£2240.00
T3200 720k and 40Mb disks, 1Mb, 12MHz	£2240.00
T5100 1.44Mb and 40Mb disks, 2Mb, 10MHz	£3124.00
External 5 1/4" 360k diskette drive & AC adaptor	£302.00
External 5 1/4" 1.2Mb diskette drive & AC adaptor	£404.00

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

EX-DEMO

We have a vast range of ex-rental and demonstration kit, all in fantastic A1 condition. Give us a call for details and incredible prices on our current stock.

COMPAQ

Portables

Portable II Model 2 8MHz, 2 x 360k disks, 256k	£1266.00
Portable II Model 4 8MHz, 360k & 20Mb disks, 640k	£1628.00
Portable III Model 20 12MHz, 1.2Mb & 20Mb disks, 640k	£2376.00
Portable III Model 40 12MHz, 1.2Mb & 40Mb disks, 640k	£2682.00
Portable 386 Model 40 20MHz, 1.2Mb & 40Mb disks	£3396.00
Portable 386 Model 100 20MHz, 1.2Mb & 100Mb disks	£4348.00

Deskpro (80386, 4.7-7.1MHz, Black)

Model I 360k disk, 128k	£803.00
Model 3 360k & 20Mb disks, 640k	£1415.00

Deskpro 286

(80286, 8-12MHz, Beige)

Model 1 1.2Mb disk, 256k	£1220.00
Model 20 1.2Mb & 20Mb disks, 640k	£1526.00
Model 40 1.2Mb & 40Mb disks, 640k	£2036.00
Model 40T 1.2Mb & 40Mb disks, 640k, 40Mb Tape	£2475.00
Model 70T 1.2Mb & 70Mb disks, 640k, 40Mb Tape	£2917.00

Deskpro 386 (80386, Beige)

Model 40 16MHz, 1.2Mb & 40Mb disks, 1Mb	£2852.00
Model 70 16MHz, 1.2Mb & 70Mb disks, 1Mb	£3260.00
Model 130 16MHz, 1.2Mb & 130Mb disks, 1Mb	£3672.00
Model 60 20MHz, 1.2Mb & 60Mb disks, 1Mb	£3328.00
Model 130 20MHz, 1.2Mb & 130Mb disks, 1Mb	£4348.00
Model 300 20MHz, 1.2Mb & 300Mb disks, 1Mb	£5708.00

Monitors

Dual mode, green-Deskpro	£122.00
Dual mode, amber-Deskpro	£122.00
Dual mode, green 286/386	£122.00
Dual mode, amber 286/386	£122.00
13" Enhanced Colour 286/386	£306.00
Enhanced Colour Graphics adaptor-Deskpro 286/386	£204.00

All Deskpro systems include a keyboard, they do not include a monitor or monitor adaptor. All 386 systems will be shipped with a free copy of Windows 386 until the year end.

SOFTWARE

Word Processors

Multimate Advantage 3.6	£321.00
Multimate Advantage II	£321.00
IBM Writing Assistant v2.0	£99.00
Displaywrite Assistant v1.5	£112.00
Displaywrite 4-inc, UK dictionary	£317.00
Displaywrite 4 v1.0.3.5"	£317.00
Lotus Manuscript	£256.00
Wordperfect	£299.00
Wordstar 2000r2	£302.00
Wordstar 2000 Plus	£367.00
Wordwriter III	£211.00

Financial Planning

Lotus 1-2-3 version 2.01	£256.00
Lotus 1-2-3 v2.01 3.5"	£256.00
Lotus Hal	£78.00
Lotus 1-2-3 Report Writer	£78.00
Lotus Measure	£256.00
Supercalc 4 R1.1	£256.00
Jovelin	£386.00

Data Management

dBASE III Plus v1.1	£386.00
Paradox 2.0	£373.00
DataBase	£341.00
Card Box Plus v3.0	£211.00
Microsoft R-base 5000 v1.1	£321.00

Operating Systems

IBM PC DOS 3.3 dualmedia	£45.00
--------------------------	--------

Integrated Software

Smart System	£451.00
Framework II	£357.00
Symphony v1.2	£357.00
Symphony v1.2.3.5"	£357.00
Symphony Spelling Checker	£61.00
Symphony Text Outliner	£61.00
Symphony Link	£191.00

Desk-Top Publishing

XEROX Ventura Publisher v1.1, including GEM Desktop	£516.00
Aldus PageMaker-PC, needs Microsoft Windows	£386.00

Graphics

Lotus Freelance Plus	£256.00
Daville	£321.00
VCN Concorde	£357.00
Graphwriter v4.3 Combination	£330.00
Storyboard Plus	£156.00

Project Management

Microsoft Project v2	£224.00
Perimeter Advanced	£646.00
Superproject Plus	£321.00
Superproject Expert	£516.00
Harvard Total Project Man. v2	£308.00

Microsoft Windows 1.03	£55.00
------------------------	--------

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	£187.00
Epson FX800	200 35	£292.00
Epson EX800	250 50	£377.00
Fujitsu DX2200	220 44	£384.00
Epson FX1000	200 35	£374.00
Epson EX1000	250 50	£506.00

24-Pin Dot Matrix

NEC P660	180 60	£373.00
Epson LQ800	180 60	£425.00
NEC P760	180 60	£441.00
NEC P565XL	254 88	£724.00
NEC P960XL	320 107	£948.00
NEC P965XL	320 107	£1016.00
Fujitsu DL2400	215 70	£686.00
Fujitsu DL2600	288 96	£918.00
Fujitsu DL5600	486 162	£1256.00
Epson LQ1000	180 60	£567.00
Epson LQ2500	270 90	£710.00
OTC OT-700c	700 350	£1356.00
OTC OT-850XL	850 400	£1492.00

Colour Dot Matrix

NEC CP660, 80 col	180 30	£431.00
NEC CP760, 136 col	180 30	£509.00
Fujitsu DL2400C	215 70	£771.00
Fujitsu DL2600C	288 96	£1033.00

*dual interface

Laser

HP LaserJet, 256k, serial 8ppm	£1356.00
HP LaserJet II, 512k, 8ppm	£1780.00
HP LaserJet 500 Plus, 512k, specify Interface	£3151.00
IBM Page Printer, 240dpi, 8ppm	£4815.25
Apple Laser Writer 8ppm	£3056.00
Apple Laser Writer Plus 6ppm	£3746.25
Epson GQ3500 6ppm	£1220.00

Plotters

HP 7440A ColourPro A4, 8 pen	£746.25
HP 7475A A3, 6 pen plotter	£1347.00
HP 7550A A3, 8 pen plotter	£2859.00
HP 7570A DraftPro A1	£3746.00

Scanners

IBM 3117 Scanner	£592.00
IBM 3118 Scanner	£1271.00
IBM 3117 Scanner PC Cable	£34.00
IBM 3117 Scanner PC Adaptor	£127.00
DEST PC Scan, requires interface	£1495.00
HP ScanJet with parallel/face	£1026.00
HP ScanJet Interface kit	£346.00

OLIVETTI

M24 & M24SP - 8086

M24 2 x 360k disks, 640k, 8MHz	£758.00
M24 360k & 20Mb disks, 640k, 8MHz	£1081.00
M24SP 360k & 20Mb disks, 640k, 10MHz	£1191.00
83 Key Standard keyboard	£106.00
102 Key Extended keyboard	£106.00
Monochrome Green display	£150.00
Monochrome Amber display	£150.00
Monochrome White display	£150.00
Colour display	£363.00
Enhanced graphics controller	£395.00

M240 - 10MHz 8086

M240 Diskless workstation, 640k	£611.00
M240 360k & 20Mb disks, 640k	£1024.00
M240 720k & 20Mb disks, 640k	£1024.00
M240 102 Key keyboard	£109.00

M28 - 8MHz 80286

M28 1.2Mb & 20Mb disks, 512k	£1778.00
M28 1.2Mb & 40Mb disks, 512k	£2258.00
M28 1.2Mb & 70Mb disks, 1024k	£2707.00
86 key Keyboard	£129.00
Colour Display	£363.00

M380 - 80386

M380 "Compact" 1.2Mb & 40Mb disks, 1Mb, 10MHz	£2547.00
M380 1.2Mb & 68Mb disks, 4Mb, 10MHz	£3439.00
M380 "Tower" 1.2Mb & 135Mb disks, 4Mb, 20MHz	£4963.00
102 Key Keyboard	£109.00

MISCELLANEOUS

Monitors

Philips monochrome monitor	£96.00
Princeton HX12 Colour monitor	£288.00
Princeton HX12E Enhanced col.	£370.00
Princeton HX9 Colour monitor	£336.00
Princeton HX9E Enhanced col.	£370.00
NEC MultiSync EGA monitor	£472.00

Hard Disks

Plus Development 20Mb	£540.00
Mountain Hard Card 20Mb	£540.00
Mountain Hard Card 30Mb	£676.00
Tandon 20Mb half-height disk with controller for XT/5	£306.00

External Modems

Racal CP 2123 AD, V21 V23	£249.00
Racal MPS 1222 V22	£437.00

Tape Streamers

Mountain MT40, 40Mb, internal, DC500A	£676.00
Alloy APT-40 Internal 40Mb half height, uses DC2000 tapes	£540.00

Internal Modems

Dacom Unity V21 V23	£209.00
Hayes Smartmodem 1200B, V22	£297.00
PC Comm. Breakout, V21, V23	£279.00

Miscellaneous

IRMA 3279 Graphics, 53G, CUT	£1329.00
IRMA print, serial	£878.00
65TAM for IBM	£136.00
Smart Term 100 DEC VT100 emulation	£118.00

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

Please ring us today for an immediate response and the latest prices

ALL MAJOR

Prices exclude VAT & Delivery

CREDIT CARDS ACCEPTED

All prices are subject to C.W.O.

MORE AMAZING BARGAINS FROM S.C.S.

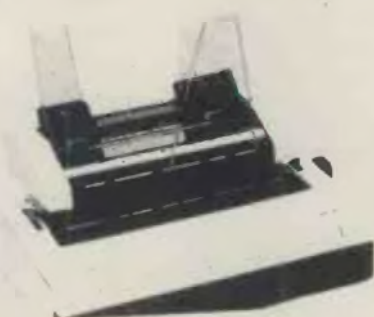
Why pay Retail when you can buy at these prices!

Triumph/Adler 2000 Daisywheel

Great for all your Home & Business correspondence needs

- ★ Cut Sheet Feeder Option £79.00
- ★ 20 cps
- ★ Wide carriage
- ★ Parallel interface
- ★ Diablo 630 compatible
- ★ Full range of Ribbons & Daisywheels
- ★ Parallel Cable £9.90

Only **£179**



The best value Daisywheel on the market today from a well known manufacturer.

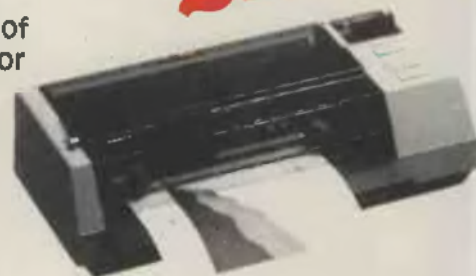
Facit 4550 Plotter

Ideal for Business & Scientific use

AMAZING
VALUE

- ★ High Quality A4 Plotter
- ★ Fully HP7475 Compatible
- ★ 6 Pens – Choice of Ballpoint, Fibre or Ceramic
- ★ Parallel & Serial Interface
- ★ Phone us for a brochure

Only **£249**



No Plotter of this Quality has ever been offered at this Price.

Genius PC Mouse

Treat yourself to a mouse for Christmas

Only **£44**



- ★ Fully Microsoft Mouse Compatible
- ★ Serial Interface
- ★ Complete with Software driver
- ★ PC Paint Painting & Graphics Package only £25.00

The Best value mouse in town.

Epson LX86

£155

- ★ Draft 120cps
- ★ NLQ 16cps
- ★ Cut Sheet Feeder Option (for only another £35)
- ★ Tractor Feed Option

The LX86 is an 80 column compact printer is exceptionally easy to use. Just press the buttons on the front to switch between NLQ and draft modes, or to change the font or character size. Or attach the EPSON cut sheet feeder that holds up to 75 pages and sit down with your favourite WP package to print page after page of text with a quality that you will be proud of.

Options Available:

- ★ Epson Cut Sheet Feeder (fits the LX80 or the LX86) £35
- ★ Epson Tractor Feed £15
- ★ Parallel Cable £9.90

Toshiba P321

£345

- ★ 24 Pins giving Superb Quality
- ★ Draft 216cps
- ★ NLQ 72cps
- ★ Cut Sheet and Tractor Options

The P321 is an 80 column printer, fully IBM Printer Compatible that delivers superb letter quality text. The reason? Unique 24 pin design. If you need proof of the 24 pin letter quality printing – phone us for a sample print out – then you will be convinced.

Options Available:

- ★ Tractor Feed £69
- ★ Cut Sheet Feeder £145
- ★ Qume Emulation £18
- ★ Serial Interface Kit £25
- ★ Downloadable Type Font Kit £45
- ★ Parallel Cable £9.90

There's a good deal going on at

Surplus Computer Sales Ltd

20A Horseshoe Park, Pangbourne, Berks, RG8 7JW

To order
Phone

07357-5455



Prices exclude only VAT and Delivery

Next day delivery on all orders

Phone if you don't see what you want

Export orders welcome

OPTIMUM TECHNOLOGY

MORE THAN JUST LOWER PRICES

LISTED BELOW IS JUST A SELECTION
FROM OUR WIDE RANGE OF PRODUCTS —
AVAILABLE IN A WIDE RANGE OF FORMATS
— PLEASE CONTACT US
WITH YOUR REQUIREMENTS

OPTIMUM

WORD PROCESSORS

Lotus Manuscript	£249
Multimate Adv. II (NEW/I)	£289
Volkswriter Deluxe	£39
MS Word V4 (NEW/I)	£245
Word Perfect 4.2 (U.K.)	£239
Word Perfect Library V1.1	£124
Wordstar Prof. V4 (NEW/I)	£199
Wordstar 2000 PLUS Rel 2	£249

DATABASES

Cardbox Plus V3.5	£245
Delta Professional V4.3	£345
dBase-III Plus V1.1 (U.K.)	£395
Clipper NEW/Summer '87	£369
Forbase Plus	£369
Geniffer V1.01 app. gen.	£229
Paradox V2.0 (NEW/I)	£369
Q & A V2 (Inc. spell. chk.)	£199
Rbase-S000	£245
Rbase SYSTEM-V	£445

SPREADSHEETS

Excel Microsoft (NEW/I)	£325
Javelin - new low price	£95
Logistix V1.18 - new low price	£95
Lotus 1-2-3 V2.01 (U.K.)	£229
Lotus HAL/Metro	£98/£65
Lotus Report Writer	£69
Plan Perfect	£295
Multipan V3.02 (NEW/I)	£139
Supercalc-4 V1.1	£219

INTEGRATED PACKAGES

ABC	£139
Ability/Ability Plus	£79/£154
Account-Ability	£96
PFS: First Choice inc. Spell Chk	£119
Framework-2 V1.1 (unprot)	£325
Smart-3.1	£385
Smart Spell Checker	£89
Symphony V1.2	£327
Psion Xchange	£245
Psion PC-Four	£65

SPARK LAPTOP

Hi-Value IBM Compatible Portable
from Interquadram

SPARK options include single or dual 720K 5.25" disc drives, 384K or 640K memory, LCD or EL-Backlit LCD Display.

SPK-3841 1 x 720K/384K/CD	£747
SPK-3842 2 x 720K/384K/CD	£896
SPK-6401 1 x 720K/640K/CD	£843
SPK-6402 2 x 720K/640K/CD	£994
SPK-3841EL 1 x 720K/384K/EL-CD	£843
SPK-3842EL 2 x 720K/384K/EL-CD	£994
SPK-6401EL 1 x 720K/640K/EL-CD	£937
SPK-6402EL 2 x 720K/640K/EL-CD	£1088

Options:
5 1/4" external disc drive £168
Rechargeable Standard Battery £35
Rechargeable Hi-Capacity Battery £57
Carry Case £39
NOTE: Please add £10 & VAT for above.

PHONE FOR DETAILED LEAFLET

MISCELLANEOUS

CAD/Graphics/Utils/Lang. etc

Autosketch (Autodesk)	£69
COPY II PC	£47
COPY II PC Option Board	£89
FastBack V5.14 (NEW/I)	£159
Gem Collection	£89
GEM Draw Plus — (NEW/I)	£163
GEM Graph	£145
GEM Desktop Publisher	£275
Graph-in-the-box (NEW/I)	£89
Harvard Graphics	£289
Lap-Link (lap-to-pc)	£89
LOTUS FREELANCE PLUS	£279
Logitech Modula-2 V3 (NEW/I)	£69
MS C. Compiler	£249
MS Flight Simulator	£39
MS Macro-Assembler	£115
MS Project	£225
MS QUICKBASIC V3 (NEW/I)	£75
MS WINDOWS	£69
The Newsroom	£49
Norton Utilities V4	£69
Norton Advanced Utils	£99
Norton Commander	£55
Norton Editor	£87
ProDesign-2 V2.5	£238
Sideways V3.1	£43
WordPerfect Library V1.1	£124
Xtree V2	£47

DTP

Aldus Pagemaker V1.0A	£495
Gem Desktop Publisher	£275
PageAbility - Migent (NEW/I)	£189
Ventura Publisher V1.1	£595

BORLAND

EUKEKA: The Solver	£65
REFLEX-UK	POA
Reflex Workshop	£59
Sidekick (unprotected)	£59
Travelling Sidekick	£59
Sidekick & T/Sidekick	£79
Superkey	£59
Turbo Basic	£59
Basic Database Toolbox	£65
Turbo C	£69
Turbo Prolog V1.1	£54
Prolog Toolbox NEW/I	£55
TURBO PASCAL (inc. 8087)	£59
Turbo Database Toolbox	£44
Turbo Editor Toolbox	£42
Turbo Gameworks	£42
Turbo Graphix Toolbox	£39
Turbo Numerical Toolbox	£67
Turbo Tutor V2	£28
Turbo Holiday Jumbo Pk	£175
Turbo Lightning	£59
Word Wizard	£42

COMMUNICATIONS

Our Free communications consultancy means that you can simply telephone or write for free datapaks and/or advice.

Modems: All modems are Auto-Dial/Auto-Answer and BABT approved. Baud rates are V21=300/300 V23=1200/75 V22=1200/1200 V22bis=2400/2400.

We also supply modems from Dwyer/Racal/Tandata/Steebek/Dacom/PC at best prices.

MODEM CABLES: IBM-PC £15 IBM-AT £23 Dacom (internal, all with Datatalk)

Unity V21/23	£299
Unity Gold V21/V22/V23	£389
Unity Quad V22bis/V22N/V21/V23	£589

STRADCOM V22/V21 Internal + software £189

MIRACLE WS SERIES — (External)	
WS4000 V21/V23 (Economy)	£149
WS3000 V21/V23 Professional Series	£259
WS3000 V22 (8 V21/V23)	£395
WS3000 V22BIS (8 V22/V21/V23)	£545
MIRACLE KEYCARD — (Internal + Datatalk)	
Keycard V21/V23	£269
Keycard V22/V21/V23	£395
Keycard V22bis/V22N/V21/V23	£539

PACE SERIES-4/LINNET — EXTERNAL

Pace Linnet V21/23 (Economy)	£139
Series-4 21235 (V21/V23)	£229
Series-4 12005 (V22/V21/V23)	£359
Series-4 24005 (V22bis/V22N/V21/V23)	£449
HAYES 1200 V22/V21/V23 NEW/I	£395
HAYES 1200B V22/V21/V23 Internal NEW/I	£375
HAYES 2400 V22bis/V22	£595

Comms Software:

Carbon Copy Plus (each)	£137
Crosstalk-4 (NEW/I)	£149
Crosstalk XVI	£99
Lap-Link (pc-to-pc)	£89
Sage Chit-Chat - special offer	£69
Smartcom-III V1.0A - NEW/I	£139
Vicom with GEM Desktop	£139

SAGE

All Sage products available at best pricing

Financial Controller	£225
Bookkeeper	£84
Accountant	£118
Accountant Plus	£159
Payroll	£82
Retrieve	£82
Chit-Chat - Special Offer	£69

HARDWARE

Hercules Graphics Cards	CALL
Logimouse C7+ (serial)	£94
Logimouse - Bus (NEW/I)	£109
MS Mouse - Bus, Serial or PS2	£129
Orchid Tiny-Turbo 286	£299
EGA Wonder Card (NEW/I)	£249
Vega Deluxe Auto EGA	£199

DECEMBER'S OPTIMUM CHOICE

● **FREE OPTIMUM CRISIS/SPREAD GAMES WITH EACH ORDER**
(514 IBM format).

● **SPARK — THE LAPTOP!**
Why did Practical Computing (Oct '87) when comparing the Spark to the Toshiba T-1000 say: "...Of the two machines, the Spark is the winner..." This same review praised the keyboard! the display! the speed! etc etc Why did PC Business World (Sept '87) say: "...Spark offers genuine value for money...excellent display...better than the Bondwell or Olivetti..." Ask for full details of this superb Japanese-made Laptop that offers unique value for money. Starts at only £2747.

● **ORCHID TINY TURBO-286 PC UPGRADE BOARD**
upgrades your 4.77Mhz PC to run faster than an IBM-AT! New low price - £299.

● **FREE COMMUNICATIONS ADVICE** —
Simply phone with your requirements.

● **FREE SHORTFORM CATALOGUE**
simply phone or write.

YES!

PLEASE RUSH ME

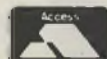
☐ The following good(s):

☐ A FREE Datapak on:

☐ A FREE shortform Catalogue.

☐ I enclose £ inc. carriage/VAT

☐ My credit card number is



Signature

UK Carriage: Most items add £5 + VAT
Express/dBase/Smart/Spark/Modems
please add £10 + VAT

Name

Address

Phone No.

1287

OPTIMUM TECHNOLOGY LTD

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

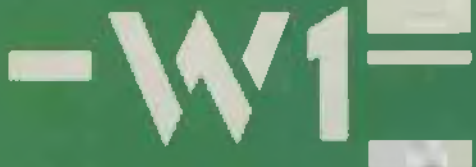
Sales Desk: 01-446 2223

Telex: 923729 (Roland G)

Fax: 01-446 1963

PLEASE ADD CARRIAGE, THEN VAT TO ALL PRICES

The above is a sample of the goods we supply — please ask for latest shortform catalogue.
We welcome official PLC/Govt./Educational/Local Authority and Export orders.
Pro-Forma invoices available on request. Above software is in IBM 5 1/4" format — please enquire for other formats. Prices/specifications subject to change without notice. Please phone to arrange demonstrations or to collect goods.



WEST ONE BUSINESS SYSTEMS

NEW IBM Personal System 2 Available now Telephone for Demonstration

Model 30-021 with 20Mb Hard Disk, one 720k Floppy drive serial and parallel port, 640k memory, and enhanced keyboard.....	£1395
Model 50 10MHz 80286 Desk Top system with 20Mb Hard Disk, one 1.2Mb Floppy drive, serial and parallel port, 1Mb memory and enhanced keyboard.....	£2395
Model 60 10MHz 80286 free standing system with 44Mb Hard disk, one 1.2Mb Floppy drive, serial and parallel port, 1Mb memory and enhanced keyboard.....	£3249
For Model 80 prices please call 01-636 7142.	
IBM Mono Monitor 8503.....	£156
IBM Colour Monitor 8513.....	£460
IBM Colour Monitor 8512.....	£410
IBM DOS 3-3.....	£59

LIMITED OFFER!

IBM ATX 80286 processor with 30Mb Hard disk, one 1.2Mb Floppy, serial and parallel port, 512k RAM, enhanced keyboard.....£1995
IBM XT286 80286 processor, with 20Mb Hard disk, one 1.2Mb Floppy drive, serial and parallel port, 640k RAM, enhanced keyboard.....£1675

Up to 35% Discount on IBM ATX and 286 Systems!

A complete range of IBM peripherals available including Monitors, Memory Upgrades and Printers.

Telephone for details

Authorised IBM DEALER

TRAINING AND INSTALLATION

Full onsite training and installation is available on all products. Ask us for a quotation! We also supply and install a range of Multi user and Network products including Xenix and Novell. Telephone for further details on 01-636 7142 or 01 323 2840.

The Akhter P.C. IBM Compatible System

All systems with keyboards Hercules compatible Adaptercard, Turbo Main Board 4.77 8MHz, Serial/Parallel port, games port, 150 watt P.S.U. and 8 expansion slots.

P.C. 1000 Single 360k floppy drive, 256k RAM.....	£495
P.C. 1500 Dual 360k floppy, 256k RAM.....	£595
P.C. 2800 Single 360k, 20Mb hard disk, 512k RAM.....	£795
P.C. 2500 Dual 360k, 20Mb hard disk 512k RAM.....	£849
P.C. 3000 Dual 720k-3.5" disk drives 512k RAM.....	£845
P.C. 3500 Single 720k-3.5" disk, 20Mb hard disk 512k.....	£829

MONITORS

Philips 7513 IBM compatible Monochrome Monitor.....	£69
Philips 8833 IBM compatible Colour Monitor (Resolution 600 x 200).....	£225
Mitsubishi 1440 Enhanced colour monitor.....	£425

DISK DRIVES

20Mb hard disk and controller.....	£295
40Mb hard disk and controller.....	£420
360k 5.25" floppy disk drive.....	£82
1.2Mb 5.25" floppy disk drive.....	£109
720k 3.5" floppy disk drive.....	£112
Mono chrome adapter Card.....	£72
Colour adapter Card.....	£72
640k Multi Function Card.....	£79
EGA Card.....	£195
3Mb AT Multi Function Card.....	£195

Call 01-636 7142 for more information on products

PRINTERS

Superb range of High Quality Star and IBM Printers

Star NL10 - 9pin, 120cps draft - 30cps NLQ 80 col.....	£199
Star ND 15 - 180cps, 136 col, NLQ 45cps.....	£399
Star NX 15 - 9in, as above but 132 col.....	£295
Star NR 15 - 9pin, 240cps draft - 60cps NLQ 132 col.....	£495
Star NB 24/10 24pin, 216cps draft - 72cps LQ 80 col.....	£475
Star NB 24/15 24pin, as above but 132 col.....	£575
IBM Quietwriter Model III.....	£749
Epson FX 800 200cps draft/40cps NLQ.....	£329
Epson FX 1000 200cps draft/40cps NLQ.....	£399
Hewlett Packard Laserjet II.....	£1995
Full range of Epson printer available - Telephone for details	

NETWORKING NOW!

The new Akhter NET — featuring MS NET from Microsoft, Arcnet Interface cards. The Akhter AT File Server, complete with 5 terminals, Networking Software and full documentation.

£5995 + VAT

For free Site Survey and alternative configuration

Tel: 01-636 7142

The Akhter PC AT IBM Compatible System

Features ★ 80286 Processor ★ 6/8/10 MHz speed ★ Switchable EGA, Colour, Mono or Hercules adapter card ★ Serial parallel, clock-calendar and light pen interface ★ 20Mb or 40Mb hard disk ★ 1Mb memory ★ 102 key enhanced keyboard ★ MS DOS ★ GW Basic. Complete with Monochrome monitor.

Prices from

£1295

Sanyo Special Offer

37 STORE ST. OFF TOTTENHAM COURT RD, LONDON WC1
01-636 7142 or 01-323 2840 (4 lines)

All prices exclude VAT. Visa and Access accepted. Prices exclusive of postage and packing. Price subject to change without notice. All goods subject to availability.

COMPUTER PRECISION LTD

TOSHIBA PORTABLE COMPUTERS		NEC COMPUTER SYSTEMS	
T3100:	80386 16MHz, 2MB RAM, 40MB Hard Disk (29ms) 1.44Mb Floppy, Plasma Display (640x400, EGA, CGA), 80387 Socket, Ser/Par, MS DOS 3.2, 15Lbs.	Multispeed	NEC V30 9.54Mhz, 640K RAM, 2 x 720K Floppy, Ser/Par, 6-Hour Battery, Software in Rom MS-DOS 3.2, 11Lbs £1250
T3200:	80286 12MHz, 1Mb RAM, 40MB Hard Disk, 720K Floppy, Plasma Display (720x400, EGA, CGA), 2 IBM Expansion Slots, 80287 Socket, Ser/Par, MS DOS 3.2, 18.7Lbs	APC IV40:	80286 8Mhz, 40MB Hard Disk 1.2MB Floppy 640K RAM, Ser/Par, MultiSync Monitor & EGA Card, MS DOS 3.2 £2495
T3100/20:	80286 8MHz, 640K RAM, 20MB Hard Disk, 720K Floppy, Plasma Display (640x400), Ser/Par, MS DOS 3.2, 15Lbs.	APC IV20:	20MB Hard Disk, rest same as above £2195
T1200:	8086 9.54MHz, 1MB RAM, 20MB Hard Disk, 720K Floppy, Supertwist LCD, Ser/Par, 8-Hour Battery, MS-DOS 3.2, 10Lbs	TANDON COMPUTER SYSTEMS	
T1100+:	8086 8Mhz, 640K RAM, 2 x 720K Floppy Supertwist LCD Ser/Par, 8-Hour Battery, MS DOS 3.2, 10Lbs	PCA70:	70MB Hard Disk, 1MB RAM 1.2MB Floppy Ser/Par, 14" Mono Monitor, MS-Windows MS DOS 3.2, GW-Basic £2250
T1000:	8088 4.77Mhz, 512K RAM Exp to 1.2MB, 720K Floppy, Supertwist LCD, Ser/Par, MS DOS 2.11 in-ROM, 6.5 Lbs	PCA40:	40MB Hard Disk, rest same as above £1795
PLEASE CALL FOR THE LATEST TOSHIBA PRICES		PCA30:	30MB Hard Disk, rest same as above £1575
		PCA20:	20MB Hard Disk, rest same as above £1350
		Tandon Enhanced Monitor & EGA Adapter £310	
		Zenith:	Z181 Laptop 2 x 720 Floppy 640k RAM £1350

MONITORS AND ADAPTERS	DOT MATRIX PRINTERS	SOFTWARE
NEC Multisync Monitor £499	Epson LQ2500 270cps 90nlq £730	AbilityPlus £135
Sony Multiscan Monitor £625	Epson LQ1000 180cps 60nlq £575	Advanced Nortons Utilities £90
Taxan Multiscan Monitor £550	Epson LQ800 180cps 60nlq £425	dBase 3 Plus v1.1 £415
Vega Delux Card £249	Epson EX1000 250cps 50nlq £525	Framework II v1.1 £335
ATI EGA Wonder Card £249	Epson EX800 250cps 50nlq £390	Lotus 1-2-3 r2.01 £239
Hercules Mono Graphics Plus £189	Epson FX1000 200cps 40nlq £385	MS Multiplan 3 £120
Hercules Incolour £290	Epson FX800 200cps 40nlq £305	MS Word 4 £260
Wyse WY-700 Monitor £695	Epson LX800 150cps 25nlq £195	Norton Utilities v4 £55
MOUSE DEVICES	NEC Pinwriter P6 216cps 72nlq £395	SuperCalc 4 £205
Microsoft Mouse v6 £130	NEC Pinwriter P7 216cps 72nlq £465	Ventura Publisher v1.1 £595
Mouse Systems PC Mouse £135	Diconix 150 Portable 150cps £335	VP Info £65
Logimouse C7 £76	LASER PRINTERS	VP Planner £65
Summouse £89	*HP LaserJet 11, 8ppm £1950	Word Perfect 4.2 £260
MATHS CO-PROCESSORS	Epson GQ-3500 6ppm £1350	Wordstar Professional £235
8087 5MHz £115	Mannesman Tally MT 910 £2695	3.5 inch Format Available
8087 8MHz £145	Canon LBP8 MK 11 £1695	BORLAND SOFTWARE
80287 6MHz £165	*AST Turbo Laser 8ppm £2495	Turbo C £59
80287 8MHz £199	(* Inc. 1 Year on site Maintenance)	Turbo Basic £49
80287 10MHz £275	COMMUNICATIONS	Basic Telecom Toolbox £55
80287 16MHz £475	WS4000 V21,23 AA AD £145	Basic Editor Toolbox £55
MEMORY BOARDS	WS4000 V21,22,23 AA AD £339	Basic Database Toolbox £55
AST Rampage XT 2MB RAM £395	WS3000 V21,22,23 AA AD £399	Turbo Pascal Ver 4 NEW £47
AST Rampage 286 2MB RAM £595	WS3000 V21,22,23,22BIS £520	Pascal Database/Editor £35
AST Advantage 1.5MB RAM £525	Pace Series 4 V21,22,23 £320	Turbo Pascal Tutor £20
AST RAMvantage 2MB RAM £525	Pace Series 4 V21,22,23,22BIS £399	Pascal Graphics Toolbox £35
Intel AboveBoard 286 2MB RAM £575	Pace Linnet V21,23 £119	Pascal Gamesworks £30
Intel AboveBoard PS/286 2MB RAM £625	Quattro V21,22,23,22BIS £625	Turbo JUMBO Pack £155
Intel AboveBoard PCXT 2MB RAM £450	Lion Systems ORATOR £695	Turbo Numeric Methods Toolbox £49
	Procomm 20 Telex Card £695	Turbo Prolog £47
	Stradcom V21,V22 Internal Modem £175	Turbo Prolog Toolbox £49
		Eureka the Solver £49
		Reflex £90
		Superkey £49
		Sidekick £49
		Turbo Lightning £49

This Page Was Produced Using Ventura Publisher And HP LaserJet II

Official orders are accepted from GOVERNMENT & EDUCATIONAL AUTHORITIES & PLCs. Prices exclude VAT. EXPORT enquiries welcome

AUTHORISED TOSHIBA NEC TANDON DEALER

Comprehensive services include: Consultancy, Demonstrations & Hotline support

 **01-226 3043** 

TELEX 268048 EXTLON FAX 01-226 7948

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



Slough Computers



AMSTRAD PC1640
FLOPPY AND HARD DISK
SYSTEMS
FROM £499
RANGE OF BUDGET PRICED
SOFTWARE IN STOCK

BONDWELL PC PORTABLES

MODEL 8 LAPTOP £799
512K 3 1/2" DRIVE.
SUPERTWIST LCD S/P VIDEO
MODEL 18 PORTABLE £699
640K, 2 x 5 1/4" DRIVES. CRT
ALL WITH DOS/BASIC 2.11



FREE!
1 YEARS ON-SITE
SERVICE



PC USER "THIS IS THE ONE I'D BUY"

THE OPUS PC II RANGE
1024K, 2 DRIVES + RAM DISK.
HERCULES COMPATIBLE GRAPHICS.
4.77-8MHz TURBO V20
AT STYLE KEYBOARD.
TILT & SWIVEL MONITOR £679

SYSTEMS FROM £499-20MB £969
EGA SYSTEMS FROM ONLY £799
VARIOUS OPTIONS AVAILABLE INCLUDING
1.2MB & 3 1/2" FLOPPIES AND 8087

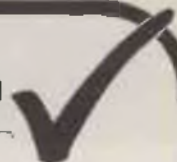
NEW FROM OPUS — PC V AT

New low cost AT has just been released by Opus. It's a small footprint machine with a 1.2Mb floppy, 30Mb Winchester, 10MHz zero wait 80286, mono/c colour graphics card, 14" amber flat screen, display and 102 enhanced keyboard at a cost of only £1295



245 HIGH STREET, SLOUGH, BERKS SL1 1BN Tel: SLOUGH (0753) 21594/32753
VAT & CARRIAGE MUST BE ADDED TO ALL PRICES. TELEPHONE/MAIL ORDERS WELCOMED
ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE

CHECK OUR PRICES FIRST



FREE
DELIVERY!
MAINLAND UK

olivetti
PERSONAL
COMPUTER



M240 20MB Hard Disk - Monitor Keyboard & MSDOS	£1495
M28 20MB Hard Disk - Monitor Keyboard & MSDOS	£1950
M28 40MB Hard Disk - Monitor Keyboard & MSDOS	£2450

Colour display £220 extra

All units fully tested before despatch



R.T.M. SYSTEMS



R.T.M. SYSTEMS, 27 BOLD STREET,
PRESTON PR1 7NX. Telephone: (0772) 58099.

*All prices exclude VAT, and subject to change and availability.

COMP!STAND!LTD!

FOR OLIVETTI AND TANDON SOFTWARE AND PERIPHERALS

Olivetti M240 (8086 PROCESSOR)

Options too numerous to mention but here are some examples.

M240 Dual 360Kb 5 1/4" Drives
M240 1 x 360Kb 5 1/4" Drives, 1 x 720Kb 3 1/2" Drive
M240 20Mb Hard Disk, 1 x 360Kb 5 1/4" Drive
M240 20Mb Hard Disk, 1 x 360Kb 5 1/4" Drive, 1 x 720Kb 3 1/2" Drive
M240 30Mb Hard Disk, 1 x 360Kb 5 1/4" Drive
M240 30Mb Hard Disk, 1 x 360Kb 5 1/4" Drive, 1 x 720Kb 3 1/2" Drive

All of the above come with 640K RAM, Parallel and Serial Ports and 102-key keyboard.

A wide range of displays and controllers are available.

Internal Tape Streamer Systems are also in stock.

ALL PRICES ON APPLICATION.

OLIVETTI M28 (80286 PROCESSOR)

Full 20Mb system including keyboard, mono monitor, MS-DOS 3.2 £1995
As above, 40Mb system £2335
As above, 68Mb system £2622
Many other configurations available - prices on application

OLIVETTI M380 (80386 PROCESSOR)

M380 COMPACT 1.2Mb Floppy Drive
40Mb Hard Disk, 1Mb RAM
M380 1.2Mb Floppy Drive
68Mb Hard Disk, 4Mb RAM
M380 TOWER 1.2Mb Floppy Drive
135Mb Hard Disk, 4Mb RAM

TOP JOB included in all configurations of M380.
Call for details on these amazing machines
Prices on application

TANDON

PCX Dual Drive	£650
PCX20	£875
PCA20	£1150
PCA30	£1400
PCA40	£1580
PCA70	£1940
TARGET 20	£1220
TARGET 40	£1650

The above prices include monochrome monitor (green or amber), keyboard and MS-DOS.
For EGA colour monitor and car, add £285

SPECIAL OFFERS:

ROLAND DXY 880A Plotter	£599
ZENITH Z181 Portable	£1255
HP LASERJET 2	£1835

DAISYWHEEL PRINTERS:

RICOH RP 3200	£310
RICOH RP 3400	£1835

SOFTWARE:

DBASE III +	£375
MICROSOFT EXCEL	£235

Full range of Dot Matrix, Daisy Wheel and Laser printers - Call for best prices.
Prices for Add on Boards, Hard Disks, Modems and other software available on request.

CALL US NOW ON CHICHESTER (0243) 771786.

COMP!STAND!LTD!

Quarry Lane, Chichester,
West Sussex, PO19 2NY

All prices include full 12 months warranty but are exclusive of VAT and delivery.



Slough Computers



COMMODORE
✓AMIGA

A500 &
A2000

Come and see the superb Commodore Amiga 2000 starting at only £1095 including one year's on site service
New Amiga 500 now available
Call for latest special offers

Tandon

PCA20 1024K, 6/8MHz, 80286, MSDOS 3.1
1.2Mb FLOPPY, 20MB WINCHESTER
£1495

AT NO EXTRA COST WE WILL SUPPLY
THE ABOVE SYSTEM WITH
EGA CARD AND MONITOR SAVING £500
NEW 70MB PCA 70 NOW AVAILABLE
FROM £2295



The new target range and other models available

STOP PRESS - NEW OPUS PC III RANGE

Just launched at the PCW Show - a world beating new range of PC's from Opus. These are small footprint machines styled as the PC V.A.T. Features include a 10MHz clock speed with no waits, mono/colour graphics card, 14" amber flat screen display and 102 key enhanced keyboard. This system with a 30MB Winchester will cost only £995

OPUS PC EGA UPGRADE BARGAIN

14" Enhanced colour monitor with multiple choice colour switch PLUS EGA/CGA/HGC Graphics card, all to suit PC's and compatibles at at previously unheard of price of only **£399**

SPECIAL OFFERS

Miniscribe 30Mb 68MS card-mounted Winchester £279
Miniscribe 40Mb 1/2 height drive and controller £369
Archive 40Mb internal tape streamer only £319
EPSON LQ800 24 pin DMP £399

245 HIGH STREET, SLOUGH, BERKS SL1 1BN Tel: SLOUGH (0753) 21594/32753
VAT & CARRIAGE MUST BE ADDED TO ALL PRICES. TELEPHONE/MAIL ORDERS WELCOMED
ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE

FORTTRANSOFT LTD

PROFESSIONAL SOFTWARE FOR THE IBM PC/XT/AT AND COMPATIBLES, eg. OLIVETTI, COMPAQ, AMSTRAD, OPUS...

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 ANSI 77 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.

FS-Fortran 77 is now at level 3.15 and current users may obtain a copy of the compiler for £2 all incl.

FS-Fortran 77 with CGA graphics routines... £34.95
FS-Fortran 77 with CGA and Hercules mono graphics routines... £39.95
FS-Fortran 77 with CGA and Olivetti 640x400 graphic routines... £44.95
FS-Fortran 77 with CGA and EGA colour graphics routines (suitable for PC1512/PC1640)... £44.95

FS-PLOT is a program for plotting mathematical equations on the screen and the printer. Works with CGA, EGA and Hercules mono graphics card. Ideal for students, mathematicians and engineers... £14.95

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 data, reading a single key from the keyboard, screen dump, etc.

FS-GRAPHKIT is available for use with Microsoft Fortran, Ryan McFarland Fortran, IBM Professional Fortran, Lattice C, and Zorland C, Prospero Fortran77, and Microsoft Optimising Compiler. (Please specify which compiler when ordering).

CGA colour graphics... £19.95
CGA and Hercules mono graphics... £24.95
CGA and Olivetti 640x400 graphics... £29.95
CGA and EGA colour graphics... £29.95

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 for FS-Fortran 77 Compiler... £19.95
FS-Sortmerge for Microsoft Fortran Compiler... £19.95
FS-Sortmerge for Ryan McFarland/IBM Professional Fortran... £24.95

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" 360K/1.2M (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)

FREE OVERNIGHT DELIVERY!*

01-455 9823

COMPUTERS/CALCULATORS/PLOTTERS

LASERPRINTERS		HP 28C (SCI PRO CAL)	£200.00
CANON LBP8	£1495.00	HP7440 (A4 2 PEN PLOTTER)	£750.00
GENIOM	£2795.00	HP745A (A3 6 PEN PLOTTER)	£1360.00
KYOCERA	£2400.00	HP7550 (8 PEN A4/A3)	£3220.00
EPSON LQ3500	£1395.00	HP7560 (A1)	£7500.00
AST PREMIUM PUBLISHER SYST 1	£5600.00	ALL HP RANGE STOCKED	
BDS (CANON COMPATIBLE)	£2197.00	ROLAND 980 (A3/8 PEN)	£945.00
QUIME LASER TEN	£2095.00	TAXAN 710 (A3/8 PEN)	£895.00
NEC L08	£2399.00	SHARP PC 1500A	£147.00
HP LASER PLUS	£POA	PC1600 (16K)	£199.50
HP LASERJET	£1495.00	AMSTRAD 8512 PC/1512 1640	
HP THINKJET	£435.00	MONO/COLOUR/DISK 10/20MB FROM	£449.00
AST TURBO-LASER	£2999.00	AMSTRAD SOFTWARE, SAGE ETC IN	STOCK
OKI LASERLINE	£1595.00		
OLIVETTI M240	£POA		
EPSON PC + TRANSPUTER	£POA	IBM COMPATIBLE EXPANSION	
EPSON PC AX WITH 20MB HD	£POA	PRODUCTS AST/PERSYS/EVEREX/	

IBM COMPATIBLE EXPANSION
PRODUCTS AST/PERSYST/EVEREX/
TECMAR/GENOVA/OMEGA/
QUADRAM/ORCHID/PARADISE

SPECIAL AUTUMN* OFFER ON EPSON PRINTERS

MONITORS/PRINTERS

MICROLINE 182 (120 CPS)	£193.50	TAXAN - PRINTERS AND PLOTTER RANGE HELD	
MICROLINE 192 (160 CPS)	£283.00	EPSON COMPLETE RANGE IN STOCK	
MICROLINE 84TF (200 CPS)	£620.00	LX86 (120CPS)	POA*
OKI 294 (400 CPS)	£750.00	LQ1000 67K BUFFER (180CPS)	POA*
OKI COMPLETE RANGE IN STOCK		LQ800 (60 180CPS)	POA*
UKI IN STOCK		LQ2500	POA*
NEC P7	£460.00	EX8000	POA*
NEC P5	£745.00	EK1000	POA*
NEC COMPLETE RANGE IN STOCK		SQ2500 (NEW)	POA*
DISK DRIVE/TAPE STREAMER POA		BROTHER HR20	£333.00
QUIME 12/20	£410.00	HR25 (3K BUFFER/25CPS)	£329.00
QUIME 12/45 SPRINT (S/P)	£599.00	HR40 (35CPS)	£POA
QUIME 1190 (90 CPS)	£1355.00		
QUIME COMPLETE RANGE IN STOCK			
STAR NB15 (136COL/300CPS)	£760.00		
STAR NL10 (120CPS/80COL)	£197.00		

MODEMS
MODULAR TECH LION SYSTEM
NIGHTINGALE/INTERLEKT/DACOMASTER/
EPSON STEEBK/ANSWERCALL ETC
FROM £73.50
MANNESMANN TALLY (full range) STOCKED
MT290 (IBM/EPSON COM) £600.00
MT90 (INKJET 220/110 CPS) £395.00
MT85 (80 COL IBM) £264.00
MT910 LASER £2800.00

MONITOR/TERMINALS
ZENITH FROM £425.00
TELEVIDEO FROM £280.00
WYSE FROM £360.00
QUIME FROM £360.00
HAZELTINE/SPRIT FROM £425.00
TAXAN/PHILIPS/ZENITH FROM £65.00
NEC MULTISYN COLOUR £POA
COMPLETE RANGE OF OLIVETTI PRINTERS NOW IN STOCK

CAN YOU FIND A LOWER PRICE PHONE US FOR BEST DEAL

SOFTWARE

IBM COMPAQ OLIVETTI/AMSTRAD		SMART SYSTEM	£385.00
LOTUS 1-2-3	FROM £222.00	SMART SPREAD SHEET	£299.00
SYMPHONY	£339.00	SMART WORD PROC	£220.00
GRAPHWRITER COMBO PAK	£339.00	DATA MANAGER	£299.00
CHARTMASTER	£295.00	MICROSOFT PROJECT	£275.00
MAP MASTER	£285.00	SUPERCALC 4	£238.00
PSF PROF WRITE	£169.00	TURBO CAD	£330.00
PFS PROF FILE	£229.00	MULTIMATE	£247.00
PFS PROF PLAN	£250.00	QUICKCODE III	£179.00
FREELANCE +	£250.00	SAGE CHIT-CHAT	FROM £76.00
FRAMEWORK	£113.00	SAGE ACCOUNTS	FROM £85.00
D/BASE III PLUS	£375.00	CROSSTALK	£120.00
D/BASE CLIPPER	£369.00	GEMPAINTWRITE	£125.00
JAVELIN	£345.00	BORLAND TURBO RANGE	FROM £22.00
EASY FILLER	£199.00	JENNIFER	£275.00
LOGISTIX	£95.00	SAMNA PLUS	£496.00
HERCULES GRAPHIC CARD PLUS	£195.00	MULTIMATE ADVANTAGE	£247.00
FORMATTING AVAILABLE		ORIAS 30BASE	£296.00
HARVARD PRESENTATION		LATITUDE COMPILER	£245.00
GRAPHICS	£250.00	VP INFO	£32.00
MS WINDOWS	£75.00	LOTUS MANUSCRIPT	£268.00
COBOL COMPILER	£495.00	VENTURA DESKTOP PUBL	£550.00
PASCAL COMPILER	£190.00	VOLKSWRITER III	£187.00
FORTRAN COMPILER	£220.00	WORD III	£243.00
VOLKSWRITER 3	£169.00	WORDCRAFT	£309.00
MICRO SOFT MOUSE/		WORD PERFECT	£249.00
WINDOWS	£199.00	WORD PERFECT LIBRARY	£124.00
LOTUS HAL	£115.00	WORDSTAR	£144.00
FUNK SIDWAYS 3.1	£68.00	WORDSTAR 2000 - (RA)	£279.00
HARVARD TOTAL 2	£399.00	WORDSTAR PROFESSIONAL	£193.00
R/BASE SYSTEMS	£395.00	MULTIPLAN	£109.00
(SELECTION OF EXTENSIVE RANGE)		SAGE PC PLANNER	£71.00
OPEN ACCESS II	£395.00	VP PLANNER	£51.00
OPEN ACCESS	£265.00		
PARADOX II	£395.00		
FOXBASE 7	£345.00		

NETWORKING 'LAN' VERSIONS AVAILABLE POA

GOODS FULLY GUARANTEED. PRICES EXCL VAT (P&P EXTRA ON GOODS UNDER £300)

Company and Government orders accepted by telephone
Barclaycard/Access/Visa accepted by phone

Tel: 01-455 9823
MOUNTAINDENE
22 Cowper Street, London EC2

QUATROSTAR LTD

BUSINESS / SOFTWARE DEVELOPMENT / AUTOCAD SYSTEM SPECIALISTS
PRESENT THE EFI RANGE OF QUALITY DESKTOP COMPUTER SYSTEMS
FROM £459.00 TO 24 MHz

*** THIS MONTH'S SPECIALIST SYSTEM OFFERS ***

<u>SOFTWARE DEVELOPMENT</u>	<u>AUTOCAD PROGRAMMER</u>	<u>PERFORMANCE SOLUTION</u>
:EFI 286 TURBO 6/8/10MHz	:EFI 286 TURBO 6/8/10MHz	:EFI 386 TURBO 6/8/16MHz
:LST=13.2MHz "0" WAIT &	:LST=13.2MHz "0" WAIT &	:LST=19.2MHz "0" WAIT &
:1MBYTE INTERNAL RAM	:2MBYTE SUPPORT RAM	:10MBYTE SUPPORT RAM
:5.25/1.2MB, 5.25/360KB	:5.25/1.2MB DISK DRIVE	:5.25/1.2MB, 3.5/720KB
:3.5/720K DISK DRIVES	:10MHz CO-PROCESSOR	DISK DRIVES
:20MB HARD DISK	:40MB HARD DISK (40MS)	:80MB HARD DISK (27MS)
:EGA COLOUR MONITOR	:EGA MULTI-SYNC MONITOR	:EGA MULTI-SYNC MONITOR
£1620.20	£2427.50	£4626.50
ALL SUPPLIED WITH FULL FUNCTION KEYBOARDS, WITTY MOUSE, DOS 3.2 & GW BASIC 12 MONTHS PARTS AND LABOUR WARRANTY		

** COMPLETE SYSTEMS INCLUDING HIGH RES TTL MONITOR **

EFI 88 TURBO (FULL XT COMPATIBLE) FROM £459.00

EFI 286 TURBO (FULL AT COMPATIBLE) FROM £899.00

EFI 386 TURBO WITH 40MB HARD DISK FROM...£2399.00

EGA SYSTEMS FROM£714.00

HARD DISK SYSTEMS (20 MBYTES+) FROM....£720.00

MOUSE, TAPE STREAMERS, NETWORKS +++ OPTIONS FOR CUSTOM SYSTEMS.

** FULL ON SITE MAINTENANCE AGREEMENTS AT 5 % OF HARDWARE PRICE **



ALL PRICES EXCLUSIVE OF VAT

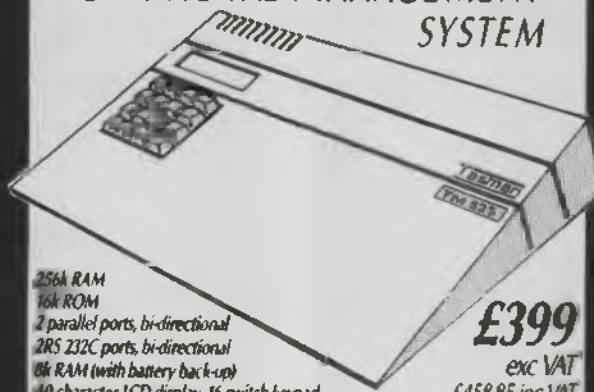
CUSTOMER HARDWARE/SOFTWARE CONSULTANCY SERVICE

FOR DETAILS CALL 01 367 4086

* LST=LANDMARK CPU SPEED TEST. COPYRIGHT 1985 LANDMARK SOFTWARE

TM-525

PERIPHERAL MANAGEMENT SYSTEM



256k RAM
16k ROM
2 parallel ports, bi-directional
2RS 232C ports, bi-directional
8k RAM (with battery back-up)
40 character LCD display, 16 switch keypad

£399

exc VAT

£458.85 inc VAT

SWITCH · LINK · SHARE · BUFFER · MULTIPLEX · QUEUE · INTERFACE · CONVERSION

The TM-525 is a COMPLETE peripheral management system in one unit.

- ▶ **BUFFER** 256k of memory, the TM-525 buffers all four ports.
- ▶ **SWITCH** data can be switched between computers and printers attached to the TM-525, manually or automatically.
- ▶ **CONVERT** between serial and parallel interfaces automatically.
- ▶ **LINK** any number of TM-525s can be linked together allowing any computer on the link to send data to any printer on the link.

ALL of these functions and many more are brought together in ONE versatile device, the TM-525 from Tasman Software

Use the coupon or telephone for a complete colour brochure

To: Tasman Software, Dept PCW, Springfield House, Hyde Terrace,
Leeds LS2 9LN. Telephone Leeds (0532) 418301
Please send me the FREE TM-525 colour brochure

Tasman
SOFTWARE

Name _____

Address _____

Soft Touch COMPUTERS

Happy Christmas to all our customers and a
prosperous New Year

Apricot Approved Dealer

Amstrad Approved Dealer

APRICOT XEN4 SYSTEMS UK'S LOWEST PRICE

XEN1386 30Mb H/D keyboard, monitor & w.	£2549
XEN1386 45Mb H/D keyboard, monitor & w.	£3249
XEN1286 30Mb H/D keyboard, monitor & w.	£1799
XEN1286 45Mb H/D keyboard, monitor & w.	£3299
XEN1286 Twin drive keyboard monitor and Op-system	£1375

XEN-1386 20MB H/D keyboard, monitor & w

Choice of 5.25 or 3.5 inch floppy drives on request also available EGA monitors, mouse external drive, modems ext tape drive, ram upgrade

Kit and maths co processor

All Apricots have windows, DOS, VP planner and gem.

APRICOT V1-386 MULTIUSER SYSTEM

Comprising of two terminals Xen4 Op-Sys 70Mb H/D 3.5 or 5.25 disk format

£7,500

AMSTRAD RANGE UK'S LOWEST PRICE

PC1640 Single drive software and ECD Colour Monitor	£699
PC1640 Dual drive software and ECD Colour Monitor	£799
PC1640 30Mb hard disk software and ECD Colour Monitor	£999
PC1640 Single drive software and Colour display	£375
PC1640 Dual drive software and Colour display	£650
PC1640 20Mb hard disk software and Colour display	£899

New Amstrad PCW512 monitor, cpu, keyboard, delaywheel printer

wordprocessor. Price only

Amstrad Software and Accessories

£475

£275

£399

£1995

£1749

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

£1195

On site installations, after sales support, 12 months guarantee
on all products.

HOT LINE 01-571 7614

24 hour answering service.

24, Orchard Avenue, Southall Middlesex UB1 1LG

'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 and EGA 640 x 350	
use in PC paintbrush, ventura, Pagemaker	£249
Apple IIGS, Iie and II+ plug in board Also IIC	£129
Software for double hi-res and image processing	£29
IIGS software for 320 x 200 resolution, 16 grey levels	£19
Atari ST 640 x 400 in high resolution mode	£149
Commodore 64/128	£109
Atari 800/800X/130	£99

(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. Where appropriate, software is available to modify images for compatibility with popular graphics packages.

* Applications include graphic art, pattern recognition, spatial measurements, desktop publishing, education, information technology, entertainment, etc.

Stem Computing

3 Blackness Avenue, Dundee DD2 1ER Tel: 0382 65113

CLP

PAPER	Per Box	1 Box	5 Plus
11 x 9.5			
80 GSM PLN/MUS	2000	£12.90	£9.83
60 GSM MICRO P	2000	£13.40	£10.66
70 GSM MICRO P	2000	£14.90	£11.92
70 GSM PLN/MUS	2000	£14.30	£11.12
85 GSM MICRO P	1000	£10.90	£9.40
2PART NCR	1000	£13.18	£15.33
11 x 14.5			
80 GSM PLN/MUS	2000	£17.00	£12.85
70 GSM PLN/MUS	1750	£17.34	£12.74
TRUE A4			
90 GSM	1500	£17.90	£16.09
70 GSM	2000	£17.85	£14.40
85 GSM MICRO P	1000	£11.50	£9.75

LABELS	Per Box	1 Box	5 Plus
2 1/2 x 3 1/2	70 x 36	£2.50	£1.10
3 1/2 x 5 1/2	70 x 74	£2.55	£1.10
3 1/2 x 7 1/2	70 x 108	£2.50	£1.10
3 1/2 x 9 1/2	70 x 142	£2.50	£1.10
4 x 1 1/2	107 x 36	£2.40	£1.10
5 x 1 1/2	107 x 36	£2.95	£1.10
4 x 1 1/2	107 x 49	£4.70	£1.10
7 1/2 x 1 1/2	170 x 36	£2.50	£1.10

Also available Photo Copies/Lasers and cut sheet labels
PLEASE STATE 1, 2 or 3 HMM. If you require 1/4 or 1/8 vertical spacing please ask. These are for fixed 9.5" motor feeds: 2 and 3 wide.

RIBBONS

FABRIC RIBBONS 1-5 QUANTITY

Amstrad	8512/8526	3.71	Epson	MX/FX/RX/1000/105	3.15
	Coloured	4.82		Coloured	4.23
	Longlife	4.76		LOLP/1500	2.95
	Coloured	6.27		LQ2500	4.83
Brother	MT1009	3.10		Coloured	3.60
	Coloured	4.45	Shinwa	CP80	3.78
	HR15/25/35	3.03		Coloured	5.01
	Coloured	3.81	Star	Gemini 10/15	1.40
Cannon	PW1156/1080	2.89		Coloured	1.90
Epson	FX/MX/FT/RX80/85	2.75		NL10	4.63
	Coloured	3.81		Coloured	5.80
	LX80	2.52		Rada 15	2.65
	Coloured	3.50		Coloured	4.45

QUALITY DISK BOXES

3 1/2 HOLDS 40 8.10	5 1/4 HOLDS 50 8.50
HOLDS 90 10.50	HOLDS 100 11.50

★ Copy Holders ★ Turntables ★ Printer Stands ★ Binders
★ CPU Stands ★ Acoustic Hoods ★ Disks
Preprinted continuous stationery + Labels

Phone CLP on (0258) 89 400
Freepost Blandford Dorset DT11 7BR
Telecom Gold Box 72: MAG 70253



RAGLEY DATA SYSTEMS LTD,
Pendennis House, Keevil, Trowbridge,
Wiltshire BA14 6NA.
Telephone: 0380 870867.
Telex: 449148 RDS

TEL: 0789 765295
0380 870867

COMPUTERS

We supply and install:

★ — AMSTRAD — APRICOT — ★
★ — TANDON — TANDY — TATUNG — ★
★ — PACKARD-BELL — ZENITH — ★

CALL for prices

Portable SPECIALISTS — SPECIAL OFFERS INCLUDE —

Toshiba T3100-20	2999	Zenith Z181	1379
Toshiba T1100+	1377	Zenith Z183	1999
Toshiba T1200	2110	Datavue Spark	747
Toshiba T5100	New!	Datavue Snap	2147

DESKTOP PUBLISHING SYSTEMS

Systems supplied to meet your requirements:

CANNON SCANNER SYSTEM	1316	EPSON GQ3500	1427
VENTURA	Call	CANON Ser2	1806
PAGEMAKER	Call	H-P LASERJET	2081
MICROSOFT MOUSE	127	CENTRONICS PP8	1600
WYSE WY700 MONITOR	765	WORDPERFECT	298
APRICOT LASER PRINTER			1750

PRINTERS

Examples from our wide range:

EPSON LX800	205	BROTHER 1409	335
EPSON FX800	306	BROTHER 1509	378
EPSON FX1000	391	BROTHER 4018	1187
EPSON LQ800	435	BROTHER HR40	833
EPSON LQ1000	575	PANASONIC P1081	180
EPSON LQ2500	799	PANASONIC P1595	539
H-P ThinkJet	435	STAR NB24/15	665

CALL for prices of other models & alternative brands

PC SYSTEM ENHANCEMENTS

★ — INTERQUADRAM SPECIALIST DEALER — ★

Full support on this exciting range!

Current SPECIAL OFFERS include

Pro-Sync card	225	Quadboard AT 1MB	430
Princeton HX12E Monitor	381	Quad 386XT	1206
XT RAM card 384k	180	Quad Sprint 8086	242

★ ★ NEW ★ ★ QUADSTAR LOCAL AREA NETWORK ★ ★ NEW ★ ★

★ — PLUS THE PORTABLES — SPARK AND SNAP — SEE ABOVE — ★

Irwin 20Mb Int. tape	475	20Mb Hardcard	305
30Mb Hardcard XT type	389	Microsoft Mouse	127
Hercules comp. card	75	Vega EGA card	256
Taxan EGA & Monitor	665	Serial/parallel	75
Lifesaver 2e Ext. tape			550

CAD SYSTEMS

Complete systems configured to suit your budget & requirements.

Preferred products from major manufacturers include:

AUTOCAD — PRO-DESIGN — TDS —
HEWLETT PACKARD — ROLAND — CHERRY

SOFTWARE

Special offers this month:

Lotus 1-2-3	250	Symphony	375
Supercalc IV	235	Sage Accountant +	165
Wordstar 1512	60	Wordstar 2000	250
Multimate Advantage	299	Cardbox Plus	256
dBase III plus	470	Flight Simulator	39

TERMINALS

Wyse 50	380	Opus II	307
Wyse 60	420	Ampex 220	365
Wyse 85	390	Esprit 6515	417
Wyse 99GT	685	Esprit 6310	417
Wyse 60 PC	420	Esprit 6110+	307

DEDICATED TO SERVICE

CALL US FOR:

SYSTEMS DESIGN — MAINTENANCE — RENTAL —
LEASING — SECOND-USER & EX-DEMO EQUIPMENT

★ ★ ALL PRICES EXCLUDE DELIVERY & VAT ★ ★

TELEPHONE 0380 870867/0789 765295

★ 24hr Ansaphone ★

RANGE OF SECOND USER & EX-DEMO EQUIPMENT AVAILABLE

CHECK OUR PRICES FIRST

up to 40% off

1. Bespoke Software in:
'C', Basic, Database Languages including
Dbase II/III, TAS+, DataEase, Psion Archive
2. Professional advice given
3. Competitive Prices

4. Suppliers to PLC's and
Government Departments
5. Access and Barclay Cards accepted
6. Open Saturdays 10am-4pm

AMSTRAD PC

	HERCULES Mono	(CGA) Colour	(EGA) Colour
NEW MODELS			
PC 1640 Single disk	£455	£579	£709
PC 1640 Twin disk	£535	£659	£789
PC 1640 20MB Amstrad Hard Disk	£799	£925	£1059

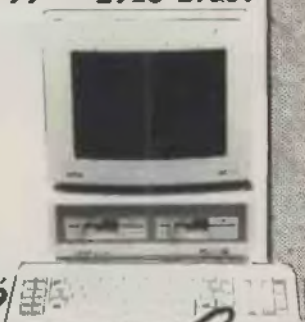
SPECIAL OFFERS

ON PC 1512's	Mono	Colour
PC 1512 Single disk	£389	£495
PC 1512 Twin disk	£459	£585

*All PC 1512's include Migent Ability
and four U.S. Gold Games

AMSTRAD PCW—NEW MODEL
PCW 9512-512K 1x3" Single 720K
disk, Daisy Wheel printer, Locoscript II,
Mail Merge & Spell Checker **£439**

*Whole range of PCW Software at
massive discounts. Please call for details.



A.S.T.

- *Manufactured in USA* High Quality*
- *10 MHz Clock Speed* AT Compatible
- *Complete Desk Top Publishing Systems*

PREMIUM 286	RRP	RTM
Premium 286—Model 120—1MB RAM, 20MB Hard Disk, Mono	£2525	£1750
Premium 286—Model 140—1MB RAM, 40MB Hard Disk, Mono	£2925	£2050
Premium 286—Model 170—1MB RAM, 70MB Hard Disk, Mono	£3325	£2350
Publisher I—Model 140, Turbo Laser, Turbo Scanner, Mouse, Mono	£7495	£5250
Publisher II—Model 140, Turbo Laser, Mouse, Mono	£5995	£4150
Premium EGA Screen extra cost	£400	£279



CARRIAGE

All prices include delivery.
Orders over £79—free next day delivery
Orders below £79—free 1st class post next day £2.50

SOFTWARE

INTEGRATED	RRP	RTM	WORD PROCESSORS	RRP	RTM
ABC (all in one)	£149	£99	Sage PC-Write	£99	69
Ability	£99	£65	DAC Word II	£43	£31
Ability+	£159	£105	Gem Write	£87	£65
Integrated 7	£99	£65	GST First Word	£69	£49
First Framework	£87	£65	Voltswriter 3	£199	£135
Logishta	£99	£69	Voltswriter D/L	£39	£29
Psion PC4	£69	£49	Microsoft Word Jnr	£61	£45
Psion Xchange	£495	£295	SSI Word Perfect Jnr	£86	£65
			SSI Word Perfect Personal	£173	£125
ACCOUNTS			SPREAD SHEETS		
Migent Account Ability	£99	£65	Lotus 123	£395	£229
Sage Accountant	£149	£105	Microsoft Multiplan 3	£175	£114
Sage Accountant+	£199	£135	Microsoft Multiplan Jnr	£61	£45
Sage Bookkeeper	£99	£69	Paperback Vp-Planner	£79	£57
Comsoft Bookworker	£173	£95	SSI Mathplan	£375	£269
Sage Financial Controller	£299	£205	Sage PC Planner	£99	£69
Sage Payroll	£99	£69			
MAP Integrated Accounts	£175	£115	DTP/GRAPHICS		
MAP Complete Accounts	£299	£199	Microsoft Fleet St. Editor	£109	£75
MAP Payroll	£99	£69	Xerox Ventura VII	£795	£465
TAS Accounts	£499	£359	Autosketch	£79	£56
TAS Accounts—Advanced	£799	£575	TurboCad (Full Version)	£325	£229
DATABASE			TurboCad Jnr	£86	£59
Space Retrieve	£99	£69	Delta Graph	£61	£39
TAS+ Latest Version	£99	£69	Gem DTP	£300	£145
TAS+ Developer	£199	£139	Fontasy	£69	£49
TAS+ Developer Multi-User	£349	£249			
Rbase 5000	£295	£205	NEW		
First Software base II	£99	£65	SSI Word Library	£147	£105
Caxton Card Box	£52	£35	Sage Desk Set	£69	£49
Comsoft Delta 4.3R	£87	£59	Sage PC Chart	£99	£69
Sapphire DataEase	£545	Call	Network Microsoft		
TSI DAC-Base	£49	£35	Word	£795	£569
SSI Data	£195	£139	Multiplan 3	£395	£289
Paperback Vp-Info—Multi-User	£79	£57	Rbase V	£545	£379
COMMUNICATIONS			Project	£595	£429
Sage Chit Chat	£99	£69			
Dataseq Databall	£150	£109			
Gem Comm	£62	£45			

No license unlimited users/server.

PERIPHERALS

PRINTERS			MODEMS		
AMSTRAD			PAGE		
Work on PC Compatible Parallel Interface* Best value*			*British Built* High Quality* Superb Value*		
DWP 2000 80 Column 105 CPS, tractor feed	£138	£129	Nightingale V21, V23, Manual	RRP	RTM
DWP 2000 80 Column 105 CPS, 26 NMQ	£169	£139	Linnet V21, V23, Auto-dial/Answer	£58	£79
IBM/ Epson Compatible			Series 4 21235 V21, V23, Multipass	£142	£115
DWP 4000 136-Column 200 CPS, 50 CPS NMQ	£349	£265	Series 4 17005, V21, V23, V22 1200	£265	£210
IBM/ Epson Compatible			Series 4 24005, V22, B15	£399	£319
PANASONIC			Pace/Amstrad Modem Card & Datapack	£499	£389
British Built			Software—works on PC & Compatibles	£149	£129
PI081 80 Column 120 CPS, 28 CPS NMQ	£245	£195			
Tractor			**Special Offer Sage Chit Chat & Linnet Modem £179**		
PI595 136 Column 240 CPS, 51 CPS NMQ	£695	£459			
Tractor					
PI592 136 Column 180 CPS, 38 CPS NMQ	£495	£395			
Tractor					
LASERS					
Citizen Overture 110 Laser 10ppm IBM/Diablo	£1995	£1329			
A.S.T. Laser 8ppm & 12 months on site warranty					
IBM/Diablo	£3250	£2179			
Canon LBP-8 II 8ppm	£2195	£1679			
AST Turbo Scanner	£1495	£1079			
TEAC EXTERNAL TAPESTREAMER 22MB, backs up 20MB in 4 minutes	£499	£429			

R.T.M. SYSTEMS

Tel: 0772 58099 (24 hours)

Telex: 265871 Monref G Quote

"Ref Mag 31520" as first line of text.

27 Bold Street,
Preston PR1 7NX

VISA

Access

Please add VAT—All prices subject to change
without notice and goods subject to availability.

£200 OFF AMSTRAD PC 1640's

Delivery FREE within U.K.

FREE 10 disks
containing games,
utilities etc, with
each computer
Worth over £100



CLASSIC INTEGRATED ACCOUNTS

CLASSIC Accounts	£1140	£199
CLASSIC Accounts +		
Stock	£1425	£249
CLASSIC Stock Control	£285	£69
CLASSIC Payroll	£385	£99

DECEMBER SPECIAL

AOKI TURBO XT 20MB

CLASSIC ACCOUNTS

DOT MATRIX PRINTER

ONLY £999 (+ £20 carriage)

COMPUTER UPGRADES

20Mb Tandon Hardcard	£240
20Mb Tandon H/D (with fittings)	£260
32Mb Miniscribe Hardcard	£285
40Mb Miniscribe H/D (with fittings)	£370
512K on Expansion Board	£145

CAD/CAM SOFTWARE

Generic Cadd3	£99
Drafting Enhancements	£49
Drafting Enhancements	£49
Auto Convert	£49
Auto Dimensioning	£49
Dot Plot	£49

Call us for Specialist Systems e.g.

Multi User JAROGATE 286 and 386, BROMCOM etc.
with SMB or PEGASUS SENIOR Accounts.

Desk Top Publishing systems with Laser Printer

AMSTRAD COMPUTERS

1640 ECD 40Mb	£1099
1640 ECD 32Mb	£1049
1640 ECD 20Mb	£999
1640 CD 40Mb	£979
1640 CD 32Mb	£929
1640 CD 20Mb	£879
1640 MD 40Mb	£849
1640 MD 32Mb	£799
1640 MD 20Mb	£749
1512 CM 40Mb	£919
*1512 CM 32Mb	£869
*1512 CM 20Mb	£819
1512 MM 40Mb	£789
*1512 MM 32Mb	£739
*1512 MM 20Mb	£689

*With Free ABILITY etc.

AMSTRAD WORD PROCESSORS

PCW 9512	£479
PCW 8512	£399
PCW 8256	£299

TANDON COMPUTERS

PCX 20	£899
PCA 20	£1399
PCA 30	£1599
PCA 40	£1799
PCA 70	£2299

EGA Systems + £325

EPSON COMPUTERS AND PRINTERS

PCHD 20Mb	£899
LQ1000	£575
LQ800	£475

SANYO MBC 16 COMPUTERS

**Twin Floppy Mono	£699
**20Mb Mono	£999
**Twin Floppy Colour	£949
**20Mb Colour	£1199

**With 12 months on site maintenance

AOKI COMPUTERS

Turbo XT 20Mb	£769
---------------	------

APRICOT COMPUTERS

XEN-i XD	from £2395
XEN-i 386	from £2995

ARKEL COMPUTER SERVICES LTD
7A MILL HILL ROAD, MARKET HARBOROUGH,
LEICS LE16 7DN

TELEPHONE: 0858 32495

Please add 15% VAT to all U.K. orders

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.

BREAKDOWNS? Call the new extra-fast Micro-Sprint service - for guaranteed delivery within two hours.

Micro-Sprint 01-700 4621

• APPLE • APRICOT •
• IBM PC. XT. AT. PS/2 •
• OLIVETTI • MACINTOSH •
• TANDON • COMPAQ •
• SIRIUS • LASER PRINTERS •
• DESK-TOP PUBLISHING •
• FAX MACHINES •

01-700 4848



MICRO-RENT
St. Marks Studios,
Chillingworth Road,
London N7 8QJ.

MAC II 40MB



£126
PER WEEK*

TANDON PCX



£32
PER WEEK*

IBM PC AT



£52
PER WEEK*

H-P LASERJET



£60
PER WEEK*

*Prices quoted are based on 3-month rental, excluding VAT.

SOFT-OPTIONS

YOUR ONE STOP COMPUTER SHOP

66 CAVENDISH PLACE

EASTBOURNE

E. SUSSEX BN21 3RL



★ 12 months full warranty

OPTION-386 (illus.)

OPTION-386 £2895 ex-VAT

- ★ 80386, 16/20MHz
- ★ 2 meg. of High Speed RAM fitted
- ★ 1 x 1.2mb floppy drive
- ★ HighRes mono monitor
- ★ Herc. compatible graphics card
- ★ 2 serial, 2 parallel ports
- ★ 101 key enhanced keyboard
- ★ 40 meg. 40ms hard disk
- ★ DOS 3.2 with GW Basic
- ★ Runs all major IBM software
- ★ DOS 3.2 — GW-Basic with all "Option" Systems

OPTION-286 £1395 ex VAT

- ★ 10 Mhz 80286, 1Mb RAM, 120NS
- ★ Specification similar to Option-386
- ★ 30Mb, 40MS Seagate, included
- ★ CGA Option card & monitor add £275
- ★ EGA Option card & monitor add £375
- ★ Nation wide, maintenance contracts available.
- ★ FREE caring and supportive backup for our machines for as long as you require.
- ★ All callers made most welcome.

★ FREE wordprocessing, spreadsheet, database, utilities and games software with all "option" systems

★★★ASK ABOUT OUR OPTION-88, full spec. 8088 machine from £669, 30Mb H/D version £865

Amstrad 1512 DD/Mono	£499.00	FREE
Amstrad 1512 DD/col	£649.00	128k
Amstrad 1512 20meg Mono	£899.00	Mem
Amstrad 1512 20meg col	£1069.00	up/g
Amstrad 1640 DD EGA	£899.00	with
Amstrad 1640 20meg EGA	£1199.00	all
Amstrad DMP 3160 printer	£199.00	1512's
Amstrad DMP 4000 printer	£349.00	
Int. Modem V21/V23 + s/w	£149.00	
Amstrad 8256 SD inc s/w	£299.00	
Amstrad 8512 DD inc s/w	£399.00	
Amstrad PCW 9512, from	£499.00	

ACCESSORIES FOR AMSTRAD & IBM

30meg Hard card	£345.00
40meg stream tape kit	£399.00
20meg Seagate inc kit	£325.00
30meg Seagate inc kit	£345.00
40meg Seagate inc kit	£575.00
3" Disks, box of 10	£26.00
Ribbon for 8256/8512 range	£5.65
Ribbon for DMP 3000 series	£5.20
Ribbon for DMP 4000 series	£6.99
(3" disks sold sep)	£2.60ea

PRINTERS

Canon Laser LBP-8A1	£1950.00
Canon Laser LBP-811	£2195.00
Epson Laser GQ3500	£1795.00
HP Laserjet 2	£2618.00
OKI Laserline 6	£1899.00
★ 2 year warranty on most printers	
Juki 5520 180cps	£449.00
Juki 7200C 324cps	£1625.00
Micro-P MP135, 135cps	£169.00
Micro-P MP165, 165cps	£229.00
Micro-P MP480, 480cps	£369.00
Micro-P MP201, 136col, 200cps	£349.00
Cannon Ink Jet, 7 colour	£449.00
Cannon Bubble Jet	£449.00
Epson LX86, 80col, 120cps	£275.00
Epson FX80, 80col, 200cps	£430.00
Epson FX1000, 132col, 200cps	£555.00
All printer accessories available.	
Ribbons, sheet feeders etc.	
Ring for details. LOW, LOW PRICES	
OKI Printers, full range, LOW PRICES	

MONITORS & ACCESSORIES

14" Mitsubishi Dual CGA/EGA	£499.00
14" Mitsubishi CGA, 640x200	£349.00
14" Taxan 770 + multisync	£625.00
12" Taxan Hi-res RGB	£389.00
14" Philips Med-res RGB	£269.00
12" Philips Mono, amber or green	£129.00
12" Philips, Mono, IBM compat	£99.00
14" NEC Multisync	£595.00
CGA Herc Card	£69.95
EGA/CGA/Herc Card	£129.95
AT above-board mem. 0k	£110.00
256k, 120ns memory set (9 chips)	£24.75
64k, 150ns memory set, (9 chips)	£11.95
IBM compatible printer cable	£8.95
Maxell DD/DS disks, box of 10	£13.65
Verbatim DD/DS, plas box 10	£14.65
ACT DD/DS disks, box 10	£8.25
3.5" DD/DS Verbatim disks	£29.95

We also stock Paper, Labels and many other accessories, ask for FREE lists.

★ SPECIAL ★

OPUS EGA card AND monitor	£399.00
OPUS EGA monitor alone	£329
OPUS Spacer + FREE chair	£149.95

SOFTWARE & BOOKS

We have an ENORMOUS list of all popular software titles, far too large to do justice to here, please ask for our lists — you'll be glad you did.

Open: Mon-Sat 9.00-5.30

SALES HOTLINE (0323) 411875

FAX (0323) 4118

ALL PRICES EX-VAT

ALL PRICES 9 SPECS SUBJECT TO CHANGE WITHOUT NOTICE

★ ALL CALLERS MADE VERY WELCOME — COME AND TRY OUR MACHINES AND SOFTWARE BEFORE YOU BUY — NO OBLIGATION — EXTENSIVE REFERENCE LIBRARY

CARDCHECK LIMITED

THE MICRO CENTRE

572 Wilmslow Road, Withington
Manchester M20 9DB

COMPUTERS

IBM PS/2	
Model 30 System Unit	£995
Model 50 System Unit	£2195

COMPAQ

Deskpro 286 Model 20	£2370
Deskpro 286 Model 40	£2735
Deskpro 386 Model 40	£4750
Other ranges	

TANDON

PCX20	£1197
PCA20	£1458
PCA30	£1272
target 20 and target 30	Call

AMSTRAD/TOSHIBA

Call for prices

DOT MATRIX PRINTERS

CITIZEN

120D	£160
MSP20	£335
HQP45	£660

EPSON

LX800	£235
LQ800	£475
LQ1000	£635

STAR

NL10	£245
SG15	£325

DAISYWHEEL PRINTERS

Juki 6000	£165
Juki 6100	£286
Pan PR281	£287
GPR2000	£189

LASER PRINTERS

Canon LBP-8 MkII	£1795
Kyocera F-1010 (10PPM)	£2345
HP Laserjet	£1595
Centronics PP-8	£1395
Epson	£1595

MONITORS

Call Philips Mono from	£69
Call for full Microvitec, Eizo, Kaga and Casper mono colour EGA range	

VIDEO CARDS

Mono Hercules compatible	£77
EGA Multi-switches	£225
Vega Video 7	£250

MOUSE DEVICES

Summa Mouse from	£89
Manager Mouse	£115
MI-KI Mouse	£60
Modems	Call
Disk Drives	Call

SOFTWARE

Microsoft Word Junior	£55
Microsoft Word	£340
Sidekick (Borland)	£59
dBASE III Plus	£400
dBASE III (Amstrad PCW)	£109
Wordstar 1512	£55
Wordstar 2000 Plus	£375
Supercalc III (Amsoft)	£55
Sage Accountant Plus	£169

ACCESSORIES

5.25" DSDD £10 per box of 10	
3.5" DSDD £25 per box of 10	
DRAMS, Expansion and I/O cards	
Cables, Listing Paper and Ribbons in stock	

Our highly qualified Technical Staff will offer you full technical advice and support.

Export enquiries welcome. Visa and Access welcome. All prices exclusive of VAT. Nominal P&P charge. Prices subject to change without notice. CONTACT SALES DEPARTMENT (061) 448 1080

LOYSTAR

the Power without the price

Do you have an IBM or a true compatible?

We've done it again with a professional word processing package at unbelievable price of £39.95 including VAT & postage. No more installation problems, it is ready for you to use, enter LOY from your keyboard and start the editing session.

FEATURES:

- ★ Drop down menus containing all the commands, accessed by a function key.
- ★ Most of the menu commands are accessed from the keyboard (interactive word star look alike commands).
- ★ Two windows, to edit two files simultaneously.
- ★ On-line help facility.
- ★ On-line justification, word wrap and pagination.
- ★ Advanced dot commands and embedded printer control commands.
- ★ Ultra fast search and search/replace facility.
- ★ Recovery of the deleted lines of text.
- ★ Built in DOS commands, Copy, Del, Ren.
- ★ Compatible with Turbo Lighting spell checker.
- ★ No overlay business, one Exe. file, load and run.
- ★ The file size is limited by your memory size.
- ★ Support wide range of printers through the PDG utility, which allows you to implement a custom driver to drive about any printer in the market place.

Above all the price is only £39.95 inc VAT and postage
Cheques or postal orders should be made payable to

LOYVIEW LIMITED

2nd Floor, 155 Oxford Street, London W1

Tel: 01-734 2408/9

NTSGROUP

Call 031-220 1115

or 01-373 3050



PC/XT



New Compact!
16MHz
Norton SI 15.3



New 386 !

NTS PC 14MHz From ONLY £399

Spectacular low cost IBM compatible entry level system. Full 640K RAM, dual RS232 C and parallel printer interface. NEC V20 processor dual clock speed 4.77 14MHz, one 360K floppy drive, Hercules compatible, 101 Key enhanced keyboard. Free PCWrite word processing software. Full 12 months parts labour warranty - unbeatable. Call now!

NTS XT-14MHz from

ONLY £695

Amazing Amstrad, better, fast NEC V20 dual 4.77 14MHz processor, 20Mb hard disc, one 360K floppy drive, dual RS232 ports, and parallel printer port, 640K RAM, AT style 101 key keyboard, Hercules compatible graphics, 12" high resolution TTL monochrome monitor with tilt-swivel base.

FREE NTS mouse with hard disc version.

NTS AT286-16 Compact from ONLY £895*

We think that this is the fastest AT on the market. It boasts VLSI technology and an ultra small footprint and will run most applications at 16 MHz. One 1.2 Mb floppy drive, or fast access 20 Mb hard disc, dual RS232 ports and parallel printer port, 101 key enhanced keyboard, full 1 Mb RAM 12" high resolution TTL paper white, green or amber monitor available.

8 slot chassis.
* Zenix V version with 101 0 ports available for £2,475. Handles up to 8 concurrent users - call for further details.

NTS AT 386-20 From

ONLY £1795*

A fast 180386 based mini-computer with 20, 40 or 80 Mb hard disc, one 1.2 Mb floppy drive, dual RS232 and parallel printer ports, 12" paper white, green or amber monitors. * Unix system 5 available with up to 301/0 ports supporting up to 24 concurrent users, call for further details.

We don't know of a faster 386, ours runs at 20 MHz with 'O' wait states, and comes with 2 Mb RAM as standard, expandable to 8 Mb on board.

NTS - PORTABLE/LCD

From only £945*

Superb backlit LCD Display and weighs only 9kg! Smart VU system shows the LED Clock speed etc.

Available in XT, AT or 386 format with various combinations of floppy and hard discs. Call now for further details!

HOW TO ORDER: Order with confidence, 14 days money back guarantee. Full 12 months parts/labour warranty. Call 031-220 1115 or 01-373 3050 (London) for further details or mail cheque/Postal order to: 9 St. Colme Street, Edinburgh EH3 6AA. Access and Visa welcome. All prices exclude VAT at 15% and are subject to change without notification. Personal callers are welcome. Generous discounts to dealers and Education. Call for the name of your nearest dealer or distributor. On-site maintenance available nationwide.

CALL NOW FOR THIS MONTH'S
SPECIAL OFFERS
ERRORS AND OMISSIONS ACCEPTED
Benchmarks Per Handmark's PC Test

ANNEX

0494 81 6686

★ COMPETITIVE PRICES
★ EX-STOCK DELIVERY
★ PROFESSIONAL ADVICE

TANDON

PCA20 AT 20MB Winchester, 1.2MB floppy, 1MB, P/S port	£1225
PCA30 AT 30MB Winchester, 1.2MB floppy, 1MB, P/S port	£1489
PCA40 AT 40MB Winchester, 1.2MB floppy, 1MB, P/S port	£1679
PCA70 AT 70MB Winchester, 1.2MB floppy, 1MB, P/S port	£2059
TARGET20 AT Small footprint, as PCA20	£1305
TARGET40 AT Small footprint, as PCA40	£1695
EGA SYSTEMS ADD	£260

AMSTRAD

PC 1640 SD ECD Single 360K floppy drive, enhanced colour	£720
PC1640 DD ECD Dual 360K floppy drive, enhanced colour	£805
PC 1640 HD ECD 20MB hard disk, 360K floppy drive, enhanced colour	£1070
PC 1640 SD CD Single 360K floppy drive, colour	£590
PC 1640 DD CD Dual 360K floppy drive, colour	£670
PC 1640 HD CD 20MB hard disk, 360K floppy drive, colour	£940
PC 1640 SD MD Single 360K floppy drive, mono	£460
PC 1640 DD MD Dual 360K floppy drive, mono	£545
PC 1640 HD MD 20MB hard disk, 360K floppy drive, mono	£815
PC 1512 SDM Single 360K floppy drive, mono	£375
PC 1512 SDC Single 360K floppy drive, colour	£505
PC 1512 DDM Dual 360K floppy drive, mono	£470
PC 1512 DDC Dual 360K floppy drive, colour	£595

OPUS

SYSTEM 1 Mono, 1x360K floppy, 256K RAM	£495
Colour, 1x360K floppy, 256K RAM	£695
EGA, 1x360K floppy, 256K RAM	£795
SYSTEM 2 Mono, 1x360K floppy, 1024K RAM	£595
Colour, 1x360K floppy, 1024K RAM	£795
EGA, 1x360K floppy, 1024K RAM	£895
SYSTEM 3 Mono, 2x360K floppy, 1024K RAM	£695
Colour, 1x360K floppy, 1024K RAM	£895
EGA, 1x360K floppy, 1024K RAM	£995
SYSTEM 4 Mono, 1x360K floppy, 1024K RAM, 20MB hard disk, and controller card	£985
Colour, 1x360K floppy, 1024K RAM, 20MB hard disk, and controller card	£1185
EGA, 1x360K floppy, 1024K RAM, 20MB hard disk, and controller card	£1285

MONO MONITORS

TAXAN	
KX123 12" green, PC compatible	£95
KX124, 12" amber, PC compatible	£95
KX125 12" b/w, PC compatible	£95
VIKING-1 19" b/w display system, software included	£1725

COLOUR MONITORS

TAXAN	
K14P 14" Vision Standard Resolution	£195
K12SV620 12" Supervision 620 RGB High Res	£275
K12SV625 12" Supervision 625 RGB High Res	£315
K12SV4M 12" Supervision 1VM RGB Ultra High Res	£315
K12SV4 12" Supervision 1V RGB Ultra High Res	£420
K12SV650 12" Supervision 650 EGA Ultra High Res	£395
K14SV760 14" Supervision 760 EGA Ultra High Res	£415
K14SV765 14" Supervision 765 EGA Ultra High Res	£395
K14SV760/VDE 14" Supervision 760 IBM EGA Ultra High Res	£475
K14MV770+ 14" Multivision 770+ Ultra High Res	£525
K16SV840 16" Supervision 840 RGB High Res	£665
K16SV860 16" Supervision 860 EGA High Res	£665

K20SV980 20" Supervision 980 Ultra High Res	£1875
K20SV990 20" Supervision 990 Ultra High Res	£1945
NEC	
MULTISYNC MONITOR	£585

SOFTWARE

LOTUS 1-2-3	£285
SYMPHONY	£395
WORDSTAR PROFESSIONAL	£240
D BASE III+	£385
SMART	£465
FRAMEWORK	£355

MATHS CO-PROCESSORS

D8087 5MHz	£89
D8087-1 10MHz	£110
D8087-2 8MHz	£110
D8087-6 6MHz	£129
D8087-8 8MHz	£175
D8087-10 10MHz	£195
D8087-16 16MHz	£379

32 BIT ADD IN BOARDS

TRANSPUTER	
Monoputer-4 IMST414-20 transputer, 2MB	£1395
Monoputer-8 IMST800-20 transputer, 2MB	£1795
ACORN SPRINGBOARD	
1MB PC Arm Card 32 bit RISC	£995
4MB PC Arm Card 32 bit RISC	£1950
ACORN SOFTWARE	
"C"	£250
LISP	£250
Fortran	£250
Prolog	£250
BBC BASIC	50
INTEL INBOARD	
Intel Inboard 386 0K	£1250
Intel Inboard 386 2MB	£1595
Intel Inboard Piggyback 1MB	£355
Intel Inboard cable	£140
ORCHID	
JET 386 16MHz	£785

ADD IN BOARDS

HERCULES IN COLOUR HI RES 720x348	£299
HERCULES MONO GRAPHICS CARD PLUS	£189
INTEL ABOVE BOARD AT WITH 512K	£459
INTEL ABOVE BOARD AT WITH 2MB	£779
287 TURBO-10	£395
287 TURBO-10	£545
NUMBER SMASHER 640K	£485
NUMBER SMASHER 640K + 8087	£685
FASTCACHE286 9MHz	£345
FASTCACHE286 12MHz	£495
FASTCACHE286 9MHz + 287	£625
FASTCACHE286 12MHz + 287	£895
BOCARAM AT 0K	£156
BOCARAM AT 1MB	£273
BOCARAM AT 2MB	£390
BOCARAM AT 4MB	£702
BOCARAM AT Daughter Board 0K	£78
BOCARAM XT 0K	£124
BOCARAM XT Daughter Board 0K	£189

**MANY MORE ITEMS
AVAILABLE PLEASE
PHONE FOR DETAILS**

Annex Components Ltd
Unit 3A
St Johns Estate
Penn, Bucks
HP10 8HR

PLOTTERS

7440-OP1 COLOUR PRO. 8 PEN A4	£875
7475-OP1 6 PEN GRAPHIC PLOTTER A4/A3	£1521
7550A 8 PEN AUTO SHEET FEED A4/A3	£3315
7570A DRAFT PRO PLOTTER A1/A2	£4055
7595A DRAFTMASTER I A4-40 SINGLE SHEET	£7715
7596A DRAFTMASTER II A4-A0 ROLL FEED	£7860

LASER PRINTERS

EPSON	
GQ3500 6 PAGE/SINGLE BIN	£1390
CANON	
LBP8A1 8 PAGE/A4	£1675
LBP8A2 8 PAGE/A4/GRAPHICS	£2425
LBP8MARK II	£1620
KYOCERA	
1000 10 PAGE/SINGLE BIN	£2090
1200 10 PAGE/SINGLE BIN	£3115
2000 10 PAGE/DUAL BIN	£4285
HEWLETT PACKARD	
2686A LASER JET	£1495
3344A LASER JET SERIES II	£1945
2686D LASER 500	£2995

DAISYWHEEL PRINTERS

JUKI	
6100 20 CPS	£210
6200 30 CPS	£409
6300 40 CPS	£629
6400 60 CPS	£759
MICRO-P	
26 26 CPS	£232
40 40 CPS	£318
PANASONIC	
KX-P3131U 17 CPS	£295

DOT MATRIX PRINTERS

EPSON	
LX 800 180 CPS/25 NLQ/80 COL	£210
LQ 800 180 CPS/60 NLQ/80 COL	£450
LQ 1000 180 CPS/60 NLQ/132 COL	£610
EX 800 300 CPS/50 NLQ/80 COL	£430
EX 1000 300 CPS/50 NLQ/136 COL	£575
FX 800 200 CPS/50 NLQ/80 COL	£330
FX 1000 200 CPS/50 NLQ/80 COL	£425
LQ 2500 270 CPS/90 NLQ/136 COL	£815
SQ 2500 INK JET	£1049
AMSTRAD	
DMP 3160 80 COL	£170
DMP 4000 200 CPS/50 NLQ/WIDE	£295
PANASONIC	
KX-P-1081 120 CPS/20 NLQ/80 COL	£180
P1592 180 CPS/38 NLQ/136 COL	£435
CANON	
PW 1080 AT 160 CPS/27 NLQ/80 COL	£260
A55 180 CPS/45 NLQ/132 COL	£415
A60 200 CPS/100 NLQ/80 COL	£415
A65 200 CPS/100 NLQ/132 COL	£480
MICRO-P	
135 135 CPS/27 NLQ/80 COL	£169
165 165 CPS/35 NLQ/80 COL	£229
200 200 CPS/40 NLQ/80 COL	£329
201 200 CPS/40 NLQ/132 COL	£349
480 480 CPS/74 NLQ/80 COL	£369
FUJITSU	
DX2100 220 CPS/44 NLQ/80 COL	£339
DX2200 220 CPS/44 NLQ/136 COL	£441
DX2300 270 CPS/54 NLQ/80 COL	£489
DX2400 270 CPS/54 NLQ/80 COL	£593
DL2400 180 CPS/60 LQ/136 COL	£789
DL2600 288 CPS/96 LQ/136 COL	£1053
DL3300 240 CPS/60 LQ/80 COL	£555
DL3400 240 CPS/60 LQ/136 COL	£644
DL8800 240 CPS/80 LQ/136 COL	£2992

Prices Exclude only
VAT and Delivery

Tel: (0494 81) 6686
(0494 81) 6687
Telex: 83884 TRANST G

33 MARKET STREET, HECKMONDWIKE, WEST YORKS

26 PCW DECEMBER 1987



Goto Computers



10 Old Crown, Windsor Road, Slough, Berks SL1 2DL

Sales Hotlines:
Telex 847698 GOTO CO G



Slough (0753) 34191
Slough (0753) 824767

★ 160 MILE FREE DELIVERY — ★ ASK ABOUT OUR 3 CHEQUES OVER 3 MONTHS SCHEME

(£5 OVER 160 MILES OR GOODS UNDER £100)

COMPUTERS

	£
ALL INCLUDE KEYBOARD MONITOR % DOS	
AST Premium 286 6/8/10MHz 20Mb Mod 120	1740
Amstrad PC1640 20Mb HD EGA Mon KB etc	1070
Amstrad PC1640 20Mb HD Hercules	830
EFI AT286 20MbHD 640k 1.2FD 6/10MHz	999
Epson PCAX 40mg 640k 10MHz Mono Mon	1949
Epson PCAX2 20mg EGA 8 or 10MHz 1.2mFD	1550
Flyer A286 20Mb HD Laptop	3325
GOTO Apollo 1 8088-2 8MHz 256k 1FD	385
NEC APC 1V20meg Multisync/EGA 640k	2095
NEC APC 1V40meg Multisync/EGA 640k	2395
NEC Multisync Lapheld PC 2x720k Dr	1200
NEC Powermate 2 286 10MHz Multisync Mono	2495
Olivetti M240 20meg HD 10Mhz Mon/KB/DOS	1495
Olivetti M380 40Mg 16Mhz Tape Back Up	Call
Opus EGA Monitor Instead of Mono Add	299
Opus PCV Turbo 6/10MHz 30MbHD 1.2FD	1275
Opus PC11 System 4.20Mhz 1024k 1FD	865
Opus PC11 30MbHD 1024k 1FD 10MHz NEW	965
Opus PC11 Turbo 10Vhz XT SF 512k NEW	499
Sharp PC-7221 AT Port 20megHD 1FD	2125
Sharp PC7100 20Meg Superwist Mon Etc	1375
Suntech PC XT Turbo 8Mhz 20mg 640k k/m	745
Tandon EGA Monitor instead of Mono Add	255
Tandon PAC 286 Removable Winchester	1575
Tandon PCA20 20mg 1mgRAM Mono	1150
Tandon PCA20 EGA 20m 1mRAM	1525
Tandon PCA30 30mg 1mgRAM 6/8MH	1395
Tandon PCA40 40mg 1mgRAM	1575
Tandon PCA70 70mg 1mgRAM	1815
Tandon PCX20 20mg 640k 360kFD No Serial	895
Tandon Target 20mg 1mgRAM 6/8MH	1175
Zenith Easy PC 20mg HD 720k 3.5FD	899
Zenith Z-181 Lapheld PC 2x720k Dr	1225
Zenith Z-183 Laptop 8MHz 10mHD 720k Dr	1940
Zenith Z-386 16MHz 1Mb RAM 40Mg HD	3925

MONITORS/ADAPTORS

	£
Genius 402 bit mapped A4+ card DkTpPub	£1250
NEC JC 1401 P3E Multisync EGA PGA 800	465
Paradise EGA Card EGA CGA Herc Auto Swc	199
Philips 7713G/23A FST 14" AG Mono	118
Philips CM9073 RGB TTL CGA/EGA 0.31mm	NEW
Philips Multisync	438
Sony Multisync 14"	530
Taxan 565 PGA card 640 x 480 132col	220
Taxan 660 12" EGA 640x350	370
Taxan 760 14" EGA 640x350	385
Taxan 770+ Multivision 1535Khz	470
Taxan 860 16" EGA 0.39mm dot 640x350	590
Taxan 980 + Card 20" EGA Autocad	1199
Taxan KX 123 Green NEW + Cable	92
Taxan Viking 119 1280x960 DeskTopPub	1525
VEGA Deluxe Video7 EGA card 640x480	230
Wyse 700 Graphics Subsystem 1280x800	665

ADD-ONS & UPGRADES

	£
AST Mini 11 i/o Exp Serial/Parallel Game/C1	95
AST PC/Short Memory Board 384k	99
Brother 3.5" Floppy Drive 1Mb Capacity	92
Cypher 1525 CT 20meg 1meg/min Amstrad	365
Cypher 5210 XT/AT Streamer	505
Dysan Hardcard 20Mb with Xiree	320
Fasidata Barcode Reader PC + software	300
Handy Scanner with card Software etc	355
Indenica 60meg External Streamer	540
Intel Above Board 286 512k XT or AT	345
Intel AbovePS/286 12 5mz 2Mb RAM	610
Intel Inboard AT to 386 cables/1Mb RAM	1300
Irwin 20Mb Internal Tape Streamer	475
Kodak Dataslow PC to Overhead Proj	900
Logimouse C7 PC or AT	76
Microsoft Mouse Bus/Ser+Paint etc	130
MiniScribe 30Mg HardCard only 9.5w	275
Miniscribe 3650 40Mb HD + WD + kit	300
NEC 20Mg H/Drive D5 126 80ms + WD + kit	260
NEC 40meg H/Drive D5 146H 40ms + WD + Kit	370
Orchid JET 386 16MHz 3x AT Speed	645
Orchid Ram Quest 50/60 2Mb for IBM 50/60	725
Orchid Tiny Turbo	315
Orchid Turbo 286 12mhz	840

DOT MATRIX PRINTERS

	£
Amstrad LQ3500 60LQ/160cps	345
Brother M-1724 72NLQ/216cps P/S 24p NEW	585
Brother M-2024 96NLQ/200cps 136cl 24p	565
Brother M-4018 67LQ/100NLQ/480 F T NEW	1075
Canon A65 34WPC/100NLQ/200cps 132 c	435
Citizen 120D 25NLQ/120cps 80 col	136
Citizen HQP-45 66NLQ/200cps 136c	480
Citizen LSP-100 30NLQ/150cps F/T NEW	178
Documetrix 150(cps) Ink Jet Portable	280
Epson EX 800 50NLQ/300cps 80 col	372
Epson EX 1000 50NLQ/300cps 136 col	498
Epson FX 1000 40NLQ/200 132 col NEW	380
Epson FX800 40NLQ/200 80 col NEW	293
Epson LQ 1000 80LQ/160cps 156c24pi	599
Epson LQ 2500 Colour Option	54
Epson LQ2500 90LQ/270cps 24pin	678
Epson LQ850 60LQ/180 F T P/S 80cl NEW	469
Epson LX800 25NLQ/150cps 2NLQF 3kb F/T	189
Juki 7200 24 wire flatbed AMF NEW	1200
NEC CP660 Color P6	435
NEC P55XL Colour	730
NEC Pinwriter P5XL 88NLQ/264 136c	705
NEC Pinwriter P6 72 216 24P 80col	375
NEC Pinwriter P7 72/216 24P 136c	435
NEC Pinwriter P9 120 380 24P 80col	950
OTC 850XL Printnet 850cps 240 1pm	1350
Panasonic KX-P1081 24NLQ/120 80col	143
Panasonic KX-P 1082 32NLQ/160cps 80col	185
Panasonic KX-P1592 51NLQ/240 136col	360
Panasonic KX-P1592 51NLQ/240 136col	320
Star NB 24-10 72NLQ/126cps 80Col 24pin	410
Star NB 24-15 139 Col version of NB24-10	516
Star NL10 30NLQ/120 80cl + Parallel I/Fc	180
Star NX15 136cl version of NL10 above	280

DAISYWHEEL PRINTERS

	£
Brother HR25XL 25cps dual 132Col	499
Brother HR40 F/T 30sheet Sheetfeed	705
Citizen Premier 35cps Fric/Frac	415
Juki 6200 30cps 132 col	365
Panasonic KX-P3131 17cps 110col Diab	235
Panasonic KX-P3151 22cps 132 col	355
Ricoh RP 3200Q 30cps 7k Bfr Diab 630	340
Ricoh RP3400Q 50cps 7k Bfr Diab 630	760

LASER PRINTERS

	£
BROTHER HL-8 1Mb Expansion	330
Brother HL-8 5 Fonts 8ppm LCD Control	1825
Centronics PP-8 8ppm 300dpi	1325
Citizen Overture 100 10ppm NEW	1260
Epson GQ-3500 6ppm HP Card + Parallel I/F	1295
Hewlett Packard Series 2	1875
Kyocera F-1000	1895
NEC Silentwriter 8ppm Dual I/Face	1875
OKI Laserline 6ppm	1300
Ricoh LP40 18-R	2695

PLOTTERS/DIGITISERS

	£
Cherry A3 Graphics Tablet Mk II NEW	460
Hewlett-Packard 7475A A3 6 Pen Plotter	1325
Hewlett-Packard ScanJet Imager	1500
Roland DPX-3300 A1 8 Pen 15kb EPH + Strand	2925
Roland DPX2200 A2 8pen 45cms Free GSM	2375
Roland DXY 880A A3 8pen FB 20cms	605
Roland DXY 885 A3 8pen 30cms 415/276cm	765
Roland DXY 980A A3 as 880A + EPH DigD 23cms	835
Roland DXY 990 as 885 + EPH DigD AdjSpee	965
Summasketch Plus 1000 lpi NEW	515

PROCESSORS/RAM CHIPS

	£
Intel 80287 8Mz	192
Intel 80287 6.5Mz	148
Intel 80287 5Mz	95
Intel 8087-2 8Mz (Amstrad/Comp/M24)	134

SOFTWARE

	£
Ability Plus NEW EGA with Rational Db	180
Autocad 2.6 Basic	260
Autoskelch	55
Boeing Calc 3D Power Spreadsheet	225
Borland SuperKey/Reflex/Sidekick each	54
Borland Reflex The Analyst V 1.1	62
Borland Turbo C NEW	75
Borland Turbo Pascal 4.0	55
Clipper dBase III Compiler NEW	310
Comsoft DELTA 4 Professional	265
DS BACKUP + Hard Disk Backup NEW	83
Dbase III + V 1.1 Unprotected	375
Eureka: The Solver Borland	65
Fontasy Ver 2 On-Screen Fonts/Draw	69
Formula FDP Form Design	370
Foxbase NEW	315
Framework II V 1.1	305
GEM Desktop Publisher + Desktop NEW	270
Harvard Graphics Log Charts 3D Graph	325
Harvard Professional Publisher	499
Javelin Plus to 65000 records extra I/E	235
Lotus 123 Rel 2.01	230
Lotus Freelance Plus	260
Lotus Manuscript Word Processor	230
Lotus Measure (Scientific) NEW	320
Lotus Metro NEW	52
Lotus Symphony 1.2	320
MACE + Unformat etc	69
MS Works Microsoft Integrated NEW	145
Mastergraphics Ashton Tate Presentation	370
Mathcad 2.0 Maths Scratchpad	185
Microsoft C 4.0	245
Microsoft QuickBasic ver 3.0	66
Microsoft Word 4.0 NEW	375
Multimate Advantage 11 NEW	280
Norton Advanced Utilities NEW	95
Open Access II V2 NEW	355
Paradox Rel 2.0 Relational DBase NEW	540
Paradox Stand alone ver	275
Pro-Design 11 ver 2.5 CAD	240
Protel PCB Designer	755
SAGE Accountant Plus	138
SAGE Financial Controller NEW	210
SAGE Payroll V7 NEW	69
Smart System 3.1 LAN Ready V 3.10	375
Statgraphics Ver 2.1 NEW	425
SuperProject Expert NEW	625
Supercalc 4.1	215
Ventura Desk Top Publishing V 1.1	470
What's Best! Linear Programming System	Call
Wordperfect 4.2 NEW	280
XTREE File & Directory Man/V2.0	42

COMMUNICATIONS

	£
Amstrad Comms Pack Card + Datatalk	130
Datatalk Software V3.27	95
Hayes 2400 V22bis External	545
Hayes Smartmodem V21 V23+ Smartcom 3	375
Hayes Smartmodem 1200B V22 + Smartcom 111	440
Irma 3270 Card	765
Miracle Keycard 3000 V21 V23	230
Miracle Keycard 3000 V22/BIS	410
Miracle Modem Maximiser Data Encryption	315
Miracle WS3000 V21 V23 Auto	200
Panafax UF-600AT Facsimile Machine	2650
SAGE Comms Pack Modem + Chit Chat	200
Smartcom 111 Software	135
Trend Opal Telex Slimline Display	1325

NETWORK SYSTEMS

	£
ASTorus AST-RSNHW + Tapestry S/ware	1300
Novelle Advanced Network 286 V2.0 + Keycard	1899
Novelle Advanced Network 286/G-NET K-card	2300
Novell Advanced Network/86	1255
Novell Advanced Network/286	1800
Orchid PC-NET + Software	650
SageNET 2 Boards Software Cables Plugs	290

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



OPEN 9.00AM TO 5.30PM MON THRU FRIDAY AND 9.30AM TO 12.15PM SATURDAY

WE MOVE SERVICE NOT BOXES — Please add VAT to all prices



OVER
100000 SALES
A YEAR IN THE USA ALONE

Beltron[®] computer

AT COMPATIBLE

£1095

- * 80286 CPU switchable 6/10 MHz
- * 32K Phoenix Bios
- * 640K RAM (Expandable to 1MB)
- * 8 Expansion slots
- * 20 MB Seagate hard disk
- * Western digital controller card
- * TEAC 1.2 MB floppy
- * 2 RS232, 2 parallel & 1 games port
- * Clock/Calendar - battery back-up
- * Monochrome graphic card
- * Hi res 14" green or amber monitor with tilt and swivel
- * 200W power supply
- * 102 key professional keyboard
- * MS-DOS 3.1
- * Full set of manuals
- * **12 month warranty**

XT COMPATIBLE

£495

- * 8088-2 CPU switchable 4.77/10 MHz
- * Phoenix Bios
- * 512K RAM
- * 8 Expansion slots
- * Floppy disk controller
- * 2 x 360K floppy
- * 1 Parallel printer port
- * Clock/calendar
- * Monochrome graphic card
- * Hi res 12" green or amber monitor with tilt and swivel
- * 150W power supply
- * 84 key professional keyboard
- * MS-DOS 3.1
- * Full set of manuals

10 MHz
XT

BELTRON 386 20MHz

As AT except:

- * 80-386 CPU 20MHz
- * 44MB 28ms Hard Disk
- * 2MB RAM
- * Plus Genius Mouse (MS & MSM Compatible)

£2395

- * **12 month warranty**

Options

ST-225 20MB HDD £219.00
40MB 28MS HDD £495.00
ST-225 WD-X2 XT
CONTL + CBLS £275.00
Fujitsu 360K FDD £69.00
WD-X2 XT HDD
CONTL £59.00
Genius Mouse MS &
MSM Compatible £69.00

WD AT 2FDD/2HDD
CONTL £135.00
MATHS CO-PROCESSORS
8087-2 £135.00
80287-6 MHz £145.00
80287-10 MHz £269.00
H-EGA card £145.00
Mono/graphic/PRN
card £49.00

Colour/Mono/PRN
card £95.00
MONITORS
12" HI-RES Mono w/tilt
+ swivel £85.00
14" HI-RES Mono w/tilt
+ swivel £99.00
14" RGB £239.00
14" EGA £339.00

I/O Plus II 2 RS232, 1 PRN &
Games Port Clock/calendar
with battery back-up £79.00
I/O Plus 2 RS232,
1 PRN & Games Port £59.00
RS232 Card +
optional 2nd RS232 £29.00
Modem Autoans/
Autodail + software £145.00

2MB Multifunction CD-ROM 2
RS232, 1PRN & Games Port £99.00
Clock/calendar with
batt/back-up £30.00
Keyboards
102 Key XT/AT £79.00
84 Key XT/AT £59.00
60MB tape streamer £595.00
TEAC 1.2 MB FDD £89.00

All prices quoted are exclusive of VAT

- Service contracts available at competitive prices!
- Please phone or write for further details, colour brochure and full price list.

Beltron Computers System Inc.
have outlets in USA, West Germany, Spain, UK, and the Far East.
IBM XT/AT are registered trade marks of International Business Machines Inc.

Sole Agents in United Kingdom Continental Limited

15 Cheltenham Trade Park, Cheltenham,
GL51 8LZ Telephone: (0242) 221590/91
Telex: 265871 MONREF G Ref: WJJ032

IGNORE THE REST – WE ARE THE VERY BEST

PiCCADILLY micros

olivetti M28

40Mb Hard Disk
8 MHz Clock Speed
512K RAM MSDOS
Olivetti Monitor
Olivetti Keyboard

£2195.00

olivetti M28

20Mb Hard Disk
8 MHz Clock Speed
512K RAM RAM MSDOS
Olivetti Monitor
Olivetti Keyboard

£1995.00

NEW olivetti M240 NEW

20Mb Hard Disk
10 MHz Clock Speed
640K RAM MSDOS
Olivetti Monitor
Standard Keyboard

£1495.00

olivetti M24

20Mb Hard Disk
Olivetti Monitor
Olivetti Keyboard
640K RAM MSDOS

£1295.00

EXTRA DISCOUNT GIVEN ON ALL EDUCATION SALES

COMPLETE AMSTRAD SYSTEMS

PC1640 DD Colour EGA £799.00
PC1640 20Mb Colour EGA £1069.00
PC1512 DD Mono £449.00
PC1512 20Mb Mono £775.00
PCW9512 £499.00

Tandon Complete Systems

PCX 256k, 20Mb, Screen,
Keyboard, MSDOS £950.00
PCA 20, 1MB 20Mb, Screen,
Keyboard, MSDOS £1395.00
PCA 30, 1MB 30Mb, Screen,
Keyboard, MSDOS £1695.00

LASER PRINTERS

CANNON
HEWLETT PACKARD
EPSON
KYOCERA

ALL AT LARGE DISCOUNTS

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

Epson LX800 180/25 CPS £205.00
Epson FX800 240/40 CPS £325.00
Epson LQ1000 180/60 CPS £625.00
Brother M1109 100 CPS £179.00
Brother HR20 Daisywheel £335.00
Olivetti DY200 Daisywheel £349.00
NEC P6 216/72 CPS £395.00
NEC P7 216/72 CPS £460.00
Amstrad DMP 4000 £299.00

SOFTWARE

DBase III Plus £399.00
Framework II £330.00
GEM Collection £75.00
Lotus 123 £249.00
MS Word 3 £280.00
Multimate II £299.00
Multiplan II £125.00
SMART Software £425.00
Wordstar Professional £215.00
Sidekick for Amstrad £17.00
Reflex for Amstrad £40.00

MULTISOFT ACCOUNTING SOFTWARE

BinderHamlyn
CHARTERED ACCOUNTANTS

training and implementation throughout
the United Kingdom from
Binder Hamlyn.

PiCCADILLY micros

ZENITH DATA SYSTEMS

NEW EAZY PC NEW

20Mb Hard Disk
720K Floppy Drive
512K RAM
HI-RES. Monitor
Keyboard. MSDOS

£899.00

Z-183 LAPTOP

10Mb Hard Disk
8 MHz Clock Speed
640K RAM MSDOS
Single 720K drive
Supertwist Screen
Keyboard

£1899.00

NEW Z286 NEW

20Mb Hard Disk
80286 Processor
512K RAM
HI-RES. Monitor
Keyboard MSDOS Windows

£1545.00

Z386

40Mb Hard Disk
80286 Processor. 16 MHz
1Mb RAM HI-RES. Monitor
Keyboard MSDOS Windows

£3495.00

EXTRA DISCOUNT GIVEN ON ALL EDUCATION SALES

Opus PC II COMPATIBLES

SYSTEM 3

Twin 360K Disk Drives
1Mb RAM 4.77/8 MHz
Mono display, keyboard, MSDOS £699.00

SYSTEM 4

20Mb Hard Disk
1Mb RAM MSDOS
Mono Monitor, Keyboard £995.00

SYSTEM 5

30Mb Hard Disk
80286 Processor, 1Mb RAM
Mono Monitor, Keyboard £1295.00

Discount on all Systems POA
CGA Option inc. 14" Monitor – add £200.00
EGA Option inc. 14" Monitor – add £300.00

NOVELL NETWORK

Leading suppliers of Novell
Network throughout U.K.
Phone for best prices

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

★ 12 months warranty ★ 7 day money back guarantee ★ Next day del. available
★ On site maintenance contracts available ★ Finance plans available

All prices exclude VAT and delivery and are correct at going to press. Piccadilly Micros reserve the right to vary prices without prior notice.
Trade enquiries welcome. Additional discounts for bulk orders.

PC GAMES FOR ONLY £2!

Out of the hundreds of games we have collected from the public domain and user-supported software, we bring you a special selection of some of the best games available — and you may choose them in any combination that you wish.

Choose any number for only £2 each (service charge), with a minimum of six programs, and we transfer them on to one, or more, of our disks for you.

We include source coding where possible. The programs are documented or the instructions are built in to the program. Disks are formatted for MS-DOS ver 2 or greater. 360K 5¼" and 3½" disks.

Programs are intended for IBM-PC or close compatibles (such as Amstrad 1512). If Basic is specified then Basic or GWBasic (for our shareware compatible version on M9001) is required, not Basic2. Basic is required if an asterisk is shown alongside the name.

We have added a CGA emulator to our disks so that those with Hercules boards can also play.

GAMES

G1: ACQB. Arm Chair Quarterback is a football strategy game. Rules are explained. You provide wits, the computer action.

G2: AFGHANISTAN. War Game with choice of weapons and roles.

G3: ANTONYMS.* Word game that challenges you to find the opposite of nominated words. Source provided.

G4: ASTRO. Dodging enemy ships and meteors. Well animated. Suit all ages.

G5: BABY. Gruesome but popular Kong-type game. Climb levels whilst avoiding the falling babies.

G6: BACKGAMMON. A good version of this popular board game.

G7: BASEBALL.* Match play with strategic choices of play for pitching, hitting.

G8: BEAST. Marauding beasts chase you through a hi-res maze.

G9: BIORHYTHM.* Prints chart of emotional, mental, physical biorhythms.

G10: BLACKFR13.* Investment simulation. Try to increase value of portfolio without going broke.

G11: BLACKJACK. Good version of this popular card game.

G12: BLUESBOX.* Easy to use song composer.

G13: BRICKS. Quick moving game where you hit a ball against a wall to demolish it. Like playing squash against the computer.

G14: BUGS! Centipede creature hunts you through the forest. When you fire and hit it, the creature multiplies! Fast game.

G15: CATCH 88.* Sky is raining letters and numbers. Catch them by correctly matching.

G16: CHASE. You're in a high voltage maze, chased by robots. Compiled with Pascal source code.

G17: CHESS.* Well designed, good board on screen.

G18: CIA.* Adventure with spies and other sinister doings.

G19: CIVILWAR.* Tactical simulation based on actual battles in Civil War.

G20: CRISIS. You're our last hope to save the world from alien invaders.

G20A: DIGGER. Fun to play. Good graphics as digger digs tunnels for gold/emeralds while hungry creatures hunt for digger.

G21: DILEMMA. You have to outguess your opponent. Cooperate or oppose?

G22: DOTS.* Board strategy game against the computer, joining dots with lines.

G23: DSK. Disk Crash. As a floppy disk you have to avoid the falling magnets.

G24: DRAIN. Joke program which causes computer to pretend it's awash and needs to drain.

G27: ELECTION.* Simulates candidate campaigning, raising funds, giving speeches. Good choices win points.

G28: ELEVATOR. You're at the bottom of a series of elevator shafts. Try to reach top without getting clobbered by elevator.

G29: ELI.* Animated cartoon depicting the adventures of Eli.

G30: ELIZA. Classic Psychiatrist game where the computer counsels you. Compiled version.

G31: ENCOUNTER.* Space encounter of the unfriendly kind. Good battle.

G32: ENTRAP. Othello board-type game, cleverly designed, good graphics.

G33: FIRE. Forest fire is raging and you have limited resources to combat. Will you lose the forest? What is your strategy?

G34: FLIGHTMARE. You are a pilot for Omegans against marauding vandals.

G35: FOOTBALL.* Tactical play in a footy simulation.

G36: FORTUNE. Wheel of fortune. Spin the wheel and win prizes or be penalised. More than one can play.

G37: FROG. Frog tries to cross road to safety and avoid being splattered by traffic.

G38: FUN.* Fun with numbers. It helps to understand a little algebra to solve the problems.

G39: GEOGRAPHY. Educational game that tests you on cities, capitals, countries, etc.

G40: PC-GOLF. Very well presented. Takes into account handicaps, clubs, swing, choice of three courses.

G41: GRIME. Hi-res fight against those nasty grimes that threaten to attack and overwhelm.

G42: HANGMAN.* Correctly spell the mystery word before the computer hangs your image.

G43: HANOI.* Transfer disks from one pile to another. Requires thought.

G44: HOBBIT.* Adventure. Hobbit thief tries to steal from the wizard's castle.

G45: HORNADETTE. Adventure. Invading the Castle and find the secret formula.

G46: IBMADV. Adventure. Government agent infiltrates IBM headquarters.

G47: IQUEEN.* Board game based on chess and using only queens.

G48: JUMPJOE. Mad robots chase Joe through rooms and past obstacles on space station.

G49: KONG. Climb the structures against falling objects and other dangers.

G50: LANDER.* Try to land a spacecraft against gravity, adjusting rocket thrust. Good sound and graphics.

G51: LANDMINE. The enemy has buried mines and you have to reach headquarters — preferably intact.

G52: LIFE2. Enter details of bacteria colonies and they breed, generating patterns on the screen.

G53: LOCUST. Spreadsheet setting. Kill the numbers, zero a column to win. They keep growing!

G54: MARS ESCAPE.* Adventure. Your mission is to escape from Mars.

G55: MAZE1. Mazes with different degrees of difficulty. Good graphics.

G56: METEOR.* Erase solid blocks before the constantly falling meteors hit you.

G57: MEMBRANE.* Chemistry game. You are a cell membrane. Learn about cell behaviour.

G58: MUSICIAN. Compose songs, music. Helps you to compose on the screen and play back.

G59: OIL. Offshore Drilling Simulation. Organise resources to strike oil or go broke.

G59A: PACMAN. Classic where you are in a maze hunting treasure while the monsters hunt you. Different levels of play.

G60: PANGO. Attempts to clear bees in a field by stunning or squashing with blocks.

G61: PARATROOPER. Fight off the paratroopers who keep landing until they can overwhelm.

G62: PINBALL. Good screen effects let you play this arcade type game with the cursor keys.

G63: PIRATE.* Adventure set on a pirate ship.

G64: PITFALL. Fast moving flight through valley or pit. Good screen effects. Needs fast reflexes to avoid walls and other dangers.

G65: POKER. Card game. Several can play or just you against the computer.

G66: POKER MACHINE. (ONE ARMED BANDIT). Try to line up the reels for your win.

G67: POLYMAZE. Computer generates hexagonal mazes and will demonstrate how to solve them.

G68: PRESCH.* Spelling and number games for small children.

PROVOCATIVE PINUPS: These are intended for printing. Hang alongside last month's sales figures (or whatever).

G69: CALENDAR GIRL.

G70: JEZABEL.

G71: DAWN.

G72: DELILAH.

PROVOCATIVE SCREEN PICS: These are animated screen pictures.

G73: RECLINING NUDE.

G74: STRIP.

G75: PYRAMID. Fast moving game where you step onto cubes to avoid bouncing rocks and creatures.

G76: QBERT. Bert & the Snake. Jump from one tile to another pursued by the snake and falling fruit.

G77: RACECAR.* You race the computer on racetrack controlling speed, braking, etc.

G78: RAIN. Challenging pinball game that has very good graphics and cursor control.

G79: ROCKETS. Fascinating, fast, hi-res game of space battle.

G80: ROULETTE. Gambling simulation using screen version of a roulette wheel. Cheaper than going to a real casino.

G81: SCATTER. Logic puzzle. Fire a laser to determine whereabouts of 10 atoms in a box.

G82: SEAWOLF.* Valiant submarine commander attempts to sink the invasion fleet with his torpedoes.

G83: SECRET ADVENTURE.* Create your own adventure. For small children. Answer questions about rooms and monsters and it generates a game for you.

G84: SKYTREK. Comprehensive strategy game of the Star Trek type.

G85: SLOT MACHINE.* Poker Machine game that can be played by all ages. Animated.

G86: SOLITAIRE. Card game that shows you the draw and you work out where to place each card.

G87: SPACEWARS. Nicely presented Star Wars type of game with many factors to consider.

G88: SPACEVADERS. Race across the screen shooting them down. Good graphics.

G89: STARLANE.* Interstellar Trading. Space Monopoly where you try to build an empire.

G90: STOCKMARKET. Simulation game where you try to amass your fortune in stocks and shares.

G91: SQUARE.* Like Tic Tac Toe but more combinations with dots on larger board.

G92: SUBCHASE. You're in a destroyer on patrol trying to destroy subs swarming below.

G93: SWARMS.* Attack of the killer bees! Bee Wars?

G94: TANK.* Two tank commanders slug it out.

G95: TRADE.* Star trading by intergalactic merchant. The ultimate travelling salesman.

G96: WIZARD.* Adventure in the Wizard's castle against monsters, elves, hobbits, dwarf, etc.

G97: WOMBAT.* Generates questions for mental arithmetic. Suits primary children.

G98: WEATHER.* Answer questions about conditions of last two days and it will attempt to forecast tomorrow's weather.

G99: XWING. Very good version of star wars-type game where you are pitted against Darth Vader and the Death Star space station.

ORDERS:

The service charge for each program is £2. There is a minimum charge of £12 (six programs) plus £2 for postage and packaging (£3 foreign). UK purchasers add 15% VAT to total.

ORDERS MUST BE PREPAID.

PAYMENT BY MAIL TO:

SELTEC COMPUTER PRODUCTS LTD,
Farley Hall, Wokingham Rd, Bracknell,
Berkshire RG12 5EU UK.

TELEPHONE ORDERS:

Pay by Access/Mastercard or Barclay/Visa.
Tele: (0344) 86 3020

FAX: (0344) 863999

We cannot guarantee the suitability of programs for users' needs or equipment.

CIRCLE NUMBERS BELOW AND SEND TO US WITH PAYMENT AND YOUR NAME AND ADDRESS. OR TELEPHONE US WITH THE PARTICULARS. SEE ABOVE.

G1	G2	G3	G4	G5	G6	G7	G8
9	10	11	12	13	14	15	16
17	18	19	20	20A	21	22	23
24	25	26	27	28	29	30	31
32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47
48	49	50	51	52	53	54	55
56	57	58	59	59A	60	61	62
63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78
79	80	81	82	83	84	85	86
87	88	89	90	91	92	93	94
95	96	97	98	99			

SELTEC

LOW-LOW-LOW-COST PROGRAMS

Out of the thousands of programs we have collected, for a small service charge from £6 we bring you a SELECTION OF THE BEST that have been carefully tested and documented. Suit IBM-PC and compatibles. 5 1/4" and 3 1/2", DOS 2 or greater.

Please note that in those instances where Basic is required, users should have Basic, GWBasic, or our shareware compatible version on disk M9001. Basic2 is not suitable.

Our games have a CGA emulator so those with Hercules boards can play.

MS-DOS GAMES

M1014: CREATE YOUR OWN ADVENTURES. Express your own ideas and fantasies. Generates games of your design. Needs Basic.

M1044: MARTIAL ARTS. Match your skills against all sorts of villains and dangers.

M1050: SUPER COMPILED GAMES (7). With Polymaze, Landmine, Drain, Elevator, Eliza, Starwars. Ready to run.

M1051: 50 BASIC GAMES. Includes a Star Trek, Swamp, Baseball, Hobbit, Blackfri, Antonyms, many more.

M1052: GAMES OF STRATEGY (3). Be challenged with Air Traffic Controller, Interbridge Construction, and Global War.

M1053: GAMES FOR 8'S AND UNDER. Special selection for the young 'uns. 13 games including a design your own secret adventure. Some games require Basic.

M1056: PINBALL GAMES (2). Good graphics and absorbing arcade game. Has Centre Fielder, Cyclops, Flame, Magic, Pin.

M1056: CHINESE CHECKERS. A well designed board game with good graphics.

M1058: MUSIC COMPOSER. Use your computer to write songs and melodies. Shows real notes.

M1059: EGA LIFE. Generates patterns of bacteria based on your input. Brilliant in hi-res colour.

M1060: CHAMPIONSHIP GOLF COURSE. You play on a course based on a real one used on professional circuit.

M1061: ADULT GAMES. Including Strip Poker, Adult Trivia, etc.

M1063: SPACE RESCUE ADVENTURE. A comprehensive and sophisticated game to challenge you.

M1064: ADULT JOKES. A collection of witty, funny and often blue jokes.

M1065: TEST YOUR ESP. Could be used seriously or in fun. Computer shuffles and displays one of 25 cards with special symbols.

M1066: CROSSWORD SOLVER. Helps you find those elusive words in crosswords.

M1067: BRIDGE. A comprehensive and well-designed game to sharpen your play.

UTILITIES

M2041: BAYLEY UTILITIES. Has mail facility for those who share the computer with others, wish to log computer time, more.

M2042: EGA UTILITIES. Help you to make better use of screen - change colours, borders, lines, etc.

M2043: SPECIAL COLLECTION UTILITIES. With Nswipe (genuine), PC-Sweep, add line ends to ASCII file, hard disk directory, adjust margins on Epson printer, etc.

M2045+: LIKE-SIDEKICK RESIDENT UTILITIES. Calculator, note pad, data base, appointments calendar, cut & paste, term, communications. 2 disks. Easy, powerful. £18.

M2046: HOT UTILITIES. Superior directory, system status, diskcheck, file find, etc. For colour screen.

M2047: MACINTOSH EMULATOR. Doesn't run Mac programs, but provides a Dos shell like the Mac's. Great to watch, use.

WORD PROCESSING/ PRINTING

M3007: SPELLING CHECKER. Works with most word processors. We've added thousands of new words incl. business/computer terms.

M3020: EXCELLENT WORD PROCESSOR. Compatible with Wordstar, has clear, easily followed commands on screen.

M3021: QUALITY MULTI-FONT PRINTING on dot matrix, incl. Courier, Greek, Helvetica, Palatino, Roman, Italics, etc.

TOP QUALITY PUBLIC DOMAIN & USER SUPPORTED SOFTWARE

M3024: WORD PROCESSING FOR KIDS. Special features, large lettering, easy to use. A gem.

M3025: TOUCH TYPING - PRACTICE AND EVALUATION. Lets you read script from screen, reports speed/accuracy.

M3026: EGA/CGA WORDPROCESSING. A many featured program that makes extensive use of colour screens. Delight to use.

M3028: FANCY PRINTING FOR WORDSTAR. Access many special characters, change line spacing, do sub/superscript, etc.

M3029: PC-WRITE ENHANCEMENTS. Uses macros to enhance the key command structure for easier and faster use.

M4017: ONE-PAGE DESKTOP PUBLISHING. Suits preparation of flyers, notices.

GRAPHICS

M4014+: COMPUTER-AIDED DESIGN. Dacard3d will do complex drawing, 2 or 3 dimensions, print sharp lines for mechanical drawing, illustrations, animate parts. We've squeezed 4 disks on to 2. Needs CGA. £18.

M4025: SCREEN CAPTURE UTILITIES. Grabs colour, b/w, graphics, etc. A professional printing aid.

M4022: EGA GRAPHICS. 3 dimensional wire-frame modelling. Move, tip, scale, rotate.

M4023: BUSINESS GRAPHICS. For pie/bar charts, graphs, comparisons. Easy to use.

M4024: PAINT GRAPHICS FOR MONO/HERCULES. Good facilities and you don't need colour. Patterned shading, backgrounds, etc.

LANGUAGES

M9001: BASIC/GWBASIC COMPATIBLE INTERPRETER with tutorial. Runs programs written in industry standard Basic. Suits PC compatibles.

M5023: Z80 CROSS ASSEMBLER. New version that lets you write & compile CPM programs on PC.

M5034: MINI-ADA. Substantial sub-set of major new language. Pascal & Basic source code + disassembler. Requires Turbo Pascal.

M5035: ZBASIC COMPILER. Fast, easy to use version, with editor & examples on disk.

M5036: TURBO PASCAL CROSS-REFERENCER. Lists, beautifies, cross-references source code.

M5038: EXPERT SYSTEM SHELL. Contains utilities to develop, test and run new expert systems. Menu driven. Turbo Prolog source provided. Book available.

COMMUNICATION

M6011: COMMUNICATION UTILITIES - new version with compression/decompression tools. RS232 tutorial.

M8014: SUPER NEW COMMUNICATIONS - Telex. Powerful, yet easy to use, menu driven. Contact bulletin boards.

M6016: PRESTEL/VIATEL COMPATIBLE communications program for contacting these bulletin boards. Handles split baud rate (1200/75).

CALCULATION/BUSINESS

M7001: GENERAL LEDGER ACCOUNTING. Has Gledger, Cash Book, Profit/Loss, Balance Sheet. Prints cheques. Data can be read by Lotus 123. Easy to use.

M7004: STOCK MARKET ANALYSIS. Special aids to help "think and grow rich". For managing and evaluating portfolios and prospects. Needs Basic.

M7024+: PAYROLL SYSTEM. Flexible, easy to use, adjustable rates. 2 disks. Good doc. £18.

M7040: 123 COMPATIBLE SPREADSHEET. Also does graphs, pie charts. 5 x 200 cells.

M7041: MEMORY-RESIDENT SPREADSHEET. Full-featured. At hand when you want it. Insert codes into text, etc.

M7042+: BILLINGS FOR SERVICES (Professions/trades, etc). Costs, mailing list, invoices, controls d/s, file merge. Quality program, easy to use. Powerful reporting. 2 disks. £18.

M7043: INTEGRATED SPREADSHEET/EDITOR. On one disk. Effective combination.

M7044+: CONTRACT BID ESTIMATING. 5 disk set of powerful programs for calculating costs, margins, progress and final estimates. Flexible to use. Needs hard disk. £36.

M7045: ACCOUNTS RECEIVABLE AND INVENTORY. Integrated system for small business that has up to 200 debtors. Prints invoices, cost of sales reports, etc.

M7046: GOAL SEEKING FOR SPREADSHEETS. Works backwards with your spreadsheet from a specified target and lets you examine options.

M7047: POINT OF SALE INVOICING. Suits retailer with different products/depts, reads bar codes, controls inventories, etc.

M7048: PURCHASE ORDER SYSTEM. Keeps track of orders, goods received, quantities, prices, suppliers.

M7049: PERSONAL FINANCIAL ANALYST. Examines your monetary/assets situation and makes projections for planning.

DATABASE

M8009: SUPER DATABASE MANAGER. New version. 120 fields, 16 million records, fast sorting, fields anywhere on screen. Calculations. Two disks on one!

M8018+: DBASEIII COMPATIBLE DATABASE MANAGER. Same functions and runs same files as DB3. Major or small tasks, good reporting, labels. Extensive docs. Highly rec. 2 disks. £18.

M8019: DBASEIII UTILITIES (1). Add colour, printer control codes, compress/decompress, menu front end, show data flow, read file structure.

M8020: DBASEIII UTILITIES (2). Weighted Retrieval. New view of data based on your selection criteria. Attach relative importance to factors.

M8021: DBASEIII UTILITIES (3). Add ons and utilities. Compiled, with C source. Display header info, port addresses, date entry, count comments, encryption, view files, strip characters, more.

M8022: HOME INVENTORY. Keep a record of your possessions re their, fire, insurance, etc.

EDUCATION

M9019: CHEMISTRY GAME that teaches chemical valences, atomic bonding and structure.

M9020: IQ WORKOUT. Gives practice on synonyms, antonyms, analogies, numbers. Evaluates. Needs Basic.

M9021: COMPUTER-AIDED TESTING. Shows questions, checks answers, re-presents questions until correctly answered, evaluates.

M9022+: MODULAR2 TUTORIAL. 2 disks that teach you how to program in this important new language. £18.

M9023+: TURBO C TUTORIAL. If already familiar with another language, this will give you a good grounding in Turbo C. Sample source included. 2 disks. £18.

M9024: SPANISH LANGUAGE TUTORIAL. Includes vocabulary and conjugation of verbs. Extensive.

M9025: JAPANESE TUTORIAL FOR BUSINESS AND TRAVEL. The words, pronunciation, grammar, most useful to the casual speaker.

M9026: FRENCH TUTORIAL. Emphasis is on conjugation of verbs.

M9027: SECONDARY MATHS (2). Compiled with Pascal source. Equations, lines, triangles, Ohm's Law, Parallel Circuits.

GENERAL

M9504+: RECIPE MANAGEMENT. Contains hundreds of recipes and excellent searching. Add your own. 2 disks. £18.

M9511: PERPETUAL DIARY. Plan ahead for appointments, events, birthdays. Print reports. Needs Basic.

M9512: GOURMET PIE RECIPES. Some of the most delicious you've ever tasted. Menu driven.

M9513: LIFESTYLE & HEALTH ANALYSIS. Has personality assess, biorhythms, heart disease risk, alcohol screening, life expectancy. Needs Basic.

M9514: CHURCH MANAGEMENT (1) PROSPECTS. Keeps track of those interested in joining, personal data, etc.

M9515: CHURCH MANAGEMENT (2) MEMBERSHIP. Details of new members, anniversaries, birthdays. Sunday school membership, etc.

PHONE NOW WITH YOUR ORDER

0344 863020

SHAREWARE REQUIRED FOR INTERNATIONAL DISTRIBUTION

We have extensive marketing and distribution facilities locally and overseas and require quality software for international distribution. Adequate documentation should be on the disk.

Please forward submissions to our Chief Executive at the address below.

CP/M AND MACINTOSH
Call or write for free catalogue.

PUBLIC DOMAIN NEWSLETTER

For news, reviews, views and how to use public domain and user-supported software subscribe to our bi-monthly newsletter and keep informed on the free programs that help your computer to serve you. INCLUDES UPDATES TO CATALOGUE. Only £12. (VAT not applicable.)

ORDERS:

For individual disks the first disk costs £10, the second £8, and each disk thereafter is £6. Sets are as specified.

Add £2 post/pack (£3 foreign). UK residents add 15% VAT to total.

ORDERS MUST BE PREPAID.

PAYMENT BY MAIL TO:

SELTec COMPUTER PRODUCTS LTD,
"Farley Hall", Wokingham Rd, Bracknell,
Berkshire, RG12 5EU UK.

TELEPHONE ORDERS: (0344) 86 3020

Pay by Access/Mastercard or Barclay/Visa.

We cannot guarantee the suitability of public domain/user-supported software for users' needs or equipment. AK1002

LOW LOW PRICES

Abbot

LOW LOW PRICES



Telephone: Malvern (06845) 62061

VISA

Amstrad

PC1512	SD/Mono	£375
PC1512	DD/Mono	£465
PC1512	SD/Colour	£495
PC1512	DD/Colour	£590
PC1640	DD/Mono	£535
PC1640	20Mb/Mono	£799
PC1640	DD/CGA	£659
PC1640	DD/EGA	£799
PC1640	20Mb/EGA	£1075
DMP3160	80Col/160 c.p.s.	£165
DMP4000	136Col/200 c.p.s.	£289
LQ3500	24 Pin/160-90 c.p.s./NLQ	£295

Epson Printers

The Worlds best selling range of printers

RX100	100 c.p.s./136 Col	£185
RX100	100 c.p.s./136	£245
FX100	200 c.p.s./136 Col	£245
LX 800	Popular low cost model 150 c.p.s. draft 25 c.p.s. N.L.Q. parallel interface, friction and tractor	£226
FX 800	Mid price printer 200 c.p.s. draft 40 c.p.s. NLQ parallel interface, friction and tractor	£355
FX 800	Sheet feed	£140
FX 1000	Wide carriage version of FX 800	£453
FX 1000	Sheet feed	£160
EX 800	Heavy duty model 300 c.p.s. draft 50 c.p.s. N.L.Q. parallel and serial interfaces, friction and tractor feed	£460
EX 800	Sheet Feed	£145
EX 1000	Wide carriage version of EX 800	£620
EX 1000	Sheet feed single hopper	£195
EX 1000	Sheet feed double hopper	£320
EX 1000	Colour unit	£60
LQ 800	Letter quality, 24 pinhead, 180 c.p.s. draft 60 c.p.s. letter quality, parallel and serial interfaces, friction feed	£446
LQ 800	Tractor feed	£44
LQ 800	Sheet feed	£140
LQ 1000	Wide carriage version of LQ 800	£600
LQ 1000	Tractor feed	£55
LQ 1000	Sheet feed	£163

OFFERS!

1000's of ZX81 and VIC20 books

Tandata Modems available

Monitors

C9M 9" Mono	£92
C14TUTX 14" Colour TV/RGB	£193
C12ND High Def 12" RGB	£322
RGB Amp	£89
Metal Monitor Stand	£46

Epson Printers

LQ 2500	Heavy duty letter quality, 24 pinhead, 270 c.p.s. draft 90 c.p.s. letter quality, parallel and serial interfaces, friction and tractor feeds	£860
LQ 2500	Sheet feed single hopper	£190
LQ 2500	Sheet feed double hopper	£300
LQ 2500	Colour unit	£65
SQ 2500	Silent ink jet printer, 540 c.p.s. draft 130 c.p.s. letter quality, parallel and serial interfaces, friction feed	£1110
SQ 2500	Tractor feed	£60
SQ 2500	Sheet feed double bin	£450

Laser Printers

Centronics PP-8 (8 page/min) Serial or Parallel	£1284
Centronics PP-8 (8 page/min) Serial, Parallel 1.5Mb RAM with full HP Laserdot plus emulation	£1606
Centronics 1.5Mb Card	£485
Centronics Toner Cart.	£39
Centronics OPC Belt	£49
Centronics Developer Kit	£190
Centronics Font Card	£99

PCW 8256-PCW 8512 upgrade

Citadel kit with 1 Mbyte internal 3" drive and 256K of memory. Easy to follow instructions, as simple as changing a plug	£135
--	------

Memory

41256/15-256K DRAM	198 each
8264 DRAM	86p each

Seikosha Printers

From the same company as Seiko watches. All have built in tractor feed.

SP180A	Low cost serial printer 100 c.p.s. draft 16 c.p.s. N.L.Q.	£169
SP1200A	80 column, 120 c.p.s. draft, 22 c.p.s. N.L.Q. parallel of serial, state which	£200
MP1300AI	80 column, 300 c.p.s. draft, 60 c.p.s. N.L.Q. parallel and serial	£400
MP1300AI	Sheet Feed	£129
SL80AI	80 column, 24 pin head, 150 c.p.s. draft, 50 c.p.s. letter quality	£400
MP5300AI	132 column, 300 c.p.s. draft, 60 c.p.s. N.L.Q. parallel and serial	£450
MP5300AI	Single bin sheet feed	£159
BP5420FA	136 column, 420 c.p.s. draft, 106 c.p.s. N.L.Q. parallel and serial	£1299
BP5420FA	Sheet feed	£199

Nintendo

Deluxe set including Robot, Zapper, two games, console and two controls	£159
Standard set including two hand controls, game and console	£100

Star Printers

Superb quality and reliability

NL 10	Popular low cost model 120 c.p.s. draft 30 c.p.s. N.L.Q. friction feed and tractor feed, parallel, I.B.M. Apple or Commodore interface (state which)	£199
NL 10	Extra for RS232 serial interface	£60
NL 10	Sheet feed	£55
NX 15	Wide carriage version of NL 10 parallel interface	£335
NX 15	Extra for RS 232 serial interface	£80
NX 15	Sheet feed	£121
ND 15	Mid price wide carriage, 180 c.p.s. draft 45 c.p.s. N.L.Q. friction and tractor feed, parallel interface	£387
ND 15	Extra for RS 232 serial interface	£75
ND 15	Sheet feed	£119
NR 15	Faster version of ND 15 240 c.p.s. draft 60 c.p.s. N.L.Q.	£467
NB 24-10	Letter quality, 24 pin head 216 c.p.s. draft 72 c.p.s. letter quality, parallel interface, friction and tractor feed	£463
NB 24-10	Extra for RS 232 serial interface	£75
NB 24-15	Sheet feed	£50
NB 24-15	Wide carriage version of 24-10	£610
NB 24-15	Sheet feed	£169
NB 24-15	Second bin for sheet feed	£109
NB 15	Heavy duty letter quality, 24 pin head, 300 c.p.s. draft 100 c.p.s. letter quality, parallel interface, friction and tractor feeds	£699
NB 15	Extra for RS 232 serial interface	£75
NB 15	Sheet feed	£169
NB 15	Second bin for sheet feed	£109

DSC 'APEX' - 1024 RAM/1.2Mb Drive/40-20Mb Hard Disc/Ega Morel	
40 Mb	£1980
20 Mb	£1746

Printer Lead

Parallel Printer Lead	£15
-----------------------	-----

Carriage is £6.00 per order, excluding Leads, IC's and books where the charge is £1.00

Add VAT at 15% to all items except books

ASK US TO QUOTE FOR ITEMS NOT LISTED

LIMITED OFFERS

Abbot Computer Products Ltd.
Foley Bank, Worcester Road,
Great Malvern, Worcs. WR14 4QW

20 Best Selling Books

1	Locomotive BASIC 2 Manual Amstrad	£9.95
2	Using Supercalc 4 Que	£17.45
3	Mellard BASIC book 2 Amstrad	£9.95
4	Using MSDOS on the Amstrad PC Newtech	£9.95
5	Enhancing your Amstrad 1512 Newtech	£14.95
6	Step by step guide to Locoscript Amstrad	£4.95
7	Using Wordstar 1512 Newtech	£9.95
8	Amstrad PC Technical Reference Manual Amstrad	£19.95
9	dBase III Plus handbook 2nd Edition Que	£18.95
10	Amstrad PC Owners Handbook Newtech	£19.95
11	Advanced MSDOS Microsoft	£19.95
12	Advanced disk user guide BBC Cambridge Micro	£16.95
13	Running MSDOS 2nd Edition Microsoft	£19.95
14	Using Supercalc 3 Newtech	£9.95
15	Programming the 8086/8088 Sybex	£16.95
16	Programming the Psion Organiser II Kuma	£9.95
17	Programmers Guide to IBM PC Microsoft	£16.95
18	Amstrad CP/M Plus M.M.L. Systems	£12.95
19	Word Perfect tips and traps Que	£18.45
20	View a dap hand guide Dabs Press	£12.95

There is no V.A.T. on books

Brother

1109	Tractor/Dual Inter	£199
1409	Dual Interface/NLQ/Tractor	£389
LQ 100	LQ Font for 1409/1509/1709	£70
LQ 200	LQ Font 164 RAM for 1409/1509/1709	£80
SF 30	Sheetfeed for 1409	£99

Printer Stands

The World's most accommodating printer stand - fits most 80/132 col printers - floor stand, storage space

	£113
--	------

IF YOU CAN FIND LOWER PRICES ANYWHERE PLEASE CONTACT US WE WILL ENDEAVOUR TO MATCH OR BETTER THEM!

PC1640 from £499 inc. FREE Software

Opus

**PC III from £499
PC V from £1199**

Tandon PCX & PCA SUPPLIED WITH 12 MONTHS FREE ON-SITE MAINTENANCE

BASIC AUTOCAD SYSTEM

Opus System 4 (20Mb, 1MB RAM) 720 x 348 resolution mono parallel & serial ports. Basic Autocad Mouse Hitachi A3 plotter

£1799

ADVANCED AUTOCAD SYSTEM

Tandon PCA40 (40Mb, 1MB RAM) 720 x 348 resolution on 14" screen, 1 parallel & 2 serial ports Autocad plus ADE 2 & 3. Cherry A3 digitiser, Hewlett Packard 7570A A1.

£8199

We can tailor Autocad systems to your requirements due to our extremely wide range of support peripherals (see below) Installation and training. Please call for details

VIKING ULTRA HIGH RESOLUTION 19" DISPLAY. Ideal for Desk Top Publishing & CAD

PLEASE CALL

ALLOY MULTI-USER and low cost networks.

PLEASE CALL

ATARI 1040 ST Mono £489

Multitech 910 Small footprint 80286, 10MHz 20Mb Monographics 1P & 25 — Superb value **£1395**

**HARD DISK UPGRADES
IBM/compatibles**

20/30Mb Hard disk controller.....	£249/£299
20/30Mb Hard card.....	£269/£319
Sanyo Memory upgrade to 256K + RAM disk + 25% extra-disk capacity.....	£65
Amstrad PC 1512 upgrade to 640k.....	£29

APRICOT ADDONS

512k Memory Board.....	£115
20Mb Hard Disk Upgrade.....	£695
Hi Res Mono Monitor for Portable.....	£109

PRINTER PROMOTIONS

PANASONIC 1081	£169
MP 165	£189
STAR NL10	£199
EPSON LX800	£199
EPSON FX800/1000	£319/£399
M. TALLY MT85/86	£299/£399
EPSON EX800/1000	£399/£539
NEC P6/P7	£409/£499
EPSON LQ800/1000	£459/£619
JUKI 6100	£259
EPSON GQ2500 LASER	£1395
CANON IX12 SCANNER	£699

MODEMS

Dataflex Stradcom V22 HAYES	£149
Miracle WS4000	£135

**SHEETFEEDERS, ACOUSTIC HOODS
& PRINTER BUFFERS**

Please call for prices and details

FANFOLD PAPER All sizes available eg

11" x 9 1/2" 60gm	£9.75	(2000 sheets)
12" x 9 1/2" 60gm	£12.99	(2000 sheets)
A4 Clean Edge 70gm	£15.95	(2000 sheets)*
85gm	£9.30	(1000 sheets)
11" x 14 1/2" 60gm	£13.50	(2000 sheets)*

Delivery £2.65 (fixed) + £1 per box. Extra £1 per order for items marked.

LABELS 89mm x 36mm from £3.25/1000.
70mm x 36mm from £2.95/1000.
Please call for other sizes.

RIBBONS for all printers eg

EPSON FX, MX, RX 80/100	£2.49/£3.75
EPSON LX 80	£2.95
JUKI 6100 single strike	£1.15
SHINWA/M. TALLY MT80	£3.79
KAGA/CANON	£3.99
QUME MS4	£2.65
APPLE IMAGEWRITER	£3.35

PRINTWHEELS from **£4.49**

Delivery 95p any Quantity ribbons/printwheels

Official Government/Educational Authority orders welcomed.

Please add 15% VAT to all prices (inc. carriage) Limited space precludes listing of our full range of products.
Please telephone if you do not see the item you require

SOFTWARE SPECIALS

VENTURA DTP	£595
Supercalc 4.....	£212
VP Planner.....	£65
VP Info.....	£65
Wordcraft 3.0 (IBM).....	£349
WORDSTAR 2000 Plus	£239
Wordstar Prof 4.....	£219
Word Perfect 4.2.....	£249
Turbo Pascal (8087+BCD).....	£55
Turbo Reflex.....	£79
Turbocad *New release.....	£99
Generic CADD inc. mouse.....	£169
Autosketch.....	£69
Sage Financial Controller.....	£239

MICRO FACTS Accounting: Please call for details

PLOTTERS — DIGITISERS etc.

Hitachi 672 A3.....	£459
Roland 880A A3.....	* £659
Roland 885 A3.....	£779
Hewlett Packard 7570AA1.....	£3995
Roland DPX2000 A2.....	** £2895
Graphtec GP9001 A0.....	£6,195
Summasketch 12" x 12" digitiser.....	£395
Cherry A3 digitiser.....	£495
Logimouse Plus.....	£85
MOUSE SYSTEMS PC Mouse.....	£99

* inc FREE 11k buffer ** inc stand

DISKS — POST FREE Packed in tens No quibble guarantee

Prices for ONE box. All extra boxes — **10% EXTRA DISCOUNT**

5 1/4"	DYSAN	SONY	PRECISION
SSDD	£11.90	£10.90	£8.90
DSDD	£15.90*	£13.90	£10.90
DSQD	£17.90	£15.90	£13.90
HD1.6MB	£19.90	£19.90	—

*** DYSAN DSDD — 1 EXTRA DISK PLUS LIBRARY CASE**

SONY 3.5" SS £16.90 DS £19.90

SONY PLAIN LABEL UNBOXED — PLEASE DEDUCT £2

AMSOFT 3" £25.90

**LOCKABLE
DISK BOXES**

**40 3 1/2" DISKS £7.95
70 5 1/4" DISKS £9.95**

THE ADVANTAGE PC 1640 IS VERY



E OF THE NEW Y EASY TO SEE.

In 1986, Amstrad took the computer world by storm with their first PC.

Its combination of compatibility and exceptional value for money meant that in under 6 months it became brand leader in the U.K. personal computer market†

But rather than resting on our laurels, we've gone one better.

The new PC 1640 range of personal computers offers the same industry standard compatibility and value for money, plus graphics capabilities that have to be seen to be believed.

A SIGHT FOR SORE EYES

If you use a computer a great deal you'll soon see the advantage of better graphic display.

It's less of a strain on your eyes to scan the monitor and spot the information you require. So you get less fatigue and consequently your time is used far more efficiently.

The enhanced colour display monitor on the PC 1640 ECD models offers graphics of stunning clarity, and the use of 16 colours on screen at any one time. (There are, in all, 64 colours to choose from.)

Of even greater interest to serious computer users is the in-built graphics expansion board on all models. This enables you to use practically all the industry standard enhanced graphics programs.

For the experts, this means EGA and CGA with colour ECD monitors. And MDA, monochrome EGA and

Hercules with monochrome monitors. For the ordinary user it just means clearer information, and the chance to get into high quality desktop publishing as well as exciting areas such as Computer Aided Design.

BIGGER AS WELL AS BETTER

The standard memory is now even bigger at 640K RAM. And all 1640's are powered by the 8 Mhz 8086 processor, still up to twice the speed of some of our competitors.

There are 3 full size expansion slots allowing you to use your 1640 for networking, modems and other applications.

And you get an RS 232 C serial port as well as a parallel interface port for printers and lots of other add-ons. (There's even a joystick port, so you can play ultra high resolution games.)

There are 9 models in the range, with a choice of enhanced colour, colour or monochrome.

From 360K byte floppy disk to 20 megabyte hard disk and all including a mouse and free software. So whatever your needs, there's an Amstrad PC 1640 that is exactly right for you.

With prices that start at £499 plus VAT* rising to £1199 plus VAT* the tremendous competitive advantage



THE NEW AMSTRAD PC 1640. NOW WITH
ENHANCED GRAPHICS OPTION‡ AND 640K MEMORY

of the new Amstrad PC 1640 is also very easy to see. If you're in business, you should make it your business to take a closer look.

All Amstrad PC 1640s come complete with monitor, disc drive system unit, keyboard, mouse and 640K RAM. Hard disc versions feature 20 megabyte hard disc. The 9 model variants in the range are:

Single drive	Mono display (MD)	£499 + VAT
Double drive	Mono display (MD)	£599 + VAT
Hard disc drive	Mono display (MD)	£899 + VAT
Single drive	Colour display (CD)	£649 + VAT
Double drive	Colour display (CD)	£749 + VAT
Hard disc drive	Colour display (CD)	£1049 + VAT
Single drive	Enhanced colour display (ECD)	£799 + VAT
Double drive	Enhanced colour display (ECD)	£899 + VAT
Hard disc drive	Enhanced colour display (ECD)	£1199 + VAT

Please send me more information about the Amstrad PC 1640.

NAME _____

COMPANY _____

ADDRESS _____

POST CODE _____

TEL. _____



THE AMSTRAD PC 1640

Amstrad plc., PO Box 462, Brentwood, Essex CM14 4EF.
Telephone: (0277) 262326.

PCW/12

*Recommended retail prices including VAT range from £573.85 to £1378.85. Prices correct at 1.9.87 but may change without notice. †Source: Romtec. ‡Except CD model.

AVAILABLE THROUGH: ADT · ALLDERS · COMET · COMPUTER MARKETING · DIXONS · ELTEC · FIRST SOFTWARE · HILL INTERNATIONAL · LASKYS · JOHN LEWIS · MBS · METYCLEAN · MICRO PERIPHERALS · NORBAIN · NORTHAMBER · OFFICE INTERNATIONAL · P&P · SANDHURST · HUGH SYMONS · VISTEC · WILDINGS



NARROW DOT MATRIX PRINTERS

Epson LX800 - The Brand New Best Seller	£189
Star ML10 - The Number Two Seller-Best Spec	£178
Panasonic 1081 - 120cps & 80 col - A Winner!	£139
Epson FX800 - Brand New! 240cps! Wow!	£293
Epson EX800 - 300cps & 80 column-Super Fast!	£373
Seikosha MP1300AI - 300cps!	£299
Seikosha SP180 - 100cps Bus a Great Price!	£149
Seikosha SP1200 - 120cps (Seiko-Epson owns Seikosha)	£189
MP 165 - Cheap Fast And Good Quality 180cps	£189
Oki Microline 182 - The Number 2 Brand	£184
Oki Microline 192 - Perennial Favourite	£279

WIDE DOT MATRIX PRINTERS

Star NX15 - The New Wide-body NL10!	£273
Star NR15 - Replaces the SR15-A Great Mover	£385
Panasonic 1582P - A Real Bargain, Mate!	£350
Panasonic 1595 - The Panasonic Favorite	£450
Epson FX1000 - Brand New! Replaces FX105	£379
Epson EX1000 - 300cps & 135 column-Super Fast!	£498
Seikosha MP5300AI - 132col Version of MP1300	£389
Seikosha BP5420 - 420cps Draft - 106 in NLQ	£999
MP 200 - 200cps! 132 column!	£259
MP 201 - 132 column 200cps	£294
Oki Microline 190 - Worth A Look	£359
Oki Microline 290 - Worth A Long Look	£608

24-PIN DOT MATRIX PRINTERS

Epson LQ800 - Letter Quality 24 Pin Pinhead	£419
Epson LQ1000 - Letter Quality 24 Pins 132 Col	£558
Epson LQ2500 - This one is really good!	£689
Epson LQ850 - Brand New 24-Pin, Due Out Soon	Call
Epson LQ1050 - Brand New 132 Column 24-Pin LQ	Call
Seikosha SL80 - 150cps Draft - 50cps LO	£280
Star NB15 - The big, up-market Star 24-pin 300cps	£598
Star NB24-15 - Similar to above, but 216cps	£617
Star NB24-10 - 80 column 24-pin winner	£413
NEC P6 - Good Buy	£379
NEC P7 - One of the Best Sellers Ever! - 24 pin	£441

DAISY WHEEL PRINTERS

Star Power Type 180cps - The Current Cheap One!	£179
Juki 6100 - 20cps - Very Popular, still no. 1	£253
Juki 6200 - 30cps - Still Popular	£393
Juki 6300 - 40cps - Very Up-Market	£639

COLOUR & INK JET PRINTERS

Okumoto 20 Thermal Printer	£159
Juki S520 - The Market Leader - Fast!	£335
Epson EX-Series Colour Option	£55
NEC P565XL - Heavy-Duty Office Favorite!	£740
Epson LQ2500 Colour Option/Makes LQ2500 Colour	£55
Seikosha MP1300 Colour Kit/Makes MP1300 Colour	£87
Epson SQ2500 - Ink your jet with this one!	£970

PLOTTERS, DIGITIZERS & LASERS

HP LaserJet II - Newer, Better, Cheaper!	£1945
Cherry A3 Digitizer Tablet	£454
Roland DXY-880A Plotter - Best Value A3 Plotter	£600
Roland DXY-990A Plotter	£922
Roland DPX-2200 A2 Flat-Bed Plotter	£2800
Epson CQ3500 - Brand new with HP Emulation!	£1822

RIBBONS

Epson FX800/85/800/LX800 (also MP165, Juki 5510)	£4.75 each
Longbow FX800/85/800/LX800 compatible ribbon	£2.80 each
Epson EX-series cartridge ribbon	£7.51 each
Longbow Ok 162/192/193 compatible ribbon	£4.81 each
Longbow NEC P3-P7 black compatible ribbon	£4.85 each
NEC P-6 black ribbon	£7.88 each
Longbow Panasonic 1080-1081 compatible ribbon	£3.18 each
Star NL10 cartridge ribbon	£4.66 each
Longbow LQ800 compatible ribbon	£2.99 each

CABLES AND THINGS

IBM-Compatible Centronics Parallel Cable (Round)	£12
BBC Centronics Parallel Cable (Ribbon)	£8
Two-Way Printer T-Switch	£45
80 Col Printer Stands	£21
SpaceBase Adjustable Floor-Standing Printer Stand	£85

AMSTRAD PC

Amstrad 1512 Single Floppy/Mono Monitor	£375
Amstrad 1512 Double Floppy/Mono Monitor	£475
Amstrad 1640 Single Floppy (Colour Monitor 640k)	£587
Amstrad 1640 Double Floppy (Colour Monitor 640k)	£680
Amstrad 1640 20mb Hard Disk (Colour Monitor 640k)	£950
Amstrad 1640 Single Floppy ECD (EGA Colour 640k)	£720
Amstrad 1640 Double Floppy ECD (EGA Colour 640k)	£815
Amstrad 1640 20mb Hard Disk ECD (EGA Colour 640k)	£1075
Amstrad 1640 Single Floppy (Mono Monitor 640k)	£450
Amstrad 1640 Double Floppy (Mono Monitor 640k)	£540
Amstrad 1640 20mb Hard Disk (Mono Monitor 640k)	£810

SPECIAL OFFERS

LX-86 Auto Sheet Feed	£39
Migent Ability	£40

MACDOUGALL PC's

MacDougall 286 AT 512k 10mz/20mb HD/mono monitor	£999
--	------

EPSON PC's

Epson PC AX-20 Mark II (640k RAM, 20mb HD & EGA)	£1259
Epson PC AX-40 AT (640k RAM, 1.2mb Floppy, 40mb HD)	£1629
Epson PC AX-60 AT (640k RAM, 1.2mb Floppy, 60mb HD)	£2359
Epson PCs (20mb XT with keyboard, DOS & mono monitor)	£925

TANDON

PCA 20mb Hard Disk AT (1mb RAM Keyboard DOS Monitor)	£1299
PCA 30mb Hard Disk AT (1mb RAM Keyboard DOS Monitor)	£1499
PCA 40mb Hard Disk AT (1mb RAM Keyboard DOS Monitor)	£1699
PCA 70mb Hard Disk AT (1mb RAM Keyboard DOS Monitor)	£2099
Target 20mb Mini AT (Complete mono system)	£1499
Target 40mb Mini AT (Complete mono system)	£1699
PAC-286 (complete EGA AT with removable 32mb hard disk)	£1996

OLIVETTI PC's

Olivetti M240 Double Floppy	£759
Olivetti M240 20mb hard disk	£1092
Olivetti Mono Monitor for M240	£167
Olivetti 102-key Keyboard for M240	£120
Olivetti M380 40mb hard disk Compact System	£3307

SHARP PORTABLES

Sharp PC-7100 20mb Hard Disk Super Twist Screen	£1399
Sharp PC-7200 20mb 80286 AT (Super Twist & Super Fast)	£2099
Sharp PC-4501 Single 3.5in Floppy, 256k, Super Twist	£699
Sharp PC-4502 Twin 3.5in Floppies, 256k, Super Twist	£875
Sharp PC-4500 Series External 5.25in Disk Drive	£250

TOSHIBA

Toshiba T5100 Laptop 40mb 80886 CGA/EGA	£3446
Toshiba T3100 20mb 80286 Portable	£2317
Toshiba T1100 Plus	£1271
Toshiba T1000	£810
Toshiba T1200	£1946

MONITORS

Eizo ER942H 14in Ultra-High Res EGA Colour Monitor	£336
ADI 14in Mono Monitor with Tilt/Swivel Stand	£120
NEC Multi-sync EGA monitor	£459

ATARI

Atari Expandable PC Twin Drive Mono (8088/2)	£579
Atari Expandable PC 20mb Hard Disk Mono (8088/2)	£799
Atari 520STFM 512k RAM, disk drive, mouse	£250
Atari 1040STF 1mb RAM, disk drive, mouse, no monitor	£380
Atari 1040STF with Mono Monitor, 1mb RAM, disk drive	£469
Atari 1040STF with Atari SC1224 Colour Monitor	£870
Atari SH204 20mb Hard Disk Drive	£478

ATARI TOP SELLING SOFTWARE

Cyber Studio Card 3D ver 2.0 - It's here at last!	£84
Right Simulator II - Very Realistic Best Seller	£36
VP Professional (Lotus Clone Gem Version)	£149
Metacomp Lattice C Compiler	£71
First Word Plus - Word Processor with Graphics	£62

CATS 'N' MICE

Mouse Systems Mouse with Pop-Up Menus & PC Paint	£140
Mouse Systems Mouse with Pop-Up Menus Only	£125
Microsoft Plus or Serial Mouse - Don't forget the cat!	£132
Logitech Logimouse C7	£77
Logitech Logimouse Plus Package	£89

DISKETTES

Computer Express 5.25in DS/DD 48trp disks	£1.00 each
Computer Express 5.25in DS/DD 96trp Hi-Density	£1.55 each
Computer Express Branded 3.5in DS/DD diskettes	£1.99 each
Un-branded Verbatim 3.5in SS/DD diskettes	£1.15 each

COMMUNICATIONS

Liner V21/V23 Autodial/Autoanswer	£129
Miracle WS4000 V21-V23 Modem	£129
Miracle WS3000 V22 Professional Modem	£345
Sage Chitchat Comms Pack (Modem/Software/Cable)	£181
Crosstalk Mark IV Comms Software	£93
DataSoft DataTalk Software	£89
Sage Chitchat Comms Software	£68
One-To-One Electronic Mail Subscription	£20
RS232 serial modem cable	£15

HARD DISKS

Dynas/Western Digital 20mb File Card	£279
Miniscribe 32mb Scribecard Hard Disk Card	£289
Western Digital 32mb FileCard (with X-Tree software)	£289
Seagate ST225 20mb Hard Disk w/WO controller & cables	£225
Seagate ST251 40mb Hard Disk 40ms Access (Drive Only)	£350
Plus HardCard 20mb	£525
Plus HardCard 40mb (the quality leader)	£850

TAPE BACK-UP SYSTEMS

Everex 20mb External Tape Back-up Unit	£620
Irwinn 20mb Internal Tape Back-up Unit	£360

ADD-ON BOARDS

AST SiPack Plus 64k memory Multifunction Card	£165
Qube SixShooter Multifunction Card 64k memory	£125
Intel AboveBoard with 0k installed	£199
Everex Mini Magic Ram Expansion Card (384K)	£117
Hercules Graphics/Graphics Plus Card	£179
Everex EverGraphics Plus (Clone Hercules Card)	£95
Ecto Auto-Switch EGA Card	£199
Paradise Auto-Switch EGA Card	£219
AST Rampage	£200
AST 3720 Terminal Emulation Card	£649
AST 5251 Model 12 Remote Emulation Card	£825
AST SiPack Premium 256k Clock Parallel & Serial	£330
AST SiPack Premium 1mb EMS daughter board	£150
SageNet 2-User System	£275

CHIPS, CO-PROCESSOR AND DRAM

64k DRAM chips (nine to make 64k)	£1.15 each
256k DRAM chips (nine to make 256k) 150 N.S.	£3.00 each
Intel 8087 8mz Maths Co-Processor	£95
Intel 8087 2mz Maths Co-Processor	£135
Intel 80287 8 Maths Co-Processor	£185

IBM-COMPATIBLE SOFTWARE

PC-MOS by Software Link - The MS-DOS Challenge!	£175
WordStar 2000 Plus release 2	£228
WordStar 3.4	£143
WordStar Professional Version 4	£192
Word Perfect ver 4.2 - The Number 1 WP Package	£219
Microsoft Word ver 3 - Number 2 WP Package	£249
Multimate ver 3.31	£189
Multimate Advantage II	£275
Lotus Manuscript - Latest Blockbuster WP Package	£234
PFS: First Choice	£108
PFS: Professional Writer	£120
Framework II Version 1.1	£311
Symphony version 1.2 (Latest Version)	£318
Symphony Spelling Checker	£89
Symphony Text Outliner	£60
Lotus 1-2-3 ver 2.1 - Top Selling Package In The World	£220
Lotus Spotlight - The desktop manager!	£39
Lotus Metro - Lotus front-end organizer	£53
Lotus Report Writer - A must for Lotus fans!	£75
SuperCalc ver 4 - The Celebrated Lotus-Beater!	£191
Grafx Logistix	£79
Javelin Plus	£175
Smart System - The Best Integrated Package	£349
Executive Systems X-Tree (Super Friendly HD Organizer)	£40
Executive Systems Hot - Make own menus and hot keys!	£36
Rosepoint Proxy - Customize your keyboard	£55
Word Perfect Library - The Word Perfect Front End	£99
Pegasus Accounts (per Module)	£199
Pision Chess - You too can play like Gary Kasparov	£19
Quail Software Copyright (Back up Protected Software)	£40
Microsoft Flight Simulator - Gives You a Lift	£39
Microsoft Quick Basic version 3 - The Ultimate Basic	£53
Funk Software Sideways	£40
Borland Turbo Lightening	£47
Microsoft Windows	£56
Norton Utilities 4 - Every user needs this one!	£51
Norton Commander - Control program for power users!	£35
Ventura Desk Top Publisher	£465
Freelance Plus	£266
Delta Professional	£319
Ansa Paradox II - Multi-User Database!	£289
Cardbox Plus	£225
Ashton-Tate Rapid File	£199
dBase III Plus - Best Selling Professional Database	£385
FileBase Plus	£269

LOW-COST SOFTWARE

VP Planner by Paperback Software - Best Seller!	£61
VP Info (dBase II Clone)	£62
VP Expert	£75
VP Graphics	£64
Borland Sidekick - The Original Co-Resident Process!	£43
Borland Turbo C - C How You Like This!	£55
Borland Turbo Pascal - The Classic Borland Product	£47
Borland Turbo Basic	£47
Sage Bookkeeper	£71
Sage Retrieval Database	£71
Sage PC Planner Spreadsheet (Lotus Clone)	£71
Sage Desk-Set	£49
Sage PC-Write Word Processor	£71
Sage Accountant - For the Small Business	£110
Sage Accountant Plus - Top Selling Cheap Accounts	£143
Sage Payroll - A Fun Event	£71
Sage Financial Controller - The Sage Top of the Range!	£216
Personal Word Perfect	£139
Word Perfect Junior	£75
Microsoft Word Junior	£59
WordStar 1512	£60
Amstrad Multitask Junior	£59
Amstrad Supercalc 3	£60
Amstrad AmstradReflex	£60
Migent Ability - Top Integrated Package	£40
Migent Ability Plus - Spend a Little More, Mate!	£103
Words & Figures - Lotus 123 v1 Clone with WP	£80

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 which has been given by 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 10% restocking fee. Technical support available Monday to Friday. Export and trade enquiries welcome.

FOR FULL PRICE LIST PLEASE CALL
TELEPHONE ORDERS WELCOME



0727-37451



MICRO-COMPUTER, PERIPHERALS
SOFTWARE SALES AND SUPPORT

SHOWROOM • 99 PARK STREET LANE • BRICKETWOOD • ST ALBANS • HERTFORDSHIRE • AL2 2JA • (0727) 72790
HEAD OFFICE • UNIT A • CAXTON CENTRE • PORTERS WOOD • ST ALBANS • HERTFORDSHIRE • AL3 6XT • (0727) 37451
TELEX: 8950511 ONE ONE G (Quote Ref: 15412001)

COMPUTER EXPRESS HOLLAND • NIJVERHEIDSWEG • N60 • 3812 PM • AMERSFOORT • NETHERLANDS • (33) 630544
COMPUTER EXPRESS AMERICA • 1713 S.E. ELLIS STREET • PORTLAND • OR • 97202 USA • TELEPHONE (503) 235 0277



PANASONIC 1081

This 120cps draft/30cps NLQ little beast is a surprising winner. It continues to sell very well, no doubt helped by the fact that everybody discounts it so massively! But it has excellent 9-pin quality, is Epson and IBM compatible, comes with a tractor feed, is 80 columns wide and amazingly cheap!
£139.00

STAR NL10

For value for money nothing can match our new low price. One of the most popular printers ever with a speed of 120cps draft and 35 NLQ. Built-in back mounted tractor feed, friction and auto single sheet feed. Comes with choice of interfaces. Recommended by Which? Very strong NLQ, 80 column wide.
£178.00

EPSON LX800

Although previous LX series printers were considered under-specified compared to the NL10 and others, the range continues to be the best seller - ever. This latest offering zips along at 150cps draft and 25cps NLQ and comes with Parallel Esc-P or IBM Parallel interfaces as standard, plus a top-mounted tractor feed. Good, clear typeface, 80 column wide.
£189.00

NEC P7 PINWRITER

Heavy duty 24-pin dot-matrix prints draft at 180cps and Letter Quality (LQ) at 72cps. A very successful product in the corporate sector. 132 column.
£441.00

EPSON LQ2500



Although very expensive, this fast (270cps, 72cps LQ) printer continues to sell in impressive numbers even in the face of strong competition in a fiercely contested market segment. Probably the best printer Epson ever made. 132 column.
£589.00

MIGENT ABILITY

A knock-down integrated system. We recommend it because it does spreadsheet, WP, Database and Comms professionally. For the budget user there is nothing to match it at this price. Great if you are learning.
£40.00

MIRACLE WS4000 V21/V23 Modem

This is the most popular Modem in the country today. Why? Mainly because it is cheap, reliable, looks good and does the job, which is really quite a simple one, after all. You can use it to access Telecom Gold, One-to-One, EasyLink, Prestel and all the bulletin boards that keep sprouting up. You also need a serial cable (£15.00) and software. We recommend Sagesoft ChitChat (£71.00) because that package also allows you to access Prestel. Most others don't.
£129.00

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 which has been given by 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 10% restocking fee. Technical support available Monday to Friday. Export and trade enquiries welcome.

FOR FULL PRICE LIST PLEASE CALL
TELEPHONE ORDERS WELCOME

EPSON FX800/1000



No printer propaganda would be complete without listing the FX series. It was on the back of this range and its ancestors that Epson came to dominate the market. The 800 is the descendant of the 80 and 85, prints draft at 200cps and NLQ at 40cps and is 80 columns wide. The 1000's parents were the famous 100 and 105. It goes at the same speed and is 132 columns wide. Both include tractor feeds and Epson/IBM compatibility. Worthing pedigrees and a safe 9-pin choice.
FX800.....£293.00
FX1000.....£379.00

LOTUS 1-2-3 (VERSION 2.01)

Although imitated by half a dozen lookalikes, the original business spreadsheet continues to out-sell all of its rivals and is the Number One selling software package - ever. Very popular with corporates and government. Our huge volumes enable us to offer it at an exceptionally low price.
£220.00

XEROX VENTURA DESK TOP PUBLISHER (VERSION 1.1)

Rightly or wrongly, Desk Top Publishing (DTP) is the latest industry buzzword. There are a lot of packages about, but the general consensus is that this is the best. It's in fashion.
£465.00

WORD PERFECT (VERSION 4.2)



Statistics show that more Word Processing software is sold than any other kind. Word Perfect is the best selling WP package in the world today - full stop. It is also, in the view of most trade people, the best. Strongly recommended. In software terms, only Lotus outsells it.
£219.00

SUPERCALC 4

If you want an alternative to Lotus 1-2-3 and its clones, this is the only 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!
£191.00

AMSTRAD 1640 - ECO

No listing would be complete without mention of this machine. Some of the shortcomings of the 1512 have been rectified, mainly the display. The 1640 is excellent value for money, coming as it does with an 8086 8MHz chip, 640k RAM, mouse, Gem, MS-DOS and full colour EGA screen. The old 1512 was selling 7000 to 9000 units per month in this country, and we expect the successor 1640 to have similar success. For real value buy the single drive version and add a 32mb Scribecard! Available in colour only.

Single Floppy.....£720.00
Double Floppy.....£815.00
20mb Hard Disk.....£1075.00

TANDON TARGET



This small-footprint mini-AT is about the most stylish around. Fast 20 or 40mb hard disk, 1.2mb floppy, 1mb RAM, serial and parallel ports, 14in mono monitor, keyboard, MS-DOS 3.2. Good price for a pedigree AT.

Target 20.....£1499.00
Target 40.....£1699.00

EPSON PC-AX

This 10MHz AT is robust and sets the standard for big-box design and style. Comes with keyboard and MS-DOS, you need to pay extra for the monitor and graphics adaptor board. This is a popular item for power users on a budget, such as local authorities!

AX20 Mark II.....£1259.00
AX40.....£1629.00
AX60.....£2359.00

MINISCRIBE 32MB HARD DISK CARD

This Scribecard is revolutionizing hard disk upgrades in the U.S. and U.K. Why? Because it's cheap! It is also easy to install, reasonably fast (65ms) and readily available. Takes up one and a half slots and works great in the Amstrad, IBM, Olivetti. You name it.
£289.00

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
£349.00

0727-37451



MICRO-COMPUTER, PERIPHERALS
SOFTWARE SALES AND SUPPORT

SHOWROOM • 99 PARK STREET LANE • BRICKETWOOD • ST ALBANS • HERTFORDSHIRE • AL2 2JA • (0727) 72790
HEAD OFFICE • UNIT A • CAXTON CENTRE • PORTERS WOOD • ST ALBANS • HERTFORDSHIRE • AL3 6XT • (0727) 37451

TELEX: 89S0511 ONE ONE G (Quote Ref: 15412001)

COMPUTER EXPRESS HOLLAND • NIVVERHEIDSWEG • N80 • 3812 PM • AMERSFOORT • NETHERLANDS • (33) 630544
COMPUTER EXPRESS AMERICA • 1713 S.E. ELLIS STREET • PORTLAND • OR • 97202 USA • TELEPHONE (503) 235 0277

DIGITASK

BANISH THE

Like many others you've probably found your head swimming with facts, jargon, prices and names, some you've heard of and some you'll never hear of again! But Digitask is one name you're going to hear a lot more of.

Digitask have been producing PC compatibles and supplying compatible hardware for nearly four years, to end users, corporates and dealers. Our customers include some of the biggest names in the business and nearly every university and technical college in the land.

Our components are individually sourced throughout the world and imported to the UK. This allows us to choose the best of all the available options and then to build and test the systems in-house. So when you call, our technical staff are fully conversant with all aspects of system design and maintenance.

Our reputation for service is second to none, our clients keep coming back for more.

A 100% British owned company based in the UK, we are going to be around when others have long gone. Maybe that is why over 8000 computer users have chosen Digitask.

STOP PRESS 3 NEW XT EGA SYSTEMS

STARTER SYSTEM EGA	£799
FULL FEATURE SYSTEM EGA	£899
BUSINESS PRO SYSTEM EGA	£1199

Identical specifications to the PC16-X range but with EGA display adaptor and monitor

XT COMPATIBLE
BUSINESS PRO
£879



DIGITASK PC16-X

- NEC V20 super processor operating at 4.77 MHz
- Soft/hard switchable to 8 MHz Turbo (provision for 8087-2 co-processor)
- Full 640 KB on-board memory as standard
- Single floppy drive
- 8 IBM® compatible expansion slots (7 on portable)
- 1 × parallel port, 1 × serial port (2nd serial opt.)
- 1 × clock, 1 × games port, 1 × light pen interface
- Easy access flip-top lid (slide on portable)
- 84 key, AT® style keyboard
- Colour display or mono graphics adaptor
- Composite green/amber monitor (internal 9" TTL on portable)
- Free Application/Utilities Software
- One year parts and labour warranty (on-site maintenance available)

STARTER SYSTEM (Specifications as above) **£499**

FULL FEATURE SYSTEM Dual 360KB Floppy **£695**

Drive 640K Ram
High Resolution TTL Monitor, Mono-Graphics Adaptor

BUSINESS PRO SYSTEM 20MB Hard Drive, **£879**

Single 360KB Floppy Drive

BUSINESS PRO PLUS SYSTEM **£1069**

20MB Hard Drive, 1 × 1.2MB + 1 × 360KB Floppy Drive

PHONE 0342 24631 NOW

or Contact Digitask, Unit M, Charlwoods Business Centre, Charlwoods Road,
East Grinstead, West Sussex RH19 2HH. Telex 957418 G
Fax 0342 26662

EXPORT ENQUIRIES WELCOME

Prices Do Not Include VAT or Carriage

DIGITASK

PC BLUES!



AT COMPATIBLE
**AXIOM
GOLD 20**
£1275

DIGITASK AXIOM 286-10

- 80286-10 processor (6/10 MHz switchable) •
- Optional 80287 co-processor • Phoenix BIOS • Full Megabyte on-board memory supplied • 1.2 MB floppy drive • 6 × 16 bit IBM® compatible expansion slots (5 usable on portable) • 2 × 8 bit expansion slots • 2 × parallel ports, 1 × serial port (2nd serial opt.) • Easy access flip-top lid (slide on portable) • Small Footprint • 84 key, AT® style keyboard • Mono/graphics adaptor • High resolution TTL monitor (internal 9" on portable) • One year parts and labour warranty (on-site maintenance available)

AXIOM SILVER (Specifications as above)	£1165
AXIOM GOLD 20 1 × 20MB Hard Drive	£1275
AXIOM GOLD 40 2 × 20MB Hard Drive	£1475
AXIOM GOLD 20 EGA 1 × 20MB Hard Drive with EGA card and monitor	£1799

Other configurations - please call



AT COMPATIBLE
**AXIOM
GOLD 20**
£1375

THE DIGITASK PORTABLE RANGE

PC16-X STARTER SYSTEM

PORTABLE	£699
PC16-X FULL FEATURE PORTABLE	£779
PC16-X BUSINESS PRO PORTABLE	£965
PC16-X BUSINESS PRO PLUS PORTABLE	£1135
AXIOM SILVER PORTABLE	£1155
AXIOM GOLD 20 PORTABLE	£1375
AXIOM GOLD 40 PORTABLE	£1575

Specifications as desktop systems



XT COMPATIBLE
**BUSINESS
PRO**
£965

PHONE 0342 24631 NOW

or Contact Digitask, Unit M, Charlwoods Business Centre, Charlwoods Road,
East Grinstead, West Sussex RH19 2HH. Telex 957418 G
Fax 0342 26662

EXPORT ENQUIRIES WELCOME

Prices Do Not Include VAT or Carriage

DIGITASK

ONE STOP SHOPPING AT THE BEST PRICES

DOT MATRIX PRINTERS

	RRP	Our Price
AMSTRAD		
DMP 3160 80col 160cps 25 NLQ F/T P	169	155
DMP 4000 136col 200cps 50 NLQ F/T P	349	260
BROTHER		
M1109 80col 100cps 25NLQ F/T P & S	220	162
M1409 110col 180cps 45NLQ F/T P & S	385	289
M1509 136col 180cps 45NLQ F/T P & S	495	353
M1709 136col 240cps 65NLQ F/T P & S (dual interface) IBM/FX	595	419
CITIZEN		
1200 80col 120cps 25NLQ F/T P	245	149
MSP-10 80col 160cps 40NLQ F/T P	349	259
MSP-15 136col 160cps 40NLQ F/T P	449	325
MSP-50 80col 300cps 60NLQ T P	525	387
MSP-65 132col 300cps 60NLQ T	695	512
EPSON		
LX-800 80col 160cps 25NLQ F/T P	275	185
FX-800 80col 200cps 40NLQ F/T P	430	294
EX-800 80col 300cps 50NLQ T P	555	372
FX-1000 136col 200cps 40NLQ F/T P	550	380
LQ-800 80col 180cps 60NLQ F P 24 pin head	625	399
EX-1000 136col 300cps 50NLQ T P	745	509
LQ-1000 136col 180cps 60NLQ F P 24 p h	835	559
P-80 XS PORTABLE 80col 45cps		250
FUJITSU		
DX2100 80col 220cps 44NLQ F/T P (S OPT)	435	293
DX2200 136col 220cps 44NLQ F/T P (S OPT)	565	391
DX2300 80col 324cps T P OR S IBM/EPSON comp.	625	479
DX2400 136col 324cps T P (S OPT) IBM/EPSON Compatible	760	582
DL3300 80col 324cps 24 p h Bi-T P IBM/EPSON/D630 Compatible	710	545
DL3400 136col 324cps 24 p h Bi-T P (S OPT) Compatible as 3300	825	632
MICRO-P MP201 132col 200cps 40NLQ F/T P	399	273
NEC		
P6 80col 216cps 72NLQ F P 24 p h	549	375
P7 136col 216cps 72NLQ F P 24 p h	649	437
OKI		
ML 182 80col 120cps NLQ F P	269	185
ML 192 80col 160cps NLQ F P	375	280
ML 193 132col 160cps NLQ F P	485	357
OLIVETTI		
DM100/4 80col 120cps 25NLQ F P	295	199
DM280/1 180col 160cps 35NLQ F/T P	466	307
DM290/1 136col 160cps 35NLQ F/T P	581	363
STAR		
NL-10 80col 120cps 30NLQ F/T P	278	179
ND-15 136col 180cps 45NLQ	489	340
NX-15 136col 120cps 30NLQ F/T P	389	270
NR-15 136col 240cps 60NLQ F/T P	589	395
PANASONIC		
KXP1081 80col 120cps 28NLQ	245	139
KXP1092 80col 180cps 35NLQ	395	315
KXP1592 132col 180cps 38NLQ	495	339
KXP1595 132col 240cps 51NLQ	695	449
PRECISION 4010 80col 480cps 100 NLQ F/T P-S 4 Print Heads	369	306
ACOUSTIC PRINTER HOOD (80col printers)	99	85

TOP RANGE DOT MATRIX PRINTERS

BROTHER 2024L 132col 160cps 96NLQ 24 pin head P OR S	795	575
BROTHER 4018 132col 480cps 100NLQ 67LQ IBM-EPSON Compat 18 pin head	1495	1120
DAISY M6001 136col 850cps 129 NLQ F/P P-S 3 Print Heads	2195	1775
EPSON LQ2500 136col 270cps 90NLQ T P 24 p h	1045	675
EPSON SQ2500 Ink Jet	1345	983
OKI ML84 80col 200/400cps NLQ F/T P	779	618
OLIVETTI DM600 132col 200cps 70NLQ P & S	1179	929
STAR NB 24-15 136col 216cps 72NLQ F/T P 24 p h 360d.p.i.	759	517
STAR NB 24-10 80col 216cps 72NLQ F/T P 24 p h 360d.p.i.	599	410
STAR NB 15 136col 300cps 100NLQ F/T P 24 p h 260d.p.i.	949	619
NEC PINWRITER P5 136col 264cps 88NLQ F P 24 p h	1066	745
TOSHIBA P351/2 136col 300cps 100NLQ P & S	1099	884
FUJITSU DL 2400 136col 220cps P IBM/Diablo/EPSON compat	1010	863

ORDERS OVER £350 CLAIM YOUR FREE IBM CENTRONICS PRINTER CABLE OR PRINTER CLEANING KIT. OVER £250 CLAIM YOUR FREE CASE/KB OR VDU CLEANING KIT.
OFFER AVAILABLE WHILE STOCKS LAST!

LASER PRINTERS

EPSON GDS-00 6p min LJ+/Diablo630/Pageprinter	1795	1295
KYOCERA F1010 10p min LJ+/FX/Diablo/Queme NEC/IBM	2495	2095
KYOCERA F2010 10p min Dual BIN LJ+/FX/Diablo/Queme NEC/IBM	4595	3790
CENTRONICS PP8 8pm S OR P FX/Diablo/IBM	1595	1339
CENTRONICS PP8 8pm LJ+ CANON IX-12 SCANNER (Without Interface)	1995	1675
MANNESMAN TALLY MT910 10pm Dual Bin P OR S	3290	2717
OKI LASERLINE 6 6pm LJ/FX/Diablo/Queme/NEC	1899	1370
CITIZEN OVERTURE 110 10pm FX/Diablo	1995	1460
QUEME LASER 10+ 10pm LJ+ FX/Queme/IBM	2683	2216
H.P. LASERJET 8pm LJ+	2618	2095
OLIVETTI PG101 8pm Diablo/Epson/LJ	3209	2499
APRICOT (KYOCERA) LASER	2499	1985

DAISY WHEEL PRINTERS

BROTHER		
HR20 117col 22cps F P & S (dual i/face)	445	327
HR25XL 132col 25 cps F P & S (dual i/face)	695	499
JUKI		
6000 80col 12cps F P	199	147
6100 132col 20cps F P	399	255
6200 132col 30cps F P	579	394
6300 132col 40cps F P	899	629
6500 132col 60cps F P	1299	935
OLIVETTI		
DY450/1 132col 45cps F P Diablo compat	1140	799
DY800/2 132col 80cps F P & S (dual i/f)	1483	1059
FUJITSU		
SP 320E 48cps P Diablo compat quiet	999	766
QUEME		
11 80col 40cps (without i/face) P OR S	1210	956
12 80col 20cps	450	355
RICOH		
3200Q 30cps 7K P D630 compat	445	367
3400Q 50cps 7K P D630 compat	995	821
DATAPRODUCTS DP20 136col 20cps S	445	200

COLOUR PRINTERS

OLIVETTI		
DM 285/1 80col 160cps 35NLQ F/T P JX compat	555	415
DM 295/1 132col 160cps 35NLQ F/T P & S (dual i/face) JX compat	707	526
DM 590/1 132col 192cps 120NLQ F P JX/Queme/Diablo compat	1137	846
TOSHIBA 351C 136col 288cps 100NLQ F P & S IBM compat	1475	1130
FUJITSU DL 2400 180cps LQ60 24 p h P & S IBM/FX80/JX80 compat	1135	870

PLOTTERS

EPSON HI-80 4 pen A4	400	345
HP 7440A 8 pen A4	1160	985
HP 7475A 6 pen A3	1796	1315
HP 7550A 8 pen A3	3813	3399
ROLAND DXY 880A 8 pen A3	775	605
ROLAND DXY 980A 8 pen A3	1100	860

MICE & DIGITISING TABLETS

LOGIMOUSE & SOFTWARE (SERIAL)	99	75
LOGIMOUSE & SOFTWARE (BUS)		83
MICROSOFT MOUSE (bus or serial)		129
MOUSE SYSTEMS MOUSE + PC PAINT		127
GENIUS MOUSE		55
SUMMASKETCH 12 x 12 W. CURSOR		425
SUMMASKETCH 12 x 12 & GEM DRAW		569
SUMMASKETCH 9 x 6 & GEM DRAW		479
CHERRY A3 GRAPHICS TABLET		455
GRAPHTECH A4 NEW		546
SUMMASKETCH BIT PAD + NEW	399	295

If you don't see what you want call for more details

We are the most consistently low priced advertiser in the UK.

Our prices and products are genuine. Excellent service, totally comprehensive range and a same day delivery service* make Digitask the best choice every time.

PHONE 0342 24631 NOW

or Contact Digitask, Unit M, Charlwoods Business Centre, Charlwoods Road, East Grinstead, West Sussex RH19 2HH. Telex 957418 G. Fax 0342 26662

*Please call for details

EXPORT ENQUIRIES WELCOME

Prices Do Not include VAT or Carriage

COMPUTERS (Inc Monitor + Keyboard)

DIGITASK PC16X STARTER SYSTEM XT compat. Single 360KB floppy drive	499
DIGITASK PC16X FULL FEATURE SYSTEM XT compat. dual 360KB floppy drive	695
DIGITASK PC16X BUSINESS PRO SYSTEM XT compat. 20 MB hard drive, 1 x 360KB floppy	879
DIGITASK PC16X BUSINESS PRO PLUS SYSTEM XT compat. 20 MB hard drive, 1 x 1.2MB, 1 x 360KB floppy drive	1069
DIGITASK AXIOM SILVER 286 AT compat. single 1.2MB floppy drive, 1 MB RAM	1165
DIGITASK AXIOM GOLD 20 AT compat. 1 x 1.2 MB floppy, 20MB hard drive	1275
DIGITASK AXIOM GOLD 20 EGA AT compat. 1 x 1.2MB floppy, 20MB EGA Monitor + EGA Contr. NEW	1799
DIGITASK AXIOM GOLD 40 2 x 20MB H/D 1 x 1.2MB floppy	1589
DIGITASK PORTABLE STARTER as per PC16X STARTER SYSTEM (9" TTL internal monitor)	699
DIGITASK PORTABLE FULL FEATURE	779
DIGITASK PORTABLE BUSINESS PRO	966
DIGITASK PORTABLE BUSINESS PRO PLUS	1135
DIGITASK PORTABLE AXIOM SILVER as AXIOM 286 above (9" TTL internal monitor)	1155
DIGITASK PORTABLE AXIOM GOLD 20	1375
DIGITASK PORTABLE AXIOM GOLD 40	1575
MULTITECH ACER 1100 386 SYSTEMS FROM	2600

TAILORED SYSTEMS OUR SPECIALITY. OTHER CONFIGURATIONS PLEASE CALL

WINCHESTER DRIVES

20MB H.H.T SEAGATE ST225 (65ms)	195
30MB H.H.T SEAGATE ST238 + RII Contr. & Cables XT only	295
40MB H.H.T SEAGATE ST251-1 (28ms)	495
40MB H.H.T SEAGATE ST251 (40ms)	448
80MB H.H.T QUANTUM SC551 Drive & Contr. + SW (12ms)	999
44MB H.H.T SEAGATE M60553 (28ms)	576
30MB F.H.T SEAGATE ST4038 V.COIL (40ms)	435
40MB F.H.T SEAGATE ST4051 (40ms)	525
72MB F.H.T SEAGATE M6085 (28ms)	773
80MB F.H.T SEAGATE ST4096 (28ms)	999
WD/NCI XT Hard Drive Controller & Cables	80
NCL SHORT CONTROLLER (up to 16MHz) FDD/HDD for AT	169
AT OR XT HARD DRIVE Cable set	12
WORM DRIVES	CALL

TAPE STREAMERS

XR4 40MB Internal streamer XT & AT	450
XR4 40MB External streamer XT & AT	560
XR4 DRIVER BOARD for External streamer	85
WANGTEK FAD5000 40Mb int.	500 419
WANGTEK 5099 EK 60Mb int.	750 639
WANGTEK 5125 125Mb int.	950 829
EVEREX STREAM-20 20MB Internal streamer	895 585
EVEREX STREAM-60 60MB Internal streamer (XT OR AT)	1295 815
QIC-125 Fast Prof 125MB b.up Novell, 3CDM comp	1499 1349

T-SWITCHES & BUFFERS

T-SWITCH Parallel 1-2 (or serial 1-2)	35
INTELLICOM LONGLINK Parallel to parallel inc 50h cable (up to 7000ft)	149 135
UPGRADE TECH BUFFER 64KB P-P	140 119
UPGRADE TECH BUFFER 256KB P-P	256 219
UPGRADE TECH BUFFER Half Megabyte Dual Channel full feature stand alone	395 335
UPGRADE TECH BUFFER One Megabyte Dual Channel full feature stand alone	495 419

EGA MONITORS

NEC MULTISYNC 14"	649 469
PHILIPS MULTISYNC 14"	503 545
SONY MULTISYNC CPD1402E 14" NEW	795 579
THOMSON MULTISCAN 14"	659 559
PACKARD BELL EGA 14"	599 349
TAXAN 760 14"	579 399
TAXAN 860 16"	899 618
TAXAN 770 MULTISYNC 14"	799 590

EGA ADAPTORS

MITAC/Paradise Manual Switch MDA/CGA/EGA/HERC PLANTRONICS	109
MITAC/Paradise Autoswitch MDA/CGA/EGA/HERC PLANTRONICS	129
VEGA DELUXE	225
EVA 480 NEW MDA/CGA/EGA/PGA/PLANTRONICS/132 x 25/28/44 60 lines on Wordperfect/Wordstar - VEA Emulation to run Ventura 1.1 in PS.2 mode. Hardware 200M/pan/window/drivers for AUTOCAD, LOTUS, SYMPHONY, WORDPERFECT, WORDSTAR, IBM/DEC TERMINAL EMULATION	229

EGA & MONITOR COMBI

PACKARD BELL MONITOR + EGA ADAPTOR	495
NEC MULTISYNC + VEGA	678
NEC MULTISYNC + EVA 480	678
TAXAN 770 + PARADISE AUTOSWITCH	604
SONY CPD1402E + EVA 480	700

COLOUR MONITORS

TAXAN SUPERVISION II 12" Hi Res	389 265
TAXAN SUPERVISION III 12" Ultra Res	459 309
TAXAN SUPERVISION IVm 12" Hi Res	499 349
TAXAN SUPERVISION IV 12" Ult Res	579 409
THOMSON 36512VPIR 14" Med Res	261 225
THOMSON 36382SIR 14" Hi Res	385 329

MONO MONITORS

SAMSUNG SM 125F 12" Amber, Med Pers. Hi Res TTL/IBM With T & S	139 95
TAXAN KX-1201 12" Green comp P31	109 85
TAXAN KX-1202 12" Green comp P39	119 89
TAXAN KX-1203 12" Amber comp PUL	119 95
TAXAN KX-1212 12" Green Hi Res P39	149 109
TAXAN KX-1213 12" Amber Hi Res PUL	149 109

DTP MONITORS

WYSE 700 (1280 x 800)	895 779
GENIUS A4 (736 x 1008)	1649 1475
VIKING 119" (1280 x 960) + DRIVER S/W	2299 1956

MAINBOARDS

SUPER TURBO XT 4.77/8 MHz (up to 640K - with (OK)	149
SMALL FOOTPRINT PC/AT comp 6/8/10 MHz (OK)	499

SPECIAL OFFERS

SEAGATE ST238 30 MB H.H.T + Controller	575 295
BROTHER 3.5" FLOPPY DISK DRIVE IN 5.25" CHASSIS	
1Mb (720Kb formatted)	114 95
1.6Mb/1Mb (1.2Mb/720Kb formatted)	138 115
2Mb/1Mb (1.6/720Kb formatted)	142 120
2MB Above Function Card Fully Populated	385 355

DIGITASK PERIPHERALS

576K Rammaster Expansion Card (OK)	59
640K Multifunction Card (OK) 1P, 1S, 1G, 1C, SW	97
2MB Above Function Card (OK) 1P, 1S, 1G, 1C	179
Multi I/O Adapter 1P, 1S, 1G, 1C, 2F1, SW	95
Multi I/O Adapter & Display Adaptor 1P, 1S, 1G, 1C, 2F1, CGA, MGA, LP, SW	159
8255 I/O Card	89
Async Comms Adaptor (dual port) 2S	39
Async Comms Adaptor (1 port)	27
4 Port Multi Async Comms Adaptor 4S	119
Clock Adaptor	47
Games Adaptor	24
PS/IO-XT Short Multifunction Adaptor 1P, 1S, 1C, 1SW	99
Floppy Drive Adaptor (4 drive) 4FL	65
Floppy Drive Adaptor (2 drive) short 2FL	54
360/1.2 MB Floppy Adaptor (XT)	79
Diamond (D10-500) I/O card (AT)	89
Diamond (D10-300) I/O card (XT)	79
Colour/Graphics Adaptor	79
Colour/Graphics Printer Adaptor RGB, 2 comp LP	129
Mono/Graphics (Hercules Compat) card	87
Parallel Printer Adaptor	18
4 Bank eprom Programmer/Analyser	259
PCP-120 to 128K SW	149
Eprom Eraser	129
EPROM/Microprocessor Programmer PCP 120+	199
FDD/HDD Controller for PC/AT	249
Serial/parallel card (AT)	69
Copy Board	99
40 Track Disk Duplicator	979
Sine Wave Uninterrupted Power Supply for 1.8KVA	1995
Sine Wave UPS for 1000VA	1499
Sine Wave UPS for 750VA	1249
Sine Wave UPS or SUPS for 500VA	495
Sine Wave UPS or SUPS for 300VA	395
Trans Net TR001	290
Trans Net Utility S/W	99

DEALER ENQUIRIES WELCOME

BRANDED PERIPHERALS

RAM EXPANSION	
AST ADVANTAGE OK 1S, 1P (AT only) upgradeable to 3MB	349
AST ADVANTAGE PAK OK (up to 1.5MB) PC/XT	119
AST RAMPAGE (2MB) pop to 256K XT	199
AST RAMPAGE 286 (2MB) pop. to 512K AT	449
AST RAMVANTAGE with 128K (upgradeable to 3MB) for PCAT	369
AST SIXPACK PLUS 64KB, 1C, 1S, 1P (upgradeable to 384K)	205
AST SIXPACK PREMIUM 512KB, C, 1S, 1P, (EMS)	329
INTEL ABOVE BOARD XT	221
INTEL ABOVE BOARD 286 12.5MHz/PS2	395
ORCHID RAMQUEST 50/60 (2MB) EMS PS/2	749
PERSYST STRETCH (Lotus/Intel/MS) up to 2MB (OK pop)	219
EVEREX Mini Magic 60K pop up to 576K	85
EVEREX RAM 3000 AT (OK pop) up to 3MB	219
EVEREX Magic Card AT 1P, 1S, WS. (OK pop) up to 2MB	259
INTEL INBOARD 386/AT OK	1131
INTEL INBOARD 386/AT 1MB	1450
NETWORKS	
AST-PC NET II (IRSN 34 PCS more with repeaters 5Mbps)	345
3-COM	CALL
IRMA Emulators & Accessories	CALL
CHASE AT-8 8MHz 32K Ram 32K Rom 50:38400 Baud 8 port serial intell controller using 80186 PC/AT-ATE-ATX Xenix 5/c oncurr PCDOS-5 comp with drivers	1099

GO-FASTER BOARDS	
AST FLASHPAK (NEC V30 at 9.45MHz)	289
INTERQUADRAM QUADSPRINT	329
MOUNTAIN RACECARD 80286	459
ORCHID TINY TURBO	330
ORCHID TURBO EGA	499
ORCHID JET 386 PC/AT upgrade up to 3 x faster!	695
ORCHID TURBO PGA	949

DISPLAY ADAPTERS	
AST 3-G EGA, card 256K, MDA, Herc, CGA & EGA compat	218
AST COLOURGRAPHPLUS (full spectrum) 32KB, 1P	859
EVEREX THE EDGE Mono/Colour 80/132col, Lotus/Symphony compat	319
EVEREX GRAPHIC EDGE as above with graphics	339
ORCHID EGA, (MDA, CGA & Hercules compat)	221
TAXAN KIF3810 IBM comp (640 x 400 dots)	229
TAXAN KIF 3800 IBM CGA comp supervision (V1/VM 840	145
TAXAN KIF3600SP IBM CGA compat (short) 1P	119
HERCULES PLUS CARD	178
HERCULES-COLOUR CARD	94
HERCULES Monochrome/GR Adaptor	145
HERCULES "In-Colour"	399 225
PARADISE AUTOSWITCH EGA	399 254

OTHER	
FASTOATA BAR CODE HEADER IBM + SW	352
ADDONICS SERIAL/PARALLEL CARD for AT	89
ADDONICS MULTI-ASYNC CARD for AT (4 port)	195
BROTHER 3.5" FLOPPY DRIVE for PC/XT (INTEGRAL PSU)	159
ORATOR	795 699

RAM CHIPS & PROCESSORS

INTEL 8087 (8087-3) 5MHz math co-roc chip (PC/XT)	95
INTEL 8087-2 8MHz math co-roc chip (TURBO PC/XT)	134
INTEL 80287-6 5MHz math co-roc (PC/AT Apricot)	149
INTEL 80287-8 8MHz math co-roc (PC/ATX Apricot)	220
INTEL 80287-10 10MHz math co-processor	289
NEC V-20 FAST PROCESSOR (8088 equiv.)	13
NEC V-30 FAST PROCESSOR (8086 equiv.)	13
SAMSUNG 4164 DRAM CHIP 150ns (set of 9)	9.50
SAMSUNG 41256 DRAM CHIP 150ns (set of 9)	25
SAMSUNG UPGRADE 256KB - 640KB	42.50
SAMSUNG ONE MEGABYTE CHIP SET (36 x 41256) multiples of 1MB only	99

PC/XT/AT HARDWARE

POWER SUPPLY 135/150 max Watt Switch Mode XT	89
AT Keyboard replacement (84 Key)	109
TOSHIBA FLOPPY DRIVE 360KB Half HT	69
TOSHIBA FLOPPY DRIVE 1.2MB for PC/AT	125
FLOPPY DRIVE 360KB Half HT DS/DD (Grey front) for AT	95
GREAT COMMUNICATOR 1.2 floppy drive w contr cables ROM S/W-XT	179
EXTENDED KEYTRONIC XT/AT Keyboard (102)	130
EXTENDED KEYBOARD (101 keys)	99
KEYBOARD K-150M AT-Style for XT (84 Key)	89
CASE PC/XT Swingtop (Incl hardware kit)	55

VISA

ALL VISA AND ACCESS CARDS ACCEPTED





SOFTWARE

Massive Discounts

DATABASE

FOXBASE + NEW	395	325
CLIPPER COMPILER	595	325
CORNERSTONE	100	61
DBASE III+	595	375
DELTA PROFESSIONAL	495	328
PARADOX II	595	349
O & A SYMANTEC	250	159
QUICKSILVER COMPILER	425	220
R-BASE 5000	295	208
RAPIDFILE	275	189
REFLEX	100	57
REFLEX WORKSHOP	70	48
SAGE RETRIEVE	99	69
VP INFO	100	52

WORD PROCESSORS

LOTUS MANUSCRIPT	395	233
MULTIMATE ADVANTAGE II	495	295
PFS WRITE	115	99
PROTEXT NEW	60	42
SAGE PC WRITE	99	65
TURBO LIGHTNING	70	45
VOLKSWRITER III	325	155
VOLKSWRITER DELUXE	40	29
WORD III	425	238
WORDCRAFT	475	309
WORD PERFECT	425	238
WORDPERFECT LIBRARY	149	120
WORDSTAR	295	144
WORDSTAR 200 + REL2	465	228
WORDSTAR PROFESSIONAL + REL 4	399	193

DTP/GRAPHICS/CAD

ALDUS PAGEMAKER	CALL	
AUTOCAD	2500	CALL
AUTOSKETCH	79	49
CHARTMASTER	295	229
EASY CAD	353	253
FASTCAD	2525	CALL
FLEET STREET EDITOR	149	75
FANTASY	80	58
FREELANCE +	320	265
HARVARD PRESENTATION		
GRAPHICS	295	219
PUBLISHERS PAINTBRUSH	225	162
VENTURA DESKTOP PUBLISHING	795	469
VUTRAX PCB DESIGN	CALL	
VP GRAPHICS NEW	79	65

OTHER

COPY II PC	50	38
COPY II PC OPTION BOARD	90	74
DESQVIEW	98	67
EUREKA: THE SOLVER	70	47
FLIGHT SIMULATOR II NEW	45	34
GEM COLLECTION	130	73
GEM DRAW +	130	119
GEM GRAPH	180	123
LIGHTNING (CACHE)	99	94
MS DOS 3.2		65
NORTON COMMANDER	55	37
NORTON UTILITIES	85	50
PC TOOLS	40	32
S/KICK (TRAVELLING)	70	48
S/KICK	70	43
S/KICK (TRAV) & S/KICK NCP	109	89
SAGE DESK SET	69	45
SAGE PC CHART	99	89
SIIDEWAYS	50	34
SUPERKEY	70	47
V-FEATURE	95	89
V-FEATURE DELUXE	125	119
WINDOWS (MICROSOFT)	85	54
BROOKLYN BRIDGE	137	87

SPREADSHEETS

JAVELIN	100	85
LOTUS 123	395	219
LOTUS HAL	120	81
MULTIPLAN	175	107
NOTE IT	69	59
SAGE PC PLANNER	99	69
SUPERCALC IV	396	189
VP PLANNER	100	52

PERSONAL PRODUCTIVITY

ABILITY	99	49
ABILITY +	159	99
FRAMEWORK II	550	297
LOTUS SYMPHONY	550	317
PFS FIRST CHOICE	149	108
SMART	695	445
SMART SPELLCHECKER	95	87
SUPERPROJECT +	495	290

ACCOUNTS

ACCOUNTABILITY	99	68
OAC EASY ACCOUNTS	85	59
MULTISOFT ACCOUNTS (PER MODULE)	390	270
SAGE ACCOUNTANT	140	105
SAGE ACCOUNTANT +	199	138
SAGE BOOK-KEEPER	99	71
SAGE FINANCIAL CONTROLLER	299	211
SAGE PAYROLL	99	67

PROGRAM DEVELOPMENT & LANGUAGES

MICROSOFT C	345	245
QUICK BASIC COMPILER	85	67
TURBO BASIC	70	47
TURBO C	70	53
TURBO DATABASE TOOLBOX	50	34
TURBO EDITOR TOOLBOX	50	34
TURBO GAMEWORKS	50	29
TURBO GRAFIX TOOLBOX	50	34
TURBO HOLIDAY JUMBO PACK	165	157
TURBO PASCAL	70	45
TURBO PROLOG	70	47
TURBO PROLOG TOOLBOX	70	47
TURBO TUTOR	30	23
ZORLAND C	30	27

COMMUNICATIONS

CROSSTALK XVI	169	93
SAGE CHIT-CHAT (S/WARE)	99	68
SMARTERM VT-100	135	119
DATATALK		10
SMARTERM 240	229	178
CROSSTALK MARK 4	150	107

**If you don't see
what you want call
for more details**

We are the most consistently low priced advertiser in the UK.

Our prices and products are genuine. Excellent service, totally comprehensive range and a same day delivery service* make Digitask the best choice every time.

PHONE 0342 24631 NOW

or Contact Digitask, Unit M, Charlwoods Business Centre, Charlwoods Road, East Grinstead, West Sussex RH19 2HH. Telex 957418 G. Fax 0342 26662

*Please call for details

EXPORT ENQUIRIES WELCOME

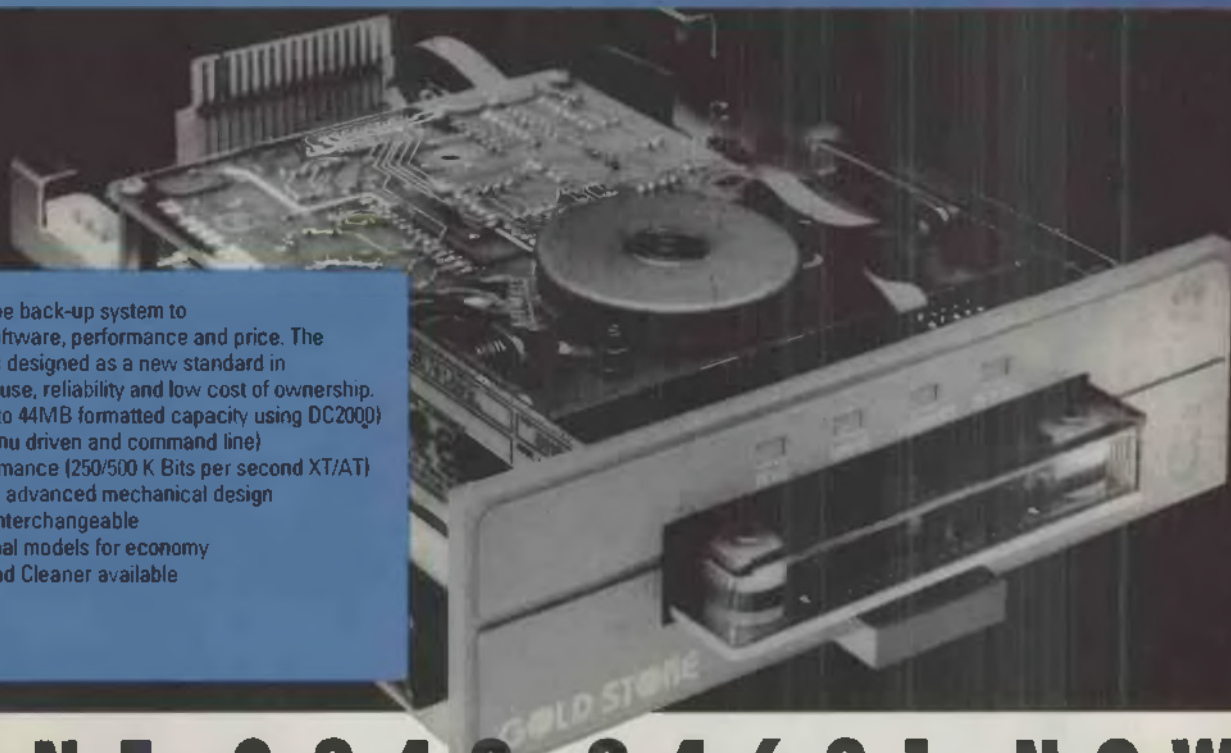
Prices Do Not Include VAT or Carriage

DIGITASK

THE ULTIMATE BACK UP



THE XR4 TAPE BACK UP



The XR4 is the first tape back-up system to optimise hardware, software, performance and price. The system architecture is designed as a new standard in performance, ease of use, reliability and low cost of ownership.

- High Capacity (up to 44MB formatted capacity using DC2000)
- Simple to Use (Menu driven and command line)
- High Speed Performance (250/500 K Bits per second XT/AT)
- Ceramic head with advanced mechanical design
- Intelligent, XT/AT interchangeable
- Internal and External models for economy
- Data Cartridge Head Cleaner available

Internal XR4 £450
External XR4 £560

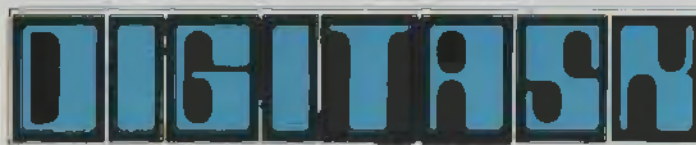
PHONE 0342 24631 NOW

or Contact Digitask, Unit M, Charlwoods Business Centre, Charlwoods Road,
East Grinstead, West Sussex RH19 2HH. Telex 957418 G Fax 0342 26662.

"Developed by Colorado Memory Systems."

OVERSEAS CALLERS WELCOME

Prices Do Not Include VAT or Carriage



MODEM SELECTOR

MANUFACTURER	MODEL	SPECIFICATION	DESCRIPTION	AUTO.ANS	No. STORE	AUTO DIAL	ERR CORR	AUTO SENSE	BUFF. L.FACE	PULSE TONE	AUTO LOG ON	RRP	OUR PRICE
AMSTRAD ANSWERCALL	INTERNAL MODEM MINIMODEM	V21, V23 V21	Suitable for all compatibles, with free Datatalk software Simple direct connect modem	Y	Y	HAYES		Y	Y	PULSE	Y	143 (75)	129 59
DACOM DACOM DACOM DACOM	DSL 2123AD DSL 2123GT PC123 PC123BIS	V21, V23 V21, V23 V21, V22, V23 V21, V22, V22BIS, V23	Mainstay of Dacom range Fully buffered to 9600 intelligent Latest IBM multispeed internal Latest IBM high speed internal	Y Y Y Y	Y Y Y Y	HAYES Y HAYES HAYES	Y Y Y & EPAD Y & EPAD	Y Y Y Y	Y Y Y Y	BOTH BOTH BOTH BOTH	Y	(255) (398) 499 699	195 359 399 549
INTERLEKT INTERLEKT	PORTMAN PROSPECT	V21, V23 V21, V23	Reliable no frills modem Reliable no frills modem	Y Y						OPT		173 125	139 99
MIRACLE MIRACLE MIRACLE MIRACLE MIRACLE	WS2000 WS3000 2123 WS3000 22 WS3000 22BIS WS4000	V21, V23 V21, V23 V21, V22, V23 V21, V22, V22BIS, V23 V21, V23 (V22 OPT)	Low cost manual modem Cost effective multispeed Cost effective multispeed Multispeed top of Miracle range Budget "Hayes" multispeed	OPT Y Y Y Y	Y Y Y Y Y	OPT HAYES HAYES HAYES HAYES		Y Y Y Y Y	Y Y Y Y Y	BOTH BOTH BOTH BOTH PULSE		108 295 495 650 170	89 205 385 400 133
MODULAR TECHNOLOGY MODULAR TECHNOLOGY	INTERMOVER 5021 INTERMOVER 5022	V21 V22	Low cost compact stand alone Low cost compact stand alone	Y Y								98 295	79 289
PACE PACE PACE PACE PACE	LINNET NIGHTINGALE SERIES 4 2123S SERIES 4 1200S SERIES 4 2400S	V21, V23 V21, V23 V21, V23 V21, V22, V23 V21, V22, V22BIS, V23	Pace best selling buffered modem Low cost manual modem Latest multispeed (Space Age) Latest multispeed (Space Age) Top pace range multispeed	Y Y Y Y Y	Y Y Y Y Y	HAYES HAYES HAYES HAYES HAYES		Y Y Y Y Y	Y Y Y Y Y	BOTH BOTH BOTH BOTH BOTH		139 99 265 399 499	119 77 224 315 389
MISSING LINK MISSING LINK MISSING LINK	BREAKOUT 2123 BREAKOUT 2400 QUATTRO CARD	V21, V23 & S/W V21, V22, V22BIS, V23 & S/W V21, V22, V22BIS, V23	IBM internal card & software pack IBM internal card & software pack Multispeed IBM internal card	Y Y Y	Y Y Y	Y HAYES HAYES	Y Y Y	Y Y Y	Y Y Y	BOTH BOTH BOTH	Y Y Y	525 945 795	440 819 685
RACAL RACAL RACAL RACAL RACAL RACAL RACAL	MPS1222 V12422 MPS24 CP2123 CP2123PM & S/W CP2123PM PM22	V22 V21, V22, V22BIS V26 V21, V23 V21, V23 & SPEAKEASY V21, V23 V22	Stand alone professional modem High spec PSTN multispeed Synchronous leased line & PSTN Stand alone IBM internal card & software pack IBM internal card IBM internal card latest Racal	Y Y Y Y Y Y Y		OPT Y Y Y HAYES HAYES HAYES	OPT Y Y	Y Y Y			625 865 530 356 450 385 495	599 879 589 299 395 285 395	
DOWTY DOWTY DOWTY DOWTY DOWTY DOWTY DOWTY DOWTY	QUATTRO TRI0 DUO MINIMO + 2 SB1212 TRI0 CARD SB2426 SB4827 SB9629	V21, V22, V22BIS, V23 V21, V22, V23 V21, V23 V21, V23 V22 V21, V22, V23 V26BIS V27 V29	Multispeed modem top Dowty range Intelligent multispeed Multistream modem plus! Auto/Manual direct connect UK best selling V22 stand alone Multispeed IBM internal card PSTN or LL synchronous modem High speed Sync/Async private line High speed Sync/Async private line	Y Y Y Y Y Y Y Y Y	Y Y Y Y Y Y Y Y Y	HAYES HAYES HAYES HAYES OPT HAYES	Y Y EPAD Y OPT Y	Y Y Y Y Y Y Y Y	Y Y Y Y Y Y Y Y	BOTH BOTH BOTH BOTH PT (OPT) BOTH BOTH BOTH	Y Y Y Y Y Y Y Y	795 595 340 246 495 595 317 795 995	599 455 289 199 399 455 279 625 795
TANDATA TANDATA	TM512 TM602	V21, V23 V21, V22, V23	Easy to use professional modem Cost effective reliable multispeed	Y Y	Y Y	HAYES Y	EPAD OPT	Y Y	Y Y	AUTO BOTH	Y	255 465	195 397
THORN THORN THORN	VX543 VX512 VX524	V21, V23 V21, V22, V23 V22, V22BIS	Thorn's best selling low cost modem New multispeed high tech modem Top of the range multispeed	Y Y Y	Y Y Y	Y HAYES HAYES	Y Y Y	Y Y Y	Y Speed buff Speed buff	AUTO BOTH BOTH		195 399 499	165 335 459
UDON SYSTEMS DEV	ORATOR	Call for details	Integrated speech & data comms centre									795	699

★ SPECIAL OFFER - FREE Chit-Chat S/W & IBM Cable with every V22, V22BIS (RRP £119) OR only £45 with every V21, V23. ★

* Please call for details

Claim Your FREE "One to One" Subscription (RRP £50) with every modem over £200

Prices Do Not Include
VAT or Carriage

PHONE 0342 24631 NOW **FAX 0342 26662**

or Contact Digitask, Unit M, Charlwoods Business Centre, Charlwoods Road, East Grinstead, West Sussex RH19 2HH. Telex 957418 G

NEW EGA: IBM SYSTEM/2 vs. EVA/480

ZOOM (magnify) your drawings 100 times faster
PAN (move) the drawings freely, instantaneously

EVA®/480

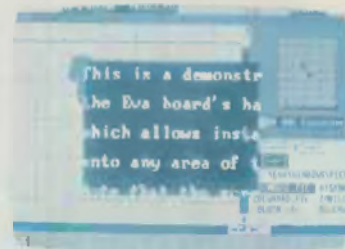
THE NEW GENERATION EGA



132-column for spreadsheet, word processing, IBM/DEC terminal emulation



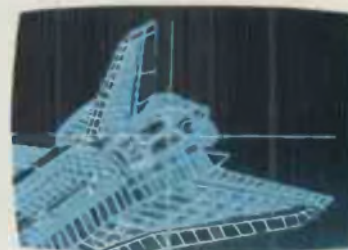
640 x 480 Graphics



smooth scroll in hardware window



**ZOOM YOUR GRAPHICS
IN 0.1 SECOND
PAN IT HEAD TO TAIL
INSTANTANEOUSLY**



Hardware Zoom, Pan, Window

The EVA/480 brings all these features to your fingertips. Instantly zoom any part of the display, create a window and pan in all directions. Now you can have professional graphics features at EGA prices, only from EVA/480.

Hercules, CGA, EGA, VGA 640 x 480 and even a printer port

The EVA/480 provides 100% complete compatibility with all the above display standards and is the first EGA (640 x 350) compatible card to offer 640 x 480 graphics. All modes can be selected by hardware, software or from the keyboard. Complete with printer port the EVA/480 provides what IBM forgot.

640 x 480 Graphics

The EVA/480 includes extensive 640 x 480 software drivers: M/S Windows, AutoCad, Page Maker, Lotus 1-2-3, Symphony and the full Dr. Halo II package is included. Drivers are also available for Ventura Publishing, EGA Paintbrush, Prodesign, Drafix, MathCad, FastCad and a growing list of popular software packages. Remember, you will need a MultiSync or equivalent monitor, to display 640 x 480.

132 column Text

The EVA/480 can produce text in 132 column x 25/28/44 lines in EGA mode, supporting Lotus 1-2-3, Symphony, Word Perfect, Wordstar, IBM/DEC terminal emulation

supported by DCA (IRMA), CXI, Persoft (SmarTerm), AST. Alternatively, try the 80 columns x 60 lines.

Performance and Quality

The EVA/480 is manufactured by Tseng International Inc. and is rated the No. 1 EGA card in the USA by PC Tech Journal (Nov 1986). They quote "All of the boards (Paradise's Autoswitch, Video 7's Vega...) presented here perform adequately for EGA functions, one clearly outshines the others; Tseng's EVA." EVA/480 is PC/XT/AT compatible and is also suitable for 16MHz 80386 systems. Ideally suited for use with the NEC MultiSync and other multi-frequency monitors. As quoted by NEC HOME ELECTRONICS, "The best for meeting the design philosophy of the NEC MultiSync monitor." Tseng's EVA/480; the new generation EGA card you can trust.

Technological Excellence

The EVA/480 is developed by Tseng Labs. Inc, a US public company since 1984. Tseng Labs design the VLSI chips, adaptor, BIOS and utilities of EVA/480. Tseng Labs are the leaders in EGA technology and as such are a manufacturer dedicated to graphics excellence.

Availability

The EVA/480 is distributed in the UK by Digitask Business Systems Limited. Call us now for further information.

EVA is a registered trademark of Tseng Laboratories Inc.
MultiSync is a registered trademark of NEC Home Electronics (USA) Inc.
IBM and SYSTEM/2 are registered trademarks of International Business Machines Corp.

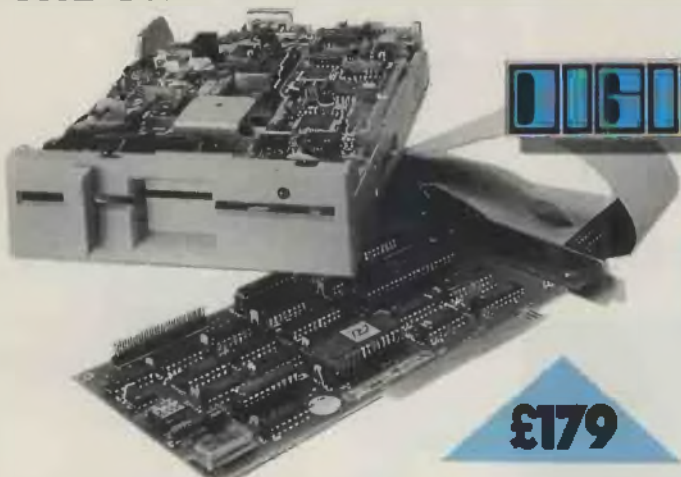
DIGITASK

The Recommended Retail Price for the EVA/480 is £229.00. Educational and Dealer enquiries welcomed.

PHONE 0342 24631 NOW

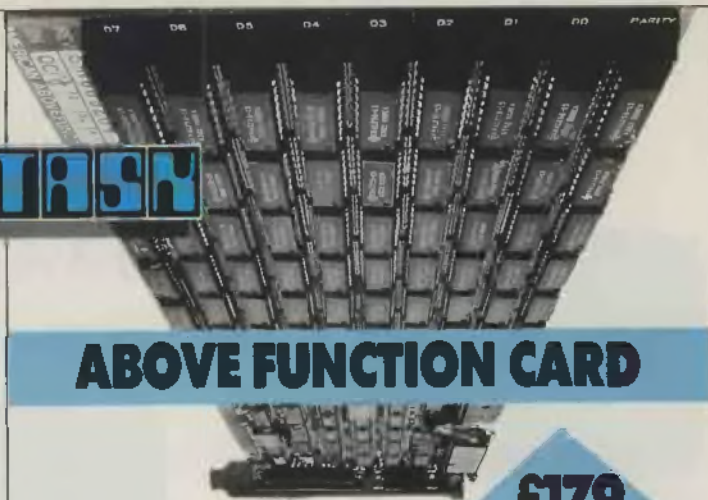
or contact Digitask, Unit M, Charlwoods Business Centre, Charlwoods Road
East Grinstead, West Sussex RH19 2HH. Telex 957418 G. Fax 0342 26662

THE GREAT COMMUNICATOR



£179

- Allows free interchange between XT® and AT® computers
- Dual drive controller and Brand Name 80TR, 1.2MB formatted drive
- Achieves more than 3-times capacity of normal 360KB floppy drive
- Controller handles (intelligently with on-board ROM) combinations of 1.2MB and 360KB floppies
- FAST data transfer (500K Bits/sec) in 1.2MB format. Excellent for Winchester backup
- 1.2MB drive reads/writes and formats 360KB using normal DOS 3-X commands
- No messy DOS patch software necessary!
- Standard DIGITASK ONE YEAR parts and labour warranty



ABOVE FUNCTION CARD

£179

- Up to 2MB expansion memory (2048KB)
- First 384KB may be configured as conventional memory
- LIM, LOTUS®, INTEL®, MICROSOFT®, (EMM) specification
- Async Comms adaptor (configurable as COM1 or COM2 or disable)
- Parallel Printer Port (configurable as LPT1 or LPT2 and Hercules® compatible)
- Real time clock/calendar with battery backup
- Games adaptor
- Utility software includes expanded memory manager, clock, ramdisk and printspooler
- Includes cables
- Fully compatible with IBM® PC/XT/AT computers
- Standard DIGITASK ONE YEAR parts and labour warranty
- (Unpopulated) Ram at £99/megabyte

PHONE 0342 24631 NOW

or Contact Digitask, Unit M, Charlwoods Business Centre, Charlwoods Road, East Grinstead, West Sussex RH19 2HH. Telex 957418 G

OVERSEAS CALLERS WELCOME

Prices Do Not Include VAT or Carriage

ALL VISA AND ACCESS CARDS ACCEPTED



JILUTECH SYSTEMS



Jilutech Systems Specialises in hardware products, we supply to many Government bodies, Corporates and small/medium sized businesses. Another side to our business is distributing to trade: Our competitive pricing is due to our buying power, if there is any computer requirement you have (including software) please contact us to discuss your requirement.

We also supply Star PRINTERS, Philips/Taxan MONITORS and Miracle Technology MODEMS.

EVEREX TAPE STREAMERS

★ IBM PS2/NETWORK Compatible ★
Comes with drive, controller card, cables, software, manuals, free cartridge, scheduler programme and one year warranty.

PC/XT/AT Compatible	OUR PRICE	RRP
60Mb Internal WANGTEK Streamer	800.00	1295.00
125Mb Internal WANGTEK Streamer	1250.00	1795.00
60Mb Internal TEAC Streamer	755.00	1200.00
60Mb External WANGTEK Streamer	920.00	1395.00
125Mb External WANGTEK Streamer	1350.00	1895.00
60Mb External TEAC Streamer	890.00	1295.00
IBM PS/2 Compatible — (for Models 50 & 60)		
60Mb External WANGTEK Streamer	1550.00	1800.00
125Mb External WANGTEK Streamer	1850.00	2276.00
Additional Controller Cards		
60Mb WANGTEK Controller Card	239.00	296.00
125Mb WANGTEK Controller Card	259.00	326.00
60Mb TEAC Controller Card	125.00	148.00

EVEREX MEMORY BOARDS

Can be supplied populated at no extra cost		
PC/XT/AT Compatible		
RAM 3000 Deluxe (AT Use)	OUR PRICE	RRP
— 3Mb Expanded/Extended mem card	175.00	260.00
Mini Magic Card a(XT/AT Use)		
— Fill out Base Memory to 640k	80.00	95.00
Maxi Magic EMS (XT/AT Use)		
— Up to 2Mb of EMS memory	145.00	190.00
RAM2000 (AT Use)		
— 2Mb Expanded/Extended mem card	130.00	152.00
IBM PS/2 Compatible		
— (Models 50 & 60)		
RAM 2000 — PS/2		
— 2Mb of EMS Memory	280.00	360.00
RAM 4000 — PS/2		
— 4Mb of EMS Memory	470.00	550.00

EVEREX TURBO CARD

Replaces PC/XT 8088 with the 80286 Microprocessor and fills out Base memory to 640Kb.

	OUR PRICE	RRP
Excellerator		
— Replaces 8088 with 80286 Chip	359.00	499.00

EVEREX GRAPHICS CARDS

Can be supplied together with a Monitor to match your requirements.

	OUR PRICE	RRP
Evergraphics Deluxe		
— High Res. Mono Card & Hercules Compatible.	140.00	176.00
Everex Edge		
— Dual Mono & Colour Card	270.00	369.00
Micro Enhancer Deluxe		
— EGA Card	179.00	206.00
PGA		
— Professional Graphics Adapter	999.00	1375.00

EVEREX MULTIFUNCTION CARD

Powerful Multifunction Cards which have Parallel Printer Port, one Serial Port as standard and an optional Second and Games Port.

	OUR PRICE	RRP
Magic I/O		
— Multifunction & Clock/Calendar	80.00	95.00
Magic Card II		
— Multifunction, 576Kb of Memory & Clock/Calendar	195.00	240.00
Multifunction EMS		
— Multifunction with 1Mb of EMS Memory & Clock/Calendar	175.00	220.00
Magic Card 16 (For the AT)		
— Multifunction with 2Mb Memory	195.00	235.00

HARD DISK DRIVES

Package includes Drive, Cables, Fitting Kit, Formatting Instructions Partitioning Software. All disk products are Genuine Seagate/Miniscribe drive with Western Digital Controllers.

	OUR PRICE
Miniscribe 20Mb 3425 drive with controller	195.00
Miniscribe 40Mb 3650 drive with controller	295.00
Seagate 20Mb ST225 drive with controller	230.00
Seagate 30Mb ST238 drive with controller	280.00
Seagate 40Mb ST251 drive only	350.00
Seagate 80Mb ST4096 drive only	750.00
20Mb External hard disk with controller	340.00
20Mb hard card	250.00
30Mb hard card	280.00

CHIPS AND COPROCESSORS

	OUR PRICE
DRAM 64k (150ns)	1.00
DRAM 256k (150ns)	2.75
DRAM 256k (120ns)	2.95
Maths Co-Processor 8087	130.00
Maths Co-Processor 80287-6MHz	170.00

SPECIAL OFFERS

	OUR PRICE
360Kb Floppy Disk Drive	105.00
1.2Mb Floppy Disk Drive	125.00
Serial Port Card	39.00
Parallel Port Card	39.00
8 Port Serial Card & Cables	195.00
Hercules Compatible Card	75.00
Colour Card with Parallel Printer Port	75.00
Monochrome Monitor	105.00
Colour Monitor	299.00

TURBOTECH SOFTWARE

Speeds up applications such as Databases, Wordprocessors, CAD-CAM etc. Up to 3 times faster and will also lower hard disk head wear.

	OUR PRICE
Turbotech software	99.00

If it concerns Computers . . . It concerns us!!! Please call to discuss quantity discounts

All our products are covered by a One Year Warranty.
VAT & DELIVERY is not included.

29 CURZON ROAD,
EALING, LONDON W5 1NE

01-991 5044

PACKARD BELL

THE HIGH LEVEL AT COMPUTER FOR LOW LEVEL PRICES



**VX 88 small footprint
 very fast XT compatible
 with 20 MB only £725!
 with 30 MB only £795!
 with 40 MB only £995!**

Since its founding in 1929, Packard Bell has established itself as a leader in electronic innovation and quality. Today, that innovation and quality is found throughout the complete range of new Packard Bell Business System Products. State-of-the-art technology, reliability, durability and value, hallmark each of these new products. To meet expanding business application requirements, the VT286 provides:

- Significantly faster Processing and Throughput.
- 640KB RAM standard; expandable to 15MB.
- High capacity Disk Drives and 1.2 MB Floppy Disk.
- Parallel and Serial Interface.
- 220W Power Supply.
- Professional Keyboard.
- MSDOS 3.2, GW Basic 3.2
- 7 Channel DMA.
- 16 Level Interrupts, 3 Program Timers.
- 4 Level Memory Protection

For further information please call on 01-842 0071

CAL-ABCO

Over 50 offices worldwide

CAL CIRCUITS-ABCO (U.K.) LIMITED
 SPENDALE HOUSE, THE RUNWAY, SOUTH RUISLIP, MIDDX.
 HA4 6SE; Tel: 01-842 0071 Fax: 01 841 3891, Telex: 295441

Cal-Abco acknowledges all trade marks in this advertisement

NEW AMSTRAD PC RANGE AT WILDING'S NOW

New Low Prices on Amstrad PC1512 Computers

Plus £180 FREE Software

including Migent Ability Integrated Package
and 4 US Gold Games

PC1512 SDMM
Mono monitor,
single disk drive

£399

PC1512 DDMM
Mono monitor,
twin disk drive

£499

PC1512 SDCM
Colour monitor,
single disk drive

£549

PC1512 DDCM
Colour monitor,
twin disk drive

£649

All models come with keyboard, processor, mouse and 512K RAM.

£50 OFF
ANY BROTHER
PRINTER
WHEN BOUGHT WITH AN
AMSTRAD PC



New Amstrad PC1640 Computers with Enhanced Graphics* and 640K RAM

All Amstrad PC1640's come complete with a choice of monitor – enhanced colour, standard colour or mono, – single, double or 20 megabyte hard disk system units, plus keyboard, mouse and 640K RAM.

£50 OFF
ANY BROTHER
PRINTER
WHEN BOUGHT WITH AN
AMSTRAD PC

MONO DISPLAY MODELS

Single Disk Drive

£499

Double Disk Drive

£599

20 Megabyte Hard Disk

£899

COLOUR DISPLAY

£150 EXTRA

ENHANCED COLOUR DISPLAY

£300 EXTRA

*Not available on standard colour
display models



Here's why it must be Wilding's

PRICE GUARANTEE

It goes without saying that Wilding customers can be certain of outstanding value for money. If you purchase any product in this advertisement from Wilding's and find that you can buy it cheaper from another retailer locally within seven days, we will refund the difference.

DEMONSTRATION AND ADVICE

Wilding's skilled, attentive staff will offer expert advice on the printer most suited to your needs and offer full comparative demonstrations.



AFTER SALES SERVICE

Service at Wilding's carries on long after the equipment is purchased. Our skilled maintenance team comprising in excess of 150 engineers offer high-speed, efficient after sales service.

50 BRANCHES NATIONWIDE

Wilding's stores can be found in major towns around Britain, where you have the confidence and benefits of dealing with a major public company.

PROFESSIONAL BROTHER PRINTERS

With Wilding's Unique 3 Year Parts Guarantee

IDEALLY
SUITED
TO
AMSTRAD
PC'S

New

Brother Laser Printer

SAVE £200

on Manufacturer's recommended price



FREE
1 Years Maintenance

Brother HL-8

The Brother HL-8 is a second generation letter quality and graphics laser printer designed to be fast, quiet and easy to use. The HL-8 can print on a wide variety of media, from single sheets up to legal size, to envelopes and transparencies. There are five resident typescripts plus many options available. The HL-8 plugs into any computer and is totally compatible with all popular software.

£1995

The Revolutionary Brother Daisy Wheel and Dot Matrix Printer



Brother Twinriter 5 The first printer to combine both daisy wheel and dot matrix printing systems into a single unit. Now you can have 40cps letter quality printouts for word processing requirements and 160cps dot matrix speed for data processing or first drafts.

£995

Brother Dot Matrix Printers



Brother M-1109

The M-1109 offers 100cps draft print and 25cps letter print. Fitted with both Centronics and RS232C Interfaces.

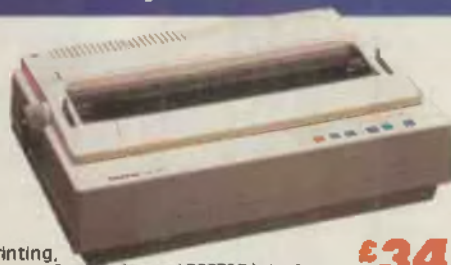
£174

Brother M-1409

The M-1409 provides superfast 180cps printing plus prestige NLQ font. There's a 3K buffer memory and tractor feed.

£345

Brother Daisy Wheel Printers



Brother HR-20

Fast 22cps printing, 8K buffer memory, Centronics and RS232C interfaces.

£345

Brother HR-40

Amazing 40cps printing yet very quiet, full range of typescripts and pitches plus 2-colour printing.

£845

Training

Wilding qualified Trainers offer excellent courses on PC Computers and a variety of Software. A free one year Hotline is included in every training course. Phone or call into your nearest branch for full details.



Free Hotline

Each Personal Computer supplied by Wilding's includes free 90 days Hotline Support.

WILDING'S OFFER PROFESSIONAL ADVICE AND TECHNICAL BACK UP

CENTRAL LONDON
261 Gray's Inn Road (London Sales Office)
54 Baker Street
278 High Holborn
157 Moorgate
23-24 Percy Street, W1 (off Tottenham Court Road)
275 Regent Street
8 New College Parade, Swiss Cottage
BATH Shraham House, Avon Street
BOLTON 36 Great Moor Street
BRIGHTON 133 Western Road
BRISTOL
Eldon Way, Brislington (Regional Sales Office)
14 Union Street
10-11 Denmark Street
BROMLEY 33 Widmore Road
CAMBRIDGE 2 Sussex Street
CHESTER 64 Northgate Street
COLCHESTER 103 High Street
CROYDON 7-9 St. Georges Walk
FIMCHLEY 134 Barklands Lane
GLOUCESTER 4 Grosvenor House, Station Road
GRAVESEND 199 Patrick Street

Tel: 01-278 4333
Tel: 01-486 0798
Tel: 01-430 0333
Tel: 01-628 0501
Tel: 01-255 3100
Tel: 01-499 2836
Tel: 01-586 7593
Tel: 0225 339933
Tel: 0204 386937
Tel: 0273 29079

Tel: 0272 221681
Tel: 0272 293199
Tel: 0272 277396
Tel: 01-250 8456
Tel: 0223 65714
Tel: 0244 351913
Tel: 0206 46768
Tel: 01-686 4957
Tel: 01-346 7195
Tel: 0452 23111
Tel: 0474 61635

GUILDFORD 9 Tinsgate
HADLEIGH (Essex)
241-243 London Road (Regional Sales Office)
HIGH WYCOMBE 12 Church Street
HORNCHURCH 196 High Street
ILFORD
531-535 High Road (Regional Sales Office)
IPSWICH 16 Carr Precinct, Carr Street
KINGSTON 26 Castle Street
LEEDS 22 King Edward Street
LUTON 25 Wellington Street
MAIDSTONE 88 King Street
MANCHESTER 125 Oldham Street
NORTHAMPTON 30 Gold Street
NORWICH 10 Queens Road
OXFORD 21 High Street
PETERBOROUGH 19 Cowgate
PURNEY 339 Purney Bridge Road
READING 16 West Street
ROMFORD 17 High Street
RUNSUP
69 High Street (Regional Sales Office)
SLOUGH 261 High Street

Tel: 0483 579489
Tel: 0702 551066
Tel: 0494 36378
Tel: 04024 48629

Tel: 01-514 1525
Tel: 0473 57469
Tel: 01-549 9461
Tel: 0532 468118
Tel: 0582 425771
Tel: 0622 685422
Tel: 081-834 5582
Tel: 0604 22713
Tel: 0603 666011
Tel: 0865 250256
Tel: 01-788 3452
Tel: 0734 503465
Tel: 0708 765896

Tel: 08956 35700
Tel: 0753 39356

SOUTHEND 26 Alexandra Street
SWINDON 47-48 Havelock Street
WALTHAM CROSS 91 High Street
WALTHAMSTOW 7 The Arcade, Hoe Street
WATFORD 166 High Street
WIMBLEDON 120 The Broadway
WOOLWICH 21 Thomas Street

Tel: 0702 331876
Tel: 0793 33111
Tel: 0992 764200
Tel: 01-520 7668
Tel: 0923 32121
Tel: 01-540 7822
Tel: 01-855 0631

HEAD OFFICE: 531-535 High Road, Ilford, Essex. Tel: 01-514 1525
Telex: 264371 Fax: 01-478 0436

WILDING
OFFICE EQUIPMENT PLC
BRANCHES THROUGHOUT THE UK

Circle No 243

Fast Facts 01-200 0200

WHAT MORE DO YOU NEED TO KNOW ABOUT ZORLAND C?

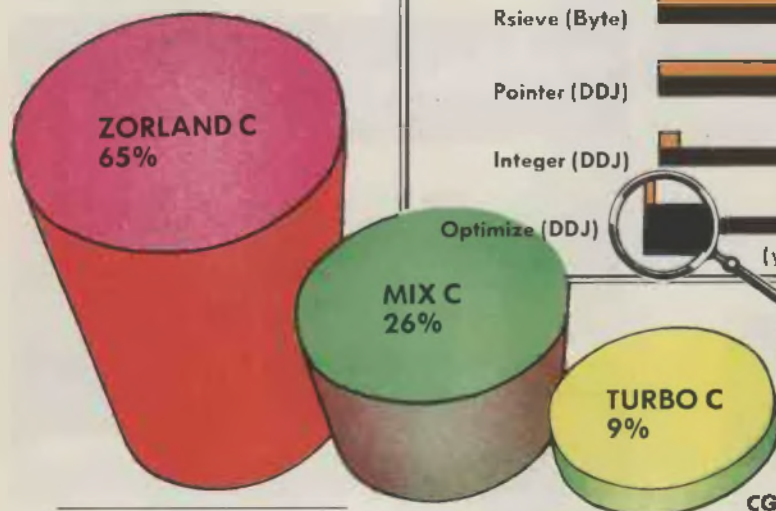
The C specialists!

Zorland sells more C compilers than anyone else in Europe. We started shipping in September 1986 and we haven't looked back since. Now we are considered to be the C specialists!

Our aim is to provide a 'one-stop' service for the C programmer whether novice or professional.

What about the others?

Independent sources say Zorland C is the top selling C compiler in Europe. The Independent 1512 User Group confirmed that 65% of their customers bought Zorland C as against only 9% for Turbo C!



Six good reasons!

Here are six good reasons why you should consider Zorland C as your first choice in C compilers:

1. Zorland C has a low-cost entry point of only £29.95
2. Zorland offers the full source code to the library for only £19.95! This is invaluable for professional programmers and students wishing to study the inner workings of the library.
3. Zorland's new Optimizer will accelerate your programs to execute by up to 30% faster than Turbo C!

Zorland's Optimized C beats any compiler — period.

4. Zorland's range of add-on libraries can save you weeks or even months in the production of serious application programs.

5. Zorland's Technical Hotline has earned itself the reputation of being one of the best in the business! FREE!

6. Zorland produce ZCNEWS — the only monthly magazine of it's kind in Europe. Full of

The family grows!

Here are just a few of the new add-on libraries that will be available shortly. No other C compiler offers such a wide range of support products.

Graphics TOOLKIT £29.95 An excellent collection of functions for drawing boxes, circles, ellipses, lines, graphic fonts, fills, patterns, etc. The program you write is 'device independent'

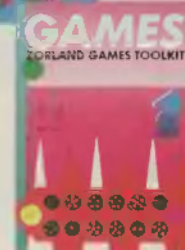


ZASM — Zorland's Assembler Fully MASM compatible with

BIG manual/beginners guide.

DATA ENTRY — You draw screens and this prog generates the source code!

BTREE MULTI-USER Make your database applications Multi-User with this BTREE add-on.



TSR/MACROS — Make your program Memory Resident with our TSR functions. Includes Keyboard Macros!

COMMS TOOLKIT — Save hours with this ready made comms toolkit. Supports up to eight serial ports!

ZORLAND'S UTILITES — £19.95 Comprehensive set of utilities. Examine disk sectors, command line editor, etc. etc.

DISK OPTIMIZER — £19.95 Reduce the time taken to access files on your hard disk, easily.

SUPERTEXT TOOLKIT £29.95 More than 90 text

processing functions together with full source code for a full-blown wordprocessor! Includes 'Wordstar' compatible keys, customizing, 'dot' commands, etc. Now you can include a Wordprocessor into your applications!



thus allowing you to use external drivers for screens, plotters, lasers etc. Includes 70 page manual and drivers for CGA, EGA, Hercules, etc.

GAMES TOOLKIT £29.95 Chess, Backgammon and Wari 150 page manual explains how to write your own games of skill and strategy. Comes with three ready to play games and the full source code.

technical help, advice and listings for the C programmer.

Reviewer's rave!

"High quality . . . impressive performance at a knock-down price!"
Personal Computer World

"Actually an improvement on some of the more expensive packages from America!"
Amstrad Professional Computing

"There is nothing to touch Zorland C . . . even at a much higher price!"
PC PLUS

SPECIAL OFFER

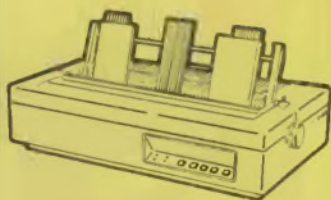
Until 31st December 1987
Get the Linker and Librarian software (worth £19.95) FREE when you buy Zorland C at £29.95!

FOR IBM PC/AMSTRAD 1512



SURPLUS COMPUTER STOCKS

SAVE £1330



EPSON SQ 2000 PRINTER

Special purchase of industrial quality inkjet printers, 175 CPS draft, 105 CPS letter quality mode, parallel interface, 2k buffer. This full-size, heavy duty (weight 39.6lb) printer has a 24 jet print head. Proportional spacing, bit image graphics. Boxed, with full one year warranty, includes manuals and mains lead. Limited supply. Original price £1825. Optional sheet feeder £100. Optional tractor feed £75.
BRAND NEW

£495

100 CPS

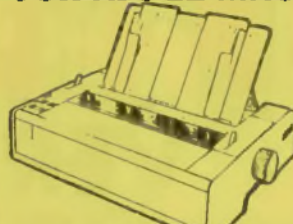


COPAL SC1000

Copal SC1000 standard parallel interface dot matrix printer. Uses Epson escape codes. Specification: friction and tractor feed 100 CPS, subscript and superscript, condensed and dual density, takes fanfold, roll, cut-sheet and copy paper, eight international character sets selectable by dip switch settings. Compatible with most popular PC programs. (Also available Copal SC 1200, 120 CPS £110).
Brand new boxed including manuals & ribbon.

£99

FOR APPLE MAC



OLIVETTI DM 280

Apple Imagewriter compatible 80 column dot matrix printer. 160 CPS, works with Mac Paint, Mac Draw, Etc, bi-directional, 7 international character sets, takes sheet-feeder and tractor feed (supplied at extra cost). Complete with mains lead, ribbon, manuals, paper guide, etc. Bring your diskette into N.O.St. or T.C.Rd. and get a print out-you will be Impressed. Also available Olivetti DM 290 similar spec. but full width 132 col printing £295 NEW

£195

LOTUS 123 RIVAL

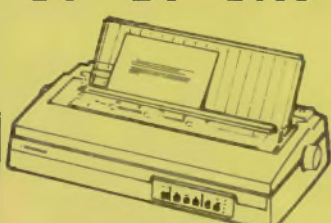


SILK

Daybreak Technologies' Silk, one of the best Lotus 1-2-3 clones but with many innovative features of it's own, including improved memory management, better graphics and time-series modelling. Help is on line and work on the spread sheet can continue whilst using the help facility. Crash recovery "saves as you type" making lost data impossible (hard disk only). Needs 512k, not copy protected.
Received rave reviews in the computer press. NEW

£95

DP 20 £195



DATAPRODUCTS DP 20

£499 list price. Daisywheel spec includes 22 CPS serial interface, full width 136 column, heavy duty. Choice of 10, 12, 15 CPM and P.S. daisywheels. Complete with mains lead, ribbons & Courier 10 daisywheel. Works on COM 1 with IBM or compatible, emulates Diablo 630 for easy installation. Free "Mode" command disk! Single bin sheetfeeder £100 extra, double bin sheetfeeder £150.
Tractor feed £75.
Brand new, boxed.

£195

PORTABLE



APRICOT PORTABLE PC

Minimum spec, 256k RAM, 720k 3 1/2" disk drive, LCD 80 x 25 display, serial & parallel printer ports, bundled software includes SuperWriter, SuperCalc, SuperPlanner, MS-DOS vers 2.11, BASIC, Apricot manager, optic fibre light pipe, carrying case. Obtained from the service department of major retailer, tested & are covered by a three months parts & labour warranty. (Also available Apricot FP slightly enhanced BIOS features £325)

£250

15MB HP



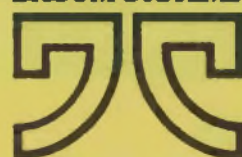
HEWLETT PACKARD HP 150

Purchased direct from the financial services company, the following limited stocks of Hewlett Packard computer hardware. HP 150 model B including 91330 15mb disk drive, 3 1/2 inch 720k floppy drive, HP Touchscreen option, internal printer HP part No. 2674A, keyboard, HP-IB connecting cables etc. Comes with MS-DOS, MemoMaker, Multiplan, Cardfile and full operating instructions. Full three months parts and labour warranty. DEMO

£795

HAYES COMPAT

DACOM SYSTEMS



DSL 2123 AD

DSL 2123 AD/H

BT and CCITT approved. DaCom DSL 2123 AD/H intelligent modem. AutoDial AutoAnswer. Standards of line connection and operation supported include: V21 (300bps) originate or answer, V23 (75/1200bps) originate or answer, V23 half duplex, V23 pseudo duplex and auto mode detection. Includes 9 volt AC transformer, new style modular jack plug on 2 metre cable and socket for hand set connection. Complete with manual.

£150

FLEA MARKET

PARTS ONLY, NO WARRANTY GIVEN
ACT Sirius complete £295
Linokay 2 inc disk drive £450
Decwriter II £95
War surplus diskettes 10's £6
No-name 132 col printer fast £75
Osborne I brown case £95
*OKI IBM Plug'n Play £25
Tandy Model III 16k £45
*DRE ICL 2348 hard disk £195
surplus 5 1/4" floppies 10s £6
Bit 24 for BBC £15
Acoustic hoods from £75
110v Nec Spinwriter £250
Various Qume printers £75
Ricoh 1600 £99
Pet 8032 £75
Pet 8050 double disk drive £195
*Alphanumeric keyboards £35
HP Thinkjet HP IB £75
Zynar hard disk off Nestar £50
OKI 92 dot matrix printer £45
Quad Liberty PC board £50
Quad Liberty AT board £50
Plantronics PC+ colour plus £50
Clock calendar 256k cards £35
*Assorted shredders from £150

MISCELLANEOUS

Compaq 286 Deskpro 30mb £1895
Apple IIc £295
Apple IIc 5 1/4" external floppy £125
Apple Scribe printer for IIc etc £125
Apple Europlus CPU £95
Apple IIe £225
Merlin 16 line phone system £1000
Kaypro 2000 EXP box £250
Televideo 1605 pc compatible £595
Televideo 1605H ditto inc 10mb £795
PR1 acoustic coupler £25
Compaq Plus inc 256k 10mb £1100
Apple Macintosh 512k £795
Epson PX 4 portable £225
Tandon PCA 20 mono AT comp £1500
Polaroid Palette demo £750
Compaq Deskpro 10mb £995
Kaypro 2000 inc software £695
Brother FD 100 3 1/2" disk drive £75
Kimtron terminal £250
*Epson Taxi mouse & software £75
Olivetti M24 2 x 360k, 640k £625
Tandon "baby" AT 30mb £1500
Quadjet 4 colour 80 col printer £195
Dataproducts DP55 £395
Symbiotic 40mb for Macintosh £595
HP Vectra 40mb hard disk £500

IBM CARDS

Orchid PCTurbot 186 £150
Orchid Blossom PcNet £125
Misslink £125
AST Rampage AT 1mb £125
Irma PC 3278 card £195
Gateway G net £125
5250 Enhanced £495
128k Idea Minimax £95
128k AT Top Hat upgrade £95
AST Flashpack £125
AST Advantage AT 128k £195
*AST Advantage £250
CGA compatible £50
CGA IBM £75
AST Rampage £100
Intel Above Board AT £150
Hercules Mono £95
AST Sixpack inc 64k £75
Quad Silverboard £150
AST Megaplus £35
Quad board inc 64k £75
Hyperam 256k £50
EGA compatible £95
EGA IBM £125
PC Express £150
AST Advantage AT 128k £195
*AST Colourgraphplus card £50

IBM HARDWARE

IBM PC 64k, inc monitor & kbd £550
IBM PC 512k complete £695
IBM XT 640k 10mb complete £995
IBM ATX 30mb complete £1900
IBM PS/2 model 80 complete £4250
IBM AT co-processor 80287 £95
IBM Wheelprinter £350
IBM compatible enhanced kbd £95
IBM Network cable 25ft. £10
IBM Colour printer £250
IBM Proprietary £200
IBM SDLC card £50
IBM Async Comms card £50
IBM swivel monitor stands £25
*IBM Translator unit £195
IBM AT tech ref manuals £25
IBM Cluster adaptor £150
IBM Network cable 100ft. £25
IBM Displaywrite II £50
IBM Displaywrite upgrade £75
IBM 10mb upgrade inc card £150
IBM 20mb upgrade inc card £250
IBM PC convertible £495
Tailgrass 20+20 £395
*Microsoft Pascal compiler £195
IdeaDisk 10mb & 5mb backup £250
Alloy 17.5mb tape streamer £250

Part exchanges accepted.

* indicates brand new goods

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

Datacommunication's products and accessories available from stock. Ordered today, delivered tomorrow, or faster!

Modems, multiplexors, line drivers, cables, connectors, switches and much more.

TelPost has almost every datacomm product any company, large or small could require. Every product is of the highest quality and backed by a full guarantee.

A MODEM IN THE HAND IS WORTH...



The new catalogue is hot off the press and full of the latest products available.

*Call now
for your free copy
of the new catalogue*
(0635)/30110

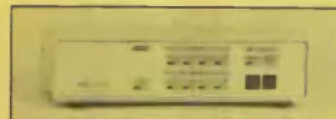
Telpost U.K.
FREE POST (RG 1547)
NEWBURY
BERKSHIRE RG 131 BR

TelPost is part of the TELINDUS group

S L DATA

4 INTO 1 AUTOSWITCH

£95



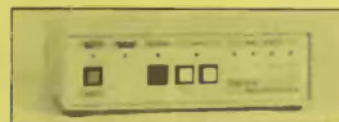
£95

MP 401 Autoswitch £95 MP801 Autoswitch £146

DATA TRANSFER SWITCHES

Serial		Parallel	
DS25 2 Way	£27.00	DP36 2 Way	£27.00
DS25 3 Way	£43.00	DP36 3 Way	£43.00
DS25 4 Way	£45.00	DP36 4 Way	£45.00
DS25 Crossover	£49.00	DP36 Crossover	£49.00
Cables & Accessories Available		RS232 Miniterster	£14.50

£105



£105

PRINTER BUFFERS — 64k & 256k

PB64	£105.00	PB64-2	£139.00
PB256	£180.00	PB256-2	£199.00

Add 15% VAT + £2.50 P&P to UK Orders
Trade and Educational enquiries welcome

S L DATA Ltd

Miswell Suite
Tring House
77/81 High Street
Tring, Herts HP23 4AB

TEL: 0442 890205
0442 890302
TX: 826715 AERO G

CASHFLOW PLANNING?

FINANCIAL BUDGETING FOR GROWTH

Then you need **CASHFLOW FORECASTER!**
for **AMSTRAD PC, IBM PC or compatible,**
APRICOT F COMPUTERS

CASHFLOW FORECASTER specifications:

- ★ A cashflow forecast based on bank's formal plus Profit & Loss and Balance Sheet essential for loan applications.
- ★ An efficient credit forecast to improve your cashflow.
- ★ A detailed analysis of your trading expenditures.
- ★ A comprehensive list of financial ratios giving you a wealth of information on the health of your firm.
- ★ A highly user friendly design so your only task is to enter data to well laid out calculation sheets.
- ★ An easy to use turnkey system so you can get CASHFLOW FORECASTER working in no time at all.
- ★ A high performance software package written in the C language for single or double disk drive systems.

The MANUAL specifications:

- ★ Business finances simply explained.
- ★ Strategies for credit forecasts and bank overdraft.
- ★ Multi-period financial forecasting.
- ★ How to determine forecast accuracy.
- ★ In addition to all these, a step by step manual enables you to start cashflow forecasting without previous experience.

IMPROVE YOUR BUSINESS FINANCE WITH
CASHFLOW FORECASTER FOR ONLY £59.95

Order with cheque for £59.95 + VAT + p&p £1. (£69.94)
direct from MayGee Systems or send SAE for details. Please
specify computer type. Allow 10 days for delivery.

MAYGEE SYSTEMS

9 Kelvin View, Torrance, Glasgow G64 4HQ
Tel: (0360) 22247

ELONEX—

WHEN BOTH PRICE AND PERFORMANCE COUNT.

PC 88 Turbo XT Compatible

■ NEC V20 Processor ■ 4.77/8 MHz switchable
■ 640 k RAM ■ 20 Mb 65 mS Hard Disk ■ 360 kb
Floppy Disk ■ Hercules compatible mono card ■ HiRes
12" monitor ■ MOUSE ■ Professional keyboard
■ 1 Parallel, 1 Serial port ■ Clock/Calendar
w/battery backup ■ 130 W power supply ■ 8
Expansion slots ■ GEM Collection from Digital
Research ■ BASIC (GW compatible) ■ MSDOS
3.21 ■ Full Set of Manuals ■ 12 Month Warranty
■ Lifetime Hotline Support



£795
+VAT

PC 286 Turbo AT Compatible

■ 286 Processor ■ 6/8/10 MHz—0 wait state ■ 640 k
RAM ■ 40 Mb 40 mS Hard Disk ■ 1.2 Mb Floppy
Disk ■ Hercules compatible mono card ■ HiRes
14" Monitor ■ MOUSE ■ Professional keyboard
■ 1 Parallel, 2 Serial Ports ■ Clock/Calendar
w/battery backup ■ 200 W power supply ■ 8
expansion slots ■ GEM Collection from Digital
Research ■ BASIC (GW compatible) ■ MSDOS
3.21 ■ Full Set of Manuals ■ 12 Month Warranty
■ Lifetime Hotline Support



£1295
+VAT

PC 386 System

■ 386 Processor ■ 16 MHz clock speed ■ 2 Mb
RAM ■ 44 Mb 28 mS Hard Disk ■ 1.2 Mb Floppy
Disk ■ Hercules compatible mono card ■ HiRes
14" Monitor ■ MOUSE ■ 102 key Enhanced
keyboard ■ 1 Parallel, 2 Serial Ports
■ Clock/Calendar w/battery backup ■ 200 W
power supply ■ 8 expansion slots ■ GEM Collection
from Digital Research ■ BASIC (GW compatible)
■ MSDOS 3.21 ■ Full Set of Manuals ■ 12 Month
Warranty ■ Lifetime Hotline Support



£2495
+VAT

All machines are supplied set up and ready for use. Nationwide on-site maintenance is available.

All machines fully compatible with DOS, XENIX, AUTOCAD, NOVELL, LOTUS, etc.

Please feel free to visit our showroom



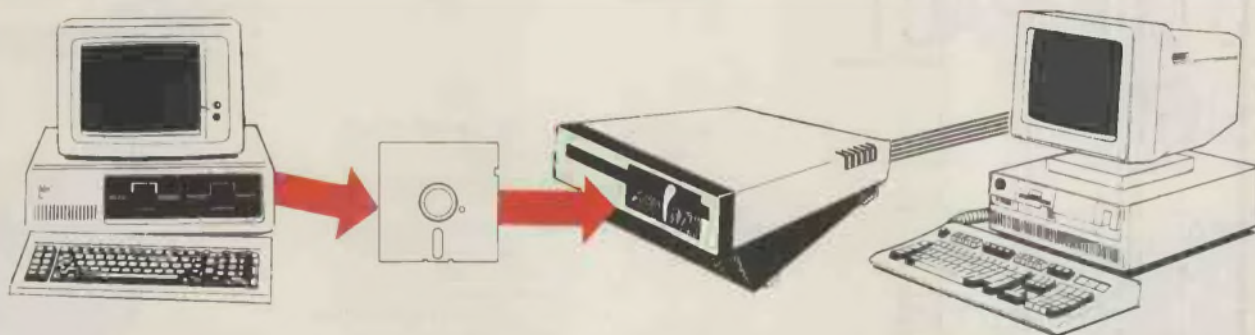
ELONEX (UK) Ltd.

Rays House, North Circular Road
London NW10 7XB
Tel: 01-965-3225 FAX: 01 965 3246
Telex: 946240 CWEASY /REF 19020170

UPGRADES: ■ EGA Card + Monitor—£360 ■ CGA
card + Monitor—£160 ■ 40 Mb Hard Disk—£190
■ 44 Mb Hard Disk—£275 ■ 80 Mb Hard Disk—£490
■ 8087/80287 Math Coprocessor—£95/£150 ■ Network
cards: 2/2.5 Mbits/s ■ Printers ■ Tapc—Streamers
■ Software

PC TO PS/2 COMPATIBILITY

(IN 360Kb and 1.2Mb FORMATS)



If you are looking for a fast and convenient way to transfer those valuable files from your IBM PC/XT/AT or compatible to the new IBM PERSONAL SYSTEM/2 then the PLUS-FD 500 Series is the answer.

FD-500 is an external 5¼" floppy disc drive for the IBM PS/2, available as either a dedicated 360Kb unit or software detected 360Kb / 1.2Mb unit.

FD-500 is supplied in an attractive compact case and is easy to install via a single flat ribbon cable connected to the PS/2.

PRICES

Model	Host	Capacity	R.R.P.
FD530	PS/2.30	360Kb	£300
FD550	PS/2.50	360Kb	£300
	Upwards		
FD55H	PS/2.50	Dual Format	
	Upwards	1.2Mb/360Kb	£350

PLUS-FD 'OPTIONS'

The PLUS-FD range offers many options for floppy disc transfer between micro's of different formats and/or drive sizes including:

- FD3I 3½" internal / external floppy drive (720K) for IBM PC/XT/AT or compatible to read, write and format a variety of 3½" formats, including IBM PS/2, APRICOT AND TOSHIBA.
- FD5A 5¼" external floppy drive (360K) for APRICOT PC/Xi to read, write and format IBM 180K and 360K formats.
- For the SIRIUS/VICTOR 9000 we offer both 5¼" IBM format floppy drives and 3½" IBM/Apricot format drives. A dual 5¼" plus 3½" unit is also available.

PLUS 5 ENGINEERING LIMITED

Crowborough Hill, Crowborough, Sussex TN6 2EG
Tel: (08926) 63211. Fax: (08926) 65389. Telex: 95538 PLUS G.



Mail and Telephone Orders welcome.



FOR THE EXECUTIVE ON THE MOVE **TOSHIBA** TOP PERFORMANCE AND COMPACT DESIGN

**TOSHIBA
IBM COMPATIBLE
PORTABLE COMPUTERS
AT GULTRONICS**



T1100 PLUS

*The portable that thinks
it's a desktop PC!*



T1100 PLUS specification.

- | | |
|----------------------------|---|
| Operating system | • MS-DOS 3.2 |
| Processor | • 80C86 running at 7.16 MHz or 4.77 MHz |
| Memory | • 640K |
| Disk drives | • Two 3.5" 720KB offering 1.4MB total storage |
| Display | • Supertwist technology
• 80 characters x 25 lines
• 9.1 x 4.7 inches
• 640 x 200 pixels
• Position adjustable a full 90° |
| Keyboard | • 81 keys, full size |
| Standard interfaces | • RGB colour monitor
• Monochrome composite monitor
• IBM compatible parallel printer/
5.25 disk drive
• RS-232C serial communications
• I/O bus for Expansion Box |

- | | |
|-----------------------------|---|
| Dimensions | • 12.1" wide, 2.6" high, 12" deep |
| Weight | • Less than 10lbs |
| Power | • Built in rechargeable NiCad batteries |
| Included accessories | • 240VAC adaptor for recharging and mains power operation
• MS-DOS manual
• Owner's manual
• Carrycase with grip handle and shoulder strap |
| Options | • Internal V21, V22, V23 Hayes compatible modem (BABT approved)
• External 5.25" floppy disk drive
• Universal Floppy Link to desktop PC disk drive
• Car cigarette lighter power adaptor/charger
• Expansion Box with five IBM compatible slots
• Bi-Synchronous Communications Adaptor |



T3100 (ALSO AVAILABLE NOW T3100 20Mb)

Features

- Enormous processing power – this is the main feature of the T3100.
- The basic version of the T3100 comes with 640 KB of main memory which can be expanded to 2.6 MB.
- The T3100 also has a built-in 3 1/2" drive with 720 KB storage capacity for exchanging data and programs with other computers.

- The hard disk – a standard feature of the T3100 – provides even greater storage capacity than the diskettes.
- The enormous storage capacity, the hard disk offers two other important advantages: considerably faster access to stored data, which means much faster response time for the computer, and greater data security.

GULTRONICS

COMPUTER CENTRE

223 TOTTENHAM COURT ROAD, LONDON W1P 9LA TEL: 01-323 2838/323 4642 TELEX: 295358
(OPPOSITE GOODGE ST. TUBE STATION)

London's main stockists for Amstrad, Atari, Commodore, Epson, Brother, Citizen, Star, Sinclair. Also extensive range of software, Modems and peripherals.

All offers also available at: 43 Church Street, Croydon, Surrey. Tel: 01-681 3344

CONSULT GULTRONICS BEFORE COMMITTING.

NEW LOW PRICE ST!



ONLY FROM SILICA

Finally, there's a personal computer that not only solves problems like other computers, but also solves the one problem that other computers have created. Affordability. Silica Shop are pleased to present the ST range of personal/business computers from Atari. The ST was designed utilising the most recent breakthroughs in semiconductor technology, producing a personal computer that performs tasks with fewer parts. Which means it costs less to make. And less to buy. The latest ST computers now include built in power supplies and built in disk drives. The TOS operating system and GEM window environment are now on ROM chips which are already installed in the ST keyboard. This enables automatic instant booting when you switch on. Silica Shop are pleased to offer the complete Atari ST range. Our mail order department is situated in Sidcup and we have 3 retail outlets at Sidcup, Lion House (Tottenham Court Rd) and Selfridges (Oxford Street). We have eight years experience of Atari products, longer than any other UK company, and are well established as the UK's No.1 Atari specialist. With a group turnover of over £8 million and in excess of 80 staff, we offer you unbeatable service and support. We provide several facilities which you will find invaluable during your Atari computing life and most of these facilities are available ONLY FROM SILICA. We suggest that you read through what we have to offer, before you decide where to purchase your Atari ST.

FREE STARTER KIT - Only From Silica

When you purchase any Atari ST keyboard, you will not only receive the best value for money computer on the market, but you will also receive the following from Atari Corporation as part of the package:

* BASIC Language Disk * BASIC Manual * ST Owners Manual * TOS/GEM on ROM
If you buy your ST from Silica Shop, you will also receive

* NEochrome Sampler - colour graphics program * 1st Word - Word Processor
In addition, we at Silica would like to see you get off to a flying start with your new computer, so we have put together a special ST STARTER KIT worth over £100, which we are giving away FREE OF CHARGE with every ST computer purchased at our normal retail prices. This kit is available ONLY FROM SILICA and is aimed at providing users with a valuable introduction to the world of computing. We are continually upgrading the ST Starter Kit, which contains public domain and other licensed software, as well as books, magazines and accessories all relevant to ST computing. Return the coupon below for full details.

DEDICATED SERVICING - Only From Silica

At Silica Shop, we have a dedicated service department of seven full time Atari trained technical staff. This team is totally dedicated to servicing Atari computer products. Their accumulated knowledge, skill and experience makes them second to none in their field. You can be sure that any work carried out by them is of the highest standard. A standard of servicing which we believe you will find ONLY FROM SILICA. In addition to providing full servicing facilities for Atari ST computers (both in and out of warranty), our team is also able to offer memory and modulator upgrades to ST computers.

1MB RAM UPGRADE: Our upgrade on the standard Atari 520ST-M or 520ST-FM keyboard will increase the memory from 512K to a massive 1024K. It has a full 1 year warranty and is available from Silica at an additional retail price of only £86.96 (+VAT = £100).

TV MODULATOR UPGRADE: Silica can upgrade the 1040ST-F to include a TV modulator so that you can then use it with your TV set. This is an internal upgrade and does not involve any untidy external boxes. A cable to connect your ST to any domestic TV is included in the price of the upgrade which is only £49 (inc VAT). The upgrade is also available for early 520ST computers at the same price.

THE FULL STOCK RANGE - Only From Silica

We aim to keep stocks of all Atari related products and our warehouse carries a stock of over 5.5 million. We import many software titles direct from the USA and you will find that we have new releases in advance of many of our competitors. Unlike dealers who may only stock selected titles, we have the full range. In addition, we carry a complete line of all books which have been written about the Atari ST. A range as wide as ours is something you will find is available ONLY FROM SILICA.

AFTER SALES SUPPORT - Only From Silica

Rest assured that when you buy your ST from Silica Shop, you will be fully supported. Our free mailings give news of releases and developments. This will help to keep you up to date with new software releases as well as what's happening in the Atari market. And in addition, our sales staff are at the end of a telephone line to service all of your Atari requirements. If you purchase an ST from Silica and would like any technical advice, we have a full time technical support team to help you get the best from your computer. Because we have both the staff and the systems specifically dedicated to providing after sales service on Atari ST computers, we are confident that our users enjoy an exceptionally high level of support. This can be received ONLY FROM SILICA.

FREE CATALOGUES - Only From Silica

At Silica Shop, we recognise that serious users require an in-depth information service, which is why we mail free newsletters and price lists to our ST owners. These are up to 48 pages long and are crammed with technical details as well as special offers and product descriptions. If you have already purchased an ST and would like to have our name added to our mailing list, please complete the coupon & return it to us. This information service is available ONLY FROM SILICA.

FREE OVERNIGHT DELIVERY - From Silica

Most orders are processed through our computer within 24 hours of receiving them. Most hardware orders are sent by the overnight GROUP 4 courier service FREE OF CHARGE to customers within the UK. This method helps to ensure minimum delay and maximum protection.

PRICE MATCH - Only From Silica

We hope that the combination of our low prices, FREE UK delivery service, FREE Starter Kit and FREE after sales support, will be enough to make you buy your Atari equipment from Silica Shop. If however, there is something you wish to purchase, and you find one of our competitors offering it at a lower price, then please contact our sales department, providing us with our competitor's name, address and telephone number. If our competitor has the goods in stock, we will normally match the offer (on a 'same product - same price' basis) and still provide you with our normal free delivery. We realise that we are not the only company who will match a competitor's price. However, if you come to us for a price match, you will also be entitled to our after sales service, including free newsletters and technical support. This makes our price match promise rather special, something you will receive ONLY FROM SILICA. We don't want you to go anywhere else for your Atari products. So shop at Silica, the UK's No.1 Atari Specialist.

£260

+VAT=£299

SO MUCH FOR SO LITTLE!

There is nothing that can compare with the incredible value for money offered by Atari's 520ST-FM. For only £260 (+VAT=£299), you can purchase a powerful 512K RAM computer, with a 95 key keyboard (including numeric keypad), MIDI interface, GEM, a palette of 512 colours, mouse controller, and a 512K built-in disk drive. The 520ST-FM has a TV modulator built-in, and comes with a lead to allow you to plug it straight into any domestic colour television set. The mains transformer is also built-in to the keyboard, so there are no messy external boxes. You couldn't wish for a more compact, powerful and stylish unit. Atari ST computers are now firmly established in the UK, there are nearly 500 software titles already available for a wide variety of applications and the list is growing all the time. And that's not all. When you buy your new 520ST-FM (or any Atari ST computer) from Silica Shop, you will get a lot more, including a FREE Silica ST Starter Kit worth over £100. Read the ONLY FROM SILICA section on the left, to see why you should buy your new high power, low price 520ST-FM from Silica Shop, the UK's No.1 Atari Specialists. For further details of the range of Atari ST computers and the FREE Silica ST Starter Kit, complete and return the reply coupon below.

ATARI 520ST-FM NOW ONLY £260 (+VAT=£299)
520ST-FM with 512K RAM & mono monitor £399 (inc VAT) Upgrade from 512K RAM to 1024K RAM £100 (inc VAT)

ATARI 1040ST-F - NEW PRICE

We are pleased to announce a new reduced price point on the 1040ST-F which is now available for only £499 (inc VAT). The 1040 is a powerful computer with 1Mb of RAM and also includes a built-in 1Mb double sided 3 1/2" disk drive. The 1040 has been designed for use on business and professional applications most of which require a high resolution monochrome or colour monitor. It does not therefore have an RF modulator for use with a domestic TV set. Modulators can be fitted for £49 (inc VAT).

1040ST-F Keyboard - Without Monitor £499 (inc VAT)
1040ST-F Keyboard + High Res SM125 Mono Monitor £599 (inc VAT)
If you would like further details of the 1040ST-F, return the coupon below.

MEGA ST's NOW IN STOCK

For the user who requires even more RAM than the 520 or 1040 ST's offer, the new MEGA ST computers are now available. There are two MEGA ST computers, one with 2Mb of RAM and the other with a massive 4Mb. Both new computers are fully compatible with existing ST's and run currently available ST software. The MEGA ST's are styled as an expandable Central Processing Unit with open architecture and a detachable keyboard. They are supplied with GEM, a free mouse controller and all extras as with the 520 or 1040. Prices are as follows:

MEGA ST 2Mb Keyboard + CPU £899 (inc VAT)
MEGA ST 2Mb Keyboard + CPU + SM125 Mono Monitor £999 (inc VAT)
MEGA ST 4Mb Keyboard + CPU £1299 (inc VAT)
MEGA ST 4Mb Keyboard + CPU + SM125 Mono Monitor £1399 (inc VAT)

If you would like further details of the MEGA ST's, return the coupon below.



To: Silica Shop Ltd, Dept PCW 1287, 1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX

PLEASE SEND ME FREE LITERATURE ON THE ATARI ST

Mr/Mrs/Ms: _____ Initials: _____ Surname: _____

Address: _____

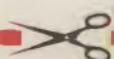
Postcode: _____

Do you already own a computer
If so, which one do you own? _____

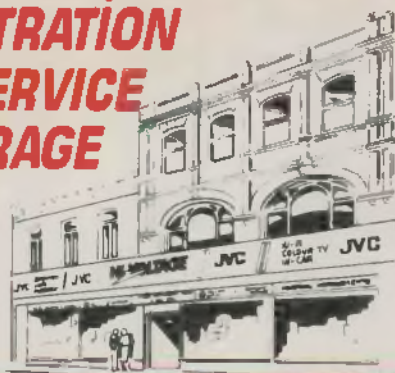
SIDCUP (& Mail Order) 01-309 1111
1-4 The Mews, Hatherley Road, Sidcup, Kent, DA14 4DX

LONDON 01-580 4839
Lion House (1st floor), 227 Tottenham Court Rd, London, W1P 0HX

LONDON 01-629 1234 ext 3914
Selfridges (1st floor), Oxford Street, London, W1A 1AB



**OVER 10,000 sq. ft. OF SHOWROOM,
DEMONSTRATION
AREAS, SERVICE
AND STORAGE**



HI YO

London's Largest

**LONDON'S LARGEST SPECIALIST
AMSTRAD DEALER**

We are an official Amstrad Service Centre

NEW AMSTRAD PC1640 MODELS

HI-RES MONO MONITOR MODELS

SD Single Drive	£499	Extra for CGA Colour Monitor
DD Double Drive	£599	£149
20Mb Hard Drive	£899	Extra for EGA Hi-Res
SD 20Mb Single Drive plus 20Mb Hard Card	£749	Colour Monitor
SD 30Mb Single Drive plus 30Mb Hard Card	£799	£299

NEW PC CATALOGUE PHONE NOW

HARD DISKS ON A CARD

Including formatting and
configuring
21 Megabyte **£249.95**
30 Megabyte **£299.95**

AMSTRAD PCW WORDPROCESSORS

NEW PCW 9512 inc Daisy Wheel Printer

• 512K Ram
• Paper white high
resolution monitor
• Spellchecker **£499**

PCW 8512 inc Printer **£399**

PCW 8256 inc Printer **£299**

**SECOND HAND MODELS
FROM £199**

STOP PRESS JUST RELEASED LOW COST PC'S

Commodore PC1 from **£433**
Zenith Easy PC from **£499**
Atari PC from **£521**

PART EXCHANGE— WE ARE THE SPECIALISTS

TOP PRICES ALLOWED
ON YOUR
PCW 8256/8512 or
PC 1512
**FOR A NEW
PC 1512 OR PC 1640**

ALTERNATIVELY EXCHANGE AGAINST ANY OF THE FOLLOWING MODELS

OPUS PC11 (XT) OR PC5 (AT)
SBC PC (XT) OR MISTRAL (AT)
TANDON PCX (XT) OR PCA (AT)
MISSION 286 (XT) OR 386 (386)
COMMODORE PC20 (XT)
OR PC40 (AT)

NEW MISSION 386 PC's

Comes complete with
2 year warranty

386/16MHz

Prices from **£1995**

386/20MHz

Prices from **£2995**

286/8MHz

Prices from **£1290**

286/12MHz

Prices from **£1690**

AMSTRAD PC 1512

MONO MONITOR MODELS

SD Single Drive **£399**
DD Double Drive **£499**
SD 20Mb Single Drive +
20Mb Hard Card **£649**
SD 30Mb Single Drive +
30Mb Hard Card **£699**

Extra for CGA
Colour Monitor **£149**

EPSON PC'S

PCe High Performance
10 MHz inc 20 Meg
hard disk
and monitor **£999**

PC-AX2 10 MHz
AT with 20 Meg
hard disk **£1399**

OPUS PC111's

We carry all models of this popular
range of PC clones. Prices from **£399**

20 meg Hard disc
models. Prices
from **£799**

Mono Monitor **£99**

EGA
Monitor **£399**

NEW OPUS PC5
AT Model inc
Mono Monitor
£1295



SBC PC COMPATIBLES

SBC PC-Turbo
8 MHz Turbo. NEC V40 CPU. MS DOS
3.2 + GWPBasic. 640K Ram. 12 months
on site service free.

SBCFD **£599**
2 x 360K disc drive mono monitor

SBCHD20 **£999**
20 Mb hard disc mono monitor
CGA colour **£199** extra
EGA colour **£399** extra

SBC Mistral 286 AT
12 MHz AT80286
30 Meg hard disc, 1 Meg Ram.
British designed and built. 12
months on site service free.

SBC 286 AT with
mono monitor
£1799

SBC 286 ATC with
colour monitor **£1999**



SBC 286 ATE with EGA
colour monitor **£2199**

LTAGE

Computer Shop

**DON'T TAKE A CHANCE
— COMPARE BEFORE YOU BUY**

**OVER 40
PRINTERS ON
DISPLAY. MOST
ON DEMONSTRATION**

DOT MATRIX PRINTERS

Amstrad OMP3160 NLQ IBM	£189.95	Star NR15 NLQ 132 col 240cps	£486.95
Amstrad OMP4000 NLQ 132 col 200cps	£339.95	Star NB24-10 NLQ 80 col 24 pin	£478.95
Amstrad LQ3500 24 pin	£339.95	Star NB24-15 NLQ 132 Col. 24 Pin	£609.95
Citizen 1200	£156.47	Star NB15 NLQ 132 Col. 24 Pin	£759.95
Citizen LSP10 NLQ IBM	£173.89		
Epson LX800 NLQ (150cps)	£195.95		
Epson FX800 NLQ 200cps	£299.95		
Epson FX1000 NLQ 132 col 200cps	£385.95		
Epson EX800 NLQ 300cps	£389.95		
Epson EX1000 NLQ 132 col 300cps	£519.95		
Epson LQ800 NLQ	£437.95		
Epson LQ1000 NLQ 132 col 180cps	£584.95		
Epson LQ2500	£759.95		
Oki-Mate 20 Colour + software	£173.87		
Panasonic KXP1081	£156.47		
Star NL10 NLQ incl I/F	£199.95		
Star ND10 NLQ 80 col 80cps	£286.95		
Star NR10 NLQ 80 col 240cps	£356.95		
Star NX15 NLQ 132 col	£313.95		
Star ND15 NLQ 132 col 180cps	£389.95		

DAISYWHEEL PRINTERS

SILVER REED EXP500

Full specification Daisy Wheel Printer. From the famous typewriter manufacturer. Special Offer Price.

£165

Juki 6100 £286.95
Juki 2200 Typewriter Serial £217.95
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.

LASER PRINTERS

Prices from only **£1349**

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.



**Plus full ranges from
Canon and Hewlett Packard**

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!

NEW AMIGA A500
INCLUDING FREE SOFTWARE
PRICES FROM **£399**
NOW IN STOCK



**NEW AMIGA CATALOGUE
JUST PRINTED -
PHONE FOR YOUR FREE COPY.**

**NEW AMIGA
A2000
NOW IN STOCK**

Including on site maintenance

Standard versions from **£1095**

IBM Compatible version from **£1595**

**LARGE RANGE OF DISCOUNTED
AMIGA SOFTWARE.**

**FULL RANGE OF CBM 64C/128D
COMPUTERS AND PERIPHERALS IN STOCK**

**ACORN
ARCHIMEDES
NOW ON
DEMONSTRATION**

**ATARI
ST RANGE**

including
520, 1040 and
Mega ST

**IN STOCK AT
LOW PRICES**

**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-6PM**

HI VOLTAGE

**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



Delivery by Securicor (4 day) please add £5.75 per item.
Delivery by Securicor 24 hour please add £9.95 per item.
(Laser Printers £15 - 24 hour delivery)



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: 01-681 3022

Prices correct at copy date. Subject to change without notice due to currency fluctuations etc. E. & O. E.

TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177
305 Edgware Road, London W2 Tel: 01-723 0233

BUSINESS SOFTWARE

INTEGRATED PACKAGES

Smart V 3.10	£405(a)
Framework II V 1.1	£325(a)
Symphony V 1.2	£329(a)
Open Access II V 2.0	£355(a)
Lotus 1.2.3	£231(a)

WORD PROCESSORS

Wordstar Professional V 4.0	£199(a)
Microsoft Word V 3.10	£275(a)
Microsoft Word Junior	£49(b)
Multimate Advantage	£269(a)
Word Perfect Personal	£159(a)
Word Perfect Junior	£79(b)
Word Perfect	£229(b)

DATABASE

dBase III Plus V 1.1 unpr.	£375(a)
Foxbase +	£395(a)
Quicksilver - Compiler dBase III	£365(a)

SPREADSHEET

Supercalc 4	£219(b)
Javelin	£95(a)
Logistix	£95(c)

LOTUS SERIES

Manuscript	£269(b)
Hal	£95(b)
Freelance Plus	£275(b)
Quickcode	£49(c)

META i

Assembler/Disassembler/Emulator handles the following CPU's.
6500 family, Z8X family
6800 family, 808X family
Emulator for all single rail eproms up to 27512 Full details on request. £695(a)

BUDGET SOFTWARE

Ability Plus (New Version)	£129(c)
Psion PC-Four	£65(c)
VP Planner	£65(c)
VP Info	£65(c)
Wordstar 1512	£59(b)
Dbase II 1592	£95(b)

DESKTOP PUBLISHING

Ventura Publisher	£749(a)
Pagemaker	£595(a)
GEM DTP	£275(b)
Page Ability	£175(b)
News Maker	£60(b)

UTILITIES

Norton Utilities V 4.0	£55(c)
Norton Advanced Utilities	£89(c)
Norton Commander	£42(c)
Copy II PC	£35(c)
Fastback	£165(c)
Xtree V 2.0	£49(c)

BORLAND SOFTWARE

Reflex Ver 1.1	£85(b)
Reflex Workshop	£52(b)
Turbo C	£60(b)
Turbo Basic	£50(b)
Turbo Pascal BCD/8087	£49(b)
Turbo Prolog	£50(b)
Turbo Prolog Toolbox	£52(b)
Turbo Lighting	£52(b)
Turbo Tutor	£32(b)
Eureka The Solver	£55(b)
Sidekick	£52(b)
Superkey	£52(b)
Turbo Holiday Jumbo Pack	£149(b)

Full Borland Range in stock.

LANGUAGES & O.S.

Microsoft Basic Interpreter	£210(b)
MicroSoft Quick Basic V 3.0	£60(c)
Microsoft C Compiler V 4.0	£235(a)
Microsoft Cobol Compiler V 4.0	£235(a)
Microsoft Macro Assembler	£90(b)
Microsoft Windows V 1.03	£72(c)
Zorland C (including Linker)	£29(d)
Zorland C - Power Pack	£59(c)
Learning DOS	£24(c)
MS Fortran 77 V4.0	£280(b)
RM Fortran 77 (including Forte)	£425(a)

PROFESSIONAL CAD

Autosketch	£69(d)
AutoCad Basic V 2.6	£300(a)
AutoCad ADE1,2&3 V 2.6	£2500(a)
Pro-Design II V 2.5	£245 (b)

ACCOUNTING SOFTWARE

Sage Book Keeper	£80(b)
Sage Accountant	£115(b)
Sage Account Plus	£160(b)
Sage Financial Controller	£225(b)
Sage Payroll	£70(b)

MISCELLANEOUS

MS Flight Simulator	£39(c)
MS Project	£289(b)
Super Project +	£325(b)

The above is just a sample of our Business Software range.
Please send for our complete listing.

ARCHIMEDES

Please send for details on Acorn's latest 32 bit Super Fast RISC Computer.

AMSTRAD PCs

PC1640DD/ECD	£875(2x a)
PC1640HD/ECD	£1175(2x a)
PC1512DDMM	£499(2x a)
PC1512DDCM	£629(2x a)

Other models of Amstrad available from stock.

CO Processors

8087-5MHz	£120 (c)	8087-8MHz	£160 (b)
8087-10MHz	£199 (b)	80287-6MHz	£160 (b)
80287-8MHz	£220 (b)	80287-10MHz	£260 (b)
V-205MHz	£10 (b)	V-305MHz	£10 (b)
V-208MHz	£12 (b)	V-308MHz	£12 (b)

AT Interface Cards

EMS Card 4Mb OK	£169(b)
(incl Ser/Par Ports) 2Mb	£349(b)
Dual I/O Card - 1 Par/1 Ser Port	£69(c)

INTERFACE CARDS

for IBM PC/XT & Compatibles

Auto Switch 560 Card	£239 (b)
EGA Board	
* Multimode card including all the capabilities of IBM, EGA, Hercules mono card, IBM colour and mono card.	£149(b)
Monochrome Graphics Card	£65(b)
Colour Graphics Card	£59(b)

Multi I/O Card

- * Parallel/Serial Ports
- * Battery backed calendar/clock.

RAM Card with 384K (Expandable to 512K).	£79 (b)
	£86 (b)

RS232 Serial Card

Short slot card with option for 2nd port	£29(c)
Extra for 2nd port	£22

Parallel Interface Port

Short slot card, Epson/Centronics compatible	£19(c)
--	--------

POINTING DEVICES

Microsoft Mouse (New Model). Also compatible with PS2 systems (please specify Bus or Ser version)	£129(b)
Logimouse (Serial)	£76(b)
PC Compatible Witty Mouse	
Plugs into serial port, adaptor for parallel conn. to k/bd. MS software compatible.	£39(b)
RB2/Cad 5 Tracker Ball	£175(b)

TRANSNET LAN

for ATs, XTs, PCs & Compatibles

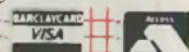
* Economical to purchase	
* Easy to install	
* Simple to use	
Starter kit links two stations, incl. adaptors, cabling and easy to use menu driven software	£409(a)
Adaptor for additional system	£189(b)
Ask for full details	

MAIL ORDER
& RETAIL
17 Burnley Road
London NW10 1ED
Telex 922800
WEST END BRANCH
305 Edgware Road
London W2

Visit our
Edgware Road shop
for demonstrations.



For fast delivery telephone
your order on 01-208 11
using VISA/ Access C



Orders welcome from
government depts &
educational establishments

All prices ex VAT.
All prices subject
to change without
notice. E & O accepted.
Please add carriage
(a) £8.00 (Datapost)
(b) £2.50 (c) £1.50
(d) £1.00

Meta-Dyne AT TURBO

Fastest AT with 80286-12 CPU

The first AT with Dynamic Speed
Control for full time 12.5MHz
operations on CPU and memory.
Auto Speed switching allows use
of conventional add-on cards.

System Spec:

80286-12 CPU, 12.5/8 MHz modes, 1Mb Ram.
80287 Socket 8 Expansion Sockets
Mono or Colour Graphics Adaptor
1 x 20 Mb Winchester, 1 x 1.2 Mb floppy,
Real Time clock with battery back up,
200W Power Supply, 1 Parallel/1 Serial Port,
AT Style Keyboard, Hi Res Green Screen Monitor



AT 100 £1195 (2x a)

AT 80 (as AT 100 but with
10MHz CPU) £1129 (2x a)

Meta-Dyne PC/XT TURBO

8088-8 cpu, 8/4.77 MHz Modes, 640K Ram
8087 Socket, 8 Expansion Slots,
Mono or Colour Graphics Adaptor,
2 x 360K floppies for PC,
1 x 360K floppy + 1 x 20 Mb Winchester for XT
Real Time Clock + battery back up
1 Parallel/1 Serial/1 Games Port
150W PSU/AT Style Keyboard
Hi Res Green Screen Monitor



Meta-Dyne PC TWO TURBO

Meta-Dyne XT TWO TURBO

£495(a)

£675(a)

Meta-Dyne was previously marketed under the name of SICON

PRINTERS

DOT MATRIX PRINTERS:

EPSON PRINTERS:

LX800 £189(a)
FX800 £299 (a) FX 1000 £405 (a)
EX800 £409 (a) EX1000 £549 (a)
LQ800 £399 (a) LQ1000 £529 (a)

GQ 3500 Laser Printer £1350 (a)

Taxan KP815 £269 (a)

Taxan KP915 £369 (a)

National Panasonic KX P1081 £149 (a)

Star NL 10 with IBM Interfac £192 (a)

Amstrad DMP3000 Printer £159 (a)

DAISY WHEEL PRINTERS

Juki 6100 £279 (a)

Brother HR20 £349 (a)

(Parallel & Serial Interface)

National Panasonic KX P3131 £249 (a)

with 38K buffer

Integrex Inkjet Colour Printer £549 (a)

IBM EGA/CGA dump £45 (b)

64 colour screen dump for Integrex.

PLOTTERS

Hitachi 672 A3 4 colour
High speed, high precision plotter
Serial & Parallel Interface. £465 (a)

Roland DXY 880A A3 8 pen £645 (a)

IBM Type Parallel Printer Lead (2m) £12 (d)

SHARERS & BUFFERS

PB 128K Buffer

Internal buffer suitable for most
EPSON printers. Easy to instal.
Instructions supplied. £89 (b)

Printer Sharers:

(All lines are switched).
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 all popular computers available.

External Serial/Parallel £37.50(c)
Parallel/Serial converter £37.50(c)

A wide range of printer interfaces, sheetfeeders,
tractor units, acoustic hoods, ribbons available
from stock.

WINCHESTER DRIVES

Seagate ST225 20Mb with kit £259(b)
MiniScribe 20Mb with kit £249(b)
MiniScribe 30Mb with kit £279(b)
MiniScribe 40Mb half ht £549(b)
25mSec Access £560(a)
Seagate ST4038 30Mb full ht. £670(a)
Seagate ST 4051 40Mb full ht. £285(a)
Mini Scribe 30 Mbyte File Card

MONITORS

Mono 12" Composite

Philips 7502 Green £69(a)
Philips 7522 Amber £75(a)
Philips 7542 White £79(a)
Taxan KX 117 Green P31 £85(a)
Taxan KX 119 Amber £90(a)

Mono 12" TTL

Philips 7513 Green £85(a)
Taxan 123 Green P31 £99(a)
Taxan 124 Amber £109(a)

RGB

Taxan 620 12" £269(a)
Taxan 625 12" £319(a)

RGB EGA

Taxan 760 14" £474(a)
Taxan 770 + Multi Scan 14" £539(a)
Mitsubishi 1440 14" £479(a)
NEC 14" Multi Syne £529(d)

3M DISC & CARTRIDGES

Discs in packs of 10

5.25" 745 48 TPI DSDD £10.50(d)
5.25" 747 96 TPI DSDD £13.25(d)
5.25" HD 1.6 Mb for AT £25(d)
3.5" 96 TPI DSDD £18(d)

Cartridges

DC1000 £12.00(d) each
DC300 XLP £16.50(d) each
DC600A £18.50(d) each
DC2000 £21(d) each
Dysan
5 1/4" HD 1.6 Mbyte for AT £16(d)

We can only show a small range of the products
stocked by Technomatic in this advertisement. If
you would like further information, please
indicate your interest by ticking the appropriate
box and we will send you a brochure.

☐ Syclon ☐ Software ☐ Modems
☐ Printers ☐ Monitors ☐ BBC Systems

NAME _____
ADDRESS _____

POST CODE _____

Return to Technomatic Ltd 17 Burnley Road,
London NW10 1ED PCW 12/87

THE PROTECTOR

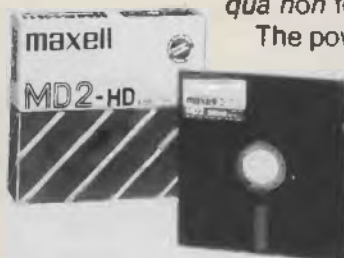
Maximum Reliability



Protects your data against dust and drop-outs

Maxell's High Density (HD) floppies fight dust and drop-outs three ways. Maxell has reduced the conventional one-billionth-of-a-bit error rate to one-hundredth-billionth of a bit!

This dramatic improvement results from a proprietary disk surface cleaning process. Second, the new Tight Grip (TG) jacket assures constant, closer contact of disk and jacket liner, and the liner gently cleans your disk as it spins. And third, the jacket is anti-static treated, preventing dust-attraction.



Even the outside is special: hold a Maxell between greasy fingers and you'll see that the jacket's embossed surface will leave no record of the crime. Clean, debris-free disks are the *sine qua non* for reliability.

The powerful benefits of Maxell protection are a clean disk, a clean signal, high resolution and error-free performance unequalled for reliability.

For the protection you deserve, Maxell floppies are it! Maxell floppies come in 8", 5 1/4", 3 1/2" and 3" sizes.

maxell®

When every bit counts, it's Maxell.

DIMENSION computers l.t.d.

27/29 High Street
Leicester LE1 4FP
Tel: (0533)
517479/21874

THE MIDLAND'S LARGEST COMPUTER STORE

AMSTRAD PC RANGE

All models include Spreadsheet, Wordprocessor and Database software.
PC1512 models also include upgrade to 640K, ABILITY Software Suite
and 4 US GOLD games.

PC1512 Single Drive Mono 640K	£375.00
PC1512 Dual Drive Mono 640K	£469.00
PC1512 Single Drive Colour 640K	£509.00
PC1512 Dual Drive Colour 640K	£599.00
PC1640 Single Drive Mono	£452.00
PC1640 Dual Drive Mono	£542.00
PC1640 Single Drive Colour	£597.00
PC1640 Dual Drive Colour	£689.00
PC1640 Single Drive ECD	£729.00
PC1640 Dual Drive ECD	£819.00

AMSTRAD 20Mb HARD DISC SYSTEMS

PC1512 Single Drive Mono 640K	
with 20Mb Hard Disc	£575.00
PC1512 Single Drive Colour 640K	
with 20Mb Hard Disc	£716.00
PC1640 Single Drive Mono	
with 20Mb Hard Disc	£679.00
PC1640 Single Drive Colour	
with 20Mb Hard Disc	£799.00
PC1640 Single Drive ECD	
with 20Mb Hard Disc	£949.00

HARD CARD UPGRADES

Suitable for Single or Dual Drive 1512 and 1640. Offers Amstrad users
a high quality, low price hard disc system. Fast, quiet operation,
takes just five minutes to install.

20Mb	£229.00
32Mb	£269.00

PRINTER OFFERS

ALL PRINTERS INCLUDE PC PRINTER LEAD

Amstrad DMP3160, 80 col, 160 cps, 40 nlq	£149.00
Amstrad DMP4000, 136 col, 200 cps, 50 nlq	£285.00
Amstrad DMP3500, 24 pin	£349.00
Citizen 120D, 80 col, 120 cps, 25 nlq	£149.00
Citizen MSP10E, 80 col, 160 cps, 40 nlq	£219.00
Citizen MSP15E, 136 col, 160 cps, 40 nlq	£239.00
Citizen MSP40, 80 col, 240 cps, 50 nlq	£299.00
Citizen MSP45, 136 col, 240 cps, 50 nlq	£399.00
Citizen MSP50, 80 col, 300 cps, 60 nlq	£399.00
Citizen MSP55, 136 col, 300 cps, 60 nlq	£499.00
Citizen HQP40, 80 col, 200 cps, 66 nlq, 24 pin	£429.00
Citizen HQP45, 132 col, 200 cps, 66 nlq, 24 pin	£572.00
Star NL10, 80 col, 120 cps, 30 nlq	£189.00
Star NX15, 136 col, 120 cps, 30 nlq	£299.00
Star NR15, 136 col, 240 cps, 60 nlq	£426.00
Star ND15, 136 col, 180 cps, 45 nlq	£354.00
Star NB24-10, 80 col, 216 cps, 72 nlq, 24 pin	£433.00
Star NB24-15, 136 col, 300 cps, 100 nlq	£549.00
Citizen Overture, 10 ppm Laser	£1249.00
Epson LX800, 80 col, 160 cps, 25 nlq	£189.00
Epson EX800, 80 col, 300 cps, 50 nlq	£399.00
Epson EX1000, 136 col, 300 cps, 50 nlq	£539.00
Epson FX800, 80 col, 200 cps, 40 nlq	£311.00
Epson FX1000, 136 col, 200 cps, 40 nlq	£399.00
Epson LQ800, 80 col, 180 cps, 60 nlq, 24 pin	£452.00
Epson LQ1000, 136 col, 180 cps, 60 nlq, 24 pin	£599.00
Epson GQ3500, 6 ppm Laser	£1346.00

MICRO P MP RANGE

Remarkably fast, low price dot matrix printers using
multiple head technology.

MP480, 80 col, 480 cps, 80 nlq	£299.00
MP700, 136 col, 720 cps, 120 nlq	£449.00

AMSTRAD PCW8256	£299.00
AMSTRAD PCW9512	£499.00
Including Locoscript, 10 Blank Discs, Lockable Disc Storage Box, plus 70 Programme Software Collection. PCW9512 also includes Locoscript 2, Locospell, and Locomail.	

AUTHORISED AMSTRAD DEALER

HIGH QUALITY MONITOR UPGRADES FOR THE PC1512 RANGE

Providing the following features:

- * Excellent Quality Text at up to 90 Columns by 38 Lines
- * Runs Simultaneously with Existing Mono or Colour Monitor
- * Hercules Compatible Graphics * 2nd Parallel Printer Port
- * Simple to Install — Takes Just 5 Minutes
- 12" Green Screen with Display Card £169.95
- 14" Green or Amber Screen with Display Card £189.95

AMSTRAD HARD CARD SYSTEMS

	20Mb	32Mb
PC1512 Single Drive Mono 640K		
with Hard Card	£584.00	£634.00
PC1512 Dual Drive Mono 640K		
with Hard Card	£678.00	£728.00
PC1512 Single Drive Colour 640K		
with Hard Card	£725.00	£775.00
PC1512 Dual Drive Colour		
with Hard Card	£819.00	£869.00
PC1640 Single Drive Mono		
with Hard Card	£660.00	£711.00
PC1640 Dual Drive Mono		
with Hard Card	£749.00	£799.00
PC1640 Single Drive Colour		
with Hard Card	£795.00	£846.00
PC1640 Dual Drive Colour		
with Hard Card	£886.00	£936.00
PC1640 Single Drive ECD		
with Hard Card	£932.00	£982.00
PC1640 Dual Drive ECD		
with Hard Card	£1022.00	£1073.00

OLIVETTI DM105 COLOUR DOT MATRIX PRINTER

Unbeatable on price/performance, the Olivetti DM105 offers the
following features:

- * IBM/Epson Colour Emulation
- * 120 cps Draft, 25 cps Near Letter Quality Mode
- * Prints NLQ, Draft and Graphics in Full Colour
- * Up to 240 Dots Per Inch Graphic Resolution
- * Normal or Colour Draft/NLQ Text Output
- * Full IBM Compatibility £173.00
- Optional Tractor Feed Unit £30.00

SBC MISTRAL 286 AT RANGE

30Mb Mono	£1799.00
30Mb Colour CGA	£1999.00
30Mb Colour EGA	£2199.00
40Mb Mono	£1999.00
40Mb Colour CGA	£2199.00
40Mb Colour EGA	£2399.00

SBC PC RANGE

Dual Drive Mono	£599.00
Dual Drive Colour	£799.00
20Mb Mono	£999.00
20Mb Colour	£1199.00

Prices include free 1 year on site maintenance contract.

SBC MONITORS

12" Green or Amber including swivel and tilt	£79.95
14" Green or Amber including swivel and tilt	£99.95
14" Medium Res. Colour	£269.95
14" EGA Compatible Colour	£359.00

COMMODORE AMIGA A2000 with 1081 HIGH RESOLUTION

COLOUR MONITOR	£1099.00
----------------	----------

including 1 year on site maintenance contract.

PERSONAL CALLERS AND EXPORT ENQUIRIES WELCOME

ALL ITEMS SUBJECT TO AVAILABILITY

ALL PRICES EXCLUDE VAT AND ARE CARRIAGE FREE

DIMENSION COMPUTERS LTD.

27/29 HIGH STREET, LEICESTER

SALES DESK Tel: (0533) 517479/21874

Fax: (0533) 511638

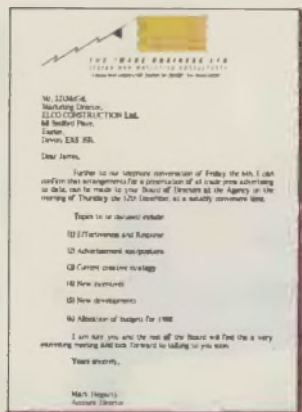
Prospero Software

LANGUAGES FOR MICROCOMPUTER PROFESSIONALS



Prospero Software is dedicated to languages and to customer support.
For an opinion ask a colleague; for information call 01-741 8531 or write to
Prospero Software Ltd, 190 Castelnau, London SW13 9DH, England.

ADD A TOUCH OF FINESSE TO YOUR...



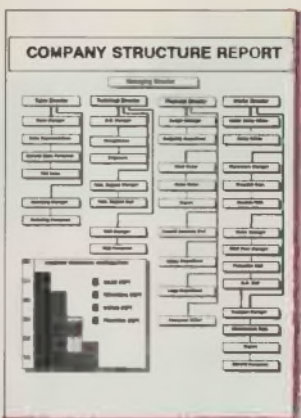
LETTERS

PRICE LISTS

FORMS



PROPOSALS



REPORTS



NEWSLETTERS

Imagine being able to create professional quality documents, from the smallest letter to the largest presentation — in house! Now it's all possible with the new Finesse range of Desktop Publishing software. Utilising dynamic WYSIWYG facilities (What You See Is What You Get), Finesse puts you right at the heart of the Desktop Publishing revolution. Coming complete with a superb selection of typescripts in a wide choice of sizes, on-screen graphics and a preview facility, Finesse makes it simple to create professional designer results — quickly and economically. Text can be imported from files created using a wide range of word-processors such as Wordstar, Word Perfect and 1st Word Plus or any ASCII text, and edited from within Finesse to achieve that final result. Graphics can be imported from Gem Paint/Draw/Chart and numerous scanners and then pasted, cropped and re-sized to fit any layout.

Finesse produces outstanding results and although it is at its very best when output to a Hewlett-Packard compatible or Postscript laser printer, fantastic results can be achieved using any normal 9-pin Epson or compatible dot matrix printer.

Finesse is available for your Amstrad PC, IBM-PC and 100% compatibles. Finesse comes as a complete package and is available with a

Microsoft compatible serial mouse for only **£159.99** or without for **£99.99** and is available from all good computer dealers or direct by cheque, Access or Visa. All prices include VAT and post and packaging. To place your order or for further software information dial the number below.



Finesse
D T P P C
D E S K T O P
P U B L I S H I N G

Get into the image business.

FOR INSTANT ACCESS OR VISA ORDERS TELEPHONE (0925) 413501/2/3/4/5
ADVANCED MEMORY SYSTEMS LTD. 166/170 WILDERSPOOL CAUSEWAY, WARRINGTON WA4 6QA. TELEX 628672 AMSG FAX 0925 58039
WORDSTAR IS A TRADEMARK OF MICROPRO INTERNATIONAL INC. WORD PERFECT IS A TRADEMARK OF SENTINEL SOFTWARE INC. 1st WORD PLUS IS A TRADEMARK OF GST HOLDINGS. GEM PAINT IS A TRADEMARK OF DIGITAL RESEARCH INC. HEWLETT PACKARD IS A TRADEMARK OF HEWLETT PACKARD INC. POSTSCRIPT IS A TRADEMARK OF ADOBE SYSTEMS INC. IBM PC IS A TRADEMARK OF INTERNATIONAL BUSINESS MACHINES CORPORATION. AMSTRAD IS A TRADEMARK OF AMSTRAD CONSUMER ELECTRONICS PLC. MICROSOFT IS A TRADEMARK OF MICROSOFT INC.

+ VAT

FREE
CHAIR

FREE CHAIR

Solver

Telephone _____

Opus

**SPECIAL
EFFECTS**

Bending

Rotate

HOW TO MAKE YOUR LASER HEADLINES

**Arrange Text in
Shapes**

NEW

Denting

HeadLine is a new desktop publishing aid for laser printer users who wish to create effects similar to those seen on video or record covers or even as on TV. The program allows full page graphics at 300 dpi and interactively automates any two or three dimensional transformation in postscript-like fashion with a few key strokes.

All *HeadLine* fonts come as stroke tables making full use of B-spline curves when you arrange headlines in some circular, bent, dented or otherwise massaged shape. Because fonts, patterns and free hand drawings you create are stored as mathematical equations rather than bitmaps, perfectly smooth lines and curves at any size and angle are guaranteed.

HeadLine includes drivers for HP LaserJet+ and Epson compatible printers. Output files compatible with most desktop publishing programs can also be generated.

HeadLine comes with 8 fonts and 32 different patterns. All fonts and patterns can be modified in 3D space, they can be drawn in black or white, as lines or with an airbrush, and both with a thickness adjustable between 1 and 127 pixels, thus allowing an endless number of designs.

HeadLine is available now for Unix (III & V) on Torch hardware, PC-AT compatibles running Microport UNIX V, and for PC-DOS on IBM compatibles (CGA, EGA or Herc., min. 512 Kb memory, min 1 Mb disk). *HeadLine* comes with a 135 page manual and is not copy protected. Introductory price: £148.75 incl. 15% VAT and P&P until 31.10.1987 (normal price £168.75).

Order from: Designer Pixels, 8 Polwithen Rd., Penzance, Cornwall, TR18 4JS, (0736) 61210.

Please rush:

☐ copies of *HeadLine* at £148.75 (£168.75 after 31.10.87) ea. incl. VAT + P&P. ☐ Working demo showing its power on screen and in print, £5.00 only. Our system: ☐ Torch Unix III, ☐ Torch Unix V, ☐ Microport Unix V, ☐ PC-DOS. Payment by cheque only.

Sender: _____

Order from: Designer Pixels, 8 Polwithen Rd., Penzance, Cornwall, TR18 4JS, (0736) 61210. PCW

System Science C COMPILERS

AZTEC	
AZTEC C86/PROF (MS-DOS) large mem, asm, link	£149.00
AZTEC C86/DEV (MS-DOS) adds source debug, editor	£225.00
AZTEC C68000 (MS-DOS) adds ROM support, lib source	£325.00
AZTEC C68000-MAC, AMIGA	£325.00
AZTEC C for PC-M-80, Apple Dos, Prodos	£ call

LATTICE	
LATTICE C Compiler ver 3-8087, all mem. models	£235.00
LATTICE Screen Editor	£95.00
LATTICE SPRITE Debugger	£129.00
LATTICE dbC-11 or II Cbase library	£175.00

MICROSOFT C 5.0 with Code View, Quick C large mem, source debugger, 8087	£325.00
TURBO C from Borland NEW Editor, Linker, Large mem options	£69.00

LIVING C PLUS (NEW) Interpreter and Comp.	£145.00
RUN/C-PROFESSIONAL Interp.	£125.00
RUN/C - Interpreter excellent tutorial	£60.00
C CROSS Compilers 6809, 68070, 8051, 6301, 80386	£ call

C LIBRARIES

GRAPHICS	
Metawindows - many languages	£115.00
Essential Graphics Library	£175.00
GraphicC - source, colour, EGA	£245.00
Halo - specify compiler	£195.00
SCREEN and DATA ENTRY	
PANEL entry screens - most languages	£215.00
Vitamin C - Screen, print layout code	£145.00
Windows for Data, Windows for C	£215.00
ISAM & DATAFILE	
C TREE - Faircom (source) Btree lib.	£245.00
R TREE - Reports generator for C TREE	£195.00
Btrieve - database library, many lang	£195.00
Btrieve-N - Novell, PC-NET networks	£425.00

COMMUNICATIONS	
GREENLEAF COMMUNICATIONS	£115.00
Ints, Ring Buff, Status & Control	
BLAISE ASYNCH MANAGER	£125.00
Port control, XMODEM protocol	
GENERAL	
GREENLEAF GENERAL FUNCTIONS	£115.00
Dos, Disk, Video Strings, Date, Keybd.	
PlorCe - source lib, comms, dbase, screen etc	£225.00
The C programmers toolkit	
BLAISE C TOOLS PLUS - source	£125.00
DOS, Dos, screen, windows, keyboard etc	
C Scientific Subroutines - source	£125.00
Matrix, polynomial, diff. eqn. etc	

PHOENIX	
PLINK-86 Plus - overlay caching	£295.00
PMATE-86 programmers editor	£120.00
PRE-C Utility	£195.00
PTX-86 Plus debugger	£225.00
PKDK - backup, disk cache & utils	£95.00

BRIEF multi-file editor	£145.00
dBRIEF addition for DBASE programmers	£75.00
EPSILON - Emacs style editor	£145.00
PCWIN screen editor	£125.00
MKS Toolkit list of Unix goodies, inc VI	£95.00
QUILT Software Revision Management	£95.00
PC-LINT by Gimpel	£99.00
CLIPPER - DBase III Compiler	£345.00

ASSEMBLERS and CROSS-ASM

Microsoft 8086 Macro Asm (SYMDEBUG & LINK)	£115.00
Cross Assemblers	£ call
6801, 68000, 286, 8080, 6502, 8048, 8051 etc.	
Simulators - 286, 8048, 8051 etc	£ call
Duelfo 6800 and 68020 cross assemblers	

LMI Forth-83

PC-FORTH, asm, Editor, DOS access	£115.00
PC-FORTH Programmers package with 8087 graphics	£175.00
UR-FORTH high perf., 8087, graphics	£245.00
METACOMPILERS 8080, 286, 8095, 6303 etc etc	

BORLAND	
TURBO C (NEW)	£69.00
TURBO PASCAL	£69.00
TURBO PASCAL JUMBO PACK	£225.00
Turbo Tutor	£20.00
TURBO PROLOG new	£60.00
TURBO LIGHTNING	£69.00
Superkey or Sidekick	£69.00

TURBO DATABASE TOOLBOX	£49.00
TURBO GRAPHICS TOOLBOX - PC-DOS	£49.00
TURBO EDITOR TOOLBOX - PC-DOS	£49.00
BLAISE POWER TOOLS PLUS	£75.00
BLAISE ASYNCH PLUS	£75.00
TURBO POWER UTILITIES	£75.00
TURBO POWER EXTENDER	£75.00
T-DEBUG PLUS	£49.00

FORTRAN/PASCAL/BASIC

Fortran Graphics, Scientific Libraries	£ call
Microsoft FORTRAN-77 with Codeview	£275.00
Pro-FORTRAN-77	£395.00
RM-FORTRAN-77 with RM-FORTE toolset	£395.00
PRO-PASCAL MS-DOS	£295.00
Microsoft Pascal	£185.00
QUICK BASIC - Microsoft (PC-DOS only)	£75.00
PASCAL 2 full features, Turbo compatible	£325.00

LISP and PROLOG

TURBO PROLOG (PC Only)	£69.00
micro-PROLOG PROF (full mem., wind.)	£245.00
micro-PROLOG entry level version	£95.00
MuLISP/MuSTAR (Common LISP)	£195.00
Golden Common LISP (PC-DOS only)	£495.00
MuMATH/MuSIMP Symbolic maths	£275.00
TransLIP Common	£75.00
PC Scheme from Texas	£95.00

TEXT WINDOWS, COMMUNICATION, DISK

VENTURA Desktop Publishing System	£895.00
FINAL WORD 2 - author's WP	£275.00
Micro TEX - scientific typesetting	from £350.00
MICROSTAT - comprehensive statistics	£295.00
STATGRAPHICS statistics and graphics	£345.00
WINDOWS by Microsoft	£85.00
WINDOWS Software Dev. kit	£345.00

ZAP Communications - VT100, 4010 emulation	£85.00
PCIntercomm - VT100, 102 Kermi etc	£95.00
UNIFORM - PC to, from, CP/M disks	£65.00
CONVERT - PC add formats	£89.00
UNIDOS run CP/M software on PC	£65.00
NORTON UTILITIES advanced	£99.00
Den Bricklin's DEMO program	£65.00

MODULA-2	
Pecan Modula-2 Powersystem	£95.00
Pecan Modula-2 Advanced Pak	£195.00
Logitech Modula-2/86 Apprentice	£69.00
Logitech Modula-2/86 Wizards package	£150.00

PECAM used PRODUCTS	
POWERSYSTEM system with a compiler	£95.00
Pascal, Fortran-77, Basic or Modula-2	
PDQ Pascal starter pak	£69.00
JACK-2 Integrated WP, database, spreadsheet	£95.00

All prices are exclusive of VAT. Please add £3.00 p&p, plus VAT to your order

**6-7 West Smithfield,
London EC1A 9JX
Tel: 01-248 0962
BTGOLD 76: CJJ028**



MICRO MEDIA

Computer Supplies Ltd.

Freepost,
Dept. PCW, Rydal Mount, Baker Street,
Potters Bar, Herts EN6 3BR (NO STAMP REQUIRED)

0707 52698 (5 lines)

Head Cleaners

	1	2+	6+
5 1/4"	3.95	3.50	3.15
3 1/2"	5.00	4.55	4.10

5 1/4 MICRO MEDIA Brand Discs

includes Plastic Library Case

	10	30	50	100	250
SS/DD	6.55	18.55	29.05	53.10	118.00
DS/40T	7.90	22.30	34.90	64.60	144.50
DS/80T	9.40	26.50	40.20	75.15	165.90
DS/HD for PCAT	20.10	57.20	90.10	168.60	385.55

5 1/4 Reversible discs (Flippy's)

Have two write protect notches & index holes.
Suitable for 40 or 80 track drives.

	10.55	30.00	47.40	88.10	204.55
--	-------	-------	-------	-------	--------



All discs supplied are with labels, 5 1/4" write protects, envelopes & hub rings.

Discs purchased direct from one major manufacturer. 100% certified error free - lifetime guarantee.

5 1/4 Rainbow Discs come in five colours

	25	50	100	250	500
SS/DD	16.50	30.75	57.10	134.50	252.45
DS/40T	17.95	33.10	60.70	141.45	262.20
DS/80T	19.00	35.20	64.85	148.75	276.00

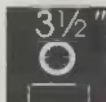
5 1/4 Unbranded Discs

SS/DD	9.80	19.35	36.40	86.55	163.85
DS/40T	10.95	20.65	38.20	89.70	172.50
DS/80T	11.80	22.30	41.60	95.75	179.50

3 1/2 MICRO MEDIA Brand

SS/DD	17.55	50.45	80.25	147.70	347.80
DS/DD	18.75	53.90	85.95	159.20	376.55

PRICES INCLUDE V.A.T.



3 1/2 Unbranded Discs

	10	30	50	100	250
SS/DD	15.10	42.60	65.95	117.70	264.75
DS/DD	16.20	45.70	72.95	128.50	290.00

AUTUMN CATALOGUE OUT NOW - CALL OR WRITE FOR YOUR COPY

Monitor Swivel Bases



Pan tilt revolves around 360 degrees
12.5 degrees tiltable up and down
Adjustable by front mechanism.

55x280x260mm for 12" Monitors		55x355x320mm for 14" Monitors	
1	12.10	1	16.70
3+	10.99ea	3+	15.15ea
6+	10.35ea	6+	14.30ea

Adjustable Copy Holder

A4 adjustable desk clamping.
Magnifying cursor line.
Paper thickness adjustment.
Paper height adjustable clip.

A4 Version	25.35
Holds up to 300g	
Desk Top Version	13.69
Holds up to 1000g	
A3 Version	40.65
Holds up to 1400g	

Printer Stand 5mm perspex

80 Column Version 400 x 310 x 100mm	22.80
132 Column Version 600 x 310 x 100mm	29.30



Mobile Printer Stand

Rugged steel frame. Height adjustable basket for output paper & base shelf for input paper. Self assembly - includes castors.

80 column	£52.90
132 column	£65.40

The Space Saver

Paper feed and refeed positioned one above the other. Dial controlled paper feed with adjustable deflectors ensures smooth flow and automatic refeeding.

80 column 414x380x460mm		132 column 530x380x460mm	
1	34.85	1	42.50
3+	32.75	3+	40.00
6+	31.05	6+	38.30



Printer Ribbons

Prices (£) per each ribbon

	3	6	12
Amstrad 8512/8256	5.65	5.35	4.90
R, G, BR, BL, Y	7.50	7.10	6.55
DMP 2000/3000	2.80	2.40	2.35
Brother HP15MS	3.30	3.10	2.80
R, BR, BL	4.35	4.10	3.75
Centronics GLP	3.65	3.45	3.15
R, G, BR, BL, Y	4.65	4.40	4.00
Canon 1080/1150	3.30	3.10	2.80
R, G, BR, BL, Y	4.95	4.65	4.25
Citizen 120 D	4.70	4.35	4.05
Diablo HyType II MS	2.80	2.65	2.40
R, BR, BL	3.80	3.55	3.25
Epson			
FX/MX/FX 80 FX 800	3.55	3.35	3.10
R, BR, BL, G, Y	4.95	4.65	4.25
MX 100/FX 1000/FX 105	4.65	4.35	4.20
R, BR, BL	5.85	5.55	5.10
LX 80/86 GX 80	2.80	2.65	2.40
R, G, BR, BL, Y	4.70	4.45	4.05
Juki 6100 MS	3.30	3.10	2.80
6100 SS	2.05	1.90	1.75
R, BR, BL	2.75	2.60	2.35
Kaga KP810/910	3.30	3.10	2.80
R, G, BR, BL, Y	4.95	4.65	4.25
M/Tally MT80 MS	4.10	3.85	3.55
Panasonic KXP110	5.50	5.20	4.75
R, G, BR, BL, Y	7.20	6.80	6.25
Quume IV MS	3.30	3.10	2.80
Fabric	3.30	3.10	2.80
Star NL 10	5.50	5.20	4.75
Shinwa CP80 MS	4.10	3.85	3.55

One off if ordered with other product.
Please mix colours and types for best prices.
R = Red, BR = Brown, BL = Blue, G = Green,
Y = Yellow

If the ribbon you require is not listed please let us quote

The above is a small selection of the 250 different ribbons we stock. We shall be pleased to find your ribbon, however old or obscure.

MD 120

1	12.55	5 1/4" x 120
3+	11.90 each	
6+	11.35 each	



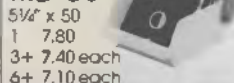
Wire Printer Stand

stacks print-out in document tray automatically. Suitable for most standard printers. Made of safety coated steel wire.
For 80 column £14.50
For 132 column £16.50



MD 50

5 1/4" x 50	
1	7.80
3+	7.40 each
6+	7.10 each



MD 100

5 1/4" x 100	
1	10.80
3+	10.30 each
6+	9.80 each



MM 40

3 1/2" x 40	
1	8.30
3+	7.90 each
6+	7.50 each



MM 80

3 1/2" x 80	
1	10.95
3+	10.40 each
6+	9.90 each



Computer Labels

Continuous fanfold, sprocket fed
Price per 1,000 3,000

70x36	3.85	11.55
89x36	5.65	14.25
89x49	7.95	20.40
102x36	6.35	15.30

Please state no. of labels across the sheet (1, 2 or 3)

Computer paper

Size	Weight 1000s gm per box	1 box	3 boxes
11x9 1/2	60	2	16.90 43.80
	80	2	20.90 53.55
Exact A4			
115x9 1/4	70	2	22.50 58.50
	90	1	16.90 45.15

ALL PRICES INCLUSIVE OF POSTAGE & PACKING AND V.A.T.

MICRO MEDIA

Computer Supplies

Freepost, Dept. PCW, Rydal Mount,
Baker Street, Potters Bar, Herts. EN6 3BR



Access & Visa

Out of Office Hours (Answer machine)

0707 52698 (5 lines)

Orders despatched 24 hrs.

Please allow 5 days for delivery.
For next day delivery, please ring for details. Postage covers U.K. only.

A Catalogue is available with a more comprehensive range of products including - 3M & Verbatim discs - a wider choice of paper labels, ribbons and accessories.

Ring or write to obtain your copy now!

Educational and HMG orders accepted. For official orders/invoice/credit orders there is a minimum order value of £15.00 excluding V.A.T. Any order under £15.00 will be subject to £3.00 handling charge.

Personal callers welcome
Weekdays 8.30am - 5.30pm
Saturdays 9.30am - 1.00pm

MICRO MEDIA - MICRO MEDIA - MICRO MEDIA - MICRO MEDIA - MICRO MEDIA - MICRO MEDIA -



The Alan Sugar army marches on — the Amstrad PPC portable range aims to challenge everything from the Z88 to the Compaq Portable. Guy Kewney casts a seasoned eye over this month's news.

Sit a Sugar-baby in your lap

It's an interesting fact that, for £400, you have a choice between Sir Clive Sinclair's Z88 and Alan Sugar's PPC512.

'Oh, well; no contest!' you cry happily. 'The new Amstrad has a 720k disk, can run standard MS-DOS software, and can drive a standard CRT monitor as well as its own 25-line display. Sinclair's Z88 has no disks, only an 8-line display, and no software in the world except what is built-in. And anyway, you can get the Amstrad with a wonderful high-speed 2400bps modem for just £100 extra.'

In fact, the new Amstrad box is a pretty good way of buying an MS-DOS machine. It costs less than the PC1512, and all you give up is the expansion slots. (Eventually, they will be available too, in a separate box.)

It has 3½in diskettes which hold 720k, compared to the standard 360k of a 5¼in disk.

It has a nice supertwist LCD which is the right aspect ratio — tall characters, circles which are round, and less eye-strain. And it's the right size, too, for close work. Speed? Fine, with an 8086 running at 8MHz — just like the Amstrad PCs.

And when you consider that the PPC512 comes with Mirror II, an excellent comms program, and a modem which will work here and in the US at speeds of up to 2400bps, then you will probably say that you have everything you want except bundled applications software — and that, Sugar promises, is on the way.

Now, for the rest of you, there are several good reasons why you should be suspicious of a portable machine that runs MS-DOS.

Weight is the first flaw of a disk-based box, and at 12lbs or so, Amstrad's PPC is six times the weight of Sinclair's laptop.

Next is the problem of how you start up a portable. With the Z88, you switch it on and start typing. With an MS-DOS machine, you switch it on and wait a minute or so while it makes sure it still has the memory chips it had yesterday, and they haven't



The Amstrad PPC range: 'true MS-DOS compatibility'

grown mould or turned into amplifiers.

Then, an MS-DOS machine starts looking for a DOS disk. Assuming you have one in the drive, it won't hang and force you to do another memory check.

When it's time to stop work, let's assume you turn the machine off on purpose. First, of course, you save all the files that are open. And, naturally, you have a blank disk ready in case the first one is full.

But switching off can be involuntary. On the PPC512 (unless the specification is changed between now and the launch in January), if you plug

it into the mains and someone steps on the cable, the batteries don't take over.

And seriously, when you only have about six hours of battery life, you're tempted to switch off to preserve that precious battery life.

Alan Sugar is planning to make about 20,000 of these PPC512s each month — almost as many as the PC1512s sold in the UK in the first year. Worldwide, he should do that easily.

If you want a budget MS-DOS portable, there is nothing to touch this model, especially if you want a modem. But a laptop it isn't.

Compaq's costly change of image

Frankly, I didn't believe Chuck Peddle when he said what his new 386-based micro would cost. It will be over £6000, which is actually more than the Compaq model.

His argument is complex, but is based on two simple ideas.

First, there is still no glut of 80386 chips, so you can't sell more of them just by being cheap.

Second, and more important, there are people around who really want the highest-performance PC they can get, and one with a super-fast, super-size disk, superfast

disk cache, lots of high-speed memory, a 20MHz clock, and no compromise anywhere — those people won't grumble about the odd thousand pounds they have to spend on such a system.

There is also the point that Tandon doesn't want to be the supplier of low-cost People's Computers for the rest of time. It would rather like to have a Porsche image — at least for its top-range models. With the 386 in short supply, it's just possible for the company to stake a claim to some of that prestige territory.

Tandon is on (0527) 46800.

Key choice

The young folks of my neighbourhood have invaded my office at home playing arcade games on things like the Spectrum, the Commodore 64, the Amstrad, and even the Atari ST.

There's one game in particular — Mastertronic's Motos — which very few of us can play. It looks like a lot of fun, and I've watched people play it, but I simply cannot get the hang of it. That's not because it's a fiendishly hard game. It's because Mastertronic made a mess of the production.

You and I, being intelligent folk, could certainly manage to read a book where the publishers had decided — for reasons of their own — to print the pages in reverse order. Similarly, we could probably make a fair fist of playing a game where the key controls were back to front.

But in neither case would we enjoy ourselves.

Somebody ought to tattoo onto the backs of the hands of any programmer who writes an arcade game: 'Give a choice of key controls.' If that doesn't work, they should be made to write their code with their arms crossed over left to right, and my choice of keys.

I mean, this is 1987!

Inky fingers

Ink runs out in laser printers (though they call it 'toner', not ink) just like it does in other machines. But, unlike matrix printers where you can re-ink a grey ribbon, it normally isn't possible to refill the toner cartridge. That involves a £99 kit from Innovation in London, which includes an instruction manual, two bottles of ink (called 'toner recharges' in laser jargon), two felt pads, and a special tool to take the cartridge apart. (Those who think £100 is a lot for two bottles of ink obviously haven't faced a demand for several hundred pounds for a replacement cartridge.)

Don't do it over the best carpet, though.

Call Innovation on (01) 434 1533.

Denton dishing up useful data

Bob Denton is selling a satellite reception board for PCs. The idea is to let businesses hire a satellite channel and transmit data to branch offices.

It's a typical Denton plan — outrageous on the face of it but quite possibly the beginning of something enormous.

Bob Denton was once the best-known name in the micro business, after Clive Sinclair. He was head of Prism, which was so many things: it was Sinclair's sole distributor for the Spectrum; it was organiser of Micronet on Prestel; and it was going for the prize of being contractor to ITV for building the ITV Micro when a series of accidents led to the collapse of the whole group.

And, before that, Denton was head of Dragon. Before that, his trail of innovation goes back to Texas Instruments, the chip giant.

So I suppressed an impulse

to laugh rudely at the idea of satellite receivers for PCs.

Denton's company, Vista, is already quite big in the satellite business — supplying dishes to hotels so that they can tap into the international TV channels. And he also installs dishes in expensive housing developments on the Costa del Crime, 'where the ex-pats sit around drinking beer and wishing they could come home, and watch *Eastenders* on TV instead,' as Denton puts it.

At the moment, it is illegal to use satellite channels for transmission of data unless you go through British Telecom. However, Denton believes that the legal situation is about to change.

At that point, he says, things will become interesting. 'Our information is that most big businesses don't use modem links as two-way links. Something like 95% of the traffic is from the centre out.'



Bob Denton: sights set on satellites for micros

A broadcast link costing £50,000 per year could actually be cost-effective, he reckons, even with the PC card to receive the broadcasts coming in at another £500, minimum.

Watch that space — something interesting could happen.

Many megabytes make fast work

'Did you know we make very fast disks, with a big capacity?' said the man from Priam. I'd never heard of Priam, I responded. 'Oh, try one of our drives!' he said.

Days later, my home PC-compatible had a 100Mbyte drive — and a very fast one. And (if I'd had a machine that wasn't a Tandon) I could have had 130Mbytes of even faster disk on my office machine.

The main attraction of these Priam drives is the simplicity of plugging one in. They're designed to appeal to people who already have a disk and want a bigger or faster one.

I tested this claim and found it totally justified. It took less than half an hour to open up the box, take out the hard drive and replace the unit with the Priam drive, attach cables, and shut it all up. One screwdriver was all it took.

A little Priam-derived system software was loaded and run, and the only problem arose when I found I'd backed up my system software and written it back over the Priam BIOS.

What do you do with 100Mbytes? You'd be surprised how quickly you find uses for it.

How much does it cost? A 45Mbyte add-in, pretty fast at 28 milliseconds, has just been launched for £797. That doesn't include a controller — you use your AT controller. And it's half-height, which can be useful.

Other drives in the Priam range include a 70Mbyte RLL (high-speed) model for £1300, including controller; a 100Mbyte RLL (with controller) for £1460; and on up.

Top of the range is something like the PRM 0201, at just over £3000. That's a lot for a disk, but it is a 233Mbyte drive with its own controller (RLL) and is pretty damn fast.

The last time I saw one, it was one of a pair, owned and operated by Electronic Arts. The company was using them as a CD simulation (it had to slow it down to make it convincing, of course...)

Priam can be contacted on (0734) 509621.

Word of warning: Do check that you don't have a Tandon until I find out what is causing the problem on my machine. There is something in Tandon's BIOS program which requires changing, and you can't just plug in a Phoenix BIOS because then it doesn't recognise the Tandon set-up program.

Journey to a prize

I went into a shop and bought a souvenir. On it, it had a clue: 'Sweet Molly Malone...' Hm, I thought; pretty obvious — Dublin. So I went to the travel agent next door and bought a rail ticket to Dublin. Silly, really. I had £500, and an air ticket would have been faster. But I wanted to buy some clues... After all, there is £5000 at stake here.

This month's game mention goes to something which is hardly a computer game — The Travel Game is a travel fantasy. And it has a prize.

The catch is: if you make a mistake in this fantasy, you can't save/game/restore and try again. You're stuck with it.

Apparently you can probably finish the game in less than a month, but it doesn't matter when you start. The time that counts is the time in the game. The first person to get there wins — game time, not real time. And in the game, it will take several months — more, if you get lost somewhere in South America.

Travelling is a matter of juggling costs. You can raise money by buying quiz questions at £10 each, minimum, and winning something like £24 to £40 for correct answers. But you need to spend your cash on tickets and souvenirs.

That's the cash sorted out. But The Travel Game also has hazards, like getting hijacked



As compensation for the shrug of the shoulders which was the best I could do for the launch of ABC by ABC Systems a few months ago, I can now report that this integrated book-keeping, word-processing, spreadsheet and database package is available free (normally £149) to buyers of the Amstrad PC1512 from Dixons.

Look out for it over the Christmas period.

on a second-class train, or following a clue to the wrong city and finding no shop there.

This game, I'm afraid, I shan't win — too many of the puzzles require intelligence. But it looks like it might be fun. And the top 50 players will get together in a few months' time, and the game masters promise to lay on a banquet, or something, and announce the real winner.

You get your disk from David Inwood at Rule Format, and that qualifies you to enter the contest for the prize of £5000 — or perhaps more.

'We've put the £5000 in for a start, but we will also add £1

for every copy we sell,' said Inwood, a Cambridge management consultant who hopes that The Travel Game could be the next *Trivial Pursuit*.

Who knows how I'll feel after a month of playing the thing... but for now, I think it looks like fun. And who knows? Inwood might invite me to the dinner anyway. (I do a great after-dinner speech, Inwood. Do you know how many Californians it takes to screw in a light-bulb?)

Details from the consultants at Rule Format in Cambridge, or order your £25 disk (plus postage) on (051) 708 8202.

Turbo Pascal 4.0—faster and

Our new Turbo Pascal 4.0* is so fast it's almost reckless. How fast? Better than 27,000 lines of code per minute†. That's more than twice as fast as Turbo Pascal 3.0. And Turbo Pascal 4.0's user friendly, intelligent design provides a second to none Pascal programming environment for beginners and professional alike.

4.0 Technical Highlights:

- Compiles 27,000 lines per minute
- Includes automatic project Make
- Supports > 64K programs
- Uses units for separate compilation
- Integrated development environment
- Interactive error detection/location
- Includes a command line version of the compiler
- Highly compatible with 3.0

*For the IBM PS/2 and the IBM and Compaq families of personal computers and all 100% compatibles.

4.0 breaks the code barrier

No more swapping code in and out to beat the 64K code barrier. Designed for large programs, Turbo Pascal 4.0 lets you use every byte of memory in your computer.

4.0 uses logical units for separate compilation

Pascal 4.0 lets you break up the code gang into "units", or "chunks". These logical modules can be worked with swiftly and separately. 4.0 also includes an automatic project Make.

4.0's cursor automatically lands on any trouble spot

4.0's interactive error detection and location means that the cursor automatically lands where the error is. While you're compiling or running a program, you get an error message and the cursor flags the error's location for you.

You'll get everything you need from Turbo Pascal 4.0, its Tutor and its 5 toolboxes.

In fact, the Turbo Pascal family is all you'll ever need to perfect programming in Pascal. If you've never programmed in Pascal, you'll

probably want to start with Turbo Pascal Tutor.

With TURBO TUTOR 4.0, you learn Pascal from the people who invented TURBO PASCAL. Turbo Tutor steps you from basic right through advanced programming concepts and techniques. The package includes a 400-page, quick-study tutorial and the accompanying disc

contains source code for every complete example in the manual.

Turbo Tutor gives a concise history of Pascal, defines basic terminology and helps the person new to programming start writing Turbo Pascal programs. As your expertise quickly gains, add Toolboxes like our:

- Database Toolbox
- Editor Toolbox
- Graphix Toolbox
- GameWorks
- Numerical Methods Toolbox

If you develop Turbo Pascal programs for end-users, you can distribute your own compiled programs that include all or part of the above toolboxes — with no royalty payments.

Turbo Database Toolbox

Now you don't have to "reinvent the wheel" each time you write new Turbo Pascal database programs. TURBO DATABASE TOOLBOX 4.0 enhances programming with Turbo Access and Turbo Sort.

Sieve (25 iterations)

	Turbo Pascal 4.0	Turbo Pascal 3.0
Size of Executable Files	2224 bytes	11682 bytes
Executive speed	9.3 seconds	9.7 seconds

Sieve of Eratosthenes, run on an 8MHz IBM AT

Since the source line above is too small to indicate a difference in compilation speed we compiled our CHESS program from Turbo GameWorks to give you a true sense of how much faster 4.0 really is!

Compilation of CHESS PAS (5469 lines)

	Turbo Pascal 4.0	Turbo Pascal 3.0
Compilation speed	12.1 seconds	Turbo Pascal 3.0
Lines per minute	27,119	9,243

CHESS PAS compiled on an 8MHz IBM AT.

†Run on an 8MHz IBM AT

BRILLIANT

I brighter than anything you've known

TURBO ACCESS quickly locates, inserts or deletes records in a database, using B + trees — the fastest method for finding and retrieving database information. Source code is on disc.

TURBO SORT, using the Quicksort method, sorts data on single items on multiple keys. Turbo Sort features virtual memory management for sorting large data files. Available now with commented source code on disc. Your TURBO DATABASE TOOLBOX comes with source code for a free sample database — right on your disc the database can be searched by keywords or numbers. Update, add or delete records as needed. Just compile it, and it's ready to go to work for you. You can tailor it to your specific needs.

Turbo Editor Toolbox 4.0

All you need to build your own text editor or word processor. Turbo Editor Toolbox gives you easy-to-install modules. Now you can integrate a fast and powerful text editor into your programs. You get the source code, the manual and the know-how.

We provide all the editing routines. You plug in the features you want. You could build a WordStar-like editor with pull down menus like Microsoft's Word, and make it work as fast as WordPerfect.

Turbo Graphix Toolbox 4.0

A library of graphics routines which is so simple to use it even lets complete beginners create high-resolution graphics on the IBM PC, true compatibles, and the Zenith Z-100. It gives you a set of tools to include in your programs for complex business graphics, easy windowing and storing screen images to memory.

Turbo Gameworks 4.0

Explores the world of state-of-the-art computer games. Using easy-to-understand examples, Turbo GameWorks teaches you techniques to quickly create your own computer games using Turbo Pascal. Or for

instant excitement, play the three great computer games we've included on disc — compiled and and ready to run.

Chess, Bridge, Go-Moku. We give you these three classic games of strategy. And we give you the source code so you can see how computer games are designed.

Turbo GameWorks provides state-of-the-art games that let you be player, referee, and rules committee — because you have the Turbo Pascal source code.

Turbo Pascal Numerical Methods Toolbox 4.0

Add Numerical Analysis to your Turbo Pascal Development Systems. The Turbo Pascal Numerical Methods Toolbox is an indispensable tool for all scientists and engineers. As a complete collection of Turbo Pascal routines and programs, the Toolbox provides you with all the state-of-the-art applied mathematics tools you'll ever need — so you don't have to reinvent the wheel every time you write a program.

The Turbo Pascal Numerical Methods Toolbox does for Turbo Pascal users what the IMSL and NAG mathematical routines do for mainframe FORTRAN users. The Numerical Methods Toolbox offers ten powerful features:

- Zeros of a function
- Interpolation
- Differentiation
- Integration
- Matrix Inversion
- Matrix Eigenvalues
- Differential Equations
- Least Squares
- Fourier Transforms
- Graphics

Again, source code is provided for all programs.

For the dealer nearest to you, or to order now.

Call 0734 320022

BORLAND
INTERNATIONAL

I want to benefit from Turbo Pascal 4.0 and the 4.0 Toolboxes.

If you are a registered Turbo Pascal user and have not been notified of version 4.0 by mail, please call us at 0734 320022. To upgrade if you have not registered your product, just send the original registration form from your manual on payment with this complete coupon to:

Borland International UK Ltd, 8 Pavilions, Ruscombe Business Park, Twyford, Berkshire RG10 9NN

Copies	Products	Price	Total
☐	Turbo Pascal 4.0	£89.95	_____
☐	Developer's Library (includes Tutor and all Toolboxes)	£245.00	_____
☐	Turbo Pascal Tutor	£49.95	_____
☐	TNT (Turbo Pascal 4.0 and Tutor)	£129.95	_____
☐	Database Toolbox	£69.95	_____
☐	Graphix Toolbox	£69.95	_____
☐	Editor Toolbox	£69.95	_____
☐	Numerical Methods Toolbox	£69.95	_____
☐	Turbo Gameworks	£69.95	_____
☐	Turbo C	£89.95	_____
☐	Turbo Basic	£69.95	_____
☐	Turbo Prolog	£69.95	_____

upgrades:

☐	Turbo Pascal 4.0	£30.00	_____
☐	Developer's Library and Pascal 4.0, (For Jumbo Pascal owners only)	£150.00	_____
☐	Turbo Pascal Tutor	£20.00	_____
☐	TNT (Turbo Pascal 4.0 and Tutor)	£40.00	_____
☐	Database Toolbox	£20.00	_____
☐	Graphix Toolbox	£20.00	_____
☐	Editor Toolbox	£20.00	_____
☐	Numerical Methods Toolbox	£20.00	_____
☐	Turbo Gameworks	£20.00	_____

Add 15% VAT

Amount enclosed _____

Prices include shipping to all UK cities.

My computer's name and model is: _____

The disc size I use is ☐ 5¼" ☐ 3½"

Payment: Access/Visa/Money order/Cheque

Credit Card expiration date: _____

Card no

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Name: _____

Signature: _____

Shipping Address: _____

Name: _____

Postal Code: _____

Telephone: _____

CODs and purchase orders WILL NOT BE accepted by Borland.

All prices are suggested list prices and are subject to change without notice.

NOT COPY PROTECTED

All Borland products are trademarks or registered trademarks of Borland International Inc. Copyright 1987 Borland International Inc.

AFTER A FEW YEARS SOME COMPUTERS ARE ONLY COMPATIBLE WITH ONE THING.

Unlike some of our competitors, the Samsung PC range doesn't come with built-in obsolescence.

Whatever developments there are in computers, ours will almost certainly be able to keep up with them.

We've made both our XT and AT computers IBM compatible.

So they'll be able to grow as fast as your business needs.

Each of our computers is also made to industry standard specification.

And because we've been working with the world's leading computer manufacturers for years, we know how to build reliability into our computers as well as technology.

(We're so confident, in fact, that we offer a 1 year on-site warranty with every Samsung PC.)

As one of the world's largest companies we're also able to guarantee one other thing.

That we're in the computer market to stay.

So if you're looking for your first PC, choose carefully.

Or you could be throwing your money in the bin.

For a full information pack on Samsung PC's and Data Monitors, send this coupon to: Samsung Electronics (UK) Ltd. Unit 1, Hook Rise Business & Industrial Centre, 225 Hook Rise South, Surbiton, Surrey KT6 7LD, Tel: 01-391 0168. Or call any of the distributors below.

Name _____

Company _____

Address _____

PCW1



You can't go wrong with
SAMSUNG



SAMSUNG DISTRIBUTORS: HUGH SYMONS DISTRIBUTION SERVICES LTD (0202-745744).
IDEAL HARDWARE (01-408 1331) · EIRE & N. IRELAND: REYNOLDS ELECTRONICS LTD (01-500144).

Genie conversion in command

I use File Genie for very little other than converting ASCII files into WordStar format — which makes me feel very guilty.

The program is imported by Caxton Systems from Team Austin in California, and may just be the most useful single utility I possess.

All it does is take a file and transform it. Before it does that, of course, it can help you decide what is in the file — it scans it to see how big the records are, what the fields

contain (or whether in fact there are any records or fields) — and all the sorts of things you need to know about database, or text, or spreadsheet files.

But its power for conversion of files is like the ultimate search-and-replace command. With it, you get a whole host of pre-defined file conversion utilities. The ASCII to WordStar utility, for example, goes through changing hard carriage returns to soft ones unless it finds two returns

together. Then it makes them hard. Result: paragraphs.

I had a public domain program which (irritatingly) insisted on creating files with the suffix '.DOC'. It was the work of less than a minute for Genie to go through the program, replacing all DOC patterns with TXT. Normally, you'd have to spend ages with Debug.

It's a really excellent program. It may not be public domain but, even at £99, it's still a bargain.

Software speed-ups

A year or so ago, everyone was quite happy with their 4.77MHz PC and 80ms hard-disk drive. Now, though, 386-based PCs run at 20MHz and contain 16ms hard drives (they will find any piece of data in an average of 16 thousandths of a second). Those who paid a fortune for their slow machine are, understandably, a little upset.

Hardware solutions to the problem are expensive. A 286 or 386 processor board won't give you much change from half an 'Archer' (£2000), and replacement hard drives aren't cheap either.

Software solutions are cheaper and, although you can't write a program to turn an 8086 into a 386, you can use software to speed up hard-disk operations.

Overdrive, from Business Simulations in Kent, tackles the problem in a unique way. It's a resident program that replaces the MS-DOS hard-disk access routines with its own, faster versions. Although this doesn't speed up the actual reading of data, it does mean that required sectors can be found faster and with less grinding noises.

In tests on my old, very slow Epson PC with hard disk, Overdrive didn't make much improvement. This is probably because by now, with version 3.3 of MS-DOS, the hard-disk routines are fairly efficient. As the Overdrive manual states, it's only the earlier versions of DOS that had the really slow code.

The Disk Wizard, distributed by Ctrl-Alt-Deli of Milton Keynes, has impressed me greatly. It's a disk cache which

Vast expense

Technically, it is very clever of Emerald Systems to come up with a tape data storage system that can put two thousand million bytes onto a single 3in cassette.

It was done by using video-scanning techniques. As in a video tape recorder, the data is pasted onto the tape in a series of slanting stripes. The more normal tape recorder just records a single line in the middle of the tape.

Each cassette, notes the UK importer, Sintrom, 'carries a life-time guarantee and is

has the disadvantage of having to use over 200k of my 640k (Overdrive takes around 40k on a 20Mbyte drive) to work effectively. Disk caches work by keeping a RAM-based copy of anything you read from, or write to, the hard disk. Then, next time you want to read some data, it is taken from RAM if it's there, and not from the comparatively slow hard disk.

Disk Wizard also scores by not writing data to disk when, say, you instruct your word processor to save a file. Instead, the data is written to

The VAST tape data storage system: storage at a price

available at a cost of £35, so providing a cost per megabyte as low as 1.6 pence.

True, as far as it goes. What Sintrom doesn't mention until right at the end is the trivial information that a 'VAST' tape drive costs little more than £5822.

Sintrom can be contacted on (0734) 311088. But the kind of people who can afford to buy something that size are likely, I would think, to be contacted by Sintrom direct. Probably through their Platinum Amex cards...

RAM and copied to disk when the computer is idle. As long as you don't re-boot the machine or turn it off immediately after saving some data, no data will be lost. If you want reassurance, you can opt for flashing indicators which appear onscreen whenever there is any data in the cache that hasn't been saved to disk yet.

Overdrive costs £69.95, while Disk Wizard is £60.

Business Simulations is on (0892) 863105. Ctrl-Alt-Deli is on (0908) 662759.

Robert Schifreen

Outline's big deal

Good news for fans of PC Outline — a new version is on the way, and is being packaged in with the next versions of WordStar 2000 Plus.

This combination has been put together because MicroPro, the company which produces WordStar and WordStar 2000, found that it was using PC Outline internally and decided to do a big deal with the publishers of Outline.

At the same time, there's rather better news for those of us who don't want to use WordStar 2000 Plus. A new version of PC Outline which will obey classic 'professional' WordStar editing commands is due soon.

As far as I can gather from Brown Bag Software, the new versions won't have more than 64k per outline. But a new version is hinted at for next year...

Communications breakdown

The news that the Psion Organiser II can now share its diary information with a PC is encouraging.

'Organiser owners don't need a pocket diary,' said Psion's sales manager recently, but it wasn't really true. Several of them had to find some way of knowing what was recorded in their desk diary. And if that desk diary was built into a PC, the only way of duplicating the information was to print it out and retype it.

Now, Diary Link allows diary information to be swapped between the Organiser and any PC or compatible. In particular, you can use the SideKick diary.

Details can be obtained on (01) 723 9408.

Peace not so quiet

Our apologies to the poor housewife whose phone has been hogged by people wanting to get hold of Kador, whose combined acoustic hood-printer stand was featured on page 85 of November's Newsprint.

Details of Kador's £40 kit can be obtained on (0784) 252662. ▶



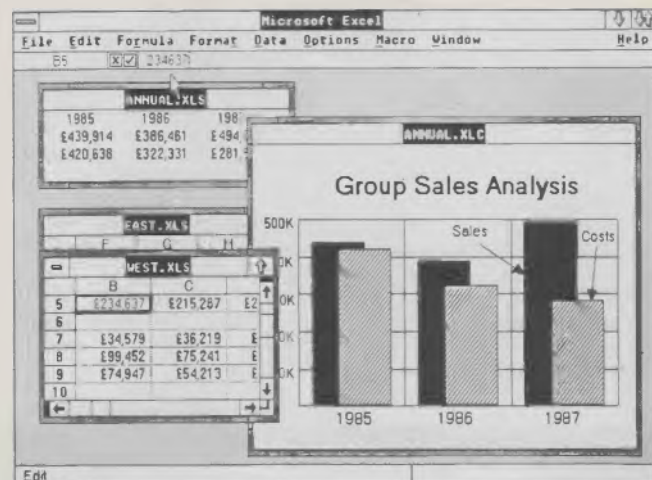
Memory-resident marvel excels

The accompanying screendump from Microsoft Excel was printed on a standard HP LaserJet+ emulating a Kyocera 1010. You may notice that a pull-down menu is in operation and that the whole of the screen, rather than just the 'active' window, has been reproduced.

This marvel is achieved with a £49 memory-resident program called Grafplus, which replaces the standard DOS print screen function with one that works in all graphics modes and is also programmable.

Grafplus works with over 20 different graphics boards, from standard CGA up to the 1024x768 Verticom H-16 card, and around the same number of output devices including ink-jet and colour printers.

Colour printers are also supported, and an installation program allows the user to specify the size of the printed



Grafplus: versatility and impressive output

image and whether any of the screen is to be cropped.

Additional goodies include hooks to allow the resident Grafplus driver to be called by Basic, Pascal and C programs,

and a standalone program, PRTSC.COM, to create screendumps from a batch file. Distributor Ctrl-Alt-Deli is on (0908) 662759.

Derek Cohen

The incredible spreadsheet market

Try as I may, I can make no sense of the spreadsheet market; and the arrival of Microsoft's Excel (reviewed in this issue on page 136) and Borland's Quattro, both out to rival Lotus 1-2-3 and Symphony, doesn't help.

When Excel was available only on the Macintosh, some people said it was so good that people might desert the IBM standard just to run Excel.

On the PC it runs under Windows 2, and the graphical interface does mean that you are better off running it on a powerful machine — at least a souped-up AT clone running at around 10MHz. When you've got that, they say, it's just wonderful.

I declined the opportunity to view it, just as I passed up the chance to see Quattro, which some people have said is nice.

My own interest in Borland has focused on two products: Sprint, the word processor; and SideKick II.

Sprint is so far behind schedule that I don't believe it. I actually saw a book, published by a third party, on how to use the program; and despite having signed a non-

disclosure agreement to allow me to beta-test the thing, I still haven't even seen a disk with bugs on.

Borland recently lost its UK managing director (whether through carelessness or as part of a subtle plot, I don't know) and spends a lot of time sending out press releases about its database product, Paradox, which it found in its shopping trolley when it bought Ansa.

Last time I looked, the company was raving on about 'disclosing major strategic directions for Paradox', which turned out to be a plan to make it work under OS/2 and Unix, and able to work with SQL, an IBM standard for data extraction from databases.

I hate to say it, you guys, but what you are currently doing is blundering around with a credibility problem.

Could you get to work on it, please?

Digitask zooms in

A card from Tseng Laboratories, and distributed by Digitask, offers the usual 640x480 extensions to the standard EGA specification. What makes it more interesting is that it has a zoom facility which works in

any application. Pressing a 'hotkey' allows you to zoom, at three different levels of magnification, onto an area of the screen. You can get better fatbits with GEM Draw, or finer details in paint packages.

Price is £229 and Digitask can be contacted on (0342) 24631.

Hancock's finest hour

The rewards of not rocking the boat, for Apple boss David Hancock, have meant promotion to a job in California. His fame at Apple rests on his determination to establish specialist Macintosh stores. His success, however, will always be seen by UK Macintosh lovers as eclipsed by his ability to sell machines in the UK for substantially more than they do in the US.

Wise man.

Had he cut prices to the same level as American 'street price' levels, naturally sales would have shot up. Then he'd have had to manage a big alteration in purchase predictions. And, finally, when the Apple market reached its natural level and the sales curve flattened out a bit, he'd have been blamed for causing a 'slowdown'.

Steady as she goes, David.

Unix ARM race

Acorn does indeed have other plans for its ARM chip (the one that powers the Archimedes) and they involve building a Unix-based mini.

On the face of it, once you know that Acorn is doing this, you would rapidly put two and two together and end up knocking on the door of AT&T in the States.

After all, AT&T owns a portion (less than a third) of Olivetti which owns most (more than two thirds) of Acorn. And Olivetti sells the Unix machines built by AT&T, which in turn sells the M24 range in the States (calling it the 6300).

At that point, you have the door slammed in your face because you might expect AT&T to be interested in Acorn's Unix box.

Indeed, AT&T has decided to go for a reduced instruction set computer (Risc) running Unix. But it doesn't want the Acorn Risc Machine. Instead, it has gone for a chip designed by Sun, one of the flag-carriers of Unix.

Surprisingly, the people at Acorn were very relaxed about this when I contacted them. As far as they were concerned, the fact that AT&T and Sun had got together was excellent news because it means that Microsoft and Unix will not have the field to themselves.

'And anyway, whatever Olivetti might think, we honestly never expected to sell this box to AT&T,' said one insider I spoke to in Cambridge.

Brian Long, managing director of Acorn, was rather more circumspect. 'The fact that AT&T has gone for a Risc machine means we're now in good company,' he said. 'It might make the search for an American partner easier.'

Plans to launch the Archimedes in the States are still on the back burner, however. 'We have always said we won't do it without a partner,' summarised Long.

That could happen, of course. The machine has been getting rave reviews in the UK, and now American publications have started testing the Archimedes with similar enthusiasm.

Without an American success, the Archimedes will just be a footnote in the history of micro-chips; and without some fast moving now, there won't be an American launch for months — even years.

IF ONLY YOU COULD PLAN YOUR ACCIDENTS ...

At 11.19, I'll have
a **stuck keyboard**
on hand.
Better save it now.

At 4.14, the **power's**
gonna fail.
Better save it now.

At 2.37, some nerd'll
yank the **power plug**.
Better save it now.

Seconds before I leave
for home, the system's
gonna **crash**.
Better save it now.

The truth is you need ResQTM To protect yourself from work-loss. Forever.

Memory-resident ResQ protects you against work-losses
And, against frustrations that work-losses can cause.

ResQ saves your work automatically at regular, pre-set
intervals. Or, if you please, at pre-set number of keystrokes.

ResQ takes up only 40K RAM, and can be installed on a
maximum of 3 sub-directories. ResQ can also be installed on
PCs with a variety of graphics cards!

ResQ is particularly useful in a multi-user environment.
With the clever use of a password, ResQ keeps your work
secure and confidential.

And - presto! - one single keystroke gets you back to
where you left off. With all your stored data - intact!

Think about it. Think about the control you have over
accidents. And, with relief, think about ResQ. You'll be glad
you did.

If you need more details contact:

ResQ from Sonata.

ResQ
Better save it now.
Automatically.



ROCKFORT PRODUCTS

81 Church Road, London NW4 4DP
Telephone: 01-203 0191
Telex: 933740 GANESH G

System requirements

IBM-PC* with hard disk 10-30 MB.
HGA, CGA or EGA card
MS DOS* or PC DOS 2.11 or later

* IBM PC and MS DOS are registered trademarks of
IBM Corp. and Microsoft Corp. respectively.



CIX 'n' BIX online

I've been making the serious error of dialling into BIX instead of CIX. I'll discuss CIX in a minute, because first, I want to rave about BIX (that's 'rave' as in 'rant and rave').

You may not be aware of this, but there does exist a magazine, based in the States, which is a (sort of) successful rival to *PCW*. Naturally, being American, it is richer than we are, and so it was able to establish an online database, all of its own, where it can listen to the richer of its readers.

The Byte Information Exchange (BIX) has a limited list of users — limited to 14,000, so I'm told. With few exceptions, they are either extremely wealthy, or programmers using the machine on their office modem, or both.

I'm one of the exceptions. I was horrified to receive notification of a bill of \$300 for a month's use. Instant resolve: not to spend more time that I had to on BIX.

At first, I thought this would be a hard kind of resolve to maintain. The treasures of BIX, I thought...

Well, they are amazing. There are well-known writers, all in a 'writers' conference. I can talk to them, and they can reply. There are well-known programmers in different programming conferences. Topics covered include C, Pascal, Assembler, Modula, Ada and Basic. Microsoft actually designed its latest Basic on the strength of input from BIX users (or Bixen, as they like to call themselves).

I joined in several of these conferences, and found them fascinating. I really can't speak too highly of the sort of information you get there.

Occasionally, I'd type in a little comment. Then, one day, I started trying to upload a little comment.

'Uploading' is the technical term for sending information flat-out, rather than typing it in character by character. So far, I haven't cracked it.

Part of the problem is the fact that BIX is not (yet) attached to an error-correcting network. It is attached to Tymnet, which can be an error-correcting network — an X.25 net. But BIX, unfortunately, doesn't have an X.25 node.

On top of that, Tymnet doesn't seem to understand that characters used by the Xmodem protocol might be seriously intended for



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 3½in disk drives.

VGA graphics and Micro Channel Architecture would seem, to these opportunists, to be minor hurdles on the road to beating IBM at its own game.

This is not to say that 3½in disk drives aren't jolly useful items in their own right. The stream of laptops, and PC emulators for machines like the Atari ST and the Acorn Archimedes, have meant that there has been a high demand for PC software on 3½in disks.

To our rescue has come a wonderful product from Citadel — a £149 3½in floppy disk drive in a 5¼in 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 3½in disk drive would recognise the disk.

To the rescue came Citadel's Frank Smith, 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 3½in drive as E: rather than B:, I now have no problems with any DOS operation.

Thanks, Frank.

Citadel can be reached on (01) 951 1848.

transmission. In order for that to work (it checks that blocks are being sent correctly) BIX has to turn off its 'handshaking', which is a poor name for it.

What handshaking really is, is a 'swallow' reflex. Networks suck data, then stop sucking while they swallow. Give a network an input without 'handshaking' and it's like

putting milkshake through a high-pressure hose. You choke, and the stuff spills all down your front.

Watching Tymnet choking on my data (at BIX's \$12 per hour rate) didn't strike me as very amusing.

Suggestions were made by helpful fellow-Bixen. 'Try logging onto IPSS with the TP protocol' and 'Are you typing

control-X before the BIX prompt at the Tymnet prompt?' and 'Try typing help upload'.

'Help upload' is a command that you can give to BIX. I gave it. Very kindly, it told me what to do, and what would happen. I did it, and it *didn't* happen.

TP is 'Transparent Protocol'. To use it, you have to have a familiarity with Packet Switchstream (PSS) that defies logic. You have to know that it is ignoring you because it is thinking to itself: 'NUA?' and you have to type A93104. Or it is ignoring you because it is thinking 'NUI?' and you have to type your own secret password. Or you have to know that it is actually doing neither and is waiting for Tymnet to wake up.

Triumph: using TP and 'upload' I got the Xmodem response — a square box on the screen, with the number of errors. The errors matched the number of blocks sent. I stopped, and tried again. This time, it worked! My software proudly announced: 'Transfer completed'.

BIX went into a terminal sulk, and refused to have anything to do with me.

For want of something to do, I typed my secret Packet Switchstream password and then the network address. Sure enough, there it was: 'Lexington Data Services is Online'.

In a couple of months, an error-correcting network link is promised. So far, despite being given access instructions, I haven't been able to even test it to the point of logging on, never mind find out if it is error-free once on.

I seriously suggest that you dial into CIX instead.

Don't run away with the idea that CIX is bliss. It isn't. Frank Thornley, who runs it, has been working hard to make it work properly. As of this month, he's come pretty close, and it only dumps you out into limbo one go in four. It used to be that you only logged in successfully one go in four.

And, although CIX uses the same program (the Cosy Conferencing System) that BIX does, it is subtly different and has several nice features.

For example, you can compress your data before downloading it, which takes half the time. Also, you can download using an error-correcting system (like Xmodem, Kermit or Ymodem) at speed. From BIX, the lack of 'windowed' download facilities makes this a considerable waste of time and money. ►

It operates at 4 million instructions per second.

It's the world's fastest microcomputer.

It has been voted the 1987 microcomputer of the year.[†]

[†]Home/Small Business Category of the British Microcomputing Awards.



Model shown here is the Archimedes 310 with colour monitor and includes Mouse.

- ▷ At an operating speed of 4 million instructions per second just about everything you do happens instantly. With this kind of power at your fingertips the advantages are enormous.
- ▷ Already Archimedes* has won the British Microcomputer of the Year award, a clear winner against the other two finalists, the Amstrad 1512* and the Amiga 500*.

- ▷ In addition to BBC Basic V, high level languages such as 'C' and 'Pascal' can be used for specialist applications fully exploiting the computer's outstanding power, graphics and speed.
- ▷ The huge potential of Archimedes doesn't stop there. The 310M with its built-in PC emulator can run Lotus 1.2.3*, D BASE III*, MS-WORD* and other popular business programs available under MS-DOS*.
- ▷ With prices starting at £749 exc. VAT for the 305 with mono monitor and rising to £1035 exc. VAT for the 310M with colour monitor, the Archimedes 300 series represents unparalleled value for a computer system of such capability.

PRIORITY REQUEST

Please send me an information pack on Archimedes together with a list of dealers.

Name: _____

Address: _____

Postcode: _____

Tel: _____

☐ Tick here for written details of the 0% finance deal available through participating dealers.

Acorn Computers Ltd.,
FREEPOST 4335, BS1 3YX

Acorn 
The choice of experience.

— OR PHONE 0800 100 100 —

0% (APR 0%) FINANCE FOR LIMITED PERIOD

Interest free credit is available on all Archimedes systems during the period 1.10.87 to 31.12.87. Maximum period of credit 12 months. Subject to status.
Written quotation available on request from participating dealers who are licensed credit brokers.

*MS-DOS and MS-WORD are trade marks of Microsoft Corporation.
*Amiga 500 is a trade mark of Commodore Business Machines.

*Amstrad 1512 is a trade mark of Amstrad Consumer Electronics plc.
*Lotus 1.2.3 is a trade mark of Lotus Corporation.

*D BASE III is a trade mark of Ashton-Tate.
*Archimedes is a trade mark of Acorn Computers Ltd.

DOWN.



**£100
OFF**

THE AMSTRAD PCW 8256 WORDPROCESSOR. NOW ONLY £299 PLUS VAT.

OUT.

The Amstrad PCW 8256 wordprocessor is down to just £299 plus VAT*

It comes complete with monitor, disc drive, keyboard, printer and word processing software. Which poses something of a problem for our competitors.

Now that we've knocked £100 off our 8256 wordprocessors what will their typewriters be reduced to?

AMSTRAD

Amstrad plc., PO Box 462,
Brentwood, Essex CM14 4EF.
Telephone: (0277) 262326.

Please send me information on the Amstrad PCW 8256 wordprocessor.

NAME

COMPANY

ADDRESS

POSTCODE

TELEPHONE

PCW/12

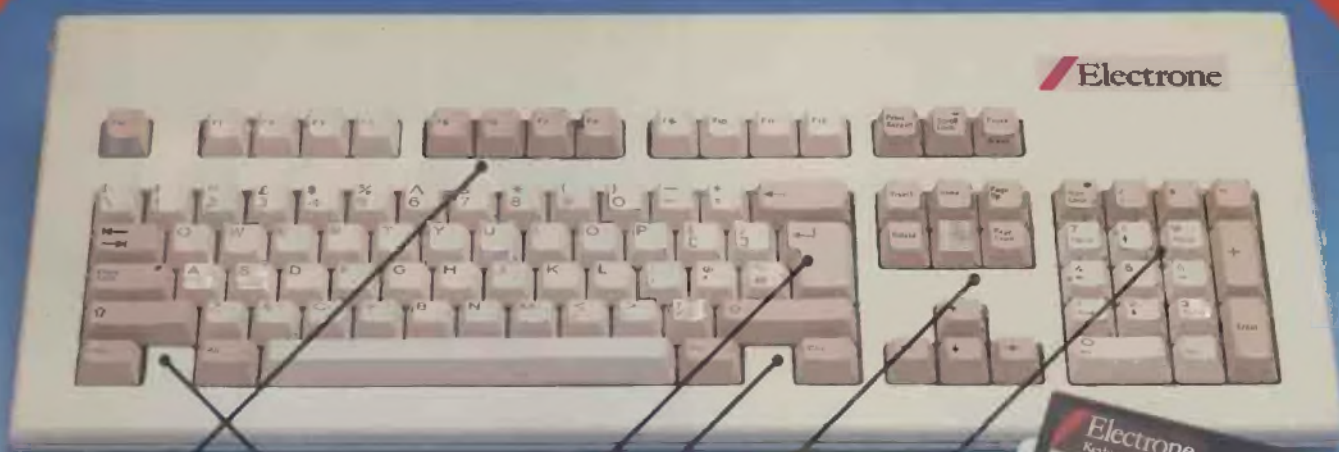
AVAILABLE THROUGH: A.D.T. · ALLDERS · COMET · COMMERCIAL OFFICE EQUIPMENT
CURRYS · DIXONS · ELTEC · FIRST SOFTWARE · HILL INTERNATIONAL · HUGH SYMONS
JOHN LEWIS · LASKYS · MBS · METYCLEAN · MICRO PERIPHERALS · NORBAIN · NORTHAMBER
OFFICE INTERNATIONAL · P&P · RYMAN · SANDHURST · VISTEC · WILDINGS

*Recommended retail price at 19.87 £399 + VAT (£458.85 inc. VAT). Reduced to £299 + VAT (£343.85 inc. VAT) from 23.9.87. Prices subject to change without notice.



AVAILABLE FOR AMSTRAD PC1512

AVAILABLE FOR IBM COMPATIBLES*



12 Programmable Function Keys

Made in the UK

Extra-size Keys where you need them

2 Alt and Control Keys

Separate Numeric Pad

Dedicated Cursor and Function Pad

Just about everybody agrees that using an "enhanced" keyboard is a great improvement. But it can also be a great expense - and if your investment has gone into AMSTRAD PC1512* machines it will also prove a great difficulty.

At **ELECTRONE** we decided to do something about all this and set out to produce the **DASHBOARD**. It is reasonably priced, comes in two versions - one to fit the AMSTRAD port and one to fit the IBM† standard port (which means it will work with most industry standard machines available).

But there's more. Like all our keyboards, the **DASHBOARD** is "soft," which means that if you buy our easy-to-use **DASHBOARD UTILITIES** Software you can dedicate keys to perform selected tasks whenever you want.

Consider the possibilities. Whole macros at the touch of a button (even if your software doesn't have a facility for macros), regularly used sentences, paragraphs or whatever, again at the touch of a button - then there's all

those hard to remember printer control codes, you can store those on whichever keys you want, if you're writing software you can even store mini programs on a button.

The potential is virtually limitless, because you can use each key in *all* its modes and you can change the whole keyboard configuration according to what you are doing.

So, if you want to enhance your machine with something a bit more meaningful we suggest that you fit a new **DASHBOARD** and for extra acceleration, install our **DASHBOARD UTILITIES** and really start motoring.



Electrone

†Copyright IBM Corp. *Trademark of Amstrad Consumer Electronics Plc **IBM Compatible must have standard keyboard port

OUR NEW DASHBOARD MAKES YOUR MACHINE EVEN FASTER

Electrone Ltd. Haywood House, High Street, Pinner, Middlesex HA5 5QA Telephone: 01-429 2433

But BIX does have more software (and organised so you can find it, which you can't say of CIX — not yet anyway). And it has lots of high-powered US programmers of a quality which aren't uniformly available to CIX, yet.

If you have a Dowty Quattro modem (or any other that does the Microcom MNP error-correcting protocol) you can actually go into CIX at 2400 bits per second, which is nice. Normally, the error rate on 2400 is too much for serious use, but with error correction the data does whip in and out.

Anybody wanting to try BIX, go through PSS and ask for address A93104*d*DBIX. As a new user, you get the chance to sign up. Similarly, to contact CIX, dial (0483) 573337 and introduce yourself.

And a word of warning: watch out for phone number changes — Thornley is going for an {01} number to give cheaper access to London users.

If you do go onto CIX, you can leave messages for me there. The name is Guy, the conference is pcw/news.

Modem madness reaches fever pitch

Dowty, the modem-making firm, may yet drive me mad. It has a wonderful modem with built-in error correction, and which will not dial more than eight numbers at a time.

This is not a design fault: it has been deliberately built into the system by the stubborn folks in Newbury.

I love the Quattro because of its error correction. You need error correction when you have a modem of the quality of this one because it works at 2400 bits per second. Try this on any other 2400bps modem, and you'll quickly discover that BT lines just aren't good enough for fast communications. There's noise — clicks, fuzz — and you get garbage.

Dowty has built MNP, the Microcom protocol for automatic re-transmission of faulty blocks of data, into the Quattro. And several bulletin boards around the UK are installing them so that you can run fast without filling the screen with gibberish.

So, the Quattro is a wonderful modem — except for one small thing. It turns out

that it will not let you re-dial a number if you didn't manage to be connected into another modem.

Dowty's theory is that this is a requirement of getting a modem approved. It isn't.

What the BABT — the approvals body — requires, is simple: a modem must not be able, by itself, to automatically dial and re-dial a number.

There's nothing, absolutely nothing, to say that a human being can't ask a modem to dial a number as often as they want it. Theoretically, there is a rule which says that you must not load software which re-dials automatically. If you use your modem with such software, it becomes unapproved; but it isn't the modem that is unapproved, it's the use of the modem that is wrong. The user can lose any rights to a phone line, but the modem can keep its green 'Approved' sticker.

As proof of this (are you reading, you stubborn Dowty engineers?) I have a Miracle modem (BABT approved), a Hayes modem (BABT approved) and a Pace modem (also approved), and all will dial a number as often as I ask them to.

What they won't do is accept an instruction to go away and dial one of the numbers in their own memory, until they get through.

It's pitifully simple and I tried to explain it to a Dowty engineer. 'Well, I'm not going to argue about this,' he said complacently. He knows better than the rest of the world, and there's an end to it.

The Dowty modem can't be used with SideKick. SideKick is one of the most popular accessories for a PC. It will dial numbers for you. You pop SideKick up while working with something else, and ask it for a number. It finds it — instantly. Then it will dial it.

With any other Hayes-compatible modem, you plug it into your serial port and your SideKick dials the numbers.

With the Quattro, you can dial eight numbers. It has a blacklist memory big enough for eight numbers. After that, it's more than its job's worth to dial another, guv. 'I can't add that number to my blacklist! It might be the same as one I've already dialled. No, no, sorry.'

The only way to avoid getting a number blacklisted is to make connection with a modem. SideKick, of course, isn't trying to make contact with modems. End of subject.

Just dialling one number — it may be engaged — several times becomes impossible. There's a strict rule of timing. First re-dial can be after a few seconds; second re-dial must be after half a minute; third must be after several minutes. And after that, hours must pass.

There is a logic behind the behaviour of this electronic jobsworth. This is that a rogue modem could accidentally get a wrong number into its memory, and spend the whole night mindlessly dialling and re-dialling every few seconds, driving the people at the other end totally bonkers. Since British Telecom (BT) can't trace a call and fine the perpetrator of such a nuisance, this is a sensible alternative. Being able to trace the call would be a lot more reasonable, of course. BT will probably do that any decade now.

Logic apart, that's the situation. Dowty, however, has taken it upon itself to improve on this. Instead of restricting the modem to this law, it also restricts you, the user. And you don't have to be using your modem to dial people, to fall foul. You can try comms numbers, too.

Suppose you start by telling the modem to dial a number, and are misrouted. Then you try again, and the line is too poor for a connection. At this point, the Quattro fussily decides that you are overdoing

things and makes you wait half a minute. So you dial again, and the number (probably a BT modem like Packet Switchstream or Telecom Gold) is engaged. 'What have you been doing, you troublesome child!' says the Quattro. 'Go and stand in the corner for five minutes!' No excuses.

Five minutes later, you dial again... oh, never mind.

You can reset the blacklist, by the way. All you have to do is press the DATA button on the modem, and it clears. This can save you a lot of bad language in the office, but a lot of people like to automate their comms. For example, FIDO operators dial each other, around 2am, to swap network mail. And naturally, a lot of the time, they dial into a FIDO node which is already busy swapping mail with another system.

After two or three goes — **blacklisted**.

Anybody who wants to know how to get around this problem, I know a better way. You'll find it on Frank Thornley's CIX service. Sign on, type 'Join PCW' and you'll plug into the conference which I patronise there. Type 'SEARCH quattro' and the system will tell you which message numbers deal with the problem. Type 'skip to 270' (there, I've saved you the hard work) and read.

Off you go, now!

Pacing yourselves

For modem users who do not have error correction (see 'CIX 'n' BIX online story') December is the time to save up your money. At that time, Pace will come to our rescue with an error-correcting box for ordinary modems.

The Pace box will do the Microcom Network protocol, level four. Impressive, you say: what the heck's that?

It costs £125, and fits in between your computer and your modem. Inside is a Hitachi-built 6803 processor; and the MNP software, which makes up packets of data, counts the contents and transmits them with a pretty little wrapping and customs declaration. If it gets to the other end with the wrapping torn, or the declaration doesn't match the contents, the receiving station requests a re-transmission.

Pace will be launching a new modem around the same time which will have this error-correction system built in, for



Pace's proud Barry Rubery

an extra £90 or so.

But out of kindness, for those of us who are stuck with other modems, Pace has packaged an add-on box. This means you can dial into bulletin boards like Deep Thought, or Alan Solomon's bulletin board (Dr Solomon's Fido), and CIX, and so on, and never see any garbage on the screen again — except the garbage transmitted by those poor people who don't have the box, of course. **END**

RE: CSD IN RECEIVERSHIP

£1/2 MILLION OF LIQUIDATED PC SOFTWARE AT FRACTION OF COST

SAVE 66%



DESKTOP PUBLISHING
Wordcraft Elite DTP c/w Imagemaster, full function, spell checker, calculator & comms, NEW **£295**

*Career Planning	£25
*Management By Exception	£25
*Sell Training	£55
*Sell Application	£55
*Management Advantage	£75
*Thoughtware Lightyear	£75
*Evaluating Effects	£35
*Understanding Styles	£35
*Leading Effectively	£35
*Motivate to Achieve	£35
*Defining Goals	£35
*Improving Performance	£35
*Performance Appraisal	£35

BOOK WORKER



INTEGRATED ACCOUNTS
Incorporates Sales, Purchase, Nominal Ledgers, Invoicing, Stock Control. IBM & compat. NEW **£99**

ASHTON-TATE



ASHTON-TATE
dBASE III PLUS LATEST VER
Industry standard database approx 1 billion records per file, 128 fields per record. **£295**

AMSTRAD



REFLEX
Powerful database produced by Borland for Amstrad 1512 and compat. Needs 384k. NEW **£50**

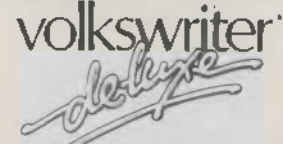
COMPAQ



COMPAQ PORTABLE
IBM compatible, minimum spec 512k, twin floppies, printer card, diags, manuals, (DEMO) **£695**

*My Accountant	£25
*Swift	£35
*Perfect Writer II	£35
*Perfect Calc II	£10
*Perfect Filer II	£15
*Perfect Link	£5
*PC Promise	£45
*PC Promise (full)	£75
*Sage Deskset	£35
*Datamaster	£95
*Conducting Meetings	£10
*Assessing Management	£35
*Managing Stress	£25

VOLKSWRITER



DE LUXE VERSION
Cut price version of well known heavyweight word processing software. NEW **£30**

MAC SOFT



MACINTOSH JAZZ PACKAGE
Software from Lotus, inc word processing, spreadsheet, database, comms, (NEW) **£100**

LOTUS PLUS WP

h3d6hh1d1f8h
3HE437jb5j

WORDS & FIGURES
Lotus 1-2-3 version 1 clone includes spreadsheet & full word processing, NEW **£50**

LAPTOP & ACCS



KAYPRO 2000 SYSTEM
Rechargeable portable computer. Inc Wordstar, Calstar, MS-DOS, MITE. Demo **£495**

5mb HARD DISK



FLOPPY DISK PRICE
5mb full height internal hard disk for IBM PC & BBC model B. Controller extra, (DEMO) **£50**

MEM RES

QUOD ERAT DEMONSTRANDUM

QED+
Memory resident for IBM & Apricot. Spec inc WP, calculator, form design. NEW, manuals **£75**

*K-Chat	£50
*K-Comm	£50
*K-Graph	£50
*K-Report	£50
*K-Text	£50
*K-Paint	£50
*K-Mouse	£50
*Zorland Compiler	£20
*Zorland Windows	£20
*Zorland Optimiser	£20
*Main Street Filer	£20
*Graphlink	£20
*Money Manager Plus	£15

APRICOT

*dBase III	£195
*Wordstar 2000	£195
*Cardbox	£35
*Dataease	£95
*Perfect Calc II	£30
*Perfect Filer II	£30
*Data Master	£50
*Sales Edge	£15
*Expert Ease	£15
*Management Edge	£15
*QED Plus	£75

SAMNA



PLUS IV
SAMNA PLUS 4
Corporate class word processing, spreadsheet. 75 plus printers supported. NEW **£295**

INTEGRATED



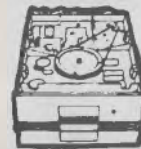
MIGENT ABILITY
Inc word processor, spreadsheet, flat file database, graphics, & communications NEW **£50**

TRIGGER



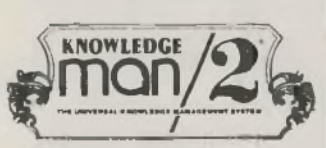
THOUGHTWARE
Monitors business and shows where to take action. Useful business management aid **£95**

5 1/4" DISK DRIVE



CDC FULL HEIGHT DRIVES
Removed from Compaq Portables being upgraded. 360k, DS/DD, 30 day warranty **£45**

TOP DATABASE



KNOWLEDGE MAN 2
One billion records per file, 255 fields per record, compares with £500+ databases **£150**

MIND PROBER



"PRACTICE" ALONE!
Personality assessing programme, better than Trivial Pursuit, for Mac, 64, Apple, IBM **£25**

COMPSOFT



compsoft plc
("BUDGET" DELTA 4)
Transactional database management system. 2 sec retrieve. No programming required. NEW **£50**

A/C PACKAGE



SAGE BOOK KEEPER
Inc sales ledger, purchase ledger, nominal ledger. Up to 1000 accounts & suppliers. NEW **£50**

* indicates brand new goods

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

THE WEST COAST CONNECTION

With the New Year just around the corner, our West Coast correspondent Tim Bjarin looks at this year's market trends in portability and DTP, and assesses whether they will really take off in 1988.

Presenting in the New Year . . .

As we move towards 1988, industry analysts will be called upon to tell other interested industry folks what they think the hot topic of this new year will be. One will certainly be fax boards for PCs; another will be connectivity. But, according to industry luminaries such as Apple's president John Sculley, the fastest growth area will be desktop presentation.

Sculley believes that there are more desktop presenters than there are publishers — and most analysts agree. Desktop publishing is a department concept; desktop presentation is much more personal.

The key to desktop presentation lies in a new type of software that specifically allows the user to design slide or overhead presentations as easily as DTP programs churn out great newsletters. Living Videotext's More was the first of this kind of new software, and Microsoft's Powerpoint is the one that has helped the industry understand how valuable this presentation idea can be.

A recent product announced by Cricket Software, called Cricket Presents, is perhaps the best of this new breed as it adds colour and draw options. And, Macromind's Videoshow 2 adds animation to this presentation concept.

Although the type of computer you use is important, with the Mac being the best so far for this type of application, even non graphics-orientated PCs can be used effectively.

Harvard Presentation Graphics and Brightbill-Roberts' Show Partner are the leaders in presentation software for the IBM world. But you can expect many other companies to have PC products like this out in 1988 as well.

Ironically, the most important part of this equation rests in the area of output devices. The main machines used for desktop presentations to date are the image recorders used for 35mm slide-

making. The leader in this area is Presentation Technologies' Imagemaker. At \$4995, this low-cost slide-making machine has great resolution, and Apple has endorsed it as a major part of the Macintosh desktop presentation marketing program.

Another important product in this category comes from General Parametrics in Berkeley, California. Its Video Show II system is the only one that will allow you to import still video images into the PC.

General Parametrics uses the advanced Targa boards and a powerful compression program that can give a 10:1 compression ratio. As a result, digitised images can be stored in a much smaller disk space.

Additionally, the company offers a sophisticated drawing program that can handle 5000 colours with computer-aided programs, and over 100,000 colours with digitised images. At \$8295 for the base unit it is rather expensive, but if you do a lot of high-end presentations, then this device will pay for itself in no time.

The devices that are needed to really make this idea take

off are colour printers. One such machine is the Mitsubishi/QMS Postscript colour thermal transfer printer. But, at over \$12,000, it will be targeted more for departmental use rather than personal use.

Another device, from Howtek Inc of Hudson, Massachusetts, called the PixelMaster, could also be a leader in this area. Using a hot plastic crayon-type formula, it gives the final copy a raised image effect: even at 240dpi it has remarkable resolution. This ink-jet type printer will retail for around \$4995. And, colour ink-jet printers and plotters will also be prime candidates for those who want hard-copy colour output for their presentations.

The printer that everyone is waiting for, though, is the colour laser. Unfortunately, the technology needed for these printers is far from being perfected in any cost-effective manner, and the colour lasers that will come onto the market in 1988 will be priced at anywhere from \$35,000 to \$50,000.

In 1988, the market will show whether desktop



Howtek's Pixelmaster gives copy a raised image effect

presentation is just an extension of desktop publishing, or an independent enough concept that customers will buy a complete system for just this application. When this market starts to grow, high-end service bureaux using the \$50,000+ Genagraphics slide-making machines could be hurt by these low-cost solutions which threaten their business in the same way that desktop publishing has affected the typesetting industry.

Roll out the red carpet

At a Mac users' meeting, I overheard someone say that they would kill to get their hands on a portable Mac. Mac users are addicted to their machines, and go through heavy withdrawals when they have to be away from their babies.

Although two companies have already given us pricey versions of this good machine — Colby and Dynamac — the industry is still waiting for Apple Computer to bring out the 'real lap-top Mac'.

There have been plenty of rumours that Apple is working on such a machine. But John Sculley, Apple's president and CEO, continues to claim that it will still be some time before Apple releases a true Mac lap-top. Nonetheless, sources

inside Apple confirm that there have been three solid prototypes of a lap-top Mac, and that the development of this machine is moving along rapidly. In fact, these sources say that things are going so well that we might even see this lap-top version as early as March 1988, when Apple will apparently roll out its colour SE and the new 68020-based laser printer.

What would this Mac lap-top look like? Most observers doubt that it will copy the Dynabook concept which Apple Fellow Alan Kay envisioned (see the Alan Kay interview in this issue). This is supposed to be a true notebook computer, and Sir Clive Sinclair's Z88 is the closest we have seen to this so far.

Most believe that Apple has really taken to gas plasma displays as well as the LCD backlit technology that is gaining real market acceptance. It is also likely that the machine will be mains rather than battery-powered.

Sources who have seen this machine say it looks a lot like the lap-top Macs already out, but they expect the final product to be sleek and sexy and much more efficient in the way it works with the user.

Sources also say that it will be very expensive at first.

Even if Apple does not release this machine in March, it is believed that it will appear some time in 1988.

And, for the Mac addicts who never travel without their Mac and only feel safe with Apple logo products, this may be the machine for them.

If Apple *does* release a Mac of this type, you can be sure that third-parties will cash in. ►

THE WEST COAST CONNECTION

Dropped into the lap of the gods

In 1983, industry researchers made outrageous claims about the potential market for lap-top computers. They said that lap-tops would dominate the market and have developed into a \$10 billion industry by 1987. And, they said that the market leader would be Gavilan Computer.

Gavilan *who*, you ask?

Gavilan was the first company to make an IBM PC-compatible lap-top, and it did so at a time when the IBM PC had not been quite accepted as a standard. Nonetheless, these researchers were fascinated by the compactness of the lap-top concept, and had delusions of grandeur.

To date, the lap-top is still not the hit these pundits said it would be.

The main reasons for the slow growth of the lap-top market have been technological in nature. Poor screen resolution has been a major problem; and combined with the laptops' heavy power consumption and weight, users tended to develop gorilla arms and bloodshot eyes from lugging them about.

In the last 18 months, radical new technologies have improved the appeal of lap-top computers. The backlit LCD has made screens more readable, while power consumption has been reduced. At the same time, disk drive weights have come down, thus reducing some of these single-drive machines,

such as the Toshiba T1000, to as little as six pounds.

Talking to most lap-top buyers today reveals that lap-top computers are regarded as secondary productivity tools — for use when travelling or working in a place where there is no access to the 'serious' desktop PC. The new generation of 80286 and 80386 portables will have great impact on the portable's potential in the market, but, as they need mains power or have limited working life in battery mode, they seem destined to be used as compact desktop units rather than as true portables.

But, many industry leaders believe that at least two major lap-top manufacturers are developing technology that could change the face of computing forever, and fulfil the expectations of the pundits of 1983. Nonetheless, the predictions of four years ago were probably eight to ten years off the most likely date when lap-tops will gain acceptance in the market.

The first major development is of low-power, high-speed microprocessors. AMD has perfected a CMOS version of Intel's 80286 chip and could have it in production early next year. Intel is also working on a version of this chip, also for release next year.

Although gas plasma is considered the best screen technology available for lap-tops, it is hungry for power

and expensive. One major vendor is perfecting an LCD backlit technology that uses a fluorescent light to increase the screen's resolution and contrast, and at the same time give the user over four hours of battery-driven power.

Sources who have seen this screen say it could destroy the demand for gas plasma or EL screens, as it offers similar resolution while using only one quarter of the power.

Quadram has used a slicing design in its Snap 1+1 so that a user can have a basic unit with drives in the main base, and add extra power through snap-on devices.

Another major player is preparing to introduce a compact lap-top that includes a new type of high-resolution screen, EMS standard memory on the mainboard, 4Mbytes of memory and a 40Mbyte hard disk.

This system will weigh nine pounds without the battery, and, when powered by a battery, the user will get up to four hours' use.

These new technological breakthroughs, if fully implemented, could have a real impact in the office. Lap-tops with this kind of power could become primary computers for any user, and perhaps even cause the standard desktop units to fade into oblivion. Desktop units of the future might become high-powered workstations, with lap-tops becoming the main personal productivity tool.

To draw a parallel, before microchip technology, calculators took up large spaces on a desk. But, miniaturisation has produced powerful calculators that fit inside a wrist-watch. Roll on the wrist-bound PC!



Gavilan: first into the fray of laptop computing.

Some facts behind the hype

When Bill Atkinson, Apple programmer *extraordinaire* and father of Hypercard, demonstrated this versatile tool last Spring, I was struck by the potential it had for non-programmers.

By itself it is a powerful product, but with its easy-to-use programming style, almost anyone could develop and customise applications as they wish.

I also expected that some good third-party applications of Hypercard could become real commercial hits, and the first two products from a non-programmer for the commercial market are about to be released.

Danny Goodman, a journalist rather than a programmer by trade, became involved with Apple in the early days of Hypercard's

development. In fact, John Sculley, president of Apple, personally asked him to write the first book on Hypercard, and Goodman wrote the current user manual for it. But, as he was writing this book, he became hooked on the programming capabilities he was discovering, and decided to practise what he preached. The results are two products that Activision will publish shortly.

Focal Point is a daily address book, appointment calendar, personal planner and spreadsheet, but its real power lies in its communications applications. With this product, a user can look up a phone number from a database, call it, and the program will log the time and billing charges and add this information to a client charges file.

This application is a must for consultants and lawyers who charge clients by the time they spend, and for the expenses directly incurred.

The other program, Business Class, is a tool that every business traveller can use. Business Class computes currency, shows time zones, explains social customs, climate, holidays and country-specific information by the user just clicking on the country they plan to visit. It also lists telephone numbers of airlines, car rental agencies and hotels, and will automatically dial them for you when you click on the number. It has a complete world map and, using the Hypercard button system, you can scroll the world and get information instantly.

This is just the tip of the iceberg, though, when it comes to applications spawned by Hypercard. Apple says that it knows of over 100

applications being designed under Hypercard expected to be on release by early 1988.

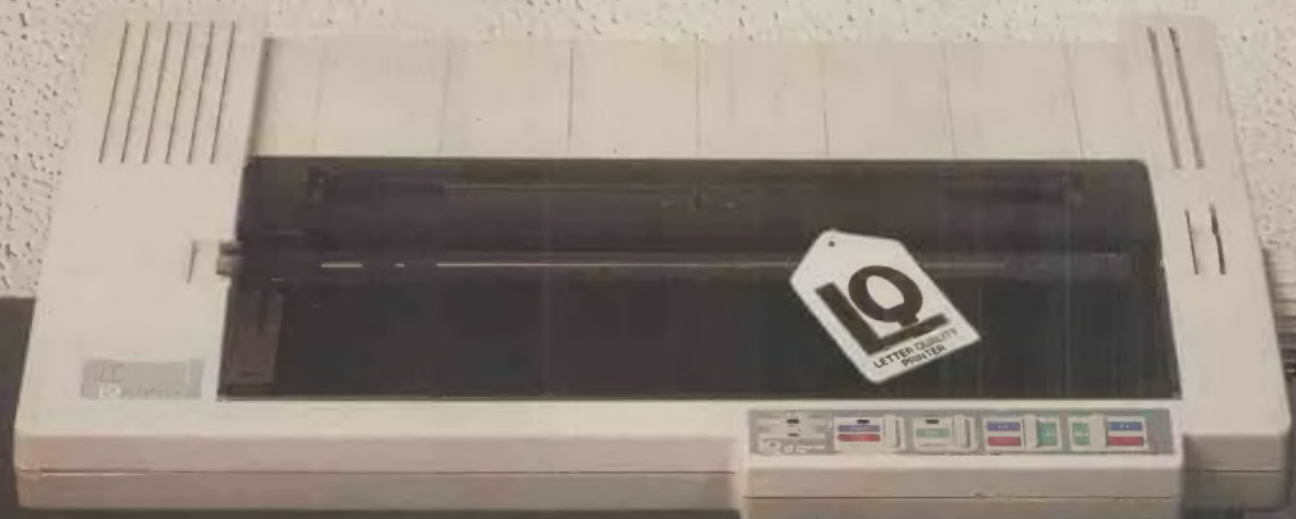
Speaking of travel-related programs, an IBM PC program called Selectrip Travel Consultant is a great gift item for your high-tech friends. The user tells the program their travel preferences in 10 different categories — such as preferred transportation, climate, activities, even food quality — and the program's expert system searches through its library of over 2500 trips to find those which match. It then shows the user a screenful of information about each trip which meets their specification, including approximate cost from a gateway city near their home. Over 130 countries are represented with all kinds of trips, from basic overnights to exotic week-long jaunts.

At \$49, it is a good bargain from Selectrip Inc on (916) 424 1277.

END

YOUR SECRETARY WILL LIKE THE SPEED AND QUALITY.

YOUR COMPANY SECRETARY WILL LIKE THE PRICE.



**160 C.P.S. 24 DOT PIN
£349 PLUS VAT.**

Amstrad's new LQ 3500 dot matrix printer has been designed to keep some very important people happy.

Your secretary, for example, will be particularly pleased that the LQ 3500 plugs straight into her industry standard computer and delivers up to 160 characters per second in draft.

And since it's a 24 pin dot matrix printer, there will be no complaints about the quality of the printing either. (The LQ or letter quality mode at up to 54 characters per second is particularly impressive)

What's more, the LQ 3500 has a

conveniently wide 10" carriage as well as offering as many as 200 different characters covering all the main European languages.

So even if it's double dutch it'll still print it immaculately.

It may not bother your secretary what all these advanced features cost, but others within the company may well be very surprised that it's only £349 plus VAT*

We'll allow your company secretary the pleasure of working out just how much cheaper than the competition that is.



Please send me further information on the LQ 3500.

NAME

COMPANY

ADDRESS

POSTCODE

TELEPHONE

THE AMSTRAD LQ 3500

Amstrad plc., P.O. Box 462, Brentwood, Essex CM14 4EF.
Telephone: (0277) 262326.

*Recommended retail price including VAT, £401.35. Price correct at 23/9/87. Prices may change without notice.

AVAILABLE THROUGH: ALLDERS · CAMBRIDGE COMPUTER STORES · ELTEC · FIRST SOFTWARE · LASKYS · JOHN LEWIS · MBS · METYCLEAN · MICRO PERIPHERALS · NORBAIN
NORTHAMBER · OFFICE INTERNATIONAL · P&P · SANDHURST · HUGH SYMONS · VISTEC · WILDINGS



VPC 10M/100M

With 256KB of memory, (expandable to 1MB), and a 360KB floppy disk drive, the VPC 10M is a great introduction to the Viglen System Turbo range. And should you need greater disk drive versatility or increased memory capacity, then the VPC 100M is ideal, featuring twin floppy disk drives and 1MB of RAM as standard. Both machines utilise a 4.77MHz Processor switchable to 8MHz in Turbo mode, and come complete with MS DOS 3.2 plus GWBASIC, and a Hercules-compatible mono graphics card.

All Viglen PCs are supplied with a 12 inch, IBM-compatible mono monitor. This amber version has a tilt and swivel base and a non-glare screen.

SPECIFICATION

VPC10M	NEC V20
Processor	4.77MHz switchable to 8MHz
Speed	256KB expandable to 1MB
Memory	1 x 360KB
Floppy Drives	1
Parallel Port	12" high-resolution mono
Monitor	Hercules-compatible mono graphics
Monitor Card	MS DOS 3.2
DOS	GWBASIC
Programming Language	As above but with the following additions:-
VPC 100M	1MB
Memory	2 x 360KB
Floppy Drives	2
Parallel Port/Serial Port	2
Clock/Games Port	Yes

VPC 10M INC. MONO MONITOR	£539
VPC 100M INC. MONO MONITOR	£679
MM-211 AMBER MONITOR	ONLY £86.15



VPC XT 120M

This truly powerful business computer allows you to make full use of the most sophisticated software. It offers 1024KB memory, a 20MB Winchester Disk and a 360KB formatted floppy disk drive. When you buy Viglen's PCs you can also be sure that there are no hidden costs. A Hercules-compatible mono graphics card, high resolution mono monitor, MS DOS 3.2, GWBASIC and bundled software are all included in the price.

What's more, Viglen offers a choice of mono monitors to suit your needs. This 'paper white' monitor is available at no extra cost. It is IBM-compatible, ergonomically-designed and allows you to switch between normal and reverse video display.

SPECIFICATION

VPC XT 120M	NEC V20
Processor	4.77MHz switchable to 8MHz
Speed	1024KB
Memory	1 x 360KB
Floppy Drives	20MB
Winchester Disk	1
Parallel Port	2
Serial Port	Yes
Clock	Yes
Games Port	12" high-resolution mono
Monitor	Hercules-compatible mono graphics
Monitor Card	MS DOS 3.2
DOS	GWBASIC
Programming Language	

VPC XT 120M INC. MONO MONITOR	£949
MM-211R PAPER WHITE MONITOR	ONLY £85.15

All monitors are available separately.

We'll lead you up

How many times, in the computer market, have businesses been lead up the wrong path? Computers that are soon relegated to the scrap heap because they are not upgradeable, flexible or versatile. With their new System Turbo range, Viglen have now introduced an answer to those problems. Four basic computers that are designed to be truly IBM compatible and all offering a full upgrade path.

Each comes with a "no-quibble" 24 months guarantee, a 2 year warranty with

built-in training support, and the best use of today's technology. The XT model is supplied with a bundled software package which includes, wordprocessor, spreadsheet, database and desktop diary. AT models are supplied with Microsoft Windows and a mouse. Viglen have been in this very competitive computer market since 1975 and have built-up a name with the educational market and the home user. Let us show you just how we can lead you up the right path to true computer compatibility, versatility and flexibility.



VPC AT 286iM

Utilising an Intel 80286 processor, switchable to 6, 8, 10 or 12MHz in Turbo mode, the VPC AT286iM is a powerful business system. It features 1024KB of memory, expandable to 4.5MB, a 1.2MB formatted floppy disk drive and a 20MB Winchester disk. A 40MB option is also available. An intelligent front panel keeps you informed of the speed of the main board, the running status of the ports, and hard disk access.

Should you require a colour monitor, the high-resolution, 14" EGA Monitor is available as an option. It is compatible with the IBM Enhanced Graphics Adaptor and allows greyscale or full colour to be selected via a flick of a switch.

SPECIFICATION

VPC AT 286iM	Intel 80286
Processor:	6MHz switchable to 8, 10, 12MHz
Speed:	1024KB expandable to 4.5MB
Memory:	1 x 1.2KB
Floppy Drives:	20MB
Winchester Disk:	1
Parallel Port:	2
Serial Port:	Yes
Clock:	12" high-resolution mono
Monitor:	Hercules-compatible mono graphics
Monitor Card:	MS DOS 3.2
DOS:	GWBasic
Programming Language:	MS Windows
Software:	Yes
Mouse:	

VPC AT 286iM INC. MONO MONITOR	£1499
VA-078 EGA CARD & COLOUR MONITOR	ONLY £449
VA-072 EGA COLOUR MONITOR	ONLY £359



VPC AT 386M

The ideal network system host, this versatile PC offers you all the advanced features of the AT 286 and much much more. Its Intel 80386 processor is switchable between 6 and 16MHz for really fast processing, and 2MB of memory is offered as standard. Both the AT286 and 386 machines are supplied with M/S windows and a mouse, together with a Hercules-compatible mono graphics card, a high resolution mono monitor, MS DOS 3.2, and GWBasic.

For applications which require high-quality colour graphics, Viglen supplies the Multiscan Monitor as an option. It is compatible with all IBM PC colour graphics boards and offers a colour resolution that is second to none. Whilst for word processing and database applications, a text switch provides a choice of 7 colours.

SPECIFICATION

VPC AT 386M	Intel 80386
Processor:	6MHz switchable to up to 16MHz
Speed:	2MB expandable to 8MB
Memory:	1 x 1.2MB
Floppy Drives:	1
Parallel Port:	2
Serial Port:	Yes
Clock:	12" high-resolution mono
Monitor:	Hercules-compatible mono graphics
Monitor Card:	MS DOS 3.2
DOS:	GWBasic
Programming Language:	MS Windows
Software:	Yes
Mouse:	

VPC AT 386M INC. MONO MONITOR	£2995
VA-073 MULTISCAN MONITOR	ONLY £499

the right path.

PERIPHERALS & UP-GRADES

MONOCHROME & COLOUR MONITORS

MONITOR CARDS

I/O CARDS

MEMORY UP-GRADES

MOUSE & JOYSTICK

MATHS CO-PROCESSOR CHIPS

STREAMERS

LOCAL AREA NETWORK KIT

ADVANCED NETWORK

2 YEAR WARRANTY

All computers are provided with a full 2 year parts and labour warranty.

GENEROUS EDUCATION & DEALER DISCOUNTS

Viglen

The Perfect Partners

Viglen Limited, Unit 7, Trummers Way
Hanwell, London W7 2QA Sales Hotline: 01 843 9903
Telex: 919 304 VIGLEN G Fax: 01 574 5126

Sole distributor for Ireland:
Shara Software, 34 Rossmore Green, Greenisland,
Carrickfergus, BT38 8TF Tel: 0232 867096

All prices exclude VAT and delivery.
All Trademarks are hereby acknowledged.

THE ONLY

WITH



T The new Citizen LSP-100 may bear more than a passing resemblance to the Epson LX800. But two crucial differences set these 9-pin dot matrix printers apart.

H Firstly, there is the LSP-100's unrivalled versatility. The built-in font produces over 400 different print styles, including reverse printing, proportional spacing, double height, double width, double strike and italic. While working in Epson mode it will accommodate an amazing 239 downloadable characters and 93 in IBM mode.

E Secondly, the LSP-100 is very competitively priced and unlike any other printer has a two year warranty.

I It is the only one to choose.

N For more information call Citizen, free of charge, on 0800 282692.

W **L S P - 1 0 0**

	LSP-100	LX 800
Speed		
NLQ mode	30 cps	25 cps
Draft Pica (10cpi)	150 cps	150 cps
Draft Elite (12cpi)	175 cps	180 cps
Buffer	4k	3k
Downloadable Characters	239 Epson mode 93 IBM mode	0
Built-in fonts	1	2 INIQ only!
Paper Feed		
Standard tractor feed	Yes	Yes
Bottom feed	Yes	No
Warranty	2 years	1 year
Price	£249	£275

CITIZEN
COMPUTER PRINTERS



Pots calling kettles black

When you read the bleats and complaints in the press from software houses, composers and programmers about piracy and breach of copyright, have you ever thought just who it is making all the fuss? No? Then let me tell you that, by and large, it is the biggest bunch of rip-off merchants, thieves and plagiarists this mean old world possesses.

If this were a fair world, and copyright actually meant something, there would be only one spreadsheet, perhaps two word processors, one version of Pacman, an accounts program or two, a database, and a drawing program. What we have in fact is hundreds — indeed thousands — of such programs. Are all these the product of original thought? In Shaw's words, not bloody likely!

We have windows and pull-down menus on every imaginable machine, not just Xerox or, at best, the Apple Macintosh. We have clones (an upmarket euphemism for a blatant copy) which actually boast of their ability to rip off everything IBM does.

In Silicon Valley and similar places around the world, some of the best brains spend their lives reverse-engineering other people's chips, while others tempt rival boffins with pots of gold to bring their secrets with them.

Meanwhile, who is said to be the villain of the piece? Why, none other than Joe Public, who has borrowed a copy of Donkey Kong for his son to use during the school holidays.

Apple had some difficulty in persuading a court that the 'look and feel' of a program should be protectable, but this

is exactly what sets the Mona Lisa apart from the Laughing Cavalier. Nobody gives a damn what paint the artists used, or the type of brush. Equally, it is of no significance that one author uses a pencil and another a word processor — what is protected is the finished visible result, not the dictionary and thesaurus and ironmongery used to achieve it.

OK, software houses; protect your programs as best you can, if you must. But don't dare adopt a holier-than-thou attitude unless you can prove that your programmer has never seen another program running.

David Kelsey, St Albans, Herts

In an ideal world, everyone would be able to customise their programs to work exactly the way they want. How many times have you found a program that does 90% of what you want? The remaining 10% is usually promised 'for the next release' but never appears.

The human factor

I have just read yet another adulatory review of some 'latest' 80386 computers in the October issue of PCW, but still can't help wondering whether it is just another case of IBM-sponsored hot air baffling brains.

Is it really worth spending a lot of money on machines with no operating system? And is this really the way to provide users with the computers that they need, as opposed to the machines that the industry would like to sell.

If you mainly process words, my old-fashioned Amstrad PCW8512 with a substantial RAM disk is surely more than adequate (the RAM disk being something that none of these so-called 'modern' computers see fit to provide, I would like to emphasise).

For those who use their machines primarily for spreadsheets, or other mathematical purposes, an 8087 or 80287 floating-point

co-processor must be far more cost-effective.

If high-resolution, multi-coloured graphics are your prime concern (as opposed to drawing pretty pictures to impress your boss), what is really needed must be a proper graphics co-processor such as the Texas Instruments TMS34010 or the Transputer, together with an adequate supply of dedicated video RAM.

But why is it that the computer industry is always so desperate to point out how high its screen resolution and number of colours are, but so reluctant to mention the staggering cost of the high-quality colour monitor required to display them, not to mention the printer/plotter needed for hard copy.

Regarding the fantastic increase in processor speed, let us not forget that a computer system can only work as fast as its slowest component; and even if your typing is only one quarter as bad as mine, you know who that is, don't you?

And, finally, printer manufacturers should stop raving about their almost unbelievable generosity in supplying a whopping great 3 whole K of buffer RAM when you can buy a 256kbit or 32k memory chip for under a fiver retail.

So, I still think it's a load of bull, or have I missed something?

John Smart, Hitchin, Herts

Yes. Greed.

'Twittering' reveals sour grapes

Thank you for confirming it. PCW staff don't have to buy the wares they twitter about, but I have to buy mine and I know I got value for money from my IBM Portable PC. Admittedly, I paid a bit less

than the going rate for it, but it runs all my word-processing, accounting and spreadsheet packages just fine. I use Basic and C — both fine.

What is Guy Kewney twittering about? Why is Owen Linderholm feeling miffed ('Newsprint', PCW September). Bill Gates puts his money where his mouth is. He makes a business judgement *not* to go for real-mode multi-tasking with MS-DOS. After all, like it or not, he is the world expert on MS-DOS and it is his money. If Owen is so convinced that the technique is profitable, he should stop twittering, put his own money on the line and market it. End of story.

But seriously, folks, I love your magazine — especially the advertisements. John McVey, Newquay, Cornwall

Microsoft obviously considers DESQView 386 a serious challenge, as it has done a detailed comparison of that product with its own Windows 386.

Unfair criticism

There supposedly has been much complaining about the print quality of the Amstrad PCW8256 dot-matrix machine; but there must have been other people — many reasonable persons like myself — who were perfectly happy with it and who, up until now, have had no need to voice an opposite point of view: namely, one of moderate satisfaction.

OK, the machine may be marginally less than wonderful, but it is also more than adequate for most purposes. In fact, many would say that the only major pain with the PCW8256 is to the eyeballs if the monitor screen is gazed at for any length of time. But, enter the PCW9512, another neat-looking machine.

Now, though, perhaps bowing under all that supposed discontent, Amstrad has dropped the dot-matrix

machine in favour of a monster tape-gorging, clanging daisywheel. No more the enjoyed and much-appreciated economy of an endless ribbon for as many draft copies of love letters as you wish; instead, a carbon tape — anyone needing to print out more than the odd spreadsheet will probably find the continual expense of replacement eventually costing them more than the initial 'economical' computer package! Fine for the dealers! It will certainly become an inhibition to experimentation or creativity, to say the least. (No, it's no good anyone saying: 'But look — there's also a place to plug in a dot matrix!')

Amstrad's PCW9512 is a good buy at £575, but if we then have to spend a further £200 on an extra printer, why didn't we buy a more expensive machine in the first place?
Alan Ruthvan, Isle of Wight

8512. The fault I sets provided by rinted on the Amseulword' and a car is superior to t ers, including Et

Windows catch

I was very disappointed with the depth of your reply to a letter from RMH Smith concerning Microsoft Windows (PCW, October).

Mr Smith stated that he required to run a word processor, communications package, database and spreadsheet together and switch between them. He was under the impression, however, that 'no decent' application was available under Windows, and you said nothing to put him right!

I am sure that you must be aware that dBase III Plus will run in a window, and that Windows comes with built-in comms and word-processing software. This only leaves two problems to be resolved: that of a suitable spreadsheet; and the amount of memory required to run all these applications at once.

Mr Smith probably already uses Lotus 1-2-3. It is possible to run this under windows, but not in a window. Other windows applications are still in memory when Lotus is running, but to access them you have to press the ALT-TAB key combination. Pressing these two keys together will

cause Lotus to be suspended and appear as an icon. Upon your return to Lotus, you will find yourself in the exact place you left it.

As both Lotus and Windows are memory grabbers, to run all the things Mr Smith wants at once will require some extended memory (about 1Mbyte at a guess).
Darren Austin (undergraduate), Lancashire Polytechnic, School of Computing

Microsoft Excel will certainly attract more users for Windows. And Palantis has released some Windows-based products which include a proper comms program.

One for the file

The software crisis has been with us now for 20 years, yet we hear little of it mentioned in the popular computing press. Ignorance of the ways of structured programming has been cited as the main reason for the current state of the software industry. Surely, then, it must be the responsibility of journals like PCW to set an example to all its readers in the standard of software that is printed in 'Program File'.

All too often you see 'Line numbers to be changed' at the beginning of a program when a CONSTANT declaration would result in a more readable and more easily modified program. One does not have to change one's style too much to accommodate a few 'tricks of the trade' that make programs more readable and more robust.

As a reader of PCW for several years, I have learned a great deal from reading other programs — it is surely one of the best ways to learn about a language. I fear that someone doing the same now would pick up far too many 'bad habits' and then, in future, have to correct them as I have had to do.

I would like PCW to impose a standard on all programs published within it (not just Program File) and that this be enforced by financial penalties (always the best way) to those programs that do not come up to scratch. Comments at the beginning of each program, such as 'Well-documented', 'Good use of data structures', and so on, would make the task of learning far easier and more beneficial.

Points I would like to be taken into consideration are:

- Use of mnemonic variable and procedure names.

The travelling salesman problem

PCW has received a number of replies to the request for a solution to the problem of a salesman visiting a number of towns while covering the least distance.

Linear programming of the type required to solve the 'travelling salesman' problem can be handled by the Simplex method devised by George B Danzig in 1947. However, this method is limited in the size of problem it can handle. Simplex methods operate in exponential time, whereas the Karmarkar Algorithm developed at AT&T's Bell Labs in 1984 works in polynomial time. This means it can deal with much larger problems such as those encountered in communications networks.
DAA Fagandini, London SE21

There is a reference to the travelling salesman problem in Nils Nilsson's 1971 book, *Problem Solving in Artificial Intelligence*. On page 27 he notes that 'several efficient solution methods have been devised that are feasible for 50 or so cities. Approximate

methods give good solutions (although not necessarily minimal mileage ones) for as many as 200 cities.'
J S Matheson, Edinburgh

The Soviet mathematician your correspondent is referring to is LG Khachian. In 1979 he solved a long-standing open problem in theoretical computer science. Although the average so-called linear programming problem can be solved efficiently, it wasn't known whether this is true generally. Khachian proved that this is the case.

In reality, the algorithm is of theoretical interest only because, on partial problems, it runs much more slowly than the Simplex algorithm. Even if Khachian's algorithm were efficient, it would not solve the travelling salesman problem which requires linear programming methods to produce not arbitrary, but integer, solutions.

Rob Gerth, Department of Mathematics and Computing Science, University of Technology, Eindhoven, Netherlands

- Use of procedures and functions (where possible).
- Machine-specific code highlighted, with explanation of its purpose.
- GOTOs to be used only where absolutely necessary. Jumping in/out of loops is definitely not to be permitted.
- Good error-handling; test the program to the limits, especially utility programs.
- Overall layout. If there is an error, how easy is it to find your way around the program?
- Sensible and efficient use of data structures.

This may only seem a small step, but the responsibility of the standard of software in this country lies as much with the computing press as it does with the education system.
Stephen Baker, Bristol

Owen Linderholm replies: I couldn't agree more with your sentiments. I would love to see Program File — and program listings in general — become more standardised. Two regular Program File contributors, Jack Weber and Mark Needham, spring to mind as producers of the sort of clear and structured programming I like to see.

Unfortunately, adopting the scheme you suggest has

practical drawbacks. Enforcing a particular style, however good, is bound to limit the flexibility of programming. It is also difficult to construct a sufficiently specific set of criteria across different languages and machines. Most importantly, enforcing a standard would be very difficult. As an example of the resistance to change of submissions to Program File, I still regularly receive programs addressed to people who have left PCW, some as long ago as 1981!

My present solution is to, as far as I can, enforce standards by rejecting programs that don't come up to scratch. Unfortunately, I don't always receive enough high-quality programs and am forced to use some that don't meet all the criteria, especially regarding documentation which must be clear, comprehensive and concise. Ideally, your list of suggestions would be included in the existing guidelines for submitting programs to Program File, but for the present I must rely on people learning good programming for themselves and can only help the process along by publishing the best of the programs I receive.

END

A MAJOR BRITISH BREAKTHROUGH IN PRICE AND QUALITY

TWO PRODUCTS WHICH COMBINE MINIMUM COSTS WITH MAXIMUM FEATURES

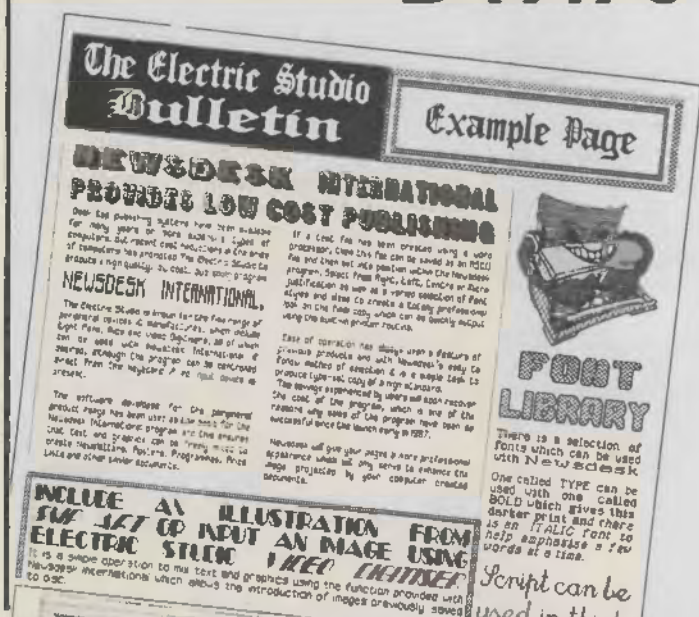
**NEWSDESK
INTERNATIONAL**

DESKTOP PUBLISHING SYSTEM

*The first truly low-cost, high quality
Desk Top Publishing package
for the PC Range*

- * Simple to use, with on-screen selection of options.
- * Full A4 page composition. * Screen displayed in true aspect ratio. * Keyboard, Mouse or Light Pen control.
- * Easy mixing of text and graphics. * 10 typefaces with dozens of font styles. * Virtually unlimited sizing of letters.
- * Integrated text editor * ASCII text files can be input from most word processors. * Font styles can be changed from within your word processor document.
- * Comprehensive graphics facilities for art creation.
- * Library of SNIP ART images included. * Import Images from the Electric Studio Video Digitiser. * Newspaper-style photographic shading for images. * Dot matrix and Laser Printer drivers included.

Unbeatable Value! **£49.95**



**VIDEO
DIGITISER**

FOR PHOTO QUALITY IMAGES

Capture an image from a Video Camera or Video Recorder on to your computer screen.

Up to 768 x 576 pixel resolution with 16 grey shades. Complete with Screen Master manipulative software to allow you to MOVE, COPY, ROTATE, MIRROR, CHANGE SIZES or ADD TEXT in 9 font styles in a variety of sizes.



The printer routine will give a 16 grey-scale output to Epson compatible printers or Postscript compatible Laser printers. In addition, a version of IMPRINT is provided to allow horizontal or vertical output on A4 paper.

Save images as GEM format files, or as BASICA files to allow them to be used with DTP programs such as

Recommended price **£149.95**

For fullest details of our superb range of products, please contact us direct on **0462 420222**



Please supply the following by return:

NEWSDESK INTERNATIONAL @ £49.95 ☐

VIDEO DIGITISER @ £149.95 ☐

SYSTEM REQUIREMENTS

PC and compatibles with a CGA or an EGA. Other graphics cards are under development - phone for details

Name.....

Address.....

Debit my Access/Visa card

No.....

THE ELECTRIC STUDIO PRODUCTS LTD.

Unit 8, The Cam Centre,
Wilbury Way,
Hitchin, Herts. SG4 0TW.

A BRITISH company selling BRITISH products



BANKS' STATEMENT

Hands off!

The right to claim your brilliant idea as 'intellectual property' does not, unfortunately, protect you from the programmer's nightmare — piracy. Martin Banks searches for honour among thieves.

Really, I am trying to be serious about this, but I am having great difficulty. I have been looking at the headline of a press release that made its way into the PCW office earlier this year.

The item in question reads as follows: 'LEVIS ... DISPOSABLE NAPPIES ... DUREX ... BRITISH LEYLAND EXHAUST PIPES ... DALLAS.' It then asks the immortal question: 'What do all these products have in common?'

But this press release was not circulated just to promote a trick question: the question is real enough, and there is, in fact, a real answer. It is that their intellectual property rights are jealously guarded. However, it takes some effort to think of a bit of bent tin (a British Leyland exhaust pipe) as 'intellectual property'. I reach total incredulity when it comes to *Dallas*.

There is, I suppose, just a little bit of me that wouldn't mind, just once in a while, if someone pinned some of the money *Dallas* makes onto me. I might feel the same about an exhaust pipe, had I designed it. And disposable nappies would be a sure-fire winner.

And that, of course, is what intellectual property is all about. If you have a good idea, then have you the right to exploit it? More to the point, has anyone else the right to copy it and set up in competition against you? The obvious answer is 'no', but with the human race being the generally unscrupulous bunch of self-interested thieves it is, we all know damned well that *someone* (not us, naturally) will copy, steal or otherwise 'appropriate' an idea or design, given half a chance.

The press release in question came from a company called Wessyng-Tech, which specialises in helping companies protect their intellectual property. WessyngTech is, it says, a real whiz at copyright, trademarks, trade secrets and patents, and I'm sure it's right. The company also

claims to be pretty nifty at an important area of modern business — making money out of intellectual property by negotiating licence agreements with other companies.

With the computer industry still relatively young, and the PC business a veritable babe-in-arms, it is understandable that many of the people in it will not necessarily understand the full intricacies of the law. This is especially so when the law, when related to computer-orientated intellectual property, is so often — demonstrably — an ass.

More often than not, however, it is the people involved in a company or project who are the asses. Wessyng-Tech quotes a story about one UK software house which did not realise that it should register copyright to its product in the US before taking on an agent to sell it there. Not only did the agent start selling the product itself, it also registered the copyright for itself. This meant that when the authors tried to sell their own product in the US market, they found themselves taken to court by their 'agent' for 'pirating' their own product. Needless to say, the agent won the court case. This is what we call 'doing business'.

Yes, I know that I am an idealist for thinking this, but it would be nice to think that we could go through a life based on honourable relationships with other individuals. But the human race, if faced with the straight choice between 'honour' and making a fast buck, will almost certainly choose the latter and won't care too much about who gets hurt.

It has to be said that, due to the vagaries of copyright law, such problems are likely to affect software much more than hardware. It is much easier to prove a rip-off when there is something physical to examine. So, if you have slaved away in your spare time creating your software masterwork, tread very carefully. There are a million sharks out there, waiting to bite your hand off.

One particular problem with software is actually proving that the program is yours once you have sweated all that blood. As the aforementioned software house found, registration is some measure of defence. That is why the new National Software Register (NSR) is worth a mention.

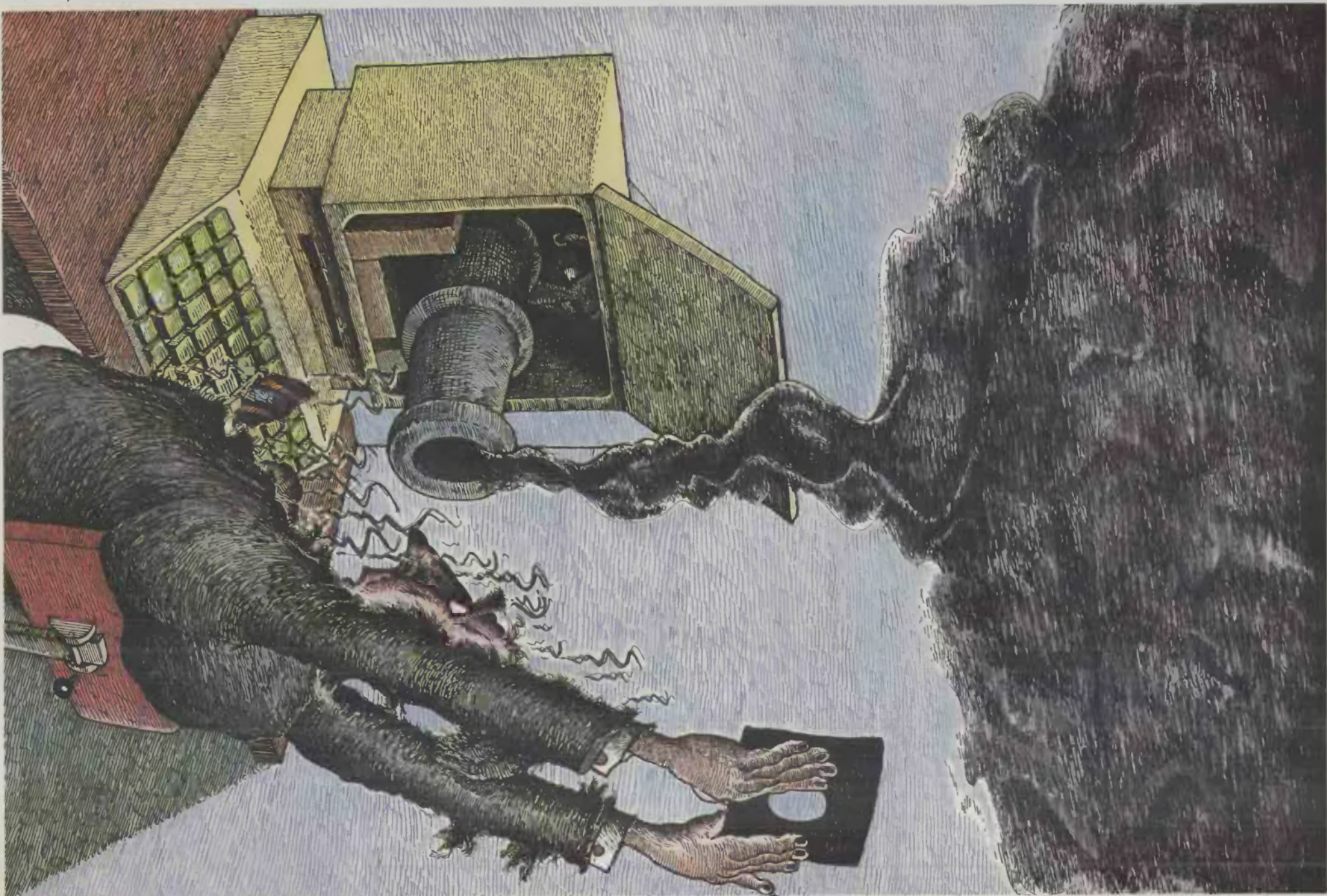
This organisation is offering a storage and registration service for new applications software that should give a fair amount of clout in any copyright case. There has to be some doubt, however, whether this breaks through the grey area of computer copyright law, where someone uses just sufficient new coding to try on the claim that their product is different or new. Certainly, there is a fee attached to the NSR service, though it could help to reduce some of the legal costs that might be faced in any copyright case.

There is an alternative solution but it is not particularly popular with the majority of people. For now, it only applies to those computer users with machines that run cassette tapes, but perhaps it could be extended.

This alternative is the imposition of a ten per cent levy on blank cassettes that is planned as part of a new Copyright and Intellectual Property Bill. This is primarily aimed at those who copy music and does have its dubious aspects. For example, while I can see a reason for a levy where I might copy an album for a friend, depriving the artist of due royalties, it is perhaps a bit hard where I copy it for playing in the car.

By and large, however, I am in favour of this approach and feel it could perhaps be applied to blank disks as well. If you don't like it then make certain you are not a pirate, even in the smallest sense, and stop anyone you know being one. Otherwise, we must assume that everyone is guilty and pay the fine accordingly.

Remember, next time it could be your new software product that is being ripped off. **END**



‘I LIKE THIS MACHINE... FOR THE MONEY IT’S UNBEATABLE’

Benchmark of the Dell 286¹² in Personal Computer World, July 1987.

This review, our first in the UK, concluded that the 286¹² ‘has a higher specification than just about any standard machine’...

- Intel 80286 running at 6 or 12 MHz
- High resolution Monochrome Monitor
- One megabyte of RAM on the system board
- 1.2 megabyte, 5.25" floppy disk drive
- Combined floppy and hard disk controller
- 192 watt power supply
- Eight expansion slots (five available)
- System Clock/Calendar/Configuration Data in CMOS RAM with battery back-up
- Hercules compatible monochrome graphics card
- 2 Serial and 2 Parallel Ports
- Enhanced 102 key keyboard
- The unique Smart VU™ system displaying computing speed and diagnostic checks

Plus a year's on-site maintenance, 12 month warranty and Technical Hotline included in the price.

286¹² with 40 Meg, 28 MS hard drive **£1,799**
with 70 Meg, 28 MS hard drive £2,099

EGA COLOUR SYSTEMS

Exactly the same specifications as the above system but incorporating:

- High Specification EGA card
- EGA high resolution monitor
- 2 Serial and 1 Parallel Port

286¹² with 40 Meg, 28 MS hard drive £2,199
with 70 Meg, 28 MS hard drive £2,499



286⁸ MONOCHROME SYSTEMS

Exactly the same specification as the 286¹² but with:

- Intel 80286 running at 6 or 8 MHz
- 286⁸ with 20 Meg, 65 MS hard drive **£1,299**
with 40 Meg, 40 MS hard drive £1,599

EGA COLOUR SYSTEMS

Exactly the same specifications as the above system but incorporating:

- High Specification EGA card
- EGA high resolution Monitor
- 2 Serial and 1 Parallel Port

286⁸ with 20 Meg, 65 MS hard drive £1,699
with 40 Meg, 40 MS hard drive £1,999



386¹⁶ MONOCHROME SYSTEMS

- Intel 80386 running at 16 MHz
- High resolution Monochrome Monitor
- One megabyte of Static RAM on the system board
- 1.2 megabyte, 5.25" floppy disk drive
- Combined floppy and hard disk controller*
- 192 watt power supply
- Eight expansion slots (five available)*
- System Clock/Calendar/Configuration Data in CMOS RAM with battery back-up
- Hercules compatible Monochrome Graphics card
- 2 Serial and 2 Parallel Ports
- Enhanced 102 key keyboard
- The unique Smart VU™ system displaying computing speed and diagnostic checks.

*The 150 Meg system has a separate ESDI hard disk controller and four available slots.

386¹⁶ with 40 Meg, 28 MS hard drive **£3,199**
with 70 Meg, 28 MS hard drive £3,499
with 150 Meg, 18 MS hard drive £4,199

EGA COLOUR SYSTEMS

Exactly the same specifications as the above system but incorporating:

- High Specification EGA card
- EGA high resolution Monitor
- 2 Serial and 1 Parallel Port

386¹⁶ with 40 Meg, 28 MS hard drive £3,599
with 70 Meg, 28 MS hard drive £3,899
with 150 Meg, 18 MS hard drive £4,599



SEE HOW IT PAYS YOU TO DEAL DIRECT WITH DELL

Since the UK launch of the Dell Computer Corporation in June this year, our fast and powerful compatibles have been creating quite a stir. People were surprised by our low prices for high quality machines which could earn reviews like those quoted opposite and below.

Astonishingly Low Prices

And when we announced that our prices even included a year's on-site maintenance and a free Technical Hotline Service, credibility was stretched still further.

The main reason we can offer low prices is that we sell our computers direct to you, the end user. There are no Dell appointed dealers, so you pay considerably less because you don't have to pay a dealer's profit margin.

The Fastest Computers In Their Class

Our parent company designs and builds each machine in Texas, employing some of the best technical brains in the business.

Consequently our machines aren't simply clones; they have original features you don't find on expensive machines. And Dell Computers are fast. Here's what the *Europa Report* 1987 has to say:

"The (Olivetti) M380/C rated 6.4 on our primes test: a reasonable result, although Compaq's Deskpro, with its own flashy RAM card, rated 7.15. IBM's PS/2 Model 80 comes in at 6.97, but the Dell 386¹⁶ blows them all away, scoring 8.25"

PC Business World puts it more succinctly:

"An 80386 pc, the fastest ever tested by PC Business World"

The 386¹⁶ high performance is achieved by the first industry use of pure static RAM and by its 32 bit proprietary memory architecture.

Besides this, all Dell Computers are compatible with programs that run on the IBM PC, XT and AT – and also run Microsoft's OS/2. Indeed, the 386¹⁶ features a user-switchable expansion bus which means it offers true compatibility with existing hardware and software standards without decreasing the power of the processor.

Major US Users Choose to Deal Direct

After just three years in the States we have more than 100,000 satisfied users, amongst them organisations of the stature of Rockwell International and NASA.

They have found that ordering a computer over the 'phone doesn't mean you are left on your own.

In fact, you get something that no dealer can give – a direct relationship with the designer and manufacturer of your machine.

That relationship works in the UK because we provide an unparalleled service to ensure that you are fully satisfied. From the start we actually guarantee your satisfaction.

30-day Money-Back Guarantee

If you are not entirely happy with your Dell Computer, you can return it within 30 days and we will refund your money in full. When you keep your machine, parts and labour are covered by a 12-month warranty.

12 Months' Free On-Site Service

In addition, your Dell comes with that full year's on-site maintenance contract included in its price. If your hardware needs service, a fully-trained engineer will be with you before the end of the next working day.

And should you have a software problem or any questions, you can call our free Technical Hotline Service. At the end of a 'phone will be an expert who has access to a full history of your machine.

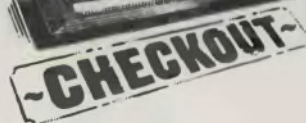
Contact Dell To Save Money Now

Your machine is delivered by courier within days of us receiving your order. It all takes just minutes to set up and if you need help, you can call our Technical Hotline.

Find out how you can save money with Dell today. Ring us on 0344 860456 or return the attached card. If you 'phone we'll give you a price for the configuration you need. 'Phone with a purchase order number and you could have exactly the machine you want in days.

Prices do not include VAT. IBM and Microsoft are registered trademarks of their respective operating companies.

 **DELL COMPUTER CORPORATION** *More computer, less money.*
Dell Computer Corporation, Cookham Road, Bracknell, Berkshire RG12 1RD. Tel: 0344 860456.



-CHECKOUT-

Atari CD-001

To all outward appearances part of a conventional hi-fi unit, the Atari CD-001 boasts excellent audio, video and digital facilities at a knock-down price of £399.

Nick Walker takes it for a spin.

By now almost all hi-fi enthusiasts must have discovered the compact disc. These small, shiny, rainbow-coloured plastic discs offer a quality of sound previously only available from a ludicrously expensive record deck. What the average hi-fi enthusiast might be unaware of is that there are up to 800Mbytes of random access data held on a single CD. Just to put this in perspective, 800Mbytes is the equivalent of 2000 thousand floppy disks, 250,000 sheets of A4 text or 500 full-length novels.

CD-ROM, as the technology is known, is the data storage form of audio compact disc technology and has been around for some two years now. While the price of an audio compact disc player has dropped from around £600 to £150, the CD-ROM has remained fairly static in price at around £1100. Considering that a CD-ROM is in some ways actually less complex than an audio CD player (no need to transform the digital information into analogue sound), this seems a little unfair. The obvious solution is to take an audio CD player and modify it to give a digital output — and this is exactly what Atari has done. The Atari CD-001 is a Shinon midi-sized audio CD player modified to give a digital output and costs only £399.

History

The earliest micros used 8in floppy disks as their mass storage medium and were capable of storing approximately 90k of data. As time passed, both floppy and hard disk technologies progressed, disks got smaller and capacities got much larger. It is now possible to store up to 7Mbytes

of data on one high-capacity floppy disk and 500Mbytes on a single, incredibly expensive, hard disk.

In order to store such large amounts of data, storage designers turned away from traditional magnetic storage towards optical media. At first glance, optical discs have a great deal going for them: they offer fantastically high capacity; they are rugged; and they cannot be accidentally erased. But they do have their problems, not least the difficulty involved in manufacturing an optical disc which can be written to many times.

Optical discs can store much more data in a given area than magnetic disks because optical discs use the narrowest form of read-head available — a laser beam. The surface of the disc can be either reflective or non-reflective; when laser light is shone onto the disc, the amount of light reflected is greater or smaller respectively. These two states allow binary 0 and 1 to be represented, and therefore make it possible to store digitised data.

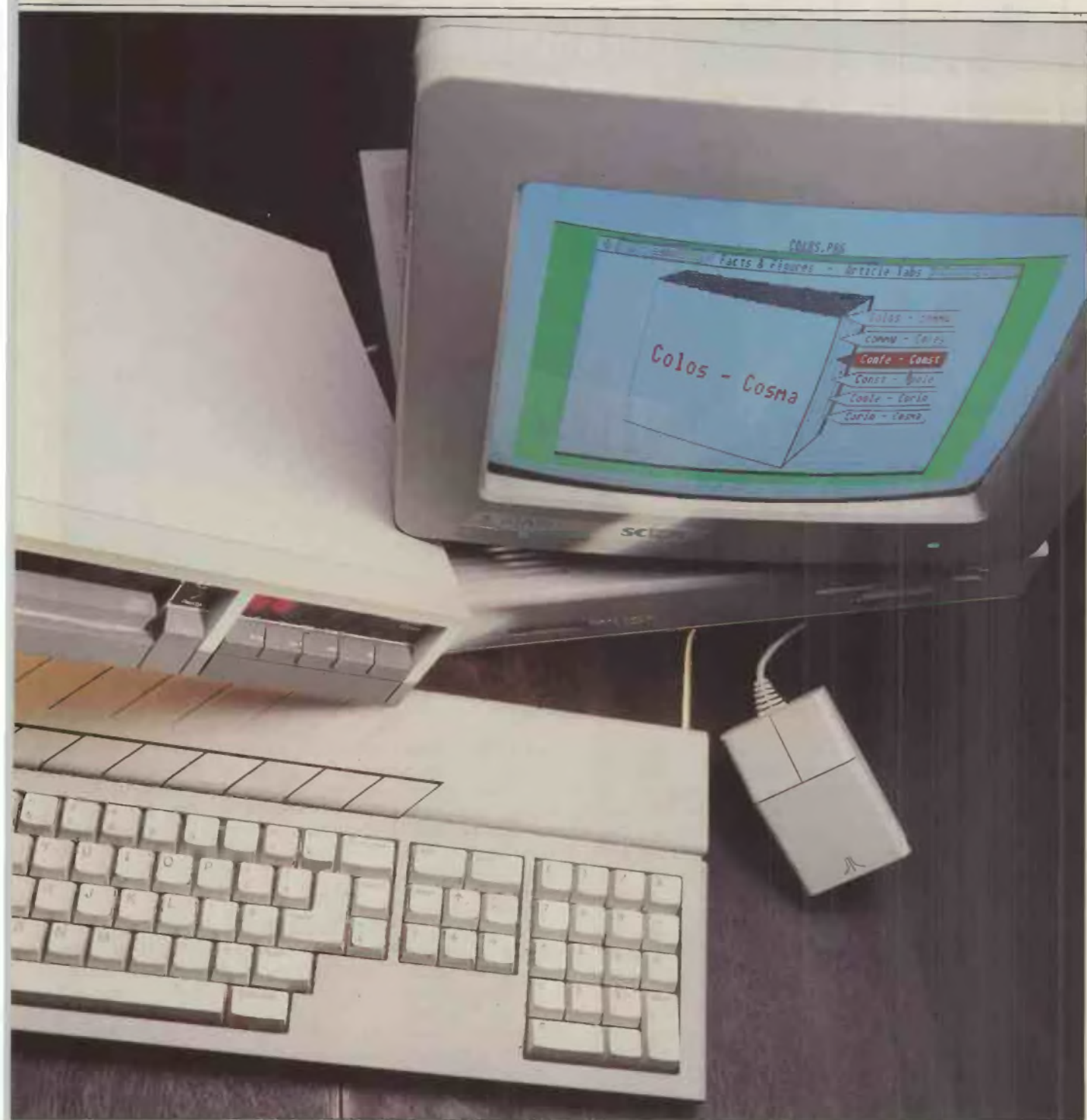
Much of the development of optical storage media and methods has been carried out over the years by Philips. It was also Philips which released the first commercial product based on optical disc technology — the video disc player. This held digitised television pictures on a large 12in disc. Although the video disc has been used in interactive training situations and some arcade games, it was not a raging success and the lesser-quality video tape recorder still reigns supreme.

Undaunted, Philips, with the aid of Sony, came up with the compact disc

(CD). This is based on the same principles as the video disc but is much smaller (12cms) and is designed specifically to store audio signals. An audio CD player runs the digital data through a very high-speed D to A converter to produce an analogue signal which is amplified and fed through to the speakers.

In terms of physical format, there isn't much difference between audio CDs and CD-ROMs. The music, after all, is held in binary format in exactly the same way as computer data. The main difference between audio and computer CDs is in the players. While the laser, servos, and so on, remain unchanged, computer CD-ROM drives have extensive error-correcting circuitry built-in, giving a





bit error rate of better than 1 in 10^{12} . The logic of this is that even the most dedicated hi-fi enthusiast won't notice a slightly off-tone 1/10,000 of a second, but a computer can't accept a single error.

At this point it is probably worth briefly mentioning WORM (Write Once Read Many) drives. WORM drives are optical disks that you can write to once and then read as many times as required. At the moment WORM drives are typically 10 times the price of the Atari CD-ROM and hold half as much data on a larger 12in disk (see the 'Memory Media' feature in September).

Atari CD-001

The Atari CD-ROM is a free-standing

unit that obviously started life as a straight audio midi hi-fi unit. If it wasn't for the fact that it is painted the usual Atari light grey, it would look great as part of a midi hi-fi stack. At the moment the CD-ROM is only designed to connect to an Atari ST, but Atari plans to produce PC expansion cards to allow PC users to use the CD-001.

For a CD-ROM that is also an audio player, the Atari CD-001 is remarkably devoid of flashing lights and buttons. The front panel houses two LEDs ('power' and 'busy'), a headphone socket, the open-close button and a tiny removable remote control unit. The remote control unit clips neatly into the player and consists of just four buttons — play, stop, next

track and previous track.

Inserting compact disks is done in the same way as on audio players: you press the open/close button and the drawer slides out awaiting a disk. The rear of the drive is even more bare than the front, consisting of two phono outputs and a single 19-way D-socket. The D-socket can be connected directly to the hard disk DMA port on the ST, so data transfer should be fast. The prototype model I reviewed also had an emergency reset switch but this won't feature on the final version. The retail version of the CD-001 will have a second DMA port to allow you to attach a hard disk or any other peripheral that uses DMA. The important thing to note about the DMA port is that it gives

CHECKOUT

two-way communications, so the ST can control the operation of the CD player. The digital output on certain audio CD players is of no use at all with CD-ROM as there is no way to control it. The only possible use for this output is with digital audio amplifiers and speakers.

I was given strict instructions by Atari not to open the unit up, but with only one screw holding down the lid who could resist? Although there were signs of an early prototype (lots of patch wires and cludges) the general impression was pretty favourable. The left-hand side of the case was dominated by the player mechanism and behind this was the power supply. To the right are two PCBs, one above the other. The lower board is the original audio board which survives the process of being turned into a CD-ROM practically unscathed. A tiny ribbon cable runs from this to the upper board which contains all the advanced error correction and interface circuitry. In total, there are around 14 chips on the lower board and 24 on the upper board. As the design is finalised, the chip count on the upper board should be considerably reduced, making it very cheap to manufacture.

The drawer mechanism, laser and servos are originally manufactured by Philips. For those interested in the technicalities of this hardware, it is a single laser beam mounted on a swivel so that it can scan the whole disc. Data is read in 16-bit blocks with 4-bits between each successive read, hence each datum is read four times (known as 16-bit, 4 times oversampling).

In theory, a single CD-ROM could contain 800Mbytes of data but this is reduced to 600Mbytes in the case of the Atari owing to formatting and organisational considerations. In general, a CD-ROM player has a similar seek time to an early floppy disk and a transfer rate somewhat faster than most hard disks. However, the seek time refers to searching through 600Mbytes of data rather than the usual 360k. The only official figure released by Atari is a transfer rate of 4.3Mbits per second. In practice, I found it took about two seconds to find and retrieve a single piece of information and three seconds to find every reference when using my *Grolier Encyclopaedia* CD.

As far as the Atari ST is concerned, the CD-ROM behaves just like a very high-capacity hard disk. The example disk I had was formatted in a special way to give very fast access but it still responded to the attempts I made to access as a hard disk. Within Atari in the US there is a CD that boots up just like a hard disk and



Looking at the Atari CD-001 from the rear: the player mechanism and power supply are visible to the right with the two PCBs to the left

contains a vast number of ordinary files.

The one feature that distinguishes a CD-ROM player from its audio counterpart is the increased error correction needed. A certain amount of misread information can be tolerated by an audio system because the player just repeats its last fragmentation of music; the fragment is so small that you never notice the error. A misread piece of information on a CD-ROM could cause the computer to crash. The error correction circuitry within the CD-001 is bought in by Atari from a company called KnowledgeSet. For those interested in a bit of history, the chairman and founder of KnowledgeSet is Gary Kildall, the man who founded Digital Research and CP/M.

Unfortunately, KnowledgeSet is very secretive about the error correction circuitry used, so all I can tell you is that it works. I've still to find an answer to why the same circuitry can't be used to give superlative hi-fi. So, if anyone has got the answer, please let me know. (Clue: I think it has something to do with the different bandwidths of CD-ROM and CD audio.)

Anyone who has picked up a flyer on the Atari CD-001 will have seen a claim that the unit is also capable of 60 minutes of video output. To put the record straight, there is no video output from the CD-001 and there won't be for at least another year. KnowledgeSet, in conjunction with RCA, is working on a system of very efficient data compression that will

allow 60 minutes of digitised video to be contained on a single CD. When this becomes available, KnowledgeSet plans to add it to all its boards, including the ones for Atari. This 60 minutes of video is in a different format from the recently announced CD-V from Philips, so you won't be able to play the new pop video CDs on the Atari player.

Software

The only example CD-ROM program I had was the *Grolier Encyclopaedia*. This is an American Encyclopaedia which comes as four weighty volumes. The software to drive it dates back to early 1985 when Atari first threatened to make a CD-ROM and is, therefore, a little crude in design. It should be considerably improved by the time it is released in the UK, however. The opening screen depicts a 26-volume bookshelf with each volume corresponding to a letter of the alphabet. Clicking on the spine of the book takes you through to a second screen showing an alphabetic breakdown of the volume (that is: GAA-GAM, GAN-GER, GER-GIS, for example). Further subdivision continues until you get to a level where all the entries are listed alphabetically; clicking on a single item then brings up the relevant entry.

What makes the *Grolier* software really useful is its intelligent search options. From the search screen it is possible to find all references to a certain word or collection of words. All the usual logical functions can be

A LOT MORE THAN JUST A CLONE!

LATEST GATE ARRAY TECHNOLOGY
SECURITY LOCK
UP TO 10MHz CPU SPEED
ONE YEAR WARRANTY
REPUTABLE MANUFACTURER

TURBO XT

- 4.7-10MHz CPU
- 640 KB RAM
- Sockets for Expansion RAM
- Multi I/O Card
Parallel & Serial Ports,
Game Port, Real Time
Clock, FDD Controller
- Legal Bios
- GW Basic + Manual
- MS DOS + Manual
- Mono/Color Graphics
Video Card
- 102 Keys enhanced
Keyboard
- 150 Watt PSU
- 1 x 360k Floppy

TURBO AT

- 6-10 MHz CPU
- 512 KB RAM Expandable
to 1Mb
- Parallel and Serial
Ports, Game Port
- FDD and HD Controller
- 32k Legal Bios
- GW Basic + Manual
- MS DOS + Manual
- Mono/Color Graphics
Video Adaptor
- 102 Keys Enhanced
Keyboard
- 200 Watt PSU
- 1 x 1.2Mb FDD

£549

+ VAT

£975

+ VAT

ALL OPTIONS AVAILABLE
incl. 20Mb Removable
Hard Disk Drive



DEALER ENQUIRIES
WELCOME
PLEASE PHONE 01-749 7421



LASER™ **TURBO XT**

MICRO COMPUTERS AIDED TECHNOLOGY LTD

THE OLD MILL,
MILLERS WAY,
SHEPHERDS BUSH ROAD
LONDON W6 7NA

PHONE: 749 6061 TELEX: 946765 MCAT G FAX: 749 1053

LASER IS A TRADE MARK OF VIDEOTECHNOLOGY INFO-TECH LTD

CHECKOUT



Inserting a compact disk is straightforward. Notice the removable remote control panel enabling the machine to be used as an ordinary CD player

applied (AND, OR and NOT) and it is also possible to specify the maximum distance between one word and another. For example, if you wanted to find all references to Sugar and South Africa, you would simply type in 'Sugar AND South Africa' and specify within, say, 50 words. After approximately three seconds, the software will return all the matching sections from the encyclopaedia.

The *Grolier Encyclopaedia* was also created by KnowledgeSet with the co-operation of Grolier. Using a suitable scanner the entire text of the *Encyclopaedia* was transferred to disk; then every single word in it was indexed. The entire text on a CD is then represented as a series of pointers to this index; not only does this result in a faster access time for searches, it also gives a data compress-

ion factor of around 25%.

KnowledgeSet has agreed with Microsoft and other CD-producing software houses to produce all disks using the same standard. In theory, this should mean that the CDs produced by most other manufacturers can be read by the Atari CD-001. The only problem is that most of the major manufacturers such as Microsoft are only interested in the IBM PC market, and the software used to access the CD will probably only be available in IBM PC format.

Also on the same floppy disk as the Grolier software is a simple program that allows you to control the playing order of an audio CD. At the moment this just allows you to select your favourite tracks and play them in any order you want. I can see no reason why this couldn't be extended to give the equivalent of Philips FTS

(Favourite Track Selection). As every audio CD has a unique index number, it would be possible for the computer to memorise the favourite tracks for all the CDs in a collection and just play these tracks whenever a CD is inserted.

Obviously, an encyclopaedia is just one of the thousand of possible uses for CD-ROMs. Already under production are dictionaries, thesauri, phone books, drug catalogues and a complete list of all names and addresses in the UK, to name but a few applications. Numerous software companies are also looking into distributing software on CD to overcome the number of disks needed and also for increased copy protection. The combination of CD-ROM, video and audio offers enormous potential of applications in such markets as training, design and, of course, games.

Prices and availability

The Atari CD-001 costs £399 inclusive of VAT. A few units will be available in December 1987 with full production commencing within the first two months of 1988. The *Grolier Encyclopaedia* will be available in the UK from Mirrorsoft. It should retail between £100-£150.

Conclusion

Since Jack Tramiel took over at Atari, the company's claim has been 'Power without the price'. Never has this been more true than with the Atari CD-001. A CD-ROM player for £399 is a bargain in itself, and combined with CD audio it is astoundingly good value for money.

The only question-mark hanging over the future of the CD-001 is the availability of software. Until lots of players have been sold, very few software companies are going to go to the enormous expense of producing software. Hopefully, potential purchasers will be satisfied with the little software there is at present and the ability to use the player for music as well. A number of large corporations have expressed an interest in the CD-001 for their own internal use and I expect this will help boost the unit's popularity.

In the long term, I see magnetic media being abolished in favour of battery-backed RAM disks of a similar capacity to hard disks today, and CD or some similar medium being used for software distribution and back-up. I personally can't wait to have 800Mbytes attached to my ST, but I never did get on with magnetic media.

The Atari as an audio CD player

The Atari CD-001 has the look and feel of a low-end midi hi-fi unit. However, the usual problem with low-end CD players, being unable to track a damaged disk, did not occur at any time during my test. Disk handling is rapid and sure, especially on the next track and previous track functions. Resistance to shock and microphony (vibration caused by low bass sounds) is excellent. To produce an analogue audio output, one very high-speed DAC is used shared between the two stereo channels — a set-up that is considered mundane by today's standards.

In musical terms the Atari turned out to be a truly excellent player in relation to its price, taking into account the extra feature of CD-ROM and CD video. Although arguably a little indistinctive, the Atari still sounds very much alive and detailed, especially on classical pieces. The presentation is slightly soft and spatially flat, but the musical integrity is much better than the brash sound of other low-cost players I have heard. Anyone who is buying a CD player for the first time, whether a hi-fi enthusiast or not, should find the Atari a pleasure to listen to. If you are considering using the unit mainly as an audio player with only occasional use of the other features, it would be worth your while listening to the latest Philips 470 range for comparison.

Atari is on (0753) 33344. Thanks to Covent Garden Hi-Fi for the use of its excellent demonstration facilities.

END

THE ENIGMA 386 OUTSTANDING TOWER POWER

The Enigma 386 is the most versatile, compact and powerful computer of its kind. Fitting neatly under the desk, the Enigma 386 can provide a complete solution to either your networking or high speed stand alone requirements.

Coming in hard disk options (20 MB – 150 MB), memory options (1 MB – 16 MB), graphics options (Hercules — VGA) and communication options (RS232 and IBM Terminal Emulation). Enigma prides itself on being able to deliver your specific complete solution.



ENIGMA

**YOUR EUROPEAN SOURCE OF
LIMITLESS TECHNOLOGY**

Call Enigma, or write for details and catalogue:

Enigma Technologies (UK) Ltd. Trend House, Dallow Road, Luton,
Bedfordshire LU1 1LY, England. Tel: (0582) 30514 Telex: 825387.

NAME: _____

COMPANY: _____

ADDRESS: _____

PHONE: _____



BENCHTEST

386 towers

If you concur with the view that computers are more office furniture than desk accessories, then systems like the IBM PS/2 Model 80 and the InterOrient CMC386 could be ideal. But do they offer equal — or better — facilities than compact desktop units? Peter Jackson finds out.



For PC manufacturers, building a machine in a floor-standing box rather than a desktop box means more than turning the disk drives sideways and making sure that the new machine won't topple over. Floor-standing tower systems remove the PC from a single user's desk, and make it seem much more reasonable and natural to use it as the heart of a multi-user or network system.

It is no surprise, therefore, that IBM and other manufacturers of high-performance PC systems should follow makers of multi-user tower systems like Altos and NCR, and offer high-end systems designed to stand next to the desk rather than sit on it with a monitor on top.

In particular, IBM's PS/2 Model 80 has set the tone in the 80386 market, and other manufacturers have followed suit in an attempt to convert their personal computers into machines that at least look like departmental computers. But is there anything special about an 80386-based tower apart from its shape? IBM's Model 80 and clone supplier InterOrient's new CMC386 may provide some clues.

IBM PS/2 Model 80

In many ways, the Model 80 is the 'real' PS/2 machine. It has the full 32-bit Micro Channel Architecture expansion bus with all the extension frills, big and fast hard disks with one-to-one interleaving, and one-wait state 32-bit RAM for extra performance. And, of course, it comes in a floor-standing tower configuration and nothing else, while the less powerful Model 60 comes in both tower and desktop configurations.

The Model 80 case, in standard PC pale grey, is a small and neat unit for machines of its type, and even has a fold-up handle on the top so that it can easily be shifted from place to place if required. However, it can in no way be regarded as portable, weighing around 40lbs. The front panel has small ventilation louvres at the bottom, a power switch at the top along with a tiny model identification label, and space for two 3½in floppy drives mounted horizontally.

Removing the front panel, which simply snaps off in IBM's new easy-maintenance style, reveals that there is space for just two floppies; the rest of the space behind the panel is slated for a second full-height hard-disk drive mounted vertically behind the blank area at the centre.

Removing the side panel, which involves unlocking a barrel lock at the top and undoing two coin-slot screws, reveals the internal hardware. A surprisingly large modular 225W power supply fills the top of

the case, and the other dominant feature is the big full-height IBM-built hard-disk drive, storing 40Mbytes, mounted vertically at the rear. The second hard disk, if fitted, would be mounted in a matching position at the front. Right at the bottom of the case is the speaker, behind the ventilation slots, which also forms the mounting for the system's battery. In the PS/2 range this battery not only maintains the real-time clock and calendar, but also maintains the configuration information required to use the DIP-switch-less Micro Channel expansion boards.

The motherboard itself mounts vertically on the side panel, and as usual with IBM boards is bigger than the clone-makers' despite the much-heralded use of custom chip technology. The 16MHz 80386 is at the bottom, next to the socket for an 80387 maths co-processor, while the other custom chips — including the VGA graphics chip — are largely hidden beneath the hard-disk drive.

The obviously new Micro Channel slots are visible below the hard disk, and can take up to eight expansion boards that extend horizontally across the case. However, since the Model 80 does not come without a hard disk, one slot is always taken up by the official IBM hard-disk controller board. The Micro Channel slots in the Model 80 cover the entire spectrum of the new standard; there are four 16-bit slots, one 16-bit slot with the video extension socket, and three 32-bit slots with the so-called 'matched-memory' extension pins.

The 16-bit and video expansion slots are fairly well understood now, thanks to coverage of earlier Model 50 and Model 60 machines. The 16-bit Micro Channel slots have all the advantages of board self-configuration without DIP-switch setting, the ability for several boards to share the same interrupt lines while avoiding collisions, and multiple DMA channels for fast data transfer, as well as the future ability to plug multiple processors into the slots and share system resources fairly between them. And the video extension feeds the VGA signals from the built-in graphics chip to a graphics expansion board, meaning that VGA, EGA or even CGA pictures could, for example, be superimposed on a higher-resolution display created by a new graphics board. IBM's own 8514/A graphics board, with a 1024x768 graphics resolution, uses this extension socket to provide VGA graphics on the same screen.

But the 32-bit Micro Channel bus has only just emerged, only on the Model 80, and deserves some extra consideration. The obvious change from the 16-bit versions is that another 16 data lines and 16 addressing lines have been added to handle

32-bit data transfers and 32-bit addressing. Other extra pins control 32-bit slave data transfers that are done byte by byte from other devices, and to check whether an additional 32-bit slave processor is now taking charge of the bus or whether the central processor remains in charge.

More interesting, however, is the matched-memory extension, which makes the 32-bit channels stick out beyond the nearby 16-bit slots in both directions: one way for the address, data and other new pins, and the other way for the memory control pins. What happens with the matched-memory extension is that the central 80386 processor is allowed to request a faster memory cycle from the bus, giving it the equivalent of zero-wait-state access to any memory on a 32-bit Micro Channel card. This gets round the current problems involved in using an 80386 add-on board in an AT and trying to access RAM on expansion boards, a process which is actually slower than it is with the 80286. Given the greater speed of the bus, the 80386 using matched memory can access 32-bit Micro Channel RAM as quickly as it can access system-board RAM, making RAM expansion much simpler without degrading CPU performance.

The problem with this is that the central 80386 is the only processor that can use matched-memory access, even if there are other 32-bit processors plugged into 32-bit Micro Channel slots. This means that any other processor must use 'normal' memory cycles to access bus memory, which takes at least 250ns compared with 180ns for a matched-memory cycle.

It is obvious from this that the 32-bit slots are intended for RAM expansion, for use by the central 80386 using matched-memory cycles rather than for secondary 32-bit processors. Indeed, the Micro Channel Architecture, although it is designed to support multiple processors on the bus at any one time, does not have the bandwidth at present to support two 32-bit processors running at full speed. This limitation can be overcome by using RAM cacheing, but for the near future it is likely that add-on processors for the Micro Channel will be 16-bit chips rather than extra 80386s. More, according to Definion, which makes a 68020 board for PCs, the smaller form factor of the Micro Channel boards makes it difficult — if not impossible — to cram in the circuitry required for a 32-bit add-on processor. This is one problem that only time and chip technology can sort out.

Apart from the custom chips, which integrate many of the usual PC

BENCHTEST

functions into theoretically non-clonable form as well as providing the VGA graphics and controlling the Micro Channel, the oddest innovation on the Model 80 motherboard is the way in which the system RAM is implemented. Obviously, this is 32-bit RAM, which does not waste the time of the 80386, but it is supplied on small daughterboards which fit into two non-standard 96-pin expansion sockets on the motherboard. On the review system there was just one board fitted, holding 1Mbyte, which means that at present the system board RAM limit is 2Mbytes. However, using matched-memory RAM boards in the Micro Channel, and assuming 8Mbytes per board, could take this up to 26Mbytes with minimal performance degradation.

The RAM boards themselves are around 5ins×4ins and hold 18 chips, each encapsulated in a metal case that makes them look like nothing so much as sugar lumps. A quick calculation shows that each chip must hold 512kbits rather than the more common 1Mbit, but then, these are IBM-made and IBM has always been a law unto itself in the chip market.

The hard and floppy-disk controller is another IBM innovation, although on the review system it looked more like a 'breadboard' (design stage) layout than a final product. It is impossible to say what it does, apart from handle one or two 1.44Mbyte 3½in floppy drives and one or two hard-disk drives with capacities up to 230Mbytes. There are three custom chips on the board, one shielded in

aluminium and labelled, ominously, 'IBM 14'; while the other is sealed in resin with a plate on top that is there, presumably, to prevent prospective cloners X-raying it. Apart from that the board is almost bare except for the usual connection of glue chips, now surface-mounted rather than soldered with their legs through holes in the board.

Removal of the disk controller indicated that getting Micro Channel boards in and out of their slots will be much more of a performance than it is with the PC or AT; not only are the bus connectors smaller, with much less space between connectors, but the board design itself seems more flimsy. Rather than the solid metal backing plate of PC boards, the Micro Channel boards have a slender aluminium plate that bends like tinfoil. The provision of a blue, plastic tab at the other end, designed for users to grab when removing a board, is not much compensation.

Obviously, given the built-in graphics, built-in mouse port, built-in serial and parallel ports, and built-in hard disk and controller, there was nothing more to be fitted in the expansion slots before the machine could be powered-up and used.

After plugging the keyboard into the upper of the two small DIN sockets on the back, and plugging the 8513 colour monitor supplied into the video socket, turning on the power switch sent the machine into its now-famous power-on-self-test and programmable-option-select (POS)

routine. The POS system is the mechanism that stops DIP-switch-setting on Micro Channel boards, and involves loading a definition file — a .ADF file — from the board's software disk and telling the system, using the software provided, which .ADF file refers to the new board. The details from this file are then stored in non-volatile RAM, which is referred to whenever the machine is powered-on.

If the board is not present, or the software in the CMOS RAM does not match the board that is present, then a descriptive error message is displayed and the machine fails to start.

System software

The operating system supplied with the Model 80 was PC-DOS 3.3, the IBM-labelled version of MS-DOS 3.3. However, there seemed to be some PS/2-specific parts missing: there was no IBMCACHE.SYS, the hard-disk RAM-cache utility, for example, and no transfer software to get 5¼in programs and data onto the machine's 1.44Mbyte 3½in drives. More, there was no apparent way of using the extra RAM on the motherboard, above the 640k MS-DOS limit but below the limit of the 1Mbyte fitted as standard.

The standard MS-DOS RAM disk utility, VDISK.SYS, could be installed easily in the CONFIG.SYS file on the root directory. But, it took RAM for the RAMdisk from the lowest 640k, rather than the extended RAM area.

For the most part, MS-DOS 3.3 is still MS-DOS, with all that is entailed.



Inside the IBM PS/2 Model 80: the Micro Channel slots are visible below the hard disk and can take up to eight extension boards



Surprisingly, Inter-Orient's CMC386 consists largely of empty space, with the computer itself being buried at the bottom of the tower

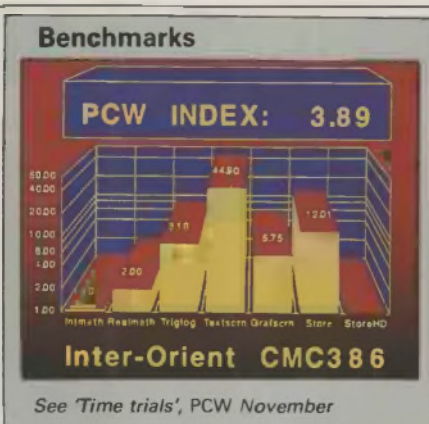
But it is worth going a little further into one of the claimed advantages of version 3.3 — the ability to handle hard-disk partitions larger than 32Mbytes. It is important to note, despite comments to the contrary elsewhere, that this does not allow users to have a single hard-disk volume extending for a couple of hundred megabytes with all the files accessible under the drive C: label.

What in fact happens is that a big hard disk under MS-DOS 3.3 must be divided into two partitions. One is the primary MS-DOS partition, up to 32Mbytes in size, and this is the only bootable partition on the disk. The rest of the disk, however big it is, makes up another single partition — but this one is divided into logical disk volumes, each one up to 32Mbytes in size, accessed under different disk-drive letters. In practice, given the limited number of disk drive letters provided by MS-DOS — 26 in fact, from A to Z — and assuming that drives A:, B: and C: are taken by the floppies and the primary boot partition of the hard disk, the maximum hard-disk capacity of MS-DOS 3.3 is $(23 \times 24) + 32$ Mbytes, or 584Mbytes. Just enough for a CD-ROM drive.

It has to be said that the Model 80 is a joy to use, largely thanks to the vastly improved VGA text display, the feel of the standard Enhanced keyboard if not its silly layout, the relative quietness of the fan and the hard-disk drive compared with the rattletrap AT, and the overall speed of response. The ESDI-interfaced hard-disk drive, with a one-to-one interleave factor, gives an average access time under 20ms, while the 16MHz 80386 with one-wait-state 32-bit RAM can easily keep up with it.

However, for prospective buyers, there is more to be taken into consideration than the theoretical performance. On the review machine there was no external 5¼in floppy drive, no transfer cable to hook up to a PC, and no applications on 3½in floppies. It was impossible to copy 5¼in software to the Model 80 over a standard communications link since there was no communications program available in 3½in format, and impossible to follow the usual course of plugging in a loaded-up 20Mbyte hard disk on a card since the Micro Channel slots would not accept it.

It took this to drive home the degree of incompatibility that IBM has introduced with the PS/2. Any buyer of a Model 50, Model 60 or Model 80 really must — despite the moves of some software suppliers like Microsoft and Ashton-Tate to include both disk formats in new releases — invest in extra hardware and software to transfer their existing data. Otherwise they will be, as we were during the limited review period, surrounded by software that was sup-



posed to run on the machine, with no way of finding out whether it would. Even software that supports the VGA graphics standard, like Autodesk's AutoCAD version 2.6, could not be tried.

On the positive side, though, the VGA monitor was excellent, with a crisp paper-white character set in 'Text' mode (including a dot in the middle of zeros to distinguish them from 'O's, making them look like Greek thetas), and some remarkable graphic effects provided by some of the VGA-compatible demonstration software on the system's Reference floppy disk. The Benchmark figures above indicate the performance to be expected, the hard disk performance is excellent, and one would expect it to be a speed demon in running applications, with (of course) little worry about compatibility. We will find that out for sure when the Model 80 is available for a longer review period.

InterOrient CMC386

The CMC386 is bigger than the PS/2 Model 80, both in height and width, which is partially explained by the need to fit 5¼in hard and floppy disk drives horizontally in the case. Externally, the case is sheet steel over an aluminium skeleton, and broadens at the base into a skirt-like support to prevent toppling.

The front panel has a set of ventilation grilles at the bottom, the power switch, barrel lock, and speed-switching and reset buttons in the centre, and space for up to six half-height 5¼in storage devices at the top. On the review machine, four of these slots were filled by a full-height hard-disk drive, a tape streamer, and a 1.2Mbyte floppy drive. The two slots at the top were vacant, but could obviously accept a 360k 5¼in or a 3½in floppy drive if required.

But the first surprise with this system is what is revealed when the case is removed. Taking out six Phillips screws and sliding the outer case off, the internal skeleton shows that it is not technology that determines the tower format. The machine is largely empty space.

The top half is taken up with a

220W Seasonic power supply, with power connectors for the system motherboard and for up to four storage devices, and by the support frame for those devices. The bottom half holds the computer itself, which is tiny. A motherboard no larger than 12ins×8ins fixes vertically to one inside face of the skeleton frame, with expansion boards extending horizontally across the width of the case. However, it is worth emphasising that the expansion boards only hold the usual AT options — display adaptor, disk controller, and serial and parallel ports — rather than vital equipment for the 80386 itself.

The Taiwanese-built motherboard demonstrates what can be done with very large-scale integration and custom chip technology. The 80386 itself is in one corner of the board, surrounded by eight custom circuits designed by Chips and Technologies in the US and built in Japan. These chips provide all the 'glue logic' and board housekeeping functions normally performed by large numbers of standard chips, and make it possible to create an AT or 80386-based AT clone with the minimum number of chips, the minimum board area, and the minimum construction cost. Chips and Technologies, like competitor Zymos, has moved on from offering AT chip sets (just add an 80286) to 80386 support sets for the new generation of PCs.

The main system memory, such an important part of any 80386 system, is mounted next to the processor and chip-set area and is built up from single-in-line memory modules (SIMMs). Each SIMM holds nine surface-mounted RAM chips on a small vertical circuit board, eight for use and one for parity checking, and the motherboard can accept up to eight such SIMMs. The review machine came with eight SIMMs using 256kbit chips, giving 2Mbytes of RAM, although manufacturer CMC claims to have SIMMs using 1Mbit chips that would allow RAM expansion to 8Mbytes on the motherboard.

Elsewhere on the board, things look a little sparse. There is no real-time clock, for example, and there is only a socket for the 8MHz 80287 maths co-processor and not for the more advanced 16MHz 80387. However, there are plenty of expansion slots.

So far, so almost conventional. But looking closely at the board revealed that buyers of the CMC386 should be careful about what software they try to run. Written in small print across the face of the 80386 is the legend '16-bit S/W only', which means that the chip failed Intel's 32-bit validation tests and is only sold as a 16-bit processor. So, in practice, 32-bit software written for the 80386 will not run reliably, and might not run at all, on the processor in the CMC386.

BENCHTEST

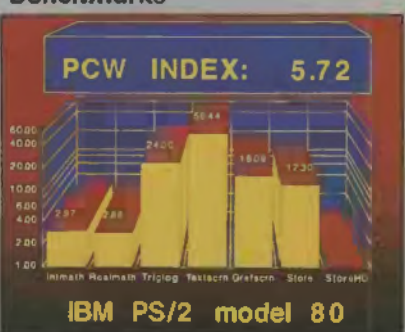
For any buyer of 80386 systems, the only solution is to check with the supplier that the processor is certified 32-bit, or to look at the chip.

InterOrient has assured me, however, that all further models will be equipped with the full 32-bit 386.

However, most users of the CMC386 as a single-user engine for standard PC applications will not have to worry about it. The machine is designed as a fast AT-compatible, and the operating system supplied with the review box was MS-DOS 3.21, which does not even require full 16-bit operation from an 80286.

It is obvious from the back panel of the case, though, that the machine would be well-suited to multi-user operation. Besides the usual eight slots designed to give access to the connectors on expansion boards, there are an additional eight blanking plates higher up the tower. And although there is nothing behind the plates, it is obvious from their size — five are standard DB25 size, while the other three are standard DB9 size, both for RS232 communications — that communications boards could be plugged in and their sockets brought out to these slots for the connection of dumb terminals. In such a configuration, running Unix

Benchmarks



See 'Time trials', PCW November

System V/386 or Xenix 386, there could be problems thanks to the processor defect.

The drives supplied were a standard NEC 1.2Mbyte floppy, a Seagate ST4038 Winchester holding 40Mbytes, and an Irwin model 125 tape streamer; again, nothing exceptional. The disk controller board, in an AT slot, was a standard Western Digital product surprisingly built in Ireland, while the graphics board supplied was an ADI EGA-compatible with 128k video RAM and an Award EGA BIOS, with an extended Hercules-compatible mode above the normal 640x350 EGA limit.

System software

The system software for the CMC386 is MS-DOS 3.2, although extensions are provided to add speed to the system: for example, a shadow RAM utility is offered to copy the ROM BIOS and the EGA BIOS into 32-bit RAM.

The configuration of the chip set is stored in CMOS RAM, backed up with a battery. However, users must be careful in removing the system case, since the batteries are connected to the outer case and it's easy to pull out the connecting wire and lose the configuration.

Otherwise, MS-DOS 3.2 is MS-DOS 3.2, and does not require more elucidation.

In its boot configuration, the machine has 640k of base RAM and 1024k of extended RAM — not expanded RAM as used by Lotus 1-2-3 and Ashton-Tate's Framework, but extended as used by Xenix. Testing Lotus 1-2-3 and checking the configuration showed that no expanded memory was found by the program.

Lotus ran fine, though, as did every other piece of software tried, thanks to the three levels of compatibility BIOS; the award HEGA BIOS on the EGA card, the Phoenix 80386

Introc

STAR LAUNCHES LASER PRINTER

Star Micronics, one of the leading manufacturers of Computer Printers, is to launch their Laser Printer. Informed sources in the City say that Star's Laser Printer has grown rapidly from 1% and Industry Analysts predict the introduction of this Laser Printer will contribute to the growth of the market.

ROM BIOS on the system board, and Chips and Technologies' own set-up and compatibility software for its chip set.

Performance was as expected, with standard Benchtest software such as the MIPS.COM package showing the system at around 2.5 times the speed of an 8MHz AT and just 10-15% faster than a Compaq DeskPro 386, with the shadow RAM options selected. A front-panel button allows the speed to be stepped down to run those few speed-sensitive packages that fail on an 80386, and a SPEED software package and Ctrl-Alt key combinations are provided to do the same job. In fact, the speed of the AT bus can also be changed if required to suit speed-sensitive expansion boards.

The system felt fast and flexible to use, and there are no complaints about the performance or compatibility.

Conclusion

At present there is no real advantage, apart from desk space, to go for an 80386 tower rather than a desktop like the Compaq DeskPro 386 or the other members of the current crop of 32-bit PCs. This is particularly true of the CMC386, where the size of the system board is so small that it could form the basis of a compact desktop unit.

Technical specifications

InterOrient CMC386

Processor:	Intel 80386, 16MHz
Co-processor:	Optional Intel 80287
RAM:	2Mbytes or 8Mbytes on motherboard
Mass storage:	One 1.2Mbyte 5¼in floppy drive, 40Mbyte hard disk
Storage options:	360k floppy drive, Irwin 40Mbyte tape streamer
Keyboard:	102 keys, Enhanced layout
Display:	Any IBM-compatible display adaptor and monitor
Standard interfaces:	RS232 serial port, Centronics parallel port
Expansion:	Four 8-bit, four 16-bit PC slots; two 8-bit and three 16-bit free in minimum configuration
Operating system:	MS-DOS 3.21

IBM PS/2 Model 80

Processor:	Intel 80386, 16MHz
Co-processor:	Optional Intel 80387
RAM:	1Mbyte, expandable to 2Mbytes on system board
Mass storage:	One 1.44Mbyte 3½in floppy drive, one 40Mbyte hard disk
Storage options:	Second 1.44Mbyte drive, second hard disk
Keyboard:	102 keys
Display:	VGA, 640×480 in 16 colours, 320×200 in 256 colours, analogue monochrome or colour monitor
Standard interfaces:	Mouse port, RS232 serial, Centronics parallel
Expansion:	Four 16-bit Micro Channel, one 16-bit with video expansion, three 32-bit with matched-memory extension. One 16-bit slot used in minimum configuration
Operating system:	PC-DOS 3.3

However, if both machines fulfil their promises, there will be more logic to it. The CMC386 already has the slots for dumb terminals to be hung off the back, while support for multi-user operation is sure to come from IBM itself under the AIX version

of Unix, and from third parties offering multi-port communications boards. And, when that support arrives, towers could form the centre of powerful departmental systems.

IBM is on (01) 928 1777.

InterOrient is on (01) 441 9866.

END

Introducing the Star LaserPrinter 8

Announcing the latest laser development from Star Micronics. The Star LaserPrinter 8.

There's no need to hold back any longer as our laser offers immediate compatibility with virtually all systems, through the inclusion of HP, IBM, Epson and Diablo emulations, as well as parallel and serial interfaces as standard.

Using laser beam technology to give excellent quality output at a very speedy eight pages per minute, with double the normal memory at 1 Megabyte as standard, expandable to 2 Megabytes, the Star LaserPrinter 8 offers optimum performance and value for a price of £1995* including 12 months on site maintenance.



An excellent choice of typestyles is included with eight fonts resident in the machine and the ability to print both portrait and landscape on the same page. If you need an even wider choice of typestyles, there are plug-in font cartridges available and you can also download your favourite fonts into the generous memory.

The front control panel – in the tradition of Star's popular range of dot matrix printers – is really easy to use, giving you total control at the touch of a button. And simplest of all is the completely sealed slot-in toner unit so there is no mess to worry about.

So if you're looking at lasers, you can now look at Star's.

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.

THE
star
PRINTERS FOR BUSINESS

I would like to take a closer look at Star's. Please send me details on the Star LaserPrinter 8.

Name

Company

Address

Post code Telephone

Or just call Belinda on 01-840 1829.

Trade marks where used acknowledged.
*Price excl. VAT.



Tektite graphics board

The Tektite TT786 board is among the first of a new breed of graphics cards for the IBM PC which offers the drawing power of a professional CAD/CAM workstation for the price of a PC expansion card.
Dick Pountain put it through its paces.

The Tektite TT786 graphics board gets its power from a single chip VLSI graphics engine, the Intel 82786, so before I discuss this innovative board in detail I'll describe a little about the workings of this chip.

Background

As anyone who has done any graphics programming will have discovered, drawing complicated pictures on bit-mapped displays can consume a lot of processor time, and the continual demand for more colours and more resolution dramatically increases this hunger. For example, doubling screen resolution along both horizontal and vertical axes requires four times the amount of buffer memory, and four times the amount of data movement; we are faced with a square law here. The introduction of windowing user interfaces and soft fonts has only emphasised the problem. When every character put onto the display is a bit-mapped object, then dragging, re-drawing and scrolling windows becomes hard work even for such a powerful CPU as the 68000, as any Macintosh, Amiga or Atari ST owner can testify.

The future will make even these demands seem puny. The resolution of today's laser printers is greater (equivalent to about 2500x2500 pixels) than that of any affordable VDU screen so WYSIWYG is only approximate; future typesetting workstations will require even higher resolutions to accurately depict typeset quality text. Alternative strategies such as 'anti-aliasing' a lower resolu-



tion display using shades of grey can be employed, but this merely shifts the computational burden from one area to another rather than eliminating it.

Traditional CAD/CAM applications tend to be based on vector drawing techniques, the typical subject matter being engineering drawings made up solely of lines. Fast 3D vector graphics depends as much upon floating point as drawing speed, since huge numbers of trigonometric calculations need to be performed to transform the picture for different viewpoints. Nevertheless, fast line drawing is still important if the user is to be able to interactively pan and scroll through complex drawings where many thousands of lines must be redrawn at every step.

There are two ways to cope with this endless demand for graphical processing power. One is to use ever more powerful CPUs to keep up with the demand. The Immos Transputer, the Acorn ARM, the Fairchild Clipper and other processors are the sort of weapons needed for this approach. However, the huge inertia of installed software bases guarantees that gaining acceptance for a new CPU takes a long time. Hence another approach is to off-load the graphics burden from the CPU altogether, and give it instead to a dedicated chip that can be used with any existing CPU, an approach that has already been applied with great success to floating point maths. Almost every major semi-conductor manufacturer offers a graphics processor chip in its range, just as they all offer floating-point co-processors. For example, Intel has the 82786, Texas Instruments has its 34010 and Advanced Micro Devices its QPDM chip. Motorola is currently the odd man out as it killed off its 68486/487 Raster Graphics chip set last year, and is reputedly working on a new design.

The Intel 82786 is of particular interest because Intel also manufactures the 8086 family upon which IBM's machines are based. A year or so back there were strong rumours that IBM's follow up to the PC, which we now know as the PS/2, would have an 82786 as its standard display controller. Either the rumours were false or Intel's extreme lateness in delivering the chip squashed the plan. True or false, the instruction set of the 82786 shows a good fit with the graphics primitives required by Microsoft's Windows operating system (and hence the IBM OS/2 Presentation Manager) which is unlikely to be mere coincidence.

The 82786 actually contains two processors on the same chip. One is the Graphics Processor proper which knows how to draw lines, polygons, and circles among other things. The other is the Display Processor which

controls the video output, monitor sync, colour modes, and is also responsible for defining screen windows and putting a cursor (cross-hair or user defined) on the screen, thus relieving the software of these chores. Both these units are full 32-bit processors with 32-bit internal data paths, though the chip itself uses a 16-bit external bus and can be used with any Intel CPU, even the 8088, as well as with other manufacturers' parts like the 68000.

'Programming the TT786 in high-level languages (including BasicA) is perfectly feasible but not for the faint of heart. A lot of code is required to set up the various lists. . .'

The 82786 is a truly independent processor, which means that the master CPU merely has to create a list of drawing instructions for it, point it to the list and it will then get on with drawing in its own time, leaving the CPU free to do other things. A danger inherent in such independent operation is that the CPU and the 82786 might clash, by, for example, trying to write to the same memory address at the same time. To this end, the 82786 also contains an on-chip programmable arbitration controller which resolves any bus conflicts not only between it and the CPU, but between its own Graphics and Display processors. There is also an on-chip DRAM controller so that the 82786 can drive a screen memory (or 'frame buffer') of up to 2Mbytes, which is used to store both bit-mapped screen images and lists of instructions. The master CPU can gain access to this memory via the 82786's memory controller.

The Graphics Processor is a ferociously fast drawing engine, with a relatively small repertoire of hard-wired graphics instructions such as ARC, CIRCLE, POLYLINE and RECT which are typically performed at around two million pixels per second. Equally important is its speed in 'blitting': that is, performing BitBLTs and CharBLTs which are block transfers of pixels from one memory location to another. The Graphics Processor can perform BitBLTs of any size, with 16 Boolean operations available between source and destination, at around 19Mbits

per second. CharBLTs are special instructions for copying characters onto the screen from font bitmaps stored in memory, and they support variable width characters and proportional spacing of text; they are so fast that soft fonts can be displayed at 20,000 characters per second, or faster than conventional hardware generated characters.

Hence the design of the 82786 is slanted towards hardware support for Windows-style user interfaces and high-quality text displays rather than pure vector graphics performance. In this connection, the Graphics Processor has a special PICK mode which sets a hardware flag when a mouse pointer enters a menu box. Another fancy trick is the hardware zoom facility which can enlarge a bit-mapped image up to 64 times along either axis by pixel replication.

The Display Processor knows some fancy tricks too. It can support hardware windowing, which is performed using the concept of 'tiles'; the screen is considered to be made up of horizontal strips of variable depth, and each strip may be divided across its width into up to 16 tiles. To display a screen, the Display Processor is pointed at a linked list of such tiles, and it then combines their bit-maps into a video image on the VDU. This means you can change the screen contents instantaneously (or rather, in less than one vertical refresh period) by merely making the Display Processor point to a different list, which involves loading a single register. Classical overlapping windows can be programmed by decomposing them into tiles (see the box on page 114).

Regrettably, no existing windowing software (for example, MS-Windows, GEM, Mac, Amiga) has been written with such hardware windowing in mind, and so it can only be used in specially written applications. Instead the powerful BitBLT performance of the Graphics Processor can be used to accelerate existing windowing software, since a software BitBLT operation invariably forms part of the driver interface; an 82786-based graphics card like the Tektite will run MS-Windows some 20 times faster than an IBM EGA.

The Display Processor represents colour using packed-pixels rather than bit-planes: that's to say, all the bits representing one pixel (the 82786 supports 1,2,4 or 8 bits/pixel) live in the same byte. Because the Display Processor builds screens out of separate tiles, you can mix 1,2,4 and 8 bits/pixel images, say, putting a 16-colour window in a black and white screen. The Graphics Processor has a special BLT operation which permits an image to be blitted from a one-bit-per-pixel bitmap into a coloured destination bitmap and auto-

CHECKOUT

matically expanded to the right number of bits. This means you can store fonts economically at one bit per pixel, but write coloured text in background, foreground or transparent colours with no extra programming effort.

Programming the 82786 is conceptually simple, if not downright primitive. A program is just a list of Graphics Processor commands, and is executed by giving its address to the 82786 along with the LINK instruction. There are no conditional branches or fancy addressing modes; the only departure from sequential execution of the list is provided by the CALL and RETURN instruction, which allows subroutines or macros to be used, but requires explicit stack management.

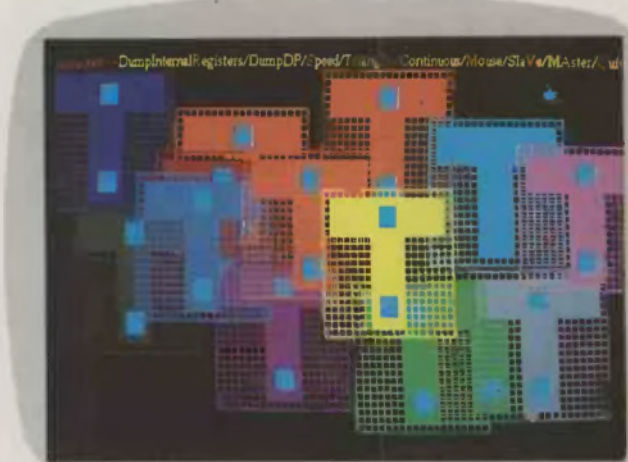
In practice, there is a lot more to programming the 82786 than merely creating the command list. The chip contains a large number of control registers which need to be initialised; the command list is constructed in host memory and needs to be copied to the frame buffer; the Display Processor needs a linked list of tile descriptors to be built, and these are quite hefty data structures; finally, various aspects of synchronisation (for example, checking whether the current drawing command has finished) are left up to the user program.

Tektite TT786

The Tektite TT786 is a colour graphics card for the IBM PC family, which contains an 82786, frame buffer memory and support circuitry. The designer is Tim Eccles of Tektite, who is no stranger to graphics hardware, having been one of the designers of the Whitechapel Workstation. The model I reviewed was an early example fitted with a 512k frame buffer, but there are now two models available with a full 2Mbytes fitted.

The TT786 is designed to work with the two most common IBM colour cards, the CGA and EGA and their respective monitors. The standard product accordingly offers two resolutions of 640x200 or 640x350, selectable under program control. A look-up table is provided which allows a palette of 16 colours to be chosen from 64, like the EGA. Two of the new versions of the card can in addition drive an NEC Multisync monitor at its maximum resolution of 800x560.

Unusually the Tektite card can be used at the same time, in the same computer as one of the IBM graphics cards. The card operates in two modes; in primary mode it requires a monitor to itself, but in secondary



The Tektite TT786 is a graphics card for the PC based on the new Intel 82786 graphics processor.

Equipped with line-drawing capabilities in hardware, it is capable of running a package like Windows up to 20 times faster than a standard EGA card. Image data can be blitted at around 19 million bits per second

CGA or EGA card, using its by-pass circuitry to allow CGA/EGA video through as required. Running in secondary mode involves routing the video output from the IBM card into the TT786 using the supplied cable, so that all video output passes through the Tektite card. The TT786 even has a slave mode in which the screen can be split horizontally between a CGA/EGA output window and the Tektite output, the vertical start position of this split being variable by changing a register value. This is a very considerable advantage since so much IBM software pre-supposes either a CGA or, less commonly, an EGA display.

'The Graphics Processor is a ferociously fast drawing engine, with a relatively small repertoire of hard-wired graphics instructions. . . which are typically performed at around two million pixels per second.'

Of almost as much interest as the 82786 is the firmware system adopted by Tektite. The 82786 needs quite a lot of 'glue' or support circuitry to adapt it to a particular hardware environment. In the Tektite board this is supplied by exploiting the latest in Logic Cell Arrays from Xilinx Corp. These devices are, unlike normal PALs or Gate Arrays, software programmed and the system

configuration firmware must actually be booted into the TT786 each time it is used, by running a program called 786FWARE.COM. A hardware encryption system protects the firmware against accidental corruption until power down.

The advantage of this choice is that Tektite can issue new firmware cheaply on disk when revisions are desired or required; no more changing of ROMs or PALs. It also means that users who need to drive special displays or whatever can either commission Tektite to do it or else learn to program the gate arrays themselves, with no hardware alterations at all.

The memory addressing limitations of the IBM PC mean that the whole frame buffer memory of the TT786 cannot appear in the PC's address space. Instead the PC is given a 16k 'window' into the 82786's frame buffer memory, and the address of this window can be moved by writing to a register. This is reminiscent of the way that EMS-expanded memory cards manage things. The 82786 can't see the PC's memory at all.

The programmer's view of the TT786 consists of this 16k memory window and a large number of registers, whose addresses are also relative to a movable I/O window. Tektite supplies a software disk which includes, in addition to the firmware, 10 soft fonts in five point sizes, serif and sans-serif, some demo programs in MASM assembler and Turbo Pascal, and several include files of Turbo source code for initialising the 82786 and setting up the data structures.

Programming the TT786 in high-level languages (including BasicA) is perfectly feasible but not for the faint of heart. A lot of code is required to set up the various lists and to address the various registers. The style of programming is rather strange to someone, like myself, who is used to close-coupled personal



TWO FOR THE PRICE OF ONE!

Any sale of the below includes a free copy of Little Smalltalk for either IBM/Clones, Archimedes, Atari, Apple MAC or DEC VAX/VMS.



Little Smalltalk, Smalltalk V, Smalltalkpc, Smalltalk-80, Actor, VBase

Call us for more details about Training Courses, Software Support, Applications, Consultancy

SMALLTALK EXPRESS LTD

HYDE HOUSE, THE HYDE,
EDGWARE ROAD, LONDON NW9 6LA

Tel: 01-200 0220

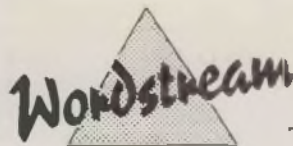
This man is after your money

David Furlonger is Managing Director of Wordstream Limited.

In less than two years Wordstream has become the market leader of Bureau Typesetters, with 1,000 users using a unique method requiring no capital outlay and very low running costs.

We try very hard, we succeed nearly always and we accept the responsibility of one of the most critical aspects of our clients' work: the typesetting.

The reason is simple. We want your money.



Wordstream Limited,
Wordstream House,
St Aldhelms Road,
Poole, BH13 6BS
Telephone: (0202) 752155

Please send me the Wordstream Information Pack

Name: _____

Company: _____

Address: _____

Telephone: _____ PCW/1

PERSONAL TYPESETTING

THE GENIUS OF LEONARDO

When Creative Logic launched Leonardo, our aim was to not only establish a new benchmark for Expert Systems software, but to make the benefits of Expert Systems available and accessible to every organisation. Have we achieved these aims?

The facts speak for themselves.

250 LEONARDOS INSTALLED

Already Leonardo is in use at over 250 organisations. Leonardo is unique in offering users a range of expert systems products to cater for different levels of knowledge bases. Whether you're a first time user or professional knowledge engineer, small company or multinational, Leonardo can and is delivering the benefits of expert systems.

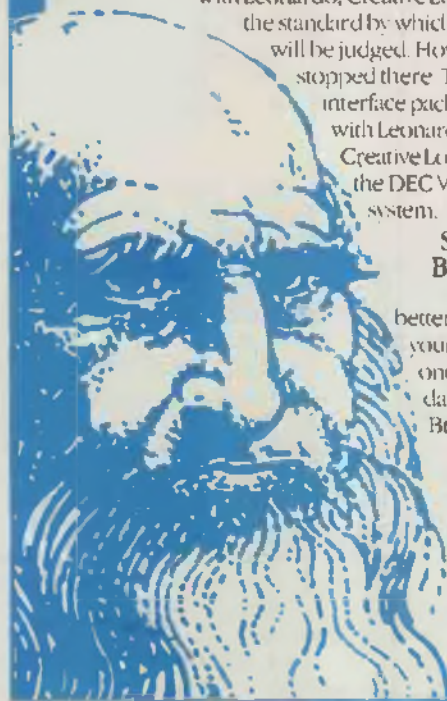
NEW PRODUCTS

With Leonardo, Creative Logic has already set the standard by which other products will be judged. However we haven't stopped there. There are new interface packages available with Leonardo 2 and 3 and Creative Logic has announced the DEC VAX version of the system.

SEEING IS BELIEVING

What better way to judge for yourself than attending one of our free half day seminars at Brunel Science Park.

If you'd like further information, just return the coupon or call us on **0895 74468**



Please return this coupon (no stamp required) to: Creative Logic Limited, FREEPOST, Brunel Science Park, Kingston Lane, Uxbridge, Middlesex, UB8 3BR. Tel: 0895 74468/9

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

POSTCODE _____ TEL NO _____

PCW 1287

Leonardo

CHECKOUT

computer graphics. I'm used to graphics procedures which do something immediately when you call them from a program — for example, draw a circle. On the 82786, though, you have to work with procedures that merely store something on a display list, to be done later; apparently, mainframe graphics systems work this way. Tektite is working on a full Turbo Pascal graphics library for the TT786, analogous to the Turbo Graphix Toolbox, which will 'sweeten' the interface considerably by hiding as much of the detail as possible.

The absence of any user data registers in the 82786 makes low-level drawing very strange indeed, like something from the pre-history of computing. For example, to plot a sequence of points you must issue a separate POINT X,Y instruction for each one, or else use self-modifying code to change the X,Y parameters in memory. The higher the level, the easier it becomes, confirming that the 82786 is really best used for drawing lines and boxes, blitting bit-map images and font manipulation.

Benchmarks

The performance of the demo programs is pretty spectacular, drawing a screenful of nested multi-coloured boxes too fast to see. Another program section illustrates blitting arbitrary bitmap objects (in this case Tek-tite logos) all over the place, again at speeds too fast to follow with the naked eye. A utility on the disk, called GPOBJLNK, enables you to use MASM or the IBM PC Assembler to pre-compile objects like this (or even animated sequences) into data files which can be loaded by applications.

Such subjective impressions are all very well but can the performance be quantified? Benchmarking graphics systems is difficult because there are so many different ways to achieve the same effects, but I thought I'd at least have a go by running PCW's GrafScan Benchmark. Unfortunately, plotting 10,000 individual points is not really a sensible thing to do on the 82786, as it involves generating inline code for all of them! Nevertheless, with the assistance of Tim Eccles, two alternative versions were prepared in Turbo C.

The first version obeys the letter of the Benchmark and actually generates the 10,000 POINT instructions as it goes along. They were buffered 350 at a time before execution, and the program spends a lot of its time shovelling full buffers to the 82786. The timing for this was 3.1 seconds.

The second version implements the spirit of the Benchmark by using the 82786 INCR_POINT instruction which automatically moves to the

Overlapping windows by tiles

```

+-----+
|                                     |
|                                     |
|                                     |
|                                     |
|.....+-----+
|  tile1      | tile2 |  tile3      |
+-----+-----+.....+
|                                     |
|                                     |
|                                     |
|                                     |
+-----+

```

next pixel after it has plotted a point. In addition, the sequence of 350 INCR_POINTS was pre-compiled in the frame buffer and then repeatedly executed via CALL — this took 0.02 seconds. Take your pick.

Software drivers

The availability of drivers for popular software is a matter of commercial importance with a new graphics board; after all, not everyone wants to write all their own software. Tektite has chosen to tackle AutoCAD, Microsoft Windows and GEM as the first priorities. The AutoCAD driver is ready now and I was able to try it out. Even on my humble 4.77MHz PC, it becomes possible to interactively pan and zoom around a large AutoCAD drawing using the mouse, whereas without the TT786 board each new view takes many seconds to draw. Interestingly, the TT786 doesn't help much with the initial rendering of a drawing retrieved from disk; each vector is drawn in an instant, but with long pauses between vectors while my wretched 8088 performs unaided floating point calculations. The moral is that you need a floating point co-processor too to do serious vector graphics.

The AutoCAD driver is a small and simple TSR program, thanks to the very simple ADI interface which AutoCAD specifies. The driver is required to provide little more than the ability to draw points and lines. With Microsoft Windows things are not quite so simple, and the driver was

not finished at the time I wrote this review though it will be by the time it appears.

An MS-Windows driver has to supply 17 functions, including BitBLT and StringBLT. However, the BitBLT it asks for is very general, with 256 possible Boolean operations, and implementing this in terms of the 16-operation BitBLT in the 82786 hardware is, I'm told, quite tricky. The Windows StringBLT is also very generalised, whereas 82786's CharBLT is restricted to 16x16 characters, so the driver has to use CharBLT for small characters and BitBLT for large ones.

The importance of the Windows and GEM drivers is that the two major PC desktop publishing programs, Aldus Pagemaker and Ventura, run under them. With hardware assistance from a Tektite card, these programs should run at a very satisfactory clip on quite modest PC clones.

The price of Tektite cards starts at £395 for the TT786-A5 I reviewed and goes up to £750 for the TT786-B20 with a 2Mbyte frame buffer and NEC Multisync 800x560 support. Add a cheap, fast AT clone and you have a blindingly fast graphics workstation for not much more than £2500, which is less than some fancy graphics cards cost alone.

Tektite can be reached on (01) 341 2468.

Dick Pountain is one of PCWs consultant editors and the European contributing editor for Byte. He uses a genuine 4.77MHz IBM PC and is currently learning Snobol.

There's no limit to what you can draw with AutoSketch

(But we drew the line at £79)

AUTOSKETCH™

AutoSketch opens up a whole new world for PC users who need to express their ideas by using drawings.

AutoSketch is a powerful, low-cost drawing tool designed to help you draw plans, diagrams, charts, sketches, layouts and designs at the click of a mouse.

AutoSketch is fast, easy to use and very accurate. With pull-down menus and prompts you can draw lines, arcs, circles, curves and text. You can use previously-drawn items in your drawings, and anything can be moved, copied, rotated, stretched, mirrored and scaled.

And that's not all. With AutoSketch you can change your mind as often as you like. Choose 'UNDO' and you go back one step. If you have second thoughts, select 'REDO' and you're back where you were.

AutoSketch has a wide range of features. It will dimension your drawings, measure angles and areas, 'ZOOM' in for detailed work, make paper copies on a printer or pen plotter, and file your drawings on disc for future use. You can even transfer your drawings to AUTOCAD, the most widely used computer-aided design program in the world.

If you have a PC, it's simple to enter the world of computer-aided drawing. We've made AutoSketch as easy to buy as it is to use: for a little money, you gain a lot of expertise.

Buy a copy from your local dealer, or telephone us on 01-928 7868 and quote your credit card number or fill out the coupon and send it with your payment to the address shown.

AUTODESK LTD.
90 LONDON ROAD
LONDON SE1 6LN
(01) 928 7868
TELEX: 911686
FAX: (01) 928 0283

AutoSketch runs on the IBM PC, XT, AT and 100% compatibles, supports the Hercules Graphics Card, the IBM Colour Graphics Adaptor (monochrome mode only) or the IBM Enhanced Graphics Adaptor with 256K graphics memory. You can use the Microsoft Mouse (or compatibles) or Joystick as your pointing device. Drawings can be printed on the Epson, Hewlett-Packard Laserjet, IBM Proprinter XL, Okidata, TI Omni or Post-Script printers, or plotted on Hewlett-Packard, Houston Instrument and compatible pen plotters. AutoSketch runs (in monochrome) on the AMSTRAD PC 1512 with twin disk drives and colour monitor. Ask your dealer for specific model numbers.

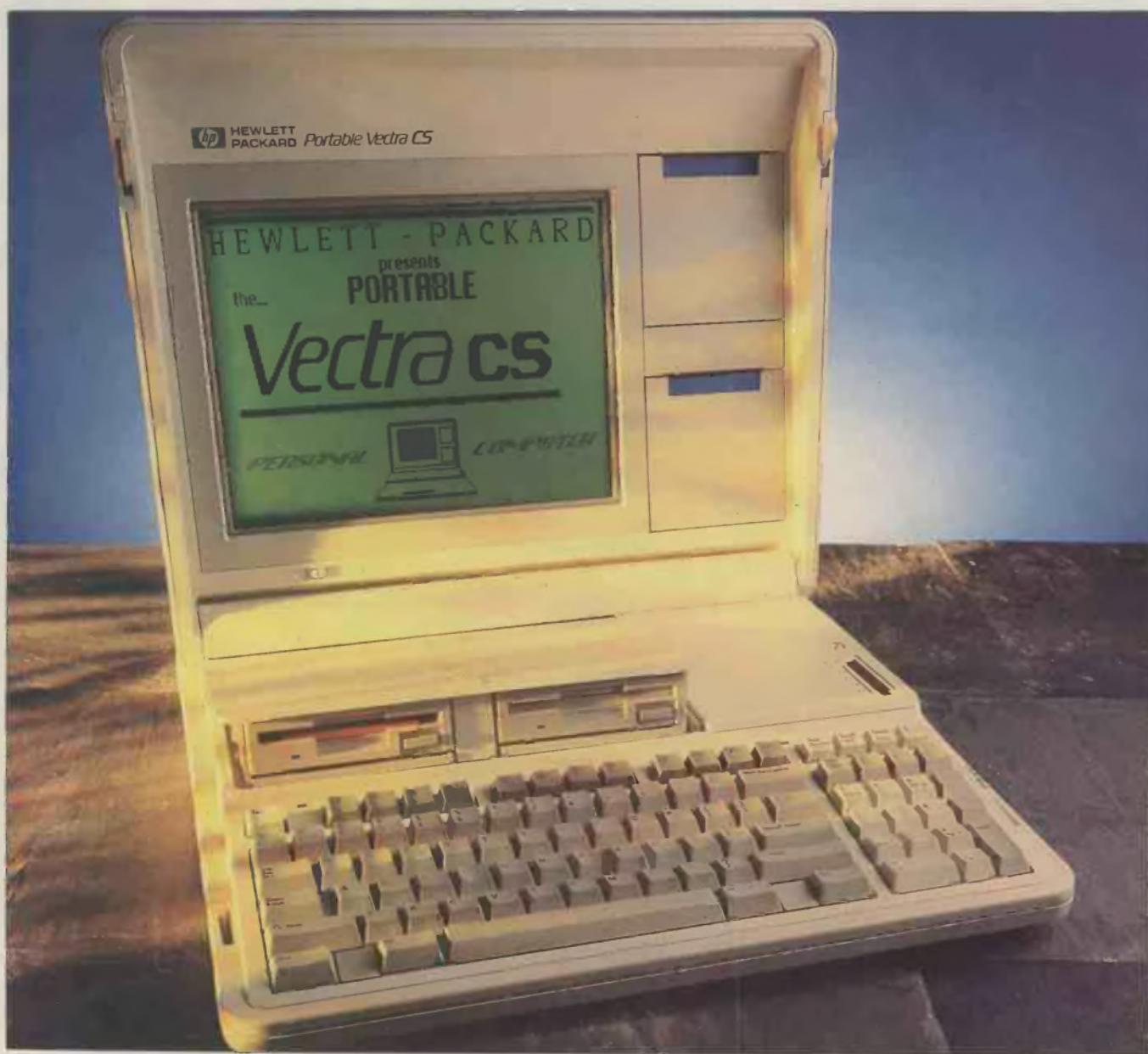
PCW-12		VAT/	QUANTITY
	PRICE	P+P	TOTAL
AutoSketch	£79	12.54	91.54
Total order value			
Method of payment			
☐ CHEQUE ☐ ACCESS ☐ VISA (please tick)			
I enclose a cheque for £			
Cheque Number/Card Number			
Card Expiry Date			
Please allow 14 days for delivery			
Name			
Company			
Address			
Post Code		Tel.	
☐ I am certainly interested in AutoSketch but would appreciate more information (please tick).			



BENCHMARK

HP Portable Vectra CS

Another accessory for the high-flying executive's Porsche Turbo, or a workhorse for the masses? Martin Wren-Hilton goes for a stroll with the Hewlett Packard Portable Vectra CS.



My grocer looked decidedly worried. The lady who did his stocktaking now had a partner. Catapulting herself into the 1980s, she now brought with her a mysterious box to bring digital precision to his accounts. I had wandered into the shop to pick up some Camembert, not expecting to find an 80286-powered PC on the cheese counter — but there it was, processing the stock figures for the year, a Toshiba T3100.

Prior to this incident, I had often wondered what sort of person would have any use for a *portable* personal computer. Workaholics? Exhibitionists? I have an XT at the office and that's where it stays. When I leave the office, I leave behind the XT and all work-related thoughts. Not being one to be overtaken by technology, I must admit that about two years ago I bought a Tandy 100, thinking how wonderful it would be to knock out a few articles in the garden and the odd note or two on the train. The trouble was, when I was in the garden, the last thing I wanted to do was work, and when I was on the train I couldn't concentrate because everybody would stare at me.

But the sales figures prove it — portable PCs are appearing with amazing — and alarming — regularity. Scarcely a month goes by without a new crop of machines being announced, so obviously many people are finding more and more uses for portable PCs.

When the HP Portable Vectra CS arrived, I must admit that I was *rather* sceptical about how useful the machine would be. It seemed too big for a portable and initially I wasn't impressed with the screen — having been spoiled by using a colleague's Zenith Z181 for some time. Both the Zenith and the HP use the latest 'supertwist' LCDs, but Zenith's is backlit and is renowned for its quality.

Hewlett Packard is best known for its high precision and high price. Built like a Volvo, and with a price tag of over £2000, the Portable Vectra is no exception. But what do you get for that much money?

Hardware

The Portable Vectra looks like a slim, white briefcase and opens in a similar manner — by lying the unit on one side and pushing two catches apart. Between the two sliding catches is the handle which pops out when depressed on either end. Nice engineering, HP.

The top half of the case opens like a clam shell to reveal a large off-yellow LCD display, two disk storage boxes and the 92-key keyboard. A sliding catch between the F4 and F5 keys on the top of the keyboard holds the two disk drives down until released. To the right of the disk



The PCB within the Portable Vectra CS is incredibly well-engineered. The four expansion slots are identical electronically to IBM PC slots but are physically smaller

drives is the removable battery pack which neatly blends in with the design of the machine.

To the right of the '-' key on the numeric keypad is the power switch. Push it up once and the machine comes on. Push it up once more and it is off. Being recessed from the rest of the keyboard, it would be almost impossible to switch the machine off accidentally. Which is a good job, because unlike some other portables (the Toshiba T1200 and the IBM PC Convertible, for example) the memory is cleared when the machine powers down. Actually, the T1200 and the Convertible do as well, but they also have a standby mode in which power to the RAM is maintained — leaving the box in a state of suspended animation.

Keeping things ticking over is an 80C86-compatible microprocessor. This chip is a CMOS (Complimentary Metal Oxide Semiconductor) equivalent of the 8086, as featured in the IBM Personal System/2 Model 30 and the Amstrad PC1640. Running at a respectable 7.16MHz, it turns in a good set of Benchmark results (see 'Benchmarks' box). An optional 8087 mathematics coprocessor may be fitted later. Not only has the processor been manufactured with CMOS technology but so have most of the components inside the box. Why CMOS? CMOS components require much less power than their standard equivalents — giving longer battery life and running cool so that no fan is needed.

Two versions of the Portable Vectra are available — the Portable Vectra CS that is the subject of this Benchtest and the Portable Vectra CS

Model 20. Whereas the former has two 3½in 1.44Mbyte disk drives, the latter has one disk drive and one 20Mbyte hard disk. Otherwise, the features are the same.

With a total storage capacity of 2.88Mbytes, the floppy disk-only model should satisfy most requirements — and the battery lasts for longer than in the hard-disk version. Presently, most portable PCs feature 720k drives, but compatibility should pose no problems as the 1.44Mbyte drives can read, write and correctly format the 720k disks. Physically, the only difference between the 1.44Mbyte disk and the 720k disk is that the former has a small notch on the opposite side of the disk to the write protect hole.

Hewlett Packard's disk drives are unusual in that they require the small notch to be present in order to format disks with a 1.44Mbyte capacity. Other manufacturers, including IBM with its Personal System/2 models 50, 60 and 80, do not need the notch, so can format any old 3½in disk as though it were a high-capacity disk. The obvious advantage of this is a great price saving on the media, although data is more likely to become corrupted even if the cheap disk has been formatted correctly.

With 1.44Mbyte disks, it should be possible to install software as though it were going onto a hard disk — they hold as much as four conventional 360k 5¼in disks.

In practice, the drives operated silently and flawlessly. Although they pop up for insertion and removal, the drives both seemed to operate OK when down. It looks neater when they're down.

BENCHTEST

The machine which started the portable computer philosophy, the Osborne, and its PC-compatible follower, the Compaq Portable, both featured 5in CRT displays. This added to their cumbersome nature — the Compaq weighed in at an arm-stretching 31lbs! Screen technology has, thankfully, advanced since then. The first generation of battery-powered laptops featured dark-grey on light-grey LCD screens that must have provided some good business for opticians.

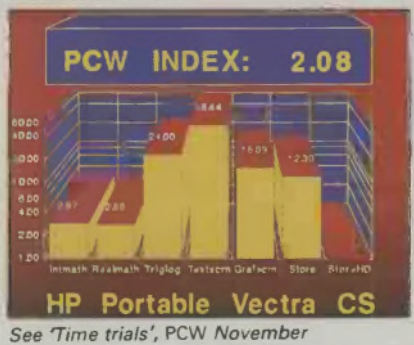
Fortunately, LCD technology has come a long way since then. The Portable Vectra features a healthy-sized 12in supertwist blue-on-green display. It's called supertwist because the crystals are twisted through 270 degrees or so, rather than 90 degrees. The added twist improves contrast considerably.

Overall screen resolution is 640x400. Text mode shows characters in an 8x16 box, adding to the legibility. Graphics mode is through CGA emulation. Despite all this, I found the display not difficult, but unpleasant to read in all but optimum lighting conditions. Admittedly, there is a contrast control under the screen, and the whole top half of the case can be tilted from 0 degrees to 170 degrees. Even so, I wasn't impressed. It was all too easy to lose track of where the cursor was and certain colours (as represented in shades of blue) looked terrible. Red was produced by lowering the contrast and using a stipple pattern. The result also flickered, giving me the impression that the Portable Vectra is at its best when used in black-on-white mode. For some reason, one pixel near the top of the screen was always on when the machine was on. Hewlett Packard realises this as well, and is presently researching newer, better technologies including EL (electroluminescent) and backlit LCDs.

For extended use in an office environment, the top half of the case (with the LCD screen) can be removed. On the back of the Portable Vectra is a display port which may be used to attach an external monitor. This may be monochrome, colour or enhanced colour. I tried the last two, and although the colour display worked fine, the enhanced colour display wasn't so good. White-on-black text characters had pink specks in the characters and when large blocks of colour were shown, the display distorted slightly. Some work needed there, HP.

Even when attached to an enhanced colour display, only CGA emulation was available. I suppose the provision of EGA support would be asking too much.

Benchmarks



Redirecting the display output to an external monitor is effected by one of two methods. You can either use the setup program, or you can remove the battery pack and turn the rotating switch at the bottom of the case.

Portables have notoriously inadequate keyboards. Not so the Portable Vectra. Although the feel was acceptable (but not up to IBM's high standards), the size and positioning were excellent. Twelve function keys across the top are laid out in a fashion similar to the new enhanced keyboard standard. To the right is a neat numeric keypad which doubles as a cursor control pad.

Keys F, J and 5 on the numeric keypad are slightly more indented than the rest — useful for touch-typists and no inconvenience for the rest of us. Lights are provided for Caps Lock, Num Lock, Scroll Lock and a funny key that seems unique to this keyboard. The lights are located at the top of the keyboard (not in the keys, as would be more useful), and no indication is given as to which is which.

As is now becoming more commonplace, the Portable Vectra comes with a full 640k of RAM. Just to speed things up, it operates with 0 wait states (like the IBM Personal System/2 Model 30), and just to conserve battery power, it's all CMOS.

The hefty 6-volt lead acid battery powers the Portable Vectra for an amazing 10 hours according to Hewlett Packard. Model 20 offers up to four hours use from a full charge — still reasonable for a hard disk portable. Recharging takes 12 hours and an LCD 'charge meter' built into the removable battery pack gives a guide as to how long you can continue working. As I am writing now, the machine has been on for three hours, accessing one disk occasionally, and the battery meter hasn't shifted from the 90-100% mark. Impressive.

More and more devices nowadays rely on Nickel Cadmium (NiCad) battery power. So, as the deficiencies of NiCads have become more apparent, manufacturers have turned their

attention to lead acid batteries.

Sony provides lead acid battery packs with its Discman portable compact disc player. Each battery is provided with a warning telling the user that the battery can be used in any position, but must be charged horizontally to avoid leaks. (When a lead acid battery leaks, sulphuric acid comes out.) No such warnings are provided with the Portable Vectra, and Hewlett Packard is unsure about the issue. Being cautious, I always charge the Portable Vectra lying down (the computer, not me, that is.)

The power supply that comes with the Portable Vectra plugs straight into the battery pack through a hole in the side of the case. You can use the machine while charging and in the event of the mains power failing, the battery takes over. Further batteries are available from Hewlett Packard, which may be charged straight from the power supply. They don't need to be installed in the machine to recharge. The dual disk model probably doesn't need it, but one may be useful for the hard-disk Model 20, whose battery life is less than half that of the dual-disk machine.

Apart from the display port, there is a standard parallel printer port on the back of the machine. This is actually on an adaptor card, along with the display circuitry, which occupies one of the four expansion slots in the base, at the back of the machine. In the United States, HP is offering three options — a combined 2Mbyte EMS expanded memory with a serial port, a 1200-baud modem and a 2400-baud modem. In the UK, HP has the combined memory/serial port card now and is expecting BABT approval of its 1200-baud Hayes-compatible modem soon.

Up to 6Mbytes of LIM EMS memory may be added to the Portable Vectra and up to 4Mbytes to the Model 20. The Model 20's hard disk adaptor occupies a second slot in that model, leaving just two free. Recently, the Lotus/Intel/Microsoft triumvirate has released version 4.0 of EMS. The Portable Vectra's desktop cousin has version 3.2 EMS cards available, so check with your dealer as to which EMS version you are getting.

Adaptor cards are easily fitted by the user. Six screws hold the bottom of the case together, and remove to reveal the Hewlett Packard expansion slots. Although the rear brackets look similar to those found on the IBM PC, the Portable Vectra does not accept standard PC expansion cards.

It is doubtful that any third party manufacturers will produce adaptor cards for the Portable Vectra, due to the relatively small market for this particular machine. Just to help any-

MAYFAIR NEWS

NEC £

APC IV 640k + 20 MB	2195
APC IV 640k + 40MB	2495
APC IV/2 640k + 66MB	3295

All NEC systems include Multisync enhanced colour display.

OLIVETTI

M240 (10MHz) 640k 2 x 360K	1150
M240 (10MHz) 640k + 20 MB	1495
Extra 3.5 in 720k disk drive	150
M380 1MB + 40 MB	P.O.A.
M380 4MB + 68MB	P.O.A.
M380 (20MHz) 4MB + 135MB	P.O.A.
EGA Colour (Extra)	425

SPERRY

MICRO IT 512K 20MB	2295
PC/IT 512K 44MB	2990
PC/IT 1MB 69MB	4295
PC/IT 1MB 117MB	6195
EGA Colour Display Extra	450
XENIX for PC/IT	650
4 Port Terminal Adaptor	245

TANDON

PCX 20 256K + 20MB	949
PCA 20 1MB + 20MB	1295
PCA 30 1MB + 30MB	1545
PCA 40 1MB + 40MB	1745
PCA 70 1MB + 70MB	2195
EGA Colour Display (extra)	345

PORTABLE MICROS

NEC	
Multispeed 640k 2 x 720K LCD	1295
TOSHIBA	
T5100 (80386) 2MB 40MB PLASMA	3595
T3200 (80286) 1MB 40MB PLASMA	3095
T3100 (80286) 640k 20MB PLASMA	2495
T1200 (8086) 1MB 20MB LCD	1995
T1100 + (8086) 640k 2 x 720k LCD	1395

HARD DISKS

Seagate 20MB + Controller	295
Seagate 40MB (40MS) + Controller	495
Hitachi 40MB (25MS) + Controller	595
Micropolis 71MB (30MS)	995
Tandon 20MB Disk Card	295
Plus 5 30MB Hardcard (PC/XT)	495

MODEMS

Dataflex Stradcom V21, 22 (INTL)	165
Steebek Quattro V21, 22, 23 (INTL)	695
Pace Series 4 V21, 22, 23 (EXTL)	399
Steebek SB2426D V26 (EXTL)	295
Steebek Trail Blazer 19k bps	1495
Chit Chat software with above Modems	45



OLIVETTI M380

New top of the range systems using 16MHz 80386 processor. M380/PC has 1MB RAM and 40MB disk. M380 has 4MB RAM and 68MB disk. Options of tape backup, 3.5" disks and enhanced displays. Prices on application.



OLIVETTI M240

Successor to the best-selling M24. 10MHz 8086 processor. 640k RAM. 20MB hard disk. Serial/Parallel ports. 7 slot BUS. Enhanced keyboard. Hi-Res display. MS-DOS 3.2. £1495 Extra 3.5" disk £150.

BOARDS £

AST Rampage 2MB EMS	349
AST Rampage 286 2MB EMS	549
AST Advantage 1.5MB	425
AST Six Pak Premium 2MB EMS	449
Orchid Ramquest 50/60 2MB	595
Hercules Mono Plus	180
Hercules Incolour	299
Vega Deluxe Auto EGA	235
AST VT 220 Emulation	395
AST 4 Port Async Comms	275
AST 4 Port Async Comms (Xenix)	300
AST 5251/11 +	595
AST 5251/12	525
AST 3780	595

MONITORS

Colour Displays	
NEC 14" Multisync EGA	495
Sony 14" Multisync EGA	675
Toscan 770 + Multisync	545
Aydin Enhancer 19" EGA	1450
Desktop Publishing Displays	
Wyse WY700 15" 1280 x 800	695
Toscan Viking 19" 1280 x 960	1795
Sigma Laserview 19" 1660 x 1200	2195

LOCAL AREA NETWORKS

PC NET; ARC NET; Novell Netware
Please Call For Full Details.

MATRIX PRINTERS £

BROTHER	
M1509 180CPS/45CPS NLQ	375
M1709 240CPS/50CPS NLQ	450
4018 480CPS/100CPS NLQ	1145
EPSON	
LX 800 150CPS/25CPS NLQ	199
FX 800 240CPS/35CPS NLQ	320
FX1000 As Above 130 COL	399
LQ 800 180CPS + LQ	445
LQ 1000 As Above 130 COL	595
LQ 2500 270CPS + LQ	745
EX 1000 300CPS/50CPS NLQ	525
SQ 2500 INK JET 450CPS	995
NEC	
P.2200 168/56 cps 24 pin	295
P6 180CPS + LQ	395
P7 180CPS + LQ	465
P9 380CPS/120CPS LQ	995
OLIVETTI	
DM 100 120CPS + NLQ	209
DM 296 220CPS + NLQ	595
DM 600 200CPS 70CPS LQ	795
PCPR 3 400/100CPS NLQ	1250

DAISYWHEEL PRINTERS

Juki 6100 18cps	295
Juki 6200 30cps	475
Juki 6300 40cps	699
Olivetti DY 200 25cps	345
Olivetti DY 300 30cps	495
Olivetti DY 450 45cps	849
Olivetti DY 800 80cps	999

LASER PRINTERS

Brother HL8 512k	8PPM.....	1695
Canon LBP-8 Mk2 512k	8PPM.....	1695
Epson GQ 3500	6PPM.....	1345
H-P Laserjet Series II 512k*	8PPM.....	1895
H-P Series II 1MB RAM		325
Qume Laser Ten 512k*	10PPM.....	2095
Qume ScripTen 2MB*	10PPM.....	3595

(* = Including On-Site Maintenance)

SOFTWARE

Aldus Pagemaker	495
Ansa Paradox 2	395
Ashton Tate DBase 3 Plus	425
Symantec Q+A	199
Sapphire Dataease	375
Gem Desktop Publisher	245
Gem Draw Plus	145
Lotus 123 Release 2.01	335
Lotus Symphony Release 1.2	335
Lotus Freelance Plus	275
Lotus Manuscript	285
Microsoft Windows	59
Migent Ability/Ability Plus	89/149
Microsoft Multiplan 3	120
Smart Int. System	425
Multimate Advantage II	295
WordPerfect 4.2	245
Micropro Wordstar 4	225
Microstuf Crosstalk	95
Xerox Ventura DTP 1.1	595

All prices exclude VAT and delivery.

Blenheim House,
Podmore Road,
London SW18 1AJ
01-871 2555/Telex 936066

MAYFAIR MICROS

BENCHTEST

one who is contemplating adding their own devices into the Portable Vectra, the edge connector pins are all clearly identified inside the case.

Looking inside the case reveals two things — the quality of HP's manufacturing (no wire patches in sight) and the diminutive size of the main circuit board. There are only a handful of surface-mounted components on the board, which is barely larger than a standard PC adaptor card. Having removed the whole display unit, the hefty battery, the bottom half of the case and the only adaptor card in my machine, I couldn't help wondering why the Portable Vectra was so heavy. It seems that most of the weight is in the disk drives and their supports.

System software

When the Portable Vectra is switched on for the very first time, a clock and a question-mark appear on the screen. According to the setup guide, this means that the Setup program has to be run to initialise the time and date. This only needs doing when either the battery is completely flat (an unlikely condition) or the battery is removed.

The Setup program also allows you to redirect the screen output and adjust the colour mapping (that is, what colour appears as what shade of blue).

One feature that I could find no real use for was the alarm. Once set, it switches the machine on at a specified time, although it doesn't switch it off. What use is that?

Also on the Setup disk is a tutorial covering some of the real fundamentals of computing. There is no way to exit from the Setup disk (why?), so you have to re-boot to get to MS-DOS.

Apart from MS-DOS and the Setup disk, you get PAM, the Program Application Manager and something called File Manager. PAM is a DOS shell, and I assume that the intention for it was to aid beginners. Frankly, it's useless and badly designed. Learning MS-DOS from the command line makes more sense. Firstly, it means that users can easily transfer to other MS-DOS machines (those without PAM) and secondly, PAM uses ridiculous key strokes. If you need a friendly 'front end', use Microsoft Windows. It's more intuitive and it's a standard.

File Manager, I can only presume, was designed by the same team that created PAM. Need I say more?

Finally, to cap this bundle of amazing software there is the Multiple Character Set Support (MCSS) program. Don't confuse this with the recently introduced multiple Code Pages in PC-DOS 3.3. All this utility

Technical specifications

Processor:	80C86-compatible, running at 7.16MHz with 0 wait states
RAM (system):	640k
RAM (display):	32k
ROM:	64k containing BIOS
Mass storage:	Portable Vectra CS — two 1.44Mbyte 3½in disk drives Portable Vectra CS Model 20 — one 1.44Mbyte 3½in disk drive and one 20Mbyte hard disk drive
Keyboard:	92 keys comprising 12 function keys, 63 alphanumeric keys, 17 keypad keys
Monitor:	detachable 12in supertwist LCD
Display modes:	text mode (8×16 pixels giving 400 lines) and CGA graphics emulation mode
Standard interfaces:	parallel printer port, display adaptor
Expansion:	three internal Hewlett Packard expansion slots
Size:	16.5ins×13.9ins×3.5ins
Weight:	17.6lbs (Portable Vectra CS)
Bundled software:	PAM, File Manager, Multiple Character Set Support
OS:	MS-DOS 3.20

In perspective

Prices have dropped, speeds have increased and memories have grown in the highly competitive portable market. The first decision you should make is — do you need to run PC software, or will an 'electronic notepad' machine suffice? The second category is frequently cheap, diskless and really portable. It includes Cambridge Computer's Z88 at £249, the Tandy 102 (with built-in, 300-baud modem) at £299 and the diminutive Psion Organiser II (excellent for portable data entry) at £99.

If you really need the power of a portable PC, you should take a close look at the Data General One/Model 2T, the fast NEC Multispeed — which is also available with an electroluminescent display, the hard-disk Sharp PC-1700, the Toshiba T1100, the sparkling (but slow) Zenith Z181 and the trendy GRiDLite. These all come in the £1200-£2000 price range.

Towards the lower end of the market, we find the InterQuadram Spark and the Bondwell 8 in the sub £1000 category.

By comparison, the Hewlett Packard is among the best built and is the only one with 1.44Mbyte 3½in disk drives. It is also one of the heaviest — a factor that may need to be taken into consideration, depending upon your application. The NEC Multispeed takes the prize for the fastest, while the Zenith Z181 has by far the most legible display.

One thing to watch out for — a CMOS version of the 80286 microprocessor has recently been announced, which will be used in the next generation of OS/2 compatible portables. Watch this space.

does is help sort out the tangle created by Hewlett Packard's insistence on using a non-IBM standard character set in its printers.

HP's printers feature a character set (Roman8) which is similar to IBM's for text and numbers, but for character values of greater than 127, the differences become apparent. Anyone who has tried to interface a Hewlett Packard printer to an IBM PC will know what I mean. The MCSS program simply installs a device driver which does the necessary translation for you.

Documentation

In true HP fashion, the documentation is good. A slim spiral-bound manual explains the basics of the Portable Vectra hardware. Two large manuals, designed to accompany the whole Vectra family, explain MS-DOS 3.2 in detail and the horrible PAM and File Manager.

The fact that the two larger manuals have not been customised for the Portable Vectra is a pity. References to 360k disks and 1.2Mbyte disks do not help beginners, especially when the Portable Vectra supports neither.

Prices

Only the price for the basic twin 3½in drive Portable Vectra was available at the time of going to press — £2086, excluding VAT. The price for the hard-disk Model 20 is expected to be in the region of £3000. Its price had not been decided, as the box won't be available until the beginning of 1988.

Conclusion

The HP Portable Vectra is one of the most expensive battery-powered laptops available. Its keyboard is a decent size, and the screen is large, but only of acceptable quality. The battery life (at least on the basic Portable Vectra) is outstanding and the speed is middle-of-the-road.

For this money you should expect a truly outstanding machine, and in many respects the Portable Vectra lives up to the mark, but there are some loose edges. Once HP has ironed these out, the Portable Vectra will be in the same league as most of the company's products — classy and dependable.

Hewlett Packard is on (0344) 773100.

END



You've made the right decision

Star makes it easy to choose the right printer when it comes to those difficult decisions. From the small business or enthusiast user through to the highly demanding corporate buyer, there's a printer in our range to suit every need.

Take the NL-10 for example. You need to choose a printer that's compatible with the computer you're using today and the one you might upgrade to later. With the NL-10's modular interface that's no problem, just select the interface you need when you buy the printer. If you need to change later it only takes a moment to swap the cartridges over.

You'll want to choose a printer that's easy to operate. On the N series printers Star have all but done away with those fiddly little DIP switches. Almost every control you need for daily use is on a single touch panel. Select print quality, character size, margins and a host more options without ever having to lift the lid.

You want to choose a printer that looks after all your paper requirements; tractor, single sheet or multiple copies. The NL-10 has tractor feed as standard for continuous printing and an automatic single sheet feed to make letterheads really easy. There's even the option of a low-cost cut-sheet feeder.

Your ultimate choice is print quality. Print quality isn't often expected of dot matrix printers but the NL-10 provides it as standard. Whether you're printing at 120cps in draft mode or 30cps in Near Letter Quality every character is crisp and clear. And the range of character options is unbeatable.

Star is making it easier to choose the right printer when it comes to service and backup. Our pedigree is inherited from many years in the manufacture of precision machine parts and a long history of producing computer printers. This means you can rely on Star's wealth of experience in advanced design and manufacturing.

We offer total support from our UK offices through a nationwide dealer network backed up by the finest distributors in the market to ensure our printers are available when and where you want them.

Countless users have made the right decision – why not join them?

Star Micronics U.K. Ltd.
Craven House,
40 Uxbridge Road,
Ealing, London W5 2BS.
Telephone: 01-840 1800.

THE
Star
PRINTERS FOR BUSINESS

A division of Star Micronics Co., Ltd., Japan.

I would like to be sure I'm making the right decision. Please send me details on the Star range of printers. PCW-10

Name

Company

Address

Postcode Telephone

Or just call Belinda on 01-840 1829. For more information – anytime.



Master Scan

Master Scan is a product in the image of the machine it's designed for, the Amstrad PCW: no nonsense, no frills, doing the job — and at low cost. But it has one elegant feature, as Justin Moffitt reports: this scanner uses the PCW's own printer mechanism.

The Amstrad PCW has always been seen as more than just a word processor. Following the introduction of many desktop publishing packages, it is not surprising that Database Software has launched Master Scan, a scanning device. What is surprising is the way it works — it uses the PCW's own printer mechanism.

Setting up

The Master Scan package comprises: a small interface box to which the scanning head is permanently connected; a manual; the Master Scan software; and some sample artwork to scan.

The manual includes a connection diagram which states that the interface box should be plugged into the serial port; it also shows an artist's impression of the rear of the PCW with the relevant interface marked. Unfortunately, the PCW doesn't have a serial port as standard; and the spot where Database claims the serial port is, happens to be a ventilator! The box in fact connects to the expansion port and provides a through connector for other peripherals, such as a mouse.

When you've removed the printer dust cover and ribbon, the scanning head can be fitted. This is easy to connect and rests securely on the ordinary print head. The printer dust cover must be removed to allow the lead connecting the scanning head and interface box to move freely.

Software

The Master Scan software loads from CP/M, so allowing you to scan an image and save it for use later. It uses a simple and pleasant system of menus and includes clear onscreen prompts as to what keys to press. The menus are controlled by a highlight bar which can either be moved using the cursor keys, or, for more experienced users, options can be



executed with a single keypress.

The scanner menu lets you set the necessary parameters for the image to be scanned. The software allows you to magnify an incoming image by factors of 50%, 100%, 200%, 300% and 600%. The start and finish columns for the scan may also be adjusted to allow a specific area to be scanned. Up to 240 pixel lines may be scanned; then the software asks whether you want to keep or destroy the image. Once you have an image scanned and kept in memory, you can view it onscreen and/or print it out as required.

You may save a scanned image in a variety of formats, including those used by The Desktop Publisher, Fleet Street Editor Plus, Newsdesk International and Master Paint. As you can also load data in any of these formats, the software can be used to convert clip-art between the numer-

ous desktop publishing packages. The disk functions use a powerful file-selector system that resembles the Locoscript disk editor. The drive and user area can be selected, then a highlight bar may be moved over the disk filenames to select a file.

Alternatively, you can type the filename in the standard CP/M format. Unfortunately, Master Scan won't let you delete or rename a file.

Scanning

Before a page can be loaded into the printer, the scanning head must be removed and the autofeed page function used. The vertical page setting is manual and is carried out with the page-feed knob, whereas the horizontal setting is made from the Master Scan software. Due to the displacement of the scanning head from the print head, the lowest possible starting column is five and

the scan must be at least fifteen columns wide. The software makes sure these conditions are met.

A full-width scan for 240 pixel lines, using 100% magnification, took 13 minutes 12 seconds, but most scans will be faster than this because only part of the page will be read.

The scanner cannot read colour material, glossy pages or pages printed using water-based inks, nor can it read anything that will not pass round the printer roller. To surmount all these limitations, Database suggests that you make a photocopy of the material to be scanned. This seems to work perfectly in each case.

The quality of the scanned images is generally very good, although the end result will nearly always have to be cropped and may need superfluous detail removed. I found that near letter-quality text from the PCW printer was not clear when scanned at 100% magnification, but that slightly larger text could be read without difficulty. Images in jet black and white only were best, especially cartoon-type drawings and similar sketches, but the scanner also coped well with photographs.

The external contrast control on the interface box may be used to make the scanned image lighter or darker as necessary but a mid-way setting is fine for most work.

When the magnification is, say, 600%, the unit does not simply scan the image at 100% magnification and repeat each pixel six times, but actually improves its resolution.

Using scanned images . . .

Images saved from the Master Scan software may be used in many desktop publishing and art packages. The Master Scan software itself does not have any image-editing facilities, so you will almost certainly need another piece of software. Let's take a look at two in detail.

. . . with Master Paint

If you want to use your scanned images alone, then Master Paint is the answer. It is a full art program that resembles Mac Paint and uses a WIMP environment that can optionally be controlled by a variety of mice, including those from AMX, the Electric Studio, and Kempston.

The program allows you to scroll the scanned image around a screen window, allowing for images larger than the display size. There are icons to draw a line, a box, an ellipse and a polygon, all with the option of using a variable-width pencil. There is also a spray can and a fill tap, for which you can use a pre-defined pattern or define your own. Parts of a drawing may be removed using an eraser. The zoom function is used to show a 16x16 grid magnified by a

factor of 64 and allows pixel by pixel editing. There is also an extensive series of block functions, including copy, move, cut and paste. Titles and other text may be added in a variety of fonts and sizes anywhere on the image. Master Paint has a powerful set of disk tools that even includes a formatting routine.

Although the program is more suited to creative art than technical drawings, it is well suited to editing of scanned artwork.

. . . and with Desktop Publisher

The Desktop Publisher provides a more complete page-design system. The program contains a number of modules called the page editor, the text editor, the graphics editor and the disk file editor, all of which use a series of pull-down menus and — like Master Paint — these can be controlled by a mouse as well as the keyboard.

Although the graphics editor is a little less extensive than Master Paint, it provides all the necessary tools for editing scanned images. Master Scan images can be rescaled upon loading, allowing them to be fitted correctly onto the page. As in Master Paint, there is a pixel by pixel editor and a number of block-editing facilities. Text in a number of redefinable fonts may be made to fit into any area, no matter how large or small.

The completed image can then be positioned on the page using the page-editing module and moved if

necessary. Other graphics images and columns of text can be added to complete the page layout.

The end result can be viewed at a fraction of its normal size, then printed either in draft or high-quality mode on the standard PCW printer or an Epson compatible. The quality of the text columns is greatly improved by the fact that they are printed in standard printer text mode rather than being converted into graphics data.

The Desktop Publisher provides the ideal environment for editing scanned photographs and drawings, which can then be directly incorporated into newsletters, and so on.

Microfax

Database claims that Master Scan can be used as a form of facsimile system, transporting graphics data from one place to another using a modem. The company calls this feature 'Microfax'.

The Master Scan software has no built-in facility for Microfax and so communications software with a file-transfer facility is needed. However, Mail232, included with the PCW, is ideal. Due to the way in which scanned images are saved, there is no checksum facility to warn of corrupt data in the file; this would be helpful in correcting lost or badly-transferred data.

Microfax will probably find little support as a standard since the person or company receiving the image must also have a PCW with suitable software. As a result, Microfax cannot be considered a serious feature of the Master Scan package.

Documentation

The well-written manual is ideal for quick reference: it lists each menu option along with a clear description of its function and parameters. It also contains some very useful tips on how the quality of scanned images can be improved. For the technically-minded, there is a small section on how the scanner works.

Conclusion

Master Scan is innovative and, with relatively little practice, produces good-quality results which can be incorporated into many desktop publishing systems.

Master Scan scores over video digitisers already available for the PCW, as there is no need for extra hardware such as video cameras and lighting; but it does lose out on capture time.

At only £69.95, Master Scan represents excellent value for money. What more can I say?

Master Scan costs £69.95, Master Paint costs £19.95, and the Master Pack containing both costs £79.95. The Desktop Publisher costs £29.95. All available from Database on (061) 456 8835.

END

How Master Scan works

Most scanners available at present are flat-bed devices that hold a page in a horizontal plane and scan the image line by line, having a specialised mechanism to advance the paper. Database, however, has used the standard PCW printer mechanism to move the page, which lowers the costs without loss of performance. Simple, and clever!

The printer graphics mode is selected to give smooth movement for the scanning head when scanning a page. The head moves unidirectionally, left to right, requiring a second pass to return it to the start position. The paper is then advanced by a small fraction and the process continues until the complete image has been scanned.

When scanning a line, a small beam of light is focused onto the page and the intensity of the light returned is measured. The interface box then converts this measurement into a series of binary codes which are read by the Master Scan software. Using a complicated algorithm to average the incoming codes, a screen image is produced; but, as the PCW cannot display pixels of different intensities, the density of screen pixels is used to emulate grey tones.

Picture show

If you never made it to the Personal Computer World Show at Olympia in September, you missed out on a lot of fun and a lot of new and exciting products. Derek Cohen presents his view of the products and people that made the event worth visiting. Photography by Tony Sleep.



Over 400 exhibitors and 75,000 visitors made for a very hectic five days for the PCW editorial staff. As journalists we spend much of our time communicating at a distance — by phone or by letter — so the show provides a great opportunity to meet readers, dealers and manufacturers in person.

PCW itself had three stands at the show. In the National Hall, we showed off some of the machines that had graced our covers over the past year. Clive Sinclair's Z88 was supported by the obligatory chimpanzee, and Acorn kept its Archimedes up to date with daily changes to its crowd-pulling graphics demo. Other machines we displayed included an Apple Mac II and the Atari desktop publishing system.

Available free was a reprint of the actual cover of each issue featured

along with a summary of the Bench-test. Sorry, but we can't supply these by post — we gave them all away at the show.

For those of a less serious nature, PCW helium balloons and T-shirts were in great demand.

In Olympia 2, expert writers such as Kathy Lang, Graham Jones, Peter Jackson and Steve Gold were available to dispense technical advice. One person had a good three-quarters of an hour consultation — think how much that would cost on the open market.

Research Machines' implementation of the Domesday laserdisc system was available for visitors wanting to locate their home town or to look up words in its gazetteer. One wag looked up the word 'whip', expecting something at least slightly salacious. The only reference came

under 'British Government'.

We were very pleased and somewhat humbled by a visit from Wladyslaw Majewski, deputy editor of a Polish magazine called *Komputer*. His publication sells 200,000 copies a month, and issues he showed us contained reviews of IBM PS/2 machines and the latest in business software. There are clearly technological holes in the iron curtain.

The great Polish interest in computer publications stems from the fact that few people can afford them. The average PC costs about as much as the average worker's annual income. So, they buy magazines and dream.

On the following pages we present a summary of just some of the items which we thought worth reporting on. If we've missed out your favourite find at the show, write in and tell us.

Acorn

The Acorn stand raised much interest as the show saw the first public appearance of the Archimedes. Despite the onslaught of music from the neighbouring US Gold stand, the company's auditorium was always full with people eager to watch the brilliant displays of animated graphics. Nonetheless, it was surprising how little software was available for the new machine considering that the development models have been with developers for quite some months.

One product available was the game Zarch, whose demo version, known as Lander, is included on the Archimedes Welcome disk. Also on display was the software PC emulator and Lotus 1-2-3 was shown running on an Archimedes 310.

Ajwad

An EGA card for £99 sounded very good value so it's a pity many people might have missed this company's stand tucked away in a corner of Olympia 2. Worth noting also was a Compaq Portable clone with many display and processor options. At the time, Compaq hadn't announced its Portable 386, so the machine's case was quite empty.

Ajwad's Tony Moriarty said at the time: 'We'll see what they put in their machine, then copy them and undercut the price.'

Amstrad

The clacking of daisywheel printers failed to attract the thousands as Amstrad's new PCW9512 and PC1640 were unveiled to the public. Nonetheless, many people thought the extra capabilities of the two new ranges of machines worth a look.

Arade games

If you've never enough change or skill to get a decent go at some of the better arcade games, the PCW Show was an ideal place to be. All the games were free, and there were queues to sit inside the more animated car-racing games. Mastertronic had more than its fair share and included a game that made use of the Atari ST 3D spectacles.

A photo we regretted missing was of the Bally arcade machines on this stand. You may have read that Bally has bought the rights to use the Amiga chip set inside its units. What we didn't expect to see was the Amiga 'Insert the Workbench' screen on these machines. If you want to know what Commodore has done with its A1000s now that the A500 is all the rage, look inside a Bally machine...

Cambridge Computer

The PCW Show attracts an international audience and one of the most outstanding beneficiaries was Sir



The Acorn Archimedes' PC Emulator



Cambridge Computers, Sir Clive Sinclair and friend

Clive Sinclair's stand. Z88s and peripherals were available to be bought 'over the counter', and no less than 37 overseas potential distributors had discussions with Sir Clive and his team.

Also on this stand were third-party manufacturers showing such delights as a file link to Amstrad PCW machines, and an adventure game that makes use of the graphic page display.

Cameron Elektronik products

Perched at the entrance to Atari World, this German company was demonstrating a hand-held scanner

which can import graphics into a range of software packages on both PC-compatibles, Amigas and Atari STs. The size of a large mouse, the £300 device is rolled across the original artwork or photograph and, immediately, the image appears in a paint-package document on the host machine.

Packages supported at present include PC Paintbrush, GEM, Ventura, Pagemaker, Microsoft Word and Dr Halo as well as paint packages on the Amiga and ST. Cameron's phone number in Germany is (07 11) 777 5118 although Lightning look set to distribute the product in the UK.

PCW SHOW 1987

Desktop Publishing

As part of the desktop publishing feature of the show, a daily newsletter was produced on site. David Tebbutt, PCW's consultant editor, Maggie McLenning, the Show news editor, and Henry Budgett, editor of *Desktop Publisher*, were captured by our photographer 'pretending to use a computer ...'

Electromusic Research

Mike Beecher's claim to fame (or infamy) is that he usually makes more noise at a show than anyone else. His camp and exuberant demonstration of his MIDI interfaces, backed by a microcomputer-driven wall of sound, usually packs the aisles and drowns out his neighbouring exhibitors. (At this year's Which Computer? Show they opened up a new section of the hall specially for him to broadcast into.)

Hantarex

If you thought sitting too close to the television would damage your eyes, try the front row of the computer class with one of these instead of a blackboard. Grotty CGA characters have never loomed so large as on Hantarex's 28in computer monitor which is designed mainly for educational use. The model will also interface to C128s, Amigas and Atari STs.

Mattell

The Nintendo games machine has already been reviewed in these pages (October issue), so we paid more attention to another showcase on this stand.

Did you ever stop in Woolworth's last Christmas and wish you had an axe to silence an animated teddy bear that told sentimental stories in a syrupy American accent? By the time we found Teddy Ruxpin on this display stand, someone had already got to him. Teddy Ruxpin had been disassembled and was totally silent. Bliss.

MicroProse

Highlight of the National Hall was the helicopter flight simulator on the MicroProse stand. Guests were invited to sit inside the simulator and play a special version of *Gunship*, with the simulator's equipment controlling both the game and the simulator. So, when your helicopter listed over to the left on the screen, so did you.

Trainer Marti Peck kept in voice contact with the 'pilots', viewing their performance on large-screen displays of the game. Marti found the simulator in a high-tech junk shop and now offers it around to training organisations as well as an extravagant games company or two.



PCW's David Tebbutt with Maggie McLenning of the show organisers



Hantarex monitors

Olivetti

Olivetti caused much murmurings in the trade by its threat to show Microsoft's new Windows 386 front-end from the beginning of the show, thereby pre-empting Microsoft's own announcement.

Backroom diplomacy saved the day, it seems, and from day two Olivetti's M380s were frantically opening and closing windowed tasks. In its eagerness to be first with the new product, however, Olivetti seems to have been let down by its

sign-writers — saying that Windows can run up to four tasks at once is something of an understatement.

Palace Software

Where does legitimate fun end and plain pornography begin? The promotional graphics for *Barbarian* look like they belong in *Penthouse* rather than the PCW Show. But, many otherwise sane and civilised men took the chance of a free play of the game. If lopping people's heads off and watching the blood spurt out



The Davrelle boys



The Taiwan Village

was your idea of fun, this was the place to be. And the graphics in the game are nothing like those on the poster.

Rainbird

'Dick Special: The Search for Spook' is an animated graphic adventure written by Ant Attack authors Sandy White and Angela Sutherland who have spent two years on the project. You play the game by manoeuvring Dick Special around his world, which may not seem so special. Games

such as King's Quest have already used this technique. In Dick Special, however, the size and movement of the characters is quite stunning. Amiga and ST versions will sell for £24.95.

Also on this stand was the latest magnetic Scrolls game, Jinxter, set in a world of magic and humour. The subtle graphics and clever puzzles should give Anita Sinclair another hit. As usual with Magnetic Scrolls games, Jinxter will be available on the usual wide variety of machines

and cost between £19.95 and £34.95.

Scicom

A touch screen and interactive laser-disc module for the Amiga was one of the highlights of the Commodore Village. Priced at £1500, a simple ASCII file can be used to control both the disc and the text that appears on the screen.

Scicom's laser disk control language includes commands such as 'TOUCH' to accept a touch from the screen, 'PRINT %' to display a string on the screen over the video picture, and 'FRAME %d' to go to a frame on the disc.

Soft Image Systems

The Davrelle boys — Dave Reid and Morel Fourman — used one of those huge Mitsubishi televisions to demonstrate their presentation graphics package which we use to present PCW's Benchmarks (see 'Time trials', November issue). Not content with filling their stand, Dave and Morel Davrellated all over the corridors as well as the crowds gathered to watch an impressive demonstration of presentation graphics.

Taiwan Village

Taiwanese electronic components and computers are commonplace in the High Street these days, but rarely is there a chance to meet the people who produce them. Companies with names such as Brotherbox (which makes the PC in a Mac case described in 'West Coast' last month), Chicony, Sun Up and Tseng proudly showed off copies of practically every kind of personal computer. All were delighted with the level of interest and many distribution deals were discussed, so watch for some of these products to reach the shelves of UK dealers in the future.

Tulip

This Dutch company had probably the largest stand in Olympia 2 and launched its 386-based machine as well as an AT Compact. The latter machine's small footprint is achieved by placing the hard disk drive over the power supply. As Tulip's machines are built to a high quality, there shouldn't be any problems.

Victor

Victor's marketing manager, Cindy Bowie, and managing director, Bob Webb were pleased with the interest shown in their AT with a removable hard disk, shown on one of the largest stands in Olympia 2.

Their disappointment at not making the finals of the British Micro Awards can't have been helped by photographer Tony Sleep's enquiry as to whether the hard-disk case to the left of the machine was a 'bell chime'. **END**

Alan Kay: face values

Alan Kay has had a profound influence on the microcomputer user interface. Mice, icons, windows and the Smalltalk programming language can all be attributed to the team he led at Xerox PARC in the 1970s. Robin Webster talks to him about his work, from those early days at Xerox and the creation of the Apple Macintosh to his current work with software fish-tanks!

Consider the magician's top hat ... is it not one of the most singular user interfaces ever? The magician only need reach in and retrieve whatever he wishes, whether it is a bunch of flowers or a rabbit. While its operation may be mystical, its purpose is readily apprehended.

In many senses, software developers are striving to emulate that top hat, to find a delicate balance between power and ease of operation that will open up the potential of the computer to everyone without demanding too great a price.

Personality

One of the most imaginative and influential computer scientists involved in shaping the ways in which people interact with computers is Alan Kay. Now an Apple Fellow with Apple Computer in California, Kay is best known for his early work at Xerox's Palo Alto Research Centre (PARC) on the Smalltalk language and the notion of the Dynabook computer.

Although Kay intended the Dynabook to take a number of forms, the most famous is the notebook-sized version which would have a full-page graphics display capable of mimicking paper and ink in its clarity, and a variety of processors to provide the power to handle sophisticated computing tasks.

So what happened? Why don't we have a Dynabook today?

'Well, my timetable for the Dynabook was 1982,' said Kay. 'It wasn't just a hope, though, I really expected that it would be a reality by then. Many of the technologies and concepts required to make the Dynabook

possible were already in place or easily predictable.

'For example, Gordon Moore, one of the guys who started Intel, wrote a paper way back then predicting what would happen with silicon. Basically, he said here's what the physics of silicon are when you are trying to make transistors from it, and here's what happens when you try to go smaller and smaller as far as power and speed and so on ... he drew this curve that extends into the year 2000 and shows the kind of progress to expect — in 22 years he's only been off by about 5%.

'Personally, I was off by about five years in predicting the flat display screen because I had no idea American industry would just drop the technology so that we would have to wait for the Japanese to move in and take that particular business over ... The one technology I was completely wrong about was magnetic bubbles — I certainly haven't been able to figure out whether it is inherently a bad idea or whether there are just a thousand times more people working on CMOS technology.'

The fact that the Dynabook remains an unfulfilled idea is only one symptom of what Kay sees as a fundamental problem in the way computer developments take place today.

'I started programming in 1969 and so it always makes me smile a little when I see the hyperbole used in computer magazines to describe things that were actually first done years ago,' said Kay.

'Whenever I give a talk, I often start by saying that there really was life in the 60s and that many of the

seminal ideas we are still trying to work out are due to people from that time. People back then had a more complete vision of what a computer system should be able to do. There's a real problem with trying to have a complete vision today because of the urgency to go out and get people to buy something — there's no effort to think it through all the way. In the 60s, people who worked on design projects were true believers. They actually cared about what the product was and what it could do. There are a few people like that today, but most are trying to make a quick buck.

'A good example is that you can't find a user interface that is more advanced in terms of qualitative features than the one we designed 15 years ago at Xerox PARC with windows and all that stuff. The point is that there have been 15 years to invent something else. I would claim that the rise of PCs has formed a sort of Gresham's Law ... you know, Gresham's Law is that the bad money drives out the good. Therefore, it's easier to do bad software than good software.'

A major reason for mediocre software is that most developers are not willing to face up to the immense amount of incubation that it requires to turn a good idea into a good product, says Kay.

'Consider that the first wave of stuff at Apple was really built on the shoulders of many PhDs who figured out how to produce silicon chips, and that the second wave of stuff from Apple (the Lisa and Macintosh products) was built on probably \$100

TAS-SPELL PC

THE SPELLING CHECKER

man Software Ltd and Longman Group UK Ltd

TAS-SIGN PC

THE SIGN MAKER

© Tasman Software Limited 1987

TASWORD PC

THE WORD PROCESSOR

TASPRINT PC

THE STYLE WRITER

TASCOPY PC

THE GRAPHICS PROCESSOR

Five powerful programs for the IBM PC and compatibles. Use the coupon below and send today for our free comprehensive brochure. Quality, performance and great value for money.

TAS-SPELL PC

THE SPELLING CHECKER

Spelling mistakes and typing errors spoil any document. TAS-SPELL PC can check the spelling of TASWORD PC text at over 4000 words per minute.

TAS-SPELL PC includes a comprehensive dictionary of over 70,000 words provided under license from the Longman Group UK Ltd. You can add your own specialised words to the dictionary. The dictionary contents can even be displayed giving on-screen reference at the touch of a key!

£39.95

TAS-SIGN PC

THE SIGN MAKER

Produce and print your own signs, posters, banners and large notices to get your message across with maximum impact.

Print across the paper in the usual direction OR along the length of the paper to produce large eye-catching banners and notices. Four distinctive lettering styles, in addition to italics, underlining, constant or proportional letter spacing. Characters can be printed at any height from less than one inch to the full width of the paper.

£39.95

TASWORD PC

THE WORD PROCESSOR

Power and versatility combined with a remarkable ease of use. Whatever your needs, from a simple letter to a best selling novel, TASWORD PC can meet your requirements. Simply and efficiently.

TASWORD PC combines a remarkable ease of use with a host of useful features: detailed on-screen help at the touch of a key, comprehensive print options, on-screen formatting, an indispensable range of text editing commands and even a built-in mail merge. Power, flexibility and ease of use combined into one program.

£29.95

TASPRINT PC

THE STYLE WRITER

Give your dot matrix printer a new dimension of exciting capabilities. Print output from TASWORD or almost any other program in one of the distinctive TASPRINT typestyles. Ideal for notices, headings within documents, and for that special letter that must command attention.

TASPRINT PC drives all dot matrix printers with full bit image graphics capabilities to form, with a double pass of the print head, output in any of 25 distinctive fonts. The program also includes a font editor which you can use to create your own lettering styles.

£29.95

A complete graphics package for dot matrix printer owners. Edit and enhance screen copies and create your own diagrams and pictures. Capture copies of the screen while running almost any other program. Print diagrams and pictures from within Tasword and most other programs. Create your own lettering styles, formulae, symbols and logos to annotate your TASCOPY diagrams. The applications of this suite of programs are enormous — letter headings, logos, formulae, chemical structures, bar charts and graphs.

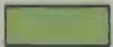
£39.95

Available from good stockists and direct from:
DEPT. PCW, TASMAN SOFTWARE LTD., SPRINGFIELD HOUSE, HYDE TERRACE, LEEDS LS2 9LN. TEL: (0532) 438301.
If you do not want to cut this magazine simply write out your order or brochure request and post to the above address.

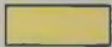
All prices include VAT and post and packing.

I enclose a cheque/P.O. made payable to TASMAN SOFTWARE LTD or charge my ACCESS/VISA number for the items marked below (tick box):

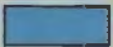
Please send me your comprehensive brochures on your PC products. ☐



TAS-SPELL PC
£39.95



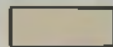
TAS-SIGN PC
£39.95



TASWORD PC
£29.95



TASPRINT PC
£29.95



TASCOPY PC
£39.95



Telephone ACCESS/VISA orders:
LEEDS (0532) 438301.



Name: _____

Address: _____

PCW/12/87

Overseas: The following distributors of Tasman products may be contacted for the address of local suppliers. Many products are supplied in translated form. FRANCE & SWITZERLAND: Semaphore Logiciel La Plaine CH 1283 Geneva. NORWAY: Keltdata Postboks 192, 1371 Asker. PORTUGAL: Indonova Campo Grande 28 4 A 1700 Lisbon. NEW ZEALAND: Software Supplies P.O. Box 865 Christchurch. GERMANY: Prosoft Softwarehaus Str. 50/52 D 4500 Osnabrück. RSA: Spectra Rentals P.O. Box 2733 Johannesburg. BENELUX: Filisoft P.O. Box 1253 9701 B Groningen. DENMARK: Quicksort Baldersgade 46 9-11 DK-1804 Frederiksberg C Copenhagen. AUSTRALIA: Dolphin Computers Unit 2, 7 Watlington Street Artarmon NSW 2064.

INTERVIEW

million worth of development by Xerox.

'In the 60s, you had basically 10 or 15 people who were personally involved in most of the major advances in computing. There's Ivan Sutherland, for example, who was the developer of computer graphics as we know it today — that is, interactive computer graphics. Twenty-five years ago, Ivan started working at MIT on something called Sketchpad. All his work was done on a machine the size of a gymnasium which was slightly less powerful than a 512k Macintosh. Nevertheless, Ivan believed that the pictures on the screen should be a representation of some meaningful structure inside, and so Sketchpad was the first object-orientated programming system: it had objects, instances, and classes.

'There is no graphics system today that runs as well as Sketchpad did 25 years ago — there's no question about that. Also, if you look at today's spreadsheets, they provide just a glimmering of what Sketchpad could do. Sketchpad could solve simultaneous on-linear problems that involved many iterations of something — most spreadsheets can't even solve problems that have any kind of circular relations in them at all.'

Nothing new

Kay even rejects the idea that the in-vogue concept of hypertext — as typified by products such as Bill Atkinson's HyperCard (see review in PCW's November issue) — is new.

'There was a system called NLS in the mid 60s — in many ways every bit as good as HyperCard,' he said. 'NLS was developed by Doug Engelbart and it was the first living hypertext system. Furthermore, you could do group collaboration with it, which none of today's systems can do.'

Nevertheless, Kay believes that the HyperCard will have a major impact on the way people get things done with computers.

'The hardest thing about giving people building blocks is deciding how much architecture you should build in. Smalltalk was very successful because some of the systems level architecture was provided so that you had to go to enormous lengths not to do something the way Smalltalk wanted you to.

'The same thing is true about HyperCard — although we don't even call it programming. It's called scripting instead. Basically, HyperCard forces people to do object-orientated programming for the first time ever. The reason the scripting language was called Hypertalk is that a lot of the ideas came from the early Smalltalk, although, paradoxically,

it is less complete.

'While HyperCard has some flaws, the flaws are far outweighed by the fact that the context is so powerful it lowers the threshold for programming,' added Kay. 'It's much closer to what I have in mind.'

Generally, Kay is not too impressed with the kind of hardware that is available today, though he admits to being fairly well-disposed towards the new Macintosh II system.

'Well, let's put it this way. When the first Macintosh came out I said that it was the first personal computer good enough to be criticised. And now, in my opinion, the Macintosh II is the first microcomputer that's actually good. Mind you, it's still a subset of the stuff we did at PARC — it takes us to about the level we reached at Xerox in 1978-1980, something like that.

'There's a real problem with trying to have a complete vision today because of the urgency to go out and get people to buy something...'

'I really think that things could have gone a lot more smoothly with regards to computer hardware. I was once quoted, correctly, as saying that 8-bit micros are no good, and I was right, even though I was criticised for saying it at the time. There's nothing like 80 million of those things out there, is there?

'The micros that everybody will be using in the future are going to have exactly the specifications I predicted almost 20 years ago because it's a trivial prediction. All you have to do is ask how fast the human nervous system is and how much faster again do you need a computer system to be before it is both fast enough and high level enough to be useful?'

Foundation

Kay points to the late 60s and early 70s as being a very important time for him, a time when his perceptions of computing were altered by a series of key, and sometimes unlikely, events.

'I was at the University of Utah in the late 60s and got a consulting job at an aerospace radar company with a guy called Ed Cheadle. Together

we developed something called the Flex machine. It had an object-orientated language, called Flex, that actually repelled users when we tried it on them. It was a little bit too much like dealing with APL, even though it was extremely powerful. There were just too many commands to learn.

'It was then that I realised that graduate students were really bad at designing user interfaces, since part of the puberty rite of being a graduate student is proving you can deal with systems that have 500 lousy commands, just for the sake of it.

'It was just shortly afterwards that a number of things happened. I became aware of Seymour Papert's work with children and the LOGO language, and that gave me a completely different perspective. The kids weren't faking, they really were using the language to do things, even if it was only creating effects. I said to myself, boy, you should never design a computer system that children can't use. That became a total rule, and I've never designed a system since that wasn't designed for children first.

'I also started reading McLuhan and there was the realisation that computers were a type of media and not tools. This was just the opposite to what I had been thinking, it was unbelievable.'

Armed with these new perspectives, Kay then tried to figure out his next step.

'One of the best things about getting interested in how children might use computers was that it got me to read books I would never have read before — books by authors like Piaget and Bruner. I didn't get much inspiration from Piaget, but Bruner was really amazing. If you want to design a user interface you should read his book *Towards a Theory of Instruction*; it is quite remarkable.

'Basically, he was saying that there were three very different ways of apprehending the world: a muscular, or enactive, stage; an iconic stage; and a symbolic stage.'

Now, about 1972, Kay published his first paper at Xerox on the Dynabook concept. It was only three years later that he chanced upon what he calls 'the missing link' between all the different ideas he had collected.

'We were trying to understand what the mouse and stylus would mean to a user, then one day I happened to be watching television when this guy called Tim Galway, who wrote a book called the *End Game of Tennis*, came on.

'ABC Television didn't believe what Galway had said in his book about being able to teach anybody to play tennis and so they had challenged

him to prove it. They found 35 people who had never played tennis before and then picked the worst one, who was a 55-year-old lady called Molly Groger. She was 40 pounds overweight and had not exercised in 20 years.

'They put live television cameras on Galway and said you have 20 minutes to teach her tennis, and he did. He got her to play a set of tennis after 20 minutes of instruction. I went bananas when I saw that and immediately went out and got a copy of the book. It was full of great stuff.

'I realised then that one of the things you get out of giving somebody a pointing device is that you energise their enactive mentality ... the kinesthetic senses of the body ... the body knows where it is and where things are in relation to it.

'As far as icons are concerned, they had been around since the late 1960s. Icons are basically used for memory. There are two strong characteristics about the iconic memory: one is that it is basically a bulletin board, which means that you have a number of things in the same field at one time; and the other is its incredible ability to remember images. There was an experiment done in which 25 people were showed 10,000 images spaced ten seconds apart. Even after a month, all 25 people had better than 90% recall in terms of being able to say whether they had seen an image before. They could even identify many images despite the fact that they were covered.

'The third stage of apprehending the world, the symbolic stage, is the slightly more sinister one of the three, because it is very good for creativity and that means it is also alchemical. It is with this way of thinking that what you might call 'strange associations' are possible. This is where things that are not really two sides of the same coin — black and white, good and evil — become fused. There is a wonderful book written about the turn of the century which showed that, regardless of religion, all primitive societies around the world have basically the same rules for magic.

'The author was an early anthropologist and he was trying to say that this shows there is something deep and elemental about the way the human mind works. It is kind of interesting if you think about science in these terms since science is magic with some power thrown in and what we do with a mathematical model is exactly what a person in a more primitive society is trying to do with a voodoo doll. They are trying to make something they can manipulate, and which will in turn manipulate the external world.'

Halted progress

In terms of the ways in which computers are used today, Kay believes that most people are more or less treading water.

'We're using computers today just like we use a pencil,' he said. 'We're just making marks and looking at marks. Most of the content is just paper content, even with the fancy windows and other kinds of embellishments. Not only that, it's semi-literate paper content in that users are not expected to be able to do any creation of tools for themselves. It's like teaching a bunch of people to read just a little bit and then giving them comic books.'

Despite the slow progress of the Dynabook, and his general contemptuousness, Kay talks hopefully about



new technologies that may yet be featured on the device when it appears.

'I suppose if Xerox had become really interested in the idea, we could have had a flat-panel display of the type I described by 1980/1981. The reason I say this is that Xerox has an outstanding technology for making flat screens — it isn't a liquid crystal display, but something called a particle migration display.

'Five years from now this technology will replace all the liquid crystal displays because it looks essentially like paper. The surface of the display consists of tiny glass spheres that scatter the light evenly, and the contrast ratio is about 40:1 compared to the usual 10:12:1 you get with liquid crystals. But it's important to realise that in the labs in Japan right now are liquid crystal displays that are good enough for a Dynabook.

'Of course, the other way to do Dynabook today is to have it the size of your Sony tape recorder and have a head-mounted display. Not with CRT monitors, but with imagings on a silicon chip, which is easy to do.

'In fact, I predict that silicon-based displays will be a dominant display system over the next 15 years. The reason for that is that there are some very nice sensors for tracking head motion. So now you are sitting in an aeroplane and you have a display that is the size of your entire visual field and is entirely private to you. That display is very technically possible and is almost certainly going to happen.

'McDonnell Douglas has been working on an even more ambitious, head-mounted system which is called a variable acuity display. This is based on the idea that you are legally blind outside of a two by three degree field. So, if you put a number of pixels in the right place on a person's retina, you can give them a subjective sensation of infinite resolution — in fact, it could be something like a million pixels concentrated in one spot. The idea is that when the eye moves, the device that is shining the pixels in there has to move with it and so it always keeps the pixels on the same area of the fovea. The size of your fovea is about the size of the end of your finger at normal viewing distance ... you put a million pixels in there and you really think it is high resolution.'

Will this kind of display system mean that we no longer need such artefacts as windows?

'That's right, windows will no longer be needed for their space-saving attributes. Instead, windows might be used as a method of navigating around the extremely large viewing area available to you. It's worth remembering that the drawing area on the old Sketchpad system was a third of a mile on each side.'

Current projects

Nowadays, as an Apple Fellow, Kay has the freedom to develop his own projects. Currently he is working on an AI-orientated project based in a Los Angeles public school where children as young as five years old are learning how to use Macintosh computers.

'My new project is called the Vivarium, an honest Latin word that basically means a protective enclosure for all living things. It came out of another person's idea, Ann Merriam, who worked for me when I was at Atari. For a while there we were working on interactive movies, the concept of creating movies you get involved with in some particular way.

'One of the questions raised was whether we could do semi-intelligent cartoon characters because Warners owned Atari and Warners also owned the *Bugs Bunny* cartoons. In the midst of all this stuff Ann Merriam was stubbornly thinking about some-



Two Little Ducks

20MB-£199

ex. VAT

40MB-£299

ex. VAT

We've done it again!

Kudos Systems were the first to bring you a complete 20MB hard disk system for less than £300. And now the Kudos HarDisk 20 is back – for an amazing £199 (ex. VAT). We've also hatched the Kudos HarDisk 40 – a complete 40MB hard disk system for only £299 (ex. VAT).

If you canardly believe it then give us a wing on 01-200 6511 or clip the coupon below.

Kudos HarDisk 20 – £199 ex. VAT

Includes: Miniscribe 5¼", 20MB hard disk drive, Western Digital controller card, cables, manual and utility disk.

20MB Amstrad fixing kit

– £11.95 ex. VAT

Fixing kit and modified front bezel for installing the HarDisk 20 in an Amstrad PC.



**Rubber Ducks
Now
Available**

The Kudos Systems Price Guarantee

If you buy from Kudos Systems then discover that you could have bought the same products at an advertised UK price lower than ours, then we will refund the difference.

Kudos HarDisk 40 – £299 ex. VAT

Includes: Miniscribe 5¼", 40MB, hard disk drive, Western Digital controller card, cables, manual and software.



AMSTRADS – Lowest prices guaranteed – phone for details

All Kudos Systems' products come with a 12 month no-quibble guarantee

To Kudos Systems Ltd, Capitol House, Capitol Way, Edgware Road, London NW9 0ED

Please rush me the following products:

(Qty)	Kudos HarDisk 20	£241.50
(Qty)	HarDisk 20 fixing kit for Amstrads	£13.74
(Qty)	Kudos HarDisk 40	£356.50

★ Prices include VAT and courier delivery to your door

TOTAL

Please send me your latest information pack ☐

I enclose a cheque for £

or debit my Visa Card Number

Name

Company

Address

Postcode

Telephone

Approx No. of PC's in Company

If you're a government department, education authority or PLC, just send us an official order and your goods will be despatched on the same day. If you're a dealer and would like a copy of our dealer datafile call Gary Munz on 01-200 6511. For details of our personal export scheme call Karen Bond Sax on 01-200 6511.

Kudos Systems Ltd
Capitol House
Capitol Way
Edgware Road
London NW9 0ED

Tel: 01-200 6511

Tlx: 8813241

Fax: 01-205 3911

Personal callers welcome – Call in and save on delivery charges.

KUDOS
Systems
LIMITED

All tradenames and product names are the property of their respective manufacturers/owners.

The 1987 Business Micro of the Year goes where no other micro has gone before.



Inside this ordinary looking parcel is an extraordinary idea: a Winchester hard disk that is small enough and rugged enough to post.

We've called it the Tandon Data Pac and it's the first of its kind.

And thanks to five very demanding industry judges Tandon's PAC 286 system has been voted Business Micro Computer of the Year.

To win the UK's most prestigious computing award we had to beat some strong competition, particularly from the two runners up Zenith and Compaq.

We also had to meet some challenging criteria:

The panel of judges was looking for technical innovation, flexibility, ease of use as well as value for money.

They found that the system's unique separation of data storage and actual computing met the challenge.

Because the hard disk Data Pac is completely portable, the user simply slots all their stored information into and out of a 286 computer. Whether it is in their own office, a colleague's, or at home.

Our PAC 286 means total data mobility.

The judges also found value for money since the 286's low price means the user can afford two computers to work on.

For more information on Tandon's compatible micros simply send us the coupon.

That way we can keep you posted on all our award-winning ideas.

Please send me more information on Tandon's low price, high quality computers. Tandon (UK) Ltd., Freepost, Redditch, B97 4BR. Tel: (0527) 46A00.

Name _____

Job Title _____

Company/Address _____

Postcode _____ Tel _____

Nature of Business _____

No. of Employees _____

No. of installed PCs _____

Tandon

INTERVIEW

thing else. She had made many proposals before I finally got the idea which was: "Wouldn't it be interesting to do something where the characters aren't very intelligent by themselves, but in which the whole conglomeration of them is fascinating."

'So she came up with the idea of something she called the "Aquarium", the idea being that you let children build their own animals such as little fish. These fish would not have more intelligence than a fish would have, but they would interact and go off and seek food and carry out realistic actions. The fascination of them would be like the fascination of an aquarium. When I finally got the idea I got very excited and worked on it a little bit, then Atari went down the tubes.

'Then in 1985, about a year after I joined Apple, I visited a school called the Open School near where I live in Los Angeles. It is really the most wonderful public school I've ever seen and it was interesting because the teaching process was so good that they didn't need computers: I thought this is a place where we could really do the aquarium project ... a school that doesn't need to be fixed.

'Although Anne had gone to Hewlett-Packard I thought about the idea for a while and eventually raised it up from an aquarium to a vivarium — it wouldn't just be for fish, but for all types of creatures.'

Kay took the idea to Apple chairman John Sculley and the Apple board for approval. He got an immediate go-ahead.

'I immediately called up Ann and she's now running the project. We've been in the school for about a year. At Xerox PARC the context of our work was what if everybody had a Dynabook? What could they do with it? The two main things we chose to work on at my group at PARC were access literacy (the equivalent of reading a book) and creative literacy (the equivalent of writing an essay).

'The children involved in the Smalltalk project were an important key, to the context, because designing for them made you think of a rule that simple things must be simple and complex things must be possible. The context in the Vivarium is: "What would it be like for people to do their own artificial intelligence programming?" We're really talking about end-user AI. What would it be like to create your own intelligent agents: semi-intelligent entities that take on your goal structure — that go off and do things? You may not see them more than a few per cent at a time, but that's because they are acting according to the constraints you've applied to them.'

Intelligent agents, in terms of the Vivarium project, are user-created characters that exist only within the confines of the computer software being used. The purpose of these agents is not clear cut: they may be used to just stimulate the ways in which various creatures might behave in isolation and in groups, or they may eventually be sophisticated enough to do the users' bidding, such as retrieving information from a database.

At this point, though, Kay stresses that virtually all the work taking place at the Open School, using hundreds of Apple-donated Macintosh systems, is exploratory and that there are no really specific goals that must be met.

'We're using computers today just like we use a pencil. . . We're just making marks and looking at marks. Most of the content is just paper content, even with the fancy windows. . .'

'It's a six-year project and we're really just getting started. It's very hard to think about what an agent might be, and what would it be for children, and how to go about defining one. The Vivarium has been set up as a forcing, catalytic project where we're saying we are going to teach very young children — from grades 1-6 — about animal behaviour.'

Currently, the children at the Open School are using readily available Macintosh programs such as Videoworks and HyperCard with laserdisc systems to create frame by frame animations of aquatic life forms in their underwater domains.

Kay, in the meantime, is working on the special software that will be needed to more fully implement the concept of intelligent agents. As a first approach, he is using a state-of-the-art flight simulator system produced by Evans and Sutherland (a company co-founded by Ivan Sutherland of Sketchpad fame), as a proving ground for some Vivarium interface design concepts.

'Right now, we're busy figuring out first how we might go about creating agents ourselves,' he said. 'With the

flight simulator we are able to generate 3D graphics with lots of scene details at 60 frames per second in real time. What we've been looking for here is a visual style, something like Walt Disney's *Fantasia*, that has pastel colour animation.' Kay has videotapes of these early 3D explorations that suggest the extraordinary potential of the Vivarium project.

'Here's a first pass we made at the idea,' said Kay, while showing a tape of two shark-like creatures swimming undersea. 'This represents a thousand miles of Australian Barrier Reef, and these are artificial beings, generated in real-time, that we were able to define over one weekend. Basically, nobody has done this kind of thing in 3D graphics yet, so we have to solve a bunch of adult problems. We're working entirely in real time to keep ourselves honest because you can do arbitrarily good-looking things in non-real time . . .

'What you have to realise about all these flight simulator-based tests is that they are just tests. During our Smalltalk work we didn't give children a Mac Draw program to work with, they created Mac Draw applications of their own. Similarly, we're not going to give the children any of this flight simulator stuff. Instead, our job is to take the work that us adults have done and come up with a user interface and a new kind of programming language that will allow the children to come up with similar results in a matter of hours rather than weeks. They will program not only the graphics, but also the intelligence, the brains of the animals.'

The way forward

Although Kay resisted speculating about any really specific end results of the Vivarium project, he did give an inkling of the kind of applications that could emerge from it.

'Eventually, when this stuff is sophisticated enough, the children will be able to turn their artificial animals into agents that can actually carry out tasks for them . . . creatures may be intelligent enough not only to be taught a particular task, but to deal with a task when it becomes intractable.

'An example of one agent I designed in the past is Newspeek that is at the Media Lab at MIT. Newspeek is an agent that stays up all night reading a dozen or so different news sources trying to put together a personal newspaper for you to read at breakfast.

'In a research project like Vivarium, though, you can't look for or worry about goals, you can only look for directions. And that's what we are doing, looking for directions . . .' **END**



SCREENTEST

Microsoft Excel

Microsoft Excel is a powerful, sophisticated spreadsheet which runs under Windows and has the potential to overtake Lotus 1-2-3 in the popularity stakes. But how do its features compare with those of its established Macintosh relative? Anthony Meier finds out.

Microsoft's new spreadsheet program, Excel, looks set to leave Lotus 1-2-3 and its lookalikes well behind in the spreadsheet stakes. It promises to be the most powerful and user-friendly spreadsheet written to date. It is being introduced as the third-generation spreadsheet for personal computers, and is designed primarily to run on machines based on the 80286 and 80386 microprocessors. Macintosh users will be familiar with this program already, as a version of Excel has been available for this machine for 24 months or so (see the 'Function comparison' box for a comparison between the two versions).

Overview

Excel is a sophisticated piece of software which offers many advanced spreadsheet facilities and programming features, an integrated onsheet database and a wide range of charting and graphing facilities. It is the first spreadsheet in the MS-DOS environment to offer interactive, dynamic linking of worksheets, a one-step automatic macro recorder and high-resolution output. It runs under Microsoft's Windows 2.0 and takes full advantage of all its facilities, providing multiple worksheets in overlapping windows onscreen, pull-down menus and full mouse operations.

A run-time version of Windows 2.0 is bundled with the program for users without the full version. A version of Excel is also planned for the OS/2 operating system. Windows 2.0 has an identical interface to that of OS/2 with Presentation Manager, so Excel users should find making the transition to that new operating system easy.

The machine I used for the review

was a Dell 286 with a 20Mbyte hard disk, EGA card, colour monitor and mouse. I also had an AST card installed which increased the memory from 640k to 2.5Mbytes to give more room for testing large spreadsheets. There is only about 140k available for data on a standard 640k machine.

Installing the program on the hard disk was very simple. It involved inserting the setup disk, typing 'setup', and following the instructions given on the screen. These asked for the other disks supplied to be inserted one by one until all the necessary files had been copied across. I was supplied with 14 disks, eight of which contained the files for Excel, the other six were files for run-time Windows.

In use

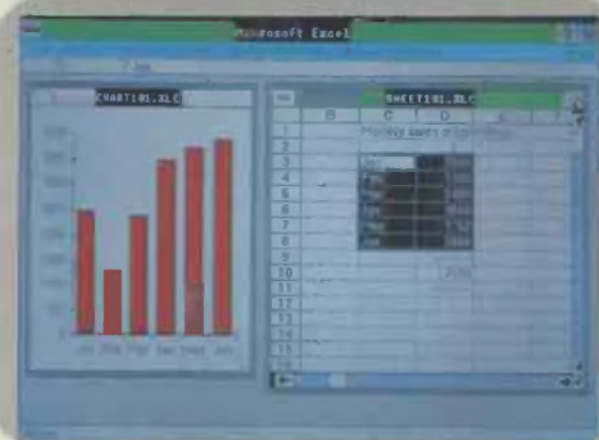
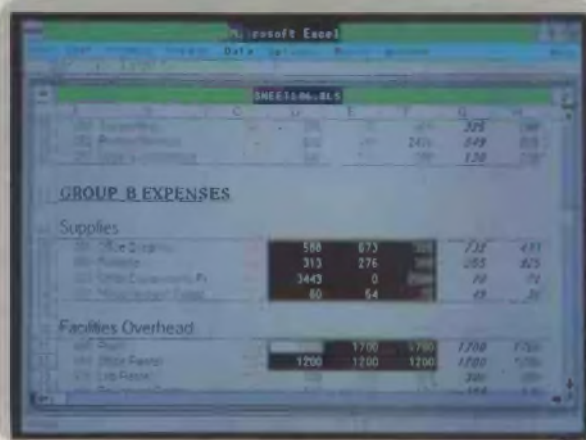
When the program had been installed and loaded, I found Excel very simple to learn and use. Virtually all of the user-friendly features of the

Macintosh version were present — windows, pull-down menus and intuitive operation with the mouse. There was comprehensive online help and an online tutorial.

The initial screen presents a new, blank spreadsheet window called 'Sheet 1' to let you start working straight away. If you want to create another new document, you pull down the 'File' menu with the mouse and select the 'New' command. This brings up a dialogue box which asks you to select the type of document you want to create: you can choose between a worksheet, a chart and a macro sheet. To select one of these, you can click once on the relevant option button with the pointer and once in the 'OK' box; or you can double-click the relevant option button. Either method creates a new window containing the new document. Macintosh users will be familiar with these mouse techniques; it's surprising what you can do with



Excel makes use of the ability of Windows 2 to have a number of spreadsheets open at once. The arrows at the top left size the windows. The most obvious difference from Excel on the Apple Macintosh is the use of colour



Fonts, type styles and colour can be used to enhance the appearance and logic of a spreadsheet both onscreen and when printed. Debits, for example, could appear in red

Charts are created by selecting an area of data and then choosing a chart style option. Charts are automatically updated as the data changes

combinations of clicking, double-clicking and dragging.

The mouse can be used to give all the commands and instructions you need in Excel. It saves you from having to learn and type in commands at the keyboard, and makes program operation very fast. You can also keep your eyes on the screen instead of continually glancing at the keyboard. However, keyboard lovers can still use the keyboard instead of the mouse for all the commands and operations they need — even moving and sizing windows. Pressing the 'Alt' key makes the menu bar active, then pressing the underlined letter of the menu title you want (or using the cursor key and Return) pulls down that menu. Finally, pressing the underlined letter of the command you want (or using the cursor key and Return) invokes that command. Pressing the 'Esc' key cancels the menu selection.

The mouse, however, does make it quick to select a cell, or cells, for data entry — you just move the pointer to the cell you want and click to make it active. You then need to use the keyboard to type your data in. The mouse can also make operations like inserting and deleting rows and columns, and cutting, copying and pasting cells, very fast.

The mouse also comes in handy for entering cell references into formula. Instead of typing in a cell reference, you only need to point and click on the cell in question for its reference to be automatically inserted into the formula. Dragging the pointer across a range of cells inserts that range into the formula. And you can include references to cells on another spreadsheet (linking the spreadsheet) just by clicking on the cells in that other spreadsheet. This saves time setting up formulae and speeds up the creation of models.

Spreadsheet handling with Excel is very impressive. You can have several spreadsheets, charts and macro

sheets onscreen at the same time, each one in its own window, like so many pieces of paper. You can shrink or expand the windows, depending on which one you are working on, and you can transfer information easily from one to the other. Spreadsheets can easily be linked, allowing you to consolidate figures from as many different spreadsheets as desired. Because you can work on many spreadsheets at once, you can see the effects of changes in one worksheet on other linked worksheets immediately on the screen.

'Excel is an impressive program, and there is no reason why it should not ultimately overtake Lotus 1-2-3. It has superior power and ease of use ...'

Each spreadsheet has a maximum of 16,384 rows by 256 columns, and it is easy to move quickly to any desired location using the mouse on the scroll bars along the sides of each window. Column widths and individual row heights can be adjusted easily with the mouse. Each window has a horizontal and a vertical split bar which you can use to divide the window into a maximum of four panes, to see different parts of a spreadsheet next to each other. You can also open up new windows for the same spreadsheet if this is more convenient. As you are expected to

have many windows fighting for space on your screen, there is a window menu which lets you select the window you want to bring to the top of the others.

Functions

Excel has all the features and functions you would expect to find in a top spreadsheet package, such as cell protection, calculation options and zero suppression. It has an 'undo' feature that can reverse your last command if you make a mistake, and it also has a matching 'repeat' feature that you can use to repeat your last command.

Excel only recalculates those cells that have changed since the last calculation, thus speeding calculation. It also uses 'background' calculation which lets you continue working while it recalculates. And it doesn't require you to wait until all the cells have been calculated before you can start working again, which is nice.

Excel has more functions than both Lotus 1-2-3 version 2 and Excel for the Macintosh. The box on page 140 gives a comparison, although functions alone should not be used as a guide to a program's overall capabilities.

Many of Excel's functions are similar to those of Lotus 1-2-3, so 1-2-3 users should be able to build spreadsheet models with Excel's functions without too many problems. Some of the interesting new functions provided by Excel are as follows:

- The 'information' function, CELL(type-of-info, reference), returns information about the formatting, location or contents of the upper left cell in 'reference'. CELL("width", F13), for example, would give you the column width of cell F13. CELL("format", B12) would give you information on the cell formatting.

- The text function, CODE(text), returns the numeric ASCII code of the first character in 'text'. CODE("A1-phabet"), for instance, would equal

65. CODE(B5) would equal 70, where cell B5 contained the text "February".

● Excel can be used for working on arrays, which are groups of two or more values that can be used like a single value in formulae and functions. Excel also has matrix functions which can be used for working with these arrays. The matrix function, MMULT(array1,array2), returns the product of two arrays, where both arrays contain only numbers. This might be written as MMULT(A1:B2,D1:E2).

Compatibility with Lotus 1-2-3

Many of Excel's new users are expected to be previous Lotus 1-2-3 users, and Microsoft has developed tools and functions within Excel to make learning and using the program easier for these users. The features will also help Excel integrate more easily into a Lotus 1-2-3 environment.

For beginners, two-way file compatibility enables spreadsheets to be exchanged between the two programs. Then there is a useful 1-2-3 macro translator that can automatically convert nearly all 1-2-3 macros into Excel macros. A '1-2-3 Help' facility lets users type in the command sequences they would have used in 1-2-3 and automatically gives them the corresponding Excel commands.

Presentation features

Excel's presentation facilities are very impressive, and provide you with a wide range of screen display and printing options. You can turn the spreadsheet grid on or off, show or hide the row and column headings, switch them between R1C1 and A1 according to your personal preference, and choose between different

font types and sizes. You can use up to four different fonts on one worksheet — individual row heights will automatically adjust to accommodate the font sizes you choose. There are 19 number-formatting options which are meant to be used for things like date formats, decimal places, commas and negative brackets.

'Excel is a sophisticated piece of software which offers many advanced spreadsheet facilities and programming features, an integrated onsheet database and a wide range of charting and graphing facilities.'

Individual cells can be emboldened, underlined or italicised. You can add shading, create boxes or lines around cells or blocks of cells, and control screen colours to enhance the appearance of the screen display or printed document. You could have all the positive figures in a column display automatically as blue, and all negative figures red, for instance. All these facilities help you to produce printed documents that rival word processor output and can be used for final reports and presentations.

There is a page preview facility to let you see a miniature version of your page as it will look when printed out, which is very useful for

checking pages before printing them. It is also useful for viewing large spreadsheet models like a map to give you a better idea of what they look like.

Printing

A wide variety of printers and plotters are supported, and your own printer and plotter drivers can be installed during the 'SETUP' procedure. High-resolution graphics printers are required if you want to take advantage of the graphics output of the program — a laser printer would be ideal.

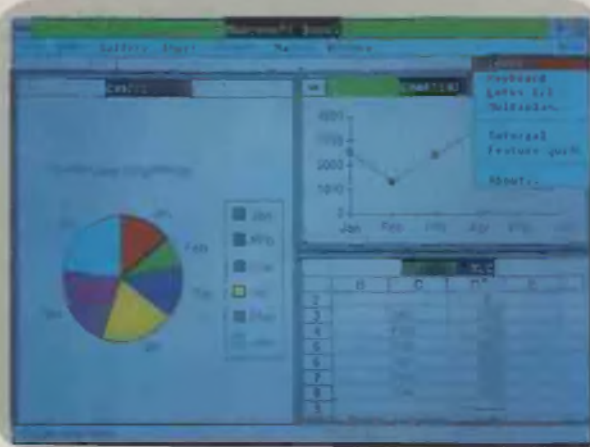
Excel includes a sophisticated printer spooler that lets you queue up print jobs, control the printing operation and continue with your work while they print in the background.

Charts

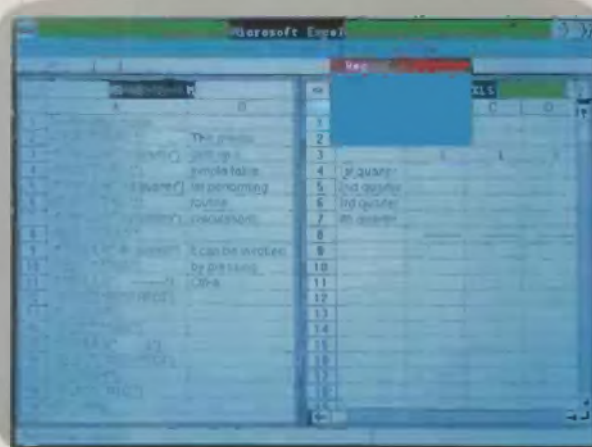
Excel has sophisticated charting and graphing facilities. A wide range of charts can be summoned instantly from selected spreadsheet cells and will change shape automatically if the cell contents are changed. You can see a chart in one window change as the data in the spreadsheet window alongside it is altered.

To create a chart from data in your spreadsheet, you first need to select the data you want to chart. This can be done by dragging the mouse across the relevant cells to highlight them, then you select the 'File New' command and click on the 'Chart' option. This creates a new chart window that automatically contains a default-type chart built up from the values in your highlighted cells.

The program has 44 pre-designed chart formats grouped into seven types of charts: area, bar, column, line, pie, scatter and combination. When any of these is created, the program provides default labels and designs. The charts are highly custo-



Many chart styles are available. The 'help' system includes a cross-reference to Multiplan and 1-2-3 commands, so users who know what to do in those programs can transfer across



Macros can be created line by line or recorded; this allows Excel to 'learn' a process that the user performs. A separate module allows for the conversion of 1-2-3 macros

misable, however, and most of the parameters can be altered to suit your own requirements. You can alter the colours, add text labels and legends, and scale the chart horizontally or vertically to get it to look just the way you want.

Auditing & documenting

Excel has very useful auditing and documenting features. These help you check the logic and formulae in your model, track down errors and discrepancies, and document your model for your own reference and for other users. You can attach notes to any cell and view them using the 'Show Window Info' command. This command also shows you other information such as the cells that contain references to your active cell (dependents) and the cells that it refers to (precedents).

You can use the 'Formula Select Special' command to highlight all the dependents and precedents in the worksheet for easy identification. You can also automatically find all the cells with notes or those containing a particular formula.

These features are a great help when you are creating or amending a spreadsheet model and when you are checking its logic. They reduce the risk of missing important cells and making errors.

Excel has sophisticated cell-naming features, too. You can name each cell in a block of cells automatically by using a combination of the titles in your row and column headings. You can easily find cell references in a spreadsheet and replace them with names, and you can find cell names.



It is possible to create forms for the entry of information into a database section of an Excel worksheet. There is provision for creating search criteria for finding records

You can define a name which is not attached to a particular cell, but which refers to a value: 'INFLATION', for instance, can be defined to be '4%'. Then, whenever you use the name in formulae in your spreadsheet (and in other spreadsheets) it will equal 4%.

Macros

Excel has powerful macro facilities which let you pre-program the system to perform calculations and operations automatically. Excel macros

have their own programming language and are created on separate macro sheets which are handled in the same way as spreadsheets. The macro commands are typed into cells in a column and, like cells on a spreadsheet, can be deleted, copied and moved around. You can have as many macro sheets as you want, and as many different macros as you can fit on each macro sheet. The macros can then be used with any spreadsheet.

You can incorporate branches and

How Microsoft Excel compares to the Macintosh version

On running the Windows version of Excel for the first time, I was amazed at its similarity to the Macintosh version. The look of the spreadsheet with its cell grid, the cross pointer, the menu options and the way in which the mouse operated are all the same. The ways in which you create macros, databases and charts are the same, too. On closer inspection there are a few differences, all of them turning out to be improvements. The Windows version I used did not seem to be as fast, however, but the final release version should be faster as all the debugging code will have been removed.

The Windows version has all the features of the Mac version with many more besides. The first new feature difference I noticed was a status line at the bottom of the screen that gives brief explanations of each command as you move through the menu options — very helpful for the first-time user. Another feature is that you can choose between short and full menu options: short gives you the most commonly-used commands and may be more suitable for beginners; full gives you the complete range of commands.

On the Mac version you can adjust only column widths on a spreadsheet, but on the Windows version you can adjust the row height of individual rows as well. You can also use more than one font on a worksheet. Both these features give you a

lot more flexibility in designing models and spreadsheet reports.

On the Windows version, there is a new 'Arrange Windows' command that automatically resizes and fits all your windows into neat boxes on the screen to let you see them all side by side. I found this feature very useful when my screen became cluttered with several spreadsheet windows.

The 'Resume Excel' feature from the Macintosh version has been enhanced in the form of the Workspace feature on the Windows version. This lets you save all open worksheets and window arrangements you are working on for any particular project as a workspace file, to which you can give a name. You can then reload that workspace file (or any other) if you wish to continue working on that project, and all your worksheets and windows will be opened up exactly as they were when you saved them.

The auditing and documentation features of the Windows version, described in the main text, are an important new addition that make the Windows version useful and practical, and there are also many new spreadsheet functions (see the 'Function comparison' box).

There are other differences too, but for day-to-day operations the programs are basically the same; and a Macintosh Excel user should have no problem at all getting to grips with complex spreadsheets on Excel for Windows. However, the Windows version offers more features and functionality which power users will find very useful indeed.

SCREENTEST

loops into your macro, and control can pass from one macro to another if certain conditions are satisfied. You can create 'intelligent' macros to interact with the user for example, to prompt for information at certain stages, using dialogue boxes.

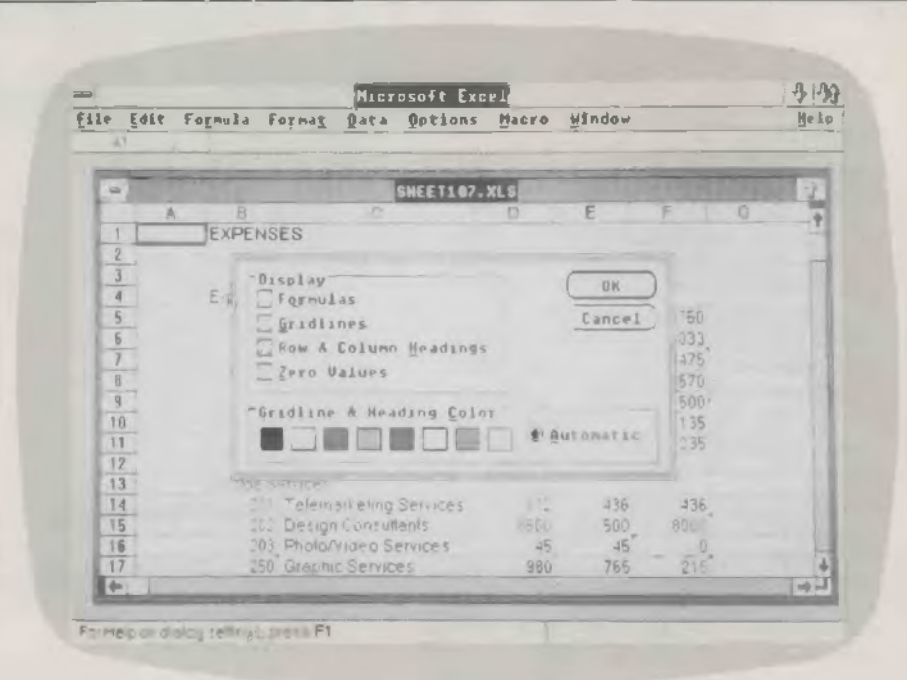
There is also a group of macro commands for customising the appearance of the program itself. You can set up your own menu bar and menu options, and create your own commands and dialogue boxes. You can use these facilities to effectively create your own custom applications within Excel.

The automatic macro creation facility can be used to build macros if you want to avoid programming — this works by simply recording actions you perform. The 'Record' command starts the macro recording, after which you can perform the task you want to record. When you have finished, you give the 'Stop Recorder' command. When the macro has been recorded, it can be edited and added to just like any other macro. In fact, you can see your macro being created line by line as you perform the actions it records. You can do this if you place the macro sheet window next to your worksheet window.

Macros can also be used for creating new spreadsheet functions; these are called function macros as opposed to the command macros just described. The 131 functions already available cover most of the standard purposes I can envisage, but function macros can be created for more complex, customised requirements. A function macro called 'PAYE', for example, could be set up to calculate the tax due for a given set of variables such as gross pay, tax code, month, and so on. Function macros can be used in formulae in the same way as standard functions.

Database

Excel has on-sheet integrated database facilities with 11 database functions and a new feature, an automatic database form interface. Any rec-



An Excel worksheet can be as plain or as detailed as you want, with grid lines and headers being optionally shown in various colours and styles

tangular area of the spreadsheet can be designated as the database area, after which its rows become database records and its columns database fields. All the database functions, like 'EXTRACT', 'DSUM' and 'DMAX', are then available for acting on the information, but these don't interfere with other spreadsheet functions which can be used as normal.

The 'Database Form' command is used to bring up the automatically-created form window, which you can use to enter, edit, delete and find records. The form resembles the standard form layout screen that many database programs provide, and makes using the database very simple.

The macro facilities can be used in conjunction with the database facilities to perform customised database operations and create customised database applications.

Data transfer

Data transfer facilities are very important, as you may often need to import data from other programs to Excel in order to perform analysis and create reports from it. Excel can read and write files in any of the following formats: text, CSV (comma separated values), SYLK, WKS and WK1 (Lotus 1-2-3), DIF, DBF2 and DBF3 (dBase II and III). This is a comprehensive range and facilitates the exchange of data with a wide variety of programs.

The Dynamic Data Exchange (DDE) protocol resident in Windows can also be used by Excel to exchange data with other programs running under Windows.

Documentation

The Excel manuals are well up to Microsoft's usual standard, and I didn't have to refer to them too often since the program's menu options are fairly self-explanatory.

Conclusion

Excel is an impressive program, and there is no reason why it should not ultimately overtake Lotus 1-2-3. It has superior power and ease of use, more facilities, and it is easy for 1-2-3 users to upgrade to. I have been a regular user of Excel on the Macintosh for some time, and I am confident that Excel for Windows will serve me equally well.

Microsoft is on (0734) 500741.

Anthony Meier is a chartered accountant and computer consultant.

END

Function comparison

Function type	Lotus 1-2-3	Excel (Windows)	Excel (Macintosh)
Maths/Trig	17	26	18
Logical/Special	18	34	23
Text/String	18	21	8
Date & Time	11	12	10
Financial	11	13	8
Statistical	7	14	11
Database	7	11	7
	89	131	85

Abraca d'abacus.

Psion Organiser II. The magic of PC power in your pocket.

You could be forgiven for thinking that the Psion Organiser II is just another hand-held programmable. Hand held, yes. Programmable, very much so. But just another? No way.

For a start, with plug-in Datapaks you can have up to 320k of memory at a time, giving around 280k for your own programs. Even without Datapaks you can now have a massive 32k RAM (Model XP). What's more, what's saved there stays there, even when you switch off... or change the battery.

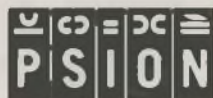
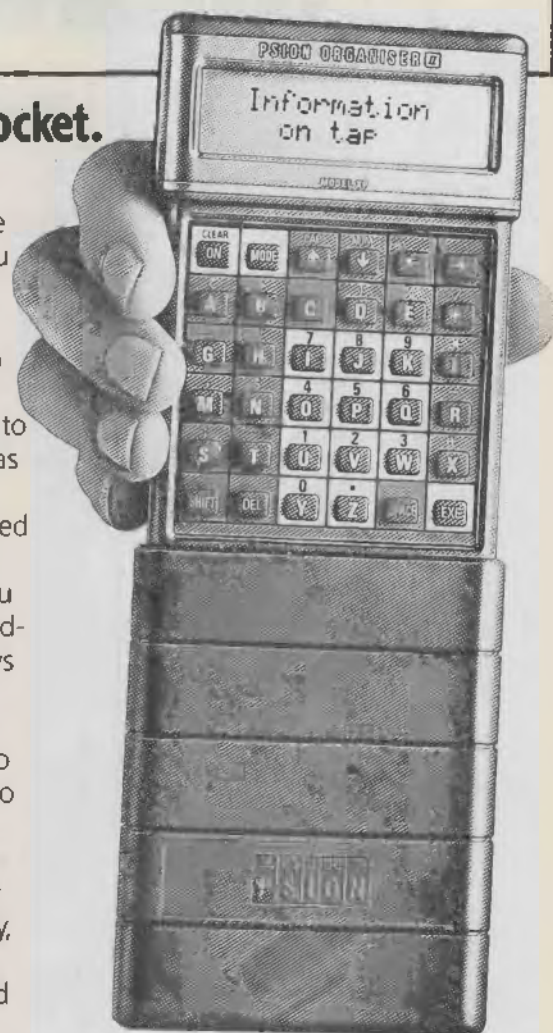
You might think that, because it's small, Organiser II's programming language is just a token gesture. Wrong again. Combining the ease of Basic with the structure of 'C', it offers full integer, floating point, string, array, file-handling and machine code facilities. It has around 120 commands and functions, plus any you add

yourself. And it runs up to 10 times faster than Basic. You can of course program Organiser II direct. But you can also write your programs on a PC using our powerful Developer environment, and down-load them through our Comms Link (which incidentally also allows Organiser II to be linked to printers and modems as well as desk-tops).

You can also plug pre-programmed packs into Organiser II. Our Pocket Spreadsheet, for example, gives you all the major features of a PC spreadsheet and, with Comms Link, allows you to transfer Lotus 1-2-3* type spreadsheets to and from your PC. There's a range of program packs to help you, from a Spelling Checker to a Formula Calculator.

And just in case all this isn't enough, Organiser II comes already programmed with a remind-you diary, a find-it-for-you filing system and address book, a clever calculator and a clock with eight hourly, daily or weekly alarms.

The price of all this power? From less than £100, including VAT. Psion Organiser II. It's fast. It's powerful. And it's available from leading retailers, including Alders, Dixons, House of Frazer, John Lewis, Laskey, R.S. Components, Ryman, Underwoods and Wilding Office Equipment.



Psion Limited, Psion House, Harcourt Street,
London W1H 1DT Tel: 01-723 9408
Telex: 296489 PSIONC G. Fax: 01-724 6646

*Lotus and 1-2-3 are registered trademarks of Lotus Development Corp.



SCREENTEST

Amiga sound samplers

While the sound capabilities of the Amiga range may pose no threat to synthesiser manufacturers, a sampler/digitiser could help in the production of reasonable sound/music applications. Roger Howorth tests two such devices, and looks at the Amiga as a host for acoustic software.

The Commodore Amiga is often praised for its exceptional sound facilities — its capabilities have often been likened to those of a Fairlight sound synthesiser. While this is perhaps a slight exaggeration, the Amiga's ability to manipulate digitised sound is second to none. Most computers have a sound generation chip that will generate certain tones: the Amiga, however, can only play back digitised sound. True — you can simulate sound generation by passing data to the sound chip as though it were digitised, but to get the most out of the machine you really need a sound digitiser to generate this data.

A sound digitiser, or sound sampler, is a small hardware device that allows you to capture external sound via a microphone or hi-fi. This review is centred on two sound sampling systems for the Amiga range — the Future Sound and the Sophus S5. It is also intended to provide a brief outline of the strength of the Amiga with regard to sampling as an application, and the uses to which these pieces of hardware can be put.

Future Sound

The Future Sound package comprises one disk, a 38-page stapled booklet, a microphone, and the sampling hardware which is housed in a small box. This box has a socket for

the microphone, and a standard RCA phono socket for connection to a headphone output from your hi-fi or video. There's also a volume knob which controls the amplification applied to the microphone and hi-fi inputs before they are fed to the analogue to digital converter (ADC).

A lead on the rear panel should be plugged into the Amiga's printer port, and there's a 25-way D-type socket for printer connection. The Amiga cannot access both sampler and printer simultaneously, but a switch is provided on the front panel that will select which device may be used at any time.

The program is driven from one full-size screen window which cannot be re-sized or moved. Functions are invoked either by selecting one of the standard Amiga menu items, or by holding down one of the special 'Amiga' keys and a letter (usually the initial one of the menu command) on the keyboard.

Program operation

Future Sound operates rather like a four-track tape recorder in that the computer's memory can be divided into four buffers or 'tracks', each of which can hold up to 512k of sample within the limits of your Amiga's total free memory. Tracks can be merged with each other and copied or saved to disk.

Each track, in fact, relates to one of

the Amiga's four DAC channels, so all the tracks can be played simultaneously although there is provision for temporarily silencing one or more. Only one track can be recorded at a time. Each can be set to a different sample frequency, and each can be replayed at a different speed.

Screen display

The Future Sound window is divided up into several sections. Along the top, just below the standard Amiga menu bar, are four boxes, one of which is always highlighted. This represents the current track being displayed and used as the destination track for recording.

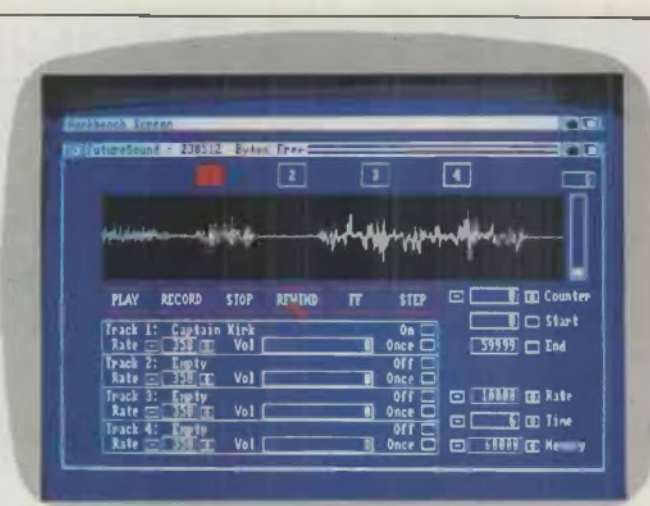
Below these boxes is a large graph of the current sample. The graph plots amplitude against time, and is used to select a portion of a track for further manipulation. By default it will display the entire sample, but it may be zoomed in to show only a small portion of the sample.

The main functions of replay and record are controlled from a set of buttons below the graph that are similar to a video cassette machine, with forward and rewind as well as stop and slow motion forward wind.

The other two sections of the window are more text-orientated, with one section controlling how the four tracks are replayed. This section includes a sliding icon for the volume,



This Future Sound screen shows an immortal line from the film Casablanca as a Future Sound amplitude/time graph. Up to four tracks can be loaded in simultaneously



Future Sound has a limited zoom facility to examine sampled sounds but comprehensive editing facilities. Being mono, a longer sound can be recorded in a single sample

an on/off switch that mutes the track, a speed control that will affect the pitch as well as the speed of the sample, and a loop function (of which more later).

The final section of the display is the recording control section, which features the sample rate, sample duration and memory size, as well as a bar graph meter that helps to set the volume control knob. This meter works in the same way as those found on most cassette machines, with a 'needle' moving across the screen in relation to the amount of noise present at the ADC; the idea here being that you should set the recording level as high as possible without causing the 'peak' indicator to flash red, which would mean that the level is too high and would produce a distorted sample.

Sampling

The sampling process is quite straightforward: first, select which track to record onto; then, if desired, change the sample rate and duration from the values last used. Finally, the record level should be adjusted by turning the volume knob on the Future Sound box before clicking the mouse on the Record button.

While sampling, the Amiga will seem to freeze, but this is not a huge problem.

Sophus S5

The Sophus S5 sampling package looks very similar to Future Sound. It comes with a 42-page manual of which roughly half concentrates on using the Sophus S5 and the theory of sampling, while the remainder deals with using the samples from within other software and programming languages.

Sophus differs slightly from Future Sound in that it is a stereo sampler: therefore, it has two RCA phono-type sockets on the front panel for con-

nection to either hi-fi or microphones. There is also a volume knob and a switch which alter the amount of amplification applied to the inputs.

Unfortunately, Sophus doesn't supply any microphones or duplicate socket for a printer, and you would have to keep powering down the Amiga and unplugging Sophus in order to do any printing. However, a bonus for Sophus is that it features a tone generator which can produce an octave of notes starting at the A below middle C (440Hz), which is very useful if musical instruments have to be tuned to the sampler and you don't have a tuning fork!

'Sound samplers . . . function as some kind of musical instrument, or they provide a method of capturing and storing real-life sounds inside the computer . . .'

Another nice feature in Sophus is a function to calculate discrete Fast Fourier Transformations. This is perhaps the academic side of sampling and produces, after much processor time, a graph of the frequency spectrum of the sample, highlighting particular harmonics and fundamental frequencies in the sample.

Program operation

Sophus is a stereo sampler and, therefore, acts rather like an ordinary cassette machine; the difference

being that a cassette machine can only record left and right channels simultaneously. Sophus can record in this way but can also record first on one channel and then on the other, so it can also function as a 'two-track' mono sampler.

Channels can be merged in order that a stereo sample can be made into a mono one, leaving the other mono channel free to record another sample. The sample rate, buffer size and play-back speed can be varied for the left and right channels independently, and any of the inputs or outputs can be muted.

Screen display

Sophus operates from one full-size screen window that is divided into several areas, and is, in general, very similar to the Future Sound display with Amiga menus and keyboard short-cuts, bar graph metering to help set the sample level, and Play, Stop and Record buttons to control the main functions. There are two amplitude/time graphs, one for each channel of the stereo sample.

The screen has a neat appearance, with an absence of increment/decrement boxes for data entry. Instead, numbers are either typed directly from the keyboard, or icons are used to 'drag' numbers to their new values.

Sophus has a few extra features above Future Sound, such as the ability to alter both the amplitude and frequency envelopes of a sample. These envelopes change the way in which a sample is replayed and are redefined graphically, so the user is initially presented with a straight-line graph which can then be dragged to form a linear gradient. This gradient will affect either the volume or pitch for amplitude or frequency envelopes, respectively. In this way, samples can be made to fade in or out in volume or rise or fall in pitch, which again can lead to some in-

SCREENTEST

teresting effects. Also, 'n-n-n-nine-teen' effects can be created by re-starting the play-back of a sample before it has finished playing.

Sampling

Sampling with Sophus is quite straightforward. Like Future Sound, it is simply a process of choosing a sample rate and duration, setting the record level with the help of a stereo bar graph meter and peak display, and, finally, hitting the Record button. The Amiga screen is blanked out and the keyboard 'hangs'.

Overview

I was impressed with the completeness of the Future Sound package which, if you use the microphone provided, requires no other plugs, leads or boxes to get you going; and, once installed, will cause no inconvenience when the computer has to be used for more conventional purposes.

On the negative side, Future Sound dictates that certain data items, such as how many seconds you wish to sample for, may only be altered by pointing the mouse at increment or decrement boxes located next to the existing value — there is no provision for typing numbers into the program via the keyboard. This is a shame, as not only can it be very frustrating to have to increment a value by 10,000 using this method, but it can also be even more frustrating to be continually switching between mouse and keyboard. Here, I feel both systems of data input should be supported.

The Sophus system is not quite as complete as Future Sound, lacking a microphone and, perhaps more importantly, a duplicate printer port. However, the software does have a nice feel, being quick and easy to

move around the various functions. One feature I found very useful on Future Sound and missing on Sophus was a display of the RAM available for sampling. With Sophus, if you need to increase the sample time, you have to guess how many bytes you need and how many are available; with Future Sound this is not a problem as these figures are constantly displayed.

'Neither package is at all musical in itself, but both allow samples to be exported to virtually any other piece of Amiga software.'

Both samplers allow editing of their samples by using cursors superimposed over the amplitude/time graphs. However, this is another area where I feel that Sophus wins because its cursors can be dragged to their new positions with the mouse. Future Sound's system is similar but involves re-drawing the whole graph each time a cursor is moved, which is quite frustrating. Sophus also uses a better system to alter the sample and play-back rates, but loses a little in the race for user-friendliness by making you specify the sample time in terms of bytes rather than seconds.

Both packages cause the computer to 'hang' during the sampling process, which can be annoying if you accidentally ask it to sample for minutes rather than seconds.

Implementation

Sound samplers for home computers are usually designed to perform one of two tasks: either they function as some kind of musical instrument; or they provide a method of capturing and storing real-life sounds inside the computer, perhaps for later use by other programs.

Both types will perform common functions, such as sound sampling, but the uses to which either can be applied are quite different. Systems required for use in creating music have to provide a method of replaying the samples quickly and easily at varying pitches.

Both Sophus and Future Sound fall into the last category, in that they don't provide a musical environment in which to use the samples. However, because virtually all Amiga music software supports the interchange of standard 'IFF' sound files, samples from either program can be exported to more specialist sequencer or sound-editing software as well as programs written by the user in a variety of languages.

In this way, programs such as Instant Music can be enhanced with a whole library of samples built up with either Sophus or Future Sound.

Looping

Although both Sophus and Future Sound can save files in IFF format, unfortunately, neither provide an efficient system for setting 'loop' points. Consequently, some kinds of sample may be unusable unless they are passed through another piece of software to help set loop points more accurately. The best that these two programs can offer by way of looping is to repeat the whole sample continually.

Loop points are only crucial to samples that are intended for music-



Sophus S5 has two amplitude/time graphs, one for each channel of the stereo sample. The four 'push-buttons' in the left-hand corner operate like those on a cassette recorder



Sophus S5's 'Zoom In' and 'Zoom Out' buttons allow you to examine the wave form of any sampled sound in detail. Slider bars control other features such as sampling rate and volume

The Amiga as a host

Any sampling package must include some hardware that can convert the electronic signals produced by microphones or record players into digital values that a computer can then manipulate, and complementary hardware to convert these digital signals back into acoustic 'sounds'. These two hardware stages are referred to as the analogue to digital converter and the digital to analogue converter, or ADC and DAC respectively.

What makes the Amiga unusual is that it actually has DAC hardware built into the standard machine, which, in turn, means that people producing samplers for the Amiga only have to provide the software and an ADC stage. This obviously provides a financial saving to the manufacturer but, more significantly, also gives a degree of standardisation that allows samples to be used within a range of software from many different sources.

The Amiga's sound capability

Part of the Amiga's custom sound chip provides four DAC channels which have their outputs mixed into a stereo signal under software control. These chips are 8-bit, so sample values can only vary between -128 and +127, and can replay samples at a maximum speed of 28KHz. As such, all samplers which use these chips will be limited to that specification, replaying via a stereo output and playing no more than four samples simultaneously. The amount of time that a sample can last for is related to the size of the Amiga's free RAM, but a standard 512k Amiga can hold roughly 10 seconds of data sampled at a speed of 10KHz alongside the sampling software.

One of the main problems with sampling is that a relatively

large amount of noise is generated at the audio frequencies which are approximately half the sample frequency (that is, the number of samples taken per second). There is a universal solution to this problem, which is to filter the audio output stage of the sampler at this frequency. Clearly, for this solution to work at its best, the frequency at which the filter is set should be variable with the sample rate.

Unfortunately, the Amiga 1000 has a hardware filter on its audio outputs that is set to remove everything above 7.5KHz. This is all very well when sampling speech to be replayed via a TV loudspeaker, but is quite limiting if you wish to replay top-quality samples through a hi-fi which can produce frequencies as high as 20KHz.

To put this in perspective, the human ear can hear frequencies up to about 20KHz but the British telephone system only reproduces frequencies up to about 4KHz. Samplers have to sample at a rate which is double the highest frequency they are to capture if they are to record both positive and negative peaks of a sound wave; this is why the digital audio compact disk system works with a sample rate of around 44KHz. It can be seen that using a filter to remove audio frequencies above 7.5KHz makes using sampling frequencies above 15KHz rather pointless.

Commodore has rectified this problem on the later Amiga models (A500 and A2000) by making the filter software controllable. Owners of Amiga 1000s can effect a partial solution by removing their filters completely, although this involves opening up the main system unit and cutting a few wires. This obviously invalidates any warranty and will create a new problem in that removing the existing filter will make a new, variable external filter all but essential. For these reasons, A1000 owners are unfortunately stuck with relatively poor-quality sampling.

al use because they are related to the way that software extends a sample in order to make it last for a variable amount of time. Percussive sounds, such as drums, are never required to last for a varying amount of time and, therefore, require no looping. However, imagine you wanted to sample a violin sound that you could then use within another program. Obviously, to sample every note that the violin could make at a variety of durations would be impossible within the memory of any home computer. Overcoming the problem of sampling every note is quite easy, as one sample can be played at many different pitches simply by altering the replay speed.

Making a sample last for a variable amount of time is slightly harder, the theory being that most sounds have an 'attack' phase, which is the first part of the sound to be heard. This then develops into a 'sustain' phase which will sound fairly constant and occupy most of the time that the sound is heard, before entering the 'decay' phase as the sound fades.

If a sample begins at memory point 'A' and ends at memory point 'D', it can be made to last longer by repeating or 'looping' a section that lies somewhere in the middle of the sample. The start and end points of this section can be called 'B' and 'C', which are the limits of the sustain phase. This system allows a sound to last for a variable amount of time while leaving the initial 'attack' and 'release' of the sound unaffected.

The lack of a good loop control system within these programs means that this part of the sample editing must be performed from another program. It should be possible to write a simple Basic program that could alter these values, though.

Documentation

Both manuals are adequate. Neither go into too much detail on the true technicalities of sampling, although both present just enough information to guide you through using the product. As these samplers can be used to provide samples for inclusion in your own programs, copious notes are required. Here, the Sophus manual certainly wins in comparison, with around 20 pages dedicated to this topic as opposed to Future Sound's two. While Future Sound manages to discuss Basic and C, Sophus covers interfacing to machine code, Modula 2 and Forth.

Both packages supply example programs on the program disk.

Conclusion

If stereo sampling appeals to you, there is no choice — Sophus is the only package that can do this. Otherwise, the issues are less clear cut: one package can be thought of as a two-track recorder, the other a four-track. Technically, Future Sound will produce slightly better samples because its maximum sample rate is 28KHz as opposed to Sophus's 20KHz maximum. On the other hand,

Sophus has more sophisticated editing facilities and can use as much RAM as your Amiga has available; whereas Future Sound can only access whatever is left in the first 512k after the program has loaded.

Both packages have their strengths, and would be useful additions to your range of sound/music applications as well as being fun things to have around. Although Future Sound is unique with its four tracks and comprehensive hardware package, I feel it is let down by its software which doesn't have quite the same edge as Sophus.

Neither package is at all musical in itself, but both allow samples to be exported to virtually any other piece of Amiga software. Sophus comes closer to providing a hint of musical creativity by allowing you to make 'n-n-n-nineteen' effects: you could even make Max Headroom type recordings with Sophus, a cassette recorder and a lot of patience.

A final and interesting use for these products would be with those people who want to include sampled speech or music within their own programs. This not only applies to people developing commercial games software, but also to people writing utilities in their preferred language — perhaps providing spoken instructions instead of the more traditional Amiga prompts.

Future Sound costs £175 and is available from Tri Computer Software on (01) 840 6136.

Sophus \$5 costs £162.15 and is available from ASAP on (0724) 280222.

END

Helping with enquiries

The collation of information is a vital part of police work, and the increased use of standard micros in this field has led to some interesting — and helpful — observations. Robert Schifreen reports on a crimebusting effort to improve the lot of the policeman.

Tapping a villain on the shoulder outside British Home Stores and whispering 'You're nicked, son' is the glamorous part of police life. It's what the recruitment adverts would have you believe the job involves — rounding up wrongdoers and helping make the world a safer place.

In reality, though, while fictional crimefighters are pulling their underpants on over their trousers and flying faster than a speeding bullet, the average British policeman (or woman) is probably at a desk catching up on the endless paperwork.

Even the most trivial crime will involve the investigating officer recording everything in his or her pocket-book, interviewing witnesses, taking statements, and more. Back at the station, these notes have to be copied onto multi-coloured forms and filed in case the information is required in the future.

Slowly, computer technology is coming to the aid of the police. For example, officers can now use electronic notebooks that upload their observations into a PC (of the silicon variety) back at the station after their day on the beat. Fingerprints can be digitised and matched in a thousandth of the time it would take to do the job by hand. Someone sitting at a control desk can find the location of a police car (perhaps carrying a VIP) anywhere in the UK, within a few feet.

It's not just huge mainframes that are playing their part. This article concentrates on the use to which standard PCs and clones, as well as the odd 68000-based machine, are being put by innovative manufactur-

ers, which they are hoping will be snapped up by the police authorities.

Everything mentioned here was recently on show in London at the International Police Exhibition and Conference (IPEC) — a trade exhibition for chief police officers, where exhibitors were showing off everything from better-flashing blue lights to deadlier guns.

On the beat

Included in every beat officer's 12-hour shift is at least an hour at the end of the day to catch up on the routine paperwork. This involves filling in a number of forms and reporting any event investigated or attended while on duty. This information is often copied from a notebook, which the officer has to keep handy at all times. It serves not just as a reminder, but is also acceptable as evidence in Court.

All this writing takes time and, more importantly, keeps officers from where they are supposed to be — on the street.

About to start field trials in one UK force is an electronic version of the policeman's notebook called The Investigator, marketed by Scientific Computers Ltd of West Sussex.

The system would typically be operated at police-station level and is based around a hand-held, battery-operated CP/M micro running custom software. There's nothing special about the micro, except that it's built like a tank and, therefore, costs around £1500 a time. Each car-based officer (it's too heavy to walk the streets with) is given one, which contains, in ROM, a simple word proces-

sor that acts as a replacement for the notebook. Also built into the system is the officer's diary for the day, and appointments will flash up on the 8-line LCD screen.

An officer called to investigate an incident tells the computer what sort of incident it is and the system uses artificial intelligence techniques to suggest the sort of questions to ask. The answers, needless to say, are typed into the computer. The same procedure applies when conducting house-to-house enquiries.

At the end of a shift on duty, the officer returns the micro to the station and connects it to two cables. The first recharges its batteries, while the second downloads the data into a central AT-compatible from where it is printed out, legibly, onto standard forms. The officer's diary for the following day is then uploaded into the micro, ready to be taken away at the start of the next shift.

In urgent situations, a facility currently under development will allow the portable micro to transmit its data back to base using either a cellular telephone or the police-person's pocket radio.

Just in case someone steals the police car, the system is protected by a password. Get this wrong three times, and all data is wiped.

Typically, say the manufacturers, the system will save between 5 and 10 per cent of beat officers' time, thus keeping them out on the streets for longer periods.

Fingerprints

The Police National Computer at Hendon, North London, stores semi-

digital records of some 3.7 million fingerprints, and even local forces' records are huge. If a criminal's fingerprint is found at the scene of a crime, it takes a skilled person a long time to find a match with a print on file.

One way for computers to help is to digitise photographs of fingerprints; then, to compare two prints, you just have to compare two blocks of memory. However, a digitised print of sufficient resolution occupies some 64k of memory, which takes a huge amount of disk space and processing power. Add to this the software overheads of making sure that you are comparing the same part of both prints, and the whole system becomes impossible except on the more powerful mainframes.

What was needed was an algorithm that would produce a unique pattern for any fingerprint. There are four such algorithms in use in the world today, and the CAP Group uses the one that is considered the best — as designed by R&D scientists at the Home Office. The system is called AFR (automatic fingerprint recognition) and is currently at prototype stage.

There are two important features to look for in the lines, or ridges, of a fingerprint. Firstly, ridge endings — that is, the end of a line. Secondly, ridge forks, where a line divides into two.

The Home Office algorithm works by digitising a fingerprint onto a standard PC screen. With the image onscreen, special software overlays a small dot on every ridge ending and fork. Then, every dot is joined up to its five nearest neighbours, always working left to right.

The digitising and overlaying is done with an array of 16 T414 transputers, using a Compaq Deskpro 386 as a front end, running under Windows to allow multi-tasking. With each transputer working on 1/16th of the image, the whole process takes about three seconds compared with 50 seconds on a Prime mini-computer.

Taking away the actual fingerprint image, you end up with something that looks like a distorted spider's web. This web takes just 1k of memory to store, and is a digital 'signature' of someone's fingerprint. This can be compared electronically to stored prints, or printed on a laser printer, and that's where Windows comes in. The system can be printing, digitising and comparing data simultaneously.

When the system has been upgraded to use T800 transputers which have hardware support for floating-point maths, the operation should be speeded up even more. The beauty of using Transputers for matching is that you can keep adding



This thumb print was digitised and encoded by 16 transputers in 3.4 seconds. Forty-nine ridge endings and forks were found and linked to five neighbours

transputers to speed up the job: currently they're up to 56, which together can make 30 comparisons per second. Plans are afoot to have 1200 units operating concurrently, with each unit containing 256 transputers. This configuration will perform 60,000 comparisons per second which, assuming the suspects are not comedian Dave Allen (fans of whom will know only has nine fingertips), will compare a print with 6000 known criminals.

Incidentally, the transputers can share the job among themselves in one of two ways. In the first case, each transputer can work on 1/56th of an image. In the second, each transputer can be working on one whole image, with each transputer comparing a different image at a time.

Photofit identification

Photofit identification by eyewitnesses is invaluable to the police, but there have always been problems. The finished picture usually resembles someone designed by committee, and often the standard cards don't contain exactly what the witness saw. Sirchie Fingerprint Labs in the US has combined a PC clone and some custom software with the standard photofit cards to give the best of both worlds.

As before, the witness still sits with the book of pictures on his or her lap, picking possible matches from around a hundred different fore-

heads, eyes, noses, mouths, chins, beards, moustaches, hats and glasses. As the witness calls out the number of each part — for example, eyes number 4A and chin number 12 — the police officer types the number into the PC. The required image is then taken from the machine's 80Mbyte hard disk, where it is stored as a pixel bit image and displayed on the screen.

Currently, the database uses facial parts taken from volunteers, although a police authority which buys a system will be able to add local characters to the file. As with the old system, the witness can chop and change until the image looks right.

With one of everything chosen, the clever bit comes in. The operator, guided by the witness, can touch up the image onscreen using a mouse. The painting package is custom-made, written in machine code both for speed and to allow better control of the display hardware, and uses a resolution of 512x480, with a choice of 256 colours. For example, the mouse can be used to iron out the sharp outlines of the individual components. Scars can be added, or spots, or even tattoos. Rectangular blocks of the image can be picked up and moved, though the system doesn't yet allow portions of the picture to be zoomed for greater touching-up accuracy.

The mouse-enhanced image is

COMPUTERS IN ACTION

then saved on disk as a bit-image picture, which takes some 55k. It can be printed out on a badged Toshiba dot-matrix printer (included in the price) to give a rough outline, or sent to an add-on unit that will produce a polaroid print direct from the screen. Alternatively, the data can be transmitted by modem to aid other police forces.

The complete kit costs around \$14,500 and produces final pictures so lifelike that the system plays safe and adds a caption on every photo to indicate that the image is computer-generated.

Photo filing

Around five million people in the UK have a criminal record and, somewhere, buried deep in a filing cabinet, are mugshots of every one of them. The problems with this kind of system are many. Not only does it take a long time to index, file and retrieve a picture, but your average bobby is no David Bailey and frequently forgets to rewind the film. Getting 40 shots on a 12-exposure cartridge may save money, but it confuses the judge no end.

The Hertfordshire constabulary was the first to use the new computerised solution to the problem, called Fastfoto. When a person is brought to a police station for questioning, no longer is he or she made to sit in front of a 35mm camera. Instead, the person's features are captured on VHS video tape by a standard recorder that takes around 450 frames in nine seconds. The lighting, timing and recording are controlled by an array of relays linked to a PC clone. The heart of the system is a custom-built micro based on a 68000 running a Unix clone at 12.5MHz. And the reason for nine seconds? The timing loop in the PC is achieved by asking the system to count down from 10 million to zero, and this just happens to take nine seconds, in which time 450 frames are taken.

The VHS recorder is a standard home model, modified to prevent use of the Play, Rewind or Fast Forward buttons. This means that the tape is always in the correct position to record the next 'customer'. The cassette is then taken to headquarters, where an operator scans manually through the frames to find the best one. This is then blown onto a 12in laser disc which holds 50,000 separate pictures. (The reason that laser discs are used and not CD-ROMs is that a laser disc holds 2.6Gbytes of digital data, whereas a CD-ROM stores 'only' around 600Mbytes.) The index to the picture disk is held on a standard PC with a hard disk. The drive holds the name

and number of everyone whose picture has been recorded, along with details of age, height, colour, sex, and so on. These are all typed in manually. The disk also records the position on the laser disc of the person's picture.

If the suspect's case comes up in court and a verdict of 'not guilty' is returned, or if he is not even charged, the record from the hard disk is removed, thus making it impossible for the picture to be located on the laser disc.

When the 50,000 image capacity of the disk is reached, a juke-box type system is used to hold up to 32 disks. The limit of this is 1.6 million pictures, though it will still find and display any one in less than seven seconds.

The real benefit of the system comes when a witness has to identify a suspect. Instead of being shown endless books of mugshots, the witness can give just a brief description of the villain — for example, the colour of eyes, hair and skin — and the system will then present the matching pictures to look at.

At the moment, the system lacks intelligence. When the witness asks to see all the men who have brown eyes, the computer scans the manually-entered data on the hard disk and calls up the required pictures. Eventually, the system will be able to look at the photos on the laser disc and automatically look for eyes, scars, spectacles, and so on.

Investigating

Helping with major investigations is where micro technology can really help. Solving murders, armed robberies and complex frauds generate huge amounts of paperwork as the specially-assembled team in the 'incident room' starts its work.

A number of systems are available to interpret and analyse all the collected data. Most of these use either mainframe or mini systems, though micros make a couple of appearances. British Telecom's research laboratories at Martlesham, for example, have come up with Vmis — the video maps imaging system. The system consists of a BT Merlin micro based around a Motorola 68020 running under Unix 5. This is interfaced to a laser disc player which holds photographs of the complete Ordnance Survey map of the UK. All major roads in the country are covered, and major cities are detailed down to street level. In London, individual house numbers are included.

Software written in C displays images from the laser disc as selected by the use of either a tracker ball or graphics tablet. Additionally, assuming that the operator has fed the sys-

tem's free-field database with records of recent crimes, the micro will produce dots and graphics and overlay them onto the photograph on the monitor.

The advantages become clear with an example. Suppose that a number of pubs in Central London have been burgled recently. The operator searches the database of crime descriptions, requesting any record that contains both the words 'Pub' and 'Burglary'. A map is then displayed on the screen, and the computer marks, in the correct place, the scene of the crime.

Analysis of this data can help the police pinpoint areas which need more men on the beat. Also, patterns begin to emerge. For example, it may become clear that gangs of burglars are operating along a certain motorway or railway and so their next target can be anticipated.

It's worth noting that, if you want to zoom in on a particular area, a more detailed map is pulled from the laser disc and the computer plots the data again. The laser disc itself is not capable of zooming a picture, so a more detailed one has to be pulled in instead.

As with all laser disc applications of this kind, the key to finding a required map on laser disc is the NGR, or National Grid Reference. Contained on a Winchester drive are a number of look-up tables. If the user enters an NGR directly, the system software can instantly pull from the laser disc the street map showing the required location. If the operator uses any other input criteria, like street name, post code, type of property, and so on, look-up tables convert these to grid references.

The hard disk can also hold small map alterations. For example, if a road has been closed to make way for a new hyperspace bypass, the software will overlay a relevant warning over the map if that particular ex-road is summoned from laser disc. This is cheaper than blowing a new disc every time a set of cones appears on the M25.

The system currently supports up to 2Gbytes of hard-disk storage, which will store approximately 140,000 crimes. The exact number varies because the database system used allows unlimited comment fields to be attached to any record. Eventually, the system will be able to pull down existing data from the police national computer and systems based in other police authorities.

Vmis currently sells to police authorities for around £13,000.

On a slightly smaller scale, the Home Office has just finished development of the Crime Analysis

Package. This runs under MS-DOS and consists of some complex and clever macros for use with Lotus 1-2-3 version 2.

Basically (understandably, the Home Office didn't want to go into too much detail) the software can perform three tasks:

- Firstly, it acts as a database of crimes that will tell you what happened, where and when. The database can be searched to provide, for instance, a record of every incident that happened on a particular officer's beat during a certain period of time.

- Secondly, the system will plot occurrences of crimes on a map. This time, there is no laser disc — the images are drawn and scaled using normal EGA graphics.

- And, thirdly, the data can be graphed and analysed to provide important information about what type of crime is happening regularly in certain areas. For example, districts prone to excess vandalism can be highlighted and more officers can be posted there.

Vehicle tracking

There's one big problem for someone in control of a fleet of cars — you never know exactly where they are. With police cars, it's even more important to know where they are and to be sure that they are safe — especially if they're carrying royalty, diplomats or terrorists. Three systems are currently available that will track around 100 cars and display, in real time, positions and status on a PC's screen.

To track a vehicle requires two pieces of equipment: a small computer in the car that is capable of working out where it is, and of transmitting that information over the airwaves as a pair of coordinates based on the national grid system; and a PC back at base linked to an antenna, which can listen to the incoming grid references, draw a map on the screen and plot the correct points.

GEC's system is called Tracker. The in-car unit consists of a black box about 6insx4ins. Its heart is a magnetometer, which accurately measures the strength of the earth's magnetic field. From this, it can work out its geographical position within 50 metres, which it stores in RAM. This data is constantly being calculated, so it's always up to date.

The PC, back at the police station, is linked to a laser disc player which holds some 55,000 photographs of Ordnance Survey maps. (This isn't the same disk used by BT's Vmis system, but it's made by the same company.)

Software in the PC is capable of polling up to three cars per second. It does this by sending out a request signal over the PMR — the Police Mobile Radio system. Assuming that

the car's radio is not currently being used for voice transmission, the micro in the car then assembles its identity, position and status into a packet along with some error-correcting checksums, and transmits the data. If the radio is being used for voice, the message is ignored: voice transmission always has priority and, in any case, if you're in voice contact you can always ask the driver where he is!

The status part of the message is a code that is input by the car's driver, using a simple numeric code. This allows him to specify whether he is on patrol, pursuing a suspect vehicle, having a rest, involved in an emergency, or whatever. Naturally, cars which are in pursuit of robbers are polled more frequently than one which is full of sleeping policemen.

Software in the PC pulls up a picture from the map database and overlays small graphics characters to indicate the position of cars. The colour of the graphics indicates their status.

As well as providing a real-time display of up to a hundred cars (any more, and the screen would be too cluttered), all data is logged to the system's 20Mbyte hard disk, allowing a full analysis of a car's route at a later date.

Accuracy

The in-car magnetometer relies on what's called 'dead reckoning' — the system contains no intelligence whatsoever and cannot compensate for errors in its locating skills. This means that the grid references it sends to the receiver will often be slightly out, and the PC's screen will often show cars travelling on the pavement, on the roofs of buildings, in the middle of rivers, and so on. The common way of correcting these errors, as used by GEC and others, is very expensive. But it does work.

A series of radio beacons is fixed to landmarks such as buildings and street lamps. Each is programmed to know its exact position and, earthquakes permitting, this will not change. The beacon continually transmits a signal containing its position, via a radio transmitter. When a car passes one of these beacons, it picks up the beacon's position and can then correct itself if necessary.

Although the beacon system works, it's expensive because someone has to install and maintain a complete network of beacons throughout the area in which the tracking system operates.

Realising the cost and inconvenience of setting up a beacon system, Bosch — the West German company better known for its Black and Decker clones — set to work on eliminating them. The result — a prototype system based around a car that always knows exactly where it is, and

doesn't make mistakes.

Instead of relying on passing beacons, the Bosch car-based transmitter relies on its own intelligence. In its memory, it has a complete copy of the map contained back at the base-station PC. It isn't a laser disc — the Bosch system draws its own maps using standard EGA graphics from digitised patterns. Currently, the only map available is of West Berlin, which takes some 1.6Mbytes of disk space.

Armed with its map, in addition to a magnetometer, the computer in the car can detect slight errors as they creep in and correct them, thus guiding itself accurately along the digital streets. If the car appears to be going off the road into a field, the computer will correct it and the data transmitted will assure the PC that the car really is on the road.

As any good getaway driver will tell you, though, muddy fields are the ideal way to shake off a persistent panda car. Extensive research by Bosch found that cars leaving the road for a good reason tend to do so at a fairly sharp angle — typically, above 45 degrees. So, with this information in mind, the in-car micro can work out whether the car really is off the road, or whether it only appears so because of an error in the magnetometer.

Although the system is not yet commercially available, Bosch hopes to have the car-based computer sell for around £2500. This is around £1000 more than beacon systems, although the long-term savings are obvious.

People-tracking

Having devised systems which spy on cars, the next step is to track single people. The easy way to do this, as any reader of *Spycatcher* knows, is to have a clever little gizmo like, for example, a 120-metre transmitter, concealed in a Parker pen (it writes, too) or a belt buckle (it doesn't). British Telecom was also showing live pictures of the car park at London's Brent Cross shopping centre, transmitted via a dial-up phone line.

The more legal way, used to keep track of people entering and leaving secure areas like computer rooms, is made by Chubb. It's called Entacard. There are three parts to the system — the card, the card reader, and the PC. There is usually one PC, running special software that controls, programs and interrogates the card readers. Each person who is permitted to access the secure area has a card, rather like a credit card, and each door has a card reader.

At its simplest level, the system works by allowing anyone holding a card to put it through any reader and the door will open. For more complex operations, there are options that will only allow access to certain

INDUSTRY STANDARD SOFTWARE.

AMSTRAD STANDARD PRICES.

There are two factors that have made the Amstrad name pre-eminent in the world of computers.

Outstanding quality. And prices that are a mere fraction of any of the alternatives.

Now Amstrad have brought both of these qualities to software for Industry Standard PC's.

Amstrad Infomaster for example is a fast, accurate and powerful database that is exceptionally easy to use.

It has a long list of features that put it in the forefront of database software.

It is designed for Amstrad PC's or any other IBM compatible PC, and it can be used with hard disc drive or twin floppy discs systems.

And it is available only from Amstrad.

..... **£69.00**
— PLUS VAT* —

Then there is Amstrad Wordstar Express.

Wordstar Express is the market leader in word processing software with an amazing spellcheck system that covers 85,000 words. It also offers excellent editing and formatting facilities.

..... **£69.00**
— PLUS VAT* —

And for businesses that need advanced financial data processing there is now Amstrad Supercalc 3.21.

It not only performs highly complex forecasting and financial modelling but presents the results in brilliant high resolution graphics using up to 16 colours.

..... **£69.00**
— PLUS VAT* —

Any of these Amstrad programs would cost hundreds of pounds from another manufacturer.

From Amstrad they are just £69.00 plus VAT* each.

So it looks as if there is now a new industry standard for software too.

The Amstrad Standard.

*Recommended retail price including VAT, £79.35. Price correct at 1.9.87 but may change without notice.

Please send me information on Amstrad software packages.

NAME _____

COMPANY _____

ADDRESS _____

POST CODE _____ TELEPHONE _____

PCW.12

AVAILABLE THROUGH: ALLDERS · COMET · CURRYS · DIXONS · ELTEC · FARNELL · FIRST SOFTWARE · LASKYS · JOHN LEWIS · NORBAIN
NORTHAMBER · OFFICE INTERNATIONAL · O.S.A. · P&P · RYMAN · SANDHURST · HUGH SYMONS · WILDINGS



Amstrad plc., Box 462
Brentwood, Essex CM14 4EF
Telephone: (0277) 262326.

8324: U (M5) 11

REF	RM	DATE	TIME	IN	CRIME	DEPT	REF	TIME	OFF	REF
417		06/08/85	20.00	10.00	50	50	50	13	50	50
418	31	06/08/85	3.00	3.00	50	2	50	50	50	50
419	42	06/08/85	23.00	23.00	50	50	50	50	7	1
421	13	06/02/86	16.45	5.30	50	50	50	50	2	10
500	42	06/02/85	12.15	12.15	50	50	50	50	4	1
501	32	06/02/87	16.30	7.30	50	50	50	50	4	0
502	21	06/02/87	17.30	8.30	50	50	50	50	2	5
504	42	06/02/87	18.00	9.30	50	50	50	50	4	50
505	11	06/02/87	20.00	11.00	50	50	50	13	50	50
502	11	06/02/80	22.00	0.00	50	50	50	13	50	50
507	23	06/02/80	17.00	0.00	50	50	50	50	4	50
502	32	06/02/80	19.15	19.15	50	50	50	50	50	50
504	11	06/02/85	7.10	21.30	50	2	50	50	50	50
601	42	06/02/82	23.30	6.55	50	50	50	50	50	50
600	42	06/02/82	14.00	23.55	50	50	50	50	3	1
613	41	06/02/85	0.01	1.00	50	50	50	50	50	50
632	32	06/02/84	18.00	24.00	50	50	50	50	50	50
635	32	06/02/85	17.00	5.00	50	50	50	50	50	50

14-Oct-87 03:46 PM



The Crime Analysis Package from the Home Office is based on Lotus 1-2-3 and Borland's Superkey. This picture shows the results of a search for incidents involving criminal damage

The Crime Analysis Package will plot occurrences of crime on a map. The picture here was taken from an IBM Model 30 screen, and depicts beat number 13 in Newcastle

cards, at certain times and through certain doors.

There is also a four-character numeric password associated with each card, and the user will have to tap this in as well as swipe the card though the reader in order to open a door. If the password is wrong, the PC is notified through standard RS232 links and a log is kept for the daily report.

As well as individual passwords for each card, users are also informed of a 'duress' number. If they tap in this number instead, the door opens as normal but the host PC is informed that something is wrong, and the police are quickly and silently called, to the scene.

Firearms training

For me, the most terrifying stand at the IPEC show was the one demonstrating the Airtex firearms training system. Yet again, the heart of the machine is a laser disc player linked to a PC, using custom applications software written under MS-DOS. Instead of a monitor, the system is linked to a projection TV and shown on a lifesize screen. (By lifesize, I

mean that when the laser disc shows a film of someone pointing a Smith and Wesson .357 revolver at you, it looks real. Having been unfortunate enough, a few years ago, to be working in the wrong bank at the wrong time, I can assure you it feels real, too.)

Airtex will take any current handgun or rifle and retro-fit a laser device to it, effectively converting it to a lightpen. The live bullets are out, but blanks are used to provide the noise, smell and recoil.

In addition to the filmed scenario, portrayed by actors, a narrator gives you a rough guide as to what is happening. One scene, for example, shows an officer, investigating strange sounds emanating from a parked car. As he goes to investigate, he calls on you to cover him. A woman, visibly distressed, then crawls from the car towards you, while a man runs out the far door and attempts to escape.

The majority of policemen I saw trying out the system, all of whom were trained to handle guns, decided that this was a shoot situation and pulled the trigger. A CGA graphics

card plotted a little white blob just above the man's heart. The action froze, and the score was overlaid on the screen. I left.

Conclusion

Information is what the police thrive on. If someone under interrogation denies being at a certain place at a certain time, there are database systems around at the moment that let the officer, at the touch of a key, call up records of what all the suspect's accomplices answered when asked that same question. If the suspect is lying, he can be accused of doing so immediately.

I'm sure that increased use of micros will bring as many problems, in the short term at least, as the paper-based methods do. Someone, somewhere is going to sit on a laser disc and destroy 55,000 mugshots.

More common, though, will be the duplication of effort. If individual police forces start using their own computers to analyse crime patterns, and local police stations do the same, there is going to have to be some fundamental thinking done about how to prevent four officers each having to enter the same information into different systems to be used for different purposes.

I spoke to someone recently about their database system which records occurrences of crimes. I was interested in what would happen if a disk became corrupted, or if errors meant that records could not be recovered. 'We've never lost a record yet,' he assured me. I reminded him of my grandmother, who's a bit deaf and sometimes doesn't answer the phone. When I went round to her house and asked why she hadn't answered my call, she used to assure me that, if the phone had rung, she'd have answered it.

If Robert Peel were alive today, he'd turn in his grave.

END



A screen from the ComPhotofit system, printed direct from the PC to polaroid film. The right-hand window originally held the image as selected by the witness from different component cards. It was then copied to the other window for rodential editing. The small picture shows a far view of the image



It's always a problem following in the footsteps of a successful product, but Turbo Pascal version 4 from Borland has an especially difficult jobs on its hands. Owen Linderholm judges whether its enhancements — or failings — justify the upgrade.

152 PCW DECEMBER 1987

whatever you like. Pop-up boxes appear bearing relevant messages whenever the program wants to convey more information to the user. Also, as usual, almost everything about the interface is configurable with regard to positioning and colour.

Everything operates very cleanly, quickly and smoothly. For example, although the editor is less powerful than a full word processor, it is also considerably quicker. One of the nicest parts of the new environment is how files are loaded. A large directory box pops up on the screen showing all the files matching whatever name you requested (the default is '*.PAS') and you simply move the cursor to the required file and press ENTER.

Most functions of the compiler are accessed through the menus or directly via combinations of keys with ALT and CTRL.

The menus contain a lot of surprises for users of Turbo 3. Turbo 4 is probably twice as complex as Turbo 3, and that means there are a lot of unfamiliar options now available. Most of these are concerned with the expansions and changes to the language itself. The others, all features of the new Borland integrated environment, are things like onscreen help, window sizing, configuration, file operations, and so on.

The significant changes are in the language itself. The highlights are: the 64k code limit imposed by Turbo 3 can now be broken; the compiler is even faster; separate compilation is available using units (the single most important change); code generation has been improved; far better basic graphics are included; run-time error detection has been improved; '.OBJ' files can now be linked in by the linker (which, incidentally, now only links in code necessary to the running of the program); project management; interactive debugging is possible using MAP files generated by Turbo 4 and a third-party symbolic debugger; and the range of data types supported has been considerably extended.

One obvious change is that Turbo 4 produces '.EXE' files rather than '.COM' files. The only significance here is that .EXE files can be larger than 64k, unlike .COM files; and that .EXE files contain some extra embedded information about themselves. Otherwise, there are no essential differences.

Pascal programmers who cut their teeth on Turbo Pascal will be unfamiliar with units. These are an integral part of most serious versions of Pascal and are specified in both ANSI standards and as part of the UCSD system. Essentially, a unit is a set of pre-declared constants, variables, functions and procedures that can be used by your program as if they were part of the language itself.

```
{SR-} {Range checking off}
{BO-} {Boolean short circuiting off}
{SS+} {Stack checking on}
{II+} {I/O checking on}
{NN-} {No numeric coprocessor}
{$M 65500,16384,655360} {Turbo 3 default stack and heap}
```

```
($R+)
program textTest;
uses
  Crt, Dos, Graph;

var
  GraphDriver, GraphMode, Err : integer;
  MaxX, MaxY : integer;
  message:string;

procedure display(msg : string);
var
  c : char;
  p : pointer;
  size : word;
  len : word;
  x,y,x1,y1,x2,y2 : integer;
begin
  SetColor(White);
  SetBkColor(Black);
  SetTextStyle(triplexFont, HorizDir, 4);
  SetTextJustify(CenterText, CenterText);
  len := Length(msg);
  x1:=maxx div 2 - len*TextWidth('X');
  y1:=maxy div 2 - TextHeight('X');
  x2:=maxx div 2 + len*TextWidth('X');
  y2:=maxy + TextHeight('X');
  size := imagesize(x1,y1,x2,y2);
  GetMem(p, size);
  OutTextXY(maxx DIV 2, maxy DIV 2, msg);
  GetImage(x1,y1, x2, y2, p^);
  repeat
    begin
      x:=maxx div 2 - len * textwidth('X') - 60 + random(60);
      y:=maxy div 2 - textheight('X') - 100 + random(100);
      putimage(x,y,p^,XORput);
      putimage(x,y,p^,XORput);
    end
  until KeyPressed;
  FreeMem(p, size);
end;

procedure initialise;
begin
  GraphDriver := Detect;
  graphmode:=getgraphmode;
  InitGraph(GraphDriver, GraphMode, '');
  err:=graphresult;
  if err<>grOk then writeln('graphics error: ',grapherrormsg(err));
  SetColor(1);
  SetBkColor(0);
  Randomize;
  MaxX := GetMaxX;
  MaxY := GetMaxY;
  cleardevice;
end;

begin
  writeln('enter message');
  readln(message);
  initialise;
  display(message);
end.
```

Listing 1 Fancy text and graphics An example listing of a Turbo 4 graphics program. It takes a text string and prints it on the screen in a fancy Times Roman-type font, then rapidly moves copies around using the 'bit blit' operations

As far as your program is concerned, using a unit requires no extra code; the linker takes care of it all. This is important since it is how the 64k limit is breached. All units are separately compiled and, when used by a program, the linker section of the

Turbo 4 compiler finds the portions of code it needs from within the compiled unit and adds it on to the code compiled from the main program. This lets the size of the final program rise above 64k.

The memory model used by Turbo

SCREENTEST

4 is the same as that for Turbo 3, with the exception of units. Data can still only occupy the 64k data segment. To exceed the 64k data limit means allocating space on the heap for each new variable. This means an overhead in coding, but the heap can be up to 640k in size.

More importantly, units are a sensible way for modular parts of a program or libraries of routines to be created and used. In fact, units are very similar to modules in Modula-2. They make the language even more organised and structured. For this reason, hacker-type programmers may not like them; but what would a hacker type be doing programming in Pascal anyway? As the story goes, the only real hackers are those capable of writing all their programs directly into memory in machine code. For those who program in the real world, however, units could prove to be very useful in long-term development. Units, like modules in Modula-2, have a 'visible' declaration section listing what they contain and a 'hidden' implementation section where the code is. Commercial companies could sell units for specific purposes and their source code would be protected.

In association with units, Borland has provided a program for maintaining libraries of units. One library, TURBO.TPL, is automatically scanned by Turbo 4 when searching for units. Initially, TURBO.TPL has the units Borland has provided as part of Turbo 4; these are the 'System', 'DOS', 'CRT', 'Printer' and 'Graph' units. You can add your own units with the TPUMOVER program, which can insert and delete units to or from libraries. You can also create separate libraries and inform Turbo 4 to look for units in them.

There are three other units in the TURBO.TPL library. These are not strictly needed by Turbo 4 but are provided to make it easier to convert Turbo 3 programs to run under Turbo 4. Conversion between the two is not necessarily an easy matter.

Graphics

Another major change to Turbo 4 is in the graphics commands. These have been completely rewritten and bear almost no resemblance to the graphics commands available in Turbo 3. This disadvantage is offset by the fact that Turbo 4's graphics commands are far more comprehensive, powerful and fast. Some of the new functions include: auto-detection of the graphics mode you are in and use of it; using CGA, MCGA, EGA, Hercules, ATT400, VGA and PC3270 graphics displays in many of their available modes (22 graphics modes in all, from 320x20 in four colours

{THIS IS AN EXAMPLE OF SOME CODE FROM THE TURBO EDITOR TOOLBOX FOR VERSION 4. IT SHOWS THE USE OF UNITS AND LINKING .OBJ FILES. THE DOTS SHOW WHERE CODE HAS BEEN SKIPPED OUT}

```
unit SInst;
{-Fast screen writing routines for installation programs}

interface

uses
  Crt,           {screen routines - standard unit}
  Dos;           {dos calls - standard unit}

const
  Defnrows = 25;      {Default number of rows/physical screen}
  Defncols = 80;      {Default number of cols/physical screen}
  HiddenCursor = $2000; {scan lines for a hidden cursor}

  .
  .
  .

procedure EdFastWrite(St : String; Row, Col, Attr : Word);
  {-Writes St at Row,Col in Attr (video attribute) without snow}

procedure EdChangeAttribute(Number, Row, Col, Attr : Word);
  {-Changes Number video attributes to Attr starting at Row,Col}

  .
  .
  .

implementation

  {$L SINST}

  procedure EdFastWrite {(St : String; Row, Col, Attr : Word)}; external;
  procedure EdChangeAttribute {(Number, Row, Col, Attr : Word)}; external;
  procedure EdMoveFromScreen {(var Source, Dest; Length : Word)}; external;
  procedure EdMoveToScreen {(var Source, Dest; Length : Word)}; external;
  procedure EdSetCursor {(ScanLines : Word)}; external;

  .
  .
  .

{NOW FOLLOWS SOME CODE FROM A SEPERATE FILE, SINST.ASM, WHICH PRODUCED
THE SINST.OBJ FILE WHICH IS LINKED INTO SINST.PAS BY THE {$L SINST}
DIRECTIVE ABOVE}

; SINST.ASM
; Fast screen writing routines for Editor Toolbox installation programs

DATA    SEGMENT BYTE PUBLIC

        EXTRN  ScreenAdr:WORD,PhyScrCols:WORD ;Pascal variables
        EXTRN  RetraceMode:BYTE

DATA    ENDS

CODE    SEGMENT BYTE PUBLIC

        ASSUME CS:CODE,DS:DATA

        PUBLIC EdFastWrite,EdChangeAttribute
        PUBLIC EdMoveFromScreen,EdMoveToScreen
        PUBLIC EdSetCursor
```

Listing 2 Including different file types This piece of code has been assembled from different places within a Turbo 4 source file and an ASM file which is to be compiled to the Turbo 4 source. It has been taken from part of the Turbo Editor Toolbox

through 720x348 in two colours, up to 640x480 in 16 colours); commands for changing colours, palettes, line styles, line widths, fonts (normal, small, triplex (fancy roman), gothic and sans serif); text direction and justification; viewports and clip-

ping; 3D boxes; fill patterns (13 including a user-defined one); 'bitblt' operations that work impressively fast; arcs, circles, ellipses, pie segments; aspect ratio; error-handling; and the usual lines and polygons. All of these new graphics commands are

ONLY ONE OTHER PERSONAL COMPUTER LOOKS THIS GOOD..



SUBSTANTIAL SAVINGS
ON ALL EDUCATION,
BUSINESS
AND PUBLIC SECTOR ORDERS

£1,295

Introducing the PCV Turbo from Opus Technology, a remarkable performance low-cost AT compatible created by popular demand.

With a price tag of just £1,295, the PCV Turbo offers you everything you demand from an AT compatible and more – more performance, more quality, more features:

- Turbo 80286 microprocessor
- 6/10 MHz (zero wait state) switchable clock speeds
- 1 Mb motherboard memory
- 30 Mb Winchester
- 1.2 Mb ½-height floppy
- Enhanced, extended 102-key keyboard
- 80287 maths co-processor option
- Parallel/serial printer ports
- Mouse port
- 14" super high resolution flat-screen amber monitor
- Dual mode mono/colour graphics card
- Keyboard lock
- 8 expansion slots
- Phoenix BIOS
- Space for additional drive
- EGA option
- Super small footprint
- Comprehensive user manual
- 12-month guarantee

PCV TURBO
A small price to pay for quality.

Opus Technology.

For details call Sales 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

extremely fast. For an example of graphics programming (text fonts and bit blitting) see Listing 1.

But, seriously . . .

Life has also been made easier for serious programmers who want to use Turbo Pascal. In version 4, they are provided with project management commands to make and build files. If you are working on a large project and have written a program using many units and include files, it can be irritating to see the compiler recompile everything when only one short file has been changed since the last compilation. The 'Make' option on the 'Compile' menu will only recompile those parts of a program that are new or have changed since the last compilation. The 'Build' option, which is similar, will do the same except that it will recompile all units as an intermediate level between full compilation and making a program.

In addition, it is now possible to link binary .OBJ files into your program. Turbo 4 cannot create these files itself, but will make use of Intel standard .OBJ files from any program that can create them, including the Microsoft languages and, of course, Turbo C and Turbo Prolog. Programmers can then make use of languages like C and assembler for code dependent on high speed and on the underlying hardware. The .OBJ files produced can then be used within Turbo 4. The manual is clear on the interfacing required: you will need to declare procedures to be used as external in Turbo 4, and the .OBJ files will need to have been produced with procedures and functions declared as public.

The final extension in Turbo 4 of particular interest to serious program developers is the ability to interactively debug Turbo code. In interactive debugging, it is possible to look at the source code and check the values of all variables while a program is running. The first program I saw do this was Mac Pascal, and it was a revelation. On one side of the screen was a window showing the source code listing of the program, with the current line highlighted; on the other side was a window where the program was running. In addition, you could suspend execution of the program at any time and look at the values of all variables. Execution could proceed at any speed up to about half normal, and could be cut right down to executing the next statement on command. Never was debugging so easy.

This level of debugging (or almost) is now available for Turbo 4. However, you will need a symbolic debugger from a company other than Bor-

The Toolboxes

The Toolboxes have all been completely rewritten for Turbo 4. Full advantage has been taken of the new features of Turbo 4 and of the advantages of units — their functionality has increased at least as much as that of Turbo 4, and in a couple of cases their size has quadrupled. Although this makes them much more useful to the programmer who wants powerful pre-written code, it also means that they aren't of much use to the low-end user. Even a double-floppy system wouldn't really be suitable for a program whose source took up over two floppies of its own, as will easily be the case with large and complex programs written using Turbo Pascal Toolboxes. However, the price (£69.95) is so low that they are worth double just as examples of good Turbo 4 programming — but be prepared to spend a long time studying!

An example section of code from the Editor Toolbox is given as an example of programming with units and .OBJ files — see Listing 2. The word processor produced by the Editor Toolbox is incredibly powerful. It now has printer drivers, fonts, macros, and much more.

land to make use of it. Turbo 4 produces extra files with debugging information embedded in them if required — these are known as TPM files. A program supplied by Borland will then convert these to MAP files, which are what the current symbolic debuggers on MS/PC-DOS machines feed on. With a program such as CodeView (the best currently available), SymDeb or Periscope, you can then step through the program, executing it and examining variable values.

It seems a great shame that Borland, Godfather of the integrated environment approach to programming, did not include a symbolic debugger as part of Turbo 4's integrated environment. Even more unfortunately, such a debugger is available for Turbo 3 — in fact, two are. Turbo Power produces a program called T-Debug Plus which attaches itself, parasite-like, to the Turbo 3 main menu and then performs windowed interactive tracing and debugging beautifully. A company called Turbo Smith produces a similar product. Perhaps Borland will announce a debugger for version 5.

Another addition to the compilation process is the inclusion of directives for conditional compilation. This facility lets you generate code that will, for example, make use of an 8087 if present and ignore it if not.

There have been many other changes to the language, especially to the commands and syntax, but most of them are not serious and many are simply additions. There are several new data types: short int, long int, comp (integers from -2^{63} to $2^{63}-1$), words (2 bytes), new real types conforming to IEEE standards — single, double and extended (only usable on systems with an 8087, as is comp), pointer and string. Some of these clear up annoying failings of Turbo 3 and others considerably extend the language. Words are particularly useful since the task of addressing hardware relies on them almost completely.

Many additional commands have been added — some to make use of the new data types, others to clear up oddities or missing functions in Turbo 3. For example, a new function, 'ReadKey', is provided to read a key from the keyboard without echo; interrupt-handling procedures are included in the DOS unit; a new procedure to execute a DOS program has been included; there are special procedures to move blocks of memory around; file and disk utilities are more extensive than in Turbo 3; there is date and time access, and changing functions; there's a wide range of directory management commands; and there are commands and tests for memory-mapped video displays.

Compatibility with version 3

It is obvious from all of these changes that compatibility between Turbo 3 and Turbo 4 is a matter for considerable concern, and is the main reason for the extra units provided for Turbo 3 compatibility. The Turbo 3 unit covers all the basic changes and makes sure that the ordinary Turbo 3 commands will work; the Graph3 unit covers the Turbo 3 graphics commands, as these have completely changed; and the Float3 unit provides compatibility between the BCD arithmetic in Turbo 3 and the new real types in Turbo 4. These three units will make sure that practically every pure Pascal program will work, with only the addition of a line saying 'uses Turbo3, Graph3, Float3'.

However, many programmers have resorted to various tricks to get the most out of the available hardware, or have written 'sloppy' code. This kind of thing can be difficult to alter, though, especially since Turbo 4 is much stricter about type-checking. Most of these tricks can be dealt with by a few simple modifications, guided by an upgrade program provided with Turbo 4 that automatically rewrites Turbo 3 code for Turbo 4. The upgrade program also flags any

.. FORTUNATELY WE MAKE THAT TOO

From

£499

SUBSTANTIAL SAVINGS
ON ALL EDUCATION,
BUSINESS
AND PUBLIC SECTOR ORDERS

30 Mb XT model
only

£995



Announcing the PC III Turbo from Opus Technology – Britain's first range of 10 Mhz Super Turbo PC/XT compatibles. Enhanced performance, stunning specifications, compact design and prices which stop where many others start.

Now you can choose from a quality range of stylish PC-compatibles with mono, colour and EGA versions, or select a pace-setting new XT computer for as little as £995.

PC III TURBO 30 Mb XT

- 8088 super turbo processor 4.77/10 MHz
- 14" flat screen amber monitor
- Extended 102-key keyboard
- Advanced multi-function card – Mono/Colour graphics adaptor, Parallel and Serial ports, floppy disk controller and mouse port
- Six free expansion slots
- 360 K floppy disk drive
- 1 Mb motherboard memory
- 30 Mb Winchester
- Super small footprint case
- Lockable keyboard
- Phoenix BIOS
- Space for second disk drive
- Battery-backed clock/calendar
- 180 watt UL-approved power supply
- Comprehensive UK user manual
- 12-month guarantee – on-site maintenance option

PC III TURBO
A small price to pay for quality.

Opus Technology

For details call 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



OLYMPIC SYSTEMS LTD.

IMPORTERS · DISTRIBUTORS

COMPUTER SUPPLIES & ACCESSORIES
FREE CARRIAGE
TRADE ENQUIRIES WELCOME

TOP BRAND DISKS

3" MAXELL CF2 £22.50

	3 1/2"		5 1/4"		
BRAND	DSDD	DSHD PS/2	DSDD 48 TPI	DSQD 96 TPI	DSHD AT DISKS
SONY	£18.50	£45.00	—	—	—
DATALIFE	£20.50	£45.00	£14.50	£16.50	£22.50
DYSAN	£20.50	—	£12.50	£16.50	£19.50
3M	£19.50	—	£12.50	£16.50	£22.50

Prices per box of 10 disks

UNLABELLED DISKS Certified & Guaranteed

	10	25	50
3 1/2" DSDD	£11.00	£26.00	£50.00
Supplied with labels			
	25	50	100
5 1/4" DSDD, 48 TPI	£10.00	£19.50	£38.00
Supplied with Labels, Envelopes & Write Protects			

COLOURED DISKS

Verex 5 1/4" DSDD 48 TPI Disks in Plastic Library Case
Available in: RED, BLUE, GREEN, YELLOW & WHITE.
£9.90 per box of 10

DISK STORAGE SYSTEMS



YUDD100L	5 1/4" x 100	£ 8.50	YA10	5 1/4" x 10 Plastic Library Case	£1.75
YUD50L	5 1/4" x 50	£ 6.50	YA5	5 1/4" x 5 Disk Transit Case	£1.25
YA6090L	3" x 60 or 3.5" x 90	£10.50			
YA40L	3 1/2" x 40	£ 6.00			

All with Lock & 2 Keys

DISK DRIVE HEAD CLEANING KITS WITH FLUID

3 1/2"	£4.50	5 1/4"	£3.75
--------	-------	--------	-------

VERBATIM VCP404 ALL IN ONE KIT

- 1 Bottle General Surface Cleaner
 - 1 Bottle Anti-Static Fluid
 - 1 Bottle CRT Cleaning Solvent
 - 3 Manual Spray Pumps
 - 1 5 1/4" Floppy Head Cleaning Kit
 - 50 Lint Free Cloths
- SPECIAL PRICE £12.50

MOBILE PRINTER STAND



Rugged steel frame.
Height adjustable basket
for output paper & base
shelf for input paper.
Self assembly —
includes castors.
80 column £45.00
132 column £57.50

PRINTER STANDS



YU-S23 PRINTER STAND
Securely holds any printers wide or small.
Made of molded plastic.
£10.50



YU-S24 UNIVERSAL PRINTER STAND
Knock-Down type. A cantilever refold paper
trays use no table space. Fits all printers,
standard carriage and wide. Made of molded
plastic.
£10.50



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.
YU-S25B: for 132 col. printer.
80 column £28.50
132 column £32.50

PRINTER RIBBONS

	Price per Ribbon
AMSTRAD 8512/8256	£3.95
DMP 2000/3000	£2.25
BROTHER HR15MS	£2.75
CITIZEN 120D	£3.75
COMMODORE MPS 801	£4.00
DIABLO HYTPYE II MS	£1.90
EPSON FX/RX80 FX800	£2.75
MX/100/FX1000	£3.75
LX80/86	£2.25
JUKI 6100MS	£2.50
PANASONIC KXP110	£3.95
QUME IV M5	£2.50
STAR NL-10	£4.50

MOST OTHER MAKES OF RIBBON
AVAILABLE, PHONE FOR DETAILS

COPY HOLDERS



YU-H33 DESKTOP
COPY HOLDER
Size: 9 1/2" x 11 1/2"
With smooth slide
line guide.
£10.50



YU-H32 COPY HOLDER
WITH ADJUSTABLE ARM
Size: 9 1/2" x 11 1/2"
With smooth slide line
guide.
£15.00



YU-H34 COPY HOLDER
WITH ADJUSTABLE
ARM. Size: 19" x 12"
With smooth slide line
guide.
£30.00

DUST COVERS

Protect your
computers from dust.
Complete set for
Monitor, CPU &
Keyboard.
IBM PCXT £6.50
IBM PCAT £8.50

CABLES

IBM PC Shielded	£ 8.50
IBM RS232	£10.50
IBM Keyboard extension	£10.50

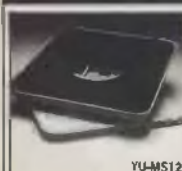
GENDER CHANGERS

MALE to MALE or
FEMALE to FEMALE £6.00

LASER PRINTER TONER CARTRIDGE FOR CANON HP/APPLE

£75.00

MONITOR STANDS



YU-MS12
MONITOR STAND
For 12" CRT.
Fits large CRT's
with feet separation
up to 10" x 11".
Stable 25° tilt and
360° turn.

12"	£10.50	14"	£13.50
-----	--------	-----	--------



YU-M10 MONITOR MOVER
Solid steel structure with a finish that
ensures stability and longevity.
Expand work space.
£75.00

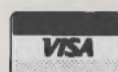
PLEASE NOTE PRICES ARE EXCLUSIVE OF VAT @ 15%
FREE POSTAGE & PACKING IN U.K.
TO PLACE YOUR ORDER PLEASE CONTACT:

OLYMPIC SYSTEMS LTD.

34-36 RUTLAND STREET, LEICESTER LE1 1RD
Telephone: (0533) 511212 · Fax: (0533) 513586



ANY ORDER UNDER £12.50 WILL BE
SUBJECT TO £2.50 HANDLING CHARGE



OUR COLOUR CATALOGUE IS AVAILABLE WITH A
COMPREHENSIVE RANGE OF PRODUCTS.
CALL FOR YOUR COPY TODAY.

PERSONAL CALLERS WELCOME

MON-FRI: 9.00am to 5.30 pm
SAT: 9.30 am to 5.00 pm

SCREEN FILTER

12" ANTI-STATIC ANTI-REFLECTION	£9.00
------------------------------------	-------

DATA SWITCHES

AVAILABLE IN RS232 or
CENTRONICS



AB SWITCH BOX	£24.50
ABC SWITCH BOX	£26.50
ABCD SWITCH BOX	£32.50
X SWITCH BOX	£45.00

3M DATA CARTRIDGES

DC 1000	£13.50
DC 2000	£24.00
DC 300XLP	£19.50
DC 600A	£20.50

Packed in 5's

BINDERS

REXEL BINDERS FOR:
11" x 14 1/2" PAPER
BLUE WITH WHITE
STRIPES
£9.50 per box of 10

EDUCATIONAL &
GOVERNMENT ORDERS
ACCEPTED.

COMPANY CREDIT
ACCOUNTS OPENED.

PLEASE CONTACT FOR
DETAILS.

SCREENTEST

code it isn't sure about and doesn't know how to alter.

The Turbo 4 manual includes a section on converting programs. I was only able to find one piece of code which these three methods couldn't solve, and that was a piece of inline assembler which made use of system variables within Turbo 3 itself and which could only compile under Turbo Pascal 3.01a, not any other version.

Despite Borland's efforts to make conversion as painfree as possible, it is unfortunate that such drastic changes are necessary. It is the price of necessary and welcome progress, but does it have to be quite so high? Perhaps some bright spark will come up with a perfect upgrade program.

In use

As expected, the compile speed is extremely fast. Even really large projects will compile in seconds.

I found Turbo 4's integrated environment very easy to use. Even if you object to windows, you can zoom the current window up to full-screen size. In the editor, this gives

you just two fewer lines than the old Turbo 3 editor, and you get the full-screen width. In addition, the editor and its environment support the EGA 43-line and VGA 50-line modes.

I was also very impressed by the size of code produced by Turbo 4. The improvement is most noticeable in small files, but is still apparent even in large ones. An empty program consisting simply of 'BEGIN END.' (you don't need the program title) takes up 1216 bytes compared with Turbo 3's 11433. (The box alongside gives other comparisons.)

The execution speed of the resulting code seems to have improved, especially for floating-point operations. Details of Benchmark comparisons between Turbo 4, Turbo 3 and Turbo C are shown below.

Despite the increase in size, which will upset those who can't afford to increase their RAM to 384k, Turbo 4 is still manageable on a single-disk system, although two would be better and a hard disk would be ideal.

I found it extremely easy to make Turbo 3 programs work in Turbo 4, despite the complex set of issues involved in conversion. However, getting a program to work isn't quite the same thing as getting it to work satisfactorily. If I had to optimise my programs for code size and speed, then conversion alone wouldn't be enough — a thorough rewrite would be called for.

Documentation

In the usual Borland style, the Turbo Pascal 4 documentation consists of a paper-bound book that is larger than the Turbo 3 version, reflecting the increase in the language's complexity. The contents are quite clear and well laid out, although you may need a couple of trips through the index to find what you want. The style isn't perfectly clear, but is a lot better than most computer manuals.

The manual is completely indispensable — it's the perfect method of copy protection, as you can't use a language seriously without a good reference guide.

Prices

Turbo 4 costs £69.95 but, as an introductory offer, it will be available for

£59.95 until the end of November. Registered users of Turbo 3 can upgrade to Turbo 4 before the end of 1987 for £30 plus VAT and £2 postage, and will receive exactly the same package as they would have if they had bought it new.

The Turbo Pascal 4 Developer's Library includes Turbo 4, Turbo Tutor for version 4, Turbo Database, Editor, Graphics, Numerical Methods and Gameworks Toolboxes (all upgraded for version 4), and is available as an upgrade for £99.95 before the end of November and £245 thereafter. £245 is also the price for first-time buyers. The Toolboxes will cost £69.95 separately and Turbo Tutor will cost £49.95. All prices are subject to review, so if you want to upgrade or purchase Turbo 4, don't hesitate!

Borland is continuing to sell and support Turbo 3 primarily for CP/M and generic MS-DOS computers, but PC/MS-DOS sales and support will also be continued for those who don't want to upgrade.

Conclusion

Turbo 4 is a significant advance on Turbo 3. The problem is that Turbo 3 is a worldwide established product (the Program file section of PCW has had Turbo 3 submissions from countries as far afield as Thailand, India, Poland and Argentina) with three quarters of a million registered users — and probably the same again with pirated copies — and people don't like change.

The compatibility issue is bound to cause concern but it shouldn't. Firstly, 95% of programs will run immediately after a pass through the upgrade program. Secondly, Turbo 4 offers a significant increase in power for the same price, or only £30 if you are upgrading. Finally, Borland won't object if you continue to use both version 3 and version 4 — just don't expect your version 3 programs to work with any new Borland developments.

However, I have my doubts about a few of the new features, and I am disappointed that Borland didn't see fit to include an interactive or symbolic debugger.

The pricing is pretty much as expected, and there are some good bargains available for those upgrading from Turbo 3. As Turbo 3 is still being supported, you will have to make the decision whether or not to upgrade. Personally, I feel that upgrading is essential if only because of the additional power of Turbo 4. For people starting out with Turbo Pascal, there's no excuse. The best bargain in programming software is now even better value.

Borland is on (0734) 320022.

END

Compile speed comparison

These tests were all performed on a Hewlett-Packard Vectra one after another. All files were taken from real applications rather than dummy test files.

Turbo 4

1273 lines took 2.8 seconds for a compile speed of 455 lines per second.

Turbo 3

978 lines took 3 seconds for a compile speed of 326 lines per second.

Turbo C

1108 lines took 7.2 seconds for a compile speed of 154 lines per second.

Comparison of code size

Turbo 4

INTMATH.EXE	2336 bytes
GO-MOKU.EXE	10576 bytes
EMPTY.EXE	1216 bytes

Turbo 3

INTMATH.COM	11550 bytes
GO-MOKU.COM	17778 bytes
EMPTY.COM	11433 bytes

Turbo C

INTMATH.EXE	5664 bytes
-------------	------------

Benchmarks

All timings are in seconds and were produced by the given language on a Hewlett-Packard Vectra.

	Turbo 4	Turbo 3	Turbo C
Intmath	0.02	0.03	0.015
Realthmath	0.80	1.40	1.50
Triglog	12.75	15.30	10.60
Textscrn	26.25	23.00	41.50
Grafscrn	1.25	1.47	—
Store (hard disk)	2.50	2.75	2.30

For a full explanation of these Benchmarks, see PCW, December 1986 issue, page 164

First words

Previously used to develop — among other things — the Apple Macintosh, Smalltalk has now made the transition from mainframe to micro. In the first of a four-part series, Carl Phillips describes the comprehensive elegance of this programming environment.

The Smalltalk programming system has existed, in one form or another, for around 15 years. Developed at the Xerox Palo Alto Research Centre during the 1970s and early 1980s, Smalltalk's influence is well-known. The Apple Macintosh and the modern windowing systems such as GEM and Windows owe a lot to developments in Smalltalk. However, the influence and ideas of Smalltalk 'the programming language' are less well-known — at least outside the programming language research community.

Smalltalk is based on a small set of innovative and powerful ideas, consistently applied throughout a large software system. The end result is a programming language and environment of considerable elegance and power. One organisation offering training courses in Smalltalk will help its pupils to develop a six-month programming project in the one-month course duration. Reliable, robust implementations of Smalltalk are now available for many computer systems including the IBM PC and similar machines. The box on page 120 gives details of how owners of IBM-compatible, Atari ST, Acorn Archimedes and Apple Macintosh machines can obtain a copy of Smalltalk to accompany this series.

Even if you have no interest in learning Smalltalk *per se*, studying the Smalltalk system pays dividends. In developing Smalltalk, its designers ignored — or chose to disregard — much of the established wisdom, conventions and folklore of language design. Like Lisp, Occam or Prolog, Smalltalk goes its own way. Learning to view the computing universe Smalltalk-style teaches a different approach to programming that can give new and valuable insights into programming problems.

Many of the ideas, such as windows and icons, which were present in Smalltalk 10-12 years ago, are now slowly permeating their way into the mainstream computing business.

Often, the results are inadequate and ersatz derivations. Smalltalk still points the way to how many things *should* be done, and it remains the premier object-orientated programming language at a time when many people are claiming that object-orientated programming is one of the few effective ways of making programming more productive.

Programming in Smalltalk is great fun. Smalltalk makes it possible to get programs working in a fraction of the time it would take in more conventional languages such as C or Pascal. A Smalltalk programmer can express an idea or algorithm in a few lines of Smalltalk code that would

take pages and pages of Pascal, Modula 2, Ada or C. Every programmer can use tools that make life easier — Smalltalk is one of the best.

Distinguishing features

● **Extensibility** Smalltalk is an extensible language. You extend and mould its built-in facilities to match the problems you are working with. There is no distinction between the programming language, applications programs, and an operating system. Smalltalk's design encourages the re-use of existing code — even in situations its authors did not anticipate at the time they wrote it.

Designers of programming lan-

Common Smalltalk

There are three Smalltalk dialects in common use:

Xerox Smalltalk-80

Xerox Smalltalk-80 is the result of the original Xerox research project. It is a programming language plus an interactive windowing environment — bit-mapped graphics, windows, pop-up menus, mice — the works, plus an extensible integrated programming environment with text editor, incremental compiler, debugger, source code browsers, sample applications and a large library of re-usable code. Commercial Xerox Smalltalk implementations exist for the IBM AT, the Apple Macintosh, Xerox, Sun and Tektronix workstations and similar systems.

Smalltalk/V

Smalltalk/V is a re-implementation of Xerox Smalltalk by DigiTalk Inc, based on the published Xerox descriptions of the language. It is smaller than the Xerox offering and better suited to the IBM PC. Except for minor syntactic differences, Smalltalk/V is substantially compatible with Xerox Smalltalk and code can be moved, with reasonable ease, between the two.

Little Smalltalk

Little Smalltalk was developed by Dr Tim Budd (originally at the University of Arizona, but now at the University of Oregon) as a research vehicle for teaching the principles of Smalltalk. Like the 'Tiny Basics' on personal computers of yesteryear, Little Smalltalk is a highly cut-down version of 'real' Smalltalk. It lacks the interactive programming environment and many of the more sophisticated language features. It is not a production programming environment and wasn't designed to be.

However, it *does* capture the essence of Smalltalk programming, and is a great introduction to the language for those people who want to experiment. Thanks to Tim's considerable generosity, Little Smalltalk is in the public domain (so the price is right) and comes complete with C source code. Little Smalltalk places much more modest demands on hardware than real Smalltalk and can be easily moved from system to system. PCW has made arrangements to make Little Smalltalk available to readers — for a minimal charge — for the IBM PC/AT MS-DOS environment, VAX Unix, the Acorn Archimedes and the Atari ST (see the 'Smalltalk is cheap' box on page 120).



guages talk of the 'semantic gap' — the vast, gaping void that can exist between the ideas and concepts of the problem you are trying to solve and the means of expressing those ideas and concepts in a computer programming language. In Smalltalk programs, this gap is minimised.

● **Adaptability** Smalltalk is easily customised. If you don't like the behaviour of part of the system, or even part of the language, you can change it. The vast majority of the Smalltalk system is written in Smalltalk. The bulk of the source code is usually available online and can be easily perused, re-used or modified.

Since one of the goals of the original Xerox research was to investigate programming-language design, Smalltalk allows the language to be extended with new constructs, or fundamental changes made to how the system operates, from within a running Smalltalk system.

● **Exploratory programming** Like many interactive systems, Smalltalk supports exploratory programming. You can develop, test and refine small pieces of code in isolation, make changes immediately, and incorporate the results of such experiments into the system.

The freedom to experiment and quickly recover from mistakes is one of the distinguishing characteristics of any high-quality programming en-

vironment. A Smalltalk system lets you enter an experimental chunk of code, execute it, debug it and fix it, all in less time than it takes to exit the screen editor and invoke a C compiler on a typical system.

● **Memory management** Like Lisp, Smalltalk manages memory automatically for the programmer. Smalltalk objects (the fundamental entities in Smalltalk programming) come and go at high speed. The programmer is relieved of the burden of remembering to have to allocate and deallocate chunks of memory explicitly.

Learning to program

The first rule of learning to program in Smalltalk is to suspend disbelief. Smalltalk has an unusual syntax. The first major step in learning how to program in Smalltalk is to stop regarding the apparently meaningless collection of semi English-like expressions on the page as random mystical incantations and instead as statements in a programming language. The problems are no greater than mastering the syntax of Lisp, APL or Forth and, like the adherents of those languages, most Smalltalkers argue that the syntax is one of the strengths of the language. Most beginners disagree, however.

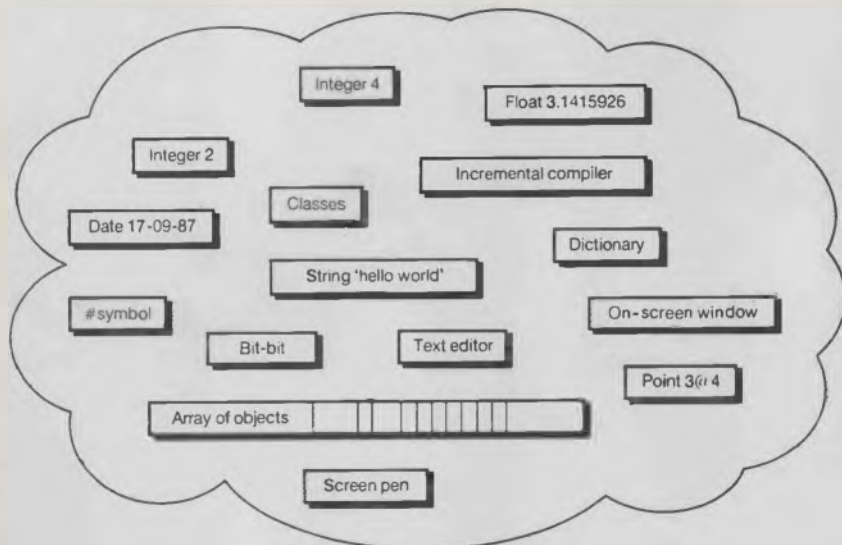
Smalltalk's major redeeming features lie in its simplicity and consistency. When you have mastered

the relatively small number of rules and have gained a certain familiarity, it is a straightforward language both to read and write. Its major problem is that it bears little resemblance to conventional programming languages such as Basic, C or Pascal.

Smalltalk uses unusual terminology to describe its fundamental concepts. Unfortunately, many of these terms have other meanings to people well-versed in different aspects of computing. 'Object', 'message' and 'instance' can all mean different things to the operating system designer than they do to the Smalltalk programmer. The famous dictum from Lewis Carroll's *Alice in Wonderland* of: 'When I say a word it means exactly what I want it to say — nothing more and nothing less' is particularly appropriate when applied to learning Smalltalk. Forget what you think the word means — concentrate on its Smalltalk meaning.

Despite its name, Smalltalk is not necessarily small — the full Xerox Smalltalk system is a very rich environment. While you can pick up the fundamental ideas behind Smalltalk in a few hours, mastery of all aspects of the system takes time. This long learning curve, plus the heavy demands a full Smalltalk can put on the hardware, are perhaps the primary reasons why there are still relatively few Smalltalk programmers around.

TEACH YOURSELF SMALLTALK



Everything in the Smalltalk universe is an object, from an integer to the compiler

When initially learning Smalltalk, concentrate on the ideas at the centre of the language and don't be overwhelmed by its apparent complexity. The investment in learning about the system is repaid handsomely when you start using Smalltalk to solve real problems.

If you know (and love) one or two conventional programming languages such as C, Pascal or Basic, much of Smalltalk will seem quite alien at first. Don't try to figure out how things are implemented. When introducing new Smalltalk concepts in this series, I'll try to explain them in terms of conventional programming language constructs so that you keep a place to stand. However, there can be significant differences between the Smalltalk interpretation and a conventional interpretation, and any apparent surface similarity is often superficial. What's going on under the hood is quite different: in some cases, it can be better to forget what you know about existing languages and start again from scratch.

Just to add to the fun, some Smalltalk concepts are sufficiently different that I'm not going to explain them fully first time through. If you're already far enough into Smalltalk to notice that I'm skirting some issues or bending the truth a little, please bear with me — all will be revealed in the course of this series!

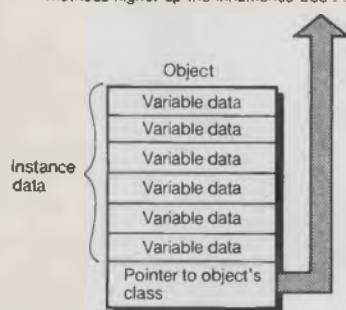
As always, the best way to learn any programming language is to use it. Buy yourself a Smalltalk implementation and you can use it to read and write Smalltalk programs. Smalltalk systems come with large amounts of source code. Look at it and try and figure out how things work. Experiment by modifying the code. You learn more from making mistakes and generating errors than

getting the syntax right first time. Learning any new programming language is frustrating until the point when it ceases to be alien and starts to be rewarding.

'Smalltalk is based on a small set of innovative and powerful ideas, consistently applied throughout a large software system.'

Before you can begin to learn Smalltalk 'the language', you have to come to grips with Smalltalk 'the programming environment'. If you have a Smalltalk system in front of you, now would be a good time to put down this article and fire it up.

The class of an object defines the layout of its instances as well as the messages and methods the object understands. Because of the Smalltalk class inheritance system this class also provides the route to other methods higher up the inheritance tree...



The Smalltalk object

Consult the documentation that comes with your particular Smalltalk. Learn how to start up the Smalltalk system, create a workspace window (Little Smalltalk doesn't have windows so this step is easy), type in and edit an expression, evaluate it, and regain control if something goes wrong. Finally, learn how to exit Smalltalk, perhaps saving the work you have done, and return gracefully to the operating system.

If you don't have a Smalltalk system yet don't worry — the preceding hurdles await you.

Principles

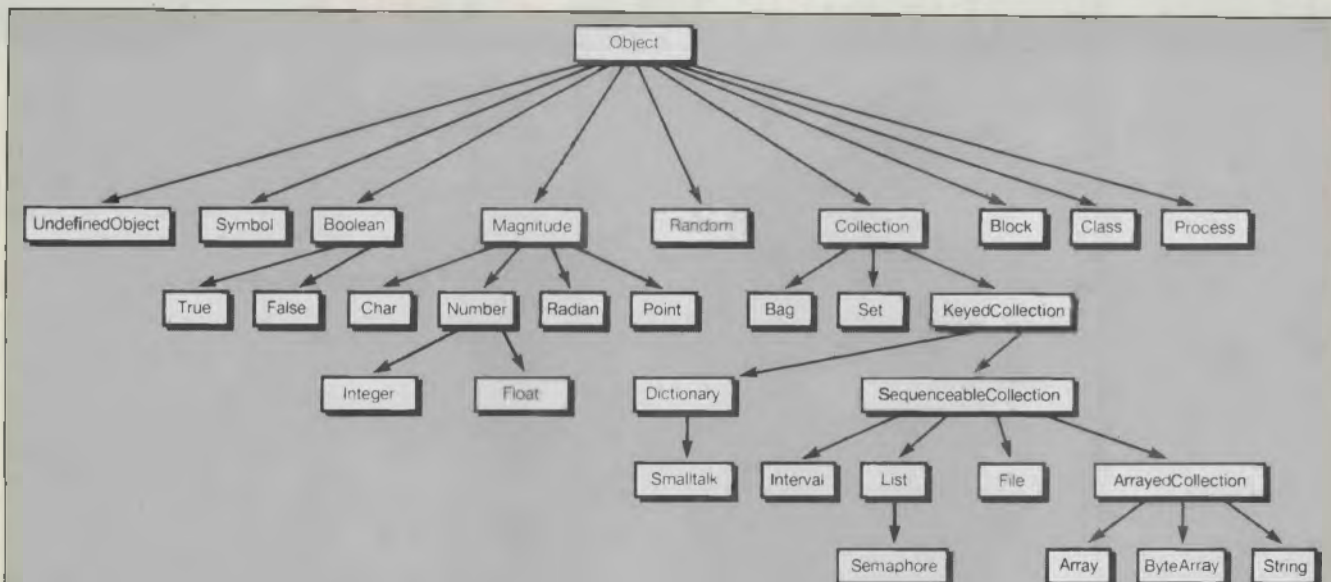
The fundamental component of the Smalltalk system is called the 'object'. Objects are used to represent all parts of the Smalltalk universe, and can communicate by sending messages requesting other objects to carry out particular operations for them. As a result of message-sending, procedures (Smalltalk calls them 'methods') are executed, variables changed and values returned — computing is undertaken.

Message-sending is the only way things happen in Smalltalk. It is a uniform mechanism that replaces multiple extraneous implementations of what are essentially the same ideas applied slightly differently in Pascal or C. Message-sending replaces, for example, calling a procedure or function, applying a built-in operator to some operands, conditional execution based on tests, or creating new examples of some built-in or abstract data type.

Objects represent everything in the system — from the humble integer, character, Boolean or floating-point number through conventional data structures such as strings, arrays, stacks or linked lists, to the Smalltalk compiler and entire range of applications programs. There is no distinction between the smallest and largest components of the system — they are *all* objects. The Smalltalk interpreter manages the creation and deletion of objects in memory automatically according to the dictates of the executing program.

An object is a container which holds data in named variables called 'instance variables'. An object also has a reference to the set of procedures (methods) which can manipulate that data. The instance variables of an object are private to the object and can only be accessed or manipulated by these methods. No other object can access or manipulate the contents of another object's instance variables, except as a byproduct of sending a message to that object.

Some Smalltalk objects can be represented literally:



The standard classes provided by Little Smalltalk. A full Xerox Smalltalk is considerably larger

45.3 — a floating-point number
 'Hello World' — a string
 -3 — an integer
 \$aSymbol — a symbol that is unique in the system
 \$c — a character
 16rffff — a hexadecimal number
 [x | ^ (x*2)] — a block of Smalltalk code
 #(1 2 3 \$F 'Apple') — an array of objects
 4@21 — a point object with x coordinate 4, y coordinate 21

Some objects have no literal representation but are created with simple statements:

aDate := Date today — create a date object that represents today's date and assign it to the variable 'aDate'
 Rectangle fromUser — get the user to indicate a graphical rectangle using the mouse, and create a new rectangle object that represents it
 names := OrderedCollection new — create a new OrderedCollection object and assign it to the variable names

A message is a request for an object to perform a task by carrying out one of its methods. Along with the name of a message (called the 'selector') an object can send an optional set of arguments to an object. Sending a message is akin to a subroutine or function call in Basic or C. However, there is a crucial difference: the object which receives the message (called the 'receiver') is free to decide for itself how it responds to the message. The object which sends the message has no knowledge about what methods and variables are changed in the process.

Think of an object as a little specialist computer. Its instance variables are its memory, and the set of messages it undertakes are its instruction set.

Some sample messages to objects:

45.3 sin — calculate the sign of 45.3
 'Hello world' at: 3 — get element 3 of the string 'Hello World'

'Smalltalk . . . teaches a different approach to programming that can give new and valuable insights into programming problems.'

addressBook includes: 'Charles Smith' — does the object referenced by the variable addressBook (an OrderedCollection — see above) include the string 'Charles Smith'?
 'Hello World' at: 7 put: \$w — at element 7 of the string object, put the character w
 2 + 3 — ask the object that represents the integer 2 to add the integer object 3 to itself

The messages the object will understand (its instruction set) vary depending on what type of entity the object represents. Objects representing integers or floating-point numbers respond to arithmetic messages such as '+', '-', 'sqrt' or 'negate'. Objects which represent arrays respond to messages such as 'at:' and 'put:', which access their elements; 'size', which returns their size; and so on. Objects which represent rectangles on the screen respond to messages asking them to display themselves, move or update their contents. Ob-

jects which represent compilers take strings in a source language and return the translated code.

The closest analogy to an object in a language such as C would be that an object is a structure with a set of named fields, plus a look-up table of pointers to functions equivalent to an object's methods and their selectors. When a message is sent, the selector is used to search the array of function pointers. If a matching function is found, it is executed with the arguments sent along with the selector.

Objects which represent the same kind of entity are grouped together into classes. Each object in the system is a member of some class — an 'instance' of a class in Smalltalk.

The class of an object stores the information that is common to all of its instances. It holds the table of methods — called the 'method dictionary' — which all instances of that object will call on to respond to messages. It also determines the number of instance variables that a particular instance will have, and their names. The class of an object therefore determines what kind of component an object represents and what can be done to and with it.

Consider the simple expression '3+4'. The C programmer would say that the operator '+' obtains two integer arguments and will return the value 7. The Smalltalk programmer would view the same expression as the object which represents the integer: 3 receives a message consisting of the selector '+' with the argument 4. The end result is the integer object which represents 7. In C, the statement 'sqrt(45.0)' calls the function 'sqrt' with the floating-point argument 45.0. The appropriate square root will be returned as a floating-point number.

The equivalent Smalltalk statement would be '45.0 sqrt'. The interpreta-

TEACH YOURSELF SMALLTALK

tion of this would be to send the object which represents the floating-point number 45.0 the message 'sqrt'. The object which represents the appropriate floating-point number would be returned.

In C, the statement 'max(3,4)' calls the function 'max' with two integers, 3 and 4. The larger of the two integers (hopefully 4) would be returned.

The equivalent Smalltalk expression would be '3 max: 4' which is

interpreted as: send the object which represents the integer 3 a message with 'max:' as the selector, and the object which represents the integer 4 as the argument. The object that represents the larger of the two integers would be returned.

A sample Smalltalk class

This is a (very) simple example of what an entire Smalltalk class definition which corresponds to a simple program might look like. Written in Little Smalltalk, it is a definition of Class Person designed to store various bits of information about people. Comments are in double quotes.

```
Class Person :Object
! name age jobStatus !
    "Class Person is a subclass of Object"
    "Person objects have 3 instance variables
    named name, age and jobStatus"

[
    name
    ^name
    name: aString
    name := aString
    "Define a method that responds 'name' selector"
    "Return the name instance variable"
    "Set the name variable of Person to be aString"

    age
    ^age
    age := anInteger
    age := anInteger
    "Return the age of the person"
    "Set the age instance of a Person to anInteger"

    job
    ^jobStatus
    job: aSymbol
    jobStatus := aSymbol
    "Return the job a person does"
]
```

To create and use person objects:

```
! aPerson anotherPerson ;
aPerson := Person.new.
aPerson name: 'Henry Smith'.
aPerson age: 55
aPerson jobs: lmanager.
    "Creates a person object"
    "Set the name to Henry Smith"
    "Set the age to 55"
    "Set the job"

anotherPerson := Person new.
anotherPerson name: 'Susan York'.
anotherPerson age: 22

aPerson age
55

anotherPerson name
'Susan York'

aPerson age < 40
False
```

Smalltalk is cheap

PCW has negotiated a special deal with Smalltalk Express which will enable our readers to follow the 'Teach Yourself Smalltalk' series at a reasonable cost.

For owners of an IBM compatible, an Acorn Archimedes or an Atari ST, Little Smalltalk is available for £7.50 for the disk and minimal documentation, or £32.50 including the book *Little Smalltalk* (which normally retails for £27.95). All versions of Little Smalltalk will be supplied with the original C source code and example programs. If any reader requires the book alone, this can be supplied for £25.

Smalltalk/V, the highly recommended graphical Smalltalk programming environment for IBM compatibles with at least 512k of RAM and two floppy disk drives, is available for £135 including full documentation. A free copy of Little Smalltalk will also be supplied with Smalltalk/V.

Negotiations are under way for the availability of Smalltalk for the Macintosh — watch this space in future issues of PCW for details.

All prices are fully inclusive of VAT and postage & packing. Cheques should be made payable to 'Smalltalk Express' and addressed to: Smalltalk Express, Hyde House, The Hyde, London NW9 6LA.

Smalltalk Express also operates a bulletin board system for Smalltalk developers; this can be contacted on (01) 205 0512 and operates at 300/300, 1200/75 and 1200/1200 baud. There is a wide variety of applications, hints and tips and online support, with sections for Little Smalltalk, Smalltalk/V and the full-blown Xerox Smalltalk 80.

Class inheritance

In order to save space and re-use information, classes are grouped into a tree structure. Objects which are instances of classes further down the tree inherit the layout of variables and methods of their parent classes. In practice, this is not as complicated as it sounds. The box on page 119 shows the class tree for the built-in classes of Little Smalltalk. Instances of classes such as Integer have the methods and variables defined by their class definition — Class Integer plus Class Number, Class Magnitude, and Class Object.

If a message is received and the Smalltalk interpreter is unable to find a matching method in the class of the object, then the interpreter will look in the method dictionary of the parent class for a matching message and method. If it is successful, the message and method will be executed with the arguments to the message. If not, the process is repeated in the parent class of the parent class, and so on.

This continues until the interpreter is searching the method dictionary of the class at the top of the tree (Class Object). If the matching method isn't in there, you've got yourself an error message.

Inheritance is the fundamental mechanism for code re-use in Smalltalk and is very powerful. Any message defined in Class Object, for example, will be understood by any object in the system of whatever class. This can be used to implement a 'print' method. Whenever you send the message selector 'print' to any Smalltalk object, it will respond with an appropriate visual manifestation of itself:

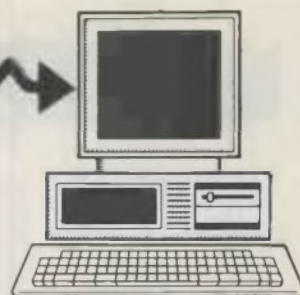
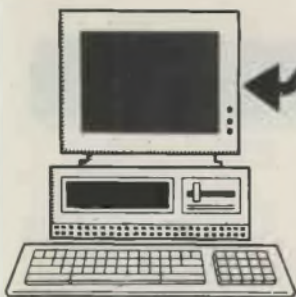
```
3 print
would print 3
(OrderedCollection new with: 5 with:
'Hello World') print might print 'an
OrderedCollection (5 'Hello World')
```

Series continued next month.

END

Homework

- (1) Instruct your Smalltalk system to print 'Hello World'.
- (2) Try out some of the simple expressions in the 'sample' box opposite on a real Smalltalk system.
- (3) What might the following Smalltalk expressions do?
 - 'Now is the winter' at: 12 put: \$W
 - 10 factorial
 - 65 asCharacter
 - today := Date today



TELEX FOR £149 PLUS VAT

(It's either a misprint or an Amstrad)

You don't need a telex machine to send a telex.

All you need is an Amstrad Modem and you're talking.

Or rather, your PC is talking. With other PC's, terminals and telex machines around the country and around the world.

Simply slot the Modem card into your Amstrad or other compatible PC, plug it into your phone socket, load the software and hey presto, you've entered the age of electronic mail.

You can send everything from a simple memo to a large confidential document without getting up from your desk.

And you can electronic-mail up to 500 addresses simultaneously. In fact, you'll be amazed at just how fast, and cheap, electronic mail can be.

What's more you can access a vast library of information services including newspapers, company reports and flights and fares. The Amstrad Modem costs £149 plus VAT* and comes complete with all the necessary software (another saving since it usually costs more than £150 for the communications software alone).

So if you'd like to be able to send telexes without buying a telex machine, send off the coupon today.

AMSTRAD MODEM TURNS YOUR PC INTO A TELEX.

For further information call 0277 262326

Please note that there is a 'per message' charge for each telex you send.

AVAILABLE THROUGH: ADT · CENTRESOFT · COMET · COMPUTER MARKETING · DIXONS · ELTEC · FIRST SOFTWARE · GARWOOD · GEM · GREYHOUND · LASKYS · LAZAROLD · LEISURESOF · MBS · MICRODEALER · MICRO PERIPHERALS · NORBAIN · NORTHAMBER · OFFICE INTERNATIONAL · OSTA · P&P · REFLEX · SANDHURST · HUGH SYMONS · VISTEC · WILDINGS

*Recommended retail price including VAT, £171.35. Price correct at 1.9.87 but may change without notice.

Please send me more information about the Amstrad Modem.

NAME

COMPANY

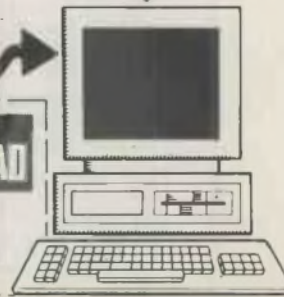
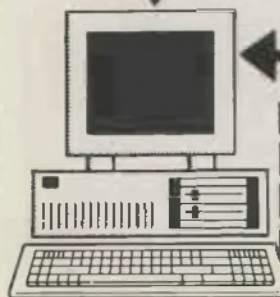
ADDRESS

TEL

Please send to: Amstrad plc., PO Box 462, Brentwood, Essex CM14 4EF. Telephone: (0277) 262326.

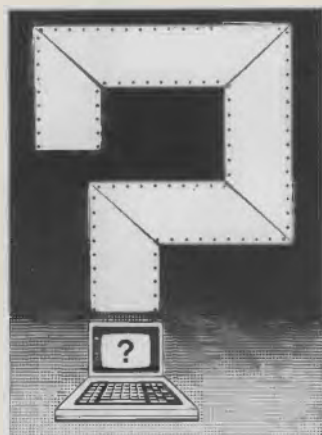
AMSTRAD

PCW 12



COMPUTER ANSWERS

*Steve Gold takes his toolkit to your problems.
The address to write to is: Computer Answers, PCW,
32-34 Broadwick Street, London W1A 2HG.*



Computer Answers is PCW's help column. We offer advice about all kinds of specific hardware and software problems through the pages of the magazine. We also welcome further information in response to published queries.

Brainy solution

I have been using a package called Brainstorm on the Amstrad PCW at work and am looking for a similar package to run on my single-drive Amstrad PC at home.

The problem is that Brainstorm requires two installation disks and frequent disk swapping, and is expensive. Is there a solution? *Phil Davies, Leeds*

Your salvation lies in an excellent package called PC Outline, which performs many of the functions seen in Brainstorm. PC Outline is a shareware package that can be obtained from many user groups for as little as £3, or even downloaded for free from several bulletin boards.

PC Outline is a 'thought organiser' and allows 'nested' listings of thoughts and ideas. Outline programs are really an *aide memoire* to sketching out a plan for an essay or article.

Outlines can be constructed in a conventional word-processing program such as WordPerfect, but PC Outline has several facilities not normally available in word-processing packages. Its ability to work as a TSR (Terminate and Stay Resident) program in the same way as Borland's SideKick is another bonus.

Considering that PC Outline

is 'shareware' (that is, try before you buy) you would do well to consider the package as a low-cost alternative to commercial software.

Do bear in mind, however, that US-based shareware does not have the same level of support that UK-based commercial packages have, and you may want to choose the PC version of Brainstorm which is available now and which has a UK manufacturer's support behind it.

PC versus AT

Having sold my Commodore 64, I'm about to buy a PC/XT clone — or should I go for a PC/AT clone? What precisely is the advantage of the AT over the XT? I want to use my PC for word processing and database retrieval.

Stanley Jebb, Dunstable

When IBM first unveiled the PC standard more than five years ago, the central processor was an 8088 chip. The 8088 functions as a 16-bit chip internally, but talks to the world via an external 8-bit data bus. As a result of this, data going into — and out of — the 8088 chip experiences a 'bottleneck' as 16-bit data has to be fed into and out of the chip in 8-bit chunks.

The 8088 microprocessor also has a limit on the amount of memory it can address at any one time. In the PC and PC/XT's case, this limit is further restricted to 640k by the PC-DOS operating system.

The PC/AT uses an 80286 microprocessor as standard. The 80286 microprocessor is a later-generation chip and is capable of faster speeds than the 8088. Whereas the generally accepted limit of an 8086 or 8088 microprocessor is 8MHz (compared with a standard of 4.77MHz), an 80286's theoretical top speed is 24MHz, although physical limits imposed by technology mean that 16MHz is about as fast as you can push an 80286 microprocessor.

In practice, there is very little speed difference between an 8088 and an 80286 microprocessor running at 8MHz. The main reason for opting for an 80286-based machine (such as the PC/AT) is to be able to address more

memory at one go — that is, beyond the 640k limit, and up to 16Mbytes of RAM at any one time.

Apple Reset

When I pressed the Control/Reset key on my Apple IIc at the same time as pressing a joystick button, I discovered a strange effect. The screen went blank and then started filling with colourful — and constantly changing — high-resolution graphics.

This sequence isn't documented in my Apple IIc technical manual. What is it used for?

Adrian Kirk, Sheffield

On the Apple IIc and IIe series, pressing a joystick button performs the same function as pressing the Open-Apple and Closed-Apple keys on the keyboard.

Pressing Reset, Control and Open-Apple keys all at the same time performs a system reset, just as if the power had been turned off and on again.

If the Closed-Apple key is added to this three-key combination — a near impossible task involving much keyboard contortion — the Apple IIe goes into a 20-second diagnostic test routine that is normally used at the factory to check all is well when the machine rolls off the production line.

The Apple IIc does not — officially — have a self-test diagnostic routine. The Apple technical manuals state that the above particular four-key combination will send the machine into 'Terry's memory and soft switch routine,' which generates the coloured patterns you saw. Although the programme is not an official diagnostic routine, I suspect it performs a similar function to that seen on the Apple IIe series.

Both program sequences will do no harm to your machine and, as well as being pretty to watch, may serve to indicate if all is not well — hardware wise — with your machine.

Full screen ahead!

I've just upgraded my 32k BBC Model B to an Amstrad

PC1512, but I'm making a number of keyboard mistakes. On the BBC, I could repeat the command line by manoeuvring the cursor up and pressing the Copy key to repeat the line character by character — a great time-saver.

On the PC1512, a similar — if somewhat cruder — facility exists by pressing the cursor right key. This seems to repeat the previous command line entry character for character but does not allow corrections to be made easily, which means that I keep dropping characters.

Is there an equivalent program for the PC that mimics the command line editor on the BBC Model B? *James Hakeworth, Headingley, Leeds*

Your problem is that the PC does not have a full-screen editor as seen on the BBC Model B.

There are, however, several commercial packages which will provide you with rudimentary screen-editing functions, not dissimilar to those found on your BBC Model B.

Before you lash out on such packages, remember that two function keys in DOS can be used in repeating commands — F1 and F3.

Function key F1 will repeat the last command line keyboard entry character by character. Moreover, the cursor can be moved so as to allow replacement and/or insertion of extra characters. When F1 is pressed again, the previous line continues to be repeated — without the breaks experienced when using the cursor right key.

Function key F3, meanwhile, will allow the previous command line to be repeated in one keystroke from the cursor position. This is particularly useful when a directory entry has been omitted.

For example, if 'DIRWORDSTAR' had been entered from the DOS prompt, with the intention of obtaining a directory of WordStar files on the disk, then pressing function key F3 followed by the necessary '*.*' would save on the number of key depressions required to repeat the command line.

END

LOGITECH MOUSE

From the World's leading Mouse Experts

At LOGITECH, we have spent years developing the most advanced mouse hardware and software and we have earned the reputation of the world's leading mouse experts. As proof of our unsurpassed engineering, the LOGITECH Mouse has been chosen by many of the world's largest computer manufacturers - Apollo, AT & T, DEC, Epson, HP, Nixdorf, Norsk Data, Olivetti, Zenith.

Our mouse and bus mouse are high quality products, offering you the latest mouse technology at the lowest available price.



Purchase our best selling LOGITECH Serial Mouse or Bus Mouse and Plus Package (including Mouse Driver, Click, Logi-

menu, Point & Click Shell for Lotus 1-2-3, Point, Text Editor) with CADD, Paint and Publisher software at very affordable prices. Each package is a complete solution that gets you the results you need right now.

Advantages and main features

- High resolution (200 dpi) - a must for all CAD/CAM applications
- Opto-mechanical technology offering the best of both worlds - optical precision and the rugged durability of mechanical technology
- Reliability
- Ergonomic design, no need for grid or pad
- Compatibility with all the major hardware and software
- Easy to install, easy to use
- Best mouse software

Get your hands on more solutions



LOGITECH has selected for you some of the highest performance graphic applications to be bundled with the Mouse or the Bus Mouse:

CADD Solution



The LOGITECH Mouse, Plus Software and LOGICADD (Generic Cadd, 3.0 plus DotPlot). Everything to turn your PC into a full featured CADD workstation. It is the complete solution for dimensioned line drawing and CADD.

PAINT Solution



The LOGITECH Mouse, Plus Software and LOGIPAIN (PC Paintbrush). With 11 types fonts and a 16 colour palette, it's the paint set that's used by professionals and beginners alike.

DESKTOP PUBLISHING Solution

The LOGITECH Mouse, Plus Software and PUBLISHER Software (PFS: First Publisher). It's the complete package that makes it easy to produce high-impact, professional looking documents.



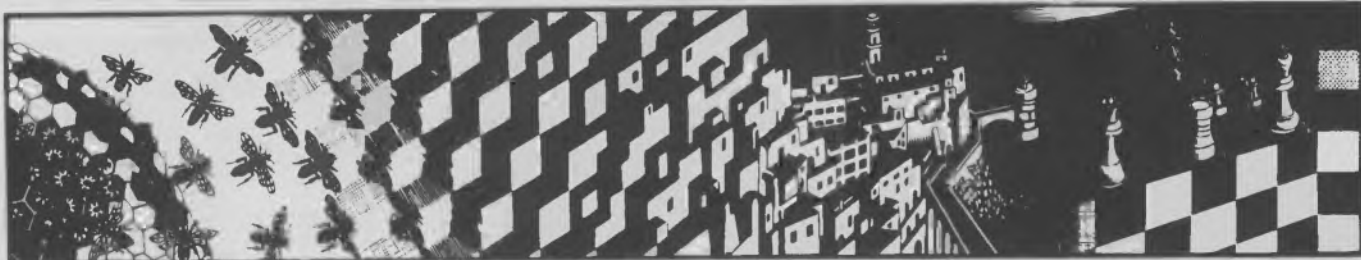
LOGITECH

LOGITECH U.K.
Linford Forum, Rockingham Drive
GB-Milton Keynes, Bucks, MK14 6LY
Tel. 908 67 99 76

SILICON EXPRESS LTD.
Silicon House, Fowke Street, Rothley
GB-Leicestershire LE77 7PJ
Tel. 533 37 49 17

SOFTSÉL COMPUTER PRODUCTS LTD
Softsel House, Syon Gate Way
Great West Road, Brentford, GB-Middlesex TW9 9DD
Tel. 1-568 88 66

SOFTWARE LIMITED
2 Alice Owen Tech. Cent., 251 Goswell Road
GB-London EC1V 7JD
Tel. 1-278 23 77



RADA dropout Stephen Applebaum settles for a role in a B-movie. He also witnesses a warped idea of feminism and decides that the oldies are the goodies in this month's review of the best games.

Just like the movies

Title: Stifflyp & Co
Computer: Commodore 64;
Spectrum +2
Supplier: Palace Software
Format: Disk; cassette
Price: £14.99; £9.99

If each month I awarded a prize to the game with the most ridiculous title, Stifflyp & Co would be this month's runaway winner. This program, like The Sentinel reviewed alongside, has been on the market for several months; but, unlike The Sentinel, has not done as well as it might have due to some High Street stores' refusal to stock it on the grounds that it does not fit into any clearly-defined category. True, it is neither an adventure in the accepted sense, nor an arcade shoot-'em-up, nor even a platform-and-ladders game; but originality should be welcomed and not shunned for convenience.

The word 'Stifflyp' in the game's title is not a reference to what you come out of the dentist with, but the name of the lead character in this offbeat pastiche of cinema serials. It recalls the days when Britannia ruled the waves, when men wore starched longjohns, and film-makers would have you believe that sex meant holding hands (something to do with the starch, probably).

The game's scenario centres on Viscount Sebastian Stifflyp and his three accomplices — Miss Palmyra Primbottom, Professor Braindeath and Colonel RG Bargie. Playing all four characters, you must thwart the depraved Count Chameleon, an oddball notorious for selling rubber goods through mail-order ads in a civil service magazine and who now threatens to relax England's moral standards with his dastardly Rubber-tronic Ray.

Stifflyp & Co's appeal comes largely from its visual intensity. Its graphics are unusual and some of its special effects are unique among



Commodore 64 programs. The game's designer and programmer, Paul Norris and Rupert Bowater respectively, spent a lot of time programming some of the visual trickery we have come to associate with the B-movie genre. On the whole, it was time well spent.

There are only two main screens in Stifflyp & Co, which probably makes the game sound limited. However, there is enough activity in each screen to keep even the most demanding player interested for several hours at a time.

The first screen you see is the storyboard. In film-making jargon, the storyboard is a kind of comic strip where each picture represents a potential scene or event in the movie. Stifflyp & Co's storyboard is a pad of paper on which are drawn two scenes, one above the other. The bottom scene shows the current position of whichever of the four characters you happen to be controlling, while the top one represents their previous location.

When you move between scenes, the top sheet slowly peels off to reveal a new one with the next scene drawn on it. The peeling effect is extremely realistic and forms just one of the game's visual gems.

Down the left-hand side of the screen are six very stylised icons which are used to make the various characters talk ('Chinwag') to and trade with one another, fight ('Fisticuffs') with Count Chameleon's henchmen, move ('Beetle off'), per-



form an action of some kind ('Do one's stuff'), and 'Take Stock'; there is also an icon for swapping between characters, strangely called 'Changing batter'.

When you select the Take Stock icon, the game pauses and the display 'wobbles', exactly like the effect used in some movies to indicate when a character is having a flashback. (I have seen this effect before but never in a computer game.)

Running down the opposite side of the screen is a strip of film containing the faces of the characters other than the one you have control of. When one of these characters dies, or is jailed for some offence, their face is struck out with a black cross or depicted behind bars. Of course, the character you have control of is not immune to these inconveniences and can also suffer the same fate, in which case they will be relegated to the sidelines.

The icons and the characters on the film strip are selected using a cursor drawn in the image of a pencil — this makes play quick and easy. And to further speed things up, the 'Act' icon includes a list of actions which can be performed in a particular scene, doing away with the need to type commands.

The second of the two playing screens is accessed via the Fisticuffs icon. A rather chaotic display appears, in which a lot of seemingly unconnected events appear to occur simultaneously. To the left there is a picture of your character being pum-

melled by a boxing glove which bounces on a spring. Each hit saps a little of your strength, as indicated by a meter on the left of the screen.

In the centre of the display is a circle containing a glove on a rotating arm. This spins around, faster and faster, its speed being an indication of how hard a punch would be were you to throw one. However, as the exertion becomes too much for you, the glove begins to slow down

and the effectiveness of a punch decreases.

Below the power indicator is a box containing a number of punch options. You can, for instance, throw a right upper cut, a left hook or, if you are feeling particularly aggravated, throw a punch to your opponent's groin — a surefire winner in times of trouble. Then again, you could always select the white feather option and chicken out. You aim a punch by

trying to position a cross-hair in the centre of a rotating, 3D target. The nearer to the centre you are, the greater the power of your punch.

Stifflyp & Co is unlike any other game on the market. The only thing I can think of that comes anywhere near being similar in style is a graphic adventure, but even that would be, conceptually, so far removed as to make the comparison virtually invalid.

The (un)fairer sex

Title: Plundered Hearts

Computer: IBM PC; Apple II Series; Macintosh; Atari ST; Atari XL/XE series; Commodore 64/128; Amiga

Supplier: Activision

Format: Disk

Price: All systems £29.99 apart from Commodore 64/128 & Atari XL/XE versions, £24.99

Infocom claims that it produced *Plundered Hearts*, one of its latest text adventures, in response to letters received from women calling for a scenario that reflected their attitudes and interests. The result is not only the first adventure from a major software house to feature a female protagonist, but must surely also be one of the few to have been written solely by a woman, Amy Briggs.

But even though *Plundered Hearts* apparently has the credentials to appeal to a predominantly female audience, it is not, I suspect, the game those women had in mind when they wrote to Infocom. Amy Briggs has pastiched Mills and Boon and characterised her heroine in the way men like to present women: she is beautiful, vulnerable but not helpless, and liable to forget everything when confronted by Mr Right.

How many adventures can you recall where the male lead jeopardises his mission because he lets his hormones, rather than his brain, dictate his actions? And why should this be the case in an adventure purportedly written for women?

In *Plundered Hearts*, the heroine swoons with delight each time the male interest swaggers into view; keeping her out of his octopus-like grip long enough to complete her mission is a major preoccupation. Surely women aspire to things other than being carried off by a hulking male, the likes of which stopped evolving somewhere between simians and homo sapiens. But, Amy Briggs is a woman, and this, apparently, is what she thinks members of her sex desire. (If you are a woman reading this review, I apologise for the way women are depicted in some of the following extracts. They are, however, Amy Briggs' words, not mine.)

Plundered Hearts is set in the bal-

my West Indies of the 17th century. You play a young ingenue, travelling aboard a ship bound for St Sinistra where, in a house owned by the unscrupulous Jean Lafond, your grizzled father lays dying from a rare, wasting disease. Everyone (well, almost) hopes that your presence on St Sinistra will encourage your father to fight off his illness.

However, there are people who would stop you reaching him — Jean Lafond being one of them. His motives for inviting you to St Sinistra are far from honourable.

Even before the action proper begins, Amy Briggs has her heroine — that is, you — caught in the clutches of an unnamed, but perfectly formed, seaman, whose eyes 'rake over your inadequately dressed body, the damp chemise clinging to your legs and heaving bosom.' Before long, 'his mouth is on yours, lips parted, demanding, and you arch into his kiss...' Sizzling stuff.

All this has very little whatsoever to do with the main story since, when the game does actually start, you are aboard the Lafond Deux which is being attacked by pirates. One of these pirates throws you into a cabin and promises to make you the crew's plaything, after the *mêlée* on deck has subsided.

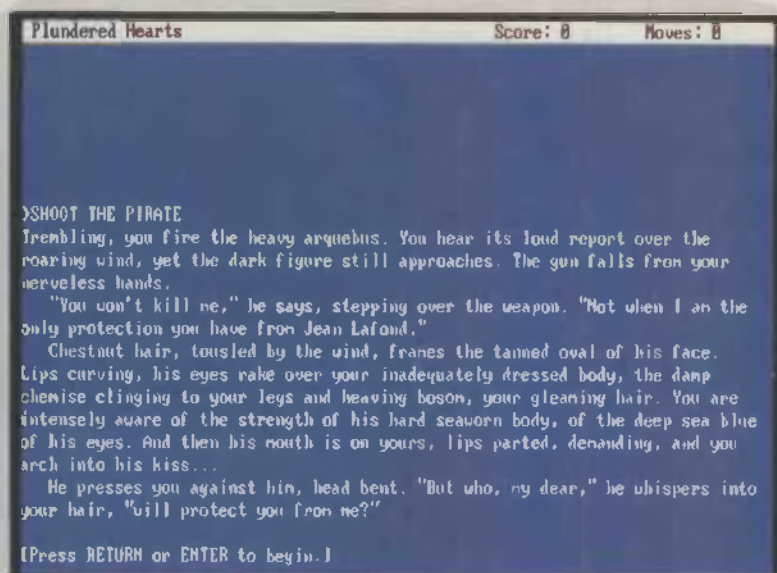
Quicker than you can say 'sexual

harrassment', in barges a rather repulsive-looking sailor shouting 'Me name's Andy Crulley, and ladies learn to love me.' Just when all seems lost, who should appear but Captain Nicholas Jamison, aka The Falcon, whose manly features turn your legs to jelly and somewhat predictably cause you to swoon. Could he be Mr Right? You bet he is.

Jamison, you soon discover, has been sent to protect you from Lafond by your father. And, as in all the best romance novellas and TV soaps, has his own reasons for wanting to meet Lafond — in this case to take revenge for the murder of his brother.

More of the action in *Plundered Hearts* takes place aboard Jamison's ship and in Lafond's house on St Sinistra, and the latter location features a superb ball scene. Amy Briggs' atmospheric evocation of the ball is so convincing that you find yourself drawn into the action until you are no longer a mere onlooker. Her description brings to life the smell of the women's perfumes, and you can almost hear the frou-frou of their dresses as they promenade blithely around the ballroom in time to the orchestra.

Plundered Hearts contains large sections of purely descriptive prose, since it was written to emulate a romantic novel. In this sense the



SCREENPLAY

game is a success, but I doubt whether adventure purists will enjoy it as these prosaics amount to long interludes of inactivity for the player.

Although her writing is lively and skilful, Amy Briggs should have tried to strike a better balance between the amount of descriptive text and periods of activity in the game — viz, the parts of the game where the player has to perform some form of action.

She might also have considered cutting out some of the slush. Things like 'Tender is his kiss, soft his lips as

his body presses hard against you. You drown in the tide of your passion, swept like the sea against the rocks of the shore' can become extremely tiresome if spread too thickly.

As *Plundered Hearts* is an Infocom game, it is hardly a surprise to find that not only is a disk included, but also a number of freebies. These include a small velvet reticule, with the name of the adventure embossed on it in silver; a letter from Jean Lafond; and a 50 guinea note, as used on *St Sinistra*.

Plundered Hearts is an interesting and, on the whole, successful experiment. Although it does not come off nearly as well as Nord and Bert (reviewed in last month's *Screenplay*), it illustrates how a writing genre can be imitated within the adventure structure.

Amy Briggs has not quite done for romance what Dave Lebling did for horror in *The Lurking Horror*, but she at least provides an interesting, though somewhat dubious, alternative to the normal adventure scenario.

A cut above the rest

Title: *The Sentinel*

Computer: Atari ST; BBC; Spectrum

Supplier: Firebird

Format: Disk; cassette

Prices: £19.95; £14.95; £9.95

Sometimes, due to circumstances beyond my control, I fail to include in *Screenplay* a game which, because of its quality and innovation, deserves coverage. When this happens, instead of going back to the original, I often wait for a new version; simply because, by the time the review is published, the first one has become passé. Thus, after a long wait, I at last bring to these pages the ST version of *The Sentinel*, a brilliant and uniquely refreshing game of strategy.

The Sentinel is a power struggle in the truest sense, as it involves a fight for the lion's share of a planet's energy (there are in fact 10,000 different 'worlds' to conquer).

Each world is presided over by the Sentinel — a she-creature who survives by sapping a planet's energy. Your role is that of a lowly synthoid, programmed to roam the universe delivering planets from the Sentinel's evil stare. However, you are alone in this venture, whereas the Sentinel has at her disposal hordes of Sentries and Meanies.

During play, you see your surroundings through the synthoid's eyes. Using either the keyboard or mouse, you can scan your surroundings in any direction. Rotating the synthoid causes the screen to pan, revealing the surrounding land. Trees and boulders proliferate across every planet and provide the major sources of energy for yourself and the Sentinel.

Energy is the prize in *The Sentinel*. As a synthoid, you are able to assimilate the energy latent in trees and boulders; this is used to produce new synthoids, or to create trees and boulders, the strategic potential of which is enormous. Energy must be absorbed before new forms can be created because, as in the real world,

energy cannot be created or destroyed but only turned into another form.

Like everything else in this extraordinary game, the Sentinel can be transformed into pure energy through a process of absorption — if she doesn't absorb you first. The idea, therefore, is to move your synthoid into a position from where you can see the Sentinel, absorb her, and then hyperspace to a new world. If this sounds easy, the Sentinel always inhabits the highest location on a planet, which means that you must first find a relatively high spot and then pile boulder upon boulder until you are high enough to zap her.

To move about a planet, you point to a square and then press a key or click the mouse, depending on the control device you are using. This not only moves you but actually creates a new synthoid. If you look back after moving, you will see the shell of the old synthoid standing at the location from where you moved.

Mountains and valleys provide refuge from the Sentinel's withering stare; she rotates constantly, enervating anything that falls along her line of vision. When you are spotted by either the Sentinel or one of her cronies, your energy falls until you move to a safe position out of sight.

If, at any time, you cannot move because the land immediately surrounding you is too high, you can hyperspace to another position on the landscape. Whereabouts you emerge from hyperspace is entirely up to the computer, and you could find yourself landed in full view of

the Sentinel.

Depleted energy is replaced in multiples of one, two, three or four, depending on whether you absorb a tree or a Meanie, a boulder, a synthoid or a Sentry, or a Sentinel respectively. As the game is subject to the law of the 'conservation of energy', it follows that if a Synthoid provides three units of energy, it must also take the same amount to create one. Therefore, if your energy level falls below three units, it is impossible to move — in which case you can wait to be absorbed by the Sentinel, or mercifully restart the game from scratch.

Despite standing on the highest point on a planet, the Sentinel is not always visible because of the mountain ranges which characterise the geography of the various planets. To give you a chance, Firebird has installed a 'cheat' option on the Atari's HELP key. When this is pressed, the display changes to a bird's-eye view of the current world, showing your position in relation to the Sentinel.

The Sentinel has been around for some time now but remains one of the most original games I have seen to date. This version for the Atari ST has everything: excellent graphics, good gameplay, and a scenario so deceptively simple that you could not hope to appreciate the subtle strategy involved until you have played the game.

The Sentinel is, without a doubt, a classic and one of the few games I would advise all ST owners fed up with arcade shoot-'em-ups to buy on spec: you won't regret it. **END**



Abraca d'abacus.

Psion Organiser II. The magic of PC power in your pocket.

You could be forgiven for thinking that the Psion Organiser II is just another hand-held programmable. Hand held, yes. Programmable, very much so. But just another? No way.

For a start, with plug-in Datapaks you can have up to 320k of memory at a time, giving around 280k for your own programs. Even without Datapaks you can now have a massive 32k RAM (Model XP). What's more, what's saved there stays there, even when you switch off... or change the battery.

You might think that, because it's small, Organiser II's programming language is just a token gesture. Wrong again. Combining the ease of Basic with the structure of 'C', it offers full integer, floating point, string, array, file-handling and machine code facilities. It has around 120 commands and functions, plus any you add

yourself. And it runs up to 10 times faster than Basic. You can of course program Organiser II direct. But you can also write your programs on a PC using our powerful Developer environment, and down-load them through our Comms Link (which incidentally also allows Organiser II to be linked to printers and modems as well as desk-tops).

You can also plug pre-programmed packs into Organiser II. Our Pocket Spreadsheet, for example, gives you all the major features of a PC spreadsheet and, with Comms Link, allows you to transfer Lotus 1-2-3* type spreadsheets to and from your PC. There's a range of program packs to help you, from a Spelling Checker to a Formula Calculator.

And just in case all this isn't enough, Organiser II comes already programmed with a remind-you diary, a find-it-for-you filing system and address book, a clever calculator and a clock with eight hourly, daily or weekly alarms.

The price of all this power? From less than £100, including VAT. Psion Organiser II. It's fast. It's powerful. And it's available from leading retailers, including Allders, Dixons, House of Fraser, John Lewis, Laskys, R.S. Components, Ryman, Underwood and Wilding Office Equipment.



PSION

Psion Limited, Psion House, Harcourt Street,
London W1H 1DT Tel: 01-723 9408
Telex: 296489 PSIONC G. Fax: 01-724 6646

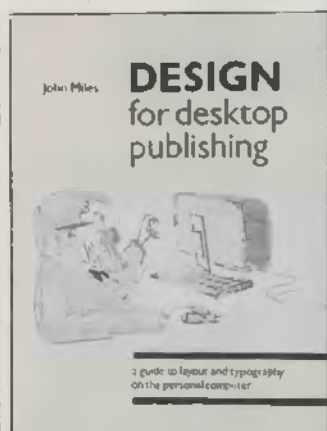
*Lotus and 1-2-3 are registered trademarks of Lotus Development Corp



BIBLIOFILE

Flavour of the year is desktop publishing. Everybody is talking about it, but how many of us are actually doing it — properly. Our reviewers look at the best book buys on DTP.

Design for desktop publishing



Author: John Miles
Publisher: Gordon Fraser
Price: £9.95

Enough has been written and spoken about desktop publishing (DTP) for most people to be aware that traditional publishing and printing methods are about to come in for a severe thrashing as DTP systems gain in popularity. Woored by the

tempting promises of zealous sales staff that all you need to be 'your own publisher' is a PC, some software and a laser printer, punters are rapidly being parted from their money — and are making the most hideous mistakes. Having the tools of the trade is no guarantee of success in DTP, and eager, would-be publishers are finding themselves plunged into a world fraught with danger.

Just in time, then: enter John Miles, professional designer and author of *Design for desktop publishing*, the first in a series of books on DTP from publishing house Gordon Fraser — better known for its greetings cards and gift paper than computer books, but a logical progression nonetheless. For just under a tenner, this 100-page wire-bound manual takes you step-by-step through the practical and design considerations involved in putting together a publication from start to finish.

The 20-odd chapters are short and well laid out with plenty of illustrative examples and annotations throughout. They span: identifying your market; typography, design and layout; choice of paper and binding methods; and finally a list of printer's marks and a useful glossary.

Mr Miles spent two years researching *Design for desktop publishing*, and its lucid and non-technical approach will quickly have you conversant with common printing jargon such as picas, ems, founts and halftones, so that you can get on with the job in hand. However, he warns that it 'is not a manual of instant creativity nor is it an instruction book on how to operate a machine.' (In fact, the book makes no more than a handful of references to the personal computer, although the blurb states that it was indeed written and laid out on a PC. And so it occurred to me that this excellent little primer

might well have started life as *A student's guide to creative design* and changed course as the popularity of DTP grew. Only Mr Miles knows the answer to that one.)

The lesson to be learned — and often painfully — is that many of the skills involved in becoming a 'desktop publisher' have nothing to do with computers and are based on a thorough understanding of printing conventions and aesthetic criteria. So the book's real strengths lie in pointing out why certain designs and layouts work and others don't, to a consideration of the use of different founts to enhance the printed text.

Design for desktop publishing is attractive, long-awaited and essential reading for anyone embarking on, or already in the throes of, desktop publishing.

Nice one, Mr Miles, and on with the rest of the series, Gordon Fraser.

Joanna Murchison

The Desktop Publishing Companion



Author: Graham Jones
Publisher: Sigma Press
Price: £14.95

One of the problems of DTP systems is that once purchased, users confidently expect their chosen system to be their instant panacea. Unless forewarned, the reality can come as something of a shock. *The Desktop Publishing Companion* by Graham Jones is an honest and well-informed appraisal of what desktop publishing is, what it involves and what it can do for you — seen through spectacles which are clearly not rose-tinted. 'Do not get carried away thinking that the technology is the answer to all of your publishing problems. It may only be the beginning.' The book aims to dispel the widespread myth that DTP

users will become instant publishers and warns that preparation and hard work is necessary even before you sit down in front of the computer. 'Desktop publishing involves all of the aspects of production used in the traditional publishing industry... (it) is made up of writing, design, graphics and typography.'

Graham Jones has either done his homework well or has spent time on the production treadmill, for his grasp of the production process is second to none, with sections devoted to scheduling, flat-planning, copy flow, editing (and a large subsection on grammar and syntax for would-be publishers whose English is a bit rusty), design and layout, choice of paper, finishing and printing (although not necessarily in

that order). He doesn't mince his words either: 'This book is not about computers, but about publishing.'

Well, yes, that's certainly true but in saying so he's doing the book a disservice, and so would I be if I failed to mention that there are also some excellent chapters on hardware and software choices for DTP systems, with summaries of the most popular buys, together with a first-class 'help' directory and a useful glossary of publishing terms. He also examines the advantages (speed, flexibility, cost-effectiveness) and disadvantages (yes, there are some of those too) of DTP systems compared with traditional publishing methods, and elucidates the potential application areas for DTP (mainly office-based

publishing, but also, paradoxically, of use to typesetters). Even strategic considerations such as marketing, sales and distribution are considered (well, if you haven't got that side sorted out, there's not much point in having the idea in the first place, is there?).

The aim of desktop publishing after all is to allow you to produce professional-looking publications quickly and cheaply from the comfort of your 'desk'. And so Mr Jones' message to newcomers who want to achieve good results is: 'Keep it simple' and 'Keep an eye on the clock.' Just remember that faced with the huge variety of techniques available, it's all too easy to create an infinite number of designs. Comforted by the advice and information in this book, however, you'll soon be getting it right first time round.

Joanna Murchison



Desktop Publishing

Author: Joseph St John Bate & Kirty Wilson-Davies
 Publisher: Blackwell Scientific Publications
 Price: £12.95

People who make their living by writing books about microcomputers must be thanking their lucky stars for desktop publishing.

Until recently life was pretty quiet for these professional authors, the home micro boom was over and business computers tended to be so similar that there was little mileage left in them — once you've seen one *How to use MS-DOS* book, you've seen them all.

Now desktop publishing has come to the rescue and all the old hacks can dust off their typewriters and start trying to earn an honest crust explaining all the wonderful things DTP can do. For the most part these new books are a sorry bunch. They are

usually poor-quality rewrites of the manuals of the popular DTP packages and are generally bad at explaining what to expect from a DTP package.

It is refreshing, therefore, to read *Desktop Publishing* by the double-barrelled duo of Joseph St John Bate and Kirty Wilson-Davies. This is the first book I have come across which would actually be useful to someone who wanted to know about DTP systems.

The book provides an overview of DTP software and hardware for both the Apple Macintosh and the IBM PC. It even looks at multi-user systems such as the dreaded Troff on Unix. After explaining about DTP software and looking at the leading packages, it then goes on to look at add-ons, typesetters and who should do what in a company which uses a DTP system. The authors even include a chapter on the basics of page design to help you produce more professional results from your system.

The writing style is easy-going and helpful, and the book only uses screendumps or pictures where they are necessary to put over a particular point. The restraint of the authors in not using too many pictures is commendable and is in marked contrast to some other DTP books I have seen where the pictures outnumber the words.

If you want to know what DTP systems are, what they can do and what software and hardware is available, then *Desktop Publishing* is an excellent place to start.

John Donaldson

Desktop Publishing Bible



Editor: James Stockford
 Publisher: Howard W Sams/
 The Waite Group (Pitman Publishing)
 Price: £20.95

When a publisher calls a book the something or other 'bible',

you are led to expect a complete and authoritative work. Unfortunately, in the desktop publishing world, today's complete information is only a fraction of tomorrow's.

Nevertheless, Howard W Sams and Company collaborated with The Waite Group to produce the *Desktop Publishing Bible*, which thudded on my desk last week. The book is almost five hundred pages of information vital to adherents of the latest IT cult.

This book differs from most because it is actually a collection of essays by specialists in different aspects of DTP, many of whom bring their knowledge of traditional publishing to the book. The whole lot has been stitched together by Jim Stockford, editorial director of The Waite Group and, considering he had 21 authors to contend with, he's done a good job.

Thankfully, the book is not a hymn of praise to desktop publishing. The first five chapters concentrate on traditional aspects of publishing, setting the scene really for those entering the game through DTP. One of these chapters is devoted to copyright law but, since the book is American, this is only of partial interest. Chapter five carries out a worthwhile comparison of the cost of DTP against traditional methods. Broadly speaking, it convinces the reader that as the complexity of a task increases, DTP becomes the less financially viable option, although it always offers less quantifiable, more qualitative, benefits.

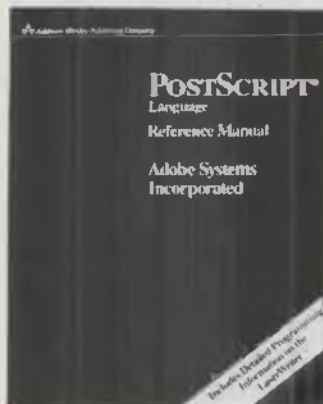
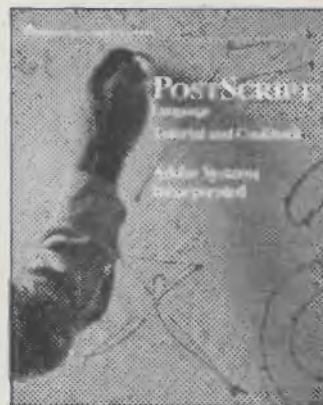
Essays are written on various hardware and software ingredients: Macintosh, PC, graphics cards, monitors and printers are all covered to a greater or lesser degree. IBM's PS/2 gets a token mention, but I felt this was thrown in at the last minute to keep the book looking up to date. The book focuses primarily on PC systems but does venture up to Unix systems and high-end workstations. While Windows got plenty of detailed coverage, GEM figured hardly at all. The Waite Group has clearly decided which way the operating system wind(ow) is blowing. Mitchell Waite himself does a very readable chapter on the Postscript programming language.

Techniques of both using sample programs and the process of production in a DTP environment are covered, including the special problems associated with music and comic publishing. While some

of the essays are really good, others are a bit light. In the main, though, I would regard this as a useful addition to any would-be desktop publisher's bookshelf.

David Tebbutt

PostScript Language Tutorial and Cookbook PostScript Language Reference Manual



Author: Adobe Systems Inc
 Publisher: Addison-Wesley
 Prices: £16.30 (Tutorial)
 £21.95 (Reference Manual)

A number of DTP packages now claim Postscript compatibility. This means that they talk to a printer (of the laser variety, usually) using the Postscript language.

Normally, the average DTP person won't need to, or want to, learn Postscript. As long as the laser printer contains a Postscript interpreter, it will obey the commands sent by the software and your page will roll neatly out of the tray.

A Postscript program is simply an ASCII file containing a description of the page that is to be printed. It's a fairly high-level language, in that you don't have to specify the position of every pixel. You just send a Postscript command saying 'draw a line from here to there' and the

printer, guided by its Postscript interpreter, will do this to the best of its ability.

Your program doesn't have to worry about resolution. The printer takes care of that, so the same program will run on a 300dpi LaserWriter or a 2100dpi typesetting machine.

For those suitably inclined, there's nothing to stop you writing your own Postscript program and sending it to a printer as a straight ASCII file. All you need is a good book on the subject, and Adobe, the company who wrote the language (and who make huge amounts of money licensing their interpreter) have produced such a work.

Actually, there are two books, and you'll need them both.

The *Postscript Language Tutorial and Cookbook* is a thorough introduction to the language, with lots of examples. It starts by explaining the concept of Postscript's page — the blank work area upon which you build up an image by specifying commands.

To introduce the concept of a programming language, the book then talks about Postscript's stack, its method of arithmetic (postfix) and its data types. After chapters on each of these, with examples, the sample programs start. These gradually introduce the command set, starting with maths and writing simple text, and progressing to graphics and even the definition of an entirely new font.

Incidentally, around one third of Postscript's commands are graphics-orientated. The rest are similar to what you'd find in any language — arithmetic, trigonometry, loops, variables, and so on. If Postscript source code resembles any other language, it's Fortran, so you can practice on your Jupiter Ace while saving up for a LaserWriter.

There's not a lot you can say about the second book. The cover proclaims it to be the *Postscript Language Reference Manual*, and it is. Like the other book, it was produced totally in Postscript as produced by the Scribe Document Production System. Its 321 pages were proofread by producing draft copies on an Apple LaserWriter, and the same file was then sent to a Linotron typesetter to produce the final copies from which printing plates were made.

Although both books are crammed with useful background information, neither are good bedtime reading unless you really want

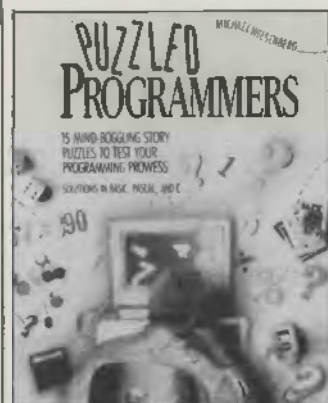
your head filled so full of thoughts that you can't get to sleep.

On the other hand, if you want to write raw Postscript code or a package to rival Ventura, these two works represent £38 worth of essential information. Well worth putting on the old expense account.

Roger Dalton

General

Puzzled Programmers



Author: Michael Wiesenbergs
Publisher: Microsoft Press
Price: £10.95

Calling all you would-be yuppie Silicon Valley, fast-driving, job-hopping, high-living programmers. Do you stand at a colleague's desk, clutching your Styrofoam cup of freshly ground coffee, while gratefully accepting a pine nut bagel stuffed with peach cream cottage cheese, waiting for someone to stroll by and nonchalantly toss aside 'Hey you guys, here's a fun puzzle for you: What is the smallest number that is the sum of two cubes in two different ways? 'Answers acceptable in Basic, Pascal or C.'

Well, if this sounds like you, then *Puzzled Programmers: 15 Mind-Boggling Story Puzzles to test your Programming Prowess* is definitely the book for you. Meet Spotwood Gilbert, a new employee at I-Q Industries, and his pals Bob Levin, Sally McRae, Grey Scrivener and Marion Smith to name but a few, who seem to spend every hour of the day munching doughnuts, blueberry muffins — fresh-from-the-oven, sour cream coffee cake and shrimp-croissant sandwiches while setting each other tempting little 'teaser' puzzles. It's a bit tongue in cheek when it comes to the stories, but all good, clean, harmless fun.

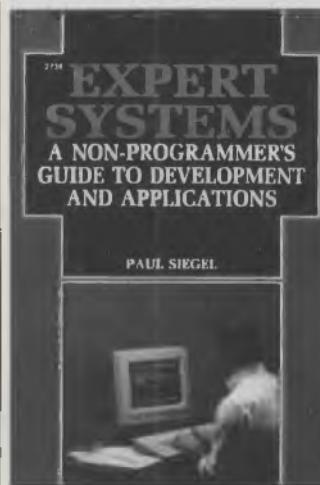
The author shows his true

colours in Sections 2 and 3 where 'Hints and Solutions' to the puzzles are given. As he states: 'merely knowing the answer is not enough; you have to devise a program that, given the data in the puzzle, produces the answer.' Each puzzle may be solved in Basic (Microsoft GWBasic Version 3.2), C (Microsoft C Version 4) or Pascal (Borland International Turbo Pascal Version 4 — see review in this issue on page 152). His solutions, although not written to include error checking, do try and show good programming practice and great pains have been taken to explain and illustrate them.

Fifteen puzzles like this aren't honestly my idea of Utopia, but one or two wouldn't come amiss every now and then, just to keep the old grey cells ticking over — and the stories are amusing at times, if only for the descriptions of the food. At £10.95, however, it could well boil down to: Do you really need this kind of programming practice?

Lorna Kyle

Expert Systems



Author: Paul Siegel
Publisher: Tab Books
Price: £24.65

There aren't many of us who can claim to be experts in our given field. 'Pretty competent' maybe, or 'best that we've got', but an expert? I'm sure I don't have to tell you that it's only when you have to explain to or teach others that you realise that perhaps there's a bit more to it than you originally anticipated.

This theory definitely holds true when talking about designing a computer-based expert system, also saddled with the additional burden of having to express your 'expertise' with rules and

storing it in a knowledge base. Anticipating the answers of a quirky human being and interpreting them can't be the easiest of jobs, especially if you're not going to be around. What about the extra hurdle of not being a programmer either? If you do feel that you have this Olympian task to face, then you could do worse than read Paul Siegel's *Expert Systems*; a book especially written for the non-programmer with two purposes in mind — to help you decide whether an expert system is for you and, if it is, to demonstrate how to develop one.

The aid used for designing an expert system is surprisingly enough a piece of software called an Expert System Builder, and the Personal Consultant from Texas Instruments is used as an example throughout the book. The author pulls no punches: nothing is dropped in without the reader being prepared for it. Indeed, he suggests that his book is read three times: firstly, to get a broad picture of expert systems and the development process; secondly, to pick up more detail for procedure and approach; and, thirdly, to evaluate your prototype before starting your final system.

The book guides you through the four phases of expert system development: ● defining the expert system domain ● defining the knowledge vocabulary ● building the knowledge base ● testing the knowledge base, and such terms as 'backward' and 'forward reasoning', 'context trees' and 'decomposability' are explained in simple language.

I would like to have seen more examples given: mention is made of MYCIN, XCON, R1, XSEL and PROSPECTIVE, but no detailed snapshots shown. Bear in mind also that this is an American book, so don't expect to get your hands on all the Expert System Builders summarised in Appendix E. A very helpful book though to find out, initially, whether you need an Expert System and, more importantly, could you cope with writing it?

Lorna Kyle

Joanna Murchison, Roger Dalton and John Donaldson are freelance computer journalists. David Tebbutt is a consultant editor to PCW. Lorna Kyle is a systems analyst.

Next month: programming languages

END

500 million people speak English...

... at last there's a database that understands it.



*The File Manager,
with a Word Processor,
that Understands English.*



0582-471313 CALL FOR FREE DEMONSTRATION DISC OR BROCHURES

BUSINESS EFFICIENCY ON A SHOESTRING



- National and International Telex
- Electronic Mail
- Access to 120,000 Telecom Gold™ and PRESTEL™ users
- Business information including share prices
- Up to the minute worldwide news
- Remote banking and accounts facilities
- Free and discounted business software
- Electronic Yellow Pages
- Company search facility

- PC Technical support
 - Telepurchasing — hotel, rail, air etc.
- MICRONET* gives you all this and more in one, cost effective, on-line connection. Improve the efficiency of your business. Call Lynne Thomas on 01-278 3143 for your free MICRONET brochure.

*MICRONET is the trading style of Telemap Ltd an EMAP/BT/Teledirect (Canada) Company.

MICRONET, Durrant House, 8 Herbal Hill, London EC1R 5EJ.
Telephone 01-278 3143. Please send me a free MICRONET brochure.

PCW12

Name

Address

Tel.

Micro

MICRONET
MICRONET, Durrant House,
8 Herbal Hill, London EC1R 5EJ.

NEW AMIGA NOW OTHER HOME COM

Amiga 500 is here.

With a mind-blowing array of features and capabilities.

And a £499.99* price ticket (inc. VAT), hundreds of pounds less than anyone could have predicted.

"...a miracle of compression..." writes *Popular Computing Weekly** "...it all adds up to a formidable system which is clearly better than anything else at the price."

This elegant little machine takes family computing into new dimensions of creativity, excitement and productivity.

It outruns and outguns office PCs as a business multi-tasker, performing a deskful of different jobs simultaneously, at over 7 million steps per second in realtime.

So other home computers may not be the only machines it consigns to the toy cupboard.

AMAZING SCIENCE FACT.

Amiga is used by Disney, Universal and other Hollywood studios for its dazzling 3D graphics manipulation and animation powers.

A sophisticated high-speed graphics processor called a blitter chip transforms images in realtime.

You can paint the screen with more than 4,000 colours. Create and modify designs and effects as you like, with pin-sharp resolution.

You command an almost limitless workshopful of stunning professional graphics capabilities.

With an optional Genlock interface, you can capture images off videotape. Manipulate and mix



them with graphics. Then re-transfer them to videotape!

This means you can produce spectacular special effects like those created by Amiga computers for Channel 4's *Chart Show* and the American TV science fiction series *Amazing Stories*.

YOU AIN'T HEARD NOTHING Y

Concealed within the sleek Amiga shape, there is also a pro-quality sound synthesiser and four-track stereo sound system.

Driven by another powerful and unique custom chip, it can synthesise musical instruments a

* Includes DeluxePaint from Electronic Arts worth £79 + VAT! (Excludes monitor or TV modulator.)

COMMODORE BUSINESS MACHINES (UK) LTD, COMMODORE HOUSE, THE SWITCHBACK, GARDNER ROAD, MAIDENHEAD, BERKSHIRE SL6 7XA. TELEPHONE: (0628) 770088. TELEX: 846057 CBM

GA 500. PUTERS ARE JUST TOYS.

Your Amiga can also synthesise the human voice.

It can speak back anything you care to write on the keyboard.

So this is one computer that can not only word process with faultless professionalism, and incorporate superlative graphics into the text, it can also read the text back to you aloud.

GAMESMANSHIP AND WORKMANSHIP!

The new Amiga 500, in fact, dumbfounds its competitors in every way.

Graphics, stereo sound, multi windowing, multi screens, 512K to 1Mb RAM (expandable by an incredible 8 further megabytes externally**), 3½" internal disk drive with 880K of mass memory, 4 unique dedicated chips plus the 16/32-bit power and 7.14MHz speed of its central processor, communications and vast expansion potential all add up to a computer of immense professional capability.

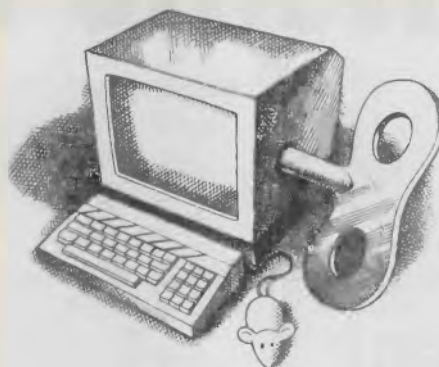
Yet the same technology allows the Amiga 500 to play games so mind bending that only full-scale arcade machines have been able to play them until now.

AND AMIGA MEANS 'FRIEND'!

However many of the Amiga's extraordinary talents you find yourself using, they will all be beautifully simple and natural.

You will be totally at home in the friendly and effortless Amiga

environment, where everything happens by windows, icons, mouse and pulldown menus.



And the Amiga 500 simplifies life in another way too.

There is now no comparable home computer. At any price.

**INCREDIBLY
ONLY £499.99:
INCLUDING VAT**

Try the astonishing new Amiga 500 at your nearest Commodore Amiga dealer.

And discover why *Personal Computer World*†, having tested the graphics performance of Amiga's latest and most powerful rival, concluded "...Amiga still reigns supreme..."



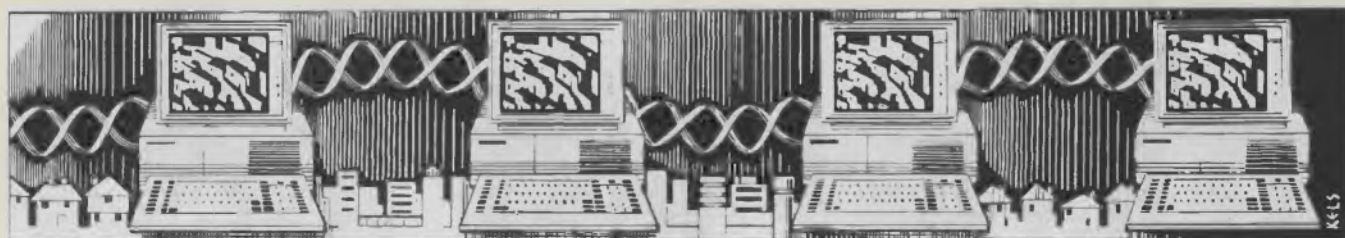
Commodore

ound effects.

An optional digitiser allows you to take onboard real sounds. Mix and modify the two. Translate your compositions from keyboard to sheet music. Play them back through the monitor's speaker or your hi-fi.

Popular Computing Weekly, 22-28 May 1987. †Personal Computer World, February 1987. **Subject to availability.

AMIGA IS A TRADEMARK OF COMMODORE-AMIGA INC. © 1987 COMMODORE BUSINESS MACHINES (UK) LTD. ALL RIGHTS RESERVED.



Home from home

Prestel has been around a long time now, but shops and banks are only just beginning to take note that there are plenty of people who want to do it all from the comfort of their armchair! Peter Tootill takes you on a shopping trip of Prestel.

When Prestel first started, electronic shopping and banking were considered obvious applications for it and were expected to help in generating a demand for Prestel terminals in millions of homes. All the customer would need to do would be to call in, browse through the catalogue, decide what they wanted and order it on the spot. The advantages were obvious — up-to-date information on prices and stock levels, instant credit card ordering and competitive mail order prices, all without leaving your armchair. Home banking would work in a similar way: paying bills, checking balances and moving money between accounts would all be carried out at your leisure, and not at the times allotted for customer business by the banks.

However, the 'instant take off' did not happen. People didn't rush out and buy Prestel sets for shopping or banking. However, the coming of the micro has changed things somewhat. Prestel subscribers are still not numbered in millions but there are 74,000 of them, some with above-average purchasing power. It is not surprising, therefore, that there are a number of companies endeavouring to collar their share of whatever market does exist. These range from those who have been there for years, such as the Nottingham Building Society, to relative newcomers, such as the off-licence chain Victoria Wine. As you would expect, they include most of the large mail order houses such as Littlewoods and Kays.

A potentially bewildering mixture of facilities are available and they don't fit into neat compartments — Homelink, for example, includes a teleshopping area and also Bank of

Scotland facilities but is separate from the Bank's own 'HOBS' home-banking section. An added complication is that, in many cases, once you select a particular company you are connected via a gateway to the company's own computers. This means that they can provide extra features that Prestel cannot handle (such as improved keyword searching, direct information about stock levels and prices without having to edit Prestel frames). If the gateway works well, you shouldn't notice the difference.

Shopping

You can buy a wide range of items on Prestel, from theatre tickets to rail and air tickets. In this article, I'll concentrate on consumer goods.

The main disadvantage of shopping via Prestel (or any of the other online systems) is that they cannot show you a picture of the articles on offer. You have to make do with a brief verbal description and, at most, a crude viewdata graphics representation of it. Judging by the amount of mail order shopping that

goes on (you only have to look through the adverts in *PCW*, for example) this shouldn't be a problem. But many people still like to see what they are buying, even if it is only a picture on the page of a catalogue. Most of the mail order houses on Prestel produce a catalogue which supplements the online catalogue on Prestel, with the latter containing special offers, latest price information and new products.

The idea of being able to shop without going out is attractive. However, you cannot use Prestel to satisfy all your needs, as the main emphasis in the teleshopping area is on the more durable items such as clothes, electrical goods and hardware (I don't mean the computer sort — although some computer goods are available). Supermarket-type shopping is only available in one or two parts of the country on a more or less experimental basis.

Using the online catalogues is straightforward and works in much the same way as Prestel itself. You can use menus or keywords to track

Other home banking services

There is another banking from home system which doesn't use Prestel — indeed, it doesn't use a micro at all. These systems use a pocket calculator-sized tone generator unit which clips onto an ordinary telephone. The bank's computer talks to you using a voice synthesiser. You can check your balance, order cheque books and statements, and even pay bills this way.

Two companies currently offer this system: the Nationwide Anglia Building Society (on its new current account) and the TSB. The unit costs £12 from TSB and £10 (which is refundable) from Nationwide Anglia. (I would imagine that if you have a tone-dialling telephone, you won't need the unit, though my local branch wasn't able to confirm that.)

This type of system looks like a good way to try out home banking and, if you like it, to move on to the added facilities such as onscreen statements, switching cash between accounts, and the better interactive nature offered by the Prestel-based systems.

I shall certainly be signing up for one shortly.

PCW Show modem news

Of the main modem manufacturers, only Pace and Miracle had stands at the PCW Show back in September. Both were showing error-correcting add-on modules that can be inserted between modem and computer. The two devices are very different, however.

The Pace module costs £125 (£143.75 including VAT), is very compact and requires no power supply. It provides MNP level 4 and EPAD error correction. MNP level 5 (which includes data compression) is expected to be introduced also. The module can be included in a Pace modem, in which case it adds around £100 to the price.

The Miracle Modem Maximiser is mains powered and comes in the same type of case as a WS3000. It is more expensive than the Pace modem at £225 (£258.75 including VAT). Miracle, deciding that the error-correcting protocols have not yet settled down enough to establish a *de facto* market leader, has devised its own, called MPAD. (The CCITT is due to produce an international standard for error correction in the next year or so but we may get some more information about it shortly.) The Maximiser also provides EPAD and incorporates a number of other functions including data compression, speed buffering, a 16k battery-packed store, a printer port and optional data encryption (this costs an extra £99 plus VAT). The price of the Maximiser drops dramatically if it is bought with a WS3000 or WS4000, adding around £100 (excluding VAT) to the cost.

I think Pace has made the correct decision in going for MNP, as this standard is already supported by Dowty, Tandata and Dacom modems. It is also very popular in the States and is a front runner for the forthcoming CCITT standard, even though there is strong opposition from some quarters. However, Miracle (and Pace for that matter) say that when a standard becomes established, they can simply change the software to suit.

Pace can be contacted on (0274) 574124 and Miracle is on (0473) 216141.

Also at the show was Dataphone, which has bought up the rights to the ill-fated Demon modem. The company is currently putting it through the approvals process and, of course, the price has had to go up: it now costs £79.95 (£91.24 including VAT). It has also introduced a version with loudspeaker and additional front panel controls for £99.95 (£114.94 including VAT).

Another interesting item on the Dataphone stand was Kiwichat terminal software which is available for the Amstrad PCW and IBM PC clones. It has two unusual features. Firstly, the PC version provides Prestel graphics (or an approximation of them) even on a micro without a graphics adaptor; and, secondly, it has a nifty way of making it easy to reply to Prestel mailboxes. Firstly, you can display two frames side by side if you are in 80-column mode and, secondly, it will memorise the mailbox number of the sender of a message and automatically enter it in the frame when you reply. I have only seen these features previously on Ruby-Comm (from Y2 computing) which runs on the Amiga and costs around £150. Kiwichat also handles split baud rates and costs £49.95 (£57.40 including VAT) for the PC version and £39.90 (£45.89 including VAT) for the PCW version.

Dataphone is based in Peterborough on (0733) 320240.

down the items in which you are interested. Once you have found something that takes your fancy, you can order it there and then and it will be delivered to your door.

There are problems for the casual user, though. Despite the credit card system, most of the mail order catalogue stores require you to register before they will sell you anything — in some cases even before they will let you into their system at all. Registration costs nothing, but is an extra complication. You do get a catalogue (at least you are supposed to, but I requested one from Kays and, at the time of writing, it still hadn't arrived — four weeks after I asked for it). Littlewoods is the exception to the pre-registration rule. Anyone can browse in their catalogue and even buy things, but even there you are given a registration number when you make your first purchase.

The prices on the systems I looked at are competitive but not spectacular, and you could easily match them in your High Street store. Nor should you use Prestel if you want something quickly — the average delivery time quoted is a couple of weeks. One exception is Victoria Wine which

has an express order service, but if you select this frame on Prestel you are given a voice telephone number to ring — so much for technology!

Banking

The home banking area is one that I thought might be just what I need. I have difficulty getting to banks while they are open and resent the cost of paying all my bills by cheque (13p stamp plus bank charges). There are two main systems on Prestel — Homelink and HOBS. Homelink is run by the Nottingham Building Society and is basically a 'building society' type of account; although it can provide a current account as well which is with the Bank of Scotland. This is confusing as the Bank of Scotland also runs HOBS (Home and Office Banking). However, the two systems are separate. HOBS is a current account facility with all the usual features including a friendly bank manager (who, for many people, will be a roving manager based in Edinburgh or London as the Bank don't have many branches south of the border). Homelink is basically a 'building society' account with the current account added because it makes a great deal

of sense to have both. Looking at the systems and the literature, it seems to me that HOBS is aimed more at the business user and Homelink at the personal user.

The two systems have some very useful features. As well as the obvious one of being able to check your balance at more or less any time of the day or night (they are closed from 1-8am) you can do things like arrange for a bill to be paid on a certain date in the future (when funds are available, for example). You can also check your statement, pay bills by giro credit, transfer between accounts and even debit other accounts in your name in other banks.

HOBS also has what is known as a cash management option which allows business users to see how the cleared cash balances in their accounts will move over the next couple of days. This helps to make best use of the cash flow and maximise interest earned. Homelink also has its extra features and these include a home shopping service, classified ads, holiday booking and buying and selling shares.

Cost

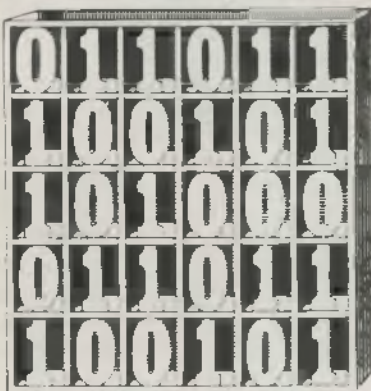
To use these services you obviously need a Prestel account. This costs a subscription of £6.50 a quarter for home users, £18 a quarter for business users and time charges of 6p/min during the day. As well as this you have to pay for HOBS, even if you normally qualify for free banking. The cost is £2.50 a month for personal customers and between £5 and £12.50 a month (depending on facilities) for business customers.

It seemed to me that such an account would be cheaper for the banks than an ordinary current account as the customer enters their transaction *directly* into the bank's computer, thus eliminating paper processing. A spokesman for HOBS told me that transaction charges are less than normal customers pay, and you can reduce them further because it is much easier to make sure that you keep the maximum amount in your high-interest deposit account. Also, transfers between accounts are free. Homelink is free if you keep a balance of over £1200 in your account, otherwise there is a subscription charge of £24 per annum. You also need a minimum of £500 to open an account. If you don't already have a means of using Prestel, both services have special offers on Prestel adaptors that plug into an ordinary television set. The HOBS adaptor is £95 and the Homelink one costs £150 (including VAT).

Peter Tootill can be contacted on: Telecom Gold 83:VNU02, Prestel 219991119, but, being entirely human, he cannot promise to reply to every message.

END

SUBSET



David Barrow presents more machine code routines and information for assembly language programmers. 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 be documented to the SubSet standard, although documentation may be amended for publication. Send your contributions to SubSet, PCW, 32-34 Broadwick Street, London W1A 2HG.

Rapid multiplication

BYTMUL from Bjorn Sten of Spanga in Sweden is a very fast unsigned byte multiplication routine for the 6502.

Its speed is achieved by using the difference of squares formula for multiplication in conjunction with a table of previously computed squares. The full operation then breaks down into computation of the sum and difference of the two input arguments (for use as

indices to the squares table), one 2-byte subtraction and a possible 2-byte addition.

Bjorn has optimised BYTMUL quite heavily for speed while retaining fairly good program structure, and there are several tricks worthy of note.

Integer $((a+b)/2)$ is computed as integer $((a-b)/2)+b$, the half-difference having been found first and used also as a test for the greater of a, b .

$(a-b)$ is converted to $(b-a)$ by the negation sequence 'EOR #\$FF: ADC #1' which is four cycles faster than recalculation.

The identical code sequences ('TAY' to 'STA PRODHI') for the four cases are repeated with individual exit points. This is quicker than the alternative shorter coding, with complex program control and the necessary saving of flags for later testing.

A major contribution to the routine's speed is the idea of splitting the table of word length squares into two parts. The sets of low-order and high-order bytes are each located within a single 256-byte page. This utilises the two 8-bit index registers, X and Y, fully and most economically.

At 369 bytes, BYTMUL is long. But, with a maximum time of only 77 cycles and an average of less than 63 cycles, it compares favourably with the byte multiplication instructions of processors like the 6809 (11 cycles at 1MHz) or the 8086 (70-77 cycles at 4-5MHz).

The routine can be used for word-length multiplication with a long-word product by using the formula: $AB * CD = (A * C * \$10,000) + (A * D * \$100) + (B * C * \$100) + (B * D)$. However, since this involves four multiplications

Datasheet 1

```

=====
:BYTMUL      8-bit by 8-bit multiplication by reference to a
:            table of squares and using the formula:
:            a * b = ((a+b)/2)^2 - ((a-b)/2)^2.
=====
:STRUCTURAL CONCEPTS
:DATA       LOOK-UP TABLE:
:            Simple list of byte length elements.
:            No terminator.
:            No head information.
:PROGRAM    IF a >= b
:            [
:              IF ((a+b)/2) = ((a+b)/2)
:              [
:                a * b = ((a+b)/2)^2 - ((a-b)/2)^2.
:              ]
:              a * b = ((a+b)/2)^2 - ((a-b)/2)^2 + b.
:            ]
:            IF ((b+a)/2) = ((b+a)/2)
:            [
:              b * a = ((b+a)/2)^2 - ((b-a)/2)^2.
:            ]
:            b * a = ((b+a)/2)^2 - ((b-a)/2)^2 + a.
:            ]
:            ]
=====
:SYSTEM REQUIREMENTS
:PROCESSOR   6502
:HARDWARE    Two 256-byte pages of memory are needed for
:            squares look-up table if not assembled with
:            routine.
:SOFTWARE    None.
=====
:PROGRAM DETAILS
:INPUT       M0 = byte multiplier.
:            M1 = byte multiplicand.
:            M2,3 = word product.
:OUTPUT      A x Y P changed.
:STATE CHANGES
:I/O ERRORS  None.
:OPTIMISATION Look-up table of word length squares is stored as
:            two separate tables of low-order and high-order
:            bytes, each within a complete 256-byte page, for
:            quicker reference.
:            Identical code sections are repeated for speed.
:            May be interrupted if M0-M3 are saved.
:            May not be re-entered.
:INTERRUPTS  Makes absolute reference to look-up tables.
:            Not specific. Code relocatable. PROMable.
:LOCATION NEEDED
:PROGRAM BYTES 127 (+ 512 bytes for look-up tables if assembled
:            with program.)
:STACK BYTES  None.
:TIMING       a >= b, a +/- b even: 51.      (clock cycles.)
:            a +/- b odd: 68 or 72.
=====

```

```

=====
:            a < b, a +/- b even: 56.
:            a +/- b odd: 73 or 77.
:            (Times assume no page boundary crossing.)
=====
: Define page zero storage.
=====
:ARGA = M0      ;Byte multiplier.
:ARGB = M1      ;Byte multiplicand.
:PRODLO = M2    ;Low order and
:PRODHI = M3    ;high order bytes of product.
=====
: Define squares look-up tables.
=====
:SQLO = LOHI    ;Base address of low order bytes.
:SQHI = LOHI    ;Base address of high order bytes.
=====
:BYTMUL SRC      ;For sub with no borrow in, 38
:  LDA ARGA      ;get a and  A5 M0
:  SBC ARGB      ;sub b (A = a-b) and  E5 M1
:  BCC LESS      ;skip if a < b. 90 3A
=====
: a >= b, use (a +/- b).
=====
:  LSR A         ;A = integer (a-b)/2. 4A
:  TAX          ;X <- ((a-b)/2). AA
:  BCS ODDA     ;skip if a < b mod 2. B0 15
=====
: [a +/- b] is even, just subtract squares.
=====
:  ADC ARGB      ;A = integer (a+b)/2. 65 M1
:  TAY          ;Y <- ((a+b)/2). A8
=====
:  SEC          ;For sub with no borrow in, 38
:  LDA SQLO,Y    ;get lo-byte ((a+b)/2)^2  B9 lo hi
:  SBC SQLO,X    ;sub lo-byte ((a-b)/2)^2  FD lo hi
:  STA PRODLO    ;and store. With borrow in, 85 M2
:  LDA SQHI,Y    ;get hi-byte ((a+b)/2)^2  B9 lo hi
:  SBC SQHI,X    ;sub hi-byte ((a-b)/2)^2  FD lo hi
:  STA PRODHI    ;and store to product. 85 M3
:  RTS          ;Exit product found. 60
=====
: [a +/- b] is odd, subtract squares of integers and add b.
=====
:  ODDA CLC      ;For add with no carry in, 18
:  ADC ARGB      ;A = integer (a+b)/2. 65 M1
:  TAY          ;Y <- ((a+b)/2). A8
=====
:  SEC          ;For sub with no borrow in, 38
:  LDA SQLO,Y    ;get lo-byte ((a+b)/2)^2  B9 lo hi
:  SBC SQLO,X    ;sub lo-byte ((a-b)/2)^2  FD lo hi
:  STA PRODLO    ;and store. With borrow in, 85 M2
:  LDA SQHI,Y    ;get hi-byte ((a+b)/2)^2  B9 lo hi
:  SBC SQHI,X    ;sub hi-byte ((a-b)/2)^2  FD lo hi
:  STA PRODHI    ;and store to product. 85 M3
=====
:  CLC          ;For add with no carry in, 18
:  LDA PRODLO    ;get lo-byte squares diff. A5 M2
:  ADC ARGB      ;add b 65 M1
:  STA PRODLO    ;and store. 85 M2
=====

```


and four additions of the 2-byte part-products into different positions of the 4-byte product, it may not be much quicker and could be slower than normal 16-bit long multiplication.

In case you find it tedious to type in the 512 bytes of the squares table, Bjorn has thoughtfully provided a short Basic program to do the job for you (Fig 1). The POKE addresses should be changed to suit your system.

Amstrad 8256/6128 configuration

PATCHM2A (Fig 2) from LJ Dundon of Crosby performs the useful function of configuring the Amstrad CPC6128 running CP/M to use drive A when drive M is specified. This allows programs configured for the 8256 to run on the 6128.

The patch is only 38 bytes long and will work as a standalone program or as a subroutine. To check that the program has run properly, type 'DIR M:'. If all is well, the banner message 'Insert disk for drive M in drive' will appear on the status line.

Rotations toolkit

PP Szabo, of the Central Research Institute for Physics in the Hungarian Academy of Sciences, suggests improving the toolkit shifts and rotations (PCW, October 1986) by using the index register X instead of the stack for the temporary storage of the accumulator A (Fig 3).

Although this 'TAX-shift-TXA-rotate' method alters the X register, it is three clock cycles faster than the original 'PHA-shift-PLA-rotate' method. However, it is still not as fast, short or elegant as the 'CMP#128-rotate' improvements for two of the pseudo-instructions, ASR and RLC, given in March, but does offer a slight timing improvement for the RRC operation.

PP Szabo has also extended the method to produce a left shift version of the Arithmetic Shift Right operation. ASR effectively halves a signed integer by propagating the sign bit (bit 7) during a right shift. ZSL ('Zero-bit-propagated Shift Left' — I hesitate to call it ASL) propagates the least significant bit (bit 0) during a left shift.

```

      BCC RETA      ;Skip if no carry to hi-byte
      INC PRODH1   ;else add in carry.
      RETA RTS      ;Exit product found.

      ... a < b, use (b +/- a).

LESS  EOR R1FF    ;negate A = (a-b) to
      ADC #1      ;give A = (b-a).

      LSR A        ;A = integer (b-a)/2.
      TAX          ;X <-- ((b-a)/2).
      BCS ODD8     ;skip if a <> b mod 2.

      ... (b +/- a) is even, just subtract squares.

      ADC ARG1     ;A = integer (b+a)/2.
      TAY          ;Y <-- ((b+a)/2).

      SEC          ;For sub with no borrow in.
      LDA SQLO,Y   ;get lo-byte ((b+a)/2)*2
      SBC SQLO,X   ;sub lo-byte ((b-a)/2)*2
      STA PRODL0   ;and store. With borrow in.
      LDA SQH1,Y   ;get hi-byte ((b+a)/2)*2
      SBC SQH1,X   ;sub hi-byte ((b-a)/2)*2
      STA PRODH1   ;and store to product.
      RTS          ;Exit product found.

      ... (b +/- a) is odd, subtract squares of integers and add a.

ODD8  CLC          ;For add with no carry in.
      ADC ARG1     ;A = integer (b+a)/2.
      TAY          ;Y <-- ((b+a)/2).

      SEC          ;For sub with no borrow in.
      LDA SQLO,Y   ;get lo-byte ((b+a)/2)*2
      SBC SQLO,X   ;sub lo-byte ((b-a)/2)*2
      STA PRODL0   ;and store. With borrow in.
      LDA SQH1,Y   ;get hi-byte ((b+a)/2)*2
      SBC SQH1,X   ;sub hi-byte ((b-a)/2)*2
      STA PRODH1   ;and store to product.

      CLC          ;For add with no carry in.
      LDA PRODL0   ;get lo-byte squares diff.
      ADC ARG1     ;add a.
      STA PRODL0   ;and store.
      BCC RETB     ;Skip if no carry to hi-byte
      INC PRODH1   ;else add in carry.
      RETB RTS      ;Exit product found.

      Dumped look-up table of squares of all numbers 0 to 255.
      Must be stored in two complete 256-byte pages with low
      order bytes in the first page and high order bytes in the
      second page.

      SQLO - squares of numbers 0 to 255, low order bytes.

```

```

00 01 04 09 10 19 24 31 40 51 64 79 90 A9 C4 E1
00 21 44 69 90 B9 E4 11 40 71 A4 D9 10 49 84 C1
00 41 84 C9 10 59 A4 P1 40 91 E4 39 90 89 44 A1
00 61 C4 29 90 P9 64 D1 40 B1 24 99 10 89 04 81
00 81 04 89 10 99 24 B1 40 D1 64 P9 90 29 C4 61
00 A1 44 89 90 39 E4 91 40 F1 A4 59 10 C9 84 41
00 C1 84 49 10 D9 A4 71 40 11 E4 B9 90 69 44 21
00 E1 C4 A9 90 79 64 51 40 31 24 19 10 09 04 01
00 01 04 09 10 19 24 31 40 51 64 79 90 A9 C4 E1
00 21 44 69 90 B9 E4 11 40 71 A4 D9 10 49 84 C1
00 41 84 C9 10 59 A4 P1 40 91 E4 39 90 89 44 A1
00 61 C4 29 90 P9 64 D1 40 B1 24 99 10 89 04 81
00 81 04 89 10 99 24 B1 40 D1 64 P9 90 29 C4 61
00 A1 44 89 90 39 E4 91 40 F1 A4 59 10 C9 84 41
00 C1 84 49 10 D9 A4 71 40 11 E4 B9 90 69 44 21
00 E1 C4 A9 90 79 64 51 40 31 24 19 10 09 04 01

```

... SQH1 - squares of numbers 0 to 255, high order bytes.

```

00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
01 01 01 01 01 01 01 01 02 02 02 02 02 03 03
04 04 04 04 05 05 05 05 06 06 06 06 07 07 08
09 09 09 0A 0A 0A 0A 0B 0B 0C 0C 0D 0D 0E 0E
10 10 11 11 12 12 13 13 14 14 15 15 16 17 18
19 19 1A 1A 1B 1B 1C 1C 1D 1D 1E 1E 1F 20 21
22 22 23 23 24 24 25 25 26 26 27 27 28 28 29
30 30 31 31 32 32 33 33 34 34 35 35 36 36 37
38 38 39 39 40 40 41 41 42 42 43 43 44 44 45
46 46 47 47 48 48 49 49 50 50 51 51 52 52 53
54 54 55 55 56 56 57 57 58 58 59 59 60 60 61
62 62 63 63 64 64 65 65 66 66 67 67 68 68 69
70 70 71 71 72 72 73 73 74 74 75 75 76 76 77
78 78 79 79 80 80 81 81 82 82 83 83 84 84 85
86 86 87 87 88 88 89 89 90 90 91 91 92 92 93
94 94 95 95 96 96 97 97 98 98 99 99 A0 A0 A1
A2 A2 A3 A3 A4 A4 A5 A5 A6 A6 A7 A7 A8 A8 A9
AA AA AB AB AC AC AD AD AE AE AF AF B0 B0 B1
B2 B2 B3 B3 B4 B4 B5 B5 B6 B6 B7 B7 B8 B8 B9
BA BA BB BB BC BC BD BD BE BE BF BF C0 C0 C1
C2 C2 C3 C3 C4 C4 C5 C5 C6 C6 C7 C7 C8 C8 C9
CA CA CB CB CC CC CD CD CE CE CF CF D0 D0 D1
D2 D2 D3 D3 D4 D4 D5 D5 D6 D6 D7 D7 D8 D8 D9
DA DA DB DB DC DC DD DD DE DE DF DF E0 E0 E1
E2 E2 E3 E3 E4 E4 E5 E5 E6 E6 E7 E7 E8 E8 E9
EA EA EB EB EC EC ED ED EE EE EF EF F0 F0 F1
F2 F2 F3 F3 F4 F4 F5 F5 F6 F6 F7 F7 F8 F8 F9
FA FA FB FB FC FC FD FD FE FE FF FF

```

Fig 1

```

PATCHM2A LOGICAL DRIVE M TO PHYSICAL DRIVE A PATCH FOR
AMSTRAD CPC 6128.

ACTION The drive table is amended by taking the entry for
drive A and copying it to the entry for drive M.
The program uses BIOS CALL 30 - USERF - and is not
transportable.
In this case USERF accesses a 6128 firmware routine
which copies from anywhere in the system RAM to
anywhere in the system RAM - KL LDIR.

PATCHM2A: ORG #100
LD IX,#0001 ;Get base of jump table.
LD DE,63 ;Offset to get DRVTEL function.
ADD IX,DE ;Form address.
CALL JUMP ;Returns address in HL.

LD IX,#0001 ;Jump table base.
LD DE,87 ;Offset to USERF function.
ADD IX,DE
LD DE,24 ;Difference between the two entries.
EX DE,HL
ADD HL,DE ;Form address of entry M.
EX DE,HL ;Source in HL, destination in DE.
LD BC,2 ;Count.
CALL JUMP ;Call USERF function.

DEFW #B91H ;KL LDIR
RET

JUMP JP {IX}

```

Fig 2

```

TLKRLC TAX ;Rotate Left Circular: Save A
ASL A ;while getting bit 7,A to Carry.
TXA ;Restore A and rotate through C
ROL A ;effecting 8-bit rotate left.
(RTS) ;Exit if written as subroutine.

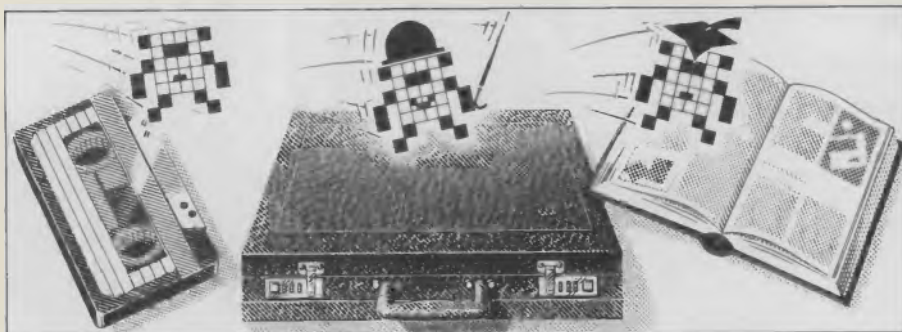
TLKRC TAX ;Rotate Right Circular: Save A
LSR A ;while getting bit 0,A to Carry.
TXA ;Restore A and rotate through C
ROR A ;effecting 8-bit rotate right.
(RTS) ;Exit if written as subroutine.

TLKRAS TAX ;Arithmetic Shift Right: Save A
ASL A ;while getting sign bit to Carry.
TXA ;Restore A and rotate through C
ROR A ;effecting signed shift right.
(RTS) ;Exit if written as subroutine.

TLKZSL TAX ;Zero-bit-propagated Shift Left.
LSR A ;Save A & get bit zero to Carry.
TXA ;Restore A and rotate through C
ROL A ;effecting lsb propagated shift.
(RTS) ;Exit if written as subroutine.

```

Fig 3



Games



Scientific/mathematic



Business



Toolkit/utilities



Educational/Computer Aided Learning

All the best!

The Amiga, the Amstrad PCW and the Atari ST are featured in this month's selection of the best of readers' programs, chosen by Owen Linderholm.

The Program of the Month is for the Commodore Amiga. Although it doesn't particularly stand out in terms of programming style, it is a wonderful demonstration of the graphics power of the Amiga. The program, written in AmigaBasic, allows you to design and produce animated displays of 3D objects.

For the Amstrad PCW range there is a program which enables you to undelete files. This allows a wide range of options, including wildcard filenames. Of course, you won't be able to undelete a file if it has

already been written over!

Regular readers of Program File will recognise the name of Mark Needham. Once again, he has produced a finely-crafted Turbo Pascal program. Turbo Pascal Circuit2 succeeds his circuit analysis program which was featured in the April issue of PCW. This program takes a designed circuit and automatically lays it out on a 'breadboard' ready for construction. (A breadboard is a standard, square-grid circuit board on which electronics projects are built.)

**PCW
DISK
LIBRARY**

For details of the PCW Disk Library, see the Program File section in the November issue.

Guidelines for program listings

PCW is interested in publishing quality programs written in any of the major programming languages for all popular home and business micros. When submitting your programs, include a disk or cassette version of your program, comprehensive documentation and a clear, dark listing on white paper.

The listing should be no more than 80 characters wide and, if possible, sample output from that program should be included. Ensure that you have marked the software, listing and documentation with your name and address, program title, machine (along with any minimum requirements) and a daytime telephone number.

We will be including some of the programs published in Program File in the PCW Disk Library. If you have any objections to your program being included, please indicate them, otherwise it will be assumed that the program can be included in the Disk Library. A total royalty of 50p is paid per disk sold from the disk library. The sum is shared among the authors of the programs on the disk.

Here are some guidelines for submitting programs. Check through previous Program Files to see the sort of programs we prefer. Original ideas are always welcome, as are good implementations of utilities and applications. Obviously the programs should be well-written, easy to understand and preferably not too long. All programs should be fully debugged and must be your own, original, unpublished work.

We will try to return submissions if they are accompanied by an appropriate stamped, addressed envelope, but please keep a copy of everything. Programs are paid for at the rate of £50 per page of published listing, plus a £50 bonus for Program of the Month.

Send your contributions to Owen Linderholm, Program File, PCW, 32-34 Broadwick Street, London W1A 2HG.

Program of the Month Amiga 3D Image Generator

by Jonathon Bates



The Commodore Amiga is an extremely good and cheap graphics computer. Much of the machine's success is due to its special blitter chip, which can be accessed from AmigaBasic with the PUT and GET statements.

The two programs featured here use the blitter chip to help produce moving 3D graphics. The first program draws objects from the data at the end of the program (in this case, a hollow cube). The data consists of a list of 3D (x, y and z) coordinates of all the points in an object, followed by links of the coordinates to form planar polygons along with a colour specified as a negative number to show that the end of the polygon has been reached. A sequence of frames for the animation is then generated

from the data and saved. The time taken to do this depends upon the complexity of the object.

The second program will take the generated images from the file saved by the first program and rapidly display them. The routine to do this can easily be modified for use in your own programs.

A sequence of 12 images will use approximately 72k on disk, so before

you enter the program you will need to create a new disk called 'gfx' on which you should put AmigaBasic and 'dos.bmap'. If you don't have a dos.bmap file, create it using 'CreateFd' on your 'Extras' disk.

To change the rotations used, alter ax, ay and az at the start of the main loop. Changing 'di%' (the distance from the object) will give a zoom effect.

MICROMART

Farsight £99

is not only a Lotus 1-2-3 clone but an integrated system which includes a spreadsheet that is fully compatible with Lotus 1-2-3 and many extra features, such as: windowing system which allows several spreadsheets to be open simultaneously, extended search function, direct interface to the word processor, etc.

The word processor is highly efficient, fast, easy to use, comprehensive, 10 different font styles, proportional spacing, as many independently formatted blocks as you want. The word processor is ideal for writing anything from memos to books!

The window manager allows full access to DOS commands. It can drive up to 2 printers as background tasks for maximum efficiency.

Farsight utilizes all the colours/attributes available on your colour or monochrome monitor and offers high speed at low cost!

Farsight Graphics £29

Pie-Charts, bar charts, stacked bars, line graphs, supports all cards including Hercules and EGA.

Address Manager £60

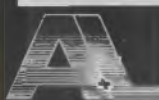
Compatible with Farsight. Addresses are sorted alphabetically or by post-code. For each address you have 10 different criteria for selection - 12 lines of data. The system is easy and easy to use.

Farsight is written in Modula-2

All these products with full support are available from

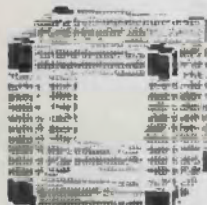
RTA REAL TIME ASSOCIATES LTD
Canning House, 59 Canning Road
Croydon Surrey CRO 6QF
Telephone 01-656 7333/4/5

Dealer inquiries welcome



A. + L. Meier-Vogt
Im Späten 23
CH-8906 Bonstetten/ZH
Tel. (41) (1) 700 30 37

E-Mail: APLUSL@komsys.ifi.ethz.ch (UUCP)



The 3d Image Generator (C) J.Bates 1987

This program in its present form requires a Commodore Amiga with at least 512k ram.
If you have less than 512k you should cut out all the rem statements and adjust the clear and s# arrays to a smaller size (e.g. less images).
On a 512k amiga this program can store up to 16 images with careful pruning and adjustment of the s# array in the present form it will store 12 images

Reserve 90k for storing generated images

IF FRE(0)<80000% THEN CLEAR ,90000%

The screen and window statements can be changed to any configuration, but they will require more memory if you are storing the generated images.

SCREEN 2,320,200,2,1
WINDOW 2,"Generating 3d display - please wait", (0,0)-(297,185),0,2
reddefine first three colours as red,blue and white
PALETTE 1,1,0,0
PALETTE 2,0,0,1
PALETTE 3,1,1,1
xs=WINDOW(2)/2;ys=WINDOW(3)/2

these library calls are used to store the generated images quickly on the disk. Ensure that you have dos.bmap on your disk, this can be created by the ConvertPd program in the Basic demos drawer on your basic utilities/extras disk
The calls are used:
filehandle=xopen\$(filename\$,1005)
to create a new file , then
CALL xwrite\$(filehandle\$,start address,num of bytes)

DECLARE FUNCTION xopen\$ LIBRARY
DECLARE FUNCTION xwrite\$ LIBRARY
LIBRARY "dos.library"

read number of coordinates from data

READ nc%
DIM xc%(nc%),yc%(nc%),zc%(nc%)
DIM x%(nc%),y%(nc%),z%(nc%)

read in coordinate data

FOR i%=1 TO nc%
READ xc%(i%),yc%(i%),zc%(i%)
NEXT

read in number of planes



FORTHS

For IBM PC and Compatibles

Modular Forth	£475.00
Workforth	£55.00
Workforth Extensions:	
Viewtrace	£35.00
Floating Pt	£35.00
Windows & Graphics	£45.00
Doc Tool Pack	£45.00
Workforth & 3 ext.	£145.00

For Atari ST & Macintosh

Gem Forth	£65.00
For Vax, RSX-11 etc	
Uniforth	£175.00
MPE-Forth/OS9 68k	£375.00
MVP-Forth for C. Amiga	£150.00

Forthright ✓

CROSS COMPILERS

for CPM 80, MS-DOS, PC-DOS, CPM 68k,
 FLEX, OS9, 68k, OS9 6809

(needs workforth as host)	£250.00
Targets: PDP-11 6502, 6511Q, 8080/5, Z80, 8086/88, Z8,	
1802 8070, 6809, 6800/01/03/6303, 68000, 9900x	£175.00
8031/51 Bryte Forth	£350.00
Forth-83 Targets:	
Z80, 8086, 680XO 32-bit	£225.00

HARDWARE for PC Programmers:

Gal Programmer (MPE)	£450.00
Pal Programmer	£350.00
EPROM Programmer	£145.00
Stack EPROM Programmer	£795.00

Forth Engines:

Novix 5MIP Board	£852.00
MVP Microcoded	£1225.00

Kaypro PC Clones:

286i (AT Clone with 20Mb)	£1699.00
Amstrad PC Clones	£549 to £1069.00

NEW 30MB SYSTEMS FOR THE PRICE OF 20MB

COMPUTER SYSTEM:

- * 80286 6/10MHz switchable
- * 640k RAM
- * Phoenix bios
- * 8 Expansion slots
- * Graphics card
- * Parallel port, 4 serial ports (3 opt.)
- * 200W power supply
- * Keyboard

AT-MONO

1.2Mb FD, mono monitor

£ 975

AT-COL

1.2Mb FD, mono monitor

£ 1175

AT30-MONO

30Mb HD, 1.2Mb FD,
 mono monitor

£ 1395

AT30-COL

30Mb HD, 1.2Mb FD,
 colour monitor

£ 1595

AT30-EGA

30Mb FD, 1.2Mb FD
 EGA monitor/adaptor

£ 1795



**AJP Business
 Computers Ltd.**

**South Bank
 Technopark,
 90 London Rd,
 London SE1 6LN**

**Tel: 01 922-8849
 01 928-2900**

NEW AJP386

20MHz 80386 (0 WAIT STATE)

COMPUTER SYSTEM

WITH

60MB HARD DISK

NOW AVAILABLE EX-STOCK

ONLY £2495.00

SPECIFICATION

80386 (32BIT) CPU 20MHz
 1MB RAM
 PHOENIX BIOS
 1.2Mb FLOPPY DISK DRIVE
 60Mb HARD DISK
 8 EXPANSION SLOTS
 5 x 16 BIT SLOTS
 2 x 8 BIT SLOTS
 1 x 32 BIT SLOT
 SERIAL/PARALLEL PORTS
 HERCULES COMPATIBLE MONO GRAPHICS ADAPTOR
 14" FLAT SCREEN MONO MONITOR
 FULL SET OF MANUALS

EGA, SUPER EGA AND OTHER CONFIGURATIONS ALSO AVAILABLE
 CALL US NOW

OR
01-922 8849

OR
01-928 2900

FOR SYSTEMS TO MEET YOUR REQUIREMENTS

Prices exclude VAT & carriage

14 days trial period or money back. One year warranty

PROGRAM FILE

```

READ np%
DIM p%(np%,9),l%(np%),d%(np%),n%(np%),c%(np%),s*(737.11)

' read in plane data as polygons

FOR i%=1 TO np%
  j%=0
  WHILE p%(i%,j%)>0
    j%=j%+1
    READ p%(i%,j%)
  WEND
  c%(i%)=ABS(p%(i%,j%)):n%(i%)=j%-1
NEXT

      Rotation Angles in radians
      Altering these will angles will alter the displayed
      orientation of the object image

ax=0:ay=0:az=0

      di% is the distance of the object from the eye
      to get a zoom effect you can change this in the
      sequence generation loop

di%=900

      start of the main display loop
      this loop generates 12 images of the object
      and rotates it about both the x and y axes
      by a quarter of a complete rotation

FOR rt%=0 TO 11
  ay=rt%/7.639:ax=rt%/7.639
  sx=SIN(ax):cx=COS(ax)
  sy=SIN(ay):cy=COS(ay)
  sz=SIN(az):cz=COS(az)

      This loop transforms all the points by
      the specified angles

  FOR i%=1 TO nc%
    x%=xc%(i%):y%=yc%(i%):z%=zc%(i%)
    x1%=x%*cy-z%*sy
    z1%=z%*cy+x%*sy
    y1%=y%*cx-z1%*sx
    z%(i%)=(z1%*cx+y1%*sx)
    s=di%/(di%-z%(i%))
    x1%(i%)=s*(x1%*cz-y1%*sz)
    y1%(i%)=s*(y1%*cz+x1%*sz)
  NEXT

      This loop generates a list of planes and specifies
      the furthest point from the eye for each polygon

  FOR i%=1 TO np%
    z%=z%(p%(i%,1))
    FOR j%=2 TO n%(i%)
      y%=z%(p%(i%,j%)):IF y%<z% THEN z%=y%
    NEXT
    d%(i%)=z%
    l%(i%)=i%
  NEXT

      This loop sorts the above list into depth order
      ready for displaying the furthest plane first
      for hidden area removal

  FOR i%=1 TO np%-1
    n%=i%:z%=d%(i%)
    FOR j%=i%+1 TO np%
      IF d%(j%)<z% THEN z%=d%(j%):n%=j%
    NEXT
    SWAP l%(i%),l%(n%)
    d%(n%)=d%(i%)
  NEXT

      Display the object as an polygon of one color
      surrounded by a black border

CLS
FOR i%=1 TO np%
  k%=1%(i%):n%=n%(k%)
  COLOR c%(k%)
  FOR j%=1 TO n%
    AREA (xs%+x%(p%(k%,j%)),ys%-y%(p%(k%,j%)))
  NEXT
  AREA FILL
  COLOR 0
  LINE (xs%+x%(p%(k%,n%)),ys%-y%(p%(k%,n%)))-STEP (0,0)
  FOR j%=1 TO n%
    LINE -(xs%+x%(p%(k%,j%)),ys%-y%(p%(k%,j%)))
  NEXT
NEXT

      This get statement stores the generated image in
      an array ready for storing on disk for the display
      program

GET (80,20)-(230,165),s*(0,rt%)
NEXT

      Save the set of generated images to disk
      the program is set up for storing the images on
      a separate disk as a sequence of 12 images takes up
      about 70k, but if you want to be able to specify

```

MICROMART

The fastest Modula-2 software development system for

the IBM PC range & compatibles £ 75

With M2SDS you develop your Modula-2 programs in a powerful window environment, where all the tools are integrated for speed and efficiency:

- syntax directed editor
- incremental compiler - much faster than a conventional compiler
- fast linker - produces stand-alone executable programs
- library manager - modules are compact and ergonomically managed
- clock, ASCII table, calculator
- all modules are provided in source form

M2SDS supports the 8087 maths co-processor, REAL arithmetic calculates to 15 digits accuracy and easy access to the MS-DOS/PC-DOS/Concurrent-DOS operating environment. Programs and data may use up to the full 640K DOS memory. No other software development system has as many tools and toolboxes as M2SDS.

SDS-XP	£ 185
Debugger	£ 70
M2SDS demonstration disks	£ 5
Turbo-Pascal to Modula-2 source code translator	£ 35

AMIGA £ 115

Extremely fast single-pass compiler, integrated into the Amiga Workbench, full support for documented functions (Intuition, Exec, Graphics, etc.), double-precision numeric types, including FFP, produces optimised machine code, links in just a few seconds! The comprehensive development system contains an editor, compiler, linker, library modules (Standard & Amiga libraries), manual and introductory Modula-2 book.

Minimum configuration: 512K, 1 drive.
Demonstration disk £ 5

IBM/370 Mainframes £ 6500

One of the fastest compilers in the world (single-pass, 36000 lines/minute), full 32 bit arithmetic, separate compilation of modules with all the benefits of Modula-2 (version control, type checking between modules, etc.), interface to Assembler and Fortran, support of project libraries, produces high efficient native code (including arithmetic checks) for linker and loader.

Annual contract for support £ 1100

All these products with full support are available from

RTA REAL TIME ASSOCIATES LTD
Coring House, 99 Coring Road
Craydon Surrey, CR0 6QF
Telephone 01-856 73334/5

Dealer inquiries welcome

A A. + L. Meier-Vogt
Im Späten 23
CH-8906 Bonstetten/ZH
Tel. (41) (1) 700 30 37

E-Mail: APLUSL@komsys.ifi.ethz.ch (UUCP)

GOEL COMPUTERS

★ We deal in the whole range of computers from PCs to Spectrums including peripherals

★ Atari STFM Ferguson colour monitor now at new price of —
£459

Amiga 500, phone for cheapest price

PC1512 phone for cheapest price

We are main dealers for Tuniworks range for the ST and PC

We are now also at

1000 Uxbridge Road, Hayes
Tel: 01-573 2726

45 Boston Road, London W7
Tel: 01-579 6133 (416)

CALLING ALL GARDENERS!

Plan your garden more effectively by selecting the right plants for every location and purpose.

Only £29.95 (+ £1.60 P&P)

- ★ Select the type of plant you want and the conditions where it is to grow from over 40 different categories including foliage colour, height, flower arranging, cottage garden, easy to grow and scented.
- ★ Suitable plants are automatically selected from an extensive database of 2,000 named plants including many choice and unusual specimens.
- ★ Plant descriptions, including growing requirements, can be displayed for the list of selected plants or for named plants on demand.
- ★ **PLANT SELECTOR** is informative, useful and fun to use.
- ★ If you have a garden, **PLANT SELECTOR** is a must.

Please make cheques payable to

ALDEX SOFTWARE

Portland House, 6 High Street, Sutton,
Ely, Cambs CB6 2RB Tel: 0353 778012

Runs on all IBM compatible MSDOS computers (inc Amstrad) with 512k RAM.

ATARI PRICE CUTS!!!

	inc VAT
MEGA ST4 + Mono	£1195
MEGA ST2 + Mono	£915
1040STF + Mono	£539
1040STF + Philips col	£740
520STFM + Mono	£399
520STFM + Philips col	£575
520STFM	£285

FREE SOFTWARE & DELIVERY

**ORDER NOW FOR 10%
SOFTWARE DISCOUNTS**

Gould Computer Services

The ATARI ST specialists

12 Stainburn Drive, Leeds LS17 6NX
Tel: 0532 692946

Personal Callers by appointment

PROGRAM FILE

the disk to save the image on remove the "gix:+"
from the "as=" statement after the input line

```
WINDOW 1
INPUT "Please enter filename to save this as :";as
as="gix:"+as+CHR$(0)
file$=xopen$(SADD(as),1006)
PRINT "saving file please wait "
```

This calls the library call xwrite to save a block
to disk. This is the quickest way to store a block
of memory in AmigaBasic.

```
dummy$=xwrite$(file$,VARPTR(s*(0,0)),708486)
```

```
PRINT "the file has been saved"
CALL xclosel$(file$)
END
```

Data to generate a hollow cube with struts
Number of points

DATA 64

X , Y , Z coordinates (range -50 to 50)

coordinates 1-8

```
DATA 30,-30,30
DATA 20,-30,30
DATA 20,-30,20
DATA 30,-30,20
DATA 30,-30,-20
DATA 20,-30,-20
DATA 20,-30,-30
DATA 30,-30,-30
```

coordinates 9-16

```
DATA -20,-30,30
DATA -20,-30,20
DATA -30,-30,20
DATA -30,-30,30
DATA -20,-30,-20
DATA -20,-30,-30
DATA -30,-30,-30
DATA -30,-30,-20
```

coordinates 17-24

```
DATA 30,-20,30
DATA 30,-20,20
DATA 20,-20,20
DATA 20,-20,30
DATA 30,-20,-20
DATA 30,-20,-30
DATA 20,-20,-30
DATA 20,-20,-20
```

coordinates 25-32

```
DATA -20,-20,30
DATA -20,-20,20
DATA -30,-20,20
DATA -30,-20,30
DATA -20,-20,-20
DATA -20,-20,-30
DATA -30,-20,-30
DATA -30,-20,-20
```

coordinates 33-40

```
DATA 30,20,30
DATA 30,20,20
DATA 20,20,20
DATA 20,20,30
DATA 30,20,-20
DATA 30,20,-30
DATA 20,20,-30
DATA 20,20,-20
```

coordinates 41-48

```
DATA -20,20,-20
DATA -20,20,-30
DATA -30,20,-30
DATA -30,20,-20
DATA -20,20,30
DATA -20,20,20
DATA -30,20,30
DATA -30,20,20
```

coordinates 49-56

```
DATA 30,30,30
DATA 30,30,20
DATA 20,30,20
DATA 20,30,30
DATA 30,30,-20
DATA 30,30,-30
DATA 20,30,-30
DATA 20,30,-20
```

coordinates 57-64

PROGRAM FILE

```
DATA -20,30,-20
DATA -20,30,-30
DATA -30,30,-30
DATA -30,30,-20
DATA -20,30,30
DATA -20,30,20
DATA -30,30,20
DATA -30,30,30
```

Number of Planes/polygons

DATA 72

Each polygon can be made by linking from 3 (triangle) to 8 (octagon) coordinates in a sequential manner. The colour must be preceded by a minus sign to show that the end of the polygon has been reached and this last element is now the logical colour.

All the polygons needed to generate the hollow cube are squares and so therefore have only 4 links.

a b c ... [h]. -- colour

data for white corner pieces

```
DATA 1,2,3,4,-3
DATA 5,6,7,8,-3
DATA 9,10,11,12,-3
DATA 13,14,15,16,-3
DATA 49,50,51,52,-3
DATA 53,54,55,56,-3
DATA 57,58,59,60,-3
DATA 61,62,63,64,-3
DATA 1,4,18,17,-3
DATA 5,8,22,21,-3
DATA 11,12,28,27,-3
DATA 16,15,31,32,-3
DATA 33,34,50,49,-3
DATA 47,48,63,64,-3
DATA 37,38,54,53,-3
DATA 44,43,59,60,-3
```

```
DATA 1,2,20,17,-3
DATA 8,7,23,22,-3
DATA 14,15,31,30,-3
DATA 9,12,28,25,-3
DATA 33,49,52,36,-3
DATA 38,54,55,39,-3
DATA 45,61,64,47,-3
DATA 42,58,59,43,-3
```

data for the red struts (horizontal at (0,0,0))

```
DATA 2,20,25,9,-1
DATA 6,24,29,13,-1
DATA 36,52,61,45,-1
DATA 40,56,57,41,-1
DATA 3,19,26,10,-1
DATA 7,23,30,14,-1
DATA 39,55,58,42,-1
DATA 35,51,62,46,-1
```

```
DATA 2,3,10,9,-1
DATA 20,19,26,25,-1
DATA 6,7,14,13,-1
DATA 24,23,30,29,-1
DATA 36,35,46,45,-1
DATA 52,51,62,61,-1
DATA 40,39,42,41,-1
DATA 56,55,58,57,-1
```

```
DATA 4,5,21,18,-1
DATA 3,6,24,19,-1
DATA 10,13,29,26,-1
DATA 11,16,32,27,-1
DATA 34,37,53,50,-1
DATA 35,40,56,51,-1
DATA 46,41,57,62,-1
DATA 48,44,60,63,-1
```

```
DATA 3,4,5,6,-1
DATA 18,19,24,21,-1
DATA 34,35,40,37,-1
DATA 50,51,56,53,-1
DATA 10,13,16,11,-1
DATA 26,27,32,29,-1
DATA 46,41,44,48,-1
DATA 62,63,60,57,-1
```

upright struts

```
DATA 21,22,38,37,-1
DATA 21,37,40,24,-1
DATA 22,38,39,23,-1
DATA 23,24,40,39,-1
```

```
DATA 17,18,34,33,-1
DATA 17,33,36,20,-1
DATA 20,19,35,36,-1
DATA 19,35,34,18,-1
```

MICROMART

Amstrad 1640
+ ECD Monitor
+ Tandon 20MB

Special Offer
£999.00
Ex-Vat and Carriage

Phone for pricing on other products
including Amstrad, Tandon, Epson,
Panasonic, Sage and HP Lasers.

The Computer Superstore
Reading (0734) 755171

SIGNWRITER £92^a
Instant display lettering by computer £49.95^b
£29.95^c

- Signs printed across or down the page
- Drives most dot-matrix printers etc
- Sharp characters any size - the bigger the better
- Create logos, symbols, fonts in any language
- Extra fonts £5.75 each + disk:

ROME Shop Fair **FREE!**
Down Hand Old XMASFONT: 

LABELWRITER £15^{a,b}

- Multiple identical labels, any size & number across
- Uses all the printer's type-styles
- Serial numbers and logos too

PAPERBASE De Luxe £103^a
Personal bibliographic database £57.50^b

- Stores, finds, and styles references
- Flexible storage in portable sequential files

PRICES: ^aPC & Apricot ^bAmstrad PCW ^cBBC

All available from the publisher:
WIGHT SCIENTIFIC
44 Roan Street, London SE10 9JT
(01) 858 2699

Also:
OXSTAT for statistics
HISTO for histograms
FREQ for word counts
INDEXER

16-bit SIGNWRITER created this advertisement. A4-size

Announcing
Version 2.2 of the
MKS Toolkit

The power and flexibility of UNIX
commands within the DOS environment.

- * KORN SHELL
- * VI/EX
- * AWK

PLUS 110 POWERFUL UNIX PROGRAMS
FOR YOUR DOS-BASED PC -
INCLUDING A 380 PAGE MANUAL &
TUTORIAL GUIDE -

ALL FOR £139 (+VAT).



SEND CHEQUE FOR £160 (VAT, p & p incl.) TO
Systems Marketing Limited

SPACE HOUSE, 8-10, WEST MILLS, NEWBURY, BERKS. RG14 5HU
TEL: (0635) 36111 FAX: (0635) 36090 TELEX: 846229

MICROMART

DECA COMPUTER POWER

UNBEATABLE VALUE: NEW RANGE

DECA 386 £2995
32-Bit 80386 Processor. 16MHz zero wait state, 2Mb RAM, 40Mb hard disk: 1 x 1.2Mb floppy disk, 1 parallel, 2 serial ports.

DECA BABY 286 AT £1395
12MHz AT286 Computer, 1Mb RAM, 20Mb 40MS hard disk, 1 x 1.2Mb floppy disk, 1 parallel, 2 serial ports.

DECATURBO-XT £595
4.77/8.00MHz, 640k RAM, 2 x 360k floppy disk drives.

All machines come with microsoft MS-DOS 3.2 + GW Basic, full documentation. Monochrome Monitor and M/G Card
Delivery and VAT excluded

ZONE ELECTRONICS LTD

Specialists in Business and Accounting Systems

Westbury House, 18 Eldorado Road
Cheltenham, Glos GL50 2PT
Tel: (0242) 221 271 Telex: 43432

COMPUTER REPAIRS

SPECTRUM 16/48	£19.95
SPECTRUM +	£19.95
QL	£27.95
COMMODORE 64	£35.00
AMSTRAD 464/664	£24.95
AMSTRAD 6128	£27.95
AMSTRAD PCW 8256/512	P.O.A.
AMSTRAD PC 1512	P.O.A.
PLEASE PHONE FOR DETAILS	

THE PRICES SHOWN ARE FULLY INCLUSIVE OF PARTS, LABOUR, POSTAGE, INSURANCE, VAT AND 3 MONTH GUARANTEE. SEND ITEM WITH CHEQUE AND DESCRIPTION OF FAULT TO:



BUREDATA
COMPUTER REPAIR AND MAINTENANCE

DEPT PCW, UNIT 6,
STANLEY HOUSE, STANLEY AVENUE,
WEMBLEY, MIDDX HA0 4JB.
Telephone: 01-902 5218

Have a go at C programming with:
FREE

C

a public domain floating point small c compiler for PC compatibles, the Amstrad PCW range and the Amstrad CPC 6128.

PC version £3.00 CP/M version £4.00

We also have:

CP/M **INTEGER C** - offers many more C facilities but at the expense of floating point numbers £4.00

PC-DOS **C INTERPRETER** - develop C programs interactively and save time - no compilation necessary £3.00

PC-DOS **C TUTOR** - learn to program in C £3.00

PASCAL Multi-user BASIC Logo Forth Prolog Ada Lisp Assemblers

and many more public domain programs for PCs and Amstrads, all at these prices. Send an 18p stamp for our free catalogues, stating which machine you are interested in.

POSTAGE - please add 50p for the first disk and 10p per disk thereafter.

PROSPEC COMPUTER SYSTEMS
PO Box 28, Beeston, Nottingham NG9 1PH

PROGRAM FILE

```
DATA 25.45,47.28,-1
DATA 25.26,46.45,-1
DATA 26.46,48.27,-1
DATA 27.48,47.28,-1
```

```
DATA 29.30,42.41,-1
DATA 30.42,43.31,-1
DATA 43.44,32.31,-1
DATA 32.44,41.29,-1
```

```
*****
*                               *
*   The 3d image animator (C) J.Bates 1987   *
*                               *
*****
```

```
This program in its present form requires a Commodore
Amiga with at least 512k ram.
If you have less than 512k you should cut out all the
rem statements and adjust the clear and s# array to
a smaller size (and so display less images).
On a 512k Amiga this program will display up to 16
images with pruning and adjustment of s#.
The data file loaded should be generated by the
3d image generator program or can be your own file.
```

```
To display a file not created by the image generator
you will have to create an image and use the GET command
to put it into a double precision array and save it
in a similar fashion to the image generator program.
```

```
Clear 90k so objects can be stored in ram
```

```
IF FRE(x)<800006 THEN CLEAR ,900006
DIM s#(737,11)
```

```
These function calls are used to load the data from disk
and store it in the s# array. You will need dos.library
on your disk to use them. If you don't have it on your
disk see the note in the generation program to set it up
```

```
DECLARE FUNCTION xOpen$ LIBRARY
DECLARE FUNCTION xRead$ LIBRARY
LIBRARY "dos.library"
```

```
WINDOW 1
```

```
filename:
```

```
INPUT "Please enter filename to load ";a$
```

```
If your file is not on a disk called gfx: delete
the "gfx:" section from the following line:
```

```
a$="gfx:"+a$+CHR$(0)
file$=xOpen$(SADD(a$),1005)
IF file$=0 THEN PRINT "no such file on this disk":GOTO filename
PRINT "loading file please wait ";
dummy=xRead$(file$,VARPTR(s$(0,0)),708486)
CALL xClose$(file$)
```

```
set up display screen (if you have changed the mode on
your generated images you should change then mode here to
correspond with it
```

```
SCREEN 2,320,200,2,1
WINDOW 2,"3d Display "+a$(0,0)-(297,185),0,2
```

```
redefine colours 1 to 3 to red,blue and white
```

```
PALETTE 1,1,0,0
PALETTE 2,0,0,1
PALETTE 3,1,1,1
```

```
r=180/3.1415927*
xr=80:yr=60
```

```
Main display loop
```

```
Display routine 1
this bit blits two copies of the 3d image rotating in
different directions whilst spiralling outwards
```

```
WHILE xr<140
FOR a%=0 TO 11
b%=(b%+5) MOD 360
x%=xr*SIN(b%/r):y%=yr*COS(b%/r)
PUT (80+x%,35+y%),s$(0,a%),PSET
PUT (80-x%,35-y%),s$(0,11-a%),PSET
NEXT
xr=xr+1:yr=yr+1
WEND
```

```
CLS
```

```
Display routine 2
this bit blits four copies of the image on and spins
them at the corners of the screen using the PUT command.
```

```
FOR a%=0 TO 200
PUT (-20,-35),s$(0,a% MOD 12),PSET
PUT (160,-35),s$(0,(a%+3) MOD 12),PSET
PUT (-20,90),s$(0,(a%+6) MOD 12),PSET
PUT (160,90),s$(0,(a%+9) MOD 12),PSET
```


PROGRAM FILE

```

NEXT
CLS

    display routine 3
    this blits just one rotating cube on the screen. this
    is about as fast as you can display images this size
    in basic (Very fast !). This display actually goes
    faster than the screen can display and so you can only
    see what the screen can catch up with.

FOR a%=0 TO 50
  FOR b%=0 TO 11
    PUT (80.35),s*(0.b%).PSET
  NEXT
NEXT
CLS

    Display routine 4
    this routine bounces the rotating image around the screen

x%=0:y%=0:xv%=5:yv%=8
FOR a%=0 TO 750
  x%=x%+xv%
  y%=y%+yv%
  IF y%>WINDOW(3)-100 OR y%<0 THEN yv%=-yv% ELSE yv%=yv%+1
  IF x%>WINDOW(2)-100 OR x%<-10 THEN xv%=-xv%
  PUT (x%,y%),s*(0.a% MOD 12).PSET
NEXT

    Display routine 5
    this shows how to use the logic operations on the
    blitted image in this case an or

FOR a%=0 TO 100
  x%=RND*WINDOW(2)-80
  y%=RND*WINDOW(3)-80
  PUT (x%,y%),s*(0.RND*11).OR
NEXT

    You can replace these simple display routines with
    any of your own and the blitter chip will be able
    to display 4 different images of this size on the
    screen before you start to notice any loss of speed

RUN

    An example set of data for drawing a 3d house

    number of coordinates

DATA 34

DATA -50,-40,30
DATA 50,-40,30
DATA 50,40,30
DATA -50,40,30
DATA -50,-40,-30
DATA 50,-40,-30
DATA 50,40,-30
DATA -50,40,-30
DATA -50,55,0
DATA 50,55,0
DATA -5,-40,30
DATA -5,-5,30
DATA 5,-5,30
DATA 5,-40,30
DATA -38,-30,30
DATA -18,-30,30
DATA -18,-5,30
DATA -38,-5,30
DATA 17,-30,30
DATA 37,-30,30
DATA 37,-5,30
DATA 17,-5,30
DATA -38,10,30
DATA -18,10,30
DATA -18,30,30
DATA -38,30,30
DATA 17,10,30
DATA 37,10,30
DATA 37,30,30
DATA 17,30,30
DATA -5,10,30
DATA 5,10,30
DATA 5,30,30
DATA -5,30,30

    Number of Planes/polygon

    as there are only 15 polygons in this house the data
    is sorted much more quickly and so the image can be
    generated very quickly.

DATA 15

    Polygon data

DATA 1,4,3,2,-3
DATA 2,3,7,6,-3
DATA 4,8,7,3,-3

```

MICROMART

Disks & Ribbons

DISKS

3" CS2 Maxell	£1.90
3.5" DS unbranded	£0.99
5.25" Memorex branded SS/DD	£0.60
5.25" 96tpi DS, unbranded, labels etc	£0.35

RIBBONS

Imagewriter	£2.95
Citizen 120D	£3.50
Epson MX/RX/FX80	£2.75
Epson MX/RX/FX100	£3.10
Cannon PW 1080A	£2.69
Citizen MSP 10	£4.90
Epson LX 80/86	£2.50
Kaga Taxan	£2.69

Please add 15% VAT, carriage free

T-Systems Ltd

The Signal Cabin, 61 High Street,
Orpington, Kent BR6 0JF. Tel: 0689 22196

MEMORY & V30 UPGRADES

PCW & PC

SPACE SAVERS



5 FREE 52 DISCS WITH * PRODUCTS until Xmas

CUSTOM DESIGN COPY & WORKING DISC HOLDERS fit to any desired angle, fits on either side of your PC and simply swings to the side when not in use.
£19.95* each £29.95* When purchased together.
Use your PC to the full UPGRADE its MEMORY £17.49
V30 PROCESSOR UPGRADE £21.95 (2.1 times faster)
SMP 2/3000 BUFFER UPGRADE £4.95 (1 page to 4 pages)
Send for our FREE CATALOGUE packed with UNBEATABLE OFFERS and useful HINTS & TIPS.
ALL PRICES INCLUDE VAT and P&P—U.K.

MEAC DESIGNS
Dept. PCW1, 5A Harpton Parade,
Village Way, Yateley, Camberley,
Surrey, GU17 7SB. 0252 879005 Anytime

DESK TOP COMPANIONS

MEMORY & DISK UPGRADES

MEMORY & V30 UPGRADES



Wordwork

PLANTAIN PLACE
LONDON SE1 1YS
TEL: 01-403 7048
FAX: 01-403 8402

MEMORY & DISK UPGRADES

MICROMART

NEW or SECOND USER SYSTEMS BUYING/SELLING

WANG-IBM-COMPAQ
HP-APRICOT

All types of Computer Equipment
from Micros to Mainframes
bought and sold.

ADVANCED TECHNOLOGY TRADING

12a, Lombard Street,
Lichfield, Staffs. WS13 6DR.
Telephone: 0543 258970

DISK CONVERSIONS

DISK/DISK • TAPE/DISK • TAPE/TAPE

We can transfer your data between over 1000 different Minis,
Micros and Mainframes, giving more than 1,000,000
permutations.

Tape

1/4" - QIC-11, QIC-24, QIC-02,

1/2" - 800, 1600, 3200, 6250 BPI

DEC/DOS, TAR, ANSI, CPIO, IBM Labelled/Unlabelled/
ASCII/EBCDIC/Binary, ICL 6/8 BIT, VAX COPY.

Floppy

8", 5 1/4", 3 1/2", 3" CP/M, CP/M86, MDOS, MSDOS, PC DOS,
UNIX, XENIX, IDRIS, TAR, RT11, IBM, BEF, SIS, FLEX, OS9,
APPLE, ACORN, TORCH, VICTOR-SIRIUS, ATARI,
MACINTOSH & MANY MORE.

WP/Typesetting

Many formats including DISPLAYWRITER, OLIVETTI,
WORDPLEX, LINOTYPE etc.

Overnight - Most formats returned by next day's post.

Prices from £10 + VAT per disk.
Usual terms C.W.O.
Ring or write for a full format list

**A.L. DOWNLOADING
SERVICES**
VOYSEY HOUSE
BARLEY MOW PASSAGE
LONDON W4 4PI
01-994 2471

Desktop Publishing and Laser Printing service also available

★ SPECIAL OFFERS ★

5 1/4" DS/DD Databyte	3 1/2" DS/DD Databyte
10.....£8.15	10.....£11.50
25.....£12.50	25.....£28.95
50.....£19.95	50.....£55.75
100.....£34.95	100.....£109.05

5 1/4" SS/DD Databyte	5 1/4" Memorex DS/DD
1-5 Boxes.....£5.50	1-5 Boxes.....£13.80
5-10 Boxes.....£5.25	5-10 Boxes.....£13.20
10+ Boxes.....£5.00	10+ Boxes.....£12.80

3" Mimic CF2	Call for bulk discounts
1-5 Boxes.....£23.50	
5-10 Boxes.....£23.00	
10+ Boxes.....£22.50	

80 Capacity 5 1/4" LSB £8.15
100 Capacity 5 1/4" LSB £11.00
3 1/2" Library Cases £1.10
5 1/4" Library Cases £1.10
Disk Notchers £3.60
40 Capacity 3 1/2" LSB £7.95
ZX Spectrum 128 £119.99
Commodore 64 Cassette unit £26.00

All prices include VAT and postage.
ALL TRADE ENQUIRIES WELCOME.

Send SAE for a free catalogue

M.D.S. Computer Supplies
11 Church Street, Banbridge BT32 4AA
Credit Card Hotline (08206) 23477 24-hours
A Division of Brocklis Enterprises Ltd.

PROGRAM FILE

```
DATA 1.5.8.4.1
DATA 5.6.7.8.1
DATA 1.2.6.5.1
DATA 4.9.10.3.1
DATA 9.8.7.10.1
DATA 4.9.10.3.1
DATA 1.2.6.5.1
DATA 1.1.10.10.1
DATA 15.15.15.15.2
DATA 10.10.10.10.2
DATA 20.10.10.10.1
DATA 27.10.10.10.1
DATA 1.1.10.10.1
```



Amstrad PCW File Recovery

by Simon Shakeshaft

PCW
DISK
LIBRARY

This program allows you to undelete files from CP/M disks on the Amstrad PCW8256 and PCW8512. To use the program, make sure you have the three program files, and BASIC.COM and SUBMIT.COM from your CP/M disk all on the same disk. Type SUBMIT UNERA.SUB at the prompt — this automatically loads Basic and runs the program.

You will be asked to put the disk to be examined in drive A and will be given a directory of deleted files. The f1 key will redisplay the list of deleted files, f5 will provide help for the program and f7 will exit.

The f3 key is used to perform an unerase operation. It prompts for a filename (it will accept CP/M wildcard characters) and then attempts to recover the file(s). During recovery, the program shows the size of the deleted files in 1k blocks and the number of collisions (blocks already allocated to new programs created since this one was deleted). Using this information, it is possible to predict if a file will be recovered intact. Note that erased files will automatically be re-named if a new file already exists with the same name.

The program should be typed in as three separate files — UNERA.SUB, UNERAS.BAS, and UNERAM.BAS. The first is a batch file and can be typed in using a text editor (RPED.BAS) and saved as UNERA.SUB. The other two are Basic programs and should both be typed in and saved before any attempt is made to run the program.

The CP/M disk directory resides in the first datablocks of a diskette. On the Amstrad PCW, these are blocks 0 and 1 of the A drive or, physically, track 1, sectors 0 to 3. The directory is divided into File Control Blocks (FCBs) which are 32 bytes long. These contain information about file allocation (which blocks on the disk make up a particular file). Some FCBs also contain time and date stamp information, password information and directory label information.

For the program's purposes, byte 1 is the most interesting part of the FCB. This is used to indicate the type of directory label as follows:
e5h — unused or erased file
21h — SFCB (time and date stamp)
20h — directory label
17h — XFCB for user number 0-15 (passwords)
07h — FCB for user number 0-15

When a file is erased under CP/M, the first byte in each file control block is changed to e5h; however, the rest of the block allocation information remains unchanged. It is possible to recover the file by converting the byte from e5h to 00h, restoring it to user area 0.

UNERAS.BAS is essentially a machine code loader with two machine code operations supported:
● a call to BDOS 50 — direct BIOS calls; and
● a call to BDOS 152 — parse filename

UNERAM.BAS is the main program.

```
100 REM *****
110 REM *****
120 REM *****
130 REM *****
140 REM *****
150 REM *****
160 REM *****
170 REM *****
180 REM *****
190 REM *****
200 REM *****
210 REM *****
220 REM *****
230 REM *****
240 REM *****
250 REM *****
260 REM *****
270 REM *****
```


PROGRAM FILE

```

280 DEF F$pos.curs(x,y)=esc$+"Y"+CHR$(32+y)+CHR$(32+x)
290 GOSUB 2010 : REM <<Opening Screen Display>>
300 GOSUB 1000 : REM <<Loader>>
310 PRINT F$pos.curs(31,29);rev.off$ : ...Loading - Please Wait... : rev.off$
320 CHAIN "A:USERAN.BAS" : REM <<Main Program>>
330 END
340 REM
350 REM *****
360 REM *      END OF LOADER MODULE      *
370 REM *****
380 REM
390 REM
400 REM
410 REM *****
420 REM *      SUBROUTINES      *
430 REM *****
440 REM
1000 REM <<SUBROUTINE - Loader>>
1010 start=HIMEM+4H300 : param.block=start+10
1020 FOR i=0 TO 17 : READ mem : POKE start+i,mem : NEXT i
1030 DATA 4B01,4B32,4B00 : REM LD BC,50 : BIOS 50 - Direct BIOS calls
1040 DATA 4B11,4B00,4B00 : REM LD DE,0000 : Parameter Block Address
1050 DATA 4Bcd,4B05,4B00 : REM CALL 0005 : Call BIOS
1060 DATA 4Bc9 : REM RET : Done
1070 DATA 4B0 : REM PARAMETER BLOCK: DE 00 : BIOS Func
1080 DATA 4B00 : REM : DE 00 : A Register
1090 DATA 4B00,4B00 : REM : DE 00,00 : BC Register Pair
1100 DATA 4B00,4B00 : REM : DE 00,00 : DE Register Pair
1110 DATA 4B00,4B00 : REM : DE 00,00 : HI Register Pair
1120 mem=INT((param.block/256) : lsb=param.block-(256*mem)
1130 POKE start+i,lsb : POKE start+i,mem
1140 start=HIMEM+4H300 : FOR i=0 TO 18 : READ mem : POKE start+i,mem : NEXT i
1150 DATA 4B01,4B00,4B00 : REM LD BC,152 : BIOS 152 - Parse filename
1160 DATA 4B11,4B00,4B00 : REM LD DE,0000 : PCB address
1170 DATA 4Bcd,4B05,4B00 : REM CALL 0005 : Call BIOS
1180 DATA 4B22,4B00,4B00 : REM SHLD 10000 : Save return code
1190 DATA 4Bc9 : REM RET : Done
1200 DATA 4B00,4B00 : REM DE 00,00 : Return code
1210 DATA 4B00,4B00 : REM DE 00,00 : PCB Address input string
1220 DATA 4B00,4B00 : REM DE 00,00 : PCB Address target file
1230 mem=INT((start/256) : lsb=start-(256*mem)
1240 POKE start+i,lsb : POKE start+i,mem
1250 mem=INT((start/256) : lsb=start-(256*mem)
1260 POKE start+i,lsb : POKE start+i,mem
1270 RETURN : REM <<END SUBROUTINE>>
2000 REM
2010 REM <<Subroutine - Opening Screen>>
2020 PRINT cls;home$;cur.off$
2030 PRINT F$pos.curs(37,1);"AMSTRAD PCWB256"
2040 PRINT F$pos.curs(29,5);"Recover Erased File Utility v1.0"
2050 PRINT F$pos.curs(30,9);"Copyright 1987 Simon Shakeshaft"
2060 PRINT F$pos.curs(36,16);rev.off$ : Important Notice : rev.off$
2070 PRINT F$pos.curs(23,18);"This Program is Now Available, Free Of Cost,"
2080 PRINT F$pos.curs(19,20);"To All Readers Of 'Personal Computer World' Magazine"
2090 PRINT F$pos.curs(24,22);"It is Not To Be Sold Or Traded In Any Form."
2100 RETURN : REM <<END SUBROUTINE>>
2110 REM
2120 REM
2130 REM *****
2140 REM *      END OF SUBROUTINES      *
2150 REM *****

100 REM *****
110 REM *
120 REM *      RECOVER ERASED FILE      *
130 REM *
140 REM *      v1.0 C Simon Shakeshaft 1987      *
150 REM *      <<USERAN.BAS>>      *
160 REM *****
170 REM
180 REM <<Main Program - Entry Should Be Via a CHAIN Command>>
190 REM
191 REM *****
192 REM *      MAIN PROGRAM MODULE      *
193 REM *****
194 REM
195 REM <<Insert Diskette Message etc>>
196 REM
200 PRINT CHR$(27);"Y";CHR$(61);CHR$(36);CHR$(27);"p";" Insert Diskette With Era
sed File(s) For Recovery - Press (SPACE BAR) to Continue ";CHR$(27);"q"
210 >>INKEY$ : IF INKEY$=" " THEN GOTO 210
220 OPTION RUN
230 CLEAR ,1024 : REM <<Clear any Garbage>>
235 REM
240 REM <<Dimension Arrays, Initialise Variables>>
245 REM
250 DIM a$(176), d$(64)
260 t.=HIMEM+4H300 : Iflag=0 : FALSE=0 : TRUE=1
270 REM <<Screen Codes>>
280 esc$=CHR$(27) : cls$=esc$+"E" : home$=esc$+"H" : cur.off$=esc$+"o" : cur.off$
=esc$+"f"
290 rev.off$=esc$+"p" : rev.off$=esc$+"q" : bell$=CHR$(7)
295 REM
300 REM <<Screen Heading Functions>>
305 REM
310 DEF F$messages(x,y,text$)=esc$+"Y"+CHR$(32+y)+CHR$(32+x)+text$
320 DEF F$movelev.port(x,y,h,w)=esc$+"I"+CHR$(32+y)+CHR$(32+x)+CHR$(31+h)+CHR$(
31+w)
330 DEF F$pos.curs(x,y)=esc$+"Y"+CHR$(32+y)+CHR$(32+x)
340 DEF F$del.line$=esc$+"N"
345 REM
350 REM <<Machine Code Functions and Variables>>
355 REM
360 DEF USRO=HIMEM+4H300 : REM <<BIOS 50>>
370 param.block=HIMEM+4H300+10
380 DEF USW1=HIMEM+4H300 : REM <<BIOS 152 - Parse filename>>
390 res.code=HIMEM+4H300+13 : top.str=HIMEM+4H300+15 : tgt.str=HIMEM+4H300+17
391 REM
393 REM <<List Deleted Files>>
395 REM

```

MICROMART



COMPUTERS & ADD-ON CARDS

TEL: 01 801 1838

XT TURBO, 10MHZ, 640K RAM:—
 READY TO RUN SYSTEMS FROM £379.00
AT TURBO, 12MHZ, 1MB RAM:—
 READY TO RUN SYSTEM FROM £849.00
80386, 16MHZ, 2MB RAM:—
 READY TO RUN SYSTEM FROM £2490.00
MAIN BOARD XT TURBO, AT TURBO..... FROM £61.00
DISK DRIVE CONTROLLERS..... FROM £15.40
HARD DISK CONTROLLERS..... FROM £62.70
DIO CARD INCORPORATING 2x360K FLOPPY CONTROLLER 2xRS 232 PARALLEL
PRINTER PORT, CLOCK CALANDER CLOCK & GAME PORT..... FROM £46.20
SPEED 7 CONVERT CARD XT, TO AT..... £210.00
MONO GRAPHIC PRINTER CARD
(HERCULES COM.)..... £36.20
SERIAL PORT CARD..... FROM £15.75
PARALLEL PRINTER CARD..... £9.75
JOYSTICK CARD (DUAL)..... £9.75
HARD DISK "SEAGATE" & CONT. 20MB..... FROM £229.00

MANY MORE PRODUCTS AVAILABLE,
PLEASE RING OUR TRADE COUNTER
FOR FULL PRICE LIST & CATALOGUE



ATOMSTYLE LTD

UNIT 21, MILLHEAD IND CENTRE 01 801 1838
MILLHEAD RD, LONDON N17 9QU

STUCK ON A PROBLEM!
WHY NOT SEND FOR PCW FILE!

The news letter is for those
interested in sharing hints and tips,
news and writing articles.

ONLY £7 FOR 6 ISSUES
CPC USERS THERE'S
ONE FOR YOU TOO!!

People who join also have free
access to our Public Domain library

ONLY £5 FOR 6 ISSUES

For sample Issue please send £1.25 to:

Mr C Bryant (PCW),
11 Havenview Road, Seaton,
Devon EX12 1PF
Telephone (0297) 20456



ASHCOM

Atari hardware

S20 STEF, keyboard/mouse/5 meg drive £259.95
 1040 STF keyboard/mouse/1 meg drive £439.95
 1040 STF plus colour monitor £799.95
 SF3141 meg drive £169.95

Commodore Amiga range

A500 + offer pack and modulator £435.00
 A1010 disc-drive £249.95
 3.5 inch DS/DD guaranteed (packed in 10s) £12.00
 and in 25s £25.00

Amazing prices on peripherals and all
software. All prices include VAT at 15%
and P&P on UK mainland. To order send
cheques/PO or Visa/Access details to the
address below or phone with credit card.

ASHCOM

10 The Green, Ashby de la Zouch,
Leicestershire LE6 5JU.

For more information call us on
(0530) 411485 for send SAE for
full price list.

MICROMART

PACE ELECTRONICS

Why not increase the speed of your PC by using the 8087/80287 Numeric Data Processor

8087/2 (8MHz) prices 1-10 PCS £135

80287/8 (8MHz) prices 1-10 PCS £185

80387 (16MHz)..... £350

Upgrade your memory

256K DRAMS 256K x 1 £1.98

All prices excluding VAT/P&P
We offer extremely competitive prices on
PACE MODEM PRODUCTS.

Pace Electronics offer the PC user
technical support and advice on
the above products.

PACE ELECTRONICS LTD
84 HIGH STREET, STONY STRATFORD,
MILTON KEYNES MK11 1AH
Tel: 0908 562664 Telex: 826679 PACE G

DISKS

DATAFLOW brand
Universal 5 1/4" Disks

The Business • Top Quality Branded Imports • Professional
Grade • Suits ALL Drives • Tested to
96 Tpi Both Sides

10 for £5.95 • 25 for £13.95
50 for £24.95 • 100 for £47.95
Including VAT & delivery

SMART Library boxes 10 disk £1.20 EACH

DATAFLOW brand Universal 3 1/2" Disks
Top Quality Japanese Imports • Professional
Grade • Suits ALL DRIVES - Single
or Double Sided

5 for £8.45 • 10 for £13.95
25 for £29.95 • 50 for £58.95 • 100 for £109.95
Including VAT & delivery

SMART Library boxes 10 disk 95p EACH

Cheque/PD with order please
CASPELL COMPUTER SERVICES
Dept PCW, FREEPOST Poole, Dorset, BH15 1BR
Tel: 0202 682087

AMSTRAD PCW

Use One Expert System

For Business, Scientific &
Educational Knowledge Engineering

A complete Shell System, to develop and use
Expert Systems — for interpreting
situations, decision advisors, or procedure
guides, with arithmetic and text file support.

- ★ Knowledge Builder ★ Consultant
- ★ Comprehensive Tutorial Manual
- ★ Example Knowledge Bases

Locoscript/RPED knowledge files ★ Help/
Explanation/Don't know/Why True/False,
numeric, and option menu knowledge
★ Rule priorities Volunteering, Changed
answers, Interruption ★ Printer logging
Variable matching ★ Reasoning stages
★ Tracing ★ Multiple goals

£34.95 Details from:

SWALLOWSOFT PUBLICATIONS
PO BOX 107, Walton-on-Thames,
Surrey KT12 5PQ

PROGRAM FILE

```

400 RESET
410 PRINT cls:bme1
420 GOSUB 1000 : REM <<Set DMA>>
430 PRINT cur.off+cls:bme1;
440 PRINT SPACES(24);CHR$(150);STRING$(38,CHR$(154));CHR$(156)
450 PRINT SPACES(24);CHR$(149);SPACES(38);CHR$(149)
460 PRINT SPACES(24);CHR$(151);STRING$(38,CHR$(154));CHR$(156)
470 PRINT SPACES(24);CHR$(149);SPACES(38);CHR$(149)
480 PRINT SPACES(24);CHR$(147);STRING$(38,CHR$(154));CHR$(156)
490 PRINT #Messages(35,1,"RECOVER BRANDED FILE") : PRINT
500 PRINT #Pos.cur+(26,3) : * F1-LIST (3-KNOCKED IN HELP 47 KEIT
510 GOSUB 2000 : REM <<List Deleted Files to Screen>>
520 as=IRKEYS : IF as="" THEN GOTO 560
530 IF ASC(as)>=48 AND ASC(as)<=57 AND ASC(as)>=65 AND ASC(as)<=90 THEN
GOTO 560
540 IF ASC(as)=48 THEN GOTO 2000 : REM <<List Deleted Files to Screen>>
550 IF ASC(as)=57 THEN GOTO 1000 : REM <<Recover Branded Files>>
560 IF ASC(as)=49 THEN GOTO 5000 : REM <<Help>>
570 IF ASC(as)=51 THEN GOTO 5500 : REM <<Exit Program>>
580 IF ASC(as)<48 THEN GOTO 220 ELSE GOTO 560 : REM <<EXIT No F1 F11 AS Appoin
late>>
590 REM
600 REM *****
610 REM *****
620 REM *****
630 REM *****
640 REM *****
650 REM *****
660 REM *****
670 REM *****
680 REM *****
690 REM *****
700 REM *****
710 REM *****
720 REM *****
730 REM *****
740 REM *****
750 REM *****
760 REM *****
770 REM *****
780 REM *****
790 REM *****
800 REM *****
810 REM *****
820 REM *****
830 REM *****
840 REM *****
850 REM *****
860 REM *****
870 REM *****
880 REM *****
890 REM *****
900 REM *****
910 REM *****
920 REM *****
930 REM *****
940 REM *****
950 REM *****
960 REM *****
970 REM *****
980 REM *****
990 REM *****
1000 REM *****
1010 REM *****
1020 REM *****
1030 REM *****
1040 REM *****
1050 REM *****
1060 REM *****
1070 REM *****
1080 REM *****
1090 REM *****
1100 REM *****
1110 REM *****
1120 REM *****
1130 REM *****
1140 REM *****
1150 REM *****
1160 REM *****
1170 REM *****
1180 REM *****
1190 REM *****
1200 REM *****
1210 REM *****
1220 REM *****
1230 REM *****
1240 REM *****
1250 REM *****
1260 REM *****
1270 REM *****
1280 REM *****
1290 REM *****
1300 REM *****
1310 REM *****
1320 REM *****
1330 REM *****
1340 REM *****
1350 REM *****
1360 REM *****
1370 REM *****
1380 REM *****
1390 REM *****
1400 REM *****
1410 REM *****
1420 REM *****
1430 REM *****
1440 REM *****
1450 REM *****
1460 REM *****
1470 REM *****
1480 REM *****
1490 REM *****
1500 REM *****
1510 REM *****
1520 REM *****
1530 REM *****
1540 REM *****
1550 REM *****
1560 REM *****
1570 REM *****
1580 REM *****
1590 REM *****
1600 REM *****
1610 REM *****
1620 REM *****
1630 REM *****
1640 REM *****
1650 REM *****
1660 REM *****
1670 REM *****
1680 REM *****
1690 REM *****
1700 REM *****
1710 REM *****
1720 REM *****
1730 REM *****
1740 REM *****
1750 REM *****
1760 REM *****
1770 REM *****
1780 REM *****
1790 REM *****
1800 REM *****
1810 REM *****
1820 REM *****
1830 REM *****
1840 REM *****
1850 REM *****
1860 REM *****
1870 REM *****
1880 REM *****
1890 REM *****
1900 REM *****
1910 REM *****
1920 REM *****
1930 REM *****
1940 REM *****
1950 REM *****
1960 REM *****
1970 REM *****
1980 REM *****
1990 REM *****
2000 REM *****
2010 REM *****
2020 REM *****
2030 REM *****
2040 REM *****
2050 REM *****
2060 REM *****
2070 REM *****
2080 REM *****
2090 REM *****
2100 REM *****
2110 REM *****
2120 REM *****
2130 REM *****
2140 REM *****
2150 REM *****
2160 REM *****
2170 REM *****
2180 REM *****
2190 REM *****
2200 REM *****
2210 REM *****
2220 REM *****
2230 REM *****
2240 REM *****
2250 REM *****
2260 REM *****
2270 REM *****
2280 REM *****
2290 REM *****
2300 REM *****
2310 REM *****
2320 REM *****
2330 REM *****
2340 REM *****
2350 REM *****
2360 REM *****
2370 REM *****
2380 REM *****
2390 REM *****
2400 REM *****
2410 REM *****
2420 REM *****

```


PROGRAM FILE

```

2430 POKE p.temp,32 : msb=INT(pointer/256) : lsb=pointer-(256*msb)
2440 POKE p.temp+1,lsb : POKE p.temp+2,msb : REM <<Make a String - 'temp'>>
2450 dsf[j]=temp : REM <<Copy Buffer to String Array Using 'temp'>>
2460 pointer=pointer+32
2470 NEXT j
2480 NEXT i
2490 RETURN : REM <<END SUBROUTINE>>
2500 REM-----
3000 REM <<Recover Erased File>>
3002 IF afile=1 THEN GOTO 3020
3004 FOR l=1 TO 3 : PRINT bells; : FOR m=1 TO 300 : NEXT m : NEXT l : REM <<Alarm>>
3005 ms=CHR$(b11) : REM <<Tricky, Fool's Main Menu So List Is Not Repeated>>
3006 RETURN : REM <<No Erased File - Selection Invalid>>
3020 PRINT #pos.cur$(34,26);rev.off$;" File name:";rev.off$;" : cur.off$ : LINE 1
INPUT a$ : PRINT cur.off$
3030 a$=a$+CHR$(32) : REM <<Delimiter>>
3040 GOSUB 4000 : REM <<Parse Filename>>
3050 IF PEEK(res.code)=&HFF AND PEEK(res.code+1)=&HFF THEN GOTO 3060 ELSE GOTO 3090
3060 PRINT #pos.cur$(31,29);rev.off$;" Illegal File Specification ";rev.off$;
3065 FOR l=1 TO 3 : PRINT bells; : FOR m=1 TO 300 : NEXT m : NEXT l
3070 FOR l=1 TO 2000 : NEXT l : PRINT #pos.cur$(32,29);Pdel.line$;
3080 GOTO 3020
3090 REM <<Form Allocation Table>>
3100 FOR i=1 TO 64 : a.t(i)=0 : NEXT i
3110 FOR i=1 TO 64
3120 f=ASC(LEFT$(dsf(i),1)) AND &HFO
3130 IF f=&H10 OR f=&H20 OR f=&H30 THEN GOTO 3190
3140 REM <<Found 'Live File'>>
3150 FOR j=17 TO 32
3160 f=ASC(MID$(dsf(i),j,1))
3170 IF f(>0) THEN a.t(i)=1 ELSE j=32
3180 NEXT j
3190 NEXT i
4000 REM <<Find Deleted File - If it exists>>
4010 GOSUB 6000 : REM <<Set up Screen>>
4020 row=1 : col=3 : d.f.blocks="" : got.some=0
4030 FOR i=1 TO 64
4040 match=1 : found=0 : file.size=0 : temp$=file.names
4050 IF (ASC(LEFT$(dsf(i),1)) AND &HFO)=&H20 THEN GOTO 4350
4060 f=ASC(MID$(dsf(i),2,1)) : IF (f=32 OR f=127) THEN GOTO 4350
4070 FOR j=2 TO 12
4080 f=ASC(MID$(temp$,j,1))
4090 IF f(<>MID$(dsf(i),j,1)) AND f(<? THEN match=0 : j=12
4100 NEXT j
4110 IF match=0 AND found=0 THEN GOTO 4350
4120 IF match=0 AND found=1 THEN GOTO 4230
4130 REM <<Found a Filespec Match!>>
4140 IF found=0 THEN fcb.start=i : found=1
4150 temp$=LEFT$(dsf(i),12) : got.some=1
4160 f=ASC(MID$(dsf(i),16,1))
4170 file.size=file.size+f : REM <<Adjust Filesize>>
4180 d.f.blocks=d.f.blocks+RIGHT$(dsf(i),16) : REM <<Get Blocks>>
4190 i=i+1 : IF i>64 THEN GOTO 4350 : REM <<Done>>
4200 f=ASC(LEFT$(dsf(i),1)) AND &HFO
4210 IF f=&H20 THEN GOTO 4070 : REM <<Still a Deleted File - Continue>>
4220 IF f=&H20 THEN GOTO 4190 : REM <<Time/Date Stamp - Skip>>
4225 IF f=&H10 THEN GOTO 4190 : REM <<IFCB (Passwords) - Skip>>
4230 REM <<Block Information Extracted For This File>>
4240 fcb.end=i-1
4250 PRINT cbs;home$;SPACES(27);"Attempting to recover ";MID$(dsfcb.start,2,8);";";MID$(dsfcb.start,10,3)
4260 PRINT : PRINT SPACES(27);"File size was ";INT((file.size+7)/8);"K = ";file.size;" Records"
4270 GOSUB 6200 : REM <<Find Collisions>>
4280 GOSUB 6300 : REM <<Rename File If Necessary>>
4290 GOSUB 6620 : REM <<Set FCB Byte 0 To 00>>
4300 GOSUB 6800 : REM <<Update List Of Files>>
4310 GOSUB 6900 : REM <<Update Allocation Table>>
4320 FOR l=1 TO 1000 : NEXT l : REM <<Delay>>
4330 i=i-1
4340 d.f.blocks=""
4350 NEXT i
4360 IF got.some(>0) THEN GOTO 4390
4365 REM <<Failed to Find a Filespec Match>>
4370 PRINT home$ : PRINT : PRINT SPACES(17);rev.off$;" No 'Deleted' Files in Directory to Match ";MID$(file.names,2,8);";";MID$(file.names,10,3);";";rev.off$
4380 FOR l=1 TO 2000 : NEXT l : REM <<Delay>>
4385 GOTO 4400
4390 GOSUB 4500 : REM <<Write Updated Directory Sectors to Disk>>
4400 PRINT #setview.port$(0,0,31,90)
4410 PRINT #pos.cur$(24,29);rev.off$;" Press [SPACE BAR] to Return to Main Menu ";rev.off$
4420 a$=INKEY$ : IF a$(<? THEN GOTO 4420
4430 RETURN : REM <<END SUBROUTINE>>
4440 REM-----
4500 REM <<SUBROUTINE - Write Updated Directory Sectors to Disk>>
4502 PRINT #setview.port$(0,0,31,90)
4504 PRINT #pos.cur$(29,29);rev.off$;" ...Updating Disk Directory..." ;rev.off$
4506 FOR i=1 TO 2000 : NEXT i
4510 track=1
4520 GOSUB 1100 : REM <<SETTRK>>
4530 FOR i=0 TO 3
4540 IF update(i)=0 THEN GOTO 4730
4550 pointer=i.m : cl=0
4560 sector=i : GOSUB 1200 : REM <<SETSEC>>
4570 GOSUB 1300 : REM <<READ>>
4580 FOR k=0 TO 511 STEP 4 : c=c%+PEEK(pointer+k) : NEXT k
4590 IF c=65535 THEN GOTO 4620 : REM <<Checksum match?>>
4600 PRINT #pos.cur$(13,29);rev.off$;" FATAL ERROR....Disk Swap Has Occured...";rev.off$
4605 RETURN : GOTO 4730 : REM <<Disk Swap - BOMB!>>
4605 FOR l=1 TO 3 : PRINT bells; : FOR m=1 TO 300 : NEXT m : NEXT l : REM <<Alarm>>
4610 FOR l=1 TO 2000 : NEXT l
4615 GOSUB 5000
4620 pointer=i.m
4630 i=i+16+1 : bi=i+16+16
4640 FOR j=i TO bi
4650 FOR l=1 TO 32
4660 POKE pointer,ASC(MID$(dsf(j),l,1))
4670 pointer=pointer+1

```

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: (0832) 244110
Telex: 295800 CWAOL

SOVERIGN MAIL-ORDER

289 St. Saviours Road, Leicester LE5 4HG
TEL: (0533) 490043. OPEN Mon-Sat 11am to 7.30

Dealers of Atari ST's & Atari PC's
software and hardware

DISCS DISCS

100 3.5"SS/DD for £109
10 3.5"SS/DD for £14.00
10 3.5"DD/DD for £16.00
10 5.25"DISCS for £6.50

NEW NEW NEW

ST Mouse extension
leads for STFM - STF
at **ONLY £4.99**
each

LOOK 5 FREE DISCS

Buy 20 5.25" discs at
£13.00 get 5 extra FREE

MOUSE MATS at £4.50

Lots of software get our
special free ST price
list, send large SAE

ATARI 1040 STF
FREE MOUSE & MAT ETC.
+ free software
ONLY £459.88

ATARI 520 STFM
FREE MOUSE & MAT ETC.
+ free software
ONLY £285.88

While U Wait Repair Service for all home Micros.
Phone for Details.
**ALL PRICES INC. VAT & P/P
IN THE UK MAINLAND**



PROGRAM FILE

```

6390 MID$(temp$,p,1)=""
6400 p=p+1
6410 IF p<0 THEN GOTO 6450
6415 PRINT F$colview.parts(0,0,31,90)
6420 PRINT F$pos.cur(10,29);rev.off$;" FATAL ERROR....Unable to Rename File S
uccessfully....RETURNING TO CP/M *;rev.off$;
6425 FOR l=1 TO 3 : PRINT bell$; : FOR m=1 TO 300 : WAIT m : WAIT 1
6430 FOR k=1 TO 10000 : WAIT k
6440 GOSUB 5600 : REM ((Unable to Rename File - BOMB!))
6450 VENN

6460 IF rename=TRUE THEN PRINT " Renaming as "+MID$(temp$,2,8)+"-"+MID$(temp$,
3) : FOR k=1 TO 4000 : WAIT k
6470 FOR l=fcb.start TO fcb.end
6480 f=(ASC(LEFT$(d$(k),1)) AND &HFO) : IF f<&HBO THEN GOTO 6500
6490 MID$(d$(k),2,1)=MID$(temp$,2,1)
6500 WAIT k
6600 RETURN : REM ((END SUBROUTINE))
6610 REM
6620 REM ((SUBROUTINE - Set PCB Byte 0 To 00))
6630 FOR l=fcb.start TO fcb.end
6640 f=(ASC(LEFT$(d$(k),1)) AND &HFO) : &HBO THEN MID$(d$(k),1,1)=CHR$(0)
6650 WAIT k
6660 FOR k=INT(fcb.start/16) TO INT(fcb.end/16)
6670 update(k)=1
6680 WAIT k
6690 RETURN : REM ((END SUBROUTINE))
6700 REM
6800 REM ((SUBROUTINE - Update List Of Files))
6810 PRINT F$colview.parts(0,16,14,90)
6815 IF collisions<0 THEN PRINT rev.off$;
6820 PRINT F$pos.cur(col,row);MID$(temp$,2,8);" ";MID$(temp$,3);
6830 IF collisions<0 THEN PRINT rev.off$;
6840 col=col+14 : IF col>76 THEN col=3 : row=row+1
6850 PRINT F$colview.parts(0,5,9,90)
6860 RETURN : REM ((END SUBROUTINE))
6870 REM
6900 REM ((SUBROUTINE - Update Allocation Table))
6910 FOR k=1 TO LEN(d.f.blocks)
6920 f=ASC(MID$(d.f.blocks,k,1)) : IF f=0 THEN GOTO 6940
6930 a.t(f)=fcb.start
6940 WAIT k
6950 RETURN : REM ((END SUBROUTINE))
6960 REM
7000 REM ((SUBROUTINE - Check if filename already exists))
7010 FOR k=1 TO 64
7020 f=(ASC(LEFT$(d$(k),1)) AND &HFO)
7030 IF f=&HBO OR f=&H20 THEN GOTO 7050
7040 IF MID$(temp$,2,1)=MID$(d$(k),2,1) THEN done=FALSE : k=64 : GOTO 7060
7050 done=TRUE
7060 WAIT k
7070 RETURN : REM ((END SUBROUTINE))
7080 REM
7090 REM
7100 REM *****
7110 REM 0 END OF SUBROUTINES
7120 REM *****

```



Turbo Pascal Circuit2

by Mark Needham



Along with the huge increase in the complexity of printed circuit boards has come a need for computers to design the layout. Circuit2 is a program that uses a simple set of rules to take a list of circuit board connections and find the best layout for the tracks. The procedure used to compute the shortest path between two points is based on Lee's Algorithm, but introduces more complex refinements to ensure that the shortest possible route is found.

Circuit2 is written in Turbo Pascal version 3.0 and requires the IBM graphics routines, GRAPH.P and GRAPH.BIN, to display the circuit board on the screen. The printout is specific to Epson-type printers and uses the 'Esc L' graphics mode.

The circuit board has a size of 40 columns by 40 rows of connectors, but these limits can be increased by changing the constant values at the start of the program. If you do change any of the constant values, ensure that you leave the range-checking on to trap any accesses to undefined elements of an array.

Each cell on the circuit board can

have a hole where a component can be soldered, plus tracks leading in four directions from the centre — north, south, east and west. To code this information, a Boolean value is used to indicate that a hole exists at a cell, and binary values are used to specify in which directions the tracks lead. North uses bit 0, east uses bit 1, south uses bit 2 and west uses bit 3. Therefore, to represent a vertical track going straight through the cell, bits 0 and 2 are set giving a value of 5. A value of 15 would mean that the cell is a crossroads with tracks leading in all directions.

To complicate matters, diagonal tracks can also be used. A diagonal can be fitted going from: (i) north to east, (ii) east to south, (iii) south to west, and (iv) west to north. These are coded 16,32,64 and 128 respectively. It is also possible to have two diagonals in the same cell: north to east, south to west or north to west, south to east. These would be coded as 16+64=80 and 128+32=160 respectively.

The circuit board is represented by a 2D array called Maingrid which

MICROMART

Variations on an

OPUS

The Incomparable Compatible

£ 495	Opus PCII Turbo 8MHz
£ 599	512k Twin Floppy
£ 635	512k 1.2Mb Floppy
£ 657	256k 5Mb Hard Disk
£ 675	512k 5Mb Hard Disk
£ 725	512k 10Mb Hard Disk
£ 765	512k 15Mb Hard Disk
£ 839	512k 20Mb Hard Disk
£ 883	1024k 20Mb Hard Disk
£ 930	512k 30Mb Hard Disk
£ 974	1024k 30Mb Hard Disk
£1149	512k 40Mb Hard Disk
£1193	1024k 40Mb Hard Disk

Add for colour upgrades

£ 199	CGA Card and Med. Res. VDU
£ 375	EGA Card and EGA VDU
£ 459	EGA Card and Taxan 660 EGA VDU
£ 515	EGA Card and NEC Multisync All Standards VDU

THE OPUS PC5

80286 CPU, 1024k RAM, 1.2Mb FDD, Parallel/Serial Ports, 30Mb hard disk, Keyboard and Hi-res mono monitor £1295

80286 Based Network

3 User £3199

4 User £3799

Inclusive of 12 months on site maintenance
XT Upgrading to AT. Call for quote.
Maintenance Contracts on all systems.

THE PACIFIC TRIO

PACIFIC 88 with INTEL 8088-2 CPU, 640k RAM, 360k or 720k FDD, Parallel/Serial/Games Ports, Battery backed Clock/Calendar, 84 key AT Style keyboard, Hi-res mono monitor, £449 with 1FDD, £539 with twin FDD, £599 5Mb Hard disk version, £725 16Mb Hard disk version, £795 20Mb Hard disk version, £999 with 40Mb 33 m/s hard disk.

PACIFIC 286 with INTEL 80286 CPU, 640k RAM, 1.2Mb FDD, Parallel/Serial Ports, Battery backed Clock/Calendar, 101 key AT Style keyboard, Hi-res mono monitor, £849 with no hard disk, £1095 with 20Mb HD, £1295 with 40Mb 40 m/s HD, £1395 with 40Mb 28 m/s HD, £1895 with 71Mb 28 m/s HD. PACIFIC 386 with INTEL 80386 CPU, 1024K RAM, 1.2Mb FDD, Parallel/Serial Ports, Battery backed Clock/Calendar, 101 key AT Style keyboard, Hi-res mono monitor, £2498 with 40Mb 40 m/s HD, £2598 with 40Mb 28 m/s HD, £3098 with 71Mb 28 m/s HD.

PACIFIC COMPUTERS (UK) LTD

565-569 Chiswick High Road,
London W4 3AY
Call 01-994 1054
Telex: 291432 Bellil G

AS
SEEN
AT PCW SHOW

AT

386 286
FROM

£1666 £677
PC MOS 386
Operating System
P O A

Multi tasking. Runs MS DOS
programmes and much much more
Single/Multi User

FAST DELIVERY SOFTWARE

VP Info (dB3+ clone)	* 68
dBase II v3.41	* 74
dBase III+	425
Foxbase	289
VP Planner (Lotus 123 clone)	* 68
Lotus 123 v2.1	* 310
Supercalc 4	280
Supercalc 3	62
Wordstar2000+R2	249
Wordstar 3.4	159
Word v3 No.2	279
Wordcraft 3	* 336
Wordperfect 4.2	255
Xerox Ventura	* 557
Pegasus modules	199
Norton Utilities 4	59
Ability Plus	139
Multiwriter (Wordstar Clone)	* 51
Sage Accountant	111
Sage Accountant Plus	* 149
Sage Payroll	74
Publican stock control	144

* TOP SELLERS

orders and enquiries to:

KINTECH COMPUTERS
ST TUDY, BODMIN
CORNWALL PL30 3NH
PHONE 0208 850176

PRICES CORRECT AT TIME OF GOING TO PRESS
ALL PRICES EXCLUDE VAT

5 1/4" DISKS

D I S K S

CERTIFIED 100%
ERROR FREE

TRY	48TPI	96TPI
10 @	£5.50 INC	£6.50 INC
25 @	£12.50 INC	£13.50 INC

100+ UNBELIEVABLE PRICES

DESPATCH BY RETURN
NO QUIBBLE GUARANTEE

Chq/PO to:

V. MARSHALL
35 Rochford Way,
Croydon,
Surrey CR0 3AG
TEL: 01-689 3487

holds the Boolean value for the hole and the track direction information. As the tracks are positioned on the board, this array is updated. All references to the Maingrid cell locations are done with the column number followed by the row number.

Circuit2 requires the name of three files. The first is a title file, which contains a single line with the title that you want to give to the current circuit. This is optional and the program will ignore the fact that the file does not exist. The title will be put at the top of the page when the circuit is printed.

The second file contains a list of all holes on the circuit board. The program needs to know where all the holes are so that it can divert the tracks around them. A hole is specified column first then row, the two numbers being separated by a comma — for example, 5,10.

The third file contains a list of all the tracks that need to be fitted. A track is defined as its starting cell location and its ending cell location. As with the hole file, the column number is followed by the row number, and the start cell location is followed by the end cell location — for example, 5,10,20,10.

Now that Circuit2 has all it needs, it will try to fit the tracks onto the board in the order that you have specified in the track file. The program's progress is displayed onscreen and, when it can fit a track, the current circuit is displayed. As the circuit is too large to fit on the screen, use the E,S,D and X keys to shift the circuit left, right, up and down. The circuit can be printed at this point, too.

All three files have default names that the program will look for if no name is specified: TITLE.TXT, HOLES.TXT and LINES.TXT. These default names can be altered in the constant area at the start of the program.

There are two refinements to the algorithm: Multiple Start and End Cells; and Diagonal Connections.

● **Multiple Start and End Cells** If the start cell already has a track or tracks leading from it, the program follows those tracks and stores all cells along

the route. If the end cell has tracks leading from it, again, all cells along the route are stored. The program then checks to see if any points on the start route coincide with any points on the end route. If they do, there is no need for a new track as the two points are already linked. If not, the program tries every combination of start and end points and measures the distance in cells that each track travels. The shortest track is the best and is added to the circuit board.

● **Diagonal Connections** Diagonal connections replace a right-angled connector in a cell if there are no other directions for the track to go. Diagonal connections can only be fitted between adjacent sides of the cell as described above. One major advantage in using diagonals is that two tracks can occupy the same cell. This is extremely important when the components are very close together, and a track needs to occupy the same cell as a hole but is not connected to it.

It is possible that the program will not find a route between a given start and end cell. If this is the case, the unfitted line or lines are displayed when all the tracks have been processed. An enhancement to the program would be to try all tracks in all possible combinations totalling the overall length of all tracks. The shortest possible overall track length would be the best solution, but the time taken to process all the combinations would be a problem.

Another solution to the problem of unfitted tracks is to use the other side of the circuit board. This should be straightforward enough to do, as all that is required is a second circuit board with the holes in the same place. When the second side is displayed, all the coordinates in the horizontal direction must be swapped to achieve the correct view.

More useful enhancements might include the ability to edit the circuit on the screen, so that power and ground tracks can be fitted first; or to help the program by removing a track that is in the way of others.

```

PROGRAM Circuit_Board_Track_Designer; ( CIRCUIT2.PAS )
(*tr+)(sc-> ( Leave range checking ON !, and stop 'C's
Computer Aided Circuit Board Design Program - By Mark Needham (June 1987)
Based on Lee's Algorithm
)
CONST
  TitleFileName = 'TITLE.TXT'; ( File name for the title )
  HoleFileName = 'HOLES.TXT'; ( File name for holes )
  TrackFileName = 'LINES.TXT'; ( File name for lines )
  StatStrs : array[0..21] of string[20] = ('FITTED', 'NOT FITTED', 'NOT NEEDED');
  StartLine = 0;
  EndLine = 1;
  DiagNums : array[1..41] of byte = (16,32,64,128);

```


PROGRAM FILE

```

( The direction numbers are numbered 1..4 starting at the top of the cell
and going clockwise. The four directions can be thought of as 4 bits,
one for each direction 1 = 1, 2 = 2, 3 = 4, 4 = 8.
The value 0..15 defines the connections within a cell. For example a value
of 5 (1+4) represents a vertical track, and 10 (2+8) represents a
horizontal track )

( If a connection is made from direction 1 to direction 2, instead of
putting a value of 3 which would be a right-angle, a diagonal track
can be used. The four possible diagonals are numbered 16, 32, 64 and 128.
This also allows two opposite diagonals to occupy the same cell. )

Tracks : array[1..4,1..4] of byte
= ((0,16,5,128),(16,0,32,10),(5,32,0,64),(128,10,64,0));
DoubleTracks : array[1..4,1..4] of byte
= ((0,0,80,0),(0,0,0,160),(80,0,0,0),(0,160,0,0));

TopLine : array[1..4,0..11] of byte
= ((0,0,0,0,0,128,192,96,24,12,3,1), (Definitions for printing )
(0,0,0,0,0,0,0,0,0,0,0,1), ( the circuit board on an )
(1,0,0,0,0,0,0,0,0,0,0,0), ( EPSON type printer. )
(1,3,12,24,96,192,128,0,0,0,0,0));

LowLine : array[1..4,0..11] of byte
= ((0,0,0,0,0,0,0,0,0,0,0,128),
(0,0,0,0,0,1,3,6,24,48,192,128),
(128,192,48,24,6,3,1,0,0,0,0,0),
(128,0,0,0,0,0,0,0,0,0,0,0));

GridDir : array[1..4,1..4] of byte
= ((2,1,0,0),(0,3,2,0),(0,0,4,3),(4,0,0,1));

TrackCol = 2; ( Colour that the tracks/lines are drawn in )
CircleCol = 1; ( Colour that the holes are drawn in )

( EPSON Escape codes )

EscCode = #27; ( Esc code )
NoGap = '1'; ( 7/72 inch Line Spacing )
Init = 'e'; ( Printer Initialisation )

( Convert the diagonal lines back to right-angle values )

DiagonalConvert : array[1..4] of byte = (3,6,12,9);

( Maximum size of circuit board grid )

MaximumCol = 41; ( This creates a grid of size 40 by 40 cells )
MaximumRow = 41; ( The extra cell is included to stop range errors )

ColsPerScreen = 10; ( The number of columns that can be displayed )
RowsPerScreen = 10; ( The number of rows that can be displayed )

( number of bytes required for printing = 12 * (MaximumCol) * (MaximumRow) )

BytesPerLine = 480;

( Maximum number of lines and points. MUST be > MaximumCol * MaximumRow )

MaximumLineStack = 1000;
MaximumPointStack = 1000;

RowDirection : array[1..4] of integer = (-1,0,+1,0);
ColDirection : array[1..4] of integer = (0,+1,0,-1);
TrackDir : array[1..4] of integer = (1,2,4,8);
NewDir : array[1..4] of integer = (3,4,1,2);
Upwards = 1;
Finished = 5;
Diagonals : set of byte = (16,32,64,128);

TYPE
StatType = (Fitted,Unfitted,NotNeeded); ( Line Status )
CellTypes = (Untested,Up,Down,Left,Right,Used); ( Test Cell Status )
GridCol = 0..MaximumCol; ( Column Definitions )
GridRow = 0..MaximumRow; ( Row Definitions )
LineStackSize = 0..MaximumLineStack; ( Max number of lines )
PointStackSize = 0..MaximumPointStack; ( Max number of points )
GridDef = record
Val : byte; ( Track shape in the cell )
Blob : boolean; ( Is there a hole in the cell )
end;

DoublePoints = record
StartRow : GridRow; ( Definition for complete line info )
StartCol : GridCol;
EndRow : GridRow;
EndCol : GridCol;
end;

Points = record
Row : GridRow;
Col : GridCol;
end;

CheckPoint = record
Row : GridRow; ( points to a grid coordinate )
Col : GridCol;
Special : byte; ( Holds flags to prevent tracks going )
( in an illegal direction )
end;

VAR
RealTitleName, RealTrackName, RealHoleName, FileStr,
CircuitTitle, NumStr : string[80];
DisplayCol, TempCol, CurrentCol, ColCount : GridCol;
DisplayRow, TempRow, CurrentRow, RowCount : GridRow;
MultiLinesNum : array[StartLine..EndLine] of LineStackSize;
StartLoop, EndLoop, LineStackPtr, LineStackCounter : LineStackSize;
NextPoint, PointPtr : PointStackSize;
NumberOfTracks, NumberFitted, NumberNotNeeded, NumberNotFitted,
topx, topy, Lines, TempDir, CurrentLength, LastDir, Dir, Loop : integer;
DisplayEachTime, YesOrNo, ProgAbort, ok, found : boolean;
LineFile : text;

```

MICROMART

PUBLIC DOMAIN
SOFTWARE

STREAM-LINE SOFTWARE
P.O. BOX 26
10001 9746 11
FELTHAM - MIDDLESEX
ENGLAND
Tel: 01 753 7406

USER SUPPORTED
SOFTWARE

**SET OF 5 DISCS FOR £20.00 OR
INDIVIDUAL DISCS £4.75 EACH
ALL INCLUDING POSTAGE AND PACKING**

SETS 5 DISC SET	INDIVIDUAL DISKS INCLUDE
PC FILE III (DATABASE)	BOOK INDEX S10026BOOK1
PC CALC SPREADSHEET	TRIVIA (2 DISCS) S10473TRIVU2
PC WRITE (WORDPROCESSOR)	RELIANCE MAIL LIST S10585REML2
BLACKJACK YAHTZEE (GAMES)	DIETERS FRIEND (BAS REQ)
DOS UTILITIES	GOLF SCORECARD S10583GOLF1
ORDER SET NO S102001SETS	JUST A FEW OF ALMOST 600 DISCS

REMEMBER !!!

ABOVE PRICES FOR INDIVIDUAL OR SETS OF
DISCS INCLUDE POSTAGE & PACKING

SEND STAMPED ADDRESSED ENVELOPE (A5)
FOR FREE CATALOG OF DISCS
INDIVIDUAL OR MADE UP SETS

**WE ARE UNABLE TO GUARANTEE
PUBLIC DOMAIN OR USER
SUPPORTED SOFTWARE**

BBD Computer Dust Covers

IN WASHABLE PROOFED NYLON FABRIC
FINISHED WITH TONING PIPING

A SELECTION FROM OUR WIDE RANGE OF COVERS FOR COMPUTERS		
Act Sinus	£5.00	Colour £9.50
Amstrad PC1512 Mono	£9.00	Olivetti M28 £9.50
Colour	£9.00	Tandon PCK £9.50
Apple II XRN 12"	£9.00	PCA £9.50
Compaq Desk pro	£9.00	Victor 9000 £9.00
IBM-PCXT	£9.00	VPC H £9.00
IBM-PCAT	£9.50	Zenith 140/150 £9.00
IBM System 2 Mod. 30	£9.00	Wyse 30, 50, 60 £9.00
Olivetti M-24 Mono	£9.00	Wyse 286 £9.00

CHOOSE FROM OUR COLLECTION OF OVER 200 PRINTER COVERS e.g.		
Amstrad DMP-2000	£5.00	Amstrad DMP-4000 £6.00
Amstrad DMP-3000	£5.00	Apple Imagewriter II £5.00
Brother M1109	£5.00	Brother HR-15 £6.00
Citizen 1200	£5.00	Epson EX-1000 £6.50
Epson EX-800	£5.00	Epson LX-1000 £6.00
Epson LX-80/85/86	£5.00	Julius 6100 £6.00
IBM Proprietary	£5.00	Panasonic KDP-1502 £6.00
Panasonic KX-P1080	£5.00	Star NB 15, NX 15 £6.00

OTHER ITEMS ON ORDER	
The Jumper	£6.95
Mouse Mat	£5.95
IBM to Centronics printer cable	£11.95
Anti-Stat Wipe	£6.50
Anti-Stat Cleaner	£8.50
Strong and well made, of shell and drawer construction. In two tone grey. Two or more sets can be joined together. Please send for leaflet.	
3.25" (56 discs)	£12.95
3.5" (156-100+)	£14.95
Loading Modules	£4.50

BBD DUST COVERS are specialist manufacturers of high quality tailored dust covers. We make a wide range of covers for other Business computers, Printers, Photocopiers etc and we match printer covers to computer covers wherever possible.

Make cheques payable to:
BBD COMPUTER DUST COVERS
The Standish Centre, Cross Street,
Standish, Wigan WNG 0HL.
Tel: (0257) 422668 ext 45 Fax: 0257
422690 Dealer enquiries welcome.

► **PostScript Bureau**
Output to Linotron 300

► **Desktop Publishing**
Reports & Brochures

► **Disc Conversion**
Read/Write 1000 word
processor formats

► **Artwork & Printing**
High Quality Studio
and Printers

SYNTRONIC

83-84 Long Acre, London WC2E 9NG
Tel: 01-240 2093/5475

MICROMART

Quality Disks

High Clip, Lifetime Guarantee, 14 Day Money Back Guarantee, By Top Manufacturers, eg Memorex, Wabash etc.
Prices include VAT & Postage

Unbranded

Qty	10	25	50	100	200
5.25" DS/DD 48ip	5.70	11.00	19.00	34.00	61.00
2.25" DS/DD 96ip	6.10	12.50	20.50	36.00	69.00
5.25" HD 1.6Mb	16.00	36.00	70.00	130.00	250.00
3.5" DS DD 135ip	11.50	28.60	51.90	98.00	189.00
3.5" SS DD 135ip	10.95	25.50	48.90	95.00	185.00

Please call for 200+ Quantity Discounts.

5.25" 10 Disk Plastic Lib. Case £1.50
3.5" 10 Disk Plastic Lib. Case £1.30

All Disks supplied with Labels, 5.25" also have sleeves and write protects.

PRICES INCLUDES VAT & PP (UK)

Unbranded does not always mean poor quality, why not take advantage of our 14 day money back guarantee and try a trial pack of 10 disks.

CREDIT CARDS WELCOME

Tel. 0329 282083 (24 Hours)

Cheques/PO To: Athene Consultants

33 Holly Grove, Fareham Hants. PO16 7UP

LOOK !

PC/XT/Amstrad & compats 30Mb Hard drive	£295
30Mb Kit (incl cont and cables)	£355
40Mb Hard Drive	£525
40Mb Kit (as above)	£585
AT Compats 30Mb Hard Disk Kit	£385
40Mb Hard Disc Kit	£495
80Mb Kit	£899

Complete range of Hard Drive up to 168Mb

Hard Cards 20Mb	£360
30Mb	£385

Complete AT 286 and 386 systems

80286 Base 8MHz 512k 8 slots 1.2Mb Id I/O	
Card	£999

80386 16MHz 512k 8 slots	£1750
--------------------------	-------

Ask for tech specs

Amstrad 640k Upgrade Kit £25.95 inc VAT

These prices are exclusive of VAT unless otherwise marked. P&P Free.

ACD COMPUTER SERVICES

Dept. PCW, Gotham Moor Farm,
Gotham, Nottingham NG11 0LH
Tel: 0602 830884; Telex: 378120

Mr Retailer Retailers Point of Sale System

Now

All the benefits of Point of Sale enjoyed by the Multi Nationals without the prohibitive cost.

Replace your till with a modern computer, as the BIG MONEY EARNERS DO.

all Bookkeeping instantly updated. Immediate access to completely updated Stock records. VAT returns at the press of a key. Even a complete Double entry Balance Sheet available instantly

All this up to date at the moment you press the key to put your money in your up-to-date till.

The Retailers Dream is Now a reality! Mr Retailer is the complete solution to your headaches and at a FRACTION of the cost. The same type of programme is costing the big boys vast sums of money.

Mr Retailer Software System

ONLY £495. Dealers required

Complete Mr Retailer system with High quality Tandon 20 Meg Hard disk computer, printer etc £1700. Electronic cash draw available
All prices plus VAT

Access Computers

Cranbrook Road, Hawkhurst, Kent TN18 4AT

Phone: 05805 3774 or 0622 58356

PROGRAM FILE

```

ch, c, t, chl : char;
TempPoints : Points;
TestGrid : array[GridCol,GridRow] of CellTypes;
MainGrid : array[GridCol,GridRow] of GridDef;
StartCells,EndCells : array[LineStackSize] of Points;
LineStatus : array[LineStackSize] of StatType;
Line# : DoublePoints;
PointStack : array[PointStackSize] of CheckPoint;
MultiLines : array[StartLine..EndLine,LineStackSize] of Points;
StartOrEnd : byte;
PrnPts : array[0..1,1..960] of byte;

(*! graph.p *) (* This is available along with GRAPH.BIN on the TURBO disk *)

FUNCTION YorN : boolean; (* Wait for a 'Y' or a 'N' *)
begin
  repeat
    read(kbd,ch);
    ch := Ucase(ch);
    until ch in ['Y','N'];
    YorN := (ch = 'Y');
  end;
end;

PROCEDURE GetDisplayMode; (* Circuit need not be displayed each time *)
begin
  writeln;
  write('Display Circuit After Each Track (Y/N) ? ');
  DisplayEachTime := YorN;
end;

FUNCTION Diag(n : integer) : integer;
begin
  case n of
    16 : Diag := 1; (* Converts the diagonal type cells to the *)
    32 : Diag := 2; (* range 1..4 *)
    64 : Diag := 3;
    128 : Diag := 4;
  end;
end;

PROCEDURE ClearPrinter; (* Clear the two lines of printer bit values *)
begin
  for loop := 1 to 960 do begin
    PrnPts[0,loop] := 0;
    PrnPts[1,loop] := 0;
  end;
end;

(* For a row of the grid, create two rows of bit values for the printer *)

PROCEDURE FillPrinterLines(Row : GridRow);
var
  offset : integer;

PROCEDURE AddDiagonal(n : integer);
begin
  for loop := 0 to 11 do begin
    PrnPts[0,offset+loop] := PrnPts[0,offset+loop] or TopLine[n,loop];
    PrnPts[1,offset+loop] := PrnPts[1,offset+loop] or LowLine[n,loop];
  end;
end;

begin
  for ColCount := 1 to pred(MaximumCol) do
    with MainGrid[ColCount,Row] do begin
      offset := pred(ColCount) * 12 + 1;
      if (Val and 15) <> 0 then begin (* 1..15 means NO diagonal connectors *)
        if (Val and 1) = 1 then begin
          PrnPts[0,offset+5] := 255;
          PrnPts[0,offset+6] := 255; (* Draws the northerly connector *)
          PrnPts[1,offset+5] := 128;
          PrnPts[1,offset+6] := 128;
        end;
        if (Val and 2) = 2 then begin (* Draws the easterly connector *)
          for loop := 5 to 11 do begin
            PrnPts[0,offset+loop] := PrnPts[0,offset+loop] or 1;
            PrnPts[1,offset+loop] := PrnPts[1,offset+loop] or 128;
          end;
        end;
        if (Val and 4) = 4 then begin (* Draws the southerly connector *)
          PrnPts[0,offset+5] := PrnPts[0,offset+5] or 1;
          PrnPts[0,offset+6] := PrnPts[0,offset+5] or 1;
          PrnPts[1,offset+5] := 255;
          PrnPts[1,offset+6] := 255;
        end;
        if (Val and 8) = 8 then begin (* Draws the westerly connector *)
          for loop := 0 to 6 do begin
            PrnPts[0,offset+loop] := PrnPts[0,offset+loop] or 1;
            PrnPts[1,offset+loop] := PrnPts[1,offset+loop] or 128;
          end;
        end;
        if (Val and 240) <> 0 then begin (* a diagonal line or lines *)
          if (Val and 16) = 16 then AddDiagonal(1);
          if (Val and 32) = 32 then AddDiagonal(2);
          if (Val and 64) = 64 then AddDiagonal(3);
          if (Val and 128) = 128 then AddDiagonal(4);
        end;
        if Blob then
          for loop := 4 to 7 do begin
            PrnPts[0,offset+loop] := PrnPts[0,offset+loop] or 7;
            PrnPts[1,offset+loop] := PrnPts[1,offset+loop] or 224;
          end;
        end;
      end;
    end;
  end;

  (* Send the two bit value lines to the printer (Uses EPSON ESC L code) *)

PROCEDURE PrintLines(Row : GridRow);
begin
  for lines := 0 to 1 do begin
    if lines = 0 then write(1st,Row;2;chr(32))
    else

```


PROGRAM FILE

MICROMART

ACE

AVON COMPUTER EXCHANGE

HOME COMPUTERS

All prices include VAT

AMSTRAD

CPC 6128 with £150 free software and Joystick

MONO MONITOR.....	£279
COLOUR MONITOR.....	£379
PCW 8256	£344
PCW 8512	£458
PCW 9512 (Daisywheel)	£574
DMP 3160 (Printer)	£179
DMP 4000	£299
DMP 2000	£159

COMMODORE

CB64 with Data Recorder Joystick and 10 free software	£159
1541c DISK DRIVE	£159
AMIGA 500	£474
AMIGA 1000 with colour monitor	£920
AMIGA 2000 with colour monitor	£1150

ACORN

BBC B	£249
BBC B Master S/4	£429
ACORN Electronic	£59
NEW ARCHIMEDES 310 Colour	£999

ATARI

520 ST FM including 10 free software	£289
--	------

BUSINESS COMPUTERS

excluding VAT

All range of Opus machines in stock.

FAST micro 30Mb H/D XT	£799
FAST AT compatible 6-8-12 switchable	£1295
40Mb Tape Streamer	£449
A full range of accessories on XT and AT at the most competitive prices.	
EGA MONITOR plus CARD	£399
EPOS SYSTEMS	from £599!!
NETWORK 2 COMPUTERS	from £399
TAPE STREAMER 40Mb	£449

BRISTOL

42, Cannon Street, Bedminster
Bristol BS3 1BN
Telephone: 0272 637981

BRISTOL

126, Church Road, Redfield
Bristol B55
Telephone: 0272 542116

CARDIFF

87 City Road, Cardiff
Telephone: 0222 483069

SWINDON

31A Faringdon Rd
Swindon SN1 5AR
Telephone: 0793 512074

```

write(1st,chr(32),chr(32),chr(32));
write(1st,EscCode + 'L' + chr(BytesPerLine mod 256) +
chr(BytesPerLine div 256));
for loop := 1 to BytesPerLine do write(1st,chr(PnPts[lines,loop]));
writeln(1st);
end;
end;

PROCEDURE TopScale(x : integer); ( Draw the top scale on the print out )
var c : integer;
begin
write(1st,chr(32)+chr(32)+chr(32)); ( to skip the row count )
c := 1; ch := chr(32);
for loop := 1 to pred(MaximumCol) do begin
if (loop mod x) = 0 then begin
ch := chr(c+48);
end
end;

PROCEDURE ClearTestGrid; ( Completely clear the Test Grid )
begin
for ColCount := 1 to pred(MaximumCol) do
for RowCount := 1 to pred(MaximumRow) do
TestGrid[ColCount,RowCount] := UnTested
end;

PROCEDURE InitTestGrid; ( Clear the Test Grid array )
begin
for ColCount := 1 to pred(MaximumCol) do
for RowCount := 1 to pred(MaximumRow) do
with MainGrid[ColCount,RowCount] do
if (Val = 0) or (Val > 15) or Blob then
TestGrid[ColCount,RowCount] := UnTested
else TestGrid[ColCount,RowCount] := Used
end;

PROCEDURE InitMainGrid; ( Clear the main grid )
begin
for ColCount := 1 to pred(MaximumCol) do
for RowCount := 1 to pred(MaximumRow) do begin
MainGrid[ColCount,RowCount].Val := 0;
MainGrid[ColCount,RowCount].Blob := false
end;

PROCEDURE InitPointStack; ( Clear the Point Stack )
begin
for PointPtr := 1 to MaximumPointStack do with PointStack[PointPtr] do begin
Row := 0;
Col := 0;
Special := 0
end
end;

( Get a single number from the hole or line file )

FUNCTION GetNumber : integer;
var Value,error : integer;
begin
NumStr := '';
while (FileStr <> '') and NOT (FileStr[1] in ['0'..'9']) do
delete(FileStr,1,1);
while (FileStr <> '') and (FileStr[1] in ['0'..'9']) do begin
NumStr := NumStr + FileStr[1];
delete(FileStr,1,1);
end;
Val(NumStr,Value,error);
GetNumber := Value;
end;

( Read the Optional Circuit Title from file )

PROCEDURE ReadCircuitTitle; ( Read the circuit title from file )
begin
write('Enter The Circuit Title File Name (',TitleFileName,') : ');
RealTitleName := '';
readln(RealTitleName);
if RealTitleName = '' then RealTitleName := TitleFileName;
write('READING TITLE : ',RealTitleName);
assign(LineFile,RealTitleName);
{#}- reset(LineFile); {#+}
if IOResult = 0 then begin
write(1st,ch);
c := succ(c);
if c > 9 then c := 0 ( loop back from 9 to 0 )
end
else write(1st,ch)
end;
writeln(1st)
end;

( Are there any components on the current row to print ? )

FUNCTION AnythingToPrint(Row : GridRow) : boolean;
begin
ok := false;
for ColCount := 1 to pred(MaximumCol) do
with MainGrid[ColCount,Row] do if (Val <> 0) or Blob then ok := true;
AnythingToPrint := ok
end;

( Print the circuit )

PROCEDURE Print;
begin
if CircuitTitle <> '' then begin
writeln(1st,'Title : ',CircuitTitle);
writeln(1st);
end;
TopScale(10); ( Draw the 10's row of the scale )
TopScale(1); ( Draw the 1's row of the scale )
write(1st,EscCode + NoGap); ( Put the printer into No gap mode )

```


MICROMART

ALL TYPES OF BUSINESS COMPUTERS AND PERIPHERALS

from micros to mainframes

Bought, sold and exchanged.

For fast efficient service

Call Phil Rose or Grant
Penaluna on
(0606) 871895. Telex: 946 240

Quoting 1902 5795

Fax: 0606 871837

**DELOSTAR
ELECTRONICS LTD**

Delostar House, Barnton,
Cheshire CW8 4JS

NEW AND USED EQUIPMENT BARGAINS (Used unless stated otherwise)

Dec Vax, Unibus and Qbus - Systems and Options	Call
Dec Peripherals and Terminals - VT100, LA120 etc	Call
Dec Rainbow 3, Pcs, Decmail	Call
Tektronix 4010, 4014, 4021, 4114, 4631, 4662, 4824, 4951	Call
Emulex SC03, SC21, PE02, UC03	Call
Java Dynamics SuperNet System 3FNO	£300
Superbrain SD 00, JR - 1.6 M, also Computer	Call
Apple IIe with 512Kb RAM, 20Mb Winchester	1,000.00
Logica VTS 2201 CPU Box (No VDU or Printer)	300.00
Televideo TS906-02 Multi-user CP/M System	500.00
Rumhouse RS501 Twin Bin Sheet Feed	100.00
Drum Tractor Hot 150, 160, 1650, 1945 ends	75.00
Duolite 525, 630, 1045A, 1041, 1650 Printers	Call
Pac 1 C7500 Serial and Parallel Printer	900.00
Deposuit QS180 Printer	500.00
Disk DU130, DU202, DU202A, DU202, 0715, D0604	Call
Intel SBC 304 128K Memory expansion	NEW 150.00
Intel Various Modules, System Buses, etc	Call
Xylogics 570, 675 and Wizard Controllers	Call
IBM 8080 So 4 bit 1800 Serial Tape Interface	300.00
Tandberg TDC3000 Cartridge Tape Drive	250.00
Dig Data 7129, 1749 Magnetic Tape Drives	Call
Teleplex 6 Series Concentrator	200.00
Televideo VDU's Model No's 925-950-970	Call
S.E.E. 13008 Unibus Int. (Cambridge Ring)	250.00
Microbar DB288K Multibus 86000 Single Card	350.00
Archiver 35021 Cartridge Tape Drive	NEW 350.00
Matrox RMB 1030, VDM1000 Multibus RGB Colour	300.00
SCM Multibus Ethernet Controller	NEW 350.00
Daude Lyons LV250 Line Voltage Conditioner	300.00
Farnell GE-40A Power Supply (5V - 40A)	NEW 100.00
Lambda LO25-0DR100X-152 Power Supply	NEW 60.00
Minuteman D3515 15 Colour Monitor	NEW 250.00
Summagraphics Bit Pad One - IEEE Int	NEW 200.00
Microbus 80016 Colour VDU	350.00
CDP 804 B1A Double Sided DFD Floppy drive	100.00
Ralph 2.50 500 781 Serial Keyboard	NEW 50.00
Dataproducs 2230 3004 PPM Drum Printer	300.00



ASHLING UK
Equipment bought and sold
Call Tom Tobin on 0788 70618

QUALITY COMPUTER SYSTEMS

Analysis of your Requirements
System Recommendations
Hardware & Software Supply
Full Telephone Support

Many popular computers and software packages available
Professional programming service for specialist applications
On-site training available in South West

Dart Computing

The Personal Computer Service

Crofters, 20b Wallaford Road,
BUCKFASTLEIGH

Devon, TQ11 0AR. Tel 0364 43428

PROGRAM FILE

```

for RowCount := 1 to pred(MaximumRow) do begin
  ClearPrinter;
  if AnythingToPrint(RowCount) then begin      ( If there is something to )
    FillPrinterLines(RowCount);                ( print, determine what to )
    PrintLines(RowCount);                       ( print and print it )
  end
  else write(1st, RowCount, 2, chr(10)+chr(10)); ( else just line feed )
end;
write(1st, #12 + EscCode + Init);              ( Form Feed and Reset the printer )
end;

PROCEDURE MainScreen; ( Display the outline of the main screen )
begin
  TextMode(BW80);
  with Line do begin
    TextBackground(Blue);
    TextColor(Yellow);
    ClrScr;
    gotoxy(2,2); write('Computer Aided Circuit Board Designer. ');
    gotoxy(50,2); write('Press any key to QUIT');
    gotoxy(2,4); TextColor(White);
    write('Current Line : From Column = ', StartCol, ' Row = ', StartRow, 3);
    gotoxy(2,5);
    write('          To Column = ', EndCol, ' Row = ', EndRow, 3);
    gotoxy(2,7);
    write('Checking Line: From Column = ', 0, 3, ' Row = ', 0, 3, ' ');
    gotoxy(2,8);
    write('          To Column = ', 0, 3, ' Row = ', 0, 3, ' ');
    gotoxy(2,10); write('Best Length : ', 0, 3);
    gotoxy(2,12); write('Number of Tracks in total : ', 0, 3);
    gotoxy(2,14); write('Number fitted : ', 0, 3);
    gotoxy(2,16); write('Number not needed : ', 0, 3);
    gotoxy(2,18); write('Number not fitted : ', 0, 3);
    readln(LineFile, CircuitTitle);
    close(LineFile);
  end
  else begin
    write(07, ' - File Not Found');
    delay(1000);
  end;
  writeln;
end;

```

(The holes file holds the coordinates of all the holes on the board.
The column first followed by the Row.

E.g. for two holes at 5,10 and 5,12 create file HOLES.TXT with :-

5,10
5,12

```

PROCEDURE ReadHoleInfo; ( Read in from file where all the holes are )
begin
  write('Enter The Hole Information File Name (', HoleFileName, ') : ');
  RealHoleName := '';
  readln(RealHoleName);
  if RealHoleName = '' then RealHoleName := HoleFileName;
  write('READING HOLES : ', RealHoleName);
  assign(LineFile, RealHoleName);
  (si-) reset(LineFile); (si+)
  if IOResult = 0 then begin
    while not(eof(LineFile)) do begin
      readln(LineFile, FileStr); ( Read a line )
      TempCol := GetNumber;      ( Get the column first )
      TempRow := GetNumber;      ( then the row )
      MainGrid[TempCol, TempRow].Blob := true
    end;
    close(LineFile);
  end
  else begin
    write(07, ' - File Not Found');
    delay(1000);
  end;
  writeln;
end;

```

(The lines file holds the coordinates of all the lines on the board.
The Start column first followed by the Start Row, then the End Column
and Row.

E.g. for a line from 5,10 to 5,12 create file LINES.TXT with :-

5,10,5,12

```

PROCEDURE ReadLineInfo; ( Read in from file all required connections )
begin
  write('Enter The Track Information File Name (', TrackFileName, ') : ');
  RealTrackName := '';
  readln(RealTrackName);
  if RealTrackName = '' then RealTrackName := TrackFileName;
  write('READING TRACKS : ', RealTrackName);
  assign(LineFile, RealTrackName);
  (si-) reset(LineFile); (si+)
  if IOResult = 0 then begin
    LineStackCounter := 0;
    while not(eof(LineFile)) do begin
      LineStackCounter := succ(LineStackCounter);
      readln(LineFile, FileStr);
      StartCells[LineStackCounter].Col := GetNumber;
      StartCells[LineStackCounter].Row := GetNumber;
      EndCells[LineStackCounter].Col := GetNumber;
      EndCells[LineStackCounter].Row := GetNumber;
      LineStatus[LineStackCounter] := UnFitted;
    end;
    close(LineFile);
  end
  else begin

```


PROGRAM FILE

```

write(#7, ' - File Not Found');
delay(1000);
end;
NumberOfTracks := LineStackCounter;
writeln;
end;

( Depending on the direction of the new connection, the diagonal cells
can be added to so that two parallel connections occupy the same cell.
This causes alot of complications !! )

FUNCTION CheckDouble(Val : byte; Dir : integer) : boolean;
begin
  case Val of
    16 : CheckDouble := (Dir in [1,2]);
    32 : CheckDouble := (Dir in [3,2]);
    64 : CheckDouble := (Dir in [3,4]);
    128 : CheckDouble := (Dir in [1,4]);
  end;
end;

( Recursive routine to find all the points that are connected together
by tracks and to store them on a stack. Diagonal sections are not
stored. )

PROCEDURE StoreDir(Col : GridCol; Row : GridRow; LastDir : integer);
var
  Temp, CheckVal, Dir, GridVal : integer;
  NewCol : GridCol;
  NewRow : GridRow;
begin
  GridVal := MainGrid[Col,Row].Val;
  Temp := 0;
  if LastDir <> 0 then begin
    if (GridVal and 16) = 16 then Temp := GridDir[1,LastDir];
    if (Temp = 0) and ((GridVal and 32) = 32) then
      Temp := GridDir[2,LastDir];
    if (Temp = 0) and ((GridVal and 64) = 64) then
      Temp := GridDir[3,LastDir];
    if (Temp = 0) and ((GridVal and 128) = 128) then
      Temp := GridDir[4,LastDir];
    end;
  if Temp <> 0 then begin
    NewCol := Col + ColDirection[Temp];
    NewRow := Row + RowDirection[Temp];
    if TestGrid(NewCol,NewRow) <> Used then
      StoreDir(NewCol,NewRow,NewDir[Temp]);
    end
  else begin
    TestGrid[Col,Row] := Used;
    MultiLinesNum[StartOrEnd] := succ(MultiLinesNum[StartOrEnd]);
    MultiLinesStartOrEnd[MultiLinesNum[StartOrEnd]].Col := Col;
    MultiLinesStartOrEnd[MultiLinesNum[StartOrEnd]].Row := Row;
    ( Check all directions for tracks from the current cell, but not
    in the direction just arrived from. )

    for Dir := 1 to 4 do begin
      CheckVal := 1 shl pred(Dir);
      if (GridVal and CheckVal = CheckVal) and (Dir <> LastDir) then begin
        NewCol := Col + ColDirection[Dir];
        NewRow := Row + RowDirection[Dir];
        if TestGrid(NewCol,NewRow) <> Used then
          StoreDir(NewCol,NewRow,NewDir[Dir]);
        end;
      end;
    end;
  end;
end;

( Find all points on the grid connected to CellInfo by a connection.
StartOrEnd is set depending on which end of the connection is being
looked at )

PROCEDURE FindAllPoints(CellInfo : Points);
begin
  ClearTestGrid;
  MultiLinesNum[StartOrEnd] := 0; ( the number of points found )
  StoreDir(CellInfo.Col,CellInfo.Row,0);
end;

( Flag a cell to stop direction in a certain direction. This is used for
cells with holes or diagonals )

PROCEDURE Flag(dir : integer);
begin
  PointStack[NextPoint].Special :=
  PointStack[NextPoint].Special or DiagNums[dir];
end;

( Look at the cell from the current cell in direction Dir to see if it
the target cell or a cell that can be moved on to. )

FUNCTION CheckDirection(dir : integer) : boolean;
begin
  CurrentRow := PointStack[PointPtr].Row + RowDirection[Dir];
  CurrentCol := PointStack[PointPtr].Col + ColDirection[Dir];
  with Line do
    if (PointStack[PointPtr].Special and DiagNums[dir] = 0) and
    (CurrentRow = EndRow) and (CurrentCol = EndCol) then
      CheckDirection := true
    else begin
      if (CurrentRow > 0) and (CurrentRow < MaximumRow) and
      (CurrentCol > 0) and (CurrentCol < MaximumCol) and
      (PointStack[PointPtr].Special and DiagNums[dir] = 0) and
      (TestGrid[CurrentCol,CurrentRow] = Untested) then begin
        ok := false;
        if (MainGrid[CurrentCol,CurrentRow].Val = 0) then begin
          ok := true;
        end;
      end;
    end;
  end;

  ( Check for the single diagonal lines and check that a double
  diagonal cell can be used )

```

MICROMART

Liberate your Printer!



DATABOOST P

- ★ End Parallel printer cable length problems with Databoost P. Parallel Line Driver
- ★ Plugs directly into your computer and printer
- ★ Drives up to 1km of twin twisted-pair cable
- ★ Complete kit with 50ft snap-in cable, power packs and twisted-pair cable adaptors
- ★ £139 (p&p £5) plus VAT

Phone or write for further details:

R-TEK RESEARCH LTD

Unit 5, Greenwood Court, Ramridge Road
Luton LU2 0TN

Tel: (0582) 23912 Telex: 825194

Laser Cartridge Recharge Kits

Buying expensive laser cartridges is now a thing of the past with the Innovation Laser recharge kit. This kit enables a conventional EP toner cartridge (as in Hewlett Packard LaserJet), to be recharged in around 15 mins.

The kit, enough for two recharges costs £99 + VAT + £2.00 delivery. It contains an instruction manual, 2 x 250 gram toner recharges (250 gram per recharge), felt pads for the fusion roller and a special tool to disassemble the toner cartridge.

Additional 250g toner cartridges (enough for one recharge) are £18 + VAT + £2.00 delivery.

Innovation Computers Ltd.,
39 Charing Cross Road, London WC2H 0AR.
Telephone: 01-434 1533. Fax: 01-734 4874

Sound Creation

29 Kingscote Road, London W4 5JL

Tel: 0836 202412

01-994 6138 (24 hrs)

Hardware and Software for the Macintosh

Opcode Sequencer 2.5	£200.00
Studio Plus 2 Interface	£235.00
Intelligent Music 'M'	£95.00
Jam Factory	£90
NEW! Upbeat	£105.00
Electronic Arts DMCS 2.0	£150.00

Also in stock

Digidesign Sound Designer for Prophet,
S900, Emax, DSS-1, S-50, Mirage.

Softsynth 2.0 Midipaint

Opcode Editor/Librarians

Passport Mastertracks Pro

Other items of Mac hardware + software
available at discount prices

Europe's only Specialist Mac Music Dealer

Demonstration area available

Write or call for details

Prices include VAT Mail Order Only

PROGRAM FILE

PANTHER SOFTWARE MAIL ORDER PRICE LIST

[illegible]

Send SAE for full price list among computers. Software also available for MSX, SINCLAIR QL, BBC ELECTRONIC ORG C16 PLUS 4, GEMINI 28. Note (charges & P.O. payable to 'PANTHER SOFTWARE', Dept PCW, 2 Riverway Gardens, The Meadows, Netherfield, Notts NG22 3U).

TECH SUPPLIES

Ex-stock electronic components, over 1,000 stock lines. Computers, peripherals, word processors, test equipment and office equipment.

NO ORDER TOO SMALL
NO ORDER TOO LARGE

**19i Winchester Avenue,
Denny, Stirlingshire FK6 6QE
Tel: 0324 825627**

Open 7 days, 9am-4pm, 7.30pm-10.30pm

{426}



DISKETTE TAPE CONVERSION

Tape-Diskette-Tape Diskette-Diskette

Specialised conversions for Typesetters

Incompatibility need not be a problem

**and for an efficient and reliable
service at competitive rates call:**

Ken Evison on Dorking (0306) 76694

KENNETH C. EVISON

154 South Street

Dorking, Surrey RH2 2ET

```

if (MainGrid[CurrentCol,CurrentRow].Val in Diagonals) then begin
  ok := CheckDouble(MainGrid[CurrentCol,CurrentRow].Val,Dir);
  if ok then begin
    Flag(Dir);
  end;
end;

```

```
( Stop tracks going in a illegal direction from the newly
  created coordinate )
```

```

case dir of
1 : case MainGrid[CurrentCol,CurrentRow].Val of
    16 : Flag(2);
    128 : Flag(4);
    end;
2 : case MainGrid[CurrentCol,CurrentRow].Val of
    16 : Flag(1);
    32 : Flag(3);
    end;
3 : case MainGrid[CurrentCol,CurrentRow].Val of
    32 : Flag(2);
    64 : Flag(4);
    end;
4 : case MainGrid[CurrentCol,CurrentRow].Val of
    64 : Flag(3);
    128 : Flag(1);
    end;

```

end:

(Check for a blob and a diagonal connector)

```
if (MainGrid[CurrentCol,CurrentRow].Blob) then begin
  ok := false;
  if (MainGrid[CurrentCol,CurrentRow].Val = 1) and
    (Dir in [1,2,4]) then begin
    Flag(1):= Flag(Dir); ok := true
```

```

end;
if (MainGrid[CurrentCol,CurrentRow].Val = 2) and
  (Dir in [1,2,3]) then begin
  Flag(2); Flag(Dir); ok := true
end;
if (MainGrid[CurrentCol,CurrentRow].Val = 4) and
  (Dir in [2,3,4]) then begin
  Flag(3); Flag(Dir); ok := true
end;
if (MainGrid[CurrentCol,CurrentRow].Val = 8) and
  (Dir in [1,3,4]) then begin
  Flag(4); Flag(Dir); ok := true
end;
end;
end;

```

```
( if the cell can be used save the new cell on the stack )
```

```

if ok then begin
  TestGrid[CurrentCol,CurrentRow] := CellTypes[NewDir[Dir]];
  with PointStack[NextPoint] do begin
    Row := CurrentRow;
    Col := CurrentCol;
    NextPoint := succ(NextPoint);
  end
end
else TestGrid[CurrentCol,CurrentRow] := Used;
nd;
checkDirection := false      ( no way this cell can be used )

```

```
end;
```

(Once the best fit has been found, the connector can be placed between the start and end cells)

```
PROCEDURE PutInConductor;
begin
```

```
CurrentRow := PointStack(PointPtr).Row;
CurrentCol := PointStack(PointPtr).Col;
with Line do begin
```

(add from centre of target to edge nearest the next cell)

```
with MainGrid[EndCol,EndRow] do begin
  if Val in Diagonals then Val := DiagonalConvert[Diag(Val)];
  Val := Val or TrackDir(NewDir[Dir]);
end;
LastDir := Dir;
```

< from edge to centre of current cell >

```

if (CurrentRow <> StartRow) or (CurrentCol <> StartCol) then begin
  Dir := ord(TestGrid[CurrentCol,CurrentRow]);
  with MainGrid[CurrentCol,CurrentRow] do begin
    Val := Val or Tracks[LastDir,Dir];
  end;
  LastDir := NewDir[Dir];
end
else begin
  with MainGrid[CurrentCol,CurrentRow] do begin
    if Val in Diagonals then Val := DiagonalConvert[Diag(Val)];
    Val := Val or TrackDir[LastDir];
  end
end;
end;

```

```
while (CurrentRow <> StartRow) or (CurrentCol <> StartCol) do begin
```

(Add track from centre of hose cell to edge of next cell)

```
TempRow := CurrentRow + RowDir * (ord(TestGrid[CurrentCol, CurrentRow]));
TempCol := CurrentCol + ColDir * (ord(TestGrid[CurrentCol, CurrentRow]));
CurrentRow := TempRow;
CurrentCol := TempCol;
Dir := ord(TestGrid[CurrentCol, CurrentRow]);
if (CurrentRow < StartRow) or (CurrentCol < StartCol) then b
```


PROGRAM FILE

```

with MainGrid[CurrentCol,CurrentRow] do
  if Val = 0 then Val := Tracks[LastDir,Dir]
  else begin
    if NOT (Val in Diagonals) then Val := Val or Tracks[LastDir,Dir]
    else
      Val := DoubleTracks(Diag(Val),Diag(Tracks[LastDir,Dir]));
    end;
    LastDir := NewDir[Dir];
  end
  else begin
    with MainGrid[CurrentCol,CurrentRow] do begin
      if Val in Diagonals then Val := DiagonalConvert(Diag(Val));
      Val := Val or TrackDir[LastDir];
    end;
  end;
end;
end; ( while )
end;

( Get the length of the best track between current start and end cells )
FUNCTION CalcLength : integer;
var
  Length : integer;
begin
  CurrentRow := PointStack[PointPtr].Row;
  CurrentCol := PointStack[PointPtr].Col;
  Length := 2;
  with Line do begin
    Dir := ord(TestGrid[CurrentCol,CurrentRow]);
    LastDir := NewDir[Dir];
    while (CurrentRow <> StartRow) or (CurrentCol <> StartCol) do begin
      Length := succ(Length);
      TempRow := CurrentRow +
        RowDirection(ord(TestGrid[CurrentCol,CurrentRow]));
      TempCol := CurrentCol +
        ColDirection(ord(TestGrid[CurrentCol,CurrentRow]));
      CurrentRow := TempRow;
      CurrentCol := TempCol;
      Dir := ord(TestGrid[CurrentCol,CurrentRow]);
      if (CurrentRow <> StartRow) or (CurrentCol <> StartCol) then
        LastDir := NewDir[Dir];
    end;
  end;
  CalcLength := Length;
end;

( Display a cell on the screen. This uses medium resolution. 320x200 )
PROCEDURE DisplayTrack(Track : byte; x : GridCol; y : GridRow);
begin
  case Track of
    1 : Draw(topx+8,topy,topx+8,topy+8,TrackCol);
    2 : Draw(topx+8,topy+8,topx+15,topy+8,TrackCol);
    3 : begin
        Draw(topx+8,topy,topx+8,topy+8,TrackCol);
        Draw(topx+8,topy+8,topx+15,topy+8,TrackCol);
      end;
    4 : Draw(topx+8,topy+8,topx+8,topy+15,TrackCol);
    5 : Draw(topx+8,topy,topx+8,topy+15,TrackCol);
    6 : begin
        Draw(topx+8,topy+8,topx+15,topy+8,TrackCol);
        Draw(topx+8,topy+8,topx+8,topy+15,TrackCol);
      end;
    7 : begin
        Draw(topx+8,topy,topx+8,topy+15,TrackCol);
        Draw(topx+8,topy+8,topx+15,topy+8,TrackCol);
      end;
    8 : Draw(topx,topy+8,topx+8,topy+8,TrackCol);
    9 : begin
        Draw(topx,topy+8,topx+8,topy+8,TrackCol);
        Draw(topx+8,topy,topx+8,topy+8,TrackCol);
      end;
    10 : Draw(topx,topy+8,topx+15,topy+8,TrackCol);
    11 : begin
        Draw(topx+8,topy,topx+8,topy+8,TrackCol);
        Draw(topx,topy+8,topx+15,topy+8,TrackCol);
      end;
    12 : begin
        Draw(topx,topy+8,topx+8,topy+8,TrackCol);
        Draw(topx+8,topy+8,topx+8,topy+15,TrackCol);
      end;
    13 : begin
        Draw(topx+8,topy,topx+8,topy+15,TrackCol);
        Draw(topx,topy+8,topx+8,topy+8,TrackCol);
      end;
    14 : begin
        Draw(topx,topy+8,topx+15,topy+8,TrackCol);
        Draw(topx+8,topy+8,topx+8,topy+15,TrackCol);
      end;
    15 : begin
        Draw(topx,topy+8,topx+15,topy+8,TrackCol);
        Draw(topx+8,topy,topx+8,topy+15,TrackCol);
      end;
  end;
end;

PROCEDURE AddOne(Var x : char); ( Loop counter from '9' back to '0' )
begin
  x := succ(x);
  if x > '9' then x := '0';
end;

( Draw the complete circuit with Startx and Starty the top left hand corner )
PROCEDURE DisplayCircuit(Var Startx : GridCol; Var Starty : GridRow);
begin
  repeat
    Palette(2); ( Light Green Red and Yellow )
    GraphBackGround(8); ( Dark Grey )
    GraphColorMode;
  until

```

MICROMART

MicroCom Systems OUTSTANDING SOFTWARE For IBM PC's and Compatibles

£350 PER
DISK

SMALL QUANTITIES

£300 PER
DISK

FOR TEN OR MORE

£1 OFF 5 DISKS OR MORE WITH THIS COUPON

- ☐ BUSINESS 1—EZ-Forms business form generation, completion and printing program.
- ☐ CAD 1—Altamira, a 4 color object oriented drawing program. Color required.
- ☒ COMM 4a,b,c,d,e—(5 disks) RBBS Bulletin Board System 14.1D.
- ☒ DATABASE 1a,b—(2 disks) File Express menu driven general purpose database mgr.
- ☐ EDUCATION 1—Interactive DOS tutorial for new PC users. Makes learning DOS painless.
- ☐ GAMES 1—3-D PacMan, Kong, SpaceWar, JanitJoe, and more. Color required.
- ☐ GAMES 2—Qubert, Pango, Centipede, Monopoly, Zorro, and more. Color required.
- ☐ GAMES 3—Blackjack (you set rules), Arm Chair QB, and Empire (War Game).
- ☐ GAMES 4—Castle, StarTrek, and the original Colossal Caves Adventure.
- ☐ GAMES 5—The Hack adventure game from the universities. Like Rogue, only more complex.
- ☐ GAMES 6—Pinball, Othello, Dragons, Sopwith (fly one), and more. Color required.
- ☒ INFO 1a,b—(2 disks) Cooking recipes database with keyword/ingredient retrieval.
- ☐ LANGUAGE 5—Turbo Pascal interactive debugger, pop-up help, formatters, et cetera.
- ☐ LANGUAGE 7—Complete Pascal interpreter/compiler. Great for learning Pascal!
- ☐ ORGANIZER 1—DeskMate, a Sidekick clone, and the Judy calendar program.
- ☐ PINUP 2—Provocative high res digitized graphics pinups. Graphics required.
- ☐ PRINTER 1—Font and sideways utilities, spoolers, banner makers, and more.
- ☐ UTILITIES 1—A collection of invaluable general purpose DOS utilities. A must!
- ☐ UTILITIES 2—More invaluable DOS utilities. Too many to list here!
- ☐ UTILITIES 3—A comprehensive set of debugging and diagnostic utilities.

NEW RELEASES/UPDATES

- ☒ CAD 2a,b—(2 disks) An advanced 2D/3D drafting prog. 640k and color required.
- ☒ COMM 1a,b—(2 disks) Version 2.4 of the ever-popular Qmodem comm. program.
- ☒ COMM 2a,b—(2 disks) Procomm 2.42, an excellent modem program with terminal emulation.
- ☐ EDUCATION 2—Learn the Presidents, States (and capitals) and more. Color required.
- ☐ EDUCATION 5—Learn Origami, the Japanese art of paper folding. Color required.
- ☒ FINANCES 3a,b—(2 disks) Express Calc 3.12, a powerful spreadsheet program.
- ☐ GAMES 8—Striker helicopter attack. and Risk, world domination. Color required.
- ☐ GAMES 9—EGARisk, the game of world domination in very high resolution. EGA required.
- ☐ GAMES 10—Solitaire, Teed-Off golfing, and Sailing in the Bermuda triangle. Color required.
- ☐ GAMES 12—MyChess (9 levels), Backgammon, and Wheel of Fortune. Color not required.
- ☐ GRAPHICS 1—Record and play back screen images! Excellent for demo, etc. Color required.
- ☒ INFO 2a,b—(2 disks) Zip-Phone, national areacode/ prefix to zip-code cross reference.
- ☒ LANGUAGE 3a,b—(2 disks) The A86 2.18 macro assembler and debugger.
- ☐ SHELL 4—Automenu and HDM II 4.04 hard disk menus. Create custom full-screen menus.
- ☐ UTILITIES 5—Utilities for formatting, parking, and optimizing hard disk drives.
- ☐ UTILITIES 6—Advanced utilities including Dpath, Esc, Hotdos, Resident program utilities.
- ☐ UTILITIES 7—More Advanced utilities including MasterKey (undeletes files from hard disks).
- ☒ WORD 1a,b—(2 disks) PC Write 2.7, a powerful word processing system, w/spell checker.

Catalog available, add £2.35 format add £1/disk.

MicroCom Systems Cost of Items _____
P.O. Box 51657 Ship/Handling £5
Palo Alto, CA 94303

U.S.A. Total Enclosed _____
Phone Orders
0101-(415) 325-6500

SALT DISK COMPANY
PO BOX 345
40 Greenhill Main Rd,
Sheffield S8 7QX
Telephone: 0742 377744

GOLD STAR DISKS

Main Distributor

All disks bulk or boxed, lifetime guarantee
 Individually certified 100% error free at all levels
 Equal to all above ANSI, DIN, ECMA, ISO and JIS standards
 Engineered to the highest possible quality for the maximum in long archival life, accuracy, data integrity and reliability
 Average dipping factor of over 80%
 Dealers wanted, Phone for quote:
Telephone: 0742 3777

DIARY

prints your diary with appointments, comments etc in size and format identical to that used in business diaries like FILOFAX and PERSONAL ORGANISER. 2 pages per week, up to 11 appointments per day, on STANDARD LISTING paper with sprocket holes.

You make a simple list of appointments using Wordstar, WordPerfect, Side-Kick or similar. DIARY does the rest. List of appointments does not have to be in chronological order. You just add new appointments to end of list. Very simple to use, very professional results.

Requires IBM PC/XT or compatible (including AMSTRAD PC 1512) running MS/DOS/PC-DOS and EPSON or compatible printer.
 Price: £15 incl postage (no VAT).

Dr A: Graff
 The Village, Barkingside, Essex.
 Telephone: 01-550 3462 (evenings)

DEVANAGARI

On IBM PC's and Compatibles

They are the cheapest, easiest and most beautiful way to word process India's manuscript!

Developed by a student of Indian languages in the University of Oxford for Word processing:

**HINDU, MARATHI,
 SANSKRIT, VERDIC...**

From:
\$129.95/£89/DM259!

For details write to:

G. MÜLLER
PEMBROKE COLLEGE
OXFORD OX1 1DW

PROGRAM FILE

```

c := chr((Startx mod 10) + 48);
t := chr((Startx div 10) + 48);
if t = '0' then chl := #32 else chl := t;
for loop := 0 to 17 do begin
    if c = '0' then begin
        if loop <> 0 then AddOne(t);
        gotoxy(4+loop*2,1); write(t); chl := t;
    end;
    gotoxy(4+loop*2,1); write(chl);
    gotoxy(4+loop*2,2); write(c);
    AddOne(c);
end;

c := chr((Startx mod 10) + 48);
t := chr((Startx div 10) + 48);
if t = '0' then chl := #32 else chl := t;
for loop := 0 to 9 do begin
    if c = '0' then begin
        if loop <> 0 then AddOne(t);
        gotoxy(1,4+loop*2); write(t); chl := t;
    end;
    gotoxy(1,4+loop*2); write(chl);
    gotoxy(2,4+loop*2); write(c);
    AddOne(c);
end;

for ColCount := 1 to ColsPerScreen do
    for RowCount := 1 to RowsPerScreen do
        with MainGrid(pred(Startx)+ColCount,pred(Startx)+RowCount) do begin
            topx := 4 + ColCount * 16; ( Calculate the real screen address )
            topy := 4 + RowCount * 16;
            if (Val and 15) <> 0 then
                DisplayTrack(Val and 15,ColCount,RowCount);

            ( if there is a hole at this cell location, draw it )
            if blob then circle(topx*8,topy*8,3,CircleCol);

            ( Draw the single diagonal cells )

            if (Val and 16) = 16 then
                Draw(topx*8,topy,topx*15,topy*8,TrackCol);
            if (Val and 32) = 32 then
                Draw(topx*15,topy*8,topy*8,topy*15,TrackCol);
            if (Val and 64) = 64 then
                Draw(topx,topy*8,topy*8,topy*15,TrackCol);
            if (Val and 128) = 128 then
                Draw(topx,topy*8,topy*8,topy,TrackCol);

            end;
            gotoxy(1,24);
            write('E = Up      X = Down  P = Print');
            gotoxy(1,25);
            write('D = Right S = Left  RETURN = Continue');
            repeat
                read(kbd,ch);
                ch := UpCase(ch);
                until ch in [#13,'E','X','S','D','P'];
            case ch of
                'X' : if Startx > 1 then Startx := pred(Startx);
                'E' : if Startx < pred(MaximumRow)-9 then Startx := succ(Startx);
                'D' : if Startx > 1 then Startx := pred(Startx);
                'S' : if Startx < pred(MaximumCol)-17 then Startx := succ(Startx);
                'P' : Print;
            end;
            until ch = #13;
            TextMode(bw80);
        end;

        ( Find the best connection between the current start and end points,
        using LEE's Algorithm plus a bit more to utilise diagonal lines. )

        PROCEDURE FitConnector;
        begin
            InitTestGrid;
            InitPointStack;
            NextPoint := 1;
            PointPtr := 1;
            with PointStack[NextPoint] do begin
                Row := Line.StartRow;
                Col := Line.StartCol;
            end;
            NextPoint := succ(NextPoint);
            found := false;
            while (PointStack[PointPtr].Row <> 0) and NOT found do begin
                Dir := Upwards;
                while NOT found and (Dir > Finished) do begin
                    found := CheckDirection(Dir);
                    if NOT found then Dir := succ(Dir);
                end;
                if NOT found then pointPtr := succ(PointPtr);
            end;
        end;

        ( This is called when the best track has been found. It repeats the
        process to find the best connection, then puts the track on the main grid )

        PROCEDURE FixConnector;
        begin
            FitConnector;
            PutInConductor;
        end;

        ( Find the best track between the current points and return the length
        of that line. This returns -1 if no track is possible.
        If the source and target are next to each other, the length is 2 )

        FUNCTION DoSearch : integer;
        begin
            FitConnector;
            if NOT found then DoSearch := -1
            else begin
                TempDir := Dir;
                if PointPtr = 1 then DoSearch := 2 else DoSearch := CalcLength;
                Dir := TempDir;
            end;
        end;
    
```



```

end;
end;

{ Check to see if one of the points is on both the start and the end
connector. If it is, then the connection is already made }

FUNCTION OnTheSameConnector : boolean;
begin
  OnTheSameConnector := false;
  for StartLoop <= 1 to MultiLinesNum(StartLine) do
    for EndLoop := 1 to MultiLinesNum(EndLine) do
      if (MultiLines(StartLine,StartLoop).Col =
          MultiLines(EndLine,EndLoop).Col) and
          (MultiLines(StartLine,StartLoop).Row =
          MultiLines(EndLine,EndLoop).Row) then OnTheSameConnector := true
    end;
  end;

FUNCTION Quit : boolean;
begin
  gotoxy(2,21); write('Quit Program (Y/N) ? ');
  YesOrNo := YOrN;
  gotoxy(1,21); ClrEol;
  Quit := YesOrNo;
end;

{ From the start and end cell locations find all other cells that are
connected to both and from all these possibilities find the shortest
route. Can take a while if there are a lot of possibilities !! }

PROCEDURE FindAllPossible;
var
  BestStart, BestEnd : LineStackSize;
  BestDir, BestLength : integer;
begin
  BestLength := MaxInt; { Set to maximum possible }
  StartOrEnd := StartLine;
  FindAllPoints(StartCells(LineStackPtr)); { Find points the same as start }
  StartOrEnd := EndLine;
  FindAllPoints(EndCells(LineStackPtr)); { Find points the same as end }
  if NOT OnTheSameConnector then begin
    gotoxy(54,7); write(MultiLinesNum(StartLine):3);
    gotoxy(54,8); write(MultiLinesNum(EndLine):3);
    StartLoop := 1;
    while StartLoop <= MultiLinesNum(StartLine) do begin
      EndLoop := 1;
      while EndLoop <= MultiLinesNum(EndLine) do begin
        Line.StartCol := MultiLines(StartLine,StartLoop).Col;
        Line.StartRow := MultiLines(StartLine,StartLoop).Row;
        Line.EndCol := MultiLines(EndLine,EndLoop).Col;
        Line.EndRow := MultiLines(EndLine,EndLoop).Row;
        with Line do begin
          gotoxy(31,7);
          write(StartCol:3, ' Row = ', StartRow:3, ' ', StartLoop:3);
          gotoxy(31,8);
          write(EndCol:3, ' Row = ', EndRow:3, ' ', EndLoop:3);
        end;
        CurrentLength := DoSearch;

        { Check for the best so far }

        if (CurrentLength < -1) and (CurrentLength < BestLength) then begin
          gotoxy(17,10);
          write(CurrentLength:3);
          BestStart := StartLoop;
          BestEnd := EndLoop;
          BestLength := CurrentLength;
          BestDir := Dir;
        end;
        if KeyPressed then if Quit then begin
          ProgAbort := true;
          EndLoop := MultiLinesNum(EndLine);
          StartLoop := MultiLinesNum(StartLine);
        end;
        EndLoop := succ(EndLoop);
      end;
      StartLoop := succ(StartLoop);
    end;
  end;
  else begin
    LineStatus[LineStackPtr] := NotNeeded;
    NumberNotNeeded := succ(NumberNotNeeded);
  end;

  { if there has been a line found, connect the best up }

  if NOT ProgAbort and (BestLength < MaxInt) then begin
    Line.StartCol := MultiLines(StartLine,BestStart).Col;
    Line.StartRow := MultiLines(StartLine,BestStart).Row;
    Line.EndCol := MultiLines(EndLine,BestEnd).Col;
    Line.EndRow := MultiLines(EndLine,BestEnd).Row;
    Dir := BestDir;
    FixConnector;
    if DisplayEachTime then DisplayCircuit(DisplayCol,DisplayRow);
    LineStatus[LineStackPtr] := Fitted;
    NumberFitted := succ(NumberFitted);
  end;
end;

{ The main procedure }

PROCEDURE DoMainProgram;
begin
  ClrScr;
  InitMainGrid; { Clear the main circuit board }
  ReadCircuitTitle; { Read the title file }
  ReadMainInfo; { Read all component hole locations }
  ReadLineInfo; { Read all track start and end coordinates }
  GetDisplayMode; { Display the circuit after each track ? }
  DisplayCol := 1; { Initialise the display routine to the top }
  DisplayRow := 1; { right hand corner }
  LineStackPtr := 1; { First track }

```

Did you know some of the very BEST software is available as **SHAREWARE?**

Shareware is a revolutionary concept of bringing top quality software to users at a fraction of the commercial prices. These programs request that the satisfied user register with the author to receive program updates, technical assistance and additional documentation. Sample some of the many programs available through ISD from the PC-SIG Library at only **£6.00 per disk**

WORD PROCESSING

- ☐ 78 PC-WRITE V 2.4 Popular/powerful word processor £6.00
- ☐ 294 EDIT Simple yet full featured word processor £6.00
- ☐ 480 PC OUTLINE Outline and organise information, much like Thinktank £6.00
- ☐ 528 NEW YORK WORD Complete word processing capability, full featured £6.00
- ☐ 563 MAX Some of the best features of EMACS (an editor) and SCRIBE (text formatter) £6.00

DATABASE MANAGEMENT

- ☐ 5 PC FILE III Most popular database program £6.00
- ☐ 287, 288 FILE EXPRESS V3.72 Database management systems that are menu driven and easy to use, also mailing list and report generator £12.00
- ☐ 398 ESIE EXPERT SYSTEM Artificial intelligence shell to build a custom knowledge base £6.00

UTILITIES

- ☐ 478 HARD DISK UTILITIES A collection of the best in the library £6.00
- ☐ 133 ULTRA UTILITIES V4.0 recover lost files, modify sectors, etc £6.00
- ☐ 610 PACKDISC V1.2 handy collection for file, floppy & hard disk management. Disk optimising tool £6.00
- ☐ 523 SIDEWRITER Print text files sideways along a page, more columns can be accommodated, source code included £6.00
- ☐ 405 DESKTEAM V1.04 better than all of the rest of the memory resident desktop utilities £6.00
- ☐ 728, 729 HOMEBASE V.2.0 complete desktop organisers £12.00
- ☐ 608 AUTOMENU V 3.01 set it up then press a single key £6.00

GAMES

- ☐ 120 PC CHESS £6.00
- ☐ 292 SPACE WARS £6.00
- ☐ 293 ARCADE GAMES Another goodie bag of top Arcade games £6.00
- ☐ 705 KIDS GAMES Games for the 2-10 year old to learn and have fun with £6.00
- ☐ 476 PATRICK'S BEST GAME A compilation of the best games for the monochrome monitors £6.00

COMMUNICATION

- ☐ 499 PROCOMM Professional communication program £6.00
- ☐ 41, 42 KERMIT File transfers £12.00
- ☐ 433, 434 KERMIT-MS Communication systems that allow different types of computer to exchange information £12.00
- ☐ PC-SIG DIRECTORY Full description of over 700 disks with 10,000 programs £9.95
- ☐ 1 YEAR ISD MEMBERSHIP New directory, bi-monthly magazine and discount on disks £20.00

SPECIAL OFFER

Any 4 Disks plus 1 Year Membership
Only £40.00

Most programs have documentation on disk and request a donation from satisfied users.

* PLEASE ADD £2.00 SHIPPING, (£5.00 overseas) plus VAT.

TOTAL ENCLOSED £

Name

Address

Telephone No.



ISD INTERNATIONAL
SOFTWARE DISTRIBUTORS LTD
P.O. Box 872, Sutton Coldfield,
West Midlands, B75 6UP
Telephone: 021-378 2229

MICROMART

Reach the top
with...

LCL

Complete Self Tuition Courses

Amstrad (CPC, PCW, PC) (Disc/tapes)
Electron, BBC (tape/disc)
Spectrum Commodore 64
(IBM PC and Apple)

BEST REVIEWS *
AS SEEN ON
TV WORLD
LEADERS *

* At all Major Shows * Home Graduate/Teacher Authors *



NEW

(Each contains 24 programs £25 off
total for 2, £10 off total for 3, £17 off
total for 4)

HOME COLLEGE

Open learning courses of video software &
books: Choice of Maths, English or French.
Only £49.99

MICRO MATHS (ALL COMPUTERS)

Course taking beginners from age 8
yrs to O-Level/GCSE. 24 programs on 59
tapes on 2 tapes/discs + 2 books £24

PRIMARY MATHS COURSE

Course taking beginners from 5 years
to secondary school entrance in 35
programs divided into 18 lessons/tests.
All animated graphics, 2 discs/tapes £24

MICRO ENGLISH

Course taking beginners to English
Language GCSE. Incorporates real
speech, no extras required 2
tapes/discs £24

MEGA MATHS

A-Level course for mature beginners.
A-Level Students or Micro Maths
users. Covers 105 topics on 2
tapes/discs + 2 books £24

Phone orders or requests for free colour catalogue to:
LCL (Dept PCW), Melody House, 13 Deanfield Road,
Henley, Oxfordshire RG9 1UG

Tel: 0491 579345 (10am-10pm)

PROTECH

Amstrad PC1512 Upgrade

Speed up your data processing

184164 — 15 D — RAMS +
S/W only £18.00

Upgrade your P.C. to 640k. Then make
your computer process disk data faster
using the disk cache program supplied
FREE with our expansion kit.

The disk cache program can make tasks
run up to 10% faster on mini based sys-
tems and up to 100% faster on floppy
based systems.

Price includes postage, VAT, instruc-
tions and FREE S/W. (S/W available
separately for only £2 to cover distri-
bution costs) Send cheque/PO for £18
payable to Product Technologies to:

Product Technologies, Dept PCW,
151 Gloucester Place,
London NW1 6DX.

CREDIT CARD ORDERS PHONE: 01-724 0959

HARD DISKS

20MB (65MS)+WD Controller/ Kit.....	£265
20MB (40MS)+WD Controller/ Kit.....	£370
10MM Seagate ST412.....	£193
20MB Seagate ST225.....	£245
20MB NEC 5126 (40MS).....	£260

FLOPPY DRIVES 5.25

Tandon 100/2A 48TPI.....	£75
Mitsubishi 501B 48TPI.....	£80
NEC 1055 96TPI.....	£95

Many other drives available.
Quantity Discounts.
Prices Exclude VAT

MD SERVICES LTD

Tel 044 4641247
Tx 946240 REF 19001460

PROGRAM FILE

```

ProgAbort := false;
NumberFitted := 0;
NumberNotNeeded := 0;
NumberNotFitted := 0;

if NumberOfTracks = 0 then ProgAbort := true;

( while there are connections to fit )

while NOT ProgAbort and (LineStackPtr < LineStackCounter) do begin
  Line.StartCol := StartCells[LineStackPtr].Col;
  Line.StartRow := StartCells[LineStackPtr].Row;
  Line.EndCol := EndCells[LineStackPtr].Col;
  Line.EndRow := EndCells[LineStackPtr].Row;
  MainScreen;
  with Line do
    if (StartRow <> EndRow) or (StartCol <> EndCol) then FindAllPossible;

  ( if line cannot be fitted that way round, swap the start and end and
    try again )
  if NOT ProgAbort and (LineStatus[LineStackPtr] = UnFitted) then begin
    TempPoints := StartCells[LineStackPtr];
    StartCells[LineStackPtr] := EndCells[LineStackPtr];
    EndCells[LineStackPtr] := TempPoints;
    MainScreen;
    with Line do
      if (StartRow <> EndRow) or (StartCol <> EndCol) then FindAllPossible;
  end;
  LineStackPtr := succ(LineStackPtr);
end;

if NOT ProgAbort then begin
  NumberNotFitted := NumberOfTracks - (NumberFitted + NumberNotNeeded);

  MainScreen;
  gotoxy(30,12); write(NumberOfTracks:3);
  gotoxy(30,14); write(NumberFitted:3);
  gotoxy(30,16); write(NumberNotNeeded:3);
  gotoxy(30,18); write(NumberNotFitted:3);
  gotoxy(2,21); write('Press a key to continue ');
  read(kbd,ch);

  ( Display Circuit now completed )

  DisplayCircuit(DisplayCol,DisplayRow);

  ( Display line status )

  if NumberNotFitted <> 0 then begin
    ClrScr;
    gotoxy(2,2);
    write('Display Tracks that could not be fitted (Y/N) ? ');
    if Y or N then begin
      ClrScr;
      for LineStackPtr := 1 to LineStackCounter do
        if LineStatus[LineStackPtr] = UnFitted then
          writeln(StartCells[LineStackPtr].Col:2, ' ',
            StartCells[LineStackPtr].Row:2, ' TO ',
            EndCells[LineStackPtr].Col:2, ' ',
            EndCells[LineStackPtr].Row:2, ' ',
            ' = ', StatStrsford(LineStatus[LineStackPtr]));
        writeln;
        writeln('Press a key to continue ');
        read(kbd,ch);
      end;
      ClrScr;
      gotoxy(2,2); write('Print Circuit (Y/N) ? ');
      if Y or N then Print
    end;
    TextBackGround(Black);
    TextColor(White);
    ClrScr
  end;

  ( Start of program code )

begin
  ClrScr;
  gotoxy(1,1);
  write('This program works only with IBM type graphic screens. ');
  write('Continue (Y/N) ? ');
  if Y or N then DoMainProgram else ClrScr
end;
  
```



C Screenwriter by Stephen Kirkby

This program, written in Zorland C, provides a fully-featured and fancy scrolling sign display on IBM compatibles. Various commands are available for different colours, clearing the screen, delays, and so on.

The commands are:

*C,16 — clear the screen with specified background colour (16) and move to the bottom of the screen.

*T,0 — move to the top of the screen without clearing.

*H,16 — half line of big text in background colour. Used for formatting pages.

*Q,16 — as for *H but only a quarter line.

*W,5 — waits for five units before doing next command.

*E,0 — end of file.

PROGRAM FILE

```
#include <stdio.h>
FILE *input;
static char blankline[80];
main(argc,argv) int argc; char *argv[];
{
    int t,i,j,q,s[200],c,k,f=1,test=0;
    char *buf, urds[200][11];
    if (strlen(argv[1]) >= 15) /* Test for filename present */
    {
        printf("Error : No file specified\n");
        abort();
    }
    if ((input = fopen(argv[1], "r")) == NULL) /* Test for openable file */
    {
        printf("Invalid file : %s\n", argv[1]);
        exit(49);
    }
    for (i=0; i<80; i++)
    {
        blankline[i] = ' ';
    }
    blankline[80] = '\0';
    for (k=0; (test == 0) && k++) /* Accepts commands until */
    { /* a '*' is found or EOF */
        c = fgetc(input); /* and puts them in arrays */
        for (i=0; (c != '*' && i<10); i++)
        {
            c = fgetc(input); /* Test for EOF */
            if (c == -1)
            {
                test = 1;
                f = k;
                continue;
            }
            urds[k][i] = c; /* build up command */
            urds[k][i+1] = '\0'; /* put string end in */
            if ((test == 1) || (urds[k] == "E")) /* If end of commands */
            { /* then break out here */
                f = k;
                continue;
            }
            fscanf(input, "%d", &s[k]); /* Take attribute or wait */
            /* length */
        }
        fclose(input);
        disp_open();
        while (1) /* Do forever */
        {
            clrscr(); /* This heading is printed */
            disp_setattr(75); /* at the beginning of every */
            disp_printf("Screen Writer \n\n"); /* cycle. */
            disp_printf("by Stephen Kirkby "); /* Wait for 5 seconds */
            wait(5);
            printf("\b"); /* So you can Ctrl-C to escape */
            clrscr(); /* Clear and move to the */
            disp_move(24,0); /* bottom of the screen */
            test=0;
            for (k=0; (test == 0) && (urds[k] != "E") && k<f; k++)
            {
                if (urds[k][0] != ' ') /* If not a command print it */
                {
                    disp_setattr(s[k]); /* If not a command print it */
                    for (t=0; t<8; t+=2)
                    {
                        if (strlen(urds[k]) < 10) /* Leading spaces for */
                        { /* background colour */
                            for (i=0; i < 4*(10-strlen(urds[k])); i++)
                                disp_putc(' ');
                        }
                        for (i=0; (urds[k][i] != '\0') && i<9; i++)
                        {
                            if (urds[k][i] == ' ')
                                urds[k][i] = ' ';
                            z = urds[k][i] + t;
                            peek(0xF000, 0xFA6E+z, buf, 2); /* lookup char defs */
                            for (j=128; j>=1; j/=2)
                            {
                                q = 224; /* work out which */
                                if (j & buf[0]) /* graphic block */
                                {
                                    q = 1; /* characters to use */
                                    if (j & buf[1])
                                    {
                                        q = 4;
                                        if (q == 224)
                                            disp_putc(' '); /* print space or */
                                        else
                                            disp_putc(q); /* right char reqd */
                                    }
                                }
                            }
                            if (strlen(urds[k]) < 10) /* Trailing spaces */
                            { /* as above */
                                for (i=0; i < 4*(10-strlen(urds[k])); i++)
                                    disp_putc(' ');
                            }
                        }
                    }
                    else
                    {
                        switch(urds[k][1])
                        {
                            case 'C': clrscr(); /* Clear screen */
                                disp_move(24,0);
                                break;
                            case 'H': disp_setattr(s[k]); /* Half height gap */
                                disp_printf("\xB0s", blankline);
                                break;
                            case 'D': disp_setattr(s[k]); /* Dtr height gap */
                                disp_printf("\xB0s", blankline);
                                break;
                        }
                    }
                }
            }
        }
    }
}
```

MICROMART

THINKSPARE LIMITED

A new name in Computer Products

AMSTRAD—BROTHER—EPSON—
HEWLETT—PACKARD ETC

Amstrad Word Processor PCW 8256 Single drive
with DM Printer £285
Amstrad Word Processor PCW 9512 512K Ram and
Daisywheel Printer £429

Epson Printer FX 800	£287
Epson Printer FX 1000	£374
Epson Printer LX 800	£164
Epson Printer LQ 2500 Dual Interface and tractor	£664
Epson Printer LQ 1000 Purchase with tractor	£553
Epson Printer EX 1000 Oval Interface and tractor	£468
Epson Printer SD 2500	£395
HP Laser Series II	£1729
Epson Laser Printer GQ3500	£1219
Kyocera Laser Printer F-1010	£1803
Centronics Laser Printer 99-B	£1145
Canon Laser Printer LBP 8 mk II	£1548
MT910 with toner and drum starter kit (no interface)	£2177
Ricoh Laser Printer LP4081-R1	£2337
Citizen Overture 110 Laser Printer	£1159
NEC Silent writer LC815	£1469
Star NL-10 120 CPS inc Parallel Interface	£180
Star NB 24-10 216 CPS inc Parallel Interface	£384
Star NR-15 240 CPS inc Parallel Interface	£403
Star NB 16 300 CPS inc Parallel Interface	£647

prices subject to VAT at the standard rate. Carriage extra.
Cash with order please.

Thinkspare Limited, Portland Chambers, 1 Mottram Road,
Stalybridge, Cheshire SK15 3AQ
Telephone 061-203 2910
E & O.E.

ELECTROTECH SERVICES PROFESSIONAL SOFTWARE DOCUMENTATION

A good user manual
will
enhance your product
and
your company image
(We write software too)

Contact: David Pearson
ELECTROTECH SERVICES

9 CHALKLANDS,
SANDON, CHELMSFORD,
ESSEX CM2 7TH
TELEPHONE 0245-71589
TELECOM GOLD 72:MAG95018

BEST AMSTRAD PRICES FROM THE NORTH WEST'S FASTEST GROWING SPECIALIST AMSTRAD DEALER

SD 1640 EGA	£800 inc vat!
DD 1640 EGA	£900 inc vat!
HD 1640 EGA	£1200 inc vat!
PCW 8256	£325 inc vat!
PCW 8512	£435 inc vat!
NEW PCW 9512 with 1 MB & 15 inch carriage daisywheel printer	£500 inc vat
PC 1512 DD MM with Migent Ability and 4 US Gold games	£550 inc vat
PC 1512 Mono Monitor 21Mb harddisk	£770 inc vat
PC 1512 Mono Monitor 32Mb harddisk	£790 inc vat

THOUSANDS MORE INCREDIBLY

Discounted hardware and software bargains!

You will not match our prices anywhere.

Phone us now for friendly and helpful service.

Cheque/P.O. with order

Add £20 for delivery outside

Greater Manchester area

Allow 28 days for delivery

DISCOUNT COMPUTERS

61 REGENT ST, ECCLES,
MANCHESTER. 061 788 7300

BRANDED DISKS (Box of 10)

3" MAXELL CF2	£23.95
3.5" SONY MFD 2DD 135 tpi	£21.95
3.5" SONY MFD-2HD 135 tpi	£49.00
5.25" MAXELL DS/DD 48 tpi	£13.95
5.25" DATALIFE DS/DD 48 tpi	£13.95
5.25" DYSAN (IBM AT) 802914-02	£26.50

C.W.O. PRICES INCLUDE CARRIAGE
& VAT. (C.O.D. ON REQUEST)

☆ QUANTITY DISCOUNTS ☆

EG 10 BOXES SONY MFD-2DD	£18.50/box
EG 10 BOXES DYSAN (IBM AT)	£21.95/box
1 BOX OF 10 3M D.C.500A DATA CARTRIDGE	£229

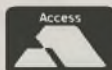
JOHN HOLMES COMPUTERS

FULBECK, GRANTHAM,
Lincs NG32 3LD

Tel: (0400) 72818

OFFICIAL GOVERNMENT
AND EDUCATIONAL ORDERS
WELCOME

AMSTRAD, OPUS AND TANDON
AUTHORISED DEALER



for AMSTRAD

- The Full Range
- Immediate Delivery
- Lowest Mail Order prices
- Authorised Dealer
- Professional Consultancy
- Competitive Software
- Tailoring

BUSINESS SYSTEMS

Amstrad PC120M	Dual Drive, Mono	445.00
Amstrad PC1640DC	Dual drive, Colour	640.00
Amstrad PC1640HM	20Mb Hard Drive, Colour	775.00
Amstrad PC1640HC	20Mb Hard Disk Colour	859.00
Amstrad PCW8512	Disk based Word Pro 2 drive	369.00
Amstrad PCW9512	Daisywheel WP	449.00
HOME MICROS		PDA

DOT MATRIX PRINTERS

Amstrad DMP3000	80 col, 105CPS, FIT, NLD	149.00
Amstrad DMP3160	80 col, 160CPS, FIT, NLD	179.00
Amstrad DMP4000	136 col, 200CPS, FIT, 50 NLD	299.00
Micro Periph MP490	80 col, 480CPS, FIT, 70 NLD	299.00
Canon PW1080A	80 col, 160CPS, FIT, 30 NLD	279.00
Juki 5520CP	80 col, 180CPS, FIT, 27 NLD	369.00
Epson LX86	80 col, 120CPS, FIT, 16 NLD	249.00
Epson FX800	80 col, 200CPS, FIT, 40 NLD	349.00

DAISYWHEEL PRINTERS

Micro Peripherals MP26	132 col, 26CPS	229.00
Juki 6000 (P/S)	80 col, 12CPS	179.00
Juki 6100 (P)	132 col, 20cps	229.00

- Prices exclude VAT and delivery.
- This is a small selection, please ring for prices of other items including hardware and consumables.

EKRA TECHNOLOGY

33 Barkby Road, Leicester LE4 7HN UK
Tel: 0533 668134 Tlx: 341419 spce g

PROGRAM FILE

```

case 'M' : wait(10);          /* Wait 10 units */
break;

case 'I' : disp_move(0,0);    /* Move top screen */
break;

}

disp_close();

}

clistatfb int attrb;          /* Clear screen in colour */
int line;

if (attrb == 0)               /* If black do it quickly */
{
    disp_move(0,0);
    disp_eoc(1);
}
else                           /* or print background coloured spaces */
{
    disp_wclatfb(attrb);
    for (line=0; line<24; line++)
    {
        disp_moveline(0);
        disp_printf("X80s", blankline);
    }
}

disp_move(0,0);

wait(num); int num;          /* Wait num units */
int pause, pause2;

for (pause2=0; pause2=num; pause2++)
{
    for (pause=0; pause=32000; pause++)
    {
        disp_startand();      /* Something to do to slow it up */
        disp_endand();
    }
}

```

Example .WRT

```

"0,64 Personal, 1,5 "M,64 Computer, 75 "M,64 World, 75 1,68 "W,4 "C,16 For the, 31 "Q
,11 best 16, 31 "Q, 31 computing, 31 "Q, 31 read..., 31 "M, 31 "W, 5 "C, 0 "T, 0 Personal
, 12 "M, 0 Computer, 12 "M, 0 World, 12 "W, 5 "T, 0 Personal, 1,2 "W, 1 "M, 0 Computer, 1,2
"V, 1 "M, 0 World, 1,2 "W, 5 "B, 0

```



Atari ST No Zoom

by Jeremy Roussak

This short program should be run immediately after boot-up. It installs itself in memory and intercepts the AES calls to draw the expanding and shrinking 'zoom boxes', and ignores them instead of taking action. This speeds up many windowing operations considerably if you can do without the pretty but unnecessary box zooms.

The calls intercepted are 'graf_growbox', 'graf_shrinkbox' and 'form_dial' with a first parameter of 1 or 2.

The program has been written in assembler and will have to be assembled. The program must then be run from the desktop rather than automatically from an AUTO folder, since AES is initialised after AUTO programs are run.

The main program calculates its own length, commandeers the AES (trap #2) vector, saves the old value of the vector and issues a terminate-and-stay-resident call. The rest of the code is the new trap #2 routine.

Trap #2 is used for AES and VDI calls which are distinguished by the

value passed in register d0; a value of 200 stands for an AES call.

On entry to trap #2, d1 contains the address of the 'params' vector. This is a vector of pointers, each of which holds the address of one of the five communication arrays used by the AES. Two of these are of interest: 'control' at offset 0; and 'int_in' at offset 8 (see the box which appears before the listing).

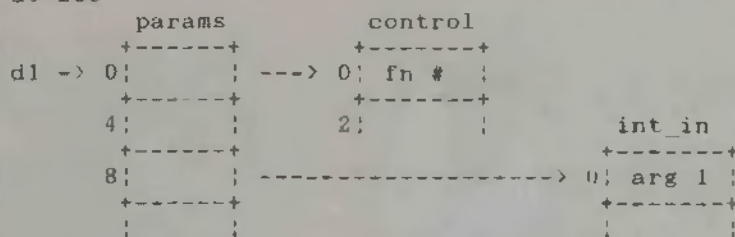
Offset 0 in 'control' is the function code of the call. We are interested in (so as to ignore them) function calls 73 (graf_growbox), 74 (graf_shrinkbox) and 51 (form_dial).

Offset 0 in 'int_in' is the first argument to the function. For graf_growbox and graf_shrinkbox this is irrelevant, since they will be ignored completely. For form_dial, we want to ignore the call if the first parameter is 1 or 2 (FMD_GROW) or (FMD_SHRINK).

To ignore a call, simply return via RTE. All other calls are passed to the correct place by reloading the original AES vector and jumping to it.

PROGRAM FILE

d0=200



Conditions on entry to trap #2

```

; Memory-resident utility to intercept all
; AES calls and to ignore the calls which draw
; those annoying zooming boxes.
;
; Jeremy Rousak, August 1987
;
;
; Various constants
;
; gendos trap and function code
;
GENDOS equ 1          gendos trap number
PTERMRES equ $31      terminate and stay resident
;
; bios trap and function code
;
BIOS equ 13           bios trap number
SETEXC equ $05        set exception vector
;
; miscellaneous
;
AES equ 2             aes trap number
FDIAL equ 51          form_dial function code
GROWBOX equ 73        graf_growbox function code
SHRINKBOX equ 74      graf_shrinkbox function code
;
; main program - exchange exception vector,
; then just terminate and stay resident
;
move.l 4(sp),a0        basepage address: program size in
move.l $100,d6         basepage size
add.l 12(a0),d6        plus text size
add.l 20(a0),d6        plus data size
add.l 28(a0),d6        plus bss size

pea     aea            aea interception routine
move.w $32+AES,-(sp)   aea vector number
move.w $SETEXC,-(sp)   function code
trap    #BIOS          do it
addq    $8,sp          clean up stack
move.l d0,oldaes       and save original vector

clr.w   -(sp)          dummy
move.l d6,-(sp)        area to keep
move.w $PTERMRES,-(sp) function code
trap    $GENDOS        do it - never returns

; this is the new aea routine
;
aea     cmpi.w $200,d0   genuine aea call?
       bne     boring   no
       move.l d1,a0     params array address
       move.l (a0),a1    control array address

       cmpi.w $GROWBOX,(a1) graf_growbox call?
       beq     ignore   yup
       cmpi.w $SHRINKBOX,(a1) or graf_shrinkbox call?
       beq     ignore   yup
       cmpi.w $FDIAL,(a1) form_dial call?
       bne     boring   no, so nothing interesting
       move.l $1(a1),a1  int_in array address
       cmpi.w $1,(a1)    growbox call?
       beq     ignore   yes, so ignore it
       cmpi.w $2,(a1)    shrinkbox call?
       beq     ignore   yup

;
; this isn't a call we're interested in, so we
; just pass control to the genuine aea routine
;
boring  move.l oldaes,a0  load old trap address
       jmp     (a0)       and go there

;
; it was an interesting call, so we ignore it
;
ignore  rte

;
; data area
;
oldaes ds.l 1           old aea vector

end
  
```

MICROMART

S.P. ELECTRONICS

AMSTRAD AND ACORN APPROVED BUSINESS
CENTRE AND SERVICE AGENT

We stock the entire range of Amstrad and Acorn products with
special offers on the following:

PC1512HD20-MM £698.00 PC1512HD20-CM £848.00
PC1640HD20-MD £798.00 PC1640HD20-CM £949.00
PC1640HD20-
ECD£1098.00

★ 30Mb fitted FREE while stocks last ★ Free menu S/W
with all hard disks ★ Fully guaranteed for 12 months ★
All PC1512s come complete with 640k memory, 4 great
games and ability from MIGENT

FD3 Second 5 1/4" Disc Drives£99.00
128k Extra memory kit£19.95

20Mb Hard cards and discsFrom £275
30Mb Hard discsFrom £299

★ All complete with S/W (and bezel) ★

NEWIN: AMSTRAD PCW9512£499
AMSTRAD LQ3500 Printer£349

Training centre and qualified consultants on hand. Full
service and repair facilities with maintenance contracts from 9%
Huge stocks of S/W, H/W, Printers, Modems, Perips,
Stationary and Accessories.

★ Acorn Archimedes Model 305-310m in stock now ★

★ Multi-Sync monitors from £605 ★

★ Atari 520ST and Amiga 500 all in stock ★

All prices exclude VAT and delivery

★ Huge range of S/W from only £1.99 ★

48 LINBY ROAD, HUCKNALL, NOTTS NG15 7TS

TEL: 0602 640377

Value For Money

Add-on 20Mbyte Hard Card (Tandon)£205.00
Add-on 30Mbyte Hard Card (MiniScribe)£275.00
On-site fitting£20.00

Epson LX 800 Printer£194
Epson GQ 3500 Laser Printer£1275

Amstrad PC1512-HD & 20Mbyte£925.00
Amstrad PC1512-SD with 20Mbyte Hard Card£775.00
Amstrad PC1512-SD with 30Mbyte Hard Card£895.00
On-site installation and set-up£20.00
Epson LX800 Printer£194.00
Epson GQ3500 Laser Printer£1275.00

Includes: "Colour Monitor, Amstrad software—MSDOS and GEM,
"Memory upgrade to 640k, "Thorough pre-delivery benches" and
software installation onto hard disk "3 Megabytes of public domain
and user-supported software: PC Write, PC Calc, PC File,
Deskmate, utilities, tutorials, Basic and Turbo Pascal routines,
and games.

RING FOR 1640 PRICES, NOW IN STOCK
and also for other Amstrad configurations, discounted
printers and software.

Prices include delivery, usually within 24/48 hours.
Add 15% VAT

ARIMA SYSTEMS

76 High Street, Stony Stratford
Milton Keynes MK11 1AH
Tel: (0908) 565 145

PostGraph

A plotter program for scientists, academics and professionals.
Draws high quality line graphs, scatter graphs and histograms
Designed for theses, research papers, project reports.
Complete with built-in text editor for data file preparation.
Imports data as ASCII text files from other programs
Presents plotter output on screen
Can copy preview screen to printer for rough drafts

Plotters supported:
EPSON HI-80 Plotter (all modes)
HEWLETT-PACKARD Graphics Language-compatible
WATANABE (and compatibles)

Requires: IBM-PC/XT/AT or compatible computer (including
AMSTRAD PC1512) running PC-DOS/MS-DOS 2.x or 3.x with at
least 300k of free memory. Graphics board (CGA, EGA or Her-
cules) needed for on-screen preview of plotter output (other-
wise program will run in text-only mode). Epson or compatible
printer with graphics needed for screen dump.

Not copy-protected. You may return the program for any
reason within 30 days after purchase for a full refund.

Price: £19.95

No VAT. Price includes airmail to all countries. Disk formats other
than standard IBM 5.25 inch: please call. Orders, stating computer
type, with cheque (all currencies acceptable) to:

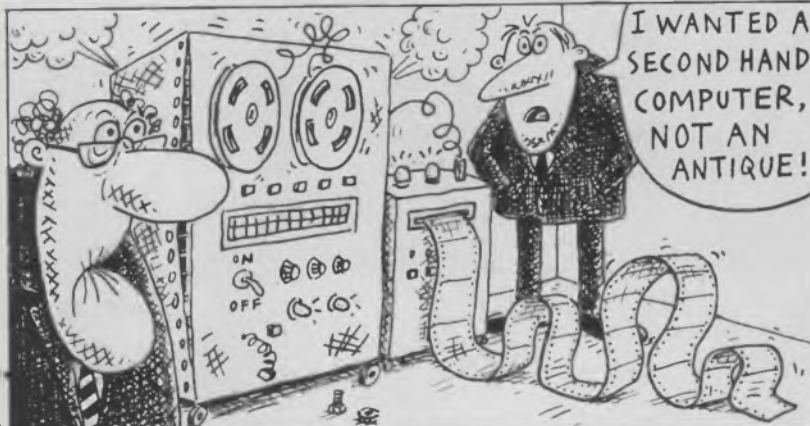
Syntax Systems

6 Caberston Avenue, Walkersburn, Peeblesshire, EH43 6RA
Telephone: (089) 687 222

Your chance to buy, sell or swap equipment.

Acorn

- BBC B. Torch 2 x 400K, Z80 + 64k, Microvitec RGB, Tandy daisy wheel II, host of accessories, software, Tandy 4 colour printer, acoustic coupler. First class condition. Sold together or separately. Also computer stationery. Offers. Tel. (041) 776 4419.
- Acorn Z80 2nd Processor. Incl. software (Accounts, WP, Cobol, Q/C, C compiler, W/source £150. Tel. Harpenden (05827) 5761 eves.
- Master 128. Green monitor, 6502 processor, 40/80 double sided twin disk drive, Epson printer, Pagemaker with mouse, powerful statistical package and loads of software. Part-exchange for Macintosh with Pagemaker preferred. Tel. (0734) 866695.
- BBC Model-B. Torch Z80 board and double 400K drives, software, Philips 12in amber monitor, Epson MX80 printer, Demon modem and all manuals. £500. Tel. Jackson Stevenage (0438) 820821.
- Acorn Z80 Second Processor. Boxed with manuals and software plus HISOFT-C, excellent condition £200. Also ATPL SIDEWISE sideways ROM/ RAM board with 16K RAM £20. Tel. Sheffield (0742) 369339 after 7pm.
- BBC B Micro. colour monitor, twin 40/80 disc drives, Acorn Z80 S/P, plus much more, including mouse, four languages, wordprocessors, etc. £900 o.n.o. For more information contact Dave on (0904) 470672.
- BBC B, DNFS, 64K SWR, 32K SHADOW, mouse, colour monitor, 400K disk



drive, joysticks, manuals, leads, magazines, tape recorder boxed. £500 o.n.o. Tel. (01) 874 8548.

Apple

- Apple IIe Computer. With Disk drive, modem, Z80 second processor, CP/M, games, books. Worth over £1700, will sell for £700 o.n.o. T. Kennedy, Merlewood, Woodlands Close, Cranleigh, Surrey. Tel. (0483) 274278 after 5pm.
- Apple II 64k. 80 column card, Z80 language card, CP/M, twin disk drives, thermal printer plus about 100 discs assorted software. Excellent condition, £300 o.n.o. Tel. (051) 608 1780, Mike.
- Apple Europlus, 128K. Language card, printer card, two discs, monitor, numeric pad, £260. Europlus as above, one drive, no pad, £240 o.n.o. Tel. (01) 935 6611, ext 2334 and (01) 328 0244.
- Apple Laserwriter Plus, 4 months old, complete with
- boxes and toner cartridge and eleven typefaces. £3500. Tel. Glasgow (041) 334 8040.
- Apple IIe. Two disk drives, Thomson colour monitor, joystick, fifty disks. £400 o.n.o. Tel. Devizes (0380) 78149.
- Apple II Europlus. 48K. Two drives, 80 col card, printer card, all manuals. Assorted software, Visicalc, PFS etc. Green monitor. £200. Tel. (0935) 813977, Thomas.
- Apple-Macintosh 512/500K. With 400K ext. drive, Macwrite, Macpaint, etc. £850 o.n.o. Also Imagewriter II £380. Will split. All manuals, exc. conditions, demos. Tel. (01) 589 5111 ext 5191, Mason, days only.
- Apple IIe. Twin disk drive, monitor II, NEC dot matrix printer. 16K buffered interface for printer, software, manual. £775 o.n.o. K. Newman day Tel. (01) 778 0249, evenings (0322) 56045.

Apricot

- Apricot F2. GEM software,

mouse, manuals. Other software available. Complete with twin disk drive. £480. Tel. Bicester (0869) 243773.

- Apricot F2. Colour monitor, internal modem, 2 mice, Microcache, Microsoft Word, Supercalc3 communique, Brainstorm, and dozen disks, games, utilities, mags, text books, Wordstar, Professional and more. £650 o.n.o. Tel. Chris Brighton (0273) 690422.
- Apricot WordStar and PC Keyboard. Reasonable offers. Tel. (0236) 722246 after 5pm.
- Portable. 720Kb floppy. As new, little used. Original boxed software and documentation. Superwriter, Supercalc, Diary, Voice Recognition, GWBasic, IBM Emulator, BBC Translator. Many additional utilities. £395. Tel. (0386) 858273 (Broadway).
- Apricot PC. 896K RAM, 2x720K disks. 2 monitors, BIOS versions 2.4 and 3.1, MSDOS 2.11, Superwriter, Supercalc, Superplanner,

Borland Turbo Pascal, Janus ADA, GWBasic and MSBasic manager. £700. Tel. Ponteland 71677 evenings.

Atari

- Atari 520STM. SF354 disk drive, mouse, manuals, public domain disks, books, mags, Goldrunner, Starglider, Cards, 1stWord and other software. £350 o.n.o. Tel. Chris (0322) 338450. Mint condition. Bought new in June 1987. Still under guarantee.
- Atari 520ST (1meg). Mono monitor, 1/2 meg drive, Star NL10 printer, lot of software, books. £550. Tel. (01) 589 1952. W.J.W. Mallinson, 5 Halsey Street, London SW7 2QH.

Commodore

- Commodore 64. 1541 drive, NPS-803 printer, C2N cassette unit, joystick, Oxford, Pascal, Skiwriter plus Arcade and adventure titles. Manuals, books and guides. £330 o.n.o. Tel. Nick (09328) 64668 (home). (01) 545 3704 (work).
- Commodore Pet 3032 Series. Basic 2, twin 200K disk drive, Commodore 4022 printer, spare ribbon and 5 1/4 in disks. Open to reasonable offers. All in good working order. Tel. (031) 442 1029 evenings only.
- Commodore 8032SK Computer. With 2x1MB disk drives, built in screen and separate keyboard. Disks, manuals, interfaces and covers all included. Excellent condition. £180. Tel. (0922) 59217.
- Commodore Business System. 8096 Computer 96K memory. Double disk drives, 80 column printer. Software, manuals, all in good

TRANSACTION FILE ADVERTISEMENT FORM

All Transaction File ads must be submitted by readers on this form or a photocopy of this form. Maximum 30 words. Print one word per box, very clearly. Name, full address and/or telephone number must be included in the 30 words. All ads must be accompanied by a flat fee of £5. Make cheques or POs payable to Personal Computer World. Ads accepted from private readers only. Ads cannot be repeated (unless sent in on another form) and we cannot guarantee to print an ad in any specific issue. Please help our typesetter to help you by writing your ad very clearly. Send your completed form to: Chris Cain, Transaction File, PCW, 32-34 Broadwick Street, London W1A 2HG.

Please find enclosed my cheque/PO for £5, together with details of my name, address and telephone number.

Please tick the appropriate category for your ad from those listed below:

Acorn ☐ Amstrad ☐ Apple ☐ Apricot ☐ Atari ☐ Commodore ☐ CP/M ☐ IBM & Compatibles ☐ Miscellaneous ☐ Monitors ☐ Peripherals ☐ Portables ☐
Printers & Plotters ☐ Sinclair ☐ Software ☐ Sharp ☐ Tandy ☐ Wanted ☐

condition. Sell for £400 o.n.o. Tel. (01) 886 0181 days. Clement. Can deliver UK.

● **Commodore 8032 Computer.** 8050 double disk drive, 4022 printer, Wordcraft and Prestel software. £500. Tel. Cardiff (0222) 41297. John Gaskell, 76 Severn Grove, Canton, Cardiff.

● **Commodore 8032.** Dual disk drive 8050 and printer 8024. All in perfect order for quick sales. Offers over £400. Tel. Les Cooper (01) 759 3352.

● **Commodore.** Disk drive, 1526 printer, data cassette, modem, Music Expansion System, Freeze Frame Mk4, joysticks, lots of disks, cartridges, games and books. Only £750 o.n.o. Tel. Neil on Guildford (0483) 63326.

CP/M

● **North Star Advantage Desktop.** CP/M 2.2 with graphics. Self contained 10in green monitor, 2x5 1/4 disk drives. All manuals, software incl Wordstar. Newbury data printer. Excellent condition. Bargain, £350. Tel. (0532) 537 507.

● **Osborne 01-DD.** 80 col. With C/W Wordstar 3.3, DBase 2.41, SuperCalc 2, MBasic, CBasic and manual. Excellent condition. Also Brother EP44 Personal printer with RS232C iface. Excellent condition. Best offered together or separately. Tel. Jim (01) 249 1938.

● **Kaypro 4.** 2x400K, Wordstar, The Word Plus, dBase II, SuperCalc, Brother CE-70 with IF-50 Daisywheel, Cosmos-80 dot matrix. Excellent condition.

Complete system £1295 o.n.o. For quick sale. Tel. (0787) 78897.

● **Sirius.** Twin 600K drives, 256K RAM, Wordstar, SuperCalc, DBase II, Basic etc. All original manuals. Perfect condition. £500 o.n.o. Tel. Heath (01) 430 1611 (office) (0689) 51481 (home).

● **Tatung Einstein.** Twin disk drive, CP/M, 80 col card, spreadsheet, accounts, bundle of software, books. £195. Tel. (0635) 578703.

IBM & Compatibles

● **Amstrad PC1512 CM-DD.** 640K, six months old plus many books, blank disks, Borland software and some adventure games. Excellent condition. Can deliver. £625 o.n.o. Tel. (0923) 773314 day time. Andy.

● **Taxan EGA Card.** Unused, boxed. Autoswitch version, paradise chip. £195. Tel. Basingstoke (0256) 473394 evenings.

● **Mouse for IBM PC XT/AT or Compatible.** Connects to Comm1 or Com2 and keyboard socket. £55 including postage. Tel. (0235) 34015 ask for Andy. Two available.

● **Olivetti M24.** 640K RAM, 10MB hard-disk, mono monitor, Epson LX80 printer, MSDOS V.2.11, dBaseIII. £1200 o.n.o. Tel. Eric on (0276) 21874 (Camberley) after 7.30 eves.

● **IBM PCXT: TAS High Quality relational data base.** New £99. will settle for £50. Also Nascom 2 computer. Colour, £35. Tel. (022023) 4190. Histon, Cambs.

● **DEC Rainbow 246K.**

10Meg hard disk, 2x400K

floppies, MSDOS, CP/M, Basic 86, Lotus 123, and manuals, £925. Anadex DC9500 matrix, Quendata daisywheel (with sheetfeed), both RS232. £160 each. Tel. Keith Webb (0386) 792785 evenings/weekends.

● **Opus PCII.** Six months old. 4.77/8.00 MHz. 20MB hard disk. 1MB RAM, 384K RAMdisk, mono monitor, serial and parallel, Hercules graphics, MSDOS 3.2 and GWBasic. £825 o.n.o. Tel. Col (0525) 713140.

Miscellaneous

● **Ice Multiplexer PCL8.** Only used for 18 months to link 2 Apples, £200. Grappler card and 2 standard 80 column cards. All £25 each. Philip Ball. Tel. (0635) 30520.

● **Merlin Tonto Personal Information Centre.** Advanced telephone, computer, word-processor etc. Twin cartridge drive, VDU, dot-matrix printer. Unwanted prize. Worth £1800+, offers around £750 for quick sale. Tel. (01) 741 9842.

● **Modem Miracle Technology WS4000 (V2123).** Together with Datatalk software £125. Contact David Stone, 6 Church Road, Felixstowe, Suffolk IP11 9NF or business telephone contact (0394) 283661 ideally between 8 & 9am.

● **Newbrain Model-A.** Excellent condition, hardly used from new. With leads, many books and technical manuals, software and user group magazine. Bargain £90 o.n.o. Tel. Locks Heath (04895) 3582 (Southampton).

Portables

● **Epson HX-20.** Tape store, battery charger, briefcase, £150. Also Epson P80 portable printer, £50. Tel. (01) 582 0494.

● **Psion Organiser II Model XP.** £124 (new). Comms Link £53. 128K datapak £90. Lead for Amiga, Philips or Thompson monitor £15.50. Tel. (0293) 553219 (Answerphone).

● **Toshiba 3100AT Compat.** 10Mb hard disk. Hardly used, with internal modem and carry case. £2,300. Tel. London (01) 727 2955 (Francis).

● **Epson PX8 Portable.** 120K RAM, PF10 disk drive, Including Wordstar, Calc, Cardbox, Basic and manuals. £500. Tel. (0222) 42588 ext 2206.

● **Epson HX-20.** 16K RAM, manuals, tape. £150 o.n.o. Tel. Ian Wilson (051) 489 3568.

Printers & Plotters

● **Daisysetp 2000 Printer.** Excellent condition daisywheel printer. Including several extra printwheels and cut sheet feeder. Cost new £360, will accept £225. Also have 256K AST memory card. Tel. Dave (0637) 875312.

● **Citizen Premiere 35 Daisywheel Printer.** Manuals, parallel interface, cable, one year old, used occasional — home use only, VGC £470. Reason for sale — upgrading. Tel. (01) 388 8507 (eves).

Sinclair

● **Sinclair QL.** CUB colour monitor. Centronics interface, Psion packages,

technical, Graphicl, advanced user guide. Original manuals. Serial cable. Cartridges. All V.G.C. £190. Tel. Macclesfield (0625) 61833 eves.

● **512k Sinclair QL and Ferguson Monitor.** Languages, manuals, Psion packages etc. All V.G.C. £175 o.n.o. Tel. (0203) 317360 evenings or weekends.

● **QL Trump Card.** 768K memory disk interface, Toolkit-II, RAM disk, Screen dump, printer buffer, memory cut. Nw, unused, £125 (cost £199). Made by Miracle Systems. Tel. (01) 249 7440.

● **Sinclair QL 640k.** 2x720K disk drives, JM ROM ver 2.3. Metacom Pascal ROM and compiler, ICE, Inkwell, Screen Dump and other software disks, cartridges, books etc. First class. £350. Tel. Middlesbro (0642) 826274.

Tandy

● **TRS80 Model 1 LII 32k.** Disk drive, monitor, lower case, many disks inc. Scripsit, Fortran, Accounts, Statistics, Mailing list, Basic compiler, games. Excellent condition, bargain at £100. Tel. (051) 608 1780 Mike.

Wanted

● **Casio FX502/602 Calculator.** For nostalgia/ collection. Tel. Brighton (0273) 541298 evenings or weekends.

● **Wanted.** 1541 or 1541C disk drive. Tel: Rob Hunt (01) 348 2711.

DIARY DATA

A look ahead at computer shows to May 1988. Readers are advised to check details before setting out on their journey.

COMPUTERS IN THE CITY

Barbican, London — Online International (01) 868 4466

COMPEC

Olympic, London — Cahners Exhibitions (01) 891 5051

ATARI COMPUTER SHOW

Novotel, London — Database (061) 456 8383

COMPUTER RECRUITMENT FAIR

Novotel, London — Intro UK Ltd (0491) 681010

OFFICE UPDATE

NEC, Birmingham — Andrew Centre (01) 891 5051 Ext 285

WHICH COMPUTER? SHOW

NEC, Birmingham — Cahners, Belinda Caver (01) 891 5051

COMPUTERS IN RETAIL AND RETAIL TECHNOLOGY

NEC, Birmingham — Focus Events (01) 834 1717

ELECTRONIC PRINTING AND PUBLISHING EXHIBITION

Olympia, London — BED Exhibitions (01) 647 1001

COMPUTERS IN TRANSPORT AND DISTRIBUTION

Wembley Conference Centre, London — Computers in Transport and Distribution (0303) 45979

COMFEST '88

Telford Exhibition Centre, Telford — (0952) 505522

17-19 November 1987

17-20 November 1987

20-22 November 1987

27-28 November 1987

19-22 January 1988

19-22 January 1988

15-17 March 1988

22-24 March 1988

19-21 April 1988

12-14 May 1988

Roger Howarth examines how home computers are helping with sound sampling, and looks at what's new in the world of MIDI.

The new generation of digitally-controlled synthesisers work according to a list of pre-programmed digital parameters, and typically a synthesiser is supplied with at least some of these parameters stored in RAM, so that the musician can alter these 'factory' sounds to suit himself.

Unfortunately, many of these synthesisers share a lot of design philosophies with home computers; that is, the manufacturer cuts hardware costs to the bare bones by using as little of it as possible! In practical terms this means that the standard method of sound editing involves the musician communicating with the synth via a couple of buttons and a knob or fader which can feed a range of digital values to the synth control program — the most elaborate form of visual feedback being a small LCD display.

Furthermore, although some or all of the sounds are stored in RAM, there is never any spare memory of any kind in which to store these new sounds (only the very expensive synthesisers come complete with disk drive) forcing the musician to either buy expensive and machine-dependent RAM cartridges, or overwrite existing sounds.

None of this actually prevents the sounds from being altered, but it certainly doesn't make the job any easier! Thankfully, the home computer industry is yet again at hand to take on this task and provide a relatively cheap answer in the form of sound editing software/hardware combinations.

Sound editors

The actual hardware involved is quite simple, with the computer talking to the synthesiser via a bi-directional MIDI link. Sound editors sold for computers without a built-in midi interface therefore need one.

The first task is to obtain a set of sound (usually called 'voice') data from the synthesiser which it can then display on screen in a relatively informative way ready for the user to edit and perhaps save to disk (Fig 1 is a screenshot taken from DCHP's Casio CZ101 editing package). To hear the effect of any changes as they are made, the sound data must be sent back to the synth each time a change is made. Fortunately, because the size of a typical voice is only a few hundred bytes and the midi interface transmits data at a rate of 31.25kbaud, equivalent to one byte per 320 microseconds, this process is very fast.

MIDI news

To help pamper to the many frustrated drummers, I can reveal that the Akai/Linn ADR 15 Drum machine, arguably representing the ultimate of its ilk and launched at the British Music Fair last summer, is still available and still more than inexpensive at £2999.95. Some may remember that this was developed by Mr Linn to overcome some of the shortcomings of the Linn 9000, but sadly he had to sell his baby to Akai because the shorts kept on coming.

Some people have predicted a change to the midi specification to help combat this, but perhaps because midi is largely a Japanese product and the Japanese are not exactly the lemmings of the electronics world, the spec remains unaltered. Instead the next generation of sequencers, such as the ADR 15, cure the problem by adding more, totally self contained, midi interfaces, thus reducing the amount of data that any one has to carry. The Akai/Linn has four such interfaces (perhaps as time passes and the cost of 5-pin DIN connectors falls still further, we might see sequencers sold not by the number of tracks but by the number of midi interfaces?).

Until recently, DCHP Electronics' range of voice editors supported virtually any synthesiser interfaced to an Amstrad CPC or PCW computer via its own midi interface costing £50 and £79.95 respectively, with the sound editing software costing £29.95 and £45. But it has now expanded to encompass the PC and Atari ST computers as well as continuing its sequencers, with an eight-track sequencer for the CPC currently retailing for £29.95 and a 12 track for the PCW at £60.

RAM Electronics, makers of the Music Machine Midi sampler for the Amstrad CPC range, is offering an upgrade for the token charge of £1.50 which will allow its product to function with DCHP's sequencer and sound editors.

Hybrid Arts displayed its latest gadgets at the PCW Show which included the ADAP 2, an enhancement of the ADAP Soundtrack, the ultimate in Atari ST sampling and itself a snip at £2000. I am unreliably informed that a price for the ADAP 2 will be set as soon as Hybrid Arts takes delivery of a powerful enough calculator, but for now the specification should give a clue; ADAP 2 boasts up to 1.5 minutes stereo sampling direct onto the Atari's hard disk drive, or up to 15 minutes stereo onto the Hybrid Arts' 350Mbyte hard disk. Because the ADAP 2 samples direct to hard disk, this leaves the ST's mere megabyte of RAM free for software!!

A slightly more down to earth enhancement for its 60-track midi sequencer is the MidiPlexer by name, and doubtless by nature. It plugs into the Atari's ROM port and provides two midi inputs and four midi thru/outputs. The bad news is that this little gem will set you back £289 and will only work with Hybrid Arts' sequencer.

Finally, news of a minor tragedy for Casio; if you visited its stand at the British Music Fair you may remember filling in a questionnaire relating to a proposed 'Casio Midi Users Club', the idea being that if response was sufficient, such a club would be started. Unfortunately, someone made off with said forms.

Anyone still interested in joining such a club should contact Bobby Kaur at Casio on (01) 450 9131, as should anyone who is offered any of the original forms through dubious outlets.

Details on the Akai/Linn ADR 15 from Syndromic Music on (01) 444 9126. DCHP Electronics is on (0440) 61207. RAM Electronics is at Unit 16, Redfields Industrial Park, Church Crookham, Aldershot GU13 0RE.

As in every other sphere of life, a pile of jargon has grown up around MIDI keyboards to describe their various capabilities. So, in order to help remove some of the mystery, here's a brief guide to the more common terms. It should be remembered that as MIDI is a two-way medium, capable of sending and receiving data and these terms can sometimes apply only to one half, with some manufacturers providing a cheap, non-touch-sensitive keyboard for their synth but good software that can make full use of incoming data from a touch-sensitive master keyboard.

Common terms

MIDI message	Meaning
1 Note on Velocity (or Velocity)	How hard a particular key is hit
2 Note off Velocity	How hard a particular key is released
3 Polyphonic After Touch	Pressure with which each key is held down (rarely implemented)
4 After Touch	Average pressure applied to all keys being held down
5 Volume	Position of volume control on synthesiser
6 Voice Dump Request	An external midi device sends this command to ask the synth to send all data relating to a specified voice
7 Sample Dump Request	As for voice dump request but featuring some error correction, this command is intended for use by samplers rather than synthesisers

The first four types describe how 'touch sensitive' a keyboard or synth is, while 6 and 7 are especially relevant to those interested in voice editing packages.

MUSICAL INTERLUDE

AND ONE

Sound editors perform another very useful function by utilising the computer's disk or cassette drive to store voice data and thus allow huge libraries of sounds to be built up at a fraction of the cost and with greater security than by using the synth manufacturer's RAM cartridges.

Midi master keyboards

A final symptom of the manufacturer's chronic cost-cutting is the quality of the synthesiser's keyboard. Although very few go quite as far as providing 'dead flesh' rubber keys, many manufacturers use very small and unresponsive devices or, indeed, go so far as to provide no keyboard at all.

The answer to this problem lies with midi master keyboards, which are distinct from synthesisers in that although they have a piano-like keyboard, they don't have any sound generation capabilities at all – their sole function is to control synthesisers via the midi interface.

Master keyboards vary in quality considerably. Those at the top of the range, costing thousands of pounds, are the 'weighted action' eight octave keyboards, which respond to the velocity and pressure that the individual keys are played with and feel rather like a real piano to play. Cheaper keyboards are available for

PRESET		05		PORTAMENTO OFF					VIBRATO ON					
LINE SELECT		MODULATION		DETUNE					VIBRATO				OCTAVE	
1+2'		RING NOISE		+/-	OCTAVE	NOTE	FINE	WAVE	DELAY	RATE	DEPTH	+/-	RANGE	
		OFF OFF		+	3	10	03	√	51	52	05	0		

DC01	STEP	1	2	3	4	5	6	7	8	DC02	STEP	1	2	3	4	5	6	7	8
↘	RATE	99								↘	RATE	99							
	LEVEL	00									LEVEL	00							
SUS.										SUS.									

DCW1	STEP	1	2	3	4	5	6	7	8	DCW2	STEP	1	2	3	4	5	6	7	8
KEY FOL.	RATE	63								KEY FOL.	RATE	99	99						
	LEVEL	00									LEVEL	40	00						
9		SUS.								9		SUS.		*					

DCAL	STEP	1	2	3	4	5	6	7	8	DCA2	STEP	1	2	3	4	5	6	7	8
KEY FOL.	RATE	94	55	21	60					KEY FOL.	RATE	99	56	38	46				
	LEVEL	99	99	00	00						LEVEL	44	28	00	00				
3		SUS.			*					3		SUS.		*					

Fig 1

RETURN to MAIN MENU

only a few hundred pounds and besides being smaller, with perhaps only five octaves, may lack some of the features of their bigger cousins and use simple spring mechanisms to return the keys to the 'up' position once they have been released by the musician.

Roger Howorth is a freelance computer journalist and sound recording engineer who owns and experiments musically with an Atari ST. If you would like to share your musical experience with Roger or you would like to pass on any interesting snippets, why not write to him care of PCW, VNU House, 32-34 Broadwick Street, London W1.

NUMBERS COUNT

You don't have to be a mathematical wizard to read and understand 'Numbers Count'. All you need to know is basic arithmetic, while Mike Mudge explains the behaviour of a simple sequence of positive integers.

There is no need for mathematical background beyond that of addition, multiplication and division this month. So, come on everyone, read a little further, and then carry out some experiments for yourselves... and do write and tell me the results of your experiments.

$$x_0 = 1,$$

$$x_1 = 1 + 1^2 = 2$$

$$x_2 = 1 + 1^2 + 2^2 = 5$$

$$x_3 = 1 + 1^2 + 2^2 + 3^2 = 14$$

$$x_4 = 1 + 1^2 + 2^2 + 3^2 + 4^2 = 30$$

$$x_5 = 1 + 1^2 + 2^2 + 3^2 + 4^2 + 5^2 = 55$$

Fig 1 A possible sequence of integers

Will the sequence (shown in Fig 1) defined algebraically by the formulae: $x_0 = 1$, $x_1 = 2$, $(n+1)x_{n+1} = x_n(x_n + n)$ for n greater than or equal to 1 always yield an integer? Notice that the values of x_n increase quite rapidly, $x_6 = 154$, $x_7 = 3520$, $x_8 = 1551880$, $x_9 = 267593772160$... But what about x_{43} ?

The corresponding sequence with squares replaced by cubes has been reported on by Boyd and Alf van der Poorten with a suggestion that integers are generated certainly as far as x_{89} , although complete analysis is not known to the author.

If, however, fourth or higher powers are used in the sequence it is believed that no results have been published.

Alf van der Poorten asks what is going on in the case of the squares displayed above. Readers are invited to answer this question and to extend the investigation to higher powers as suggested, or indeed in any other way that they feel appropriate.

Submissions containing attempts at this problem, together with general thoughts on empirical number theory using a personal computer, may be sent to Mike Mudge, 'Square Acre', Stourbridge Road, Penn, Staffordshire WV4 5NF, tel: (0902) 892141, to arrive by 1 March 1988.

All submissions will be judged using 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 summary of results obtained, in a form suitable for publication in PCW.

Please note that submissions can only be returned if a stamped addressed envelope is provided.

Review: The Left Factorial Function (June 1987)

The first problem was the least popular: Slavic has used a computer to

NUMBERS COUNT

establish that ln is not exactly divisible by n for $3 \leq n \leq 1000$. Wagstaff verified that the highest common factor of ln and $n!$ is 2 for $n \leq 50000$.

Interested readers are referred to:

- A note of the left factorial function by L Carlitz (Math Balkanica, volume 5 (1975) pages 37-42); and
- On some new left factorial propositions by Duro Kurepa (Math Balkanica, volume 4 (1974) pages 383-386; Mathematical Reviews, volume 58, number 10716).

The second problem, based upon a paper in *Mathematics of Computation*, volume 46, number 174, April 1986, pages 715-716 by Mok-Kong Shen produced many extensive replies. None of these solutions in-

cluded the 'numbers having 6043 digits or more' mentioned in the paper!

The additional solutions 93527, 228727 and 373457 requested were readily obtained.

Shen's paper establishes that each of the congruences: $2^{n-k_i} \equiv 1 \pmod{n}$ $i = 0, 1, 2, \dots$ where $k_0 = 2$ and $k_{i+1} = 2^{k_i} - 1$ has infinitely many solutions n .

After much thought, this month's prizewinner is Frank Webster of 125 Coniston Grove, Middlesbrough, Cleveland TS5 7DF who used an Acorn Electron programmed in Basic and Assembly language.

It should be observed that several very detailed theoretical submissions were received accompanied by well-documented computation (including

the first ever contribution from Spain). It was felt, however, that the submission of Frank Webster was the 'best' within the subjective criteria and the general aims of the 'Numbers Count' column.

It is hoped that non-prizewinners will continue to show an interest in the application of computing to number theory and encourage friends to share this interest!

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 Numbers Count articles; all letters will be answered in due course.

Isolated readers can be put in contact with others sharing the same interests. However, greater efficiency regarding published problems should result from contacting the prizewinner.

LEISURE LINES

Brainteasers courtesy of JJ Clessa.

A Merry Christmas and a prosperous New Year to all followers of Leisure Lines. This month's quickie (don't send answers - no prize) comes from Mr D Brown of Lincoln.

Quickie

The following equation can be made correct by the addition of a single straight line

$$2150 = 10 \ 10 \ 10$$

(Please note that you are not allowed to make the equals sign into a 'not equals'.)

Prize puzzle

An easy puzzle since it's Christmas - but it might require a micro.

Which two numbers, which together contain all the digits 1-9 used once only, when multiplied together produce the highest number, which also contains the digits 1-9?

Answers on postcards or backs of envelopes only to arrive not later than 31 December 1987.

Send your entries to: Leisure Lines, December 87, PCW Editorial,

VNU House, 32/34 Broadwick Street, London W1A 2HG.

Prize puzzle winner

A reasonable response - about 70 entries - for the puzzle in logical deduction. The killer was, of course, Betty Smith, as most entrants managed to fathom out.

The winning entry came from Mr O'Shaughnessy of Dublin.

Congratulations, Mr O'Shaughnessy - and to the also-rans, keep puzzling, it could be your turn next.

DIRECTORY OF USER GROUPS

MACHINES A-K

APPLE MACINTOSH

John Lewis, Macintosh User Group UK, 55 Linkside Ave, Oxford, OX2 8JE. (0865) 58027. £25. Professional.

APPLE MACINTOSH - BBS

David Nicholson-Cole, MacTel, 15 Elm Tree Avenue, West Bridgeford, Nottingham, NG2 7JU. Board (0602) 817696 or (0742) 350319; V21/22/23.

APPLE SYSTEMS

Sherla Hurst, Apple2000, PO Box 177, St Albans, Herts, AL2 2EG. (0727) 73990. Used to be called BASUG. Local groups; newsletter; BBS etc.

APRICOT

Apricot File, TP Group, PO Box 509, London, N1 1YL. 01-833 3501. Detailed 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, Withywood, Bristol, BS13 9DX. (0272) 647196.

ATARI LOCAL GROUPS

Association of Atari User Groups, 45 Coleburn Road, Lakenham, Norwich. (0603) 661149.

ATARI ST

Paul Glover, ST-Club, PO Box 20, Hertford. PD software.

CAMBRIDGE Z88

Roy Woodward, Z88 Owners' Club, 68 Wellington Street, Long Eaton, Nottingham, NG10 4NG. SAE.

COLECO ADAM

Keith Marner, UKAS, 33 Homer Rd, Croydon, CR0 7SB. Bi-monthly journal. SAE.

COMMODORE ALL MACHINES

Jack D Cohen, ICPU, 30

Brancaster Road, Newbury Park, Ilford, IG2 7EP. 01-346 0050 home; 01-579 1229 day. £10 +£1 entry fee.

COMMODORE AMIGA

UK Amiga Users Group, 66 London Road, Leicester, LE2 0GD. (0533) 550993 voice; (0533) 550893 Bulletin Board.

COMMODORE PLUS 4

Steve Kent, 203 Wolverhampton Road, Pelsall, Walsall, WS3 4AW. SAE.

COMPU-CORP

Compu-Corp University Users Group, c/o Compu-Corp, Cunningham House, Westfield Lane, Kenton, Middx, HA3 9ED.

CPM MACHINES

PIP, 28 Gordon Mansions, Torrington Place, London, WC1E 7HF. Supports Amstrad, Einstein, Osborne etc; BBS.

EINSTEIN

Graham Bettany, UKCUG, 80

Dales Road, Ipswich, IP1 4JR. £15. Monthly newsletter. SAE.

ENTERPRISE

Independent Enterprise User Group, PO Box 13, Crowborough, E Sussex, TN6 1QX. (08926) 3890 Mon-Sat 7pm-10pm.

HEWLETT-PACKARD HANDHELD

HPCC Membership Secretary, Gegg's Lodge, Hempton Road, Deddington, Oxford, OX5 4QG.

HITACHI MBE 16002 PC

Bruce Ainge, HICUPS, Foxberry House, 16 Foxberry Road, London. SE4 2SP. 01-691 5202.

IBM PC

IBM PC User Group, PO Box 830, London, SE1 0DB. 01-620 2244. £25 personal; £95 corporate. Professional.

JUPITER ACE

Mr J R Charter, Jupiter ACE Users Group, 8 Abney Close,

DIRECTORY OF USER GROUP



Cheedale Ave, Chesterfield,
S40 4PF. (0246) 37555. SAE.

JUPITER ACE

Ian Jones, Jupiter Ace User
Domain Resource Centre, 21
Dene St, Paillon, Sunderland,
SR4 6JB. 091-565 2833. SAE.

MACHINES L-2

MEMOTECH

Phil Eyres, Memotech Owners
Club, 23 Denmead Road,
Harefield, Southampton,
SO2 5GS. SAE.

MOTOROLA 68xxx MICROS

Rick Applegate,
68 Microgroup, 8 Great Cob,
Springfield, Chelmsford,
Essex. BBS 01-316 7402.

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) 624968.

NEWBRAIN

Gerald McMullon, NBUG,
36 Armitage Way, Cambridge,
CB4 2UE. SAE.

NEWBRAIN

OPEN#STREAM, 1 Ranelagh
Road, Deal, Kent, CT14 7BG.

ORIC

Gary Ramsey, IOUG,
1 Kingsway Crescent,
Furnage, Manchester,
M19 1GA. Newsletter.

OSBORNE/CPM/MSDOS

Jeremy Browne, BOOG Ltd.,
102a Aldershot Road, Hants,
GU13 9NY. (0252) 621745.

PSION ORGANISER

Mike O'Regan, Independent
Psion Organiser User Group,
130 Stapleford Lane, Beeston,
Nottingham, NG9 6GB. Monthly
newsletter. SAE.

RESEARCH MACHINES (RML)

RML National User Group,
Steve Burrows, Wirral CAE
Services Ltd, Gorse Lane,
Wallasey, Wirral, L44 4HE.
051-639 8237. All RML micros.

SAMURAI S16

Andrew Lee, Samurai S16
Self-Help User Group,
57 Darnley Rd, Gravesend,
Kent, DA11 0SF. SAE. S16 is
discontinued MSDOS non-PC.

SANYO MBC-550

Mr M H Syed, Wistaria, 53
Acacia Grove, New Malden,
Surrey, KT3 3BP.
01-942 9009. Informal group.

SHARP

Andrew Fergusson, Sharp
User Group, 11 Harcourt Clo,
Henley on Thames, Oxon, RG9
1U2. (0491) 574850. £6.
60pp Newsletter. Software.

SINCLAIR QL + COMPATIBLES

Brian Pain, Quanta, 24 Oxford

Street, Stony Stratford,
Milton Keynes, MK11 1JU.

SORD M-23

Mr B Nicholson, c/o Aberdeen
Reservoir Interpretation
Centre, Woodlands Drv, Kirk-
hill Industrial Estate, Dyce,
Aberdeen. (0224) 771117.
Informal group.

TANDY/GENIE/AMSTRAD/MSDOS

David Washford, NATGUG, 6
Houston Way, Frome, Somers-
et, BA11 3EU. (0373) 72739.
Newsletter. PD software.

TANGERINE

David Cawthorne, 40 West-
bourne Rd, W Kirby, Wirral,
L48 4DH. 051-625 7311.
Informal newsletter £2/copy.

TEXAS TI99/4a

Clive Scally, TI99/4a
Exchange, 40 Barrhill,
Patcham, Brighton, BN1 8UF.
(0273) 503968. £6. Newsletter.

TEXAS TI99/4a

Gordon Pitt/Peter Brooks,
International TI User Group,
259 Sneyd Lane, Bloxwich,
Walsall, WS3 2LS. £12.50.
Bloxwich 476373. Newsletter.

TRANSPUTER

Dr Howard Oakley,
Transputer Users Group,
Brooklands Lodge, Park View
Close, Wroxall, Ventnor, Isle
of Wight, PO38 3EQ. £5.

LOCAL CLUBS

DETAILS OF YOUR LOCAL CLUB

SAE please to John Dale,
Association of Computer
Clubs, Banc-y-rhosyn,
14 Bron Y Glyn, Bronwydd
Arms, Carmarthen, SA33 6JB.

AMSTRAD

AMSTRAD (SERVICES USERS)

LtCol Charles Joint, Services
Amstrad Society, Leroy TA
Centre, Sturry Rd, Canter-
bury, CT1 1HS. (0227) 61397.
£5. Newsletter.

AMSTRAD 1512/1640

1512 Independent User
Group, PO Box 55, Sevenoaks,
Kent, TN13 1AQ. (0732) 63157.
£22 pers; £25 business.

AMSTRAD ALL MACHINES

National Independent Amstrad
User Club, 1 The Middle Way,
Wealdstone, Harrow, HA3 7EG.
£9 (specify machine). A5
SAE. Discounts. Newsletter.

AMSTRAD ALL MACHINES

Jeffrey M Green, Advantage,
33 Malyns Close, Chinnor,
Oxon, OX9 4EW. (0844) 52075.
Newsletter; software lib; SAE.

AMSTRAD BUSINESS USERS

Amstrad Professional User
Club, Enterprise Hse, PO Box
10, Roper St, Pallion Indust-
rial Estate, Sunderland, SR4
6SN. 091-510 8787. £39.95.

AMSTRAD CPC

Chris Bryant, Amstrad CPC
Computing Newsletter,
11 Havenview Road, Seaton,
Devon, EX12 2PF. Large SAE
for sample newsletter.

AMSTRAD HOME USERS

Jeff Walker, WACCI, 75 Great-
fields Drive, Hillingdon,
Uxbridge, UB8 3QN. (0895)
52430. £12. Newsletter.
Special offers. 'Good fun.'

AMSTRAD LOCAL GROUPS

Amstrad Groups Federation,
4 Sutton Road, Gorton,
Manchester, M18 7PN.

AMSTRAD PCW

Robert Mobberley, PCW Users
Group, 37 Clifford Bridge
Road, Binley, Coventry,
CV3 2DW. (0203) 441417.
Monthly newsletter. SAE.

AMSTRAD PCW

Ron Morland, The PCW
Computer Club, 12 Deneve
Avenue, Poole, Dorset,
BH17 7LR. SAE.

AMSTRAD PCW

Chris Bryant, PCW File,
11 Havenview Road, Seaton,
Devon, EX12 2PF. £2 w/lt
free PD software. Large SAE
for sample newsletter.

AMSTRAD PD SOFTWARE

Peter Vass, Computer
Services (Scotland), PO Box
244, Glasgow.

AMSTRAD SOFTWARE

Amstrad User Software
Database, PO Box 11,
Gosforth, Newcastle-upon-
Tyne, NE3 1RP. 091-285
6017. Fido bulletin board.

SOFTWARE & NETWORKS

ASHTON TATE SOFTWARE

Clare Winter, Servcelline,
Ashton Tate UK Ltd, 1 Bath
Road, Maldenhead, Berks.
(0628) 33123. Online support
via Telecom Gold.

C LANGUAGE

Martin Houston, CUG, 36
Whetstone Close, Farquhar
Road, Edgbaston, Birmingham,
B15 2QN. £10.

ECONET

Michael Ryan, Econet User
Group (Scotland), Balkeerie
Cottage, Eassie, by Forfar,
Angus, DD8 1SR. UK-wide gp.

ENET (like Econet)

Mr T K Boyd, Enet (Amcom)
User Group, Seaford Cottage,
Petworth, West Sussex, GU28
0NB. Frequent info sheet in
return for SAEs to despatch.

LOTUS PRODUCTS

Lotus User Group, 79-80
Peascod St, Windsor, Berks,
SL4 1DH. (0753) 841686. £95.
Magazine, helpline etc.

LOTUS PRODUCTS

World of Lotus, Telecom Gold
Ltd, 60-68 St Thomas Street,
London, SE1 3QU. Online
(Gold) support £9.60/hour.
Free macros, drivers etc.

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 SOFTWARE

PO-SIG, Winscombe House,
Beacon Road, Crowborough,
Sussex, TN6 1UL. (08926)
63296. Disk conversions.

SINCLAIR SPECTRUM SOFTWARE

Nell Smith, The One & Only,
42 Hayes Road, Bromley, BR2
9AA. Software exchange. SAE.

SOFTWARE VIA BBS

Frank Thornley, Compulink,
67 Woodbridge Rd, Guildford,
GU1 4RD. BBS (0491) 573337
V21/23. voice (0483) 65895.

SPECIAL INTEREST

AMATEUR RADIO

Trevor Tugwell (G6TJT),
AMRAC, 6 Kestrel Drive,
Mudford, Christchurch,
Dorset, BH23 4DE. Tel Phil
Bridges G6DLJ (0703) 847754.
BBS V21 (0736) 518818.

CHRISTIAN USERS

Philip Clark, Christian Micro
Users Association, 138 Bram-
well Gdns, 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.

DISABLED

Jeff Hughes, Special Needs
User Group, 39 Eccleston
Gardens, St Helens,
WA10 3BJ. (0744) 24608.

EDUCATION - VARIOUS MICROS

TECUG, 27 Ingoldsby Road,
Gravesend, Kent, DA12 2LF.
Schools/colleges support grp.
£50. Sample pack £3.65.

GENEALOGISTS

Computer Group, Society of
Genealogists, 14 Charterhouse
Buildings, London, EC1M 7BA.
01-251 8799. Meets monthly
re micros to trace ancestors.

GENERAL HARDWARE

Andy Leeder, Amateur
Computer Club, Church Farm,
Stratton St Michael, Norwich,
NR15 2QB. Large SAE.

LOCAL AUTHORITIES

Local Authority Microcom-
puter User Group, c/o John
New, Borough Engineer's
Dept, Municipal Offices, North
Quay, Weymouth, Dorset,
DT4 8TA. (0305) 785101 x 272.

MAGAZINE INDEX

Find-It, Orkney Computing,
60 Albert Street, Kirkwall,
Orkney, KW15 1HQ. (085 686)
268. Index to PCW & 5 other
business micro mags. Sent
out on disk - requires PC.

PRESTEL

Andy Leeder, ClubSpot 810,
Church Farm, Stratton St
Michael, Norwich, NR15 2QB.
Hobby database on Prestel
(key #810*). Clubs may be
able to edit own free pages.

SEAFARERS

Mr C E Watson, 29 Doods
Place, Doods Road, Reigate,
Surrey, RH2 0NS.

The user groups were well-supported at this year's PCW Show. Rupert Steele takes a retrospective look at what was on offer.

This month the Directory of User Groups has been extensively revised. I hope that the new layout will make it easier for those using it to solve a problem or find a user group. The entries are now listed alphabetically by topic rather than by group name, so that if, for example, you need help with your Commodore machine, you look it up under C in 'Machines A-K'. The fact that the group you want is called ICPUG won't get in the way of looking it up.

User Group organisers will, of course, have to do a little thinking to find their entry. No doubt you'll let me know if you think I have classified your group inaccurately.

Unfortunately, there may not be space for the whole directory each month, even in this new format, but we have managed to present a full listing in this issue.

It is most important that I get information as well from members of user groups. While I try in the text of the column to highlight what groups are up to, I do know that some go 'dead'. Obviously, I cannot guarantee that all the groups in the directory are fully up to the mark, but I do try to remove those about whom I receive a volume of complaint. In the same way, if your group is not listed, let me know. Oh, yes, and do tell me how you like the new directory.

Show groups

This year's PCW Show contained a good many user group stands. Most of the groups were located in the hobby area, kindly made available by the exhibition organisers, although those large business groups that attended had their own (paid-for) stands.

Among the hobby stands, most of our old friends were present. The Association of Computer Clubs was there with its online database of over 700 local and national clubs. It reported a good deal of interest, including a number of sponsorship enquiries. The ACC's address is given in the directory under 'local clubs'.

Next door was ClubSpot 810 — the electronic publishing arm of the ACC which runs one of the most successful areas on Prestel from page *810#. This is a remarkable achievement for a voluntary organisation, and owes a lot to the dedicated efforts of the team involved. Among ClubSpot's present activities are two new hobby spot areas, one about

making music with your computer on *810921#, and a 'Poet's Corner' on *810922#. The club's adventure helpline is also running a National Computer Adventurers' Convention on Saturday 28 November. Details of the convention are available from David Wilkins on (01) 642 3102, or at 21 Village Row, Sutton SM2 6JZ. For other ClubSpot enquiries, see the directory under 'Special Interest'.

One new face at the PCW Show was Swafax, a hobby satellite picture and information service based at Swadlands School in Kent. Swafax had all sorts of displays, quite reminiscent of Kettering Grammar School's satellite-tracking activities. More details are available from Victor Young, Swafax, Lenham, Kent. There is a V23 bulletin board on (0622) 850440.

Another group I had not met before was the HPCC — the UK club for users of Hewlett-Packard handheld computers and calculators. If you've not heard of HP handheld machines before, these beasts are highly powerful derivatives of the HP super-calculators of ten years ago. They look like calculators (although some have abcdef-layout alpha keyboards) and use Reverse Polish notation, which makes them a little inaccessible but much faster for an expert to use. The HPCC group provides support (including machine code programming) for a range of these machines, including the HP28C, HP41, HP71 and HP75. The group's address is in the directory.

Also present were a couple of Amstrad groups (both listed in the directory). On its own paid-for stand was the Amstrad Professional User Club, complete with endorsement by Alan Sugar. Definitely aimed at the business user, the group operates direct sales as well as a magazine and 'office hours' technical hotline. If you prefer your user group to be non-profit and independent, you could have visited the National Independent Amstrad User Club in the ACC area. It covers all the Amstrad machines — CPC, PCW and PC — and has a monthly newsletter and a help line.

The Independent Commodore Group, ICPUG, was of course in force in the ACC area. This group is one of the oldest in the business, having started at the time of the Commodore PET (remember that!). Commodore started its own user group 'PUG' or Pet User Group, but this was soon

swept aside by the spirited approach of the Independent 'IPUG' which later became ICPUG. (Of course, the Amateur Computer Club, founded in 1972, has an even longer pedigree...)

Back in the paid-for area was the Macintosh User Group UK. Another business-orientated club, this produces a good quality bi-monthly newsletter, *The Mac Times*, which is not afraid to criticise Apple when it is warranted. Being a Mac magazine, it is of course laser-printed and offers to undertake laser printing for its members. Having been born and bred on 'real' (that is, difficult to use) computers, I found the newsletter refreshingly clear.

Not far away was the IBM PC User Group, which now claims 7000 members, making it possibly the largest user group in the UK. The newsletter, which is a little thinner than some of the other groups' products, is augmented by a software library of over 5000 programs. The magazine contains some interesting and useful information, which is not limited to IBM, but covers the various clones — including the first details of VGA clone boards and a complimentary review of my Dell 386. I await with terror the review which says that I bought the wrong machine. Details of the IBM club are in the directory.

And, finally, from the PCW Show, with my apologies to the user groups who were there and who I have failed to mention, I was handed a leaflet by the Atari Correspondence Club. This club uses the acronym ACC but, to avoid confusion, I should emphasise that it is not connected with the Association of Computer Clubs. The group appears to be a correspondence version of 'talkabout' for 8-bit Atari users, although there is also a tape/disk newsletter and discounted sales of software. To find out more, call it on the number in the directory.

To round off this month's column, Wolfgang Lernerz, who runs a French QL Users Club, has written to me. Apparently, PCW is widely read in France, so write to QL Contact France, 38-40 Rue Stephenson, 75018 Paris, and Monsieur Lernerz will put you in the picture.

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.

UK BULLETIN BOARDS

An up-to-date list of UK bulletin boards, compiled by Peter Tootill.

London

Airtel - TBBS (01) 200 3439
24 hrs; 3/12/75; Pilots' area
Brixton ITeC (01) 735 6153
24 hrs; 12/75
Communitel (01) 968 7402
24 hrs; 12/75
Crystal Tower (01) 886 2813
24 hrs; 3-24
Gen interest; Apple & IBM
Dark Crystal Fido
(01) 207 2989; 24 Hrs; 3-12
Distel (01) 679 1888
24 hrs; 300; Display
electronics- Commercial
3/12/75 on 01 679 6183
Gnome at home (01) 888 8894
24 hrs; 12/75
Hackney BBS (01) 985 3322
24 hrs; 12/75
Health data (01) 986 4360
24 hrs; 12/75
Hendon Fido (01) 200 7577 &
(01) 220 8281 24 Hrs; 3/12/75
Opus system
Infotel ROS (01) 581 3376
24hrs; 3/12/75
ITCU Training (01) 960 4742
24 hrs; 12/75
Lots of ITeC training
materials
Link Fido (01) 659 6992
24 hrs; 3-12
London Wand (01) 863 0198
24 hrs; 3-24 Wildcat BBS
Marctel (01) 346 7150
24 hrs; 3/12/75 FBBS system
MBBS Mitcham (01) 648 0018
24 hrs; 3/12/75
Metrotel (01) 941 4285
24 hrs; 12/75
NBBS London (01) 883 5290
24 hrs; 3/12/75
NNBBS London (01) 455 6607
24 hrs; 3/12/75
Nottingdale Tec Ctr
(01) 968 6033; 24hrs;
12/75; Communitel system
OSI Lives (01) 429 3047
24 Ring back; 300
Owlitel (01) 927 5820
24 hrs; 12/75
PC Access (01) 853 3965
24 hrs; 3-24 For PC users
Poly Fido (01) 580 1690
24 hrs; 3-12
Tacom (01) 573 8822
MF: 7pm-8am; WE: all day Sun.
300 Interak micro section
TBBS Rovoreed (01) 542 4977
24 hrs; 3-24
TBBS London (01) 348 9400
24 hrs; 3-12
Techno Line (01) 450 9764
24 hrs; 12/75; Commercial
Techno-line 2 (01) 452 1500
MF: evenings; WE: 24 hrs
12/75 Commercial
The Star BBS (01) 586 6882
24 hrs; 3/12/75; Atari ST area
The Village (01) 464 2516
24 hrs; 3-24
Atari 520ST based
Twilight Phone Fido
(01) 624 5338 24 hrs; 3
WBBS Wimbledon (01) 542 3772
Sat 7pm - Mon 8am; 3/12/75

The Midlands

Access Fido; Worcester
(0905) 52 536 24 hrs; 3-24
midi section
Bloxam; Banbury (0295) 720812
Daily 10pm-1am; 300
CBABBS; Birmingham
(021) 430 3761 24 hrs
(not Thurs); 300 Atari based
can send mail to Canada
Digital Matrix Fido
Birmingham (021) 705 5187
24 hrs; 3/12/75
Compu-store on-line

Intel-Ace; Cundle

(0832) 73 003 MF: 6pm-8am
WE: 24 hrs; 12/75
MacTel Green Box; Nottingham
(0602) 455444; 24hrs; 3-24
Multi-line system; Mac users
TABBS; Tamworth; (0827) 281713
9pm-8am; 12/75; Runs on Amstrad
464/664; Trivia
The City; Birmingham
(021) 353 5486 24 hrs; 300
Atari 8 bit & ST; Lonely Hearts
Key Board; Milton Keynes
(0908) 668 398
8pm-8am exc Tues and Thurs
12h Runs on a Spectrum.
MacTel HQ; Nottingham
(0602) 817 696 24 hrs; 3-12
Macintosh Users
Norview; Northants
(0604) 20 441; 24 hrs; 12/75
TUG II; Birmingham
(021) 444 1484; 24 hrs; 3/12/75
Amstrad; Tandy; online Adventure
Wolverhampton BBS
(0902) 745 337; 24 hrs; 3/12/75
MS-DOS; CP/M; Commodore areas

The North East

49'ers; Cleveland
(0287) 43 920 MF: 10pm-4am
WE: 10pm-4am; 3/12/75
FBBS colour for BBC users
Forum-80; Hull (0482) 859 169
MF: 7pm-11pm; WE: 1pm-11pm
3/12/75
Midnight-8am on Bell 103 tones
Kirklees ITeC; Batley, Yorks
(0924) 442598; 24hrs; 12/75
Information Technology Centre
LEMS Fido; Leeds
(0532) 600 749 Daily 10pm-8am
3/12/75
Hammet; Hull (0482) 465 150
MF: 6pm-8am; WE: 24 hrs; 3/12/75
Radio Hams
LEMS BBS; Leeds; (0532) 600749
24hrs; 3/12/75; Wildcat system
Log On Tyne Fido; Tyneside
(091) 477 3339 24 hrs; 3-24
MacTel Sheffield
(0742) 350 319 24 hrs; 3-24
For Macintosh Users
MBBS Leconfield (0401) 50 745
24 hrs; 3/12/75
OBBS Bradford (0274) 480 452
24 hrs; 3/12/75
Colour for BBC users
On-Line Systems; Cleveland
(0429) 234 346; 24 hrs; 3-24
Viewdata/scrolling
Stockton Fido; Teeside
(0642) 588989 24hrs; 300; MSX
The Sharrow BBS; Ripon
(0765) 707 887 24 hrs; 3/12/75
Viewdata & scrolling BBC based

The North West

Bolton BBS (0204) 43082
MF: 8pm-8am; WE: 24 hrs; 3-24
8am-8pm on ring back
CNOL; Lancaster (0524) 60 399
24 hrs; 300
Clinical BBS for medics
Fido Compulink North; Liverpool
(051) 220 3761 24 24 hrs
3/12/75
Fido Manchester (061) 773 7739
24 hrs; 3/12/75
Mektronik Electronic
design cons
Liverpool Mailbox
(051) 428 8924 24 hrs; 3-24
UK TBBS HQ system
Matrix; Liverpool
(051) 737 1882; 24 hrs; 3/12/75
Multi-user games; 4 lines
OBBS Manchester
(061) 427 1596 24 hrs; 3/12/75
Portal; Wirral (051) 355 0911
MF: 8pm-6am; WE: 24 hrs; 3/12/75
Pyramid; Leigh; Lancs
(0942) 609 611 24 hrs; 3

Stoke ITeC (0782) 265 078

24 hrs; 12/75
TeePee Link; Manchester
(061) 494 6938 24 hrs; 3-24
TeleMac 15; Macclesfield
(0625) 33 703 24 hrs; 3/12/75

The South East

Acorn BBS; Cambridge
(0223) 243 642 24 hrs; 12/75
Andrew's Fido; Aylesbury
(08444) 4833; 24hrs; 3/12/75
IBM-based system
Apple Crackers Basildon
(0282) 778956; 24hrs; 3-12/75
Apple II/IIIGS; also on
781318 and 771724
ARCNET; Colchester
(0376) 518 818 24 hrs; 300
Audio Output; Weybridge
(0932) 244906; 24hrs; 3/12/75
Viewdata & scrolling
Banet Board; Oxford
(0865) 882 872 24 hrs; 3-24
FidoNet UK coordinator
BBS09; Portsmouth
(0705) 736 025 MF: 7pm-7am
WE: 24 hrs; 300 059; Sci-Fi
Dragon; CoCo sections
BITEC; Basildon (0268) 22 177
24 hrs; 12/75
BITEC; Basildon
(0268) 25 122 24 hrs; 300
BOOG BB; Fleet; Hants
(0252) 626 233 24 hrs; 3/12/75
Osborne; MS-DOS; CP/M areas
C A T S Fido; Maidenhead
(0628) 824 852 24 hrs; 3/12/75
V22/bis coming
C View Rochford; Kent
(0702) 54 6373 24 hrs; 12/75
CATS BBS*; Maidenhead
(0628) 824852; 24hrs; 3/12/75
V22bis coming
CIX; Guildford (0483) 573 337
or 338 24 hrs; 3-24; multi-user
CP/M User Group; Windsor
(0753) 868 196 24 hrs; 3-24
CP/M and MS-DOS software
Dataseft Opus; Ilminster
(04605) 4615 24 hrs; 3-24
Inc Datatalk Support area
Dr Solomon's Fido; Amersham
(02403) 4946 24 hrs; 3-24
mostly for IBM programmers
Fido PD Software; E Grinstead
(0342) 315 636 24 hrs; 3-24
PD software database
Folkestone TBBS (0303) 42690
24hrs; 3-12; Portable SIG
Gosport Apricot BBS
(0705) 524 805; 24 hrs; 300
MacTel Phoenix; Ipswich
(0473) 610139; 24hrs; 3-24
Multi-line; Mac users
LABBS; Surrey (0883) 844 164
24 hrs; 3/12/75; The Prisoner
Lasermail Fido; Worthing
(0903) 212 552 24 hrs; 3/12
Maptel; Southend (0702) 552 941
24 hrs; 300; commercial system
Music World; Weybridge
(0932) 245593; 24hrs; 12/75
Viewdata & scrolling
MBBS Essex; Brentwood
(0277) 228 867 24 hrs; 3/12/75
subscribers only
Patnet; Colchester
(0206) 844 813 Daily 8pm-8am
12h; runs on a Spectrum
PD-Sig Fido I; Crowborough
(08926) 61 149 24 hrs; 3/12/75
PD software interest group
PD-SIG System; Uxbridge
(0895) 420 164 24 hrs; 3-24
also on 0895 52685
Pete's Place; Colchester
(0206) 862 354 24 hrs; 3-24
good IBM SIG
QMC Viewdata; Basingstoke
(0256) 471 757 24 hrs; 12/75

Queen Mary's College

RICBBS; Basildon (0268) 710 637

MF: 5pm-10pm; WE: 24 hrs
RSGB; London (0707) 52 242
24 hrs; 12/75
SBBS - Watford (0923) 676 644
9pm-11am plus 11pm-6am daily
3/12/75
Sentinel; Maidenhead
(0628) 781429; 3/12/24
IBM PC; FidoNet
Staines BBS (0784) 65794
24hrs; 3-24
TBBS Gamlingay; Sandy; Beds
(0767) 50 511 24 hrs; 3-24
Trinity 2; Faringdon
(0367) 81 507 24 hrs; 3/12/75
Sponsored by Courier Consultancy
Trinity 3; Reading
(0734) 484 847; 24 hrs
3/12/75 Multi-choice bedtime
story
Typnet (0689) 50866
24 hrs; 300; Budget Typsetting
Vampire's Coffin; Weybridge
(0932) 245 593 24 hrs; 12/75
Viewdata & scrolling

The South West

CBBS South West; Exeter
(0392) 53 116 24 hrs; 3/12/75
TBBS Blandford; Dorset
(0258) 54 494 24 hrs; 300
Blandford Computers
Trinity 1; Exmouth
(0395) 272 611 24 hrs; 3-12

East

BABBS; Felixstowe
(0394) 276 306 24 hrs; 3-24

Channel Islands

Jersey Fido (0534) 39 389
24 hrs; 3/12/75

Scotland

Aberdeen ITeC (0224) 641 585
24 hrs; 12/75
Aberdeen Commodore
(0224) 781 919 24 hrs; 300
Commodore 64 based
Betelgeuse 5; Inverness
(0463) 231 339 24 hrs; 3/12/75
Kirklees ITeC; Batley
(0924) 442598 24 hrs; 12/75
Information Technology Centre
Livingstone BBS; Livingstone
(0506) 38 526 24 hrs; 300
People's Palace; Glasgow
(041) 956 6537 Daily 6pm-8am
3/12/75 Colour

Wales

Bulletin AT Fido; Swansea
(0792) 297 845 MF: 6pm-9am
WE: 24 hrs; 3-12
Capital Data Line; Cardiff
(0222) 461 824 24 hrs; 300
computer repair company
Cardiff ITeC (0222) 464 725
24 hrs; 12/75
Communitree; Powys
(0874) 711 147; 24 hrs; 300
Cymrutel; Colwyn Bay
(0492) 49 194; 24 hrs; 12/75
FBBS Swansea (0792) 203 953
24 hrs; 3
MGBS Mid Glamorgan; Ferndale
(0443) 733 343 6pm-1am daily
300
Proteus Opus*; Porthmadog
(0766) 514154 24 hrs; 3-24
ANSI colour graphics

Northern Ireland

Deep Thought Fido; Bangor NI
(0247) 467 863 24 24 hrs; 3-24
PC-DOS; CP/M; BBC; Tech help Sigs
PBBS 1 Portadown (0762) 333 872
Daily 10pm-1am; ring back; 300

The **TWIN** Classic



No wonder Tweedledee is looking pleased with himself, he's found out the 7 reasons why you should get the TWIN. A program so similar to 1-2-3™ that if you know how to use 1-2-3™ then you know how to use the TWIN.

1. A spreadsheet amazingly similar to 1-2-3
2. Fantastic presentation level graphics
3. 1-2-3 Macro compatible
4. No copy protection
5. Reads and writes 1-2-3 files directly
6. Site licensing plans available
7. It only costs **£59.95**

(exc. VAT & postage)

The TWIN Classic is part of the Integrated 7 family of programs. For more information about this — and other MOSAIC products — contact 0604 830496.

PC MANAGEMENT

"Clones Challenge LOTUS"

The first clone for LOTUS 1.2.3. is out, and is being sold under the claims of "amazingly similar to 1.2.3. which it is. Software clones of this kind could have a major effect on the market for all PC software. The TWIN was developed by MOSAIC SOFTWARE".

PC MAGAZINE

"Companies currently using 1.2.3. could safely introduce TWIN into the same environment. In spreadsheet and database functions it is a true 1.2.3. clone. Represents excellent value for the money. A powerful spreadsheet with very good graphics".

WHAT'S NEW IN COMPUTING

"The TWIN offers the chance to buy a program which has a spreadsheet compatible with 1.2.3. and a number of improvements as well".



30-DAY MONEY BACK GUARANTEE

YES, you may try the TWIN on your IBM PC/XT, Amstrad PC1512 or compatible (min 512k RAM is needed) for 30 days. If you find that TWIN does not perform in accordance with our claims and provided that all goods are returned to us (in a good condition) within 30 days of purchase, we will refund your purchase price.

Mosaic Software Inc. PO Box 97, Northampton NN4 0YY, England.
MOSAIC and the TWIN are Trademarks of MOSAIC SOFTWARE INC.
Other brand and product names are Trademarks of their respective holders.

The TWIN offers so much more for so much less

Send this coupon with your cheque for £69.95 (inc. VAT & postage) made payable to: MOSAIC SOFTWARE INC. and we will send you your TWIN Classic. (Allow up to 14 days for delivery.)

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

POST CODE _____

TELEPHONE _____ PCW 12

Post to: MOSAIC SOFTWARE INC. PO Box 97, NORTHAMPTON NN4 7YY, ENGLAND Tel: 0604 830496

PC/AT COMPATIBLES

BREAKING THE PRICE BARRIER!!!!!!
MANUFACTURED IN THE UNITED KINGDOM
USING HIGHEST QUALITY JAPANESE PRODUCTS
NEW LOW PRICES

PC/XT £355
PC/XT, 20MB,
MONITOR TTL £580

★ 8088/V20 ★ 640k
★ "NEC" FLOPPY DRIVE ★ "SERIAL/PARALLEL" PRINTER PORT
★ HERCULES GRAPHICS DISPLAY ADAPTOR ★ KEYBOARD NUMS +
CAPS LOCK ★ 8 SLOTS ★ FLAT SCREEN MONITOR



AT/TURBO £590
WITH 20MB
MONITOR £890
12 MHZ AT 40MB £1025

★ DYNAMIC SPEED CONTROL ★
★ 80286 6/8/12 MHZ ★ 512K RAM EXPANDABLE TO 1M
★ LEGAL BIOS ★ FLOPPY DRIVE 1.2M
★ PRINTER PORT ★ GRAPHICS DISPLAY ADAPTOR ★ AT STYLE KEYBOARD
WITH SEPARATE CURSOR PAD
★ MOUSE £35 ★ 40MB NEC 5146 £399 30MS UPGRADE £250 ★

★ NEW 386 TURBO £2150 ★

40MB HARD DISK £399 (22MS) EGA MONITOR AND CARD £400.
MONITOR, 40MB 30MS HARD DISK, 640K RAM, 1.2MB FLOPPY KEYBOARD, DOS 3.2

ALL SYSTEMS ARE TOTALLY COMPATIBLE

HI REST TTL MONITOR £69 20MB HARD DISK £299

BILINGUAL SYSTEMS EXPORT ORDERS WELCOME

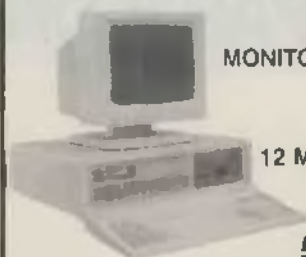
12 MONTHS WARRANTY AND SUPPORT INCLUDED PRICES EXCLUDING VAT
FOR ORDERS AND ENQUIRIES PLEASE CONTACT

C.A.S. COMPUTER POINT LTD

51 DARTMOUTH ROAD, LONDON SE23 3HN

01-291 5777 FAX 01-708 2734 TLX: 8952387 ANSWER G

Call for best prices on software.



RGP

59 EXETER STREET, PLYMOUTH

DISTRIBUTIONALL DISKS CARRY A LIFETIME
FREE REPLACEMENT GUARANTEE

** TEL (0752) 225732 **

DISKS

3.25" - BOX OF 10

PRICE PER BOX

	48 TPI	96 TPI
1-4	7.55	17.75
5-9	6.75	17.00
10-24	5.75	16.00
25-49	5.35	15.55
50 plus	4.75	15.00

BULK PACKED

PRICE EACH

	48 TPI	96 TPI	720K
50 DISKS	49p	1.59	1.75
100 DISKS	45p	1.52	1.59
500 DISKS	34p	1.45	1.45
1000 DISKS	30p	1.38	1.39

FOR HIGHER QUANTITIES
CALL US FOR LOWER
PRICES PLUS OTHER
FORMATS.

DISK BOXES

PRICE PER BOX

HOLDS 40 5.25"	10.50
HOLDS 50 5.25"	11.50
HOLDS 70 5.25"	12.50
HOLDS 90 3.50"	12.95
HOLDS 100 5.25"	13.50

PRINTER STANDS AND
CABLES ALSO AVAILABLE.10% DISC. FOR 5- BOXES
25% DISC. FOR 10- BOXES** COMPETITIVE PRICING
WITH LARGE DISCOUNTS ON
BULK PURCHASES. ****SOFTWARE**

COMPSOFT

BUDGET RANGE

BOOKWORKER	115.00
DELTA 4	57.00
DELTA GRAPH	39.00
DOMINO	57.00
1 UP	27.50

TRUST RANGE

JUSTWRITER	28.00
TRUST DESKTOP	15.00
TRUST	
DATABASE	28.00
TRUST SPELLING	
CHECKER	13.00

OTHER PRODUCTS

LABELS	45.00
TURBOCAD	
JUNIOR	59.00

PRINTERS

EPSON LX-800	192.50
EPSON FX-800	303.80
EPSON EX-800	388.50
STAR NL-10	173.60
STAR NX-15	272.30
STAR ND-15	342.30
STAR NR-15	412.30
JIUG 6100	299.25
JIUG 6200	434.25

ALL PRICES EXCLUDE VAT AND POSTAGE

STOP!!Don't throw out your used
Laser Toner CartridgesWe can refill them for only £50
and save you 40-50% and More!!

Bear River Technology Ltd.
Formerly International Laser Products Ltd.
9A Church Street
Cobham KT11 3E6
(0932) 66118 (3 lines)

Service applies to Canon based printers only
[Apple, Laserjet, QMS, Qume, etc.]

All cartridges unconditionally guaranteed

Ask about our FREE pickup and delivery service!

Paragon Provides More...

Mitac's small-footprint Paragon family provides you with a complete line of elegant office solutions. What's more, Mitac adds proven reliability backed by our years of OEM manufacturing experience.

...386 Superpower

Paragon 386 brings new speed and power to the world of small-footprint microcomputers.

...On-board Graphics

Paragon's 286's and 8088 provide on-board graphics for vivid color and high resolution on virtually any PC monitor.

...Flexibility

A host of other on-board features get your system up and running right away, leaving five expansion slots free. Storage options include 5-1/4" and 3-1/2" high-capacity disk drives.

...Reliability

Mitac insures the quality of every Paragon microcomputer by subjecting it to the same 5-phase test performed for our largest OEM's — and we quietly manufacture for some very large firms.

...Support

Mitac's international branch offices serve your local needs. Currently Mitac is seeking new distributors in many parts of the world. Contact our nearest branch office

**PETITE... PRODUCTIVE... PERFECT... PARAGON**

small-footprint personal computers

BRANCH OFFICES: North America • Distributors: American Mitac Corp. (800) 321-8443 • OEM/Private Label Mitac Research Corp. (408) 432-1506/7 • Europe • Mitac GmbH (W.G.) (0211 41-2086) • Mitac Japan Corp. (03-586-1831) • HEADQUARTERS • Mitac International Corp. Taipei • 886-2-501-8231

DISTRIBUTORS: Asia/Pacific • Australia-Tech Pacific Pty Ltd (036) 606055 • New Zealand-Australian Pacific Computers (09) 77248 • Singapore & W. Malaysia-ACS Computer Pte Ltd 2741144 • Compugen, Inc. Computer System Sdn Bhd (837) 19740-2 • Indonesia-Jakarta P.T. Multistar Corp. 578080 • Thailand-Bangkok-Computer Management Limited 253-0614 • Philippines-Manila-Integrated Computer Systems, Inc. 722-4111 • Hong Kong-Innoprima Ltd 5-474112 • East Malaysia-Capital Assoc. Int'l Sdn Bhd 420215 • Pakistan-Karachi-Selling Business Systems 326071 • Europe/Middle East/Africa • Italy-Dilog Italia Srl 011-850-3933 • Lebanon-Advanced Computer Systems and Electronics 344887 • Oman-Ahmad Trading Establishment 709048 • South Africa-Micronics (PTY) Ltd 864-2150 • Spain-ELSA 52-338-308 • Sweden-Beloma Data AB 08-970280 • Switzerland-Retrone AG 01-492-3211 • United Kingdom-Intelligence Ltd 0532-560891 • Switzerland-Schneider • PC Distribution (Birmmham) 021-742-0791 • Holland-AVT 0709-54551 • West Germany-Helton Computertechnik GmbH 089-858060 • CompuLink Computer Systems (United Kingdom) 0242-1037 • Central/South America • Argentina-Hiscomp S.A. 54-1-35-1873 • Chile-Educon Y Servicos Sncar Chile Ltd 56-2-251-6343 • Mexico-Digital Vision S.A. 52-5-514-1040 • Panama-Cam S.A. 507-27-7453 • Peru-Chico Data S.A. 51-14-710157 • North America • Unisac Systems-Microstar Computer Technology 413-342-9110 • Taiwan Systems & Technology (818) 882-6837

mitac

When reliability is a decisive factor

P & C
LT3200
LI3200
LI3200



IBM-AT Compatible

**high
 speed
 high
 performance
 Laptop**

80286, 6/12 MHZ clock
 1.44 MB 3-1/2" Floppy
 Drive
 20/30/40 MB Hard disk.
 640x400 high resolution
 Plasma Display



**P & C SHITEN
 ENTERPRISE CO., LTD.**
 RM 7, 8 FL., NO. 100,
 ROOSEVELT RD., SEC. 3, TAIPEI,
 TAIWAN, R.O.C.
 P.O. BOX: 30-291, TAIPEI,
 TAIWAN, R.O.C.
 CABLE: PCSHITEN
 TEL: (02)395-1400
 TLX: 19206 PCSHITEN
 FAX: 886-2-3512073

IBM PC/AT® are registered trademarks of IBM

SIERRA Computer Consultants Ltd.

NEW TANDON TARGET

AVAILABLE NOW

1mb RAM

20mb FIXED DISC

FULL MONO SYSTEM

RRP £1995

40mb VERSION

RRP £2295

CALL FOR SPECIAL OFFERS



QUALITY PC COMPATIBLES

TANDON	RRP
PC XT 10mb	995
PC XT 20mb	1195

PC AT 20mb	1795
PC AT 30mb	2095
PC AT 40mb	2395
PC AT 70mb	2995

**FULL MONO
 SYSTEMS
 EGA OPTION
 ADD £395**

FERRANTI	PRICE
XT 20mb	CALL
AT 20mb	CALL
AT 40mb	CALL
AT 76mb	CALL

OLIVETTI	PRICE
M24 20mb	CALL
M28 20mb	CALL
M28 40mb	CALL

**ALL FULL
 MONO SYSTEMS**

SOFTWARE	PRICE
LOTUS 123	269
SYMPHONY	359
DBASE II +	359
WORD 3	295
WORDSTAR	169
WSTAR 2000 +	325
SMART SYSTEM	395

PRINTERS	PRICE
EPSON LX86	239
EPSON FX800	359
EPSON FX1000	459
JUKI 6100	345
JUKI 6200	535

SIERRA COMPUTER CONSULTANTS LTD. The Sanderson Centre, Lees Lane, Gosport, Hants.
 Tel: 0705 504516/504874

The 16-Bit Software Centre

Freepost ABC, Aylesbury HP20 1RP

Call Free on 0800 585 120 or 029 627 165

AMIGA

A Mind Forever V	23.40
A-Talk	33.00
A-Talk Plus	53.00
Adventure Con. Set	17.30
Artic Fox	17.30
Bard's Tale	18.20
Beyond Zork	26.00
Border Zone	26.00
Bureaucracy	25.20
Championship Golf	25.20
Chessmaster 2000	18.20
DeLuxe Music C Set	60.80
DeLuxe Paint II	56.40
DeLuxe Print	18.20
DeLuxe Video	60.80
E Weaver Baseball	21.60
Feud	8.60
Flow	66.90
GBA Basketball	21.70
Hacker	17.30
Hacker II	21.70
Hollywood Hijinks	26.00
Instant Music	21.60
Kings Quest III	18.20
L.C.P.R.P.	30.00
Lurking Horror	26.00
Marble Madness	17.30
Music Studio	25.20
Ninja Mission	8.60
Nord And Bert	26.00
Plundered Hearts	26.00
Police Quest	21.70
Portal	20.80
ProWrite	83.40
Seastalker	20.80
7 Cities Of Gold	12.90
Silent Service	17.30
Skyfox	11.70
Space Quest	18.20
Space Quest II	21.50
Space Ranger	8.50
Stationfall	26.00
Supersprint	21.50
The HG To The G	20.80
The Living Daylights	14.70
The Witness	21.00
Trinity	23.40
Video Vegas	23.00
Wishbringer	20.80
Zork, Zork II, III	20.80

ATARI-ST

A Mind Forever V	26.00
Arkanoid	10.40
Art Director	36.50
Artic Fox	17.30
Bangkok Knights	17.30
Bard's Tale	21.60
Beyond Zork	26.00
Black Cauldron	26.00
Border Zone	26.00
Borrowed Time	17.30
Bureaucracy	17.30
Championship Baseball	21.70
Chessmaster 2000	21.60
Degas Elite	20.80
F-15 Strike Eagle	13.90
Film Director	43.40
Fleet Street Publisher	86.90
GBA Basketball	17.30
Hacker, Hacker II	17.30
Hollywood Hijinks	26.00
International Karate	17.30
Karate Master	11.20
King's Quest II	26.00
King's Quest III	17.30
L.C.P.R.P.	30.00
Last Ninja	17.30
Marble Madness	17.30
Music Con. Set	21.60
Music Studio	26.00
Paintworks	26.00
Plundered Hearts	26.00
Police Quest	21.70
Shanghai	17.30
Silent Service	17.30
Skulldiggery	17.30
Skyfox	12.90
Slap Fight	17.30
Space Quest	17.30
Space Quest II	21.50
Stationfall	14.70
Tai-Pan	17.00
Tass Times In T T	17.00
Tau Ceti	17.00
Thexdor	21.50
Top Gun	17.00
Trinity	26.00
Ultima II	26.00
Video Vegas	23.00
Zork, Zork II	22.50
Zork III	23.40

IBM-PC

1 Up	39.10
Arkanoid	17.00
Art Studio	43.40
Artic Fox	17.00
Award Maker Plus	33.00
Balance Of Power	26.00
Bard's Tale	21.60
Beyond Zork	26.00
Book Worker	173.80
Brainstorm	39.10
Bureaucracy	26.90
Cardbox	46.90
Chessmaster 2000	21.60
Compact Accounts	155.60
Condor 3	394.90
Consultant	17.00
Delta 4	78.20
Delta Graph	60.80
Domino	77.30
Filer	30.40
First Base	26.00
First Calc	26.00
Fleet Street Editor	99.90
GBA Basketball	18.20
GEM Comm	60.80
GEM Diary	26.90
GEM Graph	70.40
Grandslam Bridge	15.60
King's Quest III	15.60
Lords Of Conquest	12.90
Marble Madness	17.30
Mindshadow	17.30
Music Con. Set	17.30
PC Promise	174.90
Pinball Con. Set	12.90
Portal	21.70
Protext	52.10
7 Cities Of Gold	12.50
Shanghai	15.60
Silent Service	18.20
Starflight	21.50
Tai-Pan	17.00
Tasprint PC	23.40
Tasword PC	19.50
Tau Ceti	15.60
Top Gun	15.50
Touch 'N' Go	21.70
Video Vegas	23.00
Wishbringer	22.50
World Tour Golf	17.00

Please phone free for hardware prices and software not listed. Make sure you get on our Mailing List by phoning us now. Customers in the UK add 15% VAT and Overseas add 5% shipping costs



PANASONIC Model JU-363 3 1/2" Disc Drives. Shugart interface, 1/2 height, 1 megabyte double sided double density 80 track, low component. Will interface to just about anything. (A quantity discount of at least 20% is available for 10+ off)

£59.50



DUPLIX Model M100 Monochrome Monitors. With 12" high resolution green screen & composite video input. Equivalent to other models such as ZENITH & PHILIPS.

£49.50

PLESSEY Model T24 V22/V22 bis 1200/2400 Baud MODEM. Compact automatic modem featuring the latest technology & the highest data rate over the ordinary phone system. Features:

- * Free software disc for IBM PC & compatibles & MATMOS PC
- * High speed PRESTEL compatibility
- * Auto call & auto answer
- * New low price & generous quantity discounts

£249.50

Please note:

We have many other items of new & secondhand equipment in stock currently including FUJITSU Winchester drives & DEC & DATA GENERAL computers. Please ask for list. VAT & carnage must be added to all items.

MATMOS Ltd., 1 Church Street, Cuckfield, W. Sussex RH17 5JZ (0444) 414484/454377

COMPUTER APPRECIATION, 111 Northgate, Canterbury, Kent CT1 1BH. (0227) 470512
TELEX 966134 COMPAP

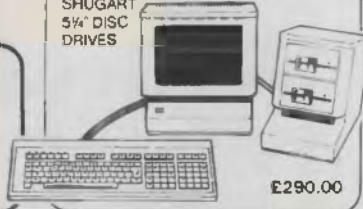
HITACHI Model 3055/SX 3" disc drives. With SHUGART compatible interface (34 way edge connector) & suitable for BBC with DFS, AMSTRAD 664/6128, TATUNG EINSTEIN & many others. Will usually replace 5 1/4" drives directly. 250K (double density unformatted) per side reversible; 40 track; standard power connector for 12V & 5V, overall power consumption typically 3.7W. Supplied BRAND NEW with connector pin-out details etc. but uncased without PSU. Data cables are available for AMSTRAD & BBC (£7.50) and an installation pack including data & power cables with instructions is available for the TATUNG EINSTEIN (£12.00)

£24.95



ITT SCRIBE IN WORD PROCESSING SYSTEM. Professional system originally selling at around £6000 without printer. Now offered with software included & a variety of different options available. This system is available from us ALL BRAND NEW at the cost of current budget systems, but with office-quality performance & features. Colour leaflet available.

SOFTWARE INCLUDES —
DATABASE * AUTOMATIC LETTER WRITING * HELP FILES * BASIC * PROGRAMMABLE COMMANDS * MATHS/ACCOUNTS FUNCTIONS *
FULL EDITING
HARDWARE INCLUDES — 128k SCREEN/WORKSTATION * DUAL D5DD SHUGART 5 1/4" DISC DRIVES



£290.00

NORTHWEST COMPUTER SUPPLIES (PCC LTD)

82 School Lane, Didsbury, MANCHESTER M20 0RY
Tel: 061-434 9747

XENIX/UNIX FOR AT'S

Santa Cruz Xenix (286 System V)	595	Xenix Application Software	
Operating System	595	Informix SQL/CSQL/4GL	1050/1050/1500
Development System	595	SCO Lyrinx (VFP system)	595
Text Processing	135	SCO Professional (Lotus lookalike)	795
(all of the above)	1295	FoxBASE + (dBase III lookalike)	795
Santa Cruz Xenix (386 System V)		Uniplex 2+ (VFP system)	920
SCO Xenix	695	Multiplex (Spreadsheet)	495
Dos Merge 386/Interactive Dos 386 Call		Access 20/20 (Spreadsheet)	595
MicroPort Unix (System V)		Xenia Hardware & port Wyse Intelligent Serial Card	695
Op System/Dev/Text	165/132/132	Cipher 60mb Tape Str. (Xenia or DOS)	975
Complete set as above	399	Wyse Terminals Wy30/Wy60	395/595
Merge-OS (DOS as a UNIX job)	132		

BORLAND/PC-WYSE SOFTWARE

Turbo Pascal NEW V4 with 8087 & BCD	49	Eureka — The Solver	49
Turbo Tutor V2	23	Turbo Basic	49
Turbo Toolboxes		Turbo Basic Toolboxes	
Numeric Methods/Database (Isam)	51/17	Comms/Graphic	Call
Editor/GameWorks/Graphics	37/37	Turbo Lighting/Word Wizard	49/37
Special TPas + Any Toolbox + Tutor	105	Turbo REFLEX/Reflex WORKSHOP	23/73
Special TPas + Tbox + Tutor + Edit + Game + Gtrap	169	Prolog/Prolog Toolbox	49/49
Turbo 'C'	59	Sidekick & Tray Sidekick/Superkey	59/49
		IBM format only	
Paradox 2.0 (Ansa)	395	Norton Utilities/Commander	67/39
XEROX Ventura Publisher (IBM vers)	625	ADVANCED Norton Utilities/Editor	89/69
Microsoft Quick Basic Compiler	66	GW-Basic (with HERC & Col Graphics)	95
Microsoft 'C' Comp/Macro Assem	265/99	Wordstar (NEW vers 4) Professional	255
Ability Plus/Flying Start	119/55	BBC Basic for IBM Compats (SUPERB)	95
Microsoft RBASIC System V (NEW VERS)	395	Other software prices — Call	
Lattice 'C' Compiler	219		

WYSE 386/286 AT COMPUTERS

WYSE 286 AT — (WY-2108 01)		Wyse 20 MB hard disc drive	350
Modular design, 8MHz, 80286, 512k 1.2MB		Wyse 40 MB hard disc drive	875
Flop, keyboard, ser, par	1219	NCS 40 MB hard disc drive	375
WYSE 286 AT — (WY-2112 01)		Wyse EGA display system	869
Modular design, 12.5MHz, 80286, 1MB		512k (18x256k DRAMS — 120ns)	369
1.2MB Flop, keyboard, ser, par	1749	PRINCE 100 EGA display system	595
WYSE 386 AT — (WY-3216 01)		NCS Mono display system (Herc)	195
Modular design, 16MHz, 80386, 1MB 1.2MB		Wyse 700 Hi-Res system (1280x800)	799
Flop, keyboard, ser, par	3499	Wyse 30/Wyse 60 Terminals	349/525

MODEMS etc/MEMORY/MICE/CO-PROCESSORS

Pace Linnet (V21/V23 Buff)	119	Amstrad package (Datatalk + Linnet)	145
Pace Series 4 120s (V21/V22/23)	289	DIALUP Comms (EPAD/Prestel/Kermil)	89
Steebeck Quatro (Ext or Int Card)	695		

MEMORY UPGRADES (AMSTRAD IBM's etc)		512k (18x256k DRAMS — 150ns)	59
Rampage AST (A/F) with 512k	460	512k (18x256k DRAMS — 120ns)	79
Rampage AST (X/TPC) with 512k	209	512k (18x256k DRAMS — 100ns)	99
Mouse Systems Mouse	135	512k 512k Column Ram (Compat 386 etc)	39
Microsoft Mouse (Serial or Bus)	149	8087 5mhz/8mhz/10mhz	125/175/269
128k Amstrad Upgrade (18x64k DRAMS)	29	80287 8mhz/10mhz	295/295

Post & Packing at COST: Manufacturer's Guarantees.
All prices plus VAT at 15% (except EXPORT)
Payment with all orders — Please — MAIL ORDER ONLY

HUBCOURT LIMITED — BUSINESS SYSTEMS

Established 1980

We are SBS Master Dealers and can offer a full range — all with 1 year on-site warranty — Free delivery

SBS XT V40	Twin floppy 12" mono, keyboard	£90
SBS XT V40	Single floppy + 20Mb hard disk	£Call
SBC XT v40	Single floppy + 30Mb hard disk	£Call
SDC AT 8/10MHz	1.2Mb floppy, 1Mb RAM serial and parallel + mono monitor keyboard	£990
SBC AT	As above with 20Mb hard disk	£Call
Phone for prices on other models we can fit free of charge our hard disks into basic model see below for prices.		
SBS 200W uninterruptible backup power supply		£190
SBC 14" mono monitor		£Call
SBC Laser Printer		£Call

HARD DISKS

Man.	Model	Capacity	Sped	Price complete with controller
Miniscribe	3425	20Mb	85MS	£197
Miniscribe	3425P	20Mb	53MS	£245
Miniscribe	3438P	30Mb	53MS	£290
Miniscribe	6053	40Mb	28MS	£625
Seagate	225	20Mb	65MS	£245
Seagate	238	30Mb	65MS	£275
Seagate	251	40Mb	40MS	£419

FILE CARDS

Miniscribe	20Mb	65MS	£260
Miniscribe	30Mb	65MS	£275

We can supply any size of hard disk from 10Mb to over 500Mb from most major manufacturers. All hard disks are complete with controller card, cables, full instructions and a utility disk. We will format free of charge any hard disk.

FLOPPY DISKS

5.25" — 360K £69	5.25" 1.2MB £95
3.5" — 720K £114 (NEC)	3.5" 1.4MB £199 (TEAC)

TAPE BACKUP

ALLOY INTERNAL 40MB £399	WANGTECK 60MB INTERNAL £599
--------------------------	-----------------------------

ADD-ON CARDS

80286 XT Speed card 8k cache RAM 8MHz	£199
2Mb Ems suites up to 12MHz (OK RAM)	£119
3MS Ems + I/O Suites up to 12MHz (OK RAM)	£179
Paradise Auto switch EGA/CGA/Hercules	£129
Hercules Compatible mono graphics (Short 12MHz)	£59
Orchid Excell RAM cards	£199

OTHER GOODS

150W XT Power supply unit	£59
14" EGA Monitor + EGA card	£399

Phone for best prices on all other goods. Prices exclude VAT & Carriage. Access accepted.

Phone 0702 72588

LOWEST PRICES IN UK?

MICROS		PSION		Letter organiser	£30
Commodore 64C Compendium	£155	Psion II CM	£82	Harvester S Chip	£86
Commodore 64C cassette unit	£135	Psion II XP	£115	Finance Pack	£26
Commodore 128D	£335	8K Datapak	£11	Maths Pack	£26
Commodore Amiga package	£412	16K Datapak	£17	Developer	£43
Commodore 64C/1541C Disk drive	£310	32K Datapak	£30	Pocket Spd Sht	£34
Commodore 128/1541C Disk drive	£200	64K Datapak	£52	RS232 Link	£41
Amstrad PCW 8256	£299	128K Datapak	£86	Comms HS232	£52
Amstrad PCW 8512	£299	Formater	£39		
Amstrad PCW 9512	£499			CASIO	
Amstrad PC 1640 DD/CD	£876	Scientific		SF3000	£56
Amstrad PC 1640 HD/CD	£1169	FX82A	£7	BC300	£56
Amstrad PC 1512 SD Mono	£399	FX100	£11	PF 7000	£26
Amstrad PC 1512 SD Colour	£649	FX451	£17	PF 3200	£34
Amstrad PC 1512 DD Mono	£499	FX570	£14	ACCESSORIES	
Amstrad PC 1512 DD Colour	£649	FX580	£22	RP6	£14
Amstrad PC 1640 DD/MD	£599	FX3600P	£15	RP16	£29
Amstrad PC 1640 DD/CD	£749	FX3800P	£17	RC2	£21
AMSTRAD PC 1512 BUSINESS PACK		FX8000G	£78	OR4	£26
(PC 1512 DD Mono, OMP 3000 Printer, Best selling Wordstar & Supercalc)	£680	FX7000G	£43	RC4	£31
Atam 520 STM Package	£243	FX4000P	£26	OR40	£30
				FA3	£20
PRINTERS		Packet Computers		FP-12-SL	£44
Epson LX 800 - The Best Seller	£199	PB1000	£120	FA7	£60
Star NL10 - The Best Seller	£199	FX850P	£78	FP40	£86
Citizen 120-D-A Hot Seller	£145	FX720P	£75	FP100	£226
Panasonic 1081 - The Hot Seller	£145	FX8410	£35	MD100	£266
Amstrad DMP 2000 NLQ	£135	FX730P	£69		
Amstrad DMP 3000 NLQ	£140	FX750P	£78		
Amstrad DMP 3160 NLQ	£150	PB700	£103		
Amstrad DMP 4000 NLQ	£259			TYPEWRITERS & CALCULATORS	
Citizen 120D for Commodore	£160	Canon			
Commodore MPS 1000	£200	Typewriter 90	£165	Casio	
MP 135	£130	Typewriter 80 II	£130	CW25	£199
Juki 6100 20 cpi 110C D-Wheel	£265	Typewriter 7	£75	DP100S	£69
Star NX15	£300	Typewriter 6 II	£148	DR120S	£79
Panasonic 1082	£195	Typewriter 5 II	£129	HR100	£30
Panasonic 3131 D-wheel	£230	Typewriter 4	£119	HR16	£29
Epson FX 1000	£400	Ribbons 1 btx	£10	Casio TV 200	£43
Brother HR20, D-Wheel	£345	Ram 4k, 8k, 16k POA		Watch DBCE60	£29
Brother N1109	£168				
Citizen 1200 — Serial I/Face	£180				
		PHOTOCOPIERS & FAX MACHINES			
		Canon PC3	£450		
		Canon PC5	£550		
		Canon PC14	£760		
		Canon Fax 110	£1525		
		Sharp Fax-F0-200	£1615		
				DISK DRIVES & MONITORS	
				Commodore 1541C	£164
				Commodore 1571	£210
				Amstrad 3" DD1/FD1/FD2	£174
				Commodore 40 Column colour monitor	£174
				Commodore 80 Column colour monitor	£187
				ANSWERING SYSTEMS	
				PANASONIC 1406	£86
				PANASONIC 1416	£113

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. TELEX: 9551182 GCOMSG.



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 2DZ
Tel: 01-402 4592

FARNHAM COMPUTERS

We are dealers for

AMSTRAD

Acorn

and ATARI ST

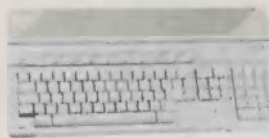
For your Computer,
Software and
Peripherals
requirements



Call Us for Prices:

1 South Street,
Farnham, Surrey
Tel: 0252 723107

ATARI COMPUTERS



All ST computers come with a mouse and software.
520STFM £277(E276)£320. 1040STF £456(E445)
£489. 1040STF + monitor £556(E557)£636.
2080STF + monitor £914(E894)£976. 4160STF +
monitor £1187(E1149)£1230. Cumana 1000K ST
disc drives: single £136(E138)£154, dual £254(E245)
£270. Atari 500K ST disc drives £108(E119)£125.
Atari ST monochrome monitor £142(E157)£205.
Atari 12" medium resolution ST colour monitor £377
(£372)£423. Atari SAMM804 printer £186(E194)£227.
Centronics printer cable for the ST range £16(E16)
£20. We offer good discounts on most ST software
for example: HiSoft DEVPAK £43(E41)£45. HiSoft
Basic Compiler £72 (£67)£71. Firstword Plus £66
(£61)£65. Metacombo Lattice C £84(E75)£79.
Computer Concepts Fast Basic £84(E75)£79. LDW
Basic ST, new basic compiler £63(E58)£62. Pson
Chess £22(E22)£26. Sub-logic flight Simulator 2 £43
(£41)£45. Starboder £22(E22)£26. Atari 130 XE
Computer + Game £95(E99)£120.

AMSTRAD PRODUCTS

Amstrad PC1640 computers:— ECD single floppy
£867(E866)£973. ECD dual floppy £964(E957)
£1004. ECD 200K HD £1289 (£1257)£1364. CD
single £713(E719)£822. CD dual £808(E806)£912.
CD HD £1126(E1105)£1212. MD single £550(E570)
£677. MD dual £555(E560)£767. MD HD £572(E560)
£1067. Amstrad PC1512 Computers with Migen
Ability:— mono single £459(E475)£582. mono dual
£567(E578)£685. colour single £507(E515)£722.
colour dual £716(E719)£825. DMP3000 printer £155
(£155)£188. DMP3160 printer £208(E205)£238.
PCW5512 computer £544(E555)£662. PCW8512
£468(E485)£592. PCW8256 £351(E375)£462.
Amstrad 6128 — colour £391(E420)£500. green
£291(E320)£404. Amstrad DMP2000 printer £166
(£171)£204. Extra disc drive for Amstrad 6128 £99

SINCLAIR PRODUCTS AND CAMBRIDGE COMPUTERS

Spectrum 128k Plus Two computer: without joystick
and software pack £139(E145)£178. with joystick
and software pack £149(E150)£192. Spectrum Plus
3 £199(E203)£233. Blank microdrive cartridges for
the QL and the spectrum £2.50(E3)£4. QL floppy disc
interface (see Cumana disc drive section for suitable
drives) £86(E84)£94. Spectrum floppy disc interface
(see Cumana section for suitable disc drives) £76
(£75)£86. Spectrum centronics printer interface and
cable £48(E42)£47. Cambridge computers Z86 £279
(£267)£287. Maths adaptor £10(E15)£25. 128k ram
cartridge £48(E48)£53. 32kram cartridge. £20(E21)
£26. Parallel printer cable £30(E32)£42.

COMMODORE COMPUTERS

Amiga A500 Computer £490(E474)£524. Modulator
£25(E25)£30. A1081 Monitor £379(E378)£448. Ram
expansion £106(E106)£111. Commodore 128 com-
puter £186(E187)£219. Commodore 64C computer
£148(E141)£166. Commodore 64C + cassette +
joystick + games £171(E176)£201. Commodore
64C computer with mouse, cassette recorder and
software £191(E193)£223. Converter to allow the
use of most ordinary mono cassette recorders with
the Commodore 128 and Commodore 64 £9(E9)£11.
Commodore cassette recorder £30(E30)£36. 1541C
disk drive £194(E192)£208.

ACORN RISC COMPUTERS

A305 £918(E919)£969. A310 £1006(E995)£945.
Mono monitor £57(E55)£115. Colour monitor £230
(£220)£270.

PSION ORGANISER

Organiser II CM £93(E94)£104. Organiser II XP £125
(£127)£137. Datapack 64K £72(E72)£77. Spell
checker £28(E29)£31. Link up adaptors £12(E13)
£15. RS232 link £46(E46)£52. Formatter £47(E47)
£52. Maths pack £27(E27)£29. Finance pack £27
(£27)£29. Maths adaptor £12(E15)£20.

PRINTERS

Amstrad DMP3000 £155(E155)£188. Amstrad DMP
2000 £166(E171)£204. Epson LX800 £276(E275)
£309. Star NL10 £235(E234)£270. Interfaces for
NL10 £37(E35)£37. Canon PW1080A £303(E298)
£338.

CUMANA 3.5" and 5.25" CASSEDISK DRIVES
WITH CABLE AND POWER SUPPLY. 40/80 track
switchable double sided to suit floppy disc interfaces
of the Sinclair QL, Sinclair Spectrum and BBC B 3.5"
drives + single £134(E134)£156. dual £224(E219)
£251. 5.25" drives: single £172(E169)£199. dual
£310(E306)£347.

SWANLEY ELECTRONICS

The Computer Export Specialists.

Dept PCW, 32 Goldsel Rd., Swanley, Kent BR8 8EZ, England
Tel: SWANLEY (0322) 64851. We give an additional discount of 2% to UK personal
callers who pay cash. Official orders welcome. UK prices are shown first and include
post and VAT. The second price in brackets is for export customers in Europe and
includes insured airmail postage. The third price is for export customers outside
Europe (including Australia etc) and includes insured airmail postage.

Link-line

PRODUCT
FILE

No. 67

STRADCOM INTERNAL MODEM



Top feature add-in modem for the PC

- Latest V22 standard. 1200/1200 means 1200bps transmission in both directions simultaneously.
- Access BT PSS, Prestel, remote PC, IBM mainframe (11 terminal emulation modes).
- Upload files 16 times faster than V23 (8 error detection modes).
- Auto-dial, auto-answer. Tone or pulse operation.
- Works automatically when unattended.
- Call monitoring provides audible progress information on a call.
- All functions controlled from the computer keyboard.
- Hayes compatible. BABT approved.
- Software included.
- Easy installation. Plugs into expansion slot. Just connect to BT line.
- UK manufacture.

You've read the features, now look at the price!

Link-Line offer (worth £40 during the currency of this ad.)
— free registration to Mercury 7500 and Telecom Gold.

Send your letterhead and cheque for £186.30
(£159 + £3 p+p + £24.30 VAT) to

Link-Line,
Prince of Orange Lane,
Greenwich, London SE10 8JQ.

LINK-LINE mail order 01-853 3206

Link-Line is the mail order division of Link
International Products Ltd. who provide
accessories, supplies and peripherals for the
PC and mainframe.

QUALITY SERVICE + UNMATCHED PRICES

Computers

£

Tandon PCX 20	899.00
PCA 20	1225.00
PCA 40	1645.00
PCA 70	1999.00

For EGA Systems add £300.00

AST Premium 20	1575.00
Premium 40	1850.00

Victor VPCIII 30Mb	1749.00
VPCIIe 30Mb	1299.00
Tandy Laptop	999.00

New

Tandon Target 20Mb	1445.00
Tandon PAC 286 2x30Mb	2490.00

Now Available

Also Authorised Dealers for
Amstrad, Apricot and Kaypro

MICRO MINDER CONSULTANTS LTD

Desk Top Publishing

£

Software	Ventura	695.00
	Pagemaker	525.00
	Gem Publisher	295.00
Laser Printers	Epson GQ 3500	1395.00
	HP Laserjet II	1995.00
	AST Turbolaser	2225.00
	Ricoh Postscript	4250.00
	Kyocera F1010	2000.00

**PACKAGE
DEAL
£ 4625**

Tandon PCA 20
Wyse 700 Monitor
HP Laserjet II
Ventura, Mouse
PC Paintbrush

Networking

Authorised Novell Netware Dealers
Call for expert guidance, installation and training

All prices are CWO and exclusive of VAT

01-870 4650/ 7431

68 Upper Richmond Road, London SW15 2RP

BONDWELL MASTER DEALER

OFFICIAL DEALERS ★ AMIGA ★ AMSTRAD ★ ATARI

COMPUTERS

Commodore AMIGA 2000 1Mb RAM & Colour Mon	1199.00
A2010 Internal 3.5" Disk Drive	169.00
A2052 2Mb RAM Expansion Card	329.00
A2092 20Mb Hard Disk Card	399.00

Commodore AMIGA 500 + Deluxe Paint + More

PHONE FOR LATEST PRICES

Amstrad PC1512 DDCM (limited quantity at this price)

MEGA ST 2Mb Mono System

MEGA ST 4Mb Mono System

Atari 1040STF Mono System

Atari 1040STF

Atari 520STFM Mono System

Atari 520STFM

Bondwell 8s Laptop 512K RAM 720K Drive

Supertwin LCD

Bondwell 18 Transportable 640K RAM Dual

5.25" Drives

Bondwell 38/2 Professional PC Clock/Cal

4.77MHz 599.00

Bondwell 38/3 with 20Mb Winchester

SBC PD Twin Floppy 640K VGA/CGA

Clock/Calendar

SBC Mistral 266 AT Mono 68/12MHz 1M

RAM 30M Winch

Pision Organiser XP expandable to 128Kb

RAM

Pision Hardware/Software Add-ons

PHONE

PRINTERS

Citizen 120D Dot Matrix 120/25cps (parallel or

Commodore)

Okimate 20 Ribbon Transfer Colour Printer

Okimate 20 Full Graphics Colour Printer for

Amiga

Star NL10 120/25cps

190.43

MONITORS

Atari High Res Mono Monitor

Atari Med Res Colour Monitor

Commodore 1901 Col 14"

Philips 8833 14" Col RGB/Comp Med Res

239.13

Please add 15% VAT to above prices

CARRIAGE EB, EXPRESS DELIVERY £12, Software & Small Items FREE

Delta Pi Software Ltd

8 Ruswarp Lane, WHITBY, N. Yorks. YO2 1ND.
Tel: 0947 600065 (9am-7pm)



PC TOOLS! Version 3.0

NEW VERSION — 3 additional functions !!!

Take the best features of Norton Utilities. Then make them resident like Sidekick and you've got PC TOOLS!

Now with these new functions:

★ COMPRESS ... your hard disk for faster use and reliable file undelete. Completely reliable!

★ UNFORMAT ... a hard disk after accidental FORMAT, RECOVER & ERASE.

★ FAST hard disk Backup/Restore — as fast as FastBack!

For IBM/PC/XT/AT, Amstrad PC 1512 and virtually all compatibles. Supports IBM's new Models 30, 50 and 60, all versions of DOS, hard disks, floppy disks (both 3.5" and 5.25" disks supplied), including 1.44Mb diskettes and fully supports the Lotus/Intel/Microsoft EMS!

"There's no reason to look beyond PC Tools ..."
PC Magazine (US) Editor's choice award.

COPY II PC OPTION BOARD

with Transcopy and Transedit V4.0 driver software.

The ultimate floppy disk duplication system — copies virtually all protected software (it's how software houses implant those non-standard tracks and sectors in the first place!). Runs on IBM PC/XT/AT, Amstrad PC 1512, Tandon, Zenith 150/1/8, Compaq Portable/Deskpro/Plus* or other highly compatible with one 360k drive and 1 half slot. (*These machines require an extra cable).

"We made copies of all our new and reputedly most difficult-to-copy programs ... Excellent performance and value". Infoworld

COPY II PC V4.0

★★ NEW VERSION — 28 additional titles!!! ★★

For the IBM PC/XT/AT and virtually all compatibles with at least one floppy drive. Copy II PC creates archival floppy backups of most IBM PC software quickly and very easily — and allows running some of the most popular programs, such as Lotus 1-2-3, Symantec, Base III Plus and now VP Planner, from a hard disk, without inserting the original floppy.

"The best disk compatibility I've found."

Jim Seymour, syndicated US computer columnist.

Copy II is also available for Apple II, Mac & Atari 520/1040 ST.

Phone now for details and immediate quote!

Jeff Morris on (0732) 847615

Felspar LIMITED

PO Box 910, Larkfield
Maidstone, Kent ME20 6QU
(0622) 862471 (ansaphone)

Electronic Mail: 87:CQQ180

Telex: 265871 MONREFG (quote ref: CQQ180)



The market is changing - don't be left behind.

SOURCEWARE

Sourceware from RiverBridge is the most innovative and exciting method of ensuring that YOU control the functionality of YOUR Software.

RIGHTHAND WORD

A full function Word Processor incorporating all of the desired user functions, including Word Wrap, Book Marking, Personal Document Library (100 documents), Pagination Setup and Save, Directory Management etc.

RIGHTHAND DATA

A User definable Database incorporating: Audio Dial fields, indexing, Import and Export (ISDF) and print facilities

RIGHTHAND COMMS

A user definable Asynchronous communications system including: Log On scripting, File Send and Receive, Disking Directory (80 entries), Long Distance Directory, Wordstar™ compatible editor with communication related context specific help, Contact and Telex Number Database etc.

RIGHTHAND SPREAD

A 3 Dimensional Spreadsheet incorporating up to 73 pages in depth, 12000 cells, 3 dimensional consolidation, Page Save and Restore, Directory Management and all conventional arithmetic facilities including: Log, Abs, Lin, Square, Root, Sum, etc.

RIGHTHAND PLAN

A full function sophisticated Project Planner with Multiple Calendar Setup, Project accuracy of 15 Mins, Pre-requisite action definition, Graphical Representation of Resource Usage and Actions against time, Graphical report printing, Colour and Printer Setup.

RIGHTHAND RUN

A User definable Graphical Operating System Front End allowing the user to install all of their system, application and DOS functions, also incorporates a DOS window and Generic Cut and Paste, allowing the user to Cut any part of a Non-

Graphical screen and Paste it elsewhere (e.g. Spreadsheet etc.). This system is also memory resident with an overhead of less than 10K including buffer space

RIGHTHAND DOS

An Electronic Operating System Manual allowing the user access to most of the commonly used DOS commands while still maintaining their presence within QOS

RIGHTHAND LABEL

A User definable Label printer including: Down Load Fonts (20), General attribute effect (Bold, Italic, Underline, Sub/SuperScript, Double Width etc.), Multiple Size (up to 15" depth and 15" width), Setup Parameters for Printer, Label, Colours and Import from SDF facility.

RIGHTHAND COLOUR

An independent Colour Manager for RightHand, allowing the user to alter the foreground and background colours without accessing the individual system.

RIGHTHAND DEMO

An Interpreter and compiler allowing the user to capture screen and narrate a complete demonstration system, including: Box, Timing, Text Char by Char, Colour Manipulation etc.

RIGHTHAND PATH

A complete Disk Operating System control Environment, incorporating a menu assisted graphic environment, for Director management, File management and manipulation including: Hex and Text View, Internal Editor with macros Pretty Printer and DOS filename extender and library.

RIGHTHAND DATE

A self contained Diary Calendar system with reporting

SourceWare is a unique opportunity for:

The discerning user requiring flexibility.

The Systems House requiring sophistication without development.

The Dealer who requires a flexible 'Added Value Component'.

The Educational establishment requiring more than Books ...!

SourceWare comes complete with:

Full function executable versions and User guides (Printed & in .TXT form)

Fully document source code (42000 lines)

Two support contracts are also available upon request.

SOURCEWARE ... All this for 551.00 plus VAT

don't be left behind - telephone now

021-233 3757

SOURCEWARE

RIVERBRIDGE 1 FLOOR DAKOTA HOUSE 4 BROOK STREET ST PAULS BIRMINGHAM B3 1SA
FAX 021 236 4984 TELEX 940 13720 RBDLG

In today's hi-tech world, most hardware and software houses are talking about computer speed. But in reality most run at a pace very similar to that of our dear friend illustrated.

Terrific.

As you're powering your way through a Lotus, I, II, III programme you may be wanting to interrupt and move to Sidekick. Press the keys, sit back and wait.

And wait.

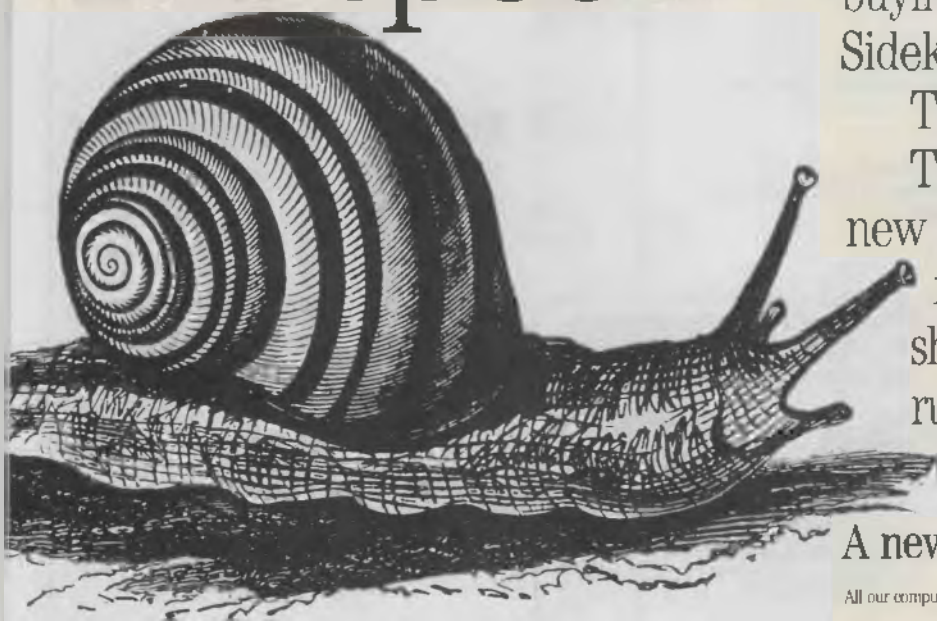
And wait. (You could have made a cuppa by the time it flashes up.)

At Dackombe and Company we believe you shouldn't have to do any waiting at all. Ever. That's why we've integrated DSC into all of our top-of-the-line computers.

So what's DSC?

It actually stands for Dynamic Speed Control (the name of our subsidiary company) and it works in a similar way to the automatic transmission in your car. You want power; you put your foot down. The car changes gear and bingo! Maximum speed and engine performance.

Running at full speed



DSC technology offers the same automatic speed switching while the computer is running.

So when you're in Lotus 1, 2, 3 and you want to find out who's buying you a pint after work on Sidekick. Easy! Press the keys.

There you are. Bob's buying.

Take a closer look at our new range of computers at your nearest dealer. And he'll show you what we mean by running at full speed.



A new breed of computer technology

All our computers are guaranteed for one year if purchased through an authorised dealer.

Sole UK distributor: Brian Harfield, CPC, Kearns Associates Ltd, Grazeley Green, Reading RG7 1LT

Dynamic Speed Control (DSC) is a wholly owned subsidiary of J. A. Dackombe & Co. Ltd, A British owned and managed company.
Dynamic Speed Control Business Reg. No. 10160927-001-12 86 8 J. A. Dackombe & Co. Ltd. Business Reg. No. 10160927-000 12 8

DCS

DATEK COMPUTER SUPPLIES LTD

AUTUMN CATALOGUE OUT NOW — ASK FOR DETAILS 0922 501110

PRINTER RIBBONS

		1-11	12+(£)
ACORN	AP80	2.69	1.95
	AP100	2.69	1.95
AMSTRAD	DMP1	3.75	3.15
	DMP2000/3000	4.25	4.05
	PCW8256/8512	4.25	3.75
BROTHER	HR5	3.00	2.55
	HR15 Corr	2.80	2.30
	HR15 FAB	3.10	2.50
	HR15MS	3.20	2.50
	HR15 also for HR25/HR35		
	EP44	2.80	2.25
	M1009	3.50	2.60
CANON	PW1080A Black	3.00	2.30
	PW1080A Red or Blue	4.30	3.75
	PJ1080 Ink Jet Col. 1 off	10.50	
	PJ1080A Ink Jet Blk. 1 off	8.90	
CBM	1515	2.60	2.00
	1525	2.60	2.00
	MPS801	3.50	2.70
	802/1526	3.60	2.60
	803	3.40	2.55
	MPS1000	2.65	2.15
	4022	2.65	2.15
	MSC801 Col. 1 off	18.40	
	DPS1101 SS	2.35	1.80
	DPS1101 MS	2.75	2.25
	DPS1101 Corr	1.70	1.30
CENTRONICS	GLP 1/2	3.25	2.60
CITIZEN	120D	4.80	4.00
DAISYSTEP	2000 MS	3.00	2.50
	2000 FAB	4.75	4.00
EPSON	MX/FX/RX80 Black	2.60	2.05
	MX/FX/RX80 Red or Blue	3.75	3.00
	100 Series	3.60	3.10
	LX80/LX86	2.65	2.10
	JX80 Col. 1 off	18.40	
	LQ800	3.60	3.00
JUKI	LQ1000	4.40	3.50
	6000/2200 Corr	3.00	2.50
	6100 MS	2.80	2.20
	6100 SS	2.40	1.65
	6100 Corr	1.65	1.30
KAGA	KP810 Black	3.00	2.20
	KP810 Red or Blue	4.25	3.70
M/TALLY	MT80	3.60	2.65
OLI	80/82	1.40	1.00
	84	3.80	3.20
	Male 20 Colour	6.50	6.10
	Male 20 Black	6.00	5.50
PANASONIC	Dot Matrix	4.95	4.20
QUENDATA	DWP1120 MS	2.95	2.40
	DWP1120 FAB	4.90	4.00
QUME	Sprint 7/9 MS	2.70	2.00
	Sprint 7/9 FAB	4.00	3.25
SEIKOSHA	GP50	6.00	5.10
	GP80	2.70	2.00
	GP100/250	2.60	2.00
	GP500/550	3.70	3.00
	GP700 Col. 1 off	18.50	
	SP1000	6.00	5.25
SHINWA	CP80	3.60	2.90
SMITH	Fastex 80 (Twinpack)	11.00	10.50
CORONA	TP1M/S	12.50	9.50
	TP1 Fabric	5.70	4.70
	TP1 Corr	4.90	4.40
	D100/200	4.80	3.80
	D300	6.00	5.50
STAR	DP/GEMINI/SG	1.40	1.00
	SR15	4.80	4.25
	NL10	4.90	3.75

PRINTOUT BINDERS

ACCO		
11 x 9 1/2 Blue, Black, Red	@	£4.25
11 x 14 1/2 Blue, Black, Red	@	£4.75

SCREEN FILTERS

Acco Polaroid screen filters	@	£28.25
		each
Call for your size		

LISTING PAPER

SIZE	QTY	PRICE PER BOX
		2+ 5+(£)
11 x 14 1/2 1PT	2000	14.25 14.10
11 x 9 1/2 1PT	2000	12.25 11.95
11 x 9 1/2 2PT OTC	1000	16.25 15.95
11 1/2 x 9 1/4 (A4)	2000	13.10 12.95

COMPUTER LABELS

SIZE	PRICE PER 1000(£)
3 1/2 x 17/16	4.25
3 1/2 x 1 1/16	4.95
4 x 1 1/16	4.75
4 x 1 1/16	5.25

Available in 1, 2 or 3 across

CLEANING PRODUCTS

MICROKIT		
All you need to clean your computer		£22.00
FLOPPICLENE		
A kit for cleaning disc/read write heads		
	5 1/4	£15.95
	3 1/2	£17.50
SAFEWIPE		
Sol, lint free squares of pure cotton for general cleaning (per pack)		
	23cm x 23cm	£19.26
	10cm x 10cm	£19.69
FOAMCLENE		
An anti-static foam cleanser for exterior cleaning		
		£2.50 per can
SAFECLENS		
Removes dirt, dust from all screen surfaces		
		£3.26 per can

FLOPPY DISKS

	5 1/4	PRICE PER BOX	
MEMOREX			
	1-2	3-9	10+(£)
MD2D D/ide D/Dens 40T	11.80	11.60	11.10
MD 2DD D/ide D/Dens 80T	16.50	15.75	14.95
MD 2HD D/ide Hidden 1.6M	24.00	23.50	22.00
DYSAN			
D/ide D/Dens 40TE	15.50	14.90	14.20
D/ide D/Dens 80T	17.75	16.70	15.95
D/ide D/Dens 1.6M	22.95	21.50	20.25
3 1/2			
MEMOREX			
S/ide D/Dens	20.50	19.20	18.65
D/ide D/Dens	26.10	25.50	24.95
DYSAN			
S/ide D/iden	22.35	21.90	21.10
D/ide D/iden	27.50	26.90	25.90

DISK STORAGE

	5 1/4	Size	1	3+(£)
DD		40	7.35	7.10
DD		90	14.25	13.95
3 1/2				
DD		40	7.35	7.10
DD		90	14.25	13.95

TONER CARTRIDGES

EPSON GQ 3500	£18.25
OKI 6	£18.25
HP LASERJETS	£73.50
HP LASERJETS MKII	£82.95
CANON A1/A2	£73.50
CANON A5	£82.95
CITIZEN OVERTURE	£23.00

COPY HOLDERS

ADJUSTABLE COPY HOLDERS	
A4 Version	£24.95
Holds up to 300g	
Desktop Version	£17.85

Please note prices are exclusive of VAT. Free postage & packing in UK. Mail order + Export line contact

DCS LTD 0922 501110

27 Railway Street, Hertford
Herts SG14 1BA

Our colour catalogue is available with a comprehensive range of products. Call for your copy today.

EDUCATIONAL &
GOVERNMENT ORDERS ACCEPTED

COMPANY CREDIT ACCOUNTS
OPENED

PLEASE CONTACT FOR DETAILS.

BRK

COMPUTER SERVICES LTD.

216 GREAT WEST ROAD, HOUNSLOW, MIDDX TW5 9AW



01-572 5457

01-572 0847

OVER £150
FREE DELIVERY
(except stationary)



COMPUTERS

Amiga 500 computer	£439
Amiga 2000	£1040
Atari 520ST 1/2M + disk	£249
Atari 1040 STF + mono	£499
Amstrad 1640 ECD/HD 20Mg	£1099
Amstrad 1640 ECD iwin disk	£825
Amstrad 1640 mono/HD 20M	£869
Amstrad 1512 mono single disk	£375
Commodore PC10 mono	£659
Commodore PC20 20Mb mono	£925
Commodore PC40/20 10MHz AT	£1479
Epson PCAX 20Mb 10MHz	£1569
Epson PCAX 40Mb 10MHz	£2069
Opus PCII 256k mono	£479
Opus PCII 1M ram mono	£669
Opus PCII 1M ram 20 Mb mono	£945
Opus 'AT' 1M ram 20Mb mono	£1295
Olivetti M28 40Mb mono	£2325
Olivetti M240 20Mb mono	£1657
Samsung 'AT' 20Mb 10MHz	£1459
Samsung 'AT' 10MHz mono	£1079
Tandon PCX20 20Mb mono	£885
Tandon PCA20 20Mb mono	£1330
Tandon PCA30 30Mb mono	£1549
Tandon PCA40 40Mb mono	£1749
Tandon PCA70 70Mb mono	£2145
Tandon Target 20Mb mono	£1489

PRINTERS

Amstrad 2000 105cps 26NLQ	£129
Amstrad 3000 as 2000 — IBM	£149
Amstrad 3160 160cps	£175
Amstrad 4000 200cps 50NLQ	£299
Amstrad LQ3500 24pin 160cps	£299
Brother 1509 132 col	£359
Brother 1709 240cps 50NLQ	£432
Brother 20241 190cps	£599
Brother M4018 480cps 100NLQ	£1397
Brother HR25XL 25cps daisy	£509
Brother HR40 40cps daisy	£709
Cannon A55 180cps 156 col	£379
Cannon A60 200cps 80 col	£385
Cannon A65 200cps 132 col	£465
Citizen 120D 120cps 40NLQ	£147
Citizen MSP-10E 160cps 40NLQ	£199
Citizen MSP-15E as 10E 136 col	£245
Citizen MSP40 240cps 50NLQ	£289
Citizen MSP50 300cps 60NLQ	£359
Citizen DWP35 35cps daisy	£399
Citizen HQP40 24 pin 200cps	£399
Epson LX800 160cps 30NLQ	£205
Epson EX800 300cps 50NLQ	£389
Epson EX1000 300cps 50NLQ	£567
Epson LQ2500 24 pin 250cps	£799
Epson SQ2500 ink jet 250cps	£999
Juki 5510 180cps 45NLQ	£257
Juki 5520 180cps colour	£354
Juki 6100 daisy 20cps	£257
Juki 6000 daisy 12cps	£159
Juki 6300 daisy 40cps	£675
MP480 480cps 74NLQ Epson/IBM	£319
MP165 165cps 35NLQ 80 col	£175
MP135 135cps 30NLQ 80 col	£149

MP26 daisy 26cps	£210
MP40 daisy 40cps	£329
NEC P5XL 264cps 88NLQ	£699
NEC P6 24 pin 216cps 70NLQ	£382
NEC P7 24 pin as P6 136 col	£443
Oki 182 120cps 20NLQ 80 col	£199
Oki 192 160cps 40NLQ 80 col	£285
Oki 292 200cps 100NLQ 80 col	£435
Panasonic P1082 180cps 30NLQ	£225
Panasonic P1081 120cps 80 col	£169
Panasonic KXP3131 17cps daisy	£247
Panasonic KXP3151 22cps daisy	£373
Star NL10 120cps 30NLQ	£199
Star NX15 120cps 30NLQ	£279

LASER PRINTERS

Cannon Laser LBP-8 A1	£1595
Cannon Laser II 8 pages/min	£1875
Centronic Laser	£1339
Centronic Laser HP emulation	£1589
Epson Laser	£1349
Hewlett Packard Laserjet series II	£1997
Hewlett Packard Laserjet 500	£3360
Kyocera F1010 10 pages-min	£1975
Kyocera F2010 10 pages/min	£3545
QMS PS800 postscript	£2969
QMS PS800 + postscript	£3519

MONITOR

Philips 8835 col monitor	£257
Philips 7510 12" mono	£89
Tandon mono monitor	£154
Tandon EGA monitor	£357
Taxan 660 EGA col monitor	£399
Taxan 760 EGA col monitor	£425
Taxan 770 multisynch	£585
Zenith 12" green/amber	£79
For others please enquire	

MODEMS

Amstrad modem V21/23 + soft	£139
Amstrad card V21/23 V22/V22bis	£179
Miracle WS2000 manual dial	£99
Miracle WS3000 V21/V22/V23 Auto	£373
Miracle WS3000 V21/V23 Auto	£233
Miracle WS3000 V22bis 2400	£509
Miracle WS4000 V21/V23 Auto	£147
Miracle Key 3000 V21/V23 internal	£235
Miracle Key 3000 V22 internal	£345
Miracle Key 3000 V22bis internal	£435
Pace Ser4 2123 V21/V23	£219
Pace Ser4 1200 V21/V23/V22	£335
Pace Ser4 2400 V21/V23/V22bis	£389
Sage Modem + Chit Chat software	£225

BUDGET SOFTWARE

Borland Turbo Basic	£59
Borland Turbo C	£79
Borland Turbo Pascal	£59
Delta 4 1512	£87
Sage PC write	£85
Supercalc 3	£59
Wordstar 1512	£55
Reflex	£75

Volkswriter Deluxe	£45
Zorland C	£38
For others please enquire	

SOFTWARE

Clipper dbase compiler	£399
Dbase II	£289
Dbase III plus	£399
Framework II	£389
Harvard presentation graphic	£355
Harvard professional publisher	£549
Javelin	£95
Lotus 123	£245
Lotus Hal	£99
Manuscript	£259
Open Access II	£379
Symphony	£339
Ventura desk top publisher	£579
Wordstar professional	£247
Wordperfect	£269
Word 3	£299
Wordcraft 3	£345
For others please enquire	

XENIX SOFTWARE

MS Basic	£355
MS Pascal	£629
Fortran Ryan McFarland	£629
Informix	£899
Q-one word processor	£555
Lex word processing	£999
Lyrix word processing	£525
Multiplan spreadsheet	£455
Development system	£525
Foxbase database	£715
Professional	£715
Text Processing system	£179
Xenix oprating system V5	£525

PAPER

9.5" 11" 2000 1port cont 60gm	£11.50
14.5" 11" 2000 1port cont 60gm	£14.65
9.5" 11" 1000 2port NCR cont	£15.95
14.5" 11" 1000 2port NCR cont	£21.75

FLOPPY DISKS

Memorex 5.25" DS/DD disks	£12
Memorex 5.25" DS/HD high density	£21
BASF 5.25" DS/DD disks	£11
BASF 5.25" DS/HD high density	£19.95

If you do not find what you are looking for please enquire as not all items can be listed.

All prices exclude VAT

Card holders telephone your order day or night on the 24 hour answerphone

01-572 0847

Prices correct at time of going to press. Prices are subject to change without notification.

NEED A MODEM? THEN 'TALK' TO US

Amstrad		Pace	
Amstrad PC V21/23 AA AD + s/w	£129	Nightingale V21/23	£79
Datalflex		Linnel V21/23 AA AD Hayes	£115
Siradcom V21/22 AA AD + s/w	£155	Series 4 V21/23 AA AD Hayes	£209
Epson		Series 4 V21/22/23 AA AD Hayes	£309
CX21 V21 Acoustic Coupler	£99	Series 4 V21/22/23/22bis AA AD	£389
Miracle Technology		Dacom	
WS2000 V21/23	£89	DSL2123AD V21/23 AD	£210
WS2000 Auto - dial board	£29	Unity Card V21/23 AA AD + s/w	£235
WS3000 V21/23 AA AD Hayes	£229	Unity Gold V21/22/23 AA AD + s/w	£309
WS3000 V21/22/23 AA AD Hayes	£379	Unity Quad V21/22/23/22bis AA AD	£459
WS4000 V21/23 AA AD Hayes	£499	Thorn EMI	
WS4000 V21/22/23 AA AD Hayes	£139	VX543 V21/23 AA AD	£160
WS4000 V21/22/23 AA AD Hayes	£349	VX512 V22 AA AD	£315
Keycard V21/23 AA AD Hayes	£225	VX524 V22bis AA AD	£385
Keycard V21/22/23 AA AD Hayes	£339	Transam	
Keycard V21/22/23/22bis AA AD	£459	M1 V21/23 with BT phone line i/l	£309
Answercall		M1 V21/23 EC + cell, phone i/l	£309
MM100 Minimodem V21	£49	Steebek - Dowty	
Tandata		SB7426D V26	£275
TM512 AA AD	£195	Trailblazer V21/22/23 + 18bps	£1479
TM602 V21/22/23 AA AD	£329	Quattro V21/22/23/22bis AA AD	£619
TM722 V22/22bis AA AD EC	£389	Trio V21/22/23 AA AD EC Hayes	£495
TD2600 Viewdata Terminal	£589	Trio IBM International version	£495
TD4000 Viewdata Terminal	£729	Duo V21/23 AA AD EC Hayes	£279
EB Communications		SB1212 V22 AA	£379
EB2123 Modem/Telephone V21/23	£135	SB1212 V22 AA AD Hayes	£499
Lion		SB1212 V22 AA EC	£545
Orator combined V21/22/23/22bis modem and voice communications system	£579	SB1212 V22 AA AD	£209
Communications Software			
Chitchat for IBM or Apricot	£75	Chitchat for Amstrad PCW	£53
Chitchat IBM/Apricot when bought with V21/22bis modem (limited period) FREE			
Dataltalk for IBM or Apricot	£115	Dataltalk with Miracle Tech modem	£65
Multicomm for IBM or Apricot	£115	Multicomm Plus for IBM	£185
V Term 220 (IBM needs EGA)	£154	Crosstalk XVI	£109
Solterm II (Apple IIe, IIc)	£145	GEM Comm	£65

Please appreciate that Computer Communications is a rapidly expanding area, with new product announcements continually appearing. Please phone for latest prices and updates. We can also supply modems for leased lines, Multiplexers, Printers, Monitors, Terminals, Hard Discs, Tape Streamers, Cables, LANs, etc.

Please add VAT at 15% to prices shown. Carriage at £9 will be made by courier.

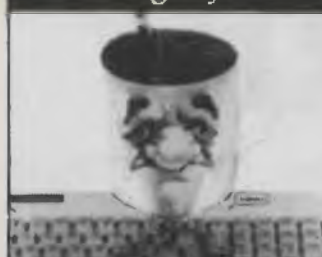
Access credit cards accepted. Make cheques, PO's payable to:

Rovoreed Ltd

The Coach House, 65A Grand Drive, London SW20 9DJ
01 - 540-8573

Or call our Bulletin Board on 01 - 542-4977 24hrs V21/22/23/22bis

We've got you covered with Seal 'n' Type



- Protective keyboard cover through which you can type freely & easily.
- 24-hour dust/spill cover.
- Removable, washable, re-usable.

£10.55

Patent & registered design pending

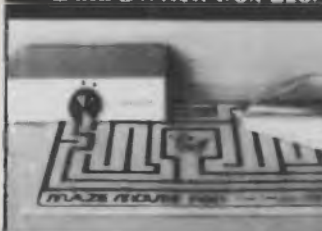
Screen 'n' View £14.50

- Superior anti-glare VDU filter.
- Ultra-fine framed mesh.
- Velcro fittings.
- Available for mono or chromo.

Plonker Box £4.99

- Working disc holder.
- Plonk your discs out of harm's way.
- Holds all standard sizes of discs.

Data Switch Box £26.95



- Provides easy switching of data from PC to 2 outlets: printers/modems/modems.
- No more constant plugging and unplugging. Cables £5.75 each.

Kador Mouse Pad £5.95

- Prolongs life of your mouse & protects work surface.
- Generous size (34x29cm).
- Anti-friction, anti-static.

SEND FOR OUR CHRISTMAS CATALOGUE

Cheques/P.O. payable to KADOR, P.O. Box 20,
Prices are fully inclusive Ashford, Middx. TW15 3QE.

Kador

POWER 386 SYSTEM \$995

16/20MHz, 0 WAIT STATE

DISTRIBUTOR

Some New Competitive Products Among Our Complete Line:

- * 10MHz S/P/G/RTC/
FDC XT COMPATIBLE
- * 6/8/10/12MHz AT
COMPATIBLE
- * 16MHz AT
COMPATIBLE
- * PARADISE VGA CARD
- * PARADISE PGA CARD



BOARD TECHNOLOGY CORP.

12TH FL., NO. 51, CHUNG CHING S. RD., SEC. 2, TAIPEI, TAIWAN, R.O.C.
TEL: (02) 396-1166 (50 LINES) TLX: 14058 STXFTX FAX: (02) 392-9747

**We needed even more space to show
you all that's new in the
Amstrad marketplace
- so we've moved to ...**

**The Great Hall
Alexandra Palace
Wood Green, London**

AMSTRAD COMPUTER SHOW

**10am - 6pm Thursday, January 28
10am - 6pm Friday, January 29
10am - 4pm Saturday, January 30**

**It's
here!**



**This is YOUR chance to
try out for yourself the
new Amstrad portable
- the machine the
press is raving about!**

**FREE
presentations in
the Amstrad Theatre**

You can sit back in
style and learn all about the
latest releases for Amstrad
computers - and get expert
advice from some of the best
brains in the industry. What's
more, there's lots more seats
than ever to meet the demand
for this very popular attraction.

How to get there

*It's so easy to get to the show - by car,
rail, underground or bus. Alexandra
Palace has its own British Rail station,
whisking visitors to and from King's
Cross in just nine minutes. And there's
a free bus service shuttling between
station and show every 10 minutes.
If you're travelling by road the show is
only 15 minutes away from Junction 25
on the M25 - and all car parking is
free.*

Advance ticket order

Please supply:

- ☐ Adult tickets at £2 (save £1) £
- ☐ Under-16s tickets at £1 (save £1) £
- Total £
- ☐ Cheque enclosed made payable to
Database Publications Ltd.
- ☐ Please debit my credit card account
- ☐ Access / Visa

Admission at door:
£3 (adults),
£2 (under 16s)

**Advance ticket orders must
be received by Wednesday,
January 20, 1988**

**AMSTRAD
COMPUTER
SHOW**

Name

Address

Signed

**The Great Hall
Alexandra Palace, Alexandra Park
Wood Green, London N22
January 28-30**

**Post to: Amstrad Show Tickets,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.**

**PHONE ORDERS: Ring Show Hotline: 061-480 0171
PRESTEL ORDERS: KEY *89, THEN 614568383
MICROLINK ORDERS: MAILBOX 72:MAG001
Please quote credit card number and full address + A210**

**Cut the queues and
save £1 per head -
with this advance
ticket order form**

Amstrad is a trade mark of Amstrad PLC

SBC products pack the punch you need – delivering fast, responsive and dependable performance – without hurting where it can hurt you most.

From the compact twin-drive FD at £599 to the top-of-the-line SBC 286AT, we bring you stand-alone and multi-user/network systems of outstanding quality.

They're fully featured, incredible value – and maintenance free. That's the measure of our confidence – a 12-month fast call out, on site maintenance contract with every FD/HD, 286AT and Speedlaser – completely free of charge.

And to meet your entire information processing needs our PC compatibles and printers form part of a cohesive range available through our nationwide network of Master Dealers. Each offers demonstrations and support, and all the advice and guidance you could possibly require.

SBC 286AT - FASTER THAN THE INDUSTRY STANDARD - AND TOTALLY COMPATIBLE

Specified, designed and built to satisfy the heavy demands of today's business users, the superb SBC 286AT offers the features and performance vital to effective business control. Software switchable between 8 and 10MHz and featuring custom-built gate arrays and an optional maths co-processor, the SBC 286AT really gets things moving when running

SBC
FD/HD SERIES

FROM
£599



SBC brings you here to make light of



1.2Mb floppy and
20Mb hard disc
£1399

integrated accounting packages, graphics and engineering applications. 1Mb of on-board RAM means you can run big programs quickly and conveniently, while data storage is taken care of by up to 40Mb of hard disk capacity. Eight expansion slots plus three peripherals ports let you make all the right connections, and three types of graphics card and our range of monitors give you complete flexibility in matching the SBC 286AT to your software applications.

SBC 286AT SERIES

SBC 286ATSD 80286-10 CPU software selectable 8 or 10MHz; 1Mb RAM; 1 x 1.2Mb floppy drive; 2 x RS 232C serial ports; 1 x Centronics parallel port; 84-key PC AT compatible keyboard; green or amber monitor with swivel & tilt; MS DOS and GW-BASIC 3.2; 12-month on site maintenance.

£999

SBC 286ATDD Specification as above except 1 x 1.2Mb floppy drive and 1 x 360K floppy drive.

£1099

SBC 286AT20 Specification as above except 1 x 1.2Mb floppy drive and 1 x 20Mb hard disk drive.

£1399

SBC 286AT40 Specification as above except 1 x 1.2Mb floppy drive and 1 x 40Mb hard disk drive.

£1599

SBC FD/HD SERIES KNOCKS SPOTS OFF THE COMPETITION FOR PRICE/PERFORMANCE

Undoubtedly among the best value XT compatibles in Europe today, the versatile SBC FD/HD series can be used as low-cost workstations in a network, or as powerful stand-alone PCs. They give guaranteed performance – day in, day out – with features at a price you wouldn't think possible. Running programs at least *three times* faster than an ordinary PC, the SBC FD/HD series makes a significant contribution to office productivity. Data storage ranges from 360Kb twin floppies to 20Mb hard disc, and expansion and interfacing is handled by four slots and two ports. You can change

SBC MASTER

ALDER
811 Computer Junction, 135/137 High Road, Marlow, Bucks. HP8 3JH.
Tel: 0494 27446.
827 Ben Court Business Services Ltd, Ben Court Court House, 11 Blenheim Street, Tel: 01478 4855.
83 Mayflower Business Systems, 42 London Lane, Farnley, Tel: 0144 8300.
847 Key Jay Systems, 135 Lakes Green Road, Tel: 01258 0100.
849 Business Technology Consultants Ltd, Watons House, 1 Park Drive, Loughborough, Tel: 01509 5545.
850 Microcomputers, Park Royal Business Centre, 9 Park Royal Road, Tel: 0181 8541.
851 Business Computing, 6 Park Road, Loughborough, Tel: 01509 7016.
852 Computer Facilities, 7 Kings Highway, Plymouth, Tel: 01752 5311.
853 Antony Department Store, 145-155 High Street, Exeter, Tel: 01392 1955.
854 363 PC, 31 Market Road, Tel: 0193 4430.
855 Riving & Hobbs, Computer Junction, Tel: 01226 7807.
856 Media America Ltd, 228a Victoria Green Road, Tel: 01503 4382.
857 Park Software, 32 Walsley Place, Tel: 0161 2846.
858 Harry Rinks, 424/426 Exeter Road, Tel: 01202 4872.
859 Highgate Ltd, 100/102 Walsley Place, Tel: 01202 4334.
860 Remy Data Services, 33 Southdown Street, Tel: 01245 1955.

ALLEN
BATH Computer News, 3 Market Street, Tel: 0275 4054.
MAILS PAP Systems (UK) Ltd, The Glen, Chertsey Road, Tel: 0272 315022.
WESTON SUPER MARE R.S. Computers, 32 Alfred Street, Tel: 01934 419224.

ALLEN
LAUGHTON KUTZAR Computer Centre Ltd, 8 Woodside Street, Tel: 0125 270790.
LETON MHI Computers, 18 Gerrard Street, Tel: 0582 458021.

ALLEN
BRACEWELL Micro Computers Ltd, 10 Langdon Lane, Tel: 0344 40133.
READING Computers, 482 Oxford Road, Tel: 0754 508099.
SLOUGH Shop Computers, 245 High Street, Tel: 0351 73554.
SLOUGH 32 PC, 1 Lymington Green, Tel: 0494 6426.

ALLEN
ONEHARM D.L. Chichester, 58 St The Broadway, Tel: 01243 78441.
BILTON EYEBS Systems Ltd, 18 Northgate, 2 New Rd, Tel: 01508 540236.

ALLEN
ALLEN/CHEN Report Computers, 10 Regent Road, Tel: 061 929 0325.
CHIEF Microplan, 120 Northgate Road, Tel: 0270 210016.
DALE Long Computer Systems, 73 Green Street, Tel: 061 905 2964.
DASHINGTON Report Systems, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

ALLEN
ALLEN/CHEN Report Computers, 10 Regent Road, Tel: 061 929 0325.
CHIEF Microplan, 120 Northgate Road, Tel: 0270 210016.
DALE Long Computer Systems, 73 Green Street, Tel: 061 905 2964.
DASHINGTON Report Systems, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

ALLEN
ALLEN/CHEN Report Computers, 10 Regent Road, Tel: 061 929 0325.
CHIEF Microplan, 120 Northgate Road, Tel: 0270 210016.
DALE Long Computer Systems, 73 Green Street, Tel: 061 905 2964.
DASHINGTON Report Systems, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 1

anything up to an extra £340 on comparable machines. And you can forget the inconvenience and expense of plug-in font cartridges (sometimes as much as £125 each) because the SBC Speedlaser comes complete with 14 'soft' fonts comprising 112 typestyles on disk. It offers HP LaserJet, LaserJet Plus and Eson FX emulation, and operates with all industry standard PCs, software and desk top publishing systems.

SBC FD NEC V40 CPU 8MHz; 640Kb RAM; 2 x 360Kb floppy drives; 1 x RS 232C serial port; 1 x Centronics parallel port; 84-key PC XT compatible keyboard; green or amber monitor with swivel & tilt; MS DOS and GWBASIC 3.2; 12-months on-site maintenance.

SBC FDC Specification as above except monitor is medium resolution colour with swivel & tilt.

SBC HD 20 Specification as SBC FD above except 1 x 360Kb floppy drive and 1 x 20Mb hard disk drive.

SBC HD 20C Specification as SBC HD20 above except monitor is medium resolution colour with swivel & tilt.

£1199

The remarkable SBC Speedlaser marks a breakthrough in low-cost laser printers - offering performance comparable with machines three times the price. By placing the PC/printer interface in the computer itself - as a conventional

£799



Dot for dot and pound for pound, a printer offering incredible value. Fully compatible with IBM and Epson character sets, it meets the vast majority of everyday printing requirements. **£249**

The perfect partners to the SBC computer range, these IBM compatible monitors are available as follows:

plug-in expansion card – there's a dramatic increase of up to *nine times* the speed when printing full page A4 graphics. Moreover, these can be printed at full resolution of 300 dots per inch thanks to the hefty 1Mb of main memory – costing

HM12G 12-inch green **£79.95** **GM14C** 14-inch med. resolution colour **£269.95**
HM12A 12-inch amber **£79.95** **GM14E** 14-inch EGA compatible colour **£359.00**
HM14A 14-inch amber **£99.95**
HM14A 14-inch amber **£99.95** All SBC monitors include swivel and tilt.

You can't afford to lose valuable data due to unexpected power failures, but you can afford an SBC uninterruptable power supply. All models allow up to 18-minutes back-up time.

PWM200 (200W) £199 PWM500 (500W) £299 UPS1000 (1KVA) £799

Individual PCs and specialised or expensive peripherals can be linked together using SBC NET network cards and inexpensive twisted-pair cable up to a distance of 4,000ft. It's the cost-effective way to share resources - saving time, workload and expense. **£249**



SBC SPEEDLASER

£1795

ER NETWORK

Luton	Stevenage	Watlington	Watlington
IT TIMINGS Data Computer Systems, 7 Bedford Avenue, Watlington Tel: 0527 302702	20 BILTON WAY BUCKINGHAM Gates, 70 Canal Street, Tel: 0273 729616. RODNEY ROAD Watlington Ltd, Unit 30, Lutterworth Road, Ely, Cambridgeshire Tel: 0432 543354.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.
140/077 Accurate, 140 The Station House, Watlington Road, Tel: 0273 340777.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.	0432 570001 Hinks, Paterson, Mauds, Watlington Square Tel: 0273 309766.



SBC is the business
computer division of
Spectrum Group plc.
20 Bilton Way, Luton
Beds LU1 1UU
Tel: 0582 402545
Fax: 0582 402571
Telex: 827608 SPUKLD G

All prices shown are exclusive of VAT and correct at time of going to press, E.&O.E. Not all dealers stock every item advertised - please phone for availability before making your journey.

For '386 power on your desk



... or off it!

- 16 and 20 MHz versions
- 0 wait states
- Ex stock, only from



INTER · ORIENT

01 · 441 · 9866



Evesham Micros

All Prices Include VAT & Delivery
Next Day Delivery £5.00 Extra

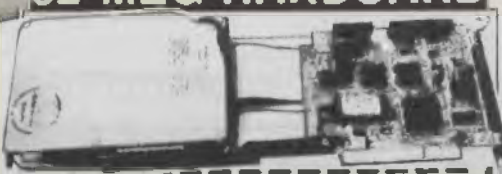
1512/1640 PRICE CHECK

Choose an Amstrad PC from our vast range. We offer outstanding value with our Evesham upgraded models. The single drive versions are professional internal installations leaving maximum room possible for future expansion, the double drive versions use a hardcard. All systems are supplied fully configured, ready for operation. Service contracts arranged. 1512 models can be supplied with 640K RAM upgrade installed for £20.00 extra.
(Figures in light type are ex VAT prices)

STOP PRESS FREE with 1512... Migent Ability & 4 games
(former retail value over £200.00)

	SD	DD	AMS 20MEG	SD 21MEG	DD 21MEG	SD 32MEG	DD 32MEG
MONO 1512	381.74 439.00	477.39 549.00	N/A	588.26 689.00	693.81 798.00	641.74 738.00	737.36 848.00
COLOUR 1512	520.87 599.00	616.52 709.00	N/A	737.39 848.00	833.04 958.00	780.87 898.00	876.52 1008.00
MONO 1640	494.78 569.00	581.74 669.00	868.70 999.00	711.30 818.00	798.26 918.00	754.78 868.00	841.74 968.00
EGA (COLOUR) 1640	625.22 719.00	712.17 819.00	912.17 1049.00	841.74 968.00	928.69 1068.00	895.22 1018.00	972.17 1118.00
ECO (EGA) 1640	755.65 869.00	842.61 969.00	1129.57 1299.00	972.17 1118.00	1059.13 1218.00	1015.65 1168.00	1102.61 1268.00

32 MEG HARDCARD



PRICE DESTRUCTION!

Western
Digital
Filecard

Only
£299.00
INC VAT & DELIVERY

A staggering offer on top brand equipment, due to our purchasing commitment we can offer this product at below trade price! We even supply it ready tested and configured, all you have to do is slot it in and start using it (please specify 1512, 1640 or other).

- Simple fitting
- Low power consumption
- Superb quality
- Full year warranty
- Suits SD or DD PCs

STOP PRESS
"XTREE" file management software included
FREE. This normally retails for £50.00

21 MEG HARDCARD

Western Digital 21MEG Filecard
Same features as 32MEG above £249.00.

MEMORY UPGRADE Upgrade 1512 memory to 640K, full instructions	£19.95
TAPE STREAMER Cipher 1525-CT, 25 MEG capacity for Amstrad	£469.00
NEG V30 Replaces 8086, improves operating speed	£24.95
8087-2 MATHS CO-PROCESSOR 8MHz, improves calculation speeds	£159.00
2 MEG "EMS" Fully loaded Zucker 2MEG RAM board	£299.00
MODEM CARD Amstrad's PC modem, Inc. Microlink membership	£158.00

COPY II

Option Board

The 100% effective disk backup method. This half card fits in an expansion slot and will allow you to make backups of ANY, yes ANY disks (excluding protection by physical damage).

- Simple to fit
- Easy to use
- Success guaranteed
- Amstrad instructions
- Works with single or dual floppy systems

Only **£79.95**

DISKS & BOXES

- 25 bulk packed DS/DD disks with tabs & labels... £13.95
- 25 disks as above with 50 capacity storage box... £22.95
- 25 disks as above with 100 capacity storage box... £24.95
- 50 capacity lockable storage box as offered with disks... £10.95
- 100 capacity lockable storage box... £13.95

Make the right decision
with a

Star

ALL PRINTER PRICES
INCLUDE
• VAT
• PRINTER CABLE
• INSURED DELIVERY

printer from Evesham Micros

If you would like a detailed print sample of any model please send S.A.E.

We use and recommend Star printers, they offer the best combination of features, print quality, reliability and value for money.

- Star **NL-10** New low price (inc. cartridge, state type) £219.00
- ... 2 extra ribbons (value £13.90) **FREE** with NL-10 orders...
- Star **NX-15** Wide carriage version of **NL-10** £319.00
- Star **ND-15** Faster version of **NX-15** £419.00
- Star **NR-15** 240cps, 60 NLQ wide carriage £499.00
- Star **NB24-10** Brilliant 24 pin printer 216cps, 72cps NLQ £479.00
- Star **NB24-15** Wide carriage 24 pin £599.00
- Star **NB-15** Ultimate 24 pin, 100cps in NLQ! £719.00
- Star **SF10-D** Sheet feeder, all 10" models £59.00
- Star **SF15-D** Sheet feeder for NX, ND & NR15 £159.00
- Star **SF15-B** Sheet feeder for NB15 & 24-15 £199.00
- PANASONIC KXP-1081** Best sub £200.00 model £179.00
- Micro P. **MP165** Fast & popular £219.00
- Micro P. **MP200** Very fast printer for the money £299.00
- Micro P. **MP26** Excellent 26cps d'wheel great value £249.00
- Micro P. **MP40** Yes a 40cps d'wheel for this price £349.00
- Amstrad **DMP3160** New version now 160cps £189.00

Other models in stock at competitive prices

Gold medal winner!
Over 100,000 copies sold

COPY II[®] PC

Protect your Software Investment...

For Amstrad PC and other compatibles

- Back up most protected software! (for personal use)
- Run many popular business programs from your hard disk!
- Verifies disk copies!
- Includes disk drive speed check!
- Fully automatic!

ONLY
£34.95

Central Point Software's best selling copy program. Allows many popular programs to run from hard disk without reference to floppy eg.: DBASE, LOTUS 123, SYMPHONY etc. NEW, "Version 4.01"

PC TOOLS[™]

The most complete PC utilities program...

For Amstrad PC and other compatibles

- Powerful DOS interface! (will run resident)
- Fast hard disk backup & restore!
- Compress a hard disk!
- (Delete files!)
- Unformat a hard disk!
- Over 20 utilities built in!

ONLY
£34.95

Central Point Software's powerful new disk utility. Combines the best features of Norton/Mace utilities, Fastback and Disk Optimizer into one incredibly powerful and ultra low priced package. NEW, "Version 3.0"

PC Magazine "Editor's Choice" award

**Evesham
Micros**

All prices INCLUDE VAT/delivery. Next day delivery £5.00 extra
How to order

Send cheque P.O. or Access Visa details
By phone with Access Visa no.
Government, educational & PLC orders welcome
Same day despatch whenever possible
Callers welcome, open 6 days 9.30-5.30
TELEX: 333294 EMICRO

Evesham Micros
63 Bridge Street
Evesham
Worcs. WR11 4SF
TEL: (0386) 765500

Also at: 1756 Pershore Rd., Cotteridge, Birmingham B30 3BH Tel: 021 458 4564



OFFER

THE ULTIMATE SUPPORT SERVICE FOR YOUR NETWORK OR STAND ALONE SYSTEM

Whether your system is based next door or half way around the world, our unique support solution will give you the most instant online help facilities available today. A simple device allows our technical support personnel instant access to your system to solve your urgent problems. You retain full visual and physical control on the system which is also secured by full password protection. Our methods are proven and have become invaluable to all our customers who have joined our scheme. You can even use our system to communicate with your other branches or offices whatever the distance. Furthermore, this service is complimented by our own hardware maintenance division?

We are the main suppliers of the following:

IBM — Compaq — Victor — Toshiba Token-
ring — Ethernet — GNET — Arcnet — Snet
Netware — Open Access — Pegasus — DBase
III + all major affiliated products.

**For Further details of our unique support
solution, contact:**

Da Vinci Computers Ltd.
112 Brent Street, Hendon,
London NW4 2DT. UK

Tel: 01-202 2272

Tlx: 265871 (MONREF G)

& refer to 81:MMD102

Fax: 01-202 4982

Telecom Gold:

81:MMD102



FROM QUE
MILLION COPY EDITION

COMPUTER MANUALS carries an extensive range
of computer books, covering all areas of
computing.

We boast

Over 60 publishers
Over 1000 titles
The best and most comprehensive list of titles
available

We guarantee

Same day despatch (for books in stock)
24 hour ordering service

To order

Telephone 021 706 6000

or

021 707 0118

or write to

Computer Manuals Ltd
30 Lincoln Road
Olton
Birmingham B27 6PA

LCD PORTABLE COMPUTER



TRKOM-206 S.K.D. LCD PORTABLE COMPUTER FOR 8088,
8088-2 AND BABY 80286, 80386

COMPRISE:

- CASE
- 200W POWER SUPPLY
- AT/XT 85 KEYS KEYBOARD
- L.C.D. MONITOR (BACKLIGHT)
- DISPLAY CARD
- WITH C.G.A./E.G.A./M.D.A.
- HGC/EL/LCD (1/100) 2 RS-232C PORTS, 1 PARALLEL
PORT & TURBO DISPLAY)

TRKOM-206X-640KB PC/XT LCD PORTABLE COMPUTER

- 640KB TURBO MAIN BOARD (4.77/8 MHZ)
- 640KB RAM ON BOARD
- 2 x 360KB 5-1/4" FDD (JAPAN)
- DRIVE CARD

TRKOM-206A 1024KB PC/AT LCD PORTABLE COMPUTER

- 1024KB BABY-AT MAIN BOARD (6/10 MHZ)
- 1024KB RAM ON BOARD
- 2 x 1.2MB 5-1/4" FDD (JAPAN) or 3-1/2" FDD
- 1.2MB FDD CARD

King Power

**KING POWER COMPUTER
ACCESSORIES CO., LTD.**

NO. 52, LANE 308, SEC. 3, HOPING E. RD., TAIPEI, TAIWAN, R.O.C.
TLX: 20204 KINGPOWR TEL: 02-7339555 (REP.) FAX: 886-2-7339796



HOMEVIEW

296 Brockley Road, Brockley, London SE4 2RA



Tel: 01-691 0207

**Complete range of Atari Computer Hardware
and Software also; large range of Amiga,
Sega Hardware and Software**

Atari Mega 2	£743.00
Atari 1040STF	£413.00
520STM inc Mouse, 1Mb drive, 1st Word	£304.00
Amiga 500	£412.00
Sega Game Consul	£86.00

Printer's Peripherals

Video Library Software our speciality

Business

The Director Video Library Software	£375.00
Authorised Malvern Dealer	
Sage Accountant	£149.00
Sage Accountant Plus	£199.00
Sage Financial Controller	£299.00
Authorised Sage Dealer	
Firstwork Plus	£69.00
Authorised GST Dealer	
Sony MD2 DS/DD	£21.69

Entertainment

Trivial Pursuit ST	£15.61
Chessmaster 2000 ST/Amiga	£19.53
Barbarian ST/Amiga	£19.53
Starglider ST/Amiga	£19.53
Terrorpods ST/Amiga	£19.53
Space Harrier Sega	£21.70
Choplifter Sega	£17.35
The Ninja Sega	£17.35

All latest Atari, Amiga, Sega software in stock. Please note we can not list all software as we are currently carrying over 1000 titles on the Atari range of computers.

All prices exclusive of VAT. Free P&P UK only.
Ring now for latest prices. 24hr answer service.

By credit card

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 & 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	£99
MP801 8 WAY	£132	PB256 256K RAM	£175

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 £9.95

2M IBM CENTRONIC PRINTER LEAD £12.86

TO ORDER, PLEASE SEND CHEQUES BUT ADD £5 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

COMPUTER INTELLIGENCE

**Superior System at sensible prices.
Everybody sells cheap PCs, we provide that extra
quality.**

eg. Flat Screen, Hi-Res monitor and 640k on all systems

Some representative prices:

10Mb £625, 20Mb £720

Ask for your specification

SPECIAL:

10MH AT with 20Mb 1.2Mb floppy and screen £995!

REMOVABLE STORAGE

30Mb hardcards £295. Kodak 6.6Mb £475.

DTC 10Mb £875. Tape Streamer 40Mb £475.

PRINTERS:

IBM Graphics 80col., very special price £125

Daisywheel Quality Qume compatible £175

Ricoh RP16 60cps Daisywheel £395

Full Range of Citizen Printers at Special Prices

Laser Printers from £1400

SPECIAL

Ferguson Comp Video Monitors £58

SOFTWARE

Very special multi-user accounting system — for high
speed network or remote VDU. Ask for details and price

THE QUADRANT CENTRE

LIMES ROAD,
WEYBRIDGE KT13 1DJ

TEL: 0932 849723



Digital Design and Development Ltd

Interface House, Chelmsford Road, Southgate,
London N14 4JN

Telephone: 01-886 3668 Telex: 8953742

Interfaces for industrial and scientific applications.

THINKLAB/INLAB multi channel multi function analog/
digital input and output system.

GPIS integrated system with 8 channel 12 bit ADC,
4 channel 12 bit DAC, 8 digital inputs and 8 relay
controls.

SPEEDLAB fast data capture and control system.
Simultaneous sampling on 8 channel, 12 bit resolution
ADC, sampling rate 100KHz, 1 Megabyte Ram,
2 channel 12 bit DAC and 16 digital I/O.

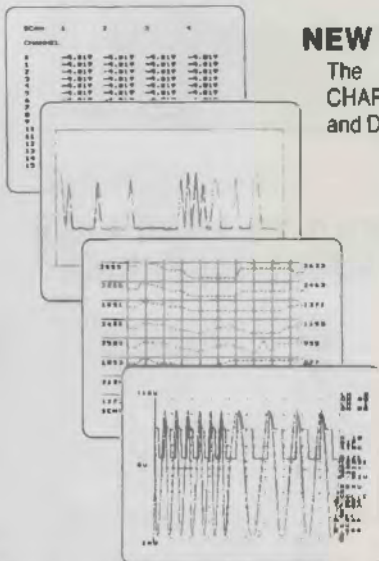
3D interfaces are compatible with IBM PC, BBC,
Macintosh, etc.



IEEE-488

RS232C

OASIS VIRTUAL INSTRUMENT SYSTEM



NEW VERSION - NEW INTERFACES - HIGH SPEED OPTION

The OASIS Virtual Instrument System (VIS) emulates conventional OSCILLOSCOPE, CHART RECORDER, PROCESS MONITOR, MULTI-CHANNEL DVM, X/Y PLOTTER and DATA LOGGER in one easy to use package.

HARDWARE

VIS includes a precision 16 channel A-D converter, with programmable ranges and read rates of 50k R/s at 8 bit, 25k at 12 bit (100k and 60k with high speed option). This simply installed unit has proven long term stability and reliability.

SOFTWARE

The menu-driven acquisition, analysis and display programs combine on-screen set up of measurement parameters, SPREADSHEET data manipulation and a range of display formats, with ZOOM and ON-SCREEN MEASUREMENTS.

Total data mobility from measured information to memory, disk, screen and HARDCOPY output, including screen dumps.

The OASIS VIS carries full documentation to allow the beginner or professional programmer to create new interface applications or personalised instrument emulations.

PRICE

The price of the complete system is less than any one of the instruments it replaces.

Prices exclude VAT, P&P (£8). High speed option £160.

The Virtual Instrument System is supplied complete - no further components are required - just plug in to your laboratory computer.

Digital to Analogue and industrial interface options - POA

For fast delivery, phone your order on 0603 747887. Technical queries answered and requests for further information on this number.

PC-XT/AT - £499, Nimbus - £499, BBC/Master - £399, New Archimedes Version - £599

The Street, Old Costessey, Norwich NR8 5DF Tel: 0603 747887

Design Consultancy



COMPLETE COMMUNICATIONS SOFTWARE

FOR IBM PC XT AT PS/2 AMSTRAD PC SIRIUS & APRICOT

EASE OF USE:

TRANS-SEND is very easy to use. It features POPUP menus, many HELP SCREENS and a user definable menu. From this menu, the user may dial and log on (etc) at the press of a single key.

MODEMS:

TRANS-SEND operates with almost any type of modem, including HAYES (tm) and non-buffered 1200/75 manual modems. Autodial is supported, and Autodial protocol is user definable.

VIDEOTEX EMULATION (PRESTEL)

TRANS-SEND offers full videotex (PRESTEL) on VGA, EGA, CGA, HERCULES, MDA, and AMSTRAD display types. The emulation is total - ALL Videotex features are fully implemented*. The display is full screen or split screen. In split screen mode, you can view two Videotex pages at once, or have a HELP screen in view as well. Pages can be printed and saved in a choice of formats.

DATAMASKING allows quick and easy retrieval of data to a database or spread-sheet application.

MAILBOXES may be created offline, and later uploaded.

SOFTWARE DOWNLOAD is supported too.

TERMINAL EMULATIONS:

TRANS-SEND emulates VT102, VT100, VT52, ANSI, VIDEOTEX and plain TTY terminals. Graphics, function keys, and even keypad application mode are supported. The LEDs of the DEC(tm) terminal are reproduced on screen.

TRANS-SEND offers extra features via its POPUP menus from these terminal emulations.

FILE EXCHANGE:

TRANS-SEND offers SLIDING WINDOWS KERMIT, XMODEM, ASCII, Software Download, and its own protocol.

COMMAND FILES:

TRANS-SEND can be fully automated by use of its COMMAND FILE language. This powerful language supports labels, conditional branches, nested subroutines, etc. COMMAND FILES can be loaded and executed with the press of ONE key from the user defined menu. ALL TRANS-SEND operations can be automated by COMMAND FILES.

DISK BACKUP:

TRANS-SEND can move groups of files quickly and easily between computers. This offers an excellent method of backing up one hard disk onto another in a different computer. It can also move files between 5.25 and 3.5 inch formats, and APRICOT and SIRIUS formats.

WORD EDITOR:

TRANS-SEND has its own built in text editor. This feature can create and edit text files up to 80 characters wide by 800 lines long.

MS/DOS:

TRANS-SEND runs under MS/DOS version 2.00 or higher. It fully supports PATH names, and can execute any MS/DOS command line without a need to exit. It can remain memory resident via its SHELL option.

LANGUAGES:

TRANS-SEND is available in ENGLISH, SWEDISH, DANISH, DUTCH and FINNISH. A version in ENGLISH but using the SWEDISH character set is available too. More languages will follow soon.

* Colour needs a colour monitor.

PRICE £49.95 + £2 p+p PLUS VAT

MESSITER SOFTWARE

67 Crescent West, Hadley Wood, Herts. EN4 0EQ, England. Tel: 01-449 2994

PROFESSIONAL

THE

DIAMOND TROUGH

WAY
TO
AVOID
DATA
LOSS



Specifications

- Manufactured in Europe's most modern plant
- Lifetime *no-quibble* warranty
- Colour coded - for no more *costly* mix-ups
- Certified beyond *all* world standards
- Degaussed to *eradicate* spurious signals
- Micro burnished for *less* head wear
- Thicker jackets - less warping - *reduced* noise
- Non woven liners for *smoother* operation
- Total cover envelope - *maximum* dust protection

DISKING International Hindhead Surrey GU26 6TD

Tel: (042 873) 4834 • Fax: (042 873) 6676

DEALERS CALL (042 873) 4934

FREE *letter opener
with every pack!*



ORDER FORM

To: DISKING, FREEPOST, Hindhead, Surrey, GU26 6BR

Telephone Orders: (042 873) 4834 • Fax: (042 873) 6676

Qty (packs)		1-	2-	5+
D2D	D/S 48 tpi (blue)	11.26	10.98	10.69
D2Q	D/S 96 tpi (silver)	13.00	12.68	12.35
D2HD	D/S 1.6 Mb (white)	26.04	25.39	24.74
DM1D	S/S 0.5 Mb (blue)	17.35	16.92	16.48
DM2D	D/S 1.0 Mb (blue)	21.70	21.16	20.62

Letter opener (one **FREE** with every ten pack)

Goods Total exc VAT

U.K. Delivery (see below) exc VAT

Sub Total exc VAT

V A T @ 15%

Value of cheque payable to Disking

OR Please debit my ACCESS/VISA No:

Name/Company:

Address:

Tel. No:

U.K. P&P exc VAT (disks/microdisks)

1 - 2.pks 95p/pk 3 - 5 pks 75p/pk 6 - 9 pks 60p/pk 10+ POST FREE

Quickest

#

You want **B-Tran V6.0** – THE fastest and THE most flexible way to further develop BASIC applications under MS-DOS. Benchmark performance tests prove it!

54

Without being an expert you can convert to 'C' from MS-BASIC or QuickBASIC at any stage during the development of your applications.

1999

Additionally **B-Tran** has replaced the need for a BASIC compiler under UNIX and gives developers clear portability and the option of sticking with BASIC or moving effortlessly to 'C'.

We don't think that you're going to need it, but of course we offer a free, comprehensive telephone support service, for three months on all **B-Tran** products.

Definitely Yes

The Ultimate QuickBASIC Translator ... £385.00 (+ VAT)

Sector 7 Software Ltd., Trend House,
Dallow Road, Luton,
Bedfordshire LU1 1LY
Tel: England (0)582 402504
Fax: (0)582 459973 Telex: 825387

TO: Sector 7 Software Ltd.
Trend House; Dallow Road, Luton, Bedfordshire LU1 1LY

Please send me copies of **B-Tan** @ £442.75 (inc. VAT) per copy.

I enclose my cheque for £..... Or
Please debit my ACCESS/BARCLAYCARD (please delete) account.

My card number is [][][][][][][][][][][][][][][][]

TELEPHONE

☐ Please send me more information on the complete **B-Tran** product range.

Sector 7
EXCLUSIVE

Sector 7 Software Limited acknowledge all other trademarks appearing in this advertisement

PC PROMISE



building a better database

PC Promise is a Powerful Relational Database Manager recognized for its ease of use when voted WHICH Computer Magazine's "Best Database Buy".

What is a Relational Database Manager?

A relational database simply means you can store information in a number of separate files and cross reference them for reporting and updating. With 'Flat file' database managers you can only use one file at a time. This makes it very difficult to get a complete overview of your business position.

IT'S EASY TO USE

You simply lay out your business forms on the screen as you would on a piece of paper. Within seconds you will be storing and retrieving information. You can also design menus and help screens to suit your needs, making task selection simpler for the inexperienced user.

IT'S FLEXIBLE

Changing business forms is as easy as changing your mind. PC Promise allows you to change the layout of your forms: you can add, delete or alter fields on the screen without having to reorganise files.

A few of the many business tasks PC Promise will handle:

- ★ Labels
- ★ Standard Letters
- ★ Invoicing
- ★ Job Costing
- ★ Solicitor's Records
- ★ Mailing Lists
- ★ Order Processing
- ★ Estate Agency
- ★ Insurance Records
- ★ Sales Ledger
- ★ Library Records
- ★ Personnel Records
- ★ Membership Files
- ★ Car Sales
- ★ Patient Records
- ★ Inventories

Specifications:

- ★ Amstrad PC, IBM PC and Compatibles
- ★ Minimum 256K bytes memory.
- ★ Single disk drive
- ★ Supports mono and colour screen
- ★ 1800 characters per field
- ★ File security by Password
- ★ Variable length fields
- ★ Calculation +, -, ×, ÷ and dates.
- ★ Reports up to 240 character wide
- ★ Data can be interchanged with Word Processors, Spreadsheets and other databases.
- ★ Screens can be redefined as windows (several can be viewed simultaneously).

“ A range of features far beyond what businesses usually get for such a price

PC World

Both Menu driven and Relational, PC Promise really is an unusual product, packed full of features not found in other databases

PC Plus

” A number of features make PC Promise stand out among the competition for Best Budget Database

Amstrad Professional Computing

Support:

90 days FREE Hotline support is available directly from the Publishers, with extended support if required at minimal cost.

Still not sure?

Try out a demonstration diskette of PC Promise for £5.00. Send your cheque with the completed coupon, or call us on 01-942-2538.

For your local dealers call:
Lightning Distribution
Microdealer International
GEM Distribution
Softsel
P & P Micro Distributors
Leisuresoft
Vanguard Leisure
Software Limited

01-966 5555
0908-74000
0279-412441
01-568 8866
0706-217744
0604-768711
0772-617665
01-278 2377

Sweden Compsoft
Spain ICS
Norway SoftTech Data
Holland Systel
Australia Amsnet
Germany Taunus

08-7714500
071-458600
04-816773
023-339101
075-531734
0617-23115

To Duncan Databases Ltd, 9 Chestnut Grove,
New Malden, Surrey, KT3 3JJ, England.

Please send me a PC Promise demo diskette

Name _____

Address _____

Telephone _____

Enclose cheque value £ _____

Duncan Databases acknowledge
all trade names.

PC Promise (Budget Version) is £69.95 (inc. VAT).

Semaphore cards

For high quality and reliability.

2Mb EMS MEMORY CARD

Memory enhancement board offering a maximum configuration of 2Mb and full compatibility with the Lotus/Intel Expanded Memory Paging Specification

- ◆ Fully socketed memory
- ◆ Configurable start address at 256K, 512K and above 640K
- ◆ Software Zero K installed
- Add £60 for each 512K memory (120ns)
- Price is for XT card
- Add £20 for AT card

£129

3Mb MULTIFUNCTION CARD

Multifunction card for the PC AT offering standard I/O functions and up to 3Mb of Extended Memory

- ◆ Fully socketed memory
- ◆ Configurable start address at 256K, 512K and above 1Mb
- ◆ 1 serial port, 2nd optional
- ◆ 1 parallel printer port
- ◆ Game port
- Zero K installed
- Add £60 for each 512K memory
- Add £15 for 2nd serial port

£175

4Mb MEMORY CARD

High performance Extended Memory card for the PC AT offering up to 2Mb on main board with a further 2Mb on piggyback board supplied

- ◆ Fully socketed memory
- ◆ Configurable start address at 256K, 512K and above 1Mb
- ◆ Extendable to max 16Mb
- Zero K installed
- Add £60 for each 512K memory (120ns)

£175

1200/1200 MODEM SHORT CARD

Remarkable high performance half-size modem card

- ◆ CCITT V22/V21 Full Duplex and Bell 212A/103 compatible
- ◆ Software compatible with Hayes Smartcom II and AT command set
- ◆ Auto dial & Auto answer
- ◆ Selective COM1 or COM2 port
- ◆ Built-in speaker
- ◆ Fail-safe line protection circuit

£125

Non Telecom approved.



EGA MULTIMODE CARD

Powerful Multimode Graphics Short Card supports all four display standards

- ◆ Fully compatible with IBM EGA, CGA, MDA & Hercules Mono Graphics
- ◆ All modes can be displayed on a single EGA monitor
- ◆ Supports 132 column text in EGA mode
- ◆ Supports 640 x 400 pixels in CGA mode with double scan capability
- ◆ 256K display memory
- ◆ Light pen interface
- ◆ Flicker free display

£165

MULTI I/O CARD

A short size card providing fully configurable standard I/O functions

- ◆ Short card 4 x 5"
- ◆ Parallel printer port
- ◆ One serial port, 2nd optional
- ◆ Real-time clock-calendar with battery backup (PC, XT only)
- ◆ Game port
- Add £15 for 2nd serial port
- Multi I/O combined with 2Mb EMS Memory Card £149

£69

ETHERNET CARD

Intelligent High Speed 10Mbps/sec Network Card with 80186 processor and 82586 LAN coprocessor on board

- ◆ Ethernet (CSMA/CD, IEEE 802.3)
- ◆ Protocol is in the firmware
- ◆ Power-on diagnostic
- ◆ NETBIOS level compatible
- ◆ Suggested Network programs NetWare, PC-NET and MS-NET

£375

MONO GRAPHICS SHORT CARD

High resolution graphics for your monochrome display monitor

- ◆ Short card 4 x 6"
- ◆ Text Mode 80 x 25
- ◆ Graphic mode 720 x 348 Pixels
- ◆ One parallel printer port
- ◆ Full compatibility with Hercules mono graphics card

£69

COLOUR GRAPHICS SHORT CARD

Colour/Graphic Adaptor, fully compatible with IBM's

- ◆ Short Card 4 x 5"
- ◆ Alphanumeric mode: 40 x 25 80 x 25
- ◆ Graphics mode: 320 x 200 4 colours 640 x 200 2 colours
- ◆ Composite video ports
- Add £10 for printer port

£59

384K MEMORY CARD

The cost effective solution for filling out the base memory on your PC, XT

- ◆ Short card 4 x 5"
- ◆ Uses 64K and 256K chips
- ◆ Configurable start address
- ◆ High reliability
- 384K installed

£89

Other Cards in range

Hard disk controller @ £85

Hard/Floppy controller (AT) @ £145

Multi Serial 4 port @ £119

Multi User 4 port Xenix @ £195

Dual Serial Card RS422/232 @ £89

We offer a full 12 months warranty and if you have any problems or questions you can call us for Technical Support.

Access & Visa accepted.
Please add VAT to all prices.
Carriage is free within mainland UK.

Call us for a catalogue of complete product range and further information.



**SEMAPHORE
SYSTEMS LIMITED**

7 Moreland Ct, Finchley Rd, London NW2 2PJ
Tel: 01-435 6315/01-433 1255

S.Z.D. Business Systems

BRYNGWYNBACH, RHUALLT, ST.
ASAPH, CLWYD, LL17 0TH
Telephone 0745 582286

**DON'T READ THIS if you
want to pay more for your
computer requirements**
*These are only a sample from our
current Price List*

PRINTERS

EPSON, LX800 150cps 80col £193.00
EPSON FX1000,
160cps 132col £380.00
NEC P5, 264cps 136col £699.00
NEC P6, 216cps 80col £376.00
OHI ML192 160cps 80col £276.00
OHI ML182 120cps 80col £188.00
CANNON PW1080 160cps 80col £239.00
CANNON A60 200cps 80col £395.00
SBC TP180-9 180cps £209.00

Also stockists of

STAR/CITIZEN/BROTHER/JUKI/AMSTRAD

JUKI 6100 (Daisywheel) £245.00
JUKI 6200 30cps 132col £399.00
CITIZEN 120D 120cps 80col £133.00
CITIZEN LSP100 175cps 80col £209.00
CITIZEN LSP

LASERS CITIZEN OVERTURE £1425.00

KYOCERA F1010 £1849.00

KYOCERA F2010 £3595.00 CANNON LBP 8A £1485.00
CANNON LBP 8II £1849.00

SPECIAL OFFER HP LASERJET £1485.00

HP LASERJET II £1879.00 **COMPUTERS** AMSTRAD 1640,
SINGLE ECD £693.00 DOUBLE £775.00

AMSTRAD 20Mb ECD £999.00 20Mb MONO £763.00

OPUS III EGA £949.00 OPUS III MONO £649.00 OPUS V

MONO £1235.00 OPUS V EGA £1475.00

SPC FLOPPY D/D M/M £519.00 SPC 20Mb M/M £889.00

TANDON PCX10 £789.00 TANDON PCX20 £899.00

TANDON PCA20 1Mb/20Mb £1295.00 TANDON PCA40

1Mb/30Mb £1715.00

XENITH 181 LAPTOP £1225.00

BONDWELL BW8 PORTABLE £679.00

**All SBC and Bondwell Units carry 12 months
on site maintenance free — Call for prices on
TANDON/FERRANTI/ACORN/COMMODORE/
ATARI**

PLOTTERS

Graphtec

WP3100 was £895.00 now £748.00/Graphtec 3200 was

£1100.00 now £899.00/Graphtec 3300 was £1300.00 now

£1099.00 **SCANNERS** Cannon IX-12 £641.00/

PC Paintbrush plus Scann Dvr £91.00 **DISKS** Phone now for

the best prices in the UK

★ ★ STOP PRESS ★ ★

Amstrad 1512 DD/MM Computer

Amstrad DMP3 160 Printer

Wordstar Wordprocessor

Supercalc Spreadsheet

Printer Cable

**£564.00 plus VAT While stocks
last. Also available with DMP4000**

Phone now for the best prices on
**COMPUTERS/PRINTERS/SOFTWARE/
MODEMS/STREAMERS/MONITORS/
CONSUMABLES**

1. All items covered by full 12 month warranty
2. Next day delivery for most goods
3. Ask about on-site maintenance
4. Government and educational orders welcomed
5. Trade enquiries welcomed
6. Leasing and finance facilities available
7. Ask to be put on our mailing list
8. All prices quoted are ex. VAT and carriage.

P.C. CLUB

1000's

20

of programmes from **each**
for the IBM-PC, XT, AT and compatibles on 5¼" diskettes. PC CLUB's diskettes are crammed full of programs. In some cases we've used an archiving program (free on disk) to squeeze on far more of these high quality programs than is normal. This means lots and lots of high quality software at the **LOWEST PRICES**. Most disks have documentation on disk and, where appropriate, a PC CLUB help file. Here's just a small selection from the PC CLUB Library. All disks just £4.99.

CHRISTMAS SPECIALS

(tick boxes required).

- ☐ **GAMES 1** ABM, Brick, Qubert, Spacewar, Keno, Kidnap, Starlane + 13 other programs.
- ☐ **GAMES 2** Galaxy Trek.
- ☐ **GAMES 3** Bandit, Pocker, Rockets, Roulette, Blackjack, Stock and Submarine Chase.
- ☐ **GAMES 4** Kong, Golf, Monopoly & Striker
- ☐ **GAMES 5** 3 Demon, Castle, Baby and Jumpjoe.
- ☐ **GAMES 6** Hopper, Kalscope, Polymaze, Space Commanders2, Thatsall and 24 other programs.
- ☐ **PC WRITE** V2.4 Multi-function Word Processor.
- ☐ **FREEWORD** The easy to use Word Processor.
- ☐ **BEGINNERS WORD PROCESSOR** — An Excellent way of learning about the WP.
- ☐ **PROCOMM** V2.42 of this excellent modem program with terminal emulation.
- ☐ **KERMIT** PC/Mainframe Host Comm by Columbia Univ, V2.29.
- ☐ **E-Z FORMS** — Business form generation, Completion and generating programs + PC Fonts on same disk.
- ☐ **FINANCE MANAGER** — Menu driven many options, Personal Date Book. Throw away your Filofax.
- ☐ **DESKMATE** — Calculator, Clock, Calendar, Notepad, Phone+ PARTNER all on one disk.
- ☐ **PORTFOLIO MANAGEMENT** — Analyse your stocks and Shares.
- ☐ **FREECALC** — Easy to use menu-driven spreadsheet. 50 col x 250 row.
- ☐ **PC-CALC** — Well-Known spreadsheet. 123 style 64 col x 250 row + Q Modem 7 on one disk.
- ☐ **PC GRAPHICS** — Create your own PC graphics.
- ☐ **DISKCAT** — Super capacity disk file catalog.
- ☐ **PC-DBMS** — V1.0 Menu driven database management system.
- ☐ **FILE EXPRESS** — Menu driven general purpose database manager. 2 Disks (11.98).
- ☐ **PIANOMAN** — Turn your PC into piano. Good for learning about music.
- ☐ **TIP NOTES + TECHNIQUES** for the IBM PC.
- ☐ **ESIE** — "Excellent and easy to use Expert System Shell" KD Expert Systems.
- ☐ **ORIGAMI** — Japanese paper folding with colour graphics.
- ☐ **TALKING PC** — Makes your PC talk, Yes, talk.
- ☐ **PC CLUB CATALOGUE** with Pacman and disk full of other games/utilities.

Programmers send us your shareware for international distribution. Overseas orders very welcome. Les commandes Européennes Bien Reçu

Please make cheque/postal order payable to:

PC CLUB LTD
CENTURY HOUSE,
LEWES ROAD, SCAYNES HILL,
HAYWARDS HEATH,
WEST SUSSEX, RH17 7NG
Telephone: 0444 86232

Subtotal for Diskettes _____
Postage/Packing and VAT
included

Total enclosed _____

A FAST AND FRIENDLY SERVICE
We cannot guarantee the suitability of
programs for users needs or equipment

MicroSight

LOW COST IMAGE CAPTURE



MICROSIGHT I

The popular low cost image capture system for IBM PC/XT/AT and compatibles capable of capturing up to 512 x 512 resolution images at 255 grey levels. MicroSight I includes camera, Microeye Scanner Card and software.

A camera stand is included to allow images of a variety of sizes to be captured **£595 + VAT**

MICROEYE SCANNER

Image capture card for use with your own camera/video system, provided with software for image capture, disk storage and printing. The microeye scanner has a resolution of up to 512 x 512 pixels at 255 grey levels.

Suitable for IBM PC/XT/AT and compatibles **£295 + VAT**

Versions of MicroSight and Microeye available for RM NIMBUS, Apricot, BBC Model B, HP 9816 and Victor 9000/Sirius



MICROSIGHT RT

A real time image capture system for use with IBM PC/XT/AT with capture of 512 x 512 resolution images at frame rate. Complete with camera and software **£1,490 + VAT**

MicroScale image processing and measurement software available with MicroSight products.

For Further details contact:-

DIGITHURST

The image analysis people

Digithurst Ltd.

Church Lane, Royston, Herts SG8 9LG

Tel (0763) 42955 Telex 818451 DHURST G

COMPLEX

NEVER BEATEN ON PRICE

MULTISOFT ACCOUNTS

Single User £199 per module

Support and Multi User Software available

Phone for price of Amstrad 1640 with 32Mb hard disk and free software

Amstrad 1512 640K (20Mb Tandem Hardcard)	£629
Amstrad 1640 Mono (20Mb Tandem Hardcard)	£679
Amstrad 1640 Colour (20Mb Tandem Hardcard)	£799
Amstrad 1640 EDC (20Mb Tandem Hardcard)	£949
(30Mb Hardcard Miniscrub) + £79 (Twin Disc drive Amstrad) + £89 (128 Memory Upgrade) + £19	

ATARI		MULTI USER	
520STFM	£235	SYSTEMS	
520STFM + mono monitor	£295	Comant Quad 20Mb	£4250
520STFM + Philips 8833	£499	Comant Quad 40Mb	£4999
1040STFM	£399	Northstar Dimension 30Mb	£3690
1040STFM + mono monitor	£479	Northstar Terminals	£799
1040STFM + Philips 8833	£824	M28 running Xenix (as other ATs)	POA
CUMANA DRIVES		Apricot Multi User Network for Xerox	POA
Atari 3 1/2" Drive	£121	20Mb Hard Disk Upgrades from	£325
Atari 20Mb hard disk	£599		
Atari 30Mb hard disk	£629		
Atari 40Mb hard disk	£899		
Atari 60Mb hard disk	£1099		

COMMODORE		HARD DISKS	
Amiga 500	£429	Seagate 20Mb 65ms	£249
Amiga 500 modulator	£25	Seagate 30Mb 65ms	£299
Amiga II	£949	Seagate 40Mb 40ms	£425
Amiga II	£1049	Miniscrub 20Mb	£299
Amiga 2000 1Mb	POA	Miniscrub 30Mb	£375
Amiga Bridge + 5 1/4"	POA	Miniscrub 20Mb hard card	£259
PC Double Disk Drive	£799	Miniscrub 30Mb hard card	£299
PC One Disk Drive 20Mb	£1099	Tandon 20Mb + Cont.	£225
AT 20Mb 1.2 Disk Drive 20Mb	£1775	Tandon 20Mb Hard Card	£225

EPSON PC PLUS		MONITORS	
Epson machines	POA	NEC MultiSync	£485
VICTOR		Philips 7502 (green)	£69
Vicam machines	POA	Philips 7522 (amber)	£75
		Philips (paper white)	£79
		Philips 8833	£225
		Philips 8852	£265
		Philips 8873	£325
		CAGA 1212	£75
		CAGA 1213	£105
		CAGA Supervision II	£275
		CAGA Supervision III	£345
		CAGA Supervision 640	£399
		CAGA Supervision 860	£499
		CAGA Supervision 860	£635
		EBA cards to suit monitors	

OLIVETTI		DOTMATRIX PRINTERS	
Olivetti 240	POA	Amstrad BMP 3000	£145
M24 1 D/D	£349	Amstrad BMP 3150	£165
M24 2 D/D	£4025	Amstrad BMP 4000	£269
M24 20Mb (Olivetti)	£1350	Amstrad LQ 3500	£299
M24 20Mb (Seagate)	£1250	Brother 1109	£185
M24 30Mb (Seagate)	£1450	Brother 1409	£325
M28 20Mb HD	£399	Brother 1509	£365
M28 20Mb + Tr/S	£2499	Brother 1875	£399
M28 40Mb	£2549	Brother 2024	£399
M28 40Mb + Tr/S	£2899	Canon 1060A	£215
All machines come with Keyboard		Canon A55	£349
Monitor and MS-DOS. M24's 640K		Citizen 1200	£139
colour monitor £250 extra.		Citizen LSP10	£199
		Citizen MSP105	£259
		Citizen MSP155	£349
		Citizen HOP45	£579
		Epson LX85	£185
		Epson LX800	£199
		Epson FX800	£299
		Epson FX1000	£365
		Epson E2800	£389
		Epson EX1000	£499
		Epson LQ800	£425
		Epson LQ1000	£569
		Epson LQ2500	£695
		Epson S302500	£949
		Micro P 135	£139
		Micro P 165	£165
		Micro P 200	£249
		Micro P 201	£361
		Micro P 480	£389
		Micro P 700	£429
		NEC Pwprinter P660 Parallel	£269
		NEC Pwprinter P665 Serial	£369
		NEC Pwprinter P660 Colour	£439
		NEC Pwprinter P665 Colour Serial	£439
		NEC Pwprinter P660 Parallel	£439
		NEC Pwprinter P765 Serial	£469
		NEC Pwprinter P760 Colour	£499
		NEC Pwprinter P765 Colour Serial	£529
		NEC Pwprinter 560XL Parallel	£699
		NEC Pwprinter 560XL Serial	£825
		NEC Pwprinter 960XL Parallel	£899
		Panasonic 1081	£195
		Panasonic 1081	£225
		Panasonic 1092	£299
		Panasonic 1581	£379
		Panasonic 1595	£459
		Star N110	£189
		Star N115	£275
		Star N115	£349
		Star FR10	£349
		Star NR15	£419
		Star NR24-10	£425
		Star NR24-15	£525
		Star NR15	£595
		Phone for prices on Dable, Newbury, Data, Qume and Ricoh.	
		Prices due to change so phone for better deals	

SPERRY		AMSTRAD PC	
Sperry machines	POA	1512 100 Mono	£379
		1512 200 Mono	£469
		1640 100 Mono	£469
		1640 200 Mono	£559
		1640 100 Hard Disk Mono	£799
		1640 100 Colour	£599
		1640 200 Colour	£699
		1640 100 20Mb HD Colour	£949
		1640 100 ECD	£725
		1640 200 ECD	£799
		1640 100 20Mb HD ECD	£1099

BONDWELL PC		TANDON	
B8 Portable	£679	PCA 20	£1249
B18 Portable	£999	PCA 30	£1499
Other Models Available	POA	PCA 40	£1749
Colour Monitor add	£199	PCA 70	£1999
		Colour Upgrade	£289
		Tandon Target 20Mb	£1399
		Tandon Target 30Mb	£1750
		Tandon Target 40Mb	£2075
		Ega colour upgrade	£475
		PC 70	Mo

SBC		PS2	
SBC Floppy	£525	Irwin 20Mb internal	£375
SBC 20Mb	£899	Irwin 40Mb internal	£469
SBC 55 20Mb	£899	Irwin 60Mb internal	£595
SBC A1 30Mb 1.20D green screen	£1499		
SBC A1 30Mb 1.20D colour 5.8			
+ 12 Mhz	£1875		
SBC A1 30Mb 1.20D ega colour 5.8			
+ 12 Mhz	£1849		
Free 12 monthers a sign maintenance			
with all Bondwells + SBC measures			

TANDON		PS2	
PCA 20	£1249	Irwin 20Mb internal	£375
PCA 30	£1499	Irwin 40Mb internal	£469
PCA 40	£1749	Irwin 60Mb internal	£595
PCA 70	£1999		
Colour Upgrade	£289		
Tandon Target 20Mb	£1399		
Tandon Target 30Mb	£1750		
Tandon Target 40Mb	£2075		
Ega colour upgrade	£475		
PC 70	Mo		

PS2		IBM XT/AT	
Irwin 20Mb internal	£375	Irwin 10Mb internal XT	£299
Irwin 40Mb internal	£469	Irwin 20Mb internal XT	£375
Irwin 60Mb internal	£595	Irwin 20Mb internal AT	£375
		Irwin 40Mb internal AT	£399
		Irwin 60Mb internal AT	£499
		Irwin 20Mb external XT	£399
		Irwin 20Mb external AT	£399
		Irwin 40Mb external AT	£450
		Irwin 60Mb external AT	£590
		Interface card XT/AT	£75

BONDWELL PC		TANDON	
B8 Portable	£679	PCA 20	£1249
B18 Portable	£999	PCA 30	£1499
Other Models Available	POA	PCA 40	£1749
Colour Monitor add	£199	PCA 70	£1999
		Colour Upgrade	£289
		Tandon Target 20Mb	£1399
		Tandon Target 30Mb	£1750
		Tandon Target 40Mb	£2075
		Ega colour upgrade	£475
		PC 70	Mo

SBC		PS2	
SBC Floppy	£525	Irwin 20Mb internal	£375
SBC 20Mb	£899	Irwin 40Mb internal	£469
SBC 55 20Mb	£899	Irwin 60Mb internal	£595
SBC A1 30Mb 1.20D green screen	£1499		
SBC A1 30Mb 1.20D colour 5.8			
+ 12 Mhz	£1875		
SBC A1 30Mb 1.20D ega colour 5.8			
+ 12 Mhz	£1849		
Free 12 monthers a sign maintenance			
with all Bondwells + SBC measures			

TANDON		PS2	
PCA 20	£1249	Irwin 20Mb internal	£375
PCA 30	£1499	Irwin 40Mb internal	£469
PCA 40	£1749	Irwin 60Mb internal	£595
PCA 70	£1999		
Colour Upgrade	£289		
Tandon Target 20Mb	£1399		
Tandon Target 30Mb	£1750		
Tandon Target 40Mb	£2075		
Ega colour upgrade	£475		
PC 70	Mo		

SBC		PS2	
SBC Floppy	£525	Irwin 20Mb internal	£375
SBC 20Mb	£899	Irwin 40Mb internal	£469
SBC 55 20Mb	£899	Irwin 60Mb internal	£595
SBC A1 30Mb 1.20D green screen	£1499		
SBC A1 30Mb 1.20D colour 5.8			
+ 12 Mhz	£1875		
SBC A1 30Mb 1.20D ega colour 5.8			
+ 12 Mhz	£1849		
Free 12 monthers a sign maintenance			
with all Bondwells + SBC measures			

TANDON		PS2	
PCA 20	£1249	Irwin 20Mb internal	£375
PCA 30	£1499	Irwin 40Mb internal	£469
PCA 40	£1749	Irwin 60Mb internal	£595
PCA 70	£1999		
Colour Upgrade	£289		
Tandon Target 20Mb	£1399		
Tandon Target 30Mb	£1750		
Tandon Target 40Mb	£2075		
Ega colour upgrade	£475		
PC 70	Mo		

SBC		PS2	
SBC Floppy	£525	Irwin 20Mb internal	£375
SBC 20Mb	£899	Irwin 40Mb internal	£469
SBC 55 20Mb	£899	Irwin 60Mb internal	£595
SBC A1 30Mb 1.20D green screen	£1499		
SBC A1 30Mb 1.20D colour 5.8			
+ 12 Mhz	£1875		
SBC A1 30Mb 1.20D ega colour 5.8			
+ 12 Mhz	£1849		
Free 12 monthers a sign maintenance			
with all Bondwells + SBC measures			

GOVERNMENT AND EDUCATIONAL ORDERS
WELCOME. EXPORT ENQUIRIES WELCOME
STANDARD DELIVERY £5 AND NEXT DAY
£9.50 — ADD 15% TO ORDER TOTAL
Complex House, 28 Bradgate Road, Hinckley LE10 1LA
(0455) 635583
Manchester 061-976 3763

OLIVETTI		MULTI USER	
Olivetti D4450	£789		
Olivetti D4800	£1049		
Panasonic 3031	£259		
Panasonic 3151	£425		
Juki 6100 20cps	£249		
Juki 6200 30cps	£399		
Juki 6300 40cps	£629		
Juki 8500 60cps	£899		
NEC Spinwriter EII	£275		
NEC Spinwriter 8800	£749		

LASER PRINTERS		CAD CAM PLOTTERS	
Epson Laser	£1299	Epson H180	£299
Centronics	£1299	HP 7440 8 pen A4	£375
Centronics with HP EM	£1599	HP 7475A 8 pen A3	£1445
Canon II	£1750	Roland DXY 880 A	£625
Kyocera F1010	£1999	Roland DXY 880 A	£1075
Kyocera 2020	£2495	Roland DXY 885	£2745
HP Laserjet Plus	£2499	Roland DXY 980	£1045
Mannesman Tally	£2599	Roland DPX 220	£2995
Citizen Overture	£1350	Roland DPX 330	£3995
		Seconic SPL 430	£637
		Seconic SPL 600	£2750
		Seconic SPL 800	£3500
		Hiatchi 612 4 pen A4	£435
		Taxan KPL 710	£635
		Phone for details on larger	
		Plotters A0 AT, Hewlett Packard,	
		Calcomp, Benson	

Kyocera 2020	£2495
HP LaserJet	£1799
HP LaserJet Plus	£2499
Mannesman Tally	£2599
Citizen Overture	£1354

CAD CAM PLOTTERS

Menu Plus

A flexible and easy to use menu generator for the IBM PC/XT/AT and compatibles. Lets you create your own user-friendly front end for DOS. Access all your applications programs at the touch of a key.

PLUS : System Features

- Full control on screen display and sound effects.
- User definable help screens and password protection.
- Up to 10 levels of follow-on menus.
- Demonstration with many examples and DOS help.
- Comprehensive and illustrative reference manual.

PLUS : Stand-Alone Utilities

- A full screen text editor to create/edit your menu files and DOS batch files.
- A browse facility for easy viewing of text files.
- Utility programs to enhance your menu files and DOS batch files.

PLUS : 14 day money back guarantee if not satisfied.

Menu Plus costs only £29.95 + VAT. Available from:

Robert Erkal Ltd
5th Floor
29-30 Warwick Street
London W1R 5RD

For further information, please write to above address or telephone 01-439 6288. All enquiries welcome.

PC MAIL LIST

Easy to use mail list program stores up to 65535 names and addresses. Fast search on name or reference, scan all fields, select any combination of fields that are including, greater than less than, equal to or unequal to your requirements. 6 different print-outs including 1 to 4 labels across to both printer or file, export files for mail merge. Single key operation i.e. press F for first record, A to add a record, U to update a record. Comprehensive manual.

£44.95

PC STOCK CONTROL

Stores data on upto 65535 stock lines including purchase price, selling price, vat rate, location, profit margin, suppliers details, reorder level, quantity on order date ordered, sales discounts and product code. Over 20 different print-outs including trade and retail price list, all items on order or low on stock, to both printer or file. Fast search on both stock number or description. Single key operation i.e. press F for first record L for last record.

£44.95

TRANSFORM LTD.



24 WEST OAK, BECKENHAM, KENT BR3 2EZ
TEL: 01-658 6350



YU TAI + ASIC PRODUCTS ARE YOUR SUCCESSFUL PARTNER!

SUPER SET -30



SUPER SET-30

8088-1, 10/4. 77MHz, 0 wait state, 640Kb RAM on board.
8087 co-processor socket, 3 parallel slots, AWORD BIOS (2.05)
All in one: real time clock with battery back-up
/ 1 * RS-232C/1 * parallel /FDC for either 5 1/4" or
3 1/2", monochrome/color/ graphics emulation /Printer
Two 3.5" FDD (720Kb * 2), EPSON

OPTICAL MOUSE



80386 SYSTEM

80386, 20/16MHz, 0 wait state
2Mb memory on board, expandable
to 8Mb, support 640+384 system,
clock and battery back-up.

- Programmable card key password



CT-6290 S² EGA
SHARPCAN,
1280 * 768 resolution



Other main products :

- Optical mouse
- Full-size 80286/baby AT mother board
- Full-line add-on cards :
*Super EGA card *HEGA printer card
*Multi-I/O card with 5 1/4", 3 1/2" FDD
*MCE (monochrome/color/emulation)
*MGP 80/132 column
*3M RAM card, 4M EMS card
*Turbo speed card
- Tower case
- Full-line bar code reader.



REFERENCE: Established in 1951 Capital : 8.5 million US\$ Computer div. Sales in 1986 : 24 million US\$

YU TAI INDUSTRIAL CORP.

4TH FL. 61. SIN-YI RD. SEC. 4, TAIPEI TAIWAN, R. O. C.
TEL: (02) 7037071-80 (10 LINES) TELEX: 26432 YUTAIAD
FAX: (02) 7000977 Attn: Computer div. Adam Tseng
AT is registered trademark of International Business Machines Corporation

Distributors wanted !

WORD PROCESSORS

LOCOMAIL 1	£33.95
LOCOMAIL 2	£33.95
LOCOMAIL 2 (NEW)	£18.95
LOCOMAIL 2 (NEW)	£33.95
LOCOMAIL 2 (NEW)	£33.95
MICROWORD MICROFILE	£36.95
NEWWORD 2	£57.95
POCKET PROTEXT	£34.95
POCKET WORDSTAR	£37.95
POCKET WORDSTAR DELUXE	£54.95
PROTEXT	£29.95
TASMAN TASPILL 8000	£14.95
TASMAN TASPILL 8000	£12.95
TASMAN TASPILL 8000	£18.95

ACCOUNTS

MAP INTEGRATED SUITE	£139.95
MICRO SIMPLY	£59.95
MONEY MANAGER	£21.95
MONEY MANAGER PLUS	£33.95
SAGE POPULAR ACCOUNTS	£79.95
SAGE POP. ACCOUNTS PLUS	£114.95
SAGE ACC. SUPER COMBO	£149.95
SAGE POPULAR INVOICING	£53.95
SAGE POPULAR PAYROLL	£53.95
SAGE STOCK & INVOICING	£59.95
SAVON CASHBOOK ACCOUNTS	£29.95

GRAPHICS

DR DRAW	£44.95
DR GRAPH	£44.95
EXBASIC	£48.95
FLEET ST. EDITOR PLUS	£48.95
GRAPHICS OPERATING SYS.	£59.95
ELEC. STUDIO FONT LIBRARY	£14.45
ELEC. STU. SNP ART (1-S/EA)	£14.45
MICRODRAFT	£69.95
NEWSDESK INTERNATIONAL	£35.95
POLYPLOT	£22.95
POLYPLOT	£29.95
POLY TYPEFACE 1	£17.95
POLY TYPEFACE 2	£17.95
POLY TYPEFACE 3	£17.95
THE DESKTOP PUBLISHER	£24.95

DATABASES

DBASE II	£64.95
CAMBASE	£44.95
CARDBOX	£49.95
CONDOR 1	£75.95
DATABASE MANAGER	£26.95
DELTA 1.25	£78.95
FLEXFILE	£45.95
MASTERFILE 8000	£44.95
MICROFILE MICROWORD	£45.95
SAGE RETRIEVE	£53.95

SPREADSHEETS

CRACKER II	£38.95
MULTIPLAN	£58.95
SCRATCH PAD PLUS	£45.95
SUPERCALC II	£38.95

LANGUAGES

ARNOR C	£88.95
OR C BASIC COMPILER	£44.95
OR PASCAL MT	£44.95
FTL MODULA 2	£49.95
HSOFT C (WITH EDITOR)	£33.95
HSOFT PASCAL 80	£33.95
HSOFT DEVPAK 80 (VER 2)	£33.95
NEVADA COBOL	£33.95
THE KIMRE	£19.95

GENERAL & UTILITIES

AUDIO TUTORIALS	£8.95
CADON TOUCH & GO	£18.95
COMPANION	£17.95
WANEY CRASH TYPING	£19.95
WANEY TWO FINGERS	£19.95
LABEL PRINTER	£22.95
MASS EASY LABELLER	£28.95
PLAN IT	£22.95
ROTATE	£19.95
SAGE MAGIC FILER	£54.95
THE FRENCH MISTRIS	£17.95
THE GERMAN MASTER	£17.95
THE ITALIAN TUTOR	£17.95
THE SPANISH TUTOR	£17.95
THE WELSH TUTOR	£17.95

9512 GOOD REASONS WHY NABITCHI WILL ALWAYS STOCK PCW'S!

COMPUTERS

FREE SECURCOR DELIVERY:
PCW 8256 COMPUTER... £298.00, £343.85
PCW 8512 COMPUTER... £389.00, £458.85
PCW 9512 COMPUTER... £499.00, £573.85

UPGRADES

PCW8256 MEMORY UPGRADE... £22.00
PCW8256 8 DISK DRIVE (FDD)... £130.00
PCW8512 8 DISK DRIVE (FDD)... £130.00
PCW8256 MEMORY & DRIVE... £159.00

COMPUTER CARE

PCW8256/8512 PAPER GUIDE... £12.85
8256/8512/9512 SCREEN FILTER... £17.85
CP8256/8512 INTERFACE... £54.95
PCW8256/8512 DUST COVER SET... £7.95
PCW 9512 DUST COVER SET... £8.95

CP2 3" DISKS ONLY £2.75

COMPUTER RODENTS

AMX MOUSE... £73.95
ELEC. STUDIO LIGHT PEN... £59.95
ELEC. STUDIO MOUSE... £89.95
ELEC. STUDIO MOUSE INTERNATIONAL... £11.45
ELEC. STUDIO VIDEO DIGITIZER... £99.95
GRAFPAD 2... £130.00
KEMPSTON MOUSE... £59.95
KEMPSTON MOUSE/FLEET ST... £115.00
KEMPSTON MWRITE HAND MAN... £89.95
PCW8000 PRINTER EXTH LEAD... £14.40

PCW PHONE HOME

AMSTRAD MODEM V21/V22... £69.95
MIRACLE WS4000 V21/V22... £105.00
SAGE CHIT CHAT WITH VIEWDATA OR E-MAIL INCLUDES MODEM... £104.95
AS ABOVE ALL SOFTWARE... £213.95

PRINTER RIBBONS

MINIMUM ORDER TWO RIBBONS:
PCW8256/8512 SENSORIA RIBBON... £4.75
PCW8256/8512 MULTI-STRIKE... £8.75
PCW8512 (BLACK)... £5.85
AMSTRAD DMP 3000/3000... £5.75
AMSTRAD DMP 4000... £7.75

PRINTERS

FREE SECURCOR DELIVERY:
AMSTRAD DMP 3000... £135.00, £154.25
AMSTRAD DMP 3160... £178.00, £204.70
AMSTRAD DMP 4000... £195.00, £232.25
AMSTRAD NLO 3500... £49.00, £401.35

PCW 9512 DAISY WHEELS

COURIER 10... £5.80
PRESTIGE PICA 10... £5.80
RECTA 10... £5.80
ORATOR 10... £5.80
LETTER 10/12... £5.80
PRESTIGE ELITE 12... £5.80
SCRIPT 12... £5.80
MINI GOTHIC 12... £5.80

NABITCHI SOFTWARE

POWERFUL SOFTWARE AT BUDGET PRICES
EXBASIC... £11.45
MALLARD BASIC CAN HAVE GRAPHICS WITHOUT THE PAIR... £7.95
IT'S BASIC VOL. 1... £7.95
PIRATES TREASURE FIVE STAR VALUE VERDICT... £7.95
8000 PLUS FEBRUARY 1987... £7.95
IT'S BASIC VOL. 2... £7.95
A WORTHWHILE BUY VERY GOOD VALUE FOR MONEY
YOUR AMSTRAD PCW OCTOBER 1987

YOUR AMSTRAD PCW OCTOBER 1987

YOUR AMSTRAD PCW OCTOBER 1987

YOUR AMSTRAD PCW OCTOBER 1987

YOUR AMSTRAD PCW OCTOBER 1987

YOUR AMSTRAD PCW OCTOBER 1987

YOUR AMSTRAD PCW OCTOBER 1987

YOUR AMSTRAD PCW OCTOBER 1987

YOUR AMSTRAD PCW OCTOBER 1987

YOUR AMSTRAD PCW OCTOBER 1987

1 THE PAPER WHITE SCREEN REDUCES EYE STRAIN AND GIVES FAR CLEARER DISPLAY

2 LARGE 512K RAM FITTED AS STANDARD GIVING FAST PROGRAM EXECUTION

3 CONTROL OVER THE CONTRAST AND BRIGHTNESS UNLIKE PCW8256

4 BUILT IN CENTRONICS INTERFACE FOR CONNECTION TO OTHER PRINTERS LIKE THE DMP3000 OR DMP4000

5 LARGE 780K 'A' DISC DRIVE NOW MEANS SOFTWARE SUPPLIERS CAN WRITE EVEN MORE POWERFUL PROGRAMS

6 PROFESSIONAL FULL SIZED KEYBOARD MEANS NO MORE MISS-TYPING

7 NABITCHI STOCK THE FULL RANGE OF GENUINE AMSTRAD PCW8512 PRINTER DAISYWHEELS

8 FAST DAISYWHEEL PRINTER MEANS HIGH LETTER QUALITY PRINT FINISH NOTE: THE DAISYWHEEL PRINTER MEANS YOU GET THE COMPUTER FOR FREE! NOT FORGETTING THE FREE TRACTOR FEED UNIT FOR CONTINUOUS PAPER

EVERYTHING THE 8256 SHOULD HAVE BEEN!

Nabitchi have always been known as THE PCW people. We intend to uphold this tradition for many years to come. The launch of the PCW8512 has again assured us all that the PCW tradition will live on. Once again Amstrad have given us a machine that caters for all tastes. It has a vast range of business software from accounts to desktop publishing. It has a full 512K RAM to accommodate the most advanced programs of the future. The 3" 780K disc drive gives vast data storage on the most reliable form of magnetic media. The full size professional keyboard means that typing is made easy. The 15 inch daisy wheel printer gives perfect letter quality on paper sizes up to A3, there is no longer a limit to the number of fonts, simply change the daisy wheel. The ever popular Locoscript.2 with spell checker and mail merge means that even our managing director David Rathbone can now write a letter. The paper white screen gives far clearer characters and thus reduces eye strain with contrast and brightness controls to adjust the display to your personal requirements. Nabitchi computing are the biggest PCW company and we intend to stay that way.

OFFICIAL ORDERS WELCOMED FROM PLC'S, GOVERNMENT AND EDUCATIONAL ESTABLISHMENTS. EXPORT CUSTOMERS SUPPLIED TAX FREE - ASK FOR GILL ROBINSON

PCW9512 ACOUSTIC PRINTER COVER NOW AVAILABLE ONLY £29.95 + vat

ALL PRICES INCLUDE VAT POSTAGE FREE TO MAIN LAND UK

NABITCHI
MERSEYSIDE INNOVATION CENTRE
131 MOUNT PLEASANT
LIVERPOOL L3 5TF
TEL. 051-708-8775/051-708-0123

TEL. 051-708-8775 / 051-708-0123
LIVERPOOL L3 5TF
131 MOUNT PLEASANT
MERSEYSIDE INNOVATION CENTRE

NABITCHI

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

10 BUDGET DISKS
10 JC HIGH QUALITY DISKS
10 COLOURED DISKS
10 LEAD DISKS (FREE BOX)

128K PC1512 MEMORY UPGRADE
8087-2 MATHS CHIP
V30 CPU CHIP 8086/8080
SCREEN CLARE FILTER
AMSTRAD MODEM
GRAPHPAD 3
LIGHT PEN
VIDEO DIGITISER

CYBER STUDIO



£89.95
INC. VAT.

Cyber Studio Presents . . . Your Own Living CAD 3D Works of Art!

Cyber Studio for the Atari 1040 ST is an exciting real-time package which combines the versatile CAD 3D 2 with Cybermate, an advanced animation facility.

Cyber Studio provides you with the tools to create a virtually limitless range of 3D images - from cartoons and science fiction fantasy to designing a car or landscaping your garden! The package is ideal for illustrating the various dimension of objects viewed from different angles and plane - invaluable for both educational and practical usage.

Dimensioning can be either in metres or feet, allowing for relational scaling between objects and real world situations. Additional features include arbitrary rotation points and a custom colour rendering system with up to 16 colours. Total control of light sources enables you to cast shadows from your objects - just like natural light!

The Cybermate animation facility allows you to view complex objects in a continuous sweeping movement, showing all possible perspectives. Just imagine it . . . design your own house or castle - then fly round your creation for a bird's eye view!

You Created It . . . Now Join In - In Fabulous 3D!

Want to get right in with the action on your screen? Well, now you can! These amazing Stereotek glasses will give you a startling view of your software, a 3D depth of vision you won't believe! As well as your screen adventures, enjoy your education and business presentations in glorious 3D too! Simply plug these hi-tech glasses into the cartridge port of your Atari 1040 or MEGA ST and get a whole new perspective on life.

£149.00
INC. VAT.



SOFTLINE

— the ultimate software support service

If you've dreamed of having access to a helpline where your questions are answered by technical experts, receiving advance warning of upgrades, tips on bugs, regular newsletters . . . your prayers are answered! Subscribe for £19.95, and all your Electric Software packages will be covered by the Softline support service. Join now!

Electric
SOFTWARE

ELECTRIC DISTRIBUTION - 8 GREEN STREET, WILLINGHAM, CAMBRIDGE CB4 5JA
TELEPHONE: 0954 61258 ELEX: 81113 (PM PROF G) FAX: 0954 80318

TEAR HERE

Please rush me your information sheet with full specifications of Cyber Studio.

Name _____ Address _____ Postcode _____ PCW 3

NOW AVAILABLE ON 5 1/4" disks
(please add 50%)

Buttonware
For the Amstrad PC1512 and other compatibles

SHAREWARE

★★★ A MARKETING REVOLUTION ★★★

Quality professional software for the Amstrad PC1512 and other compatibles.
Price covers medium, VAT & postage. Documentation on disk where appropriate.
"SINGLE DISKS £7.99; ANY 5 for £25; 10 for £39; 20 for £65"

☎ 0732 771344

★ PRODUCT OF THE MONTH ★

PC-File+ £11.50 (counts as 2)

The Most Popular Database in the World

PC-File sets a new standard for database managers. Jim Button has produced a program that is **EASIER** - 175+ help screens and improved menus: **FASTER** - with speeds up to 5 times quicker than previous versions: **MORE POWERFUL** - with a sophisticated report writer, ability to print entry screens, imbed calculations, mail merge form letters, and more!

Here is a listing of the improved features of PC-File+:

Easier
175+ Help Screens (Context Sensitive)
Completely Menu Driven
Teach mode: help screen that explains each step
Easier Macros: PC-File+ helps you define macros by memorizing each step for you
DOS PATH supported: start PC-File+ from any subdirectory
New CLONE routine: easier than previous versions
Faster
Sequential searches are 2 to 10 times faster than PC-File III
Sort is 2 to 5 times faster
Print is typically 2 times faster

Program is more compact PC-File+ is one program file - this reduces the "chaining" time from one program to another
More Powerful
Print entry screens, place fields anywhere on screen
Paint titles, prompts, boxes, etc.
Sophisticated Report Writer with Advanced Report Command Language
4 ways to define reports, including PAINTING it on the screen
Total control over EVERY aspect of the report
Edit report formats
Nested calculations
Complex searches allowed. Nesting of AND/OR
Calculations permitted Supports soundex,

wildcard, imbedded, generic. Retrieve data from multiple databases.
Global search and update on all or part of field, and on any number of fields.
Sort on any fields, ascending, descending.
Roman numerals, Random, Soundex.
Password Protection for individual features
DOS commands available at all times
Exchange data with:
dBase, Word Perfect, WordStar, Lotus, WORD, Peach Text, Leading Edge, etc.
Import and export selected records
Improved PC-Label works directly with PC-File databases, print selected records
Optional Case sensitive searches and sorts

"Duplicate Key" duplicates fields or records on data entry.

Functional Specifications

Max databases open simultaneously is 71
Max. field length is 1665
Max. fields per database is 70
Max. records per database is 65,533
Max. no. of sort fields is 10
Program is not copy protected

Requirements

IBM PC or PC compatible, 384K RAM
Two double-sided floppy drives or 1 double-sided floppy and a hard disk
MS-DOS or PC-DOS version 2.0 or later

ACCOUNTS

- 22 CashTrac 7.99 Personal finances organised. Handles standing orders.
- 26 Retail Point of Sale 7.99 PC-File handles stock/sales ledger/invoices at the counter.
- 94 Home Budget Management 7.99 Useful nominal ledger.
- 95 Stock Inventory 7.99 (Not stocks & shares).
- 21 Time & Money 7.99 OK for small business. Does more than just accounts.
- 104 Mr. BILL 11.50 Billing system for professionals. (ie Accountants, solicitors etc.) Counts as 2.
- 78 Automotive Accounts 7.99 Maintain sales ledger & inventory system for car repair (or other small) business. Produce invoices. Twin floppy ONLY!!!
- 1A FREEWAY UK Sales/ 15.00 This software is supported by registration by Freeway in UK.
- Purchases/Payroll Counts as 3.
- 48 The Front Office V5.1 15.00 Prospecting, Sales Management, Sales Order Processing, Job Costing & Profit Analysis. Needs Hard disk. Counts as 3.

COMMUNICATIONS

- 66 Greycom 7.99 Prestel comms. program from Paul Fletcher. All speeds to 9600 baud. CGA/EGA cards required. Most modems. Save frames. Carousell. Download telesoftware. Easy to use.
- 10 Procomm V1.42 7.99 Famous COMMS program.
- 74 PC-Board 11.50 Useful bulletin board system.

DATABASES

- 703 PC-File Plus 11.50 Paint screens, 71 relational files, screen tutorial, imbed & nest calculations, sophisticated report writer. Works with PC-Type Plus. Easy. Supported by us. Counts as 2.
- 700 U-Mind 7.99 Generates (GYBASIC) programs. A bit like The Last One.
- 10 Biblical Quotations 11.50 Huge database of Biblical quotes. Min. 2 driver.
- 14 Genealogy 7.99 Graphical representation on screen & printer. Program runs alone. Needs Basic. Counts as 2.
- 101 Family Tree 7.99 Genealogy program.
- 701 Wampum/ Wampum docs. 11.50 Menu driven dBase III clone. Counts as 2.
- 24 Instant Recall 7.99 Unique memory resident free-form database

GAMES (Please note that you need a CGA card. All Amstrads ok)

- 90 ZAXXON 7.99 The famous game from SEGA. CGA/EGA but DOS 2.0 or 3.1 ONLY!!!
- 35 Games V 7.99 Monopoly, Kong, Golf, Snicker.
- 800 PC-Chess 7.99 2 games. Graphical simulation.
- 100 Computer pranks 7.99 Lots of high jinks to play on your friend's computer!! Safe.
- 92 Bermuda Triangle 7.99 A sort of yacht simulator with a quest! EGA only.
- 73 Sam Spade 7.99 Text adventure on the steamier side of town.
- 802 PINBALL 7.99 9 Pinball machines emulated. Fast!
- 803 Bushido 7.99 As good as most other Martial Arts games
- 806 Fun Music Programs 6.99 A jukebox of melodies. Needs Basic.
- 707 Games III 7.99 Backgammon/Strategic US War Game (Maps etc.) Big Rug
- 81 Card Games I 7.99 Bridge, Canasta, etc.
- 801 Games I 7.99 Frogger, Digger, Paratroop, Wily, Rogue, Sowlish
- 804 Games II 7.99 Golf, American Football, Blackjack, Archery & much more
- 53 Adult Trivia/Poker 7.99
- 45 Games VII 7.99 Backgammon, Hangman
- 61 Games VI 7.99 Casino Games, Bandit, Blackjack, Poker, Roulette, Sub-chase, Stock Exchange.
- 47 Sleuth 7.99 Great detective adventure with graphics.
- 34 Cavequest 7.99 Graphical adventure. Reminds me of Elite with castles!
- 52 Games IV 7.99 Mahjong, Backgammon, Space war, Flightmare, Dragons.
- 40 Pianoman 7.99 Play music on keyboard, "record" it on disk, play it back!

GRAPHICS

- 903 PC-Key-Draw 7.99 CAD/Animation/Graphics/Scale/Rotate/Slides/Text. More facilities than ProDesign & PC-Paint. Represented by us in UK.
- 900 Danced 3D 7.99 Drawing, Animation, Wire Frame, Graphics. Needs 640K. Pretensions to desktop publishing.
- 72 Express Graph 7.99 Very easy to use colour business graphics. Pie, Exploded Pie, Segmented Lines, 3D bars etc. from typed data or imported
- 901 Draftsman 7.99 Produces pie, exploded pie, stacked bar, line & scatter charts
- 99 HI-RES 7.99 Super painting program. Works with mouse. Lots of facilities but no text on Shareware version. One single drive could replace GEM paint. CGA in colour! EGA in mono.
- 19 PC-Demo 7.99 Produce graphics display screens for presentations.

LANGUAGES

- 25 Macro Assembler (A86) 7.99 Probably the best 8086 assembler in the world. With debugger. We are the UK agents for this superb product. Version 3.07 (later version available).
- 408 Fig-Forth 7.99 Very good implementation
- 83 "C" Tutorial 7.99
- 84 TASM 7.99 Table driven cross-assembler. Set up for 6502, 8048, 8051 but configurable for Z80 etc. (who's volunteering?)
- 400 Z80/8080 Emulators 7.99 Runs CP/M software if on MSDOS format disks.
- 409 Small "C" 7.99 With primer and compiler.
- 502 P-Basic/PC-Prof 7.99 GWBasic clone with hands on Basic tutorial.
- 503 Pascal Compilers 7.99 One a subset of Turbo (everything but disk I/O); One Tiny Pascal, One Visible Pascal - built in editor/debugger.
- 406 CHASM 7.99 C-Heap ASSEMBLER. Compiled version of old standby. Retained mainly for the tutorial - otherwise use disk 25. (Now compiled)
- 43 Lisp/Xlisp 7.99
- 7 PD-Prolog V1.95c 7.99 Latest version with expert systems demo.
- 59 Expert System 7.99 This one works well and is straightforward to set up. See also PD-Prolog.

WORDPROCESSING

- 16 PC-Type Plus / PC-Label 15.00 Includes 100,000 word on-line "Fuzzy Finder". Work 10 files simultaneously. Easy to learn (interactive tutorial). Mailmerge. Direct access to PC-File Plus databases. Direct access to PC-Style & DOS Multi-columns. Maths. Graphics. Support by us. Counts as 3 (ok single drives), red by us.
- 3 PC-Write V2.6 7.99 Famous wordprocessor.
- 102 Screen Write 7.99 Special word-processor for script-writers. Unique formatting features.
- 8 Galaxy V1.2 7.99 Perhaps the fastest WP in the world. Wordstar keys.
- 31 Qwerty Wordprocessor 7.99 Probably the best one for novices. Includes comprehensive hands-on training course.
- 17 EZ-Spell 7.99 Spell-checker. Works with PC-Write.
- 18 Fofin/Tally etc. 7.99 Various programs to analyse text, word counter, indexer etc.

NEW PRODUCTS (Please note these include updates)

- 6 PC-Outline V3.30 7.99 Famous Outline processor.
- 601 AS-EASY-AS v3.0 7.99 Amazing Lotus feel-a-like spreadsheet with numerous facilities. Including decent graphics, macros. Runs Lotus 2.1. WKS files. EGA/CGA/Hercules support. Music! High quality product.
- 110 Extended Batch Language 7.99 Many more powerful commands incl. conditional.
- 111 H-MET 7.99 Super letter writer for hardcopy. Type using space bar.
- 112 Inventory system 7.99 Parts inventory/stock control. (PCBBUK 314)
- 113 Newbase 7.99 Helps publishers keep track of the contents of each issue. Useful for both advertising & editorial.
- 114 EGA utiliti 11.50 Asteroids for EGA only. Addictive with EGA demo programs & utilities. Counts as 2.
- 116 Virtual Memory 7.99 Emulates LIM/EMS expanded memory but on hard-disk.
- 117 Flowcharter 7.99 Suitable for programmers & others. Screen/printer.
- 118 Z80 Cross-Assembler 7.99
- 119 Amy's First Primer 7.99 Ages 3 to 8 Needs Basic.
- 120 Instacalc 7.99 Memory resident spreadsheet loads Lotus worksheets.
- 416 Mailing List 7.99 Sends letters or labels to selected people.
- 121 PCPG 7.99 PC Picture Graphics. Create libraries. Enlarge. Reduce. Flip. Flipster support.
- 122 Assembler utilities 11.50 Misc. utilities & routines. Counts as 2.
- 124 Turbo Pascal utiliti 15.00 Various programming tools & routines. Counts as 3.

Please note that we are authorised representatives for various authors so we get the latest versions first!

EDUCATIONAL

- 48 MS-DOS Tutor 7.99 Tutorial for learning about MS-DOS!
- 87 Help DOS 7.99 On-line help of all the DOS commands.
- 808 South American Trek/Castaway 7.99 Educational adventures from Buttonware.
- 39 Foreign Languages I 7.99 French, German, Spanish, Italian. Needs Basic.
- 1025 Educate I 7.99 High quality programs incl. Maths, Analogies etc. Needs Basic.
- 85 Fasttype 7.99 At last a decent touch typing course from beginner to advanced under ShareWare. (not perfect).
- 51 Educate II 7.99 Quality young children's games.
- 54 Learn Japanese 7.99
- 56 Learn Cantonese 7.99

VERTICAL

- 79 Portfolio Maintenance 7.99 PFRM addresses the problem of "Return on Investment" of shares.
- 418 Estibid 25.00 Estimating & Job Costing package. Counts as 5 disks.
- 76 Make My Day 11.50 Time Management. + Programs suitable for financial calculations for loans, savings etc. Time management includes Appointment calendar, Job scheduler, Expense Accounts plus TIME LOG for solicitors, accountants etc. Counts as 2.
- 33 Estate Agent 7.99 American but realistic. For residential agencies.
- 46 PC-Stock 7.99 Graphical analysis of Stocks & Shares.
- 108 DROEGE 11.50 CAD for printed circuit design. Counts as 2.
- 98 Critical Path Management 7.99 Limited facility scheduler/Unlimited facility Gantt charts.
- 23 PDS*Quote 7.99 Quotation system
- 12 Surveysoft 7.99 Land surveyors measurement and calculation program.
- 67 Supernews 7.99 Well proven newsworthy software written by our associates. This version is complete but is limited to 50 customers. On registration this limit is removed.
- 69 DOS Shells 7.99 For those who don't like GEM, Sili River, WFL, T-Shell.

SPREADSHEETS & STATISTICS

- 4 PC-CALC V3.0 7.99 Relational spreadsheet. Take data from other spreadsheets or from PC-File Plus databases. Supported by us.
- 20 Statistical Analysis 7.99 SPC-Professional. Beautifully complex graphic output.
- 104 Statistical Analysis 11.50 Kwikstat. Counts as 2.
- 600 Turbo-Calc 7.99 20,000 cells, bar graphs (poor). Also features Galaxy-style text-editor!
- 82 Curvefit 7.99 Performs least squares curve fit on x, y data. Curves for 25 equations fixed. Equation co-efficients. Correlation co-efficient & Best fit are computed. Predictions for y can be calculated. Imports from Lotus possible.
- 80 Goal Seeker 7.99 Memory resident, works with Lotus, SuperCalc, Multiplan etc. to enable user to seek end result (goal).
- 401 Sideways Print 7.99 Menu driven. OK for Lotus/ASCII files.

(For brief reviews and full list send 75p stamps)

Please send cheque/postal order or Access/Visa to:- Educational & Government orders welcome

Shareware Marketing, Dept PCW, 87 High Street, Tonbridge, Kent 0732 771344

SHAREWARE

UTILITIES & USEFUL PROGRAMS

73 Baker's Dozen	7.99	14+ useful utilities from Buttonware incl. mini-spreadsheet, calendar, sideways print (large/small), sort text files, redirect printer to disk, snapshot, undelete & more.
423 PC-Tickle	7.99	Reminds you of appointments, has simple module which allow it to report on expenses/hours utilised at certain activities. Buttonware
27 Critical Path Management	7.99	IPM Project Management
69 DOS Shells	7.99	For those who don't like GEM, Still River, WFU, T-Shell.
103 Utis IV	7.99	
420 Hard Disk Utis.	7.99	Includes disk space optimiser, diagnosis etc.
9 Deskmate	7.99	Memory resident clock, calendar, notepad etc. -> PopDOS.
403 Screens Creation	7.99	Set up entry screens for Basic & other programs. The saves worrying about field names & screen editing. Handles data entry. Brilliant!
414 Function Key Editor	7.99	
97 Commando	7.99	DOS Shell program.
89 Neofonts	7.99	Tool for creating new screen fonts in Turbo Pascal.
96 MACREAD	7.99	CGA/EGA prog to enable reading MAC graphics. Includes naughty pictures.
415 Utilibite I	7.99	Many useful utilities but including a super disc-doctor program.
11 Critical Path Management	7.99	PCPM, Gantt charts, 1000 tasks
413 Utilibite II	7.99	Undelete/undelete/sort editor/partition
421 XD-Extended DOS	7.99	Utility tools from Buttonware.
34 Multi-tasking utis.	7.99	Dosamate enables up to 7 programs to run together. Other programs thrown in.
38 Print Enhancers	7.99	3 programs to get NLQ fonts from non-NLQ printers.
28 File Encryptor	7.99	Secure your data. Prize if you can beat it!
423 Make Menus	7.99	Utis. to make menus on hard disks
35 Micro-Cache	7.99	Working copy of a commercial program. Limited features. UK product with full support.
57 Homebase v.2.0	15.00	Brown Bag's famous competitor to Sidekick. Best with Hard-disk. Counts as 3.
44 Astronomy	11.50	Relational statistics of planets, sun & moons. Counts as 2.

Public Domain Utilities only £2 each. (incl. VAT)

Choose a minimum of six of these super tested utilities for only £2 each. (Please note that you must test these utilities yourself first as we can take no liability for any data loss)

d1 Ask	Y/N option in batch file.
d2 Cal	Prints calendar to screen from DOS
d3 ★ CGClock	Colour clock with 1/4 hour beeps.
d4 Click	Another clock.
d5 Clean2	Makes full use of head cleaning kits.
d6 Color	Set display color attributes
d7 Cover26	Make disk cover labels. Include general info.
d8 Ctrl-Prts	Fakes Ctrl-Prts key in a batch file
d9 Ddate	Carries forward date for people with no clock in PC
d10 ★ DOS-EDIT	Very useful utility that holds the last 25 DOS commands used in a circular buffer. Saves retyping.
d11 Fastdisk	Speeds up floppy accesses on some drives.
d12 Flip	Flips Numbers/Caps locks on/off
d13 KBbuff	Extends the keyboard buffer.
d14 Keyloc	Acts as a Shift-lock key
d15 Keystat	Shows on screen Caps/Numlock status
d16 Membrain	Multiple Ramdisks.
d17 ★ Mspool	Print spooler for up to 4 printers.
d18 Ncolor	For people with CGA but mono monitors & problems.
d19 ★ Scav23	Scavenges marks out bad sectors on disks.
d20 ★ Scrn	Blanks out screen after n minutes
d21 Spool20	16k printer buffer.
d22 Swptr	Logically swap 2 printers.
d23 Volser	Relabel disks (volume names).
d24 Whereis	Searches all subdirectories for specified file.
d25 Load	Loads .COM files larger than 64k.
d26 Device	Reports installed device drivers.
d27 Addcol	Joins files horizontally!
d28 Undel	Recover accidentally erased files by name.
d29 Rtab	Removes tabs from text files
d30 Newboot	Bootstrap program where two operating systems are on same hard-disk. (ie MSDOS & DOSPLUS).
d31 Rdcpm	Copies files from CPM/86 disks to MSDOS disks.
d32 LU	Famous LBR program
d33 Remind	Alarm clock with message
d34 Ask	Set batch environment error levels
d35 Cal	Calendar program
d36 Calc	Small useful spreadsheet
d37 CPU	Accurate clock speed checker.
d38 F.COM	Converts Wordstar to ASCII & back again.
d39 Go	Run prog not in directory assigned by PATH.
d40 Lux	Runs a .COM file from within a .LBR

d41 Speeddisk	Can speed up some disk drives.
d42 Uniqcopy	Copy only files that don't exist on target disk.
d43 Vprint	Print to disk instead of printer.
d44 Chk4bomb	Checks for Trojan Horses.
d45 ★ Epson_1	Memory resident direct control of printer.
d46 FSD	IBM full-screen debugger.
d47 Eject	Sends Form-feed to printer.
d48 Slow	Slows processor down - useful for arcade games.
d49 Index	Text file index generator
d50 Knew	Time related file-copy program
d51 Make2	Compile & Link as per Unix.
d52 AIssearch	Searches all or some drives for files.
d53 Beep	Beeps!
d54 Set43	Sets EGA monitor to 43 lines
d55 Set25	Sets EGA monitor to 44 lines
d56 Dfix	Reports on disk, marks bad sectors. Slow.
d57 Palette	Muck about with palette on EGA
d58 Small	Patch for Wordstar 3.3 to display 48 lines on EGA/EGD
d59 Disktime	Reports on average access times of hard-disk. Revealing!
d60 Diskspd	Test floppy disk speed in rpm.
d61 Dskwatch	Monitors disk drive controller for errors.
d62 Lookmem	Look at memory locations
d63 Fix	Adds line-feeds to ASCII files.
d64 Dprotect	Protects against Trojan Horses
d65 ★ Make1512	Makes programs think they are in an Amstrad.
d66 ★ Epsonset	Pop up resident printer setup program.
d67 Splitter	Split ASCII file.
d68 ★ Prtsfxc	Allows Epson to do IBM graphic screen dumps. (useful for As-Easy-As)
d69 ★ Timepark	Parks hard disk after n minutes.
d70 Uasm	File un-assembler.
d71 Unprotect	For Amstrad owners who want to convert GWBasic files to ASCII format.
d72 Waituntl	System sleeps until hh:mm:ss
d73 Z[]	As above.
d74 Stopwch	Times the execution of other programs.
d75 Burnout	Blanks out screen after n minutes.
d76 Com2asm	Converts .COM files to .ASM (needs basic)
d77 Com2bas	Converts .COM files to .BAS (needs basic)
d78 ★ Cache2	Disk cache that works.
d79 DD	Shows 2 directories side by side. Useful for comparing.
d80 Pmm	Poor Man's Mouse (needs joystick adaptor)
d81 Speed	Compares speed of various operations against IBM XT.
d82 ★ PKXarc3	Very fast archiving system.
d83 Lptx	Very capable virtual printer with knobs on.
d84 ★ SSE-V2	Super processor timer.
d85 ★ SST	Disk optimiser. We use this but MAKE A BACKUP FIRST!!!
d86 Barcodes	Generate barcodes on Epson.
d87 Dback	Makes copy of hard-disk FAT to floppy.
d88 Wpotype	View Word-Perfect files in readable form.
d89 Cenv	Very comprehensive report on memory contents.
d90 Epson	Pop up printer control. Includes tiny print.
d91 Do	Alternative batch file language.
d92 Rev	Automatic numbering of saved programs whilst developing.
d93 Popdos2	Memory resident access to DOS
d94 Map	Memory map analyser
d95 Xray	Memory resident monitor
d96 Findstr	Find string across multiple files
d97 Megasort	Can sort multi-megabyte files
d98 Hush	Quietens some disk drives.
d99 SAP300	Directory sorter.
d100 AXX	Creates catalogue of disk
d101 Strip	Strip hi-bits & control characters from files.
d102 CPM80	Emulate CP/M80 under CP/M86
d103 HC	Convert binary file to HEX & v/versa
d104 Help	On-line syntax help from DOS
d105 Snaps	Memory resident screen snapshots.
d106 Small	Patch to Wordstar 3.3 to display 48 lines in EGA/EGD
d107 Unpro	Unprotect Basic/GWbasic programs
d108 Asmgem	Generate cross-referenced assembly language code from any executable file.
d109 BinSix	Convert binary to text & back again.
d110 Vdisk	Redirect text from printer to disk.
d111 Dscreen	Creates screens for DBase II.
d112 Xword212	Convert from Multimate/Wordstar etc to other formats.
d113 Cutpaste	Cut from one program / paste into another.
d114 Notepad	Memory resident notepad.

What is Shareware software?

The principle of Shareware is of "Try before you Buy". Most authors supply a full (or nearly full) working version of their program with enough documentation to help you give a reasonable evaluation of the software.

If you find that you use the software you are asked to send a donation to the author (at the simplest level) but some of the more professional authors can supply full support and manuals for a declared fee. With the Buttonware products, for example, we can give you a 250/300 page professionally bound manual with free 12 months technical support for only 46.50 incl. VAT. If you were to go to a commercial software house they would charge more than this for the ongoing support alone, let alone the cost of the program!

Shareware Marketing act as agents for several authors. Please enquire.

Conditions of Supply

Shareware Marketing supply software on an "as-is" basis and will only be liable for faulty media. We try to make reasonable claims for a program and will be sympathetic with any justified complaints received. However we will take no responsibility if any item of software does not meet your expectations. We do not charge for software but charge for duplicating, VAT, postage, handling, advertising & general administration. The software is free. Therefore no refunds will usually be considered.

WHAT DOES IT COST?

Single disks as priced; 5 for £25; 10 for £39; 20 for £65 UK Residents send cheque/postal order or telephone Access/Visa. EUROPE/EIRE.

We accept Mastercard/Visa/Eurocheques/Girobank.

Please deduct 15% VAT. (no postage charge).

OVERSEAS. Please send VAT inclusive amounts so that we are covered for postage.

3.5" disks please state computer (don't just say IBM format).

Shareware Marketing, Dept PCW, 87 High Street, Tonbridge, Kent

0732 771344

How to write your own software without the help of a programmer.

TAS Plus just made it faster, easier and cheaper to build database applications. It is a tool for anyone that wants to enter, store, display, report and manipulate information quickly and easily. TAS Plus combines the power of a relational database with the ease of a screen painter and a program generator. Then TAS Plus adds a runtime compiler that produces lightning fast code that outperforms all databases we know of. For just £99 look at what TAS Plus gives you:—

- **Relational Database**
- **Screen Painter**
- **Program Generator**
- **Report Generator**
- **Database Browser**
- **Source Code Editor**
- **4th Generation Language**
- **Runtime Compiler**
- **350 Page Tutorial and Reference Manual**

TAS Plus, for both Novice and Professional Programmer

TAS is fast and easy to learn. The excellent 350-page tutorial and reference manual will teach you how to develop your first application on day 1 and create new programs in as little as 20 minutes. Even if you have never programmed before.

Just "paint" the screen the way you want and the Program Generator writes the program for you. Custom reports are just as easy. When you have created your first database applications, the database browser and report generator allow you to retrieve the information quickly and print it to screen for a quick preview, direct to the printer, or to disk for subsequent word processing.

TAS Plus Technical Features:

(Developers version in brackets)

- TAS programs compile down to intermediate machine code for superfast loading and execution. TAS itself is written in Assembler for optimum efficiency.
- TAS uses high-speed B-Tree file access with built-in multi-company filing system. It handles 16 (32) simultaneous open files and each file can be accessed using up to 16 (32) keys.
- TAS has excellent array handling and string manipulation. Max. field size is 254 characters and max. number of array elements is 255.
- It supports 10,000 fields per record up to a max. record size of 10,000 characters.
- Each file may have up to 65,000 (17 million) records.
- A central data dictionary holds all data file structures in one place.
- All reports may at runtime be forced or selectively printed to screen (for a quick preview), to disk (for WP) or to the printer.
- Read and write 1 (3) ASCII files with fixed or variable length records and quote/comma delimited format (WordStar MailMerge).
- Automatically convert dBase III to TAS and TAS to dBase III data files.
- File types are alphanumeric, numeric, time and short/long European/US date and any field can be an array field.

- 4th Generation procedural language provides an incredible, but easy to learn, 85+ commands including IF, DO, WHILE, FOR/NEXT, GOTO, GOSUB, ON etc. with more than 200 options.
- Up to 9 (32 for Developer) individual screens and report formats per program.
- Full arithmetic including time and date arithmetic is supported (add and subtract times or dates and get the results in minutes or days).
- Numeric fields are stored in BCD format which saves space. Numbers may be up to 20 digits with up to 8 decimal places.
- Powerful TRAP command "traps" all function keys, numeric keypad and file Input/Output.
- From within TAS you can run other TAS programs, run non-TAS program and execute DOS commands.
- Even from within programs you can initialize, rename, restructure and delete files and calculate file sizes.
- Totally automated "idiot-proof" syntax-checking source code editor. Create your own pull-down menus and up to 10 overlapping windows.
- Up to 128 colour combinations, all IBM graphics, video highlight/normal/reverse and powerful scroll and wrap commands.
- User definable print control characters, full function key access and control.
- TAS Plus is supplied on 2 (3) floppy disks as a license to use on a single machine. It is not copy protected.

"If you can not find a commercial package to suit your organisation, then most certainly this must be one of the first places to start looking in order to produce a system of your own"

writes Jo Stork in the June 87 issue of Personal Computing with the Amstrad and produced "an impressively looking, well tested system using 5 files and requiring 20 programs inside 12 hours". (Reprints available on request)

Stop Evaluating!

dBase III	£595
Dataflex	£575
DataEase	£545
Delta4	£545
Paradox 2	£595
RBase V	£545
TAS Plus	£99

Step-by-step you will learn how to use the totally automated, syntax checking source code editor which even tells you on which page in the manual to get more help. And expand your programs to support multiple files and screens and add the "professional" features such as your own pull-down menus and TAS windows to make your software look like it would have cost thousands to develop. (We're the only database that can do this.)

TAS Plus can display 128 colour combinations and all IBM graphic characters. Your programs can have extensive calculations and even get at or set the system time and date. TAS Plus will show you how to produce programs that are better looking with on-line help and more user-friendly features than even the very expensive "professional" software.

And finally, when it comes down to the speed of writing and more importantly, running your applications (because that's what you do every day) you will find that the compiled code makes it load, read and write data quicker than any other database. And if you already have dBase III, TAS Plus can read and write those files as well. Now, you must agree that's respectable at any price. At £99 it's a must!

TAS Plus Developer's Version includes utility source code.

TAS Plus at £99 is suitable for almost everyone. The Developer's Version at £199 is for those that program professionally. (An upgrade pack is available for £135.) It has additional features and commands for developing applications which may be quite enormous in size. In addition to the TAS Source Code Editor, programs can also be created and maintained using an ASCII editor like NewWord or WordStar.

And note that all TAS utilities are written in TAS Developer's Version. **No other database or procedural language is only remotely capable of this.**

And the source code is included. This source code will show you how to write a program generator or a report generator, what techniques are used in the screen painter and the database browser etc.

Multi-User Developer's Version:

This costs £349 and supports file/record locking and runs on all MS-Net/DOS 3.x compatible networks incl. Token Ring, PC-Net, Novell, DNA, Northstar etc.

System Requirements:

TAS Plus and TAS Plus Developers Version run on any IBM PC, XT, AT or PS/2 compatible computer system including the AMSTRAD 1512 and 1640. TAS needs 512KB RAM and at least two floppy disk drives but we recommend a hard disk for development. Run-time applications will run excellent on single floppy systems.

Send for more information. Order from your local dealer. If in difficulty phone us on 01-874 6511 with Access or VISA card information or send cheque for £115 (incl. £1.00 towards P&P & VAT) payable to **MEGATECH** at the address below for 1st Class same-day despatch.

MEGATECH Ref: PCW12
111-113 Wandsworth High Street
London SW18 4HY
Tel: 01-874 6511
Telex: 21768 (NEWTON G)

TAS Plus is also distributed by GEM Distribution 0279 442842, NEWSTAR Software 0277 220573
Phone these distributors for your local TAS Plus Relational Database dealer.

All prices quoted are excluding VAT.

EFI



- ★ 80386 cpu 4.77/8/16MHz
- ★ Pheonix Bios
- ★ 1Mb RAM (80-N sec 32-bit RAM expandable to 10Mb)
- ★ 1.2Mb floppy drive (Japanese)
- ★ Mono Graphic display card.
- ★ 14" Hi-Res mono monitor (Samsung)
- ★ 1 Serial
- ★ 2 Parallel
- ★ Battery backed clock calendar
- ★ Western digital controller
- ★ 40Mb 28ms hard disk (Seagate)
- ★ 101 keyboard
- ★ Approved power supply
- ★ Deskpro look-a-like
- ★ Manual
- ★ 12 months warranty

£1987



XT
From **£339**

AND THERE'S MORE

AT
From **£650**

- ★ MSDOS £49.00
- ★ EGA £86.00
- ★ FDC £14.00
- ★ SIP Card £32.00
- ★ And many more available

DEALER NETWORK

LONDON

Wandsworth: Micro-update Ltd 01-870 7588
Camden: Hi-grade Computers Ltd 01-482 4024
Woolwich: MIS Ltd 01-692 5110
Chiswick: Pacific Computers 01-994 1054

SURREY

New Malden: A & S Ltd 01-942 0888
Croydon: IBRS 01-684 9041
Leatherhead: Computer Services 0374 386254
Dorking: Barnfield Wood Ltd 0306 886551

NOTTINGHAM

TQC Ltd 0602 503561

MIDDLESEX

Enfield: Quatrostar Ltd 01-367 4086

Berks

Slough: Goto Computers 0753 34191

W Sussex

Wornham: Data Connections 0403 40941

GLENT

Newport: Chason Business Systems: 0633 59476

CORNWALL

Bodmin: Kintech Computers 0208 850176

ISLE OF MAN

Typestyle Ltd 25890/24650

IRELAND

Co. Kildare: Saretron Ltd: 0507 24180

EFI Computer & Electronics (UK) Ltd

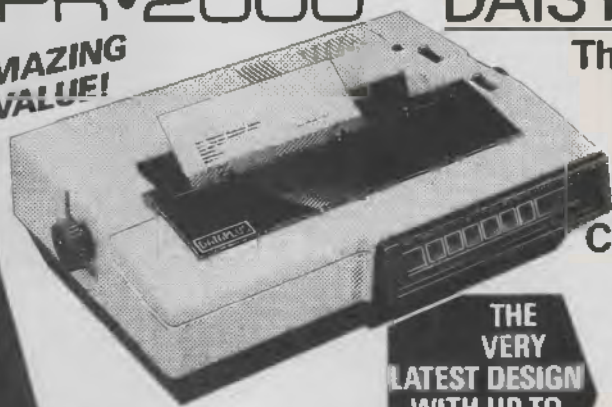
Unit 10, Vincent Works, Vincent Lane
Dorking, Surrey. Fax: 0306 888060 Telex: 859625 CSSLDK-4
Micro Graphics Ltd, Leeds Road, Mirfield
West Yorkshire WF14 0ET Tel: 0924 499322

SALES HOTLINES
0306 888512/76024

LOOK!

INTRODUCING THE NEW GPR•2000 DAISYWHEEL PRINTER

AMAZING
VALUE!



The ideal letter quality printer
for reports and general
correspondence.
Manufactured in Japan.
Complements all modern PC's

THE
VERY
LATEST DESIGN
WITH UP TO
THE MINUTE
STYLING

- ★ 18cps printing speed ★ Variable line spacing
- ★ 10, 12 & 15 pitch ★ 96 char daisywheel
- ★ Interface - parallel standard ★ RS232 option
- ★ Qume compatible ★ Paper-max 13" wide
- ★ Front panel controls ★ Low noise 58dBA
- ★ Bi-directional logic seeking print system
- ★ Supports Wordstar commands ★ Tractors & S/Feeder option

THE
PRICE
OF
SIMILAR
MODELS

ONLY
£199
+VAT +P&P
Plus FREE

- ★ 10 & 12 pitch daisywheels
- ★ Spare ribbon cassette ★ Dust cover
- ★ Detailed user manual & mains lead
- ★ Interface cable to your computer
- ★ £10 voucher for VOLKSWRITER de Luxe word processor

NO QUIBBLE - FULL MONEY
REFUND IF NOT DELIGHTED

Internationally available ribbons and
daisywheels guarantee low running costs.



The GPR - 2000
accepts Qume
fabric or film
ribbon cassettes



Wide choice of
Qume compatible daisywheels

DATAPLUS

DATAPLUS (Sales) Ltd.
PO Box 122, CHELTENHAM, GL51 8QL

TELEPHONE **0242 573573** 24
ORDERS HR

DATAPLUS (Sales) Ltd.
PO Box 122, CHELTENHAM, GL51 8QL

Please supply GPR 2000
Daisywheel printers at £228.85 each incl. VAT,
plus £8.50 courier delivery and insurance.

☐ cheque ☐ Access ☐ Visa

Expiry date _____

Name _____

Address _____

Post Code _____

Daytime Tel No. _____

Reg in England 2080289

I'll tell you who's mad!!

Anyone who pays more than £2.50 for their software.

Accounts, Spreadsheet and Database Programs

- 133B PC Calc - spreadsheet
- 133 Personal Management System - Deskmate/Partner
- 2007B PC-File plus - Fantastic Data base system (2 Disks)
- 2009B Sidefile - Flexible data manager with internal spreadsheet
- 2010B Home inventory - Keeps track of valued items and insurance
- 2011B Home loan - Shows various aspects of your home loan
- 2012B Card track - Track the plastic, check on your credit cards
- 2013B Cheques and Budgets - Control your home finances
- 2014B Purchase Order System - Menu driven, easy to use
- 2015B Carlog - Account for vehicle expenses
- 126 File express version - Information Management System 1 of 2
- 127 File express version - Information Management System 2 of 2
- 2030B PC-general ledger - ideal for small businesses
- 2031B Freeway - sales and purchase ledgers
- 2032B Freeway - essential data
- 2033B Freeway - payroll
- 2034B As easy As

Communication Programs

- 2003B Telix - excellent comm package
- 175 CModem - comm programs/Trymsym/Proindex
- 221 RBBS
- 222 RBBS

Languages Programs

- 054 Fig Forth (1) - good solution
- 056 Fig Forth (2) - good solution
- 129 XLisp - Lisp language interpreter
- 151B Xisp (C Source)
- 188 Lisp Interpreter
- 183 PD - Prolog
- 086 MS-DOS - Roff text editor/extended batch language
- 2001B Macro Assembler (A86). Excellent 8086 assembler with debugger
- 148B Cheap assembler with language primer
- 161B Chasm (basic lang)
- 2027B XD - adding features to DOS commands
- 2028B Minigen - Turbo Pascal screen code generator

Games and Graphics Programs

- 2009B Bridge - excellent version of rare computer game
- 153 Fun and Games - Aardvark/Abm/Bowling/Brick - Keno/Spacewars/Kidnap and more
- 178 Cavequest - "dungeons and dragons" Naval war simulator
- 189 Colour graphics adapter games - Subchase/Blackjack/Poker
- 190 Colour graphics adapter games - Striker/Kong/Poll/monopoly
- 217 PC-Key-Draw - more facilities than Prodesign/PC-Paint
- 2004B PC-Paint - Windowed Paint utility - Excellent
- 2016B Pro-Menu - great front end menu system, configurable
- 2024B Finger Paint - very much like PC Paintbrush
- 2025B Image 3D - wire frame modelling system

Wordprocessing Programs and Utilities

- 2002B PC-Type Plus/PC-label - includes fault finder/works simultaneously with 10 files. Easy to learn (3 Disks)
- 2007A PC-Style - Graphic reports on your writing ability
- 2017B Rysolt Typing Tutor - provides feedback on performance
- 2022B DA Directory Assistant - names and address lists
- 2023B LM - sophisticated mailing list organizer
- 144B PC-Desk - letters, files, calc etc
- 087B PC-outline - good ideas processor
- 2039B EZ-Forms - create forms and print

Utilities Programs

- 164 Present - Excellent slide presentation system
- 2000B Bakers Dozen - 12 useful utilities - mini-spreadsheet - calendar - sideways print - snapshot - sort text files etc, etc - Very Good!!
- 2005B PC-Prompt - resident DOS helper
- 2006B The Still River DOS shell - Disk management system
- 2018B Locate - searches files for specified word criteria
- 2019B EasyMenu - first disk of 3 - demos included
- 2020B EasyMenu - 2 of 3 - only for use on hard disk
- 2021B EasyMenu - 3 of 3
- 2026B Squeeze Print - 80 to 132 cols
- 054B Utilities (ANSI)

Educational Programs

- 2028B French verb conjugator
- 2029B Spanish verb conjugator

All disks £3.00 inc of VAT/P & P Non members £2.50 inc of VAT/P & P Members

Annual Membership Fee £23.00, includes BBS access, regular newsletter and much more!

Send crossed cheque made payable to BANAT Software Ltd. Access/Visa

B-A-N-A-T

The Smart Terminals Building, Churchfields, Stonesfield, Oxon. OX7 2PQ

Telephone: 0993 89 8421/2

MIGHTY MICRO

Sherwood Centre, 268 Wilmslow Road, Fallowfield, Manchester, M14 6WL.

Telephone: (061) 224 8117 (3 lines)

Established 1983

Amstrad

PC1512 SD Mono	£ 399.00
PC1512 SD Colour	£ 549.00
PC1512 DD Mono	£ 499.00
PC1512 DD Colour	£ 649.00
PC1640 SD MD	£ 499.00
PC1640 SD CD	£ 649.00
PC1640 SD ECD	£ 799.00
PC1640 DD MD	£ 599.00
PC1640 DD CD	£ 749.00
PC1640 DD ECD CD	£ 899.00
PC1640 20MbHD MD	£ 899.00
PC1640 20MbHD CD	£ 1049.00
PC1640 20MbHD ECD	£ 1199.00

Special Amstrad Deals:

PC1512 SD Mono + 30Mb HD	£ 695.00
PC1512 SD Col + 30 Mb HD	£ 839.00
PC1640 DD ECD + 30 Mb card	£ 1199.00
PCW 8256	£ 299.00
PCW 8512	£ 399.00
PCW 9512	£ 499.00

Please call for other Amstrad combinations. N.B. All PC1512s now with ABILITY package and 4 games.

Acorn Archimedes

Model 310 base unit only	£ 775.00
Model 310 mono system	£ 825.00
Model 310 colour system	£ 875.00
Model 310 - NEC multisync	£ 1359.00
Model 310M base unit only	£ 835.00
Model 310M mono system	£ 885.00
Model 310M colour system	£ 1035.00
Model 310M - NEC multisync	£ 520.00

Model 310M includes PC-emulator.

Atari ST series

Atari 520 STF	£ 260.00
Atari 520 mono	£ 390.00
Atari 520 colour	£ 608.85
Atari 1040 STF	£ 521.70
Atari 1040 mono	£ 565.17
Atari 1040 colour	£ 782.56
Atari Mega ST2	£ 869.50
Atari ST2 mono	£ 956.95
Atari ST2 colour	£ 1303.00
Atari Mega ST4	£ 1330.40
Atari ST4 mono	£ 1389.95
Atari ST4 colour	£ 1677.00

Commodore Amiga

Amiga 500	£ 434.79
Amiga 500 - colour	£ 739.08
Amiga 1000	£ 726.00
Amiga 1000 + colour	£ 956.00
Amiga 2000	£ 1040.00
Amiga 2000 + colour	£ 1325.00

Plus a massive range of Atari and Amiga software and books.

Opus

Opus System 1	£ 439.00
Opus System 2	£ 503.00
Opus System 3	£ 587.00
Opus System 4	£ 836.00

Tandon

PCX - mono monitor	£ 738.00
PCX - EGA	£ 1064.00
PCX20 + mono	£ 999.00
PCX20 + EGA	£ 1315.00
PCA20 - mono	£ 1499.00
PCA20 + EGA	£ 1820.00
PCA30 + mono	£ 1750.00
PCA30 + EGA	£ 2055.00

Zenith

Zenith Z-181	£ 1480.00
Zenith Z-183	£ 2050.00
Zenith Z-148	£ 637.00
Zenith Z-148 mono	£ 778.00

Word Processing

WordStar 1512	£ 60.82
WordStar 2000	£ 347.83
WordStar Release 4	£ 241.00
Volkswriter Deluxe	£ 39.12
Word Perfect Jr	£ 86.91

Database Systems

Reflex 1512	£ 60.82
VP info	£ 86.08
dBASE II (1512)	£ 103.47
dBASE III plus	£ 468.00
Tas Plus	£ 99.00

Financial Software

Supercalc (1512)	£ 60.82
Supercalc 4	£ 250.00
VP planner	£ 86.08
Javelin	£ 99.00

Integrated Packages

Ability Plus	£ 172.50
A B C	£ 172.50
Symphony	£ 490.00
First Choice	£ 149.00
Smart	£ 521.25

DOS Front-ends

MS-Windows v1	£ 89.95
DesqView v2	£ 125.00

GEM Software

GEM Presentation Team	£ 295.00
GEM Desktop Publisher	£ 295.00
Xerox Ventura Publisher	£ 595.00

GEM 1st Word Plus	£ 79.95
GEM Write	£ 86.91

all GEM products are supported, please call for more info.

Comms

Modems

Miracle WS2000 V21/23 (man)	£ 99.95
WS3000 V21/22b/23 (Hayes)	£ 650.00
Miracle WS4000 V21/23	£ 149.85
Pace Nightingale V21/23 (man)	£ 99.00
Pace Linnet V21/23 (Hayes)	£ 135.00
Amsired PC int. V21/23 (Hayes)	£ 150.00

Comms Software

GEM Comm (TTY and Viewdata)	£ 79.95
PMS Dialup (Viewdata, VT100)	£ 78.21

Printers

Amstrad DMP-2000	£ 156.48
Amstrad DMP-3160	£ 173.87
Citizen 120D	£ 173.04
Citizen MSP-20	£ 286.85
Epson LX-86	£ 199.00
Epson LQ-800	£ 475.00
Epson GQ-3500 Laser	£ 1435.00
NEC P6	£ 420.00
NEC P7	£ 499.00
NEC P5 XL	£ 799.00
NEC P9 XL	£ 1050.00
Panasonic KX1081	£ 173.00
Panasonic KX1082	£ 216.00
Panasonic KX1083	£ 319.00
Star NL-10	£ 216.52
Star NB-24	£ 499.00

Monitors

Phillips 7502 (PAL mono)	£ 78.25
Phillips 7513 (IBM TTL)	£ 104.30
Phillips 7713 (IBM TTL)	£ 119.04
Phillips 8833 (colour)	£ 273.85
NEC MultiSync	£ 499.00
Ferguson TV/mon	£ 182.55

IBM comp. add-on

Orchid EGA	£ 191.30
Orchid EGA	£ 191.00
Colour Card	£ 85.00
Twin RS-232C	£ 45.00
2Mb board (empty)	£ 147.00
2Mb board (full)	£ 375.00
256k board (full)	£ 120.00
Logimouse (serial)	£ 86.00
Logimouse (bus)	£ 113.00
20 Mb Hard Card	£ 299.00
30 Mb Hard Card	£ 319.00
20 Mb HD and control	£ 299.00
30 Mb HD and control	£ 319.00

We have many more cards in stock, please call for others.

Cartridge Tape Backup

Cipher 1525-CT (for Amstrad)	£ 480.00
Cipher Budget Box 21	£ 580.00
Cipher 5210 with card	£ 560.00

(All above are 25 Mb capacity)

Cipher 5400 (60 Mb)	£ 1250.00
---------------------	-----------

NEW ! NEW ! NEW !

Cambridge Computers' Z88	£ 250.00
Main power adaptor	£ 8.65

All Z88 peripherals are stocked.

Psion Organisers and Specialist Calculators

Special Offers

WordStar 1512 and Supercalc 3.1	£ 50.00
Citizen LSP-10	£ 158.00
Panasonic 1081	£ 150.00
Printer board (photocopies from notice board)	£ 600.00
Citizen Overture Laser printer	£ 1100.00

Miscellaneous

We also stock disks, computer books, ROMs, RAMS and other chips, cables, tape streamers, many printers, a massive range of software and computer consumables.

All prices EXCLUDE VAT and are correct at the time of going to press.

Export Orders Welcome:

We exported to over 60 countries in 1986.

After Sales Support:

Full support is given to products bought from us including the full installation of selected items of software and hardware.

Easy Access:

Located near to M6, M56, M602 and M62 motorway network.

Bulletin Board System:

Use our FIDO/OPLS bulletin board to request prices, quotations by using message area 10. Also holds P.D. software. Use shop's voice telephone line (061-224 8117) ONLY out of office hours.

Postage and Packing:

Free delivery anywhere in the U.K. for orders over £100.

Return this coupon today to receive a full price list.

Please send to:
Dept PCW, Mighty Micro, Sherwood Centre, 268 Wilmslow Road,
Fallowfield, Manchester, M14 6WL.

Name _____

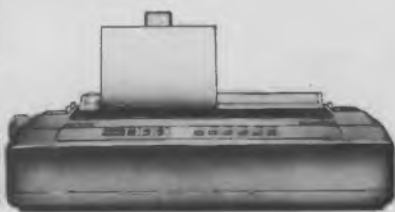
Company _____

Address _____

City _____ Post Code _____



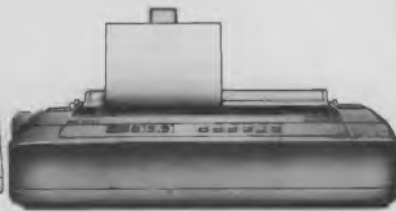
HEWLETT PACKARD.



OLYMPIA.



DEC RAINBOW.

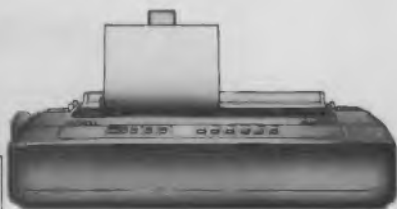


OLYMPIA.

We even make a product for our competitors.



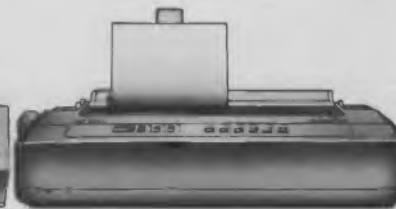
APPLE.



OLYMPIA.



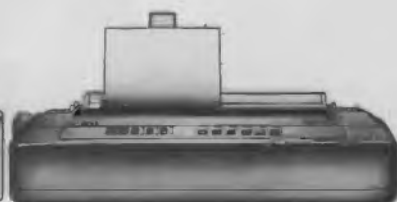
ACT APRICOT.



OLYMPIA.



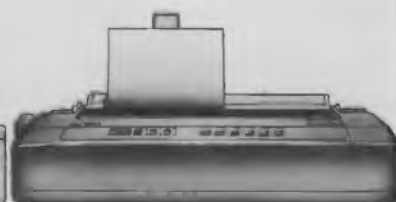
IBM PC.



OLYMPIA.



COMMODORE.



OLYMPIA.

Our printers produce very professional results when linked to our own microcomputers. And to everybody else's come to that.

They come with Olympia reliability, plus the craftsmanship and reputation of a West German manufacturer. And even with such high specifications, our printers are incredibly good value for money.

We make seven printers in all.

The NP range consists of three reliable, industry standard matrix printers with print speeds of up to 200 cps, NLQ and graphics capability. The NP80 and 136 have optional plug-in font cards, giving a choice of NLQ typescripts.

The Daisywheel range puts many

competitors' machines to shame. These printers have TLQ (True Letter Quality) at speeds of up to 50 characters per second and offer compatibility with virtually all systems.

To complete this impressive range, we have our new laserprinter, the Laserstar 6. A huge 1.5MB memory that gives text and graphics capability, dual interface and a variety of built-in and optional font cartridges put this machine at the top of its class. For free brochures of our complete range of printers send off the coupon now.

You'll see, whatever make of microcomputer you use, we'll bring the best out of it.

Send to Dionne Nelson, Olympia Business Machines, FREEPOST, 199/205 Old Marylebone Road, London NW1 1YB. NO STAMP REQUIRED. Please send me your FREE full colour Printers brochures.

Name _____

Address _____

Postcode _____

Tel. No. _____

OLYMPIA 

For a complete solution, we're all you need!

Special prices on Amstrad & Tandon range

IBRS TURBO COMPATIBLES

XT-20Mb Mono Monitor and Graphics/Printer (Hercules)
under £850

AT-20Mb Mono Monitor and Graphics/Printer (Hercules)
under £1350

Other configurations available for AT and XT.

PRINTERS

Brother 1109 with tractor feed	£210
Brother 1409 dual I/face + NLC	£365
Epson LX800	£230
Epson FX800	£350
Oki Microline 1827	£255
Oki Microline 1827	£365
Panasonic FX 1018	£235
Panasonic FX 913	£320

ACCESSORIES

Joystick	£19.00
Witty Mouse	£40.00
5 1/2" floppy disks in plastic casing (box of 10)	£10.00
3 1/2" floppy disks in plastic casing (box of 10)	£15.00

ADD-ONS

Hercules EGA	£134
Mono Graphics Printer card (Hercules compatible)	£53
Color Graphics card	£47
Math function card for PC, XT, AT	£106
Serial/Parallel card for PC, XT, AT	£53
I/O card for PC, XT, AT	£53
360kg floppy drive (TEAC)	£89
1.2Mb floppy drive	£120

SOFTWARE

MS Windows	£75
Lotus 123	£255
DBase III plus	£399
Wordstar Pro	£325
Wordperfect	£399
Sage financial controller	£275
Cashlink Accounts Release II	£750

Specialists in Computers, Maintenance, Consultancy & Training

INTEGRATED BUSINESS RESEARCH SYSTEMS LTD

10 ST JAMES PARK, WEST CROYDON, SURREY CR0 2UT
Tel: 01-254 1977

M-TEC

At last BBC BASIC to run on YOUR IBM or IBM
Compatible running under MSDOS

BBC BASIC(86)

All the features of BBC BASIC including:

- > Multi-lined named procedures
- > In-line assembler using standard mnemonics
- > Serial random and indexed disk files plus the ability to access any byte in the file
- > BBC BASIC VDU commands; graphics; sound
- > Full screen editing
- > Plus all the standard commands
- > 500 page user manual
- > Program examples on disk
- > Price £95.00 + £3.00 P&P + VAT

**You need never say GOTO again but
we won't stop you!**

Also available comms program including serial lead to
download from Acorn to IBM requires BBC Basic (86).
Please state 40 or 80 track Acorn Format.

Price £16.00 plus £1.00 carriage plus VAT

M-TEC COMPUTER SERVICES (UK)

4 Church Hill Reepham Norfolk NR10 4JL
Tel: (0603) 870620 Fax: (0603) 870436

SALE OF SALES

PLEASE READ THIS

WHOLESALE PRICES TO YOU THE USER

★ BUY 5.25" DISKS

Plain label by leading manufacturers No quibble guarantee.

	25	50	100	200	500
SS/DD 48tpi	£10.00	£18.00	£33.00	£64.00	£153.00
SS/DD 48tpi	£10.50	£19.00	£36.00	£69.00	£164.00
DS/DD 48tpi	£11.00	£20.00	£38.00	£73.00	£180.00
DS/DD 96tpi	£11.50	£21.00	£40.00	£77.00	£190.00

All above inc. envelopes, label sets and hub rings

UK MADE Library cases bought with above only £0.95 EACH

3.5" DS/DD DISKS

Plain label. 100% cert. 135TPI

	10	20	50	100	200
£15.00	£25.00	£64.00	£110.50	£198.00	

UK MADE Library cases bought with above only £0.95 EACH

LOCKABLE DISK BOXES

5.25" 50 Capacity Ref. YU-DD50L	£7.50
5.25" 100 Capacity Ref. YU-DD100L	£9.75
3.5" 40 Capacity Ref. YU-DD40L	£8.50
3.5" 80 Capacity Ref. YU-DD80L	£9.75

SPECIAL OFFERS

25 5.25" DS-DD Disks
PLUS
100 CAPACITY LOCKABLE
DISK BOX FOR
ONLY £16.50

OR
50 5.25" DS-DD DISKS PLUS
100 CAPACITY LOCKABLE
DISK BOX FOR
ONLY £26.00

20 3.5" DS-DD DISKS PLUS
40 CAPACITY LOCKABLE BOX
FOR
ONLY £28.50

OR
40 3.5" DS-DD DISKS PLUS
40 CAPACITY LOCKABLE BOX
FOR
ONLY £52.50



75 5.25" DS-DD DISKS PLUS
100 CAPACITY LOCKABLE
DISK BOX FOR
ONLY £32.50

OR
100 5.25" DS-DD DISKS PLUS
100 CAPACITY LOCKABLE
DISK BOX FOR
ONLY £41.00

50 3.5" DS-DD DISKS PLUS
50 CAPACITY LOCKABLE BOX
FOR
ONLY £67.00

OR
80 3.5" DS-DD DISKS PLUS
80 CAPACITY LOCKABLE BOX
FOR
ONLY £89.00

IBM or Amstrad Printer Cable 6' £7.75

Verbatim 5 1/4" DS/DD 48TPI, Coloured disks.

Colours: red, blue, green, yellow and white.

10 per cent colour in matching Library Case.

10	20	50	100	200	500
£10.50	£19.50	£46.00	£86.00	£161.00	£374.00

**REMEMBER THE PRICE YOU SEE IS ALL
YOU PAY (UK ONLY).
THEY INCLUDE VAT AND CARRIAGE**

Cheque or Postal Order to:



Manor Court Supplies Ltd

Dept JT12, Glen Celyn House, Penybont,
Llandrindod Wells, Powys LD1 5SY
Telephone: 0597 87784 or 0597 87792

Orders accepted from education & government depts.
Dealer enquiries invited.

KIRIN PRICE GUIDE



HARDCARDS & DISKS

PLUSCARD 20	£595.00
PLUSCARD 40	£821.00
MiniScribe 20	£275.00
MiniScribe 30	£300.00
Seagate 20MB Kit	£275.00
Seagate 40MB Kit	£445.00

ADD-ON BOARDS

MultiFunction 384K	£145.00
256K Ram Card	£85.00
384K Ram Card	£119.00
Maths Co-Pro. 8087-5Mhz	£125.00
Maths Co-Pro. 80287 8Mhz	£225.00
AST. Orchid Tech. Intel Etc.	

PRINTERS

Citizen 120D	£165.00
Citizen MSP25	£405.00
Citizen Premier 35	£485.00
Epson LX800	£210.00
Epson FX1000	£410.00
Epson EX1000	£573.50
Epson LQ900	£456.00
Epson LQ2500	£750.00
Star NL-10 Parallel	£185.00
Star NX-15 Parallel	£325.00
Star NR-15	£485.00
Panasonic P1080	£180.00
Panasonic P1092	£284.00
Panasonic P1592	£365.00
Panasonic P1595	£477.50

NEC 20MB Kit	£255.00
NEC 40MB HardDisk	£420.00
I.O. Mega 10 + 10 Box	£1200.00
I.O. Mega 10MB Cartridge	£52.00
I.O. Mega 20MB Cartridge	£58.00

GRAPHIC CARDS

Hercules Mono Plus	£155.00
Hercules Colour Plus	£285.00
Hercules Compatible Mono	£89.00
Paradise AutoSwitch EGA	£275.00
Sigma EGA Card	£210.00
Genoa Spectrum 4 Cards in 1	£185.00
Genoa Super EGA L3	£245.00
Genoa Super Hi-Res L5	£350.00

KIRIN

KIRIN COMPUTING SYSTEMS LTD

Unit 69, Abbey Business Centre,
Queenstown Road,
London SW8 3NS
Tel: 01-720 7722 FAX: 01-627-4667



OLIVETTI COMPUTERS MAIN DEALER

NEW M380C NOW IN STOCK!

COMPAQ PC Price Reduction
Please Call

IBM PC

PC/XT 286-20MB	£1750.00
PC/ATX/30MB	£2250.00
PC Enhanced keyboard	£150.00
ProPrinter XL	£425.00
EGA Hi-Res Monitor	£485.00

MULTISYNC SPECIAL

NEC Monitor	£485.00
TAXAN 770 +	£550.00
SONY MULTISYNC	£635.00
EIZO 8086 FlexiScan	£495.00
Cable for PS2 System	£15 extra

M240 2x360	£777.
M240 360K - 20MB	£1129
M240 720K - 20MB	£1129
2" Hi-Res Mono Monitor	£180
102 Keys Keyboard	£120

SPECIAL PRICES FOR M24 AND M28

AMSTRAD COMPUTERS

PC1512SD	PL
PC1512DD	CALL
PC1512HD 10Mb	SPE
PC1512HD 20Mb	
Colour Monitor	£175.00 extra
New PC1640 in stock.	
All softwares available including S/A	
Soft and others.	
Please ring for quote.	

LASER PRINTERS SPECIAL OFFER

LASER PRINTERS

QMS K8	£1645.00
H-P Laser Jet 500 +	£2650.00
H-P Laser Jet/Ser.2	£1850.00
CANON LPB-8/Ser.2	£1646.00
KYOCERA F1010	£2096.00
KYOCERA F2010	£3446.00
Toner Cartridge/A1	£66.50

CITIZEN & HERMES also available
from stock

ALL PRICES EXCLUDE VAT & DELIVERY
CHARGES. PRICES ARE CORRECT AT
TIME OF GOING TO PRESS



SOFTWARES

LOTUS, MICROSOFT, SAGE, MI
PRO, BORLAND, ASHTON-
DIGITAL RESEARCH ETC.

MODEM CARD

Special Modem for Amstrad	£1
PC1512	£1
Dowty Quatro Card V22 bis	£6
PC Com Quatro Card	£6
Miracle Tech WS4000	£1
Thorn EMI VX524	£3

TAPE BACK-UP

Maynard 20Mb Portable	£7
Maynard 60Mb Portable	£5
Maynard 20MIN Internal	£5
Maynard 60Mb Internal	£5

Also stock MOUNTAIN, EVEREX,
IRWIN.

TERMINALS

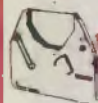
WYSE 30	£2
WYSE 50	£3
WYSE 60	£4

COMMUNICATION BOARDS

IRMA Board	£7
ATACHMATE	£9
PCOX/Standard	£5
PCOX/Plus	£5

Computers by Post

LOWEST U.K. PRICES GUARANTEED



PRINTER RIBBONS



		2+	5+	12+
ACORN	AP80	£2.70	£2.20	£2.00
	AP100	£2.70	£2.20	£2.00
AMSTRAD	DMP1	£3.90	£3.30	£3.10
	DMP2000/3000	£4.40	£4.10	£4.00
	PCW8256/8512 Red or Blue	£5.50	£5.20	£5.00
BROTHER	HR5	£3.00	£2.80	£2.60
	HR15 Corr	£2.90	£2.50	£2.30
	HR15 FAB	£3.30	£2.90	£2.60
	HR15 MS	£3.20	£2.80	£2.50
	HR15 also for HR25/HR35			
CANON	EP44	£2.90	£2.50	£2.30
	M1009	£3.40	£2.90	£2.70
	PW1080A Black	£3.10	£2.60	£2.40
	PW1080A Red or Blue	£4.50	£4.10	£3.80
	PJ1080 Ink Jet Colour, One Off			£10.90
CBM	PJ1080 Ink Jet Black, One Off			£8.90
	1515	£2.70	£2.20	£2.00
	1525	£2.70	£2.20	£2.00
	MP5801	£3.60	£3.00	£2.80
	802/1526	£3.70	£2.90	£2.70
	803	£3.40	£2.90	£2.70
	MP51000	£2.70	£2.30	£2.10
	4022	£2.70	£2.30	£2.10
	M5C801 Colour, One Off			£18.50
	DPS1101 SS	£2.40	£1.90	£1.75
CENTRONICS	DPS1101 MS	£2.90	£2.50	£2.30
	DPS1101 Corr	£1.80	£1.50	£1.40
	GLP 1/2	£3.40	£2.90	£2.70
CITIZEN	120D	£5.00	£4.60	£4.30
	2000 MS	£3.10	£2.60	£2.40
DAISYSTEP	2000 FAB	£4.90	£4.20	£4.00
EPSON	MX/FX/RX80 Black	£2.70	£2.30	£2.10
	MX/FX/RX80 Red or Blue	£3.90	£3.20	£3.00
	100 Series	£3.70	£3.30	£3.00
	LX80/LX86	£2.70	£2.30	£2.10
	JX80 Colour, One Off			£18.50
JUKI	LQ800	£3.70	£3.30	£3.10
	LQ1000	£4.50	£3.90	£3.60
	6000/2200 Corr	£3.10	£2.70	£2.50
	6100 MS	£2.90	£2.50	£2.30
	6100 SS	£2.40	£1.90	£1.75
KAGA	6100 Corr	£1.80	£1.50	£1.40
	KPB10 Black	£3.10	£2.60	£2.40
	KPB10 Red or Blue	£4.50	£4.10	£3.80
M/TALLY	MT80	£3.70	£2.90	£2.70
	80/82	£1.40	£1.10	£1.00
	84	£3.90	£3.40	£3.20
OKI	Male 20 Colour	£7.00	£6.50	£6.20
	Male 20 Black	£6.60	£6.20	£6.00
PANASONIC	Dot Matrix	£5.00	£4.60	£4.30

QUENDATA

QUME

SEIKOSHA

SHINWA

SMITH

CORONA

STAR

DWP1120 MS	£3.10	£2.60	£2.40
DWP1120 FAB	£4.90	£4.20	£4.00
Sprint 7/9 MS	£2.80	£2.30	£2.10
Sprint 7/9 FAB	£4.00	£3.70	£3.40
GP50	£6.00	£5.50	£5.20
GP80	£2.70	£2.20	£2.00
GP100/250	£2.60	£2.20	£2.00
GP500/550	£3.90	£3.30	£3.10
GP700 Colour, One Off			£18.50
SP1000	£6.00	£5.50	£5.20
CP80	£3.70	£2.90	£2.70
Fastext 80 (Twinpack)	£11.70	£11.20	£10.90
TPI M/5	£12.50	£10.70	£9.95
TPI Fabric	£5.70	£5.25	£4.95
TPI Corr	£5.00	£4.70	£4.50
D100/200	£4.80	£4.40	£3.90
D300	£6.00	£5.50	£5.30
DP/GEMINI/SG	£1.40	£1.10	£1.00
SR15	£4.90	£4.50	£4.30
NL10	£5.00	£4.40	£3.70

DISK STORAGE



LOCKABLE DISK BOXES

MODEL	SIZE	CAPACITY	PRICE
DD40L	3 1/2"	40	£8.50
GS100	3 1/2"	100	£13.90
DD50	5 1/4"	50	£8.90
DD100	5 1/4"	100	£11.70
LIBRARY CASE	5 1/4"	10	£1.50
NON-LOCKABLE DISK BOXES			
MD12/30	3 1/2"	24	£7.20
MF50	5 1/4"	50	£8.00

COMPUTER STATIONERY

PLAIN WHITE WITH MICRO-PERF EDGES			PRICE	
SIZE	GSM	QUANTITY	1 BOX	2 BOXES
11 x 9 1/2	60	2000	£13.50	£13.00
11 x 9 1/2	70	2000	£16.50	£15.50
EXACT A4	70	2000	£21.90	£19.75
11 1/2 x 9 1/2	90	1000	£14.20	£12.25

LASER PRINTER CONSUMABLES

TONER CARTRIDGES

Epson GQ3500	£18.50	Canon A1/A2	£74.95
Okilaserline 6	£18.50	Canon A8 Mk II	£84.95
HP Laserjets	£74.95	QMS K8	£74.95
HP Laserjet Mk II	£84.95	Citizen Overture	£22.95

FLOPPY DISKS



5 1/4" JVC inc Plastic Case

		1-2	3-9	10+
MD-1D	S/size D/dens 40TR	£9.99	£9.50	£9.25
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-2HD	D/size H/dens 1.6MB	£26.99	£25.99	£25.49

IBM

MD-2D	D/size D/dens 40TR	£19.95	£18.95	£17.95
-------	--------------------	--------	--------	--------

VERBATIM - DATALIFE

MD525	S/size D/dens 40TR	£11.60	£11.00	£10.60
MD550	D/size D/dens 40TR	£14.80	£14.00	£13.60
MD577	S/size Q/dens 80TR	£14.99	£14.75	£14.49
MD557	D/size Q/dens 80TR	£19.50	£19.00	£18.60

FUJI

*S/size D/dens 40TR	£10.99	£10.50	£10.25
*D/size D/dens 40TR	£13.49	£12.99	£12.75

*Coloured Disks - red, green, blue, beige, grey £1.00 per box extra.

D/size D/dens 80TR

S/size D/dens

S/size D/dens

D/size D/dens

D/size D/dens

CF2 5 Disks £2.89 each £14.45 pack

CF2 10 Disks £2.49 each £24.90 pack

SPECIAL OFFERS ON DISKS

	20 disks	50 disks	100 disks
TDK 5 1/4" SS/DD	£8.50	£8.00	£7.50
MAXELL 5 1/4" SS/DD	£8.75	£8.25	£7.75
BASF 5 1/4" SS/DD 40TR	£8.75	£8.25	£7.75
3M 5 1/4" DS/DD	£11.90	£11.50	£11.25
DYSAN 5 1/4" HD/1.6MB	£20.95	£19.95	£17.95

Bulk Disks			
5 1/4" SS/DD 40TR	£6.40	£5.90	£4.80
5 1/4" SS/DD 40TR	£7.40	£6.90	£5.80
5 1/4" DS/DD 80TR	£8.40	£7.90	£6.80
Life time guarantee. Disks include envelopes, labels, hub-rings and write protect.			
3 1/2" DS/DD	£18.80	£17.80	£16.80
Life time guarantee.			

PRINTER CABLES



Amstrad CPC	Parallel	£8.90
BBC	Parallel	£6.50
IBM/Amstrad PC/Atari ST	Parallel	£14.50

PRINTERS

Epson LX800	£186.95
Epson FX800	£294.95
Epson FX1000	£379.95
Epson EX800	£384.95
Epson EX1000	£509.95
Epson LQ800	£399.95
Epson LQ1000	£525.95
Epson LQ2500	£678.95
Epson GQ3500 Laser	£1259.95
Amstrad DMP3160	£174.95
Amstrad DMP4000	£299.95
Amstrad LQ3500	£299.95
Citizen 120D	£139.95
Citizen LSP10	£159.95
Juki 6100	£269.95
Panasonic KXP1081	£139.95
Star NL10 inc I/F	£174.95
Star ND10	£247.95

Star NR10	£317.95
Star NX15	£272.95
Star ND15	£342.95
Star ND15	£342.95
Star NR15	£412.95
Star NB24-10	£419.95
Star NB24-15	£531.95
Star NB15	£598.95

LASER

Epson GQ3500 Laser	£1259.95
HP Laserjet Mk II Laser	£1849.95
Canon LBP8 Mk II Laser	£1519.95
Okilaserline 6 Laser	£1479.95

DELIVERY

AMSTRAD 1640

SD Mono £479.95

DD Mono £579.95

20Mb Mono £869.95

CGA Colour Extra £139.95

EGA Colour Extra £279.95

All consumables and software post free. Hardware £5 + VAT 4 Day. £9 + VAT 24 Hour. Laser Printers £15 + VAT 24 Hour.

FAMOUS SOFTWARE BIG DISCOUNTS

MS Word 3	£239.95	Smart	£379.95
Word Perfect 4.2	£239.95	Symphony	£329.95
Word Star		Ventura Publisher 1.1	£599.95
Professional V.4	£199.95	Open Access II	£379.95
D Base 3 Plus	£339.95	PFS-1st Choice	£109.95
Lotus 123	£235.95	VP Planner	£59.95
Supercalc 4	£195.95	VP Info	£59.95

EPSON PC'S

PCe 20Meg	£989.95	PC AX2 20Meg	£1379.95
-----------	---------	--------------	----------

COMPUTERS BY POST GUARANTEE If after buying any of the hardware or software in this advertisement, you find the same item offered at a lower price locally within one week, we will refund the difference.

All prices exclude VAT

CREDIT CARD HOT-LINE



01-760 0014

Computers by Post (PCW), 14 Emmabrook Court, Sea Road, Rustington, West Sussex.

Export Enquiries Welcome

To: Computers by Post, 14 Emmabrook Court, Sea Road, Rustington, West Sussex. I wish to order _____

My computer is _____ inc VAT

I enclose cheque/PO for £ _____ inc VAT

or charge my Access/Visa No: _____

Name _____

Signature _____

Address _____

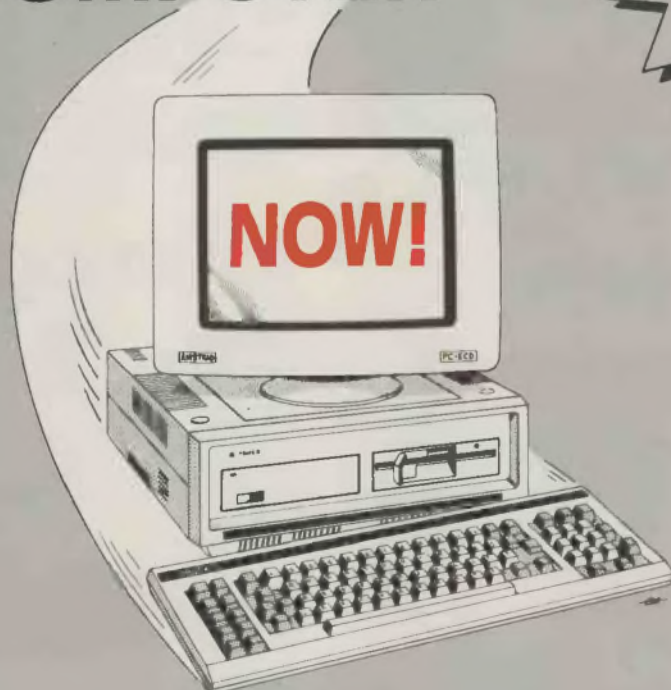
Postcode _____ Tel No: _____

PCW 12/87

THE SOFTWARE FACTORY®

SUITE 78, KENT HOUSE, 87 REGENT STREET, LONDON, W1R 7HF.

GET YOUR AMSTRAD COMPUTER



FROM
£4.99
PER WEEK
NO DEPOSIT*

FREE
QUICKSAVE
BACKUP PROGRAM
WORTH
£129!

WE ARE ABOUT TO DO FOR HARDWARE WHAT WE'VE ALREADY DONE FOR SOFTWARE. YOU WANT AN AMSTRAD NOW? OUR AMAZING EASY PAYMENT TERMS WILL GET YOU YOUR 'DREAM MACHINE' FOR ONLY A FEW POUNDS PER WEEK – BUT DON'T DELAY – CALL FOR MORE DETAILS AND **ORDER TODAY!***

OTHER HARDWARE PRODUCTS:

NETWORK THE EASY WAY – IDEAL FOR USE ON AMSTRAD
AND OTHER IBM COMPATIBLES

D-LINK STARTER PACK	– £549	IBM NETBIOS EMULATION	– £125
ADDITIONAL NODES	– £269	D-LINK SCREEN MONITOR	– £ 99
ADVANCED NOVELL EMULATION	– £125	D-LINK 1st AVENUE E-MAIL	– £249

FULL 2 YEAR GUARANTEE AND HELP LINE

ORDER AND INFORMATION LINE

01-660 7970

DON'T CALL US LAST - CALL US FIRST!

*SUBJECT TO STATUS – CALL US FIRST FOR DETAILS. SUBJECT TO CHANGE WITHOUT NOTIFICATION

THE SOFTWARE FACTORY®

SUITE 78, KENT HOUSE, 87 REGENT STREET, LONDON, W1R 7HF

WORD PROCESSING/DESKTOP PUBLISHING		NET PRICE	CHARTMASTER	159.00	XENIX O/S 2.0	299.00
PUBLISHER			DIAGRAM MASTER	144.00	XENIX SCO	375.00
ALDUS PAGEMAKER			ENERGRAPHICS	204.00	ZERODISK	45.00
ALDUS PAGEMAKER w/SCANNER			FREELANCE PLUS	265.00		
DISPLAYWRITER 3			GRASP	89.00	DESKTOP ENVIRONMENTS	
DISPLAYWRITE 4			HARVARD GRAPHICS	199.00	DESQVIEW 2.0	69.00
FANCY FONT			HARVARD PRESENTATION GRAPHI	199.00	LOTUS METRO	51.00
HARVARD PRO PUBLISHER			MICROSOFT CHART	144.00	MICROSOFT WINDOWS	49.00
LOTUS MANUSCRIPT			PC PAINTBRUSH +	83.00	SAGE DESK-SET	59.00
MICROSOFT WORD			PRODESIGN 2	122.00	SIDEKICK	45.00
MULTIMATE			PUBLISHERS PAINTBRUSH	166.00		
MULTIMATE ADVANTAGE			RBASE GRAPHICS 3.5	269.00	STATISTICS	
MULTI-LINGUAL SCHOLAR			TURBOCAD	199.00	9 SPSS DATA ENTRY	329.00
MULTI-LINGUAL SCHOLAR + LASER			VP GRAPHICS	69.00	SPSS GRAPHICS	329.00
NEWSROOM PRO			WINDOWS DRAW	189.00	SPSS MAPPING	329.00
PFS: 1ST PUBLISHER			COMMUNICATIONS & PRODUCTIVITY TOOLS			
PFS: PROF WRITE			CARBON COPY +	90.00	SPSS STATS	329.00
PLANPERFECT			CROSSTALK XVI	75.00	SPSS TABLE	329.00
SAGE PC WRITE			FREEWAY COMMS	169.00	SSPS/PC +	539.00
SAMNA PLUS			MICROSOFT ACCESS	159.00	STATGRAPHICS 2.6	324.00
TURBO LIGHTNING			MIRROR II	59.00	SYSTAT	357.00
VENTURA DESKTOP PUBLISHING			PROKEY	55.00	PROJECT MANAGEMENT	
VENTURA with SCANNER			SAGE CHIT-CHAT	84.00	HARVARD TOTAL PROJECT 2	249.00
VOLKSWRITER 3			SAGE CHIT-CHAT COMMS PACK	203.00	MICROSOFT PROJECT	189.00
WEBSTERS ON-LINE THESAURUS			SMARTCOMII	75.00	SUPERPROJECT PLUS	243.00
WORDPERFECT 4.2			TIMELINE			
WORDPERFECT 4.22 (3.5")			GENERAL PASTIMES			
WORDPERFECT LIBRARY			BRIDGE 4.0			
WORDSTAR 2000+			FIN ANALYSIS WITH 1-2-3			
WORDSTAR PRO VERSION 4			FLIGHT SIMULATOR VER 2.13			
			GOLF MICROCLINIC			
			MATHEMATICIAN TOOLKIT			
			PERSONAL MONEY MANAGER			
			PROPERTY MANAGEMENT			
			SCARSDALE MEDICAL DIET			
			ACCOUNTING			
			SAGE ACCOUNTANT			
			SAGE ACCOUNTANT PLUS			
			SAGE BOOKKEEPER			
			SAGE FINANCIAL CONTROLLER			
			SAGE PAYROLL			
			TETRA BILL MATERIALS			
			TETRA C BASE			
			TETRA INFORMAL INT/F			
			TETRA INVOICE/SALES ANALYSIS			
			TETRA JOB COSTING			
			TETRA NOMINAL/MANG RPT			
			TETRA ORDER ENTRY			
			TETRA PAYROLL			
			TETRA PURCH ORDER PROCESS			
			TETRA PURCHASE LDG			
			TETRA REPORTWRITE			
			TETRA SALES LDG			
			TETRA STOCK CONTROL			
			TRAINING			
			SAGE PC ACCOUNTING TUTOR			
			SAGE PC CHIT-CHAT TUTOR			
			SAGE PC PLANNER TUTOR			
			SAGE PC RETRIEVE TUTOR			
			SAGE PC STARTER TUTOR			
			SAGE PC TOUCH TYPIST			
			SAGE PC WRITE TUTOR			
			TYPING TUTOR IV			
			FRONTWARE			
			D-LINE 1ST AVENUE B-MAIL			
			D-LINE ADVANCED NOVELL EML			
			D-LINE IBM NETBIOS EML			
			D-LINE JUNCTION BOX			
			D-LINE MANUAL (EXTRA)			
			D-LINE NODE			
			D-LINE SCREEN MONITOR			
			D-LINE STARTER PACK			
			HANDY SCANNER			

PLEASE CALL IF YOU DON'T SEE WHAT YOU REQUIRE. ALL PRICES CARRIAGE PAID, BUT PLEASE ADD VAT AT 15%. MAIL ORDER ONLY — WE WELCOME COMPANY ACCOUNTS.

ORDER LINE: (01) 660 7970

OPEN: 9am-7pm Mon-Sat

WHY BUY 'BUDGET' SOFTWARE WHEN YOU CAN NOW HAVE THE REAL THING?

PLEASE CHECK PRICES AT TIME OF ORDER — ADS ARE PREPARED SOME WEEKS BEFORE PUBLICATION



What happened after the Queen said:

'Let them eat OS/2'?

When what the people **really** wanted was *Multi-User, Multi-Tasking, DOS Compatible* PC-MOS

...yes, the people **executed** her...

and bought **PC-MOS** from **ICCT** **instead!**

A Conference on PC-MOS will be held at
Hudson's Bay House, 67 Upper Thames Street, London EC4
on December 8th & 9th

Large Corporates, DP Managers, Dealers, Distributors and
Manufacturers will be speaking and in attendance.

Don't be forced to eat OS/2...Keep your head...Be there...

Invitations can be acquired from Madeleine Brookes on 01-248 8895

JOIN THE MULTI-TASKFORCE

**LONG LIVE PC-MOS,
LONG LIVE THE REVOLUTION!**

PC-MOS is the new DOS compatible multi-user multi-tasking operating system for personal computers.



ICCT Worcester House, Vintners Place, Upper Thames St, London EC4V 3AU

OS/2 is a trademark of Microsoft Corporation

PC-MOS/386 is a trademark of The Software Link Inc.



INTRODUCING

THE NEWSROOM • PRO™

Good news for Desktop Publishing

Making DTP work for you

Having over five years' experience of micro-based publishing, SPRINGBOARD SOFTWARE has learned what most other DTP Software publishers have not: you have a job to do.

You publish information to make your busy workload lighter, and to make yourself more effective.

That's why SPRINGBOARD has created

THE NEWSROOM PRO, the Desktop Publishing program that lets you

Available for:
IBM PC, XT, AT
and compatibles.

Is not copy protected
for your convenience.

communicate more effectively, without turning you into a full-time publisher.

Sophisticated features for more efficient use

Advanced word processing lets you quickly create an entire column on screen at once. Scroll up and down the column as you write, edit and set down graphics. What you see is what you get. Text automatically flows between columns, wraps around graphics and rearranges itself as you design your layout. You can even change type styles, sizes and line spacing. Plus, import ASCII files and convert files from The Newsroom.

Add-on features are standard equipment. Choose from **over 2000 pieces of clip art**. Then resize, flip,

overlap and personalize the art with powerful drawing and editing tools.

Experience also tells us that you won't need any more features than these, which means that there are some further newsworthy items to point out.

THE NEWSROOM PRO is, for all its versatility, remarkably easy to learn and use, so you will be producing professional reports, memos, newsletters and documents almost immediately.

And the price? You can buy **THE NEWSROOM PRO** from your usual dealer or reseller for just £99.99, including VAT.

If you would like further details, please write to us at.



SPRINGBOARD

Springboard Software, MicroProse Ltd, 2 Market Place, Tetbury, Glos. GL8 8DA. Tel: 0666 54326 Fax: 0666 54331

COMP SHOP LTD

NEVER SLEEPS

24 HOURS A DAY
7 DAYS A WEEK

TELEPHONE: 0276-22677
01-441 2922 (Office Hours)

FAX:
0276-684716

MAIL ORDER PRICES MAY VARY IN RETAIL SHOPS

PHONE YOUR ORDER NOW WITH CONFIDENCE
WE GUARANTEE TO MATCH PRICES OFFERED
THROUGH ANY OTHER SUPPLIER

ALL MAJOR
CREDIT CARDS ACCEPTED



CARRIAGE ON
ANY ITEM
POST £3.00
COURIER £10.00

BBC MASTER SERIES

Master 128	£369.00
Master Turbo Upgrade	£99.00
Master 512 upgrade	£199.00
Eprom Cartridge	£11.00
Reference Manual Part 1	£14.95
Reference Manual Part 2	£14.95
Advanced Reference Manual	£19.95
View Manual	£10.00
ViewSheet Manual	£10.00
Disk Filing System User Guide	£5.00
Plynth for Master	£12.00
Joystick (switched)	£15.00

ACORN/SMART

View ROM	£37.00
ViewSheet ROM	£37.00
ViewStore ROM	£37.00
ViewSpell ROM	£29.00
GXR Graphics ROM	£26.00
ISO Pascal ROM	£60.00
Basic 2 ROM	£15.00
OS 1.2 ROM	£10.00
ViewIndex	£12.00
ViewPlot	£22.00
Hiview	£36.00
Printer Driver Generator	£10.00
Speech Upgrade	£39.00
ADFS Rom	£25.00

COMPUTER CONCEPTS

Wordwise +	£40.00
Intersheet	£37.00
Interword	£39.00
Interchart	£26.00
Interbase	£55.00
Disc Doctor	£28.00
PrintMaster	£24.00
Communicator	£49.00
Term II	£25.00
Accelerator	£48.00
SpellMaster	£47.00
Edword 2 ROM	£46.00
ATPL Sidewise Board	£39.00
AMX Mouse	£59.00
AMX Pagemaker	£37.00

ECONET EQUIPMENT

Upgrade for		
BBC B	£60.00	10 Station Lead Set £25.00
Module for		100m Cable £86.00
Master/Archie	£43.00	Installation
Clock + Term. Set	£86.00	(per day) £150.00
Outlet Socket Kit	£26.00	Filestore E01
Level 1 Software	£80.00	(server) £828.00
Level 2 Software	£216.00	Filestore E20
Printer Server	£42.00	(20Mbyte) £721.00

DISK SYSTEMS

Acorn Winchester			
30 Mbyte with L3 S/W			£1549.00
Cumana Disk Systems for BBC			
Single without PSU			
CSX100	40T/SS	100K	£89.00
CSX400	80T/DS	400K	£119.00
Single with PSU			
CS100	40T/SS	100K	£109.00
CS400	80T/DS	400K	£139.00
CS354	3.5"	400K	£119.00
Dual with PSU			
CD200	40T/SS	200K	£199.00
CD800S	80T/DS	800K	£239.00
CD358	3.5"	800K	£199.00
UFD/Akhter Disk Systems for BBC			
MD200B	40 Track	200K	** £99.00
CS400B	40/80	400K	** £119.00
Dual with PSU			
MD902E	40/80	800K	** £219.00
HD2000	Winchester	20Mb	£695.00

**SPECIAL OFFER

ACORN ARCHIMEDES

A305	Base	£699.00
	Mono	£749.00
	Colour	£899.00
A310	Base	£775.00
	Mono	£825.00
	Colour	£975.00
A310	Base PC Emulator	£835.00
	Mono PC Emulator	£885.00
	Colour PC Emulator	£1035.00
A410	Base	£1399.00
	Mono	£1449.00
	Colour	£1599.00
A440	Base	£2299.00
	Mono	£2349.00
	Colour	£2499.00
	0.5 Mbyte Ram	£89.00
	Floppy Disk	£125.00
	20 Mbyte + Controller	£499.00
	Module Backplane	£35.00
	I/O Module	£79.00

RML PERIPHERALS

Cumana Winchester Systems	
CRM20	20Mbyte £590.00
CRM30	30Mbyte £649.00
CRM60	60Mbyte £1199.00

MICROVITEC COLOUR MONITORS

1456DL2	£225.00
1456ML2	£225.00

AMSTRAD COMPUTERS

PC 1512DD Colour Wordstar + Supercalc		** £699.00
PC 1512SD	Mono	£399.00
PC 1512DD	Mono	£499.00
PC 1512SD	Colour	£549.00
PC 1512DD	Colour	£649.00
PC 1640SD	Mono	£499.00
PC 1640DD	Mono	£599.00
PC 1640HD20	Mono	£899.00
PC 1640SD	Colour	£649.00
PC 1640DD	Colour	£749.00
PC 1640HD20	Colour	£1049.00
PC 1640SD	Enhanced Colour	£799.00
PC 1640DD	Enhanced Colour	£899.00
PC 1640HD20	Enhanced Colour	£1199.00
DMP3160 Printer		£199.00
Wordstar 1512/1640		£69.95
Supercalc		£69.95
Reflex		£69.95
Sidekick		£29.00
PCW 8256		£299.00
PCW 8512		£399.00
PCW 9512		£499.00

APPLE IIe ACCESSORIES

Cirtech 80 Column Text Card	£59.00
Cirtech 80 Column 64K Card	£99.00
Cirtech Printer Card	£59.00
Sound + Vision Modulator	£29.00
RGB colour card	£79.00
Software	
Appleworks	£175.00
Workbench	£149.00

**SPECIAL OFFER

BBC 'B' (2nd User)
PRICES FROM £175
3 Months Warranty

PLEASE CALL FOR AVAILABILITY

BARGAIN BASEMENT

Ex Demo 800K Disk Drives	
Acorn	£150.00
Akhter	£150.00
Ex-Demo Juki 6100 printer	£200.00
Ex-Demo TEC F10-40	£699.00
Acorn Electron	£50.00
Apricot Xen xi 10	£600.00
Acorn Z80 Second Processor	£200.00
Kaga/Taxan Printer	£150.00

MISCELLANEOUS

5.25" Datatech Diskettes per 10 80T Double Sided	£15.00
3.5" Datatech Diskettes per 10 80T Double Sided	£20.00
3" Diskettes per 10 Single Sided	£30.00
	Double Sided £50.00
5.25" Storage Box 10	£2.50
	30 £12.00
	80 £18.00
3.5" Storage Box 10	£3.50
	30 £9.00
	60 £15.00
C12 Cassettes 12 min x 10	£2.00
Ribbons	
Epson MX/FX/RX80/LX800	£4.00
MX/FX/RX100	£8.00
LX80	£4.00
JX80 (Colour)	£10.00
LQ800	£6.00
LQ1000	£8.00
Canon/Taxan	£6.00
Colour Cartridge	£10.00
Juki MS	£3.00
Juki SS	£2.00
Hermes (Remstar)	£3.00
Imagewriter/Apple DMP	£6.00
Microline	£2.50
Anadex 9500/1	£12.50
TEC/Clio/Diablo	£5.00
Brother HR15/DX100	£4.00
Amstrad PCW 8256/512	£6.00
PCW 9512	CALL
Amstrad DMP3000	£4.00
Printer lead for	
BBC 1m	£6.00
BBC 2m	£8.00
BBC 3m	£10.00
RS423	£8.00
Compact	£15.00
Apricot, Sanyo	£12.00
IBM/Amstrad PC/Archie	£12.00
IBM RS232	£15.00
Custom made leads	£25.00
Printer Data Switch	
2-way	£69.00
3-way	£89.00
4-way	£99.00
2-Way Crossover	£99.00
Selmour Desks	
4X2 (with shelf)	£119.00
3X2 (with shelf)	£99.00
Shinecrest Desk (3x2)	£69.00
Monitor/Disk/Printer Stand	
	£12.00
Cassette Lead	£4.00
C12 Cassettes (per 10)	£4.00
4-way mains adapter	£8.69

PART EXCHANGE YOUR BBC FOR ANYTHING WE CARRY IN STOCK

Allowances from £75 (non-working) to £200 (late model - DFS Machine).

PRINTERS

EPSON LX 800	£189.00
SS Feeder	£75.00
FX800	£299.00
SS Feeder	£139.00
FX1000	£439.00
SS Feeder	£139.00
EX 800	£399.00
SS Feeder	£148.00
EX 1000	£545.00
SS Feeder	£198.00
Colour Ribbon EX 800/1000	£18.00
Colour Option EX 800/1000	£55.00
LQ 800	£399.00
SS Feeder	£135.00
Tractor	£39.00
LQ 1000	£585.00
SS Feeder	£149.00
Tractor	£50.00
LQ 2500	£790.00
SQ 2500	£899.00

CANON PW 1080A	£249.00
A55 132 Col.	£449.00
Serial Interface	£79.00
PJ 1080 Colour	£399.00
JUKI 6100	£279.00
RS232 Interface	£59.00
Sheet Feeder	£209.00
Tractor Unit	£159.00
6200	£449.00
6300	£699.00

NATIONAL PANASONIC KXP 1081	£149.00
KXP 3131	£245.00

TAXAN KP 815	£265.00
KP 915	£350.00

STAR NL 10 Parallel	£190.00
NL 10 Serial	£219.00

BROTHER HR 15 RS 232 Daisywheel	£275.00
HR 20	£349.00

RS 232 INTERFACE + 2K Buffer	£49.00
+ 16K Buffer	£89.00

Paper Roll Holder	£17.00
Teletypewriter Roll	£4.00

Printer Labels	
IK 90 x 36mm	£5.00

IK 90 x 36mm Twin Row	£4.90
IK 90 x 49mm Twin Row	£7.50

IK 102 x 36mm Twin Row	£6.25
Listing Paper	

1000 Sheets 9.5 x 11	£7.00
2000 Sheets 9.5 x 11	£12.00

1000 Sheets 15 x 10	£9.00
2000 Sheets 15 x 10	£15.00

1000 Sheets True A4	£10.00
2000 Sheets True A4	£20.00

LASER PRINTERS

Epson GO 3500	£1495.00
DMS K8	£1645.00
HP Laser Jet Series .2	£1850.00
HP Laser Jet 500+	£2650.00
Canon LPB-8 Series .2	£1846.00
Cyocera F1010	£2096.00
Cyocera F2010	£3446.00
Data Products LZR 1230	£2490.00

PLOTTERS

Hitachi 672 465 Linear Plot Mate A4S	£282.00
A4SM	£342.00
A3	£299.00
A3M	£431.00
Hitachi 672 Colour Plotter	£495.00

Houston Instruments	
EDMP 56MP A4/A5/A2/A1/A0 Paper	£5275.00 6 pens

High Speed Intelligent Drum	
EDMP 55MP A4/A3/A2/A1	£4158.00 6 pens

High Speed Intelligent Drum	
EDMP 52MP A2/A1	£3726.00 14 pens

High Speed Intelligent Drum	
EDMP 56B A4/A3 etc.	£4545.00 1 pen

High Speed Intelligent Drum	
EDMP 56B A4/A3 etc.	£4545.00 1 pen

PRICES EX-VAT AND SUBJECT TO CHANGE WITHOUT NOTICE. PLEASE RING FOR STOCK SITUATION BEFORE MAKING LONG JOURNEYS.

PLOTTERS

EDMP 55B A4/A3/A2/A1	£3476.00 1 pen
High Speed Intelligent Drum	
EDMP 52 A2/A1	£2978.00 1 pen
High Speed Intelligent Drum	
EDMP 42 A2/A1	£2358.00 1 pen
Intelligent Drum	
EDMP 29 A3/A4	£1716.00 8 pens
High Speed Intelligent Flatbed	
EDMP 40/2 A3/A4	£972.00 2 pens
Intelligent Drum	
EDMP 40 A3/A4	£972.00 1 pen
Intelligent Drum	
E795 A4/A3	£677.00 4 pens
Intelligent Drum	
E 595 DN A4	£426.00 4 pens
Intelligent Drum	
MP-6 Multi Pen Kit DMP55/56	£686.00
Scan Cad Scanner Model 128	£2949.00
(All Houston Instruments Plotters supplied with sample pens and paper, DMPL Firmware and Serial Interface).	

MONITORS

MICROVITEC 1431MS Std Res.	£168.00
1431DS Std Res.	£168.00
1431MS/AP	£199.00
1431DS/AP	£199.00
1451MS Med Res.	£219.00
1451DS Med Res.	£219.00
1451MS/AP	£249.00
1451DS/AP	£249.00
1441 High Res.	£359.00
2030CS Std Res.	£380.00
2040CS High Res.	£685.00
ACORN 12" Green	£69.00
KAGA/TAXAN KX 17 Med. Res. Green	£75.00
KX 12 High Res. Green	£99.00

PHILIPS BM 7502 12" High Res. Green	£69.00
BM 7522 12" High Res. Amber	£75.00
BM 7524 12" High Res. White	£79.00
14" Multi Sync	£599.00

ZENITH High Res. Green	£69.00
High Res. Amber	£74.00

ACCESSORIES

12" Swivel	£10.00
14" Swivel	£14.00
PHILIPS Swivel Base	£10.00
Monitor Stand B + B	£10.00
Monitor Stand B + B	£13.00
Kaga RGB Lead	£3.00
Microvitec Lead	£3.50
Mono. BNC to Phono Lead	£1.50
Phono to Phono Lead	£1.50
Skart Monitor Lead	£5.00
TOUCHTEC Touch Screen Operation On	£239.00
Metal Case above Monitor inc. Starter/	
Development Prog.	
Anti-Glare V.D.U. Screen	£12.00

MODEMS

Miracle WS 2000 V21/23	£92.00
WS 2000 Auto Dial Card	£27.00
WS 2000 Auto Answer Card	£27.00
WS 2000 Ski Kit	£5.00
WS 2000 User Port Lead	£5.00
WS 4000 V21/23	£135.00
WS 3000 V21/23	£244.00
WS 3000 V22	£409.00
WS 300 V22 BIS	£537.00
(Comes complete with BBC Coms package and	
Data Lead).	
Pace/Nightingale Modem	£115.00
BBC/Comstar Software	£29.00

PCB DESIGN

•Professional PCB Layout using Rascal RedCAD	
— no job too small	
•EPLD Chips designed.	
(Erasable Programmable Logic Devices)	
•24 Hours turn round —	
contact:- Russell Clarke 0276-684715	

SATELLITE RECEIVING SYSTEMS

•Complete Systems from £499	
•Satellite Decoder Boxes for Filmmat + Sky + BBC	
from £299	

ATARI ST

520 ST-M	£259
520ST-FM	£399
1040 ST-F	£599

BOOK SHELF

BBC Basic for Beginners	£7.95
BBC Micro Revealed	£6.00
Adventure Games for BBC	£6.95
Assembly Language Programming for BBC	£8.95
BBC Master 128 High Flyers	£10.95
ISO Pascal for BBC	£9.90
Assembly Language Programming on Electron	£7.95
The Electron Book	£7.95
Electron User guide	£10.00
Start Programming with the Electron	£5.95
Amstrad PC1512 Basic 2	£9.90
6502 Reference Guide	£9.95
6502 Games	£5.00
6502 Practical Programming	£15.00
Programming the Z8000	£9.45
MSDOS User Guide	£18.45

Make CompShop an offer on the following books:

8085 Software Design	
Home Computers can make you Rich	
Silicon Chips and You	
Using Microcomputers in Business	
TV Typewriter Cookbook	
Business Systems Buyers Guide	
Star Ship Simulation	
More TRS80 Basic	
32 Basic Programs for TRS80 (Level 11)	
Introduction to Microcomputers	
Toshiba MOS Memory	
Business Applications	
Peanut Butter & Jelly Guide to Computers	
Introduction to Word Processing	
Computer Graphics Primer	
Introduction to Apple 11C	

IBM COMPATIBLES

Tandon PCX 10 System	£795
Tandon PCX 20 System	£995
Tandon PCA 20 System	£149
Tandon PCA 30 System	£1795
Tandon PCA 40 System	£1895
Tandon PCA 70 System	£2295
Kavpro 286i 20Mb	£1650

SOFTWARE

Pegasus Single user per module	£160
Pegasus Multi user per module	£355
Pegasus Senior per module	£300
Delta Professional	£345
DBase 3+	£355
WordStar Professional	£225
WordStar 2000	£279
Sage Bookkeeping	£95
Sage Accountant	£135
Sage Accountant +	£165
Lotus 1-2-3	£299
Lotus Symphony	£415
Psion X Change	£325
Smart Series	£450

PC ACCESSORIES

Interlink The Intelligent Link	£P.O.A.
HASP-11 Hardware for Software Protection	£P.O.A.
Printer Upgrade Kit for Epson FX/JX/RX/MX Printers	
No Moving parts P.C. Mouse	£79.95
'Universal Prom. Pal Microprogrammer'	£P.O.A.
'The Brooklyn Bridge' 5.25/3.5 Disk Transfer	£199.00
'3.5 connection'	£129.00
'SafeSkin Keyboard Protector' Apple/Epson/PC	£159.00
'IEEE-488 Interface'	£29.00
'Microway Accelerator' 9 Mhz	£399.00
'Microway Turbo Plus' 12 Mhz	£599.00

SOFTWARE

Mathcad	£P.O.A.
Cadcam — Desk Top Publishing	£P.O.A.
The Daily Wheel	£99.95
The Scientific Wheel	£99.95
The Professional Wheel	£199.95
Logitech — Desk Top Publishing	£179.00
Generic CAD 2 — inc. symbols Lib.	£299.00
C Workshop Language	£75.00
Jack 2	£99.95

RETAIL SHOPS

OPEN 10-7 • Mon-Sat

COMP SHOP LTD

14 STATION ROAD,
NEW BARNET,
HERTS EN5 1QW
(NEAR BRITISH RAIL STATION)

SALES: 01-441-2922
TECHNICAL: 01-449 6596
TELEX: 298755 TELECOM G

INNOVATION HOUSE
ALBANY PARK
CAMBERLEY,
SURREY GU15 2PL
(BEHIND "PAYLESS")
SALES: 0276-29219
TECHNICAL: 0276-684715

COMP SHOP LTD

•ESTABLISHED EDUCATION SUPPLIERS•
WITH APPROVED ACORN•AMSTRAD•CUMANA
MICROVITEC•EPSON•SERVICE CENTRES



When upgrading your PC becomes the logical thing to do, ours is the only logical way to do it.

How would you like to gain virtually all the features of the IBM PS/2™ all at once instead of in bits and pieces?

The LOGITECH Graphics Subsystem is the only complete graphics package that works with all IBM PC's, AT's, and compatibles. It includes mouse, monitor, and EGA board.

And not just any mouse, monitor and EGA board. This is Logitech's opto-mechanical 3-button mouse which gives you excellent resolution and longterm reliability. Additionally, it plugs into the board's mouse port, freeing the serial port for laser printers and other peripherals.

The LOGITECH AutoSync Monitor has a 14" diagonal screen and is compatible with CGA, EGA, VGA as well as monochrome graphics.

The EGA card is manufactured exclusively by Logitech to provide the new high quality VGA-level 640 x 480 resolution in 16 colors, a 256K memory, and an automatic mode switch. Plus, you get our EGA-compatible Paint Show program.

And because Logitech is the leading manufacturer of mice and other hardware and software products for the PC, this bundle is offered at a very attractive price.

The EGA board with mouse and software are also offered separately from the monitor as the LOGITECH EGA & Mouse.

Both the LOGITECH AutoSync Monitor and the LOGITECH EGA & Mouse are offered through LOGITECH's retail distribution channel at following prices:

- The entire GRAPHICS SUBSYSTEM £699.-
- The AutoSync Monitor £499.-
- The EGA & Mouse £299.-

(all prices excl. VAT)



LOGITECH S.A. CH-Romanel-s/Morges
Switzerland
Tel. + 41(0)21 869 96 56

LOGITECH U.K. OFFICE
Linford Forum, Rockingham Drive
GB-Milton Keynes, Bucks, MK 146 LY.
Tel. (0908) 67 99 76

SILICON EXPRESS LTD
Silicon House, Fowke Street, Rothley
GB-Leicestershire LE7 7PJ
Tel. (0533) 37 49 17

SOFTSEL COMPUTER PRODUCTS LTD
Softsel House, Syon Gate Way
Great West Road Brentford, GB-Middlesex TWB 9DD
Tel. 01-568 88 66

SOFTWARE LIMITED
Unit 2, Alice Owen Technology Center
251 Goswell Road, GB-London EC1V 7JQ
Tel. 01-278 23 77

The best in PC Networking

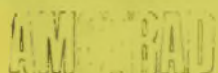
QUICKNET UK



EPSON

LX 800	80 col, 150cps, 25NLQ, 3k buffer	£199
FX 800	80 col, 200cps, 40NLQ, 8k buffer	£299
FX1000	132 col, 200cps, 40NLQ, 8k buffer	£399
EX 800	80 col, 250cps, 50NLQ, 8k buffer	£399
EX1000	132 col, 250cps, 50NLQ, 8k buffer	£525
LQ 800	24 pin, 80 col, 180cps, 60LQ, 7k buffer	£435
LQ1000	24 pin, 132 col, 180cps, 60LQ, 7k buffer	£599
LQ2500	24 pin, 132 col, 270cps, 90LQ, 8k buffer	£735
SQ2500	Ink Jet, 132 col, 450cps, 180LQ, 8k buffer	£945
GQ3500	6PPM Laser, 640k, Epson, HP, Eimu	£1299
1.5Mb Upgrade for GQ3500 Laser		£240

FREE! PARALLEL PRINTER CABLE C/W EPSONS



TOSHIBA

NEW!! 1640 NEW!!	15100 (386) 2Mb RAM	
640K, EGA Monitor Card	40Mb MD EGA Plasma	£3999
Single Drive	T3100 640K 20Mb Plasma	£2890
Dual Drive	T3100 640K 10Mb Plasma	£2490
HD/20	T1100 Plus 640K 2 - 720K LCD	£1390

Top Ten Software

Lotus 123 ver 2.01	£275
D-Base III	£450
Supercalc 4	£250
Wordperfect	£295
Wordstar Professional	£250
Wordstar	£195
Framework II	£350
Smart Integrated Pok	£425
Javelin	£95
Clipper	£395

Laser Printers

Hewlett Packard Laser Jet Series II 8PPM	£1995
Hewlett Packard Laser Jet 8PPM	£1490
AST Turbolaser Plus 15PPM	£3795
AST Turbolaser 10PPM	£2195
Epson GQ-3500 6PPM	£1299
Canon LBPBD Dual Tray	£2795
Canon LPB8A2	£2595
Canon LPB Mk II	£1690

HARD DISKS

Seagate ST-225 20mb (65MS)	£245
Seagate ST-225 20mb (65MS) kit for PC's	£299
Seagate ST-238 30mb (65MS) kit for PC's	£349
Seagate ST-251 40mb (36MS)	£399
Seagate ST-251 40mb (36MS) kit for PC's	£449
Miniscribe 3053 45mb (20MS)	£625
Miniscribe 6085 80mb (25MS)	£799
Priam 130mb (13MS) Hard Disk	£1895
Tandon 20mb Hard Card	£289
Miniscribe 30mb (65MS) Hard Card	£375
Kits include Controller Card, Cables, Screws and Rails	

TAPE STREAMERS

Archive 45mb (1mb/Min) Internal tape Streamer	£395
Idemita ID60T 60mb (5mb/min)	£799
Wangtek 125mb (5mb/Min) Internal tape Streamer	£995

Hercules.
ARCHIVE

LOGITECH

Seagate

MICRO intel
VITEC

PARADISE



MONITORS and DISPLAY CARDS

NEC multisync PGA/EGA monitor T and S	£549
Video 7 Vega Deluxe EGA Card	£235
Hercules Incalour Card	£399
Hercules Graphics Card Plus	£189
NEC Multisync	£495
Toscan 14" Multisync	£650
Micravitec 20" Multisync	£1295
Video 7 Vega Deluxe Card	£235
ATI Wonder Card	£220

ADDONS

PS/2 Addons Orchid Ramquest 2Mb EMS Card	£650
Stradcom Internal V21/V22 Hayes Modem	£165
Orchid Tiny Turbo 286	£345
Orchid Jet 386	£750
Logimouse C7 Mouse	£79
Everex Minimag 384K short RAM card	£109
Intel 8087 5/8 mHz	£119/£159
Intel 80287 6/8 mHz	£149/£249
Intel Inboard 386 (c/w 1Mb and cable)	£1795
Intel Inboard 386 (c/w 1Mb and cable)	£1440
Prices on application on hardware & software not listed above.	

FREE Delivery on all orders over £400
Redstar same day delivery (optional)

NETWORKING

NOVELL

CORVUS

Hardware:

OMINET, ETHERLINK, ARCNET, TOKEN RING, PRONET-10

Software:

NOVELL NETWARE, 3COM 3+ SHARE, CORVUS PC-NOS, SFT LEVEL II

Services:

CONSULTANCY, INSTALLATION, CABLING, TRAINING, MAINTENANCE

All 3 COM and NOVELL products
at Best Possible Prices

New! PS/2 Ethernet Cards

Available

Call to Arrange
FREE ONSITE
QUOTATION

3Com
AST

NOVELL

Premium/286

Benchtests showed the Premium/286 to be faster than the dell 286 and the Compaq Portable III and close to the values recorded by the Compaq Deskpro 386.

What sets the Premium/286 apart from many other AT compatibles is performance. Its 80286 runs at others 10Mhz, as compared to 12Mhz for some of its competitors. However, when teamed with zero-wait-state memory and a fast hard disk, the Premium/286 outshines almost all of its rivals. It is proof that a well-designed 80286 machine can offer performance rivaling an 80386.

PC Magazine August 1987



Offer includes

- NEC Multisync Monitor
- Video 7 Vega Deluxe EGA/CGA/Mono card
- 1 MB 100 N/S RAM (0 Wait State)
- 1.2 MB Floppy
- 6/8/10Mhz 80286
- 2 Years Warranty
- 102 Key Keyboard
- Serial & Parallel ports
- Choice of Fast Hard Disks
- MS DOS 3.1 and GW BASIC

AST Premium 20Mb (55m/s) £1995

AST Premium 40Mb (36m/s) £2195

AST Premium 80Mb (28m/s) £2595

For Mono systems (14" paper white T&S c/w Herc Compat card) deduct £400

NEC

VIDEO 7 SEVEN

TELEX NO: 265451 MONREF G

ATTN: MAILBOX 83:JBC2024

01-949 7161

1st FLOOR, APSLEY HOUSE, APSLEY ROAD, NEW MALDEN, SURREY KT3 3NJ

All prices exclude VAT & Delivery Trade marks acknowledged.

Quicknet reserve the right to vary prices without prior notice.

Official government and company purchase orders accepted

PRICE, PERFORMANCE, SUPPORT



JOIN NESS
USER'S CLUB NOW FOR
SUBSTANTIAL SAVINGS ON
ALL MICRO SUPPLIES.
01-207 6777

— The Unbeatable Combination

Ness Computers offer you the fastest, most powerful computer in its class with full user support. Our XT and AT ranges are 100% industry compatible.

With Ness you get fast delivery, installation and full technical support through one of Britain's largest engineering providers.

NESS AT 286

£795

Upgrades such as 20MB, 30MB, 40MB or 80MB hard disks are available — for stand alone or net working systems.

**NESS SUPER XT
TURBO 30MB**

£695

- Legal BIOS • NEC V-20 or 8088-1 Processors • Switchable 4.77/10 MHz Clock • 640K RAM • 20MB Half Height Hard Disk • 360K Half Height Floppy • Parallel Printer + RS232 Serial Ports • Clock/Calendar with Battery Back-up • Monographic/Printer card • 150W Power Supply • Professional Keyboard • 'Hi-Res 12"' Amber Monitor • MS-DOS 3.2 Optional • Full Set of Manuals • 8 Expansion Slots • 12 Months Warranty

**NESS SUPER AT
TURBO 20MB** **£995**

- True 10 MHz Computer • 0 or 1 wait states • Switchable 8/10 MHz • 640K RAM • 20MB Half Height Hard Disk • 1.2MB Half Height Floppy • Parallel Printer + One RS232 Serial Port • Clock/Calendar with Battery Back-up • Monographic/Printer Card • 200W Power Supply • Professional Keyboard • 'Hi Res 12"' Amber Monitor • MS-DOS 3.2 Optional • Full Set of Manuals • 8 Expansion Slots • 12 Months Warranty

There is our FREE technical hotline for users and the option to join our very own Ness Users Club, Tel No. 01-207 6777. You have the extra reassurance of our 30 day money back guarantee.

SPECIAL OFFER: 1 Year on-site maintenance in UK for £65.00. To start things moving, please complete coupon or phone to discuss your needs 01-806 8904/1072

NESS
FOR QUALITY

Ness Industries Ltd.,
38/40 Upper Clapton Rd., London E5 8BQ
Tel No. 01-806 8904/1072

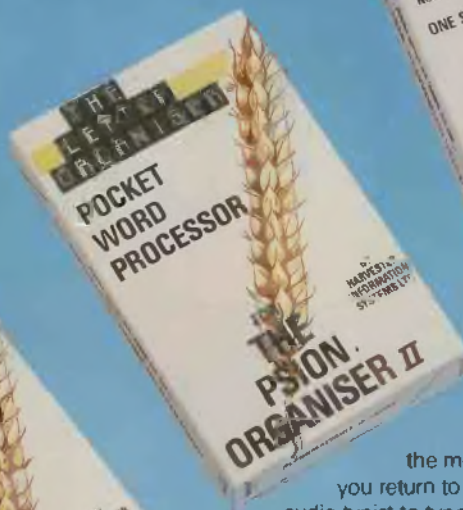
All trademarks acknowledged

To: Ness Industries Ltd., 38/40 Upper Clapton Rd.,
London E5 8BQ Tel No. 01-806 8904/1072 ☐ AT Models
YES, I'm interested. Please give me details of: ☐ XT Models
NAME: _____ TEL: _____
POSITION: _____ COMPANY: _____
ADDRESS: _____
_____ POSTCODE: _____

Available from Harrods, Selfridges (London W1), selected branches of Dixons, Ryman's, Underwoods, Wildings and other leading stores and approved Psion stockists.



"The ultimate chip . . . all the powerful functions of the Letter Organiser, Data Organiser and Informed Organiser cleverly grafted onto one Superchip!"



"... the word processor for people on the move. The work is done by the time you return to the office . . . no tape for the audio typist to type . . . no messy handwritten notes to decipher . . . download and print for drafts or export to PC. Wordprocessor for final polishing . . ."



"Smartest address book yet . . . sorts into alphabetical order on surname or company name, selective printing and categorising and lots more . . . Toolkit for data file and data pack management. Indispensable . . ."



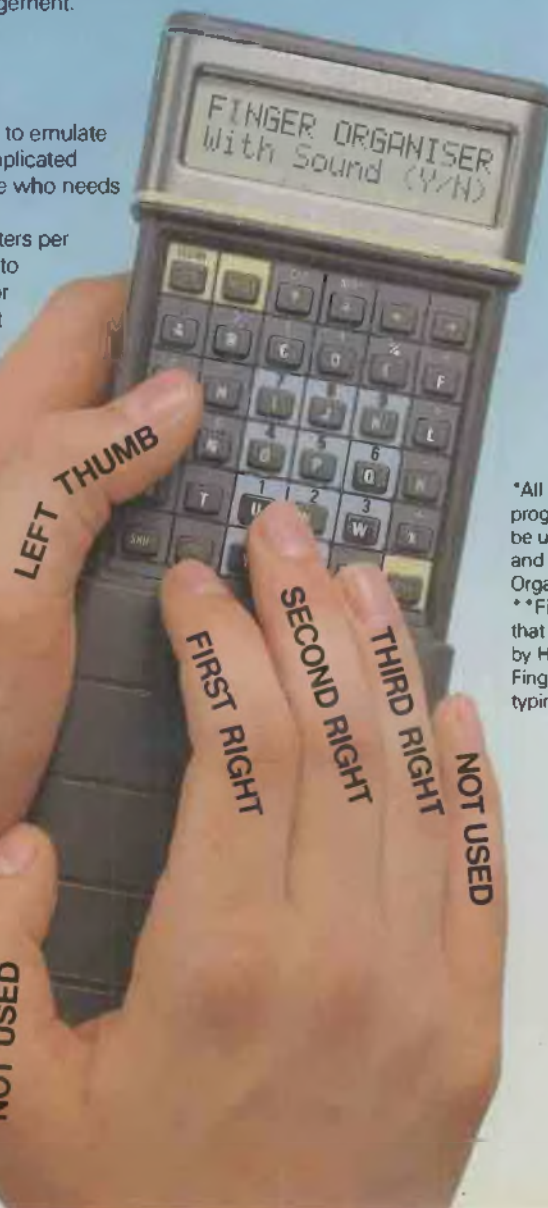
"A standard others will seek to emulate . . . simply fantastic. Uncomplicated and quick to use for anyone who needs facts at their fingertips.

Up to 16 prompts, 238 characters per record, any file length subject only to available storage, sorts alphabetically or numerically, comprehensive selective print features and much, much more"



"... teaches you to use the Psion Organiser keyboard naturally . . . makes typing information into the Organiser II quicker and easier. It's a lot of fun too! . . ."

Helps to make typing information into the Psion Organiser II quicker and easier . . . It's a lot of fun too!



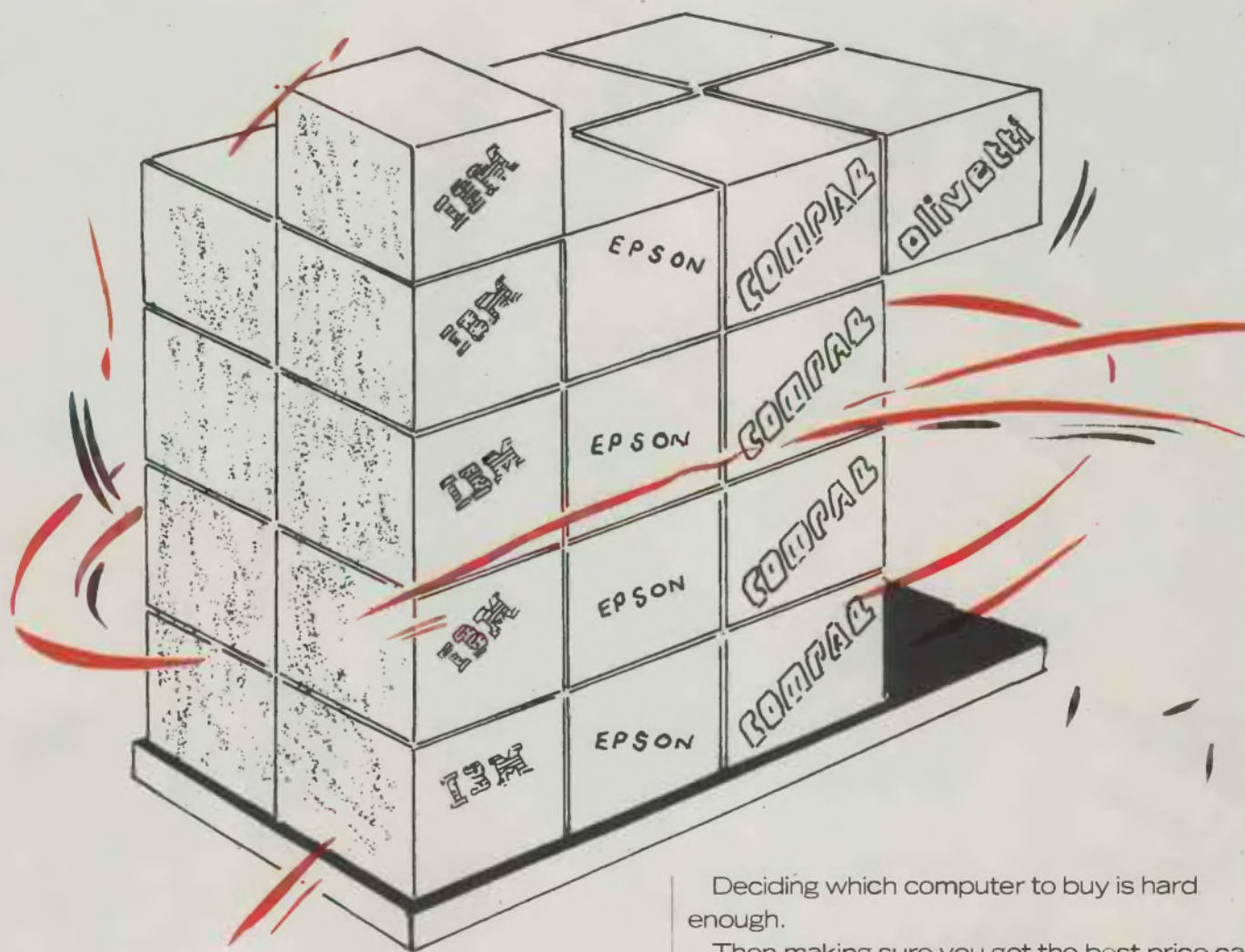
*All Harvester programs can be used on CM and XP Organiser II's.
**Fingering is that advocated by Harvester's Finger Organiser typing method.

by
HARVESTER INFORMATION SYSTEMS LTD

"as ye sow, ye shall reap"

Enquiries from Educational and Government Departments welcome. Telephone 831-2331

IF YOU THINK TO ARE FAST, TRY GET



Deciding which computer to buy is hard enough.

Then making sure you get the best price can be even more of a problem.

However, the real difficulty arises when you want one delivered straightaway.

You'll hear more excuses in five minutes than a traffic warden does in a week.

Unless, of course, you come to Worldwide Computers.

We can certainly offer you the choice you

L O N D O N

0 1 5 4 3 2 2 1 1

Worldwide House, Quicks Road, Wimbledon, London SW19 1EX
Telex: 8955888 Fax: 01-543 7812

B R I

0 2 7 3

Regent House, 2 North
Telex: 8771

WORLDWIDE

T H E E Q U I P M E N T C O S

AY'S COMPUTERS NG ONE DELIVERED



ant.

And, we believe you'll find the prices
pretty hard to beat.

But, equally importantly, we can supply 90%
of our range within 24 hours. Not 2 weeks.

All this means, if you want a computer, you'd
be better off speaking to us first.

Because when it comes to offering real value,
we have a reputation for being able to deliver
the goods.

TON

9 3 3 1

ington, Sussex BN1 1YA
073 671513

SCOTLAND

0 3 1 5 5 4 4 3 6 1

11-14 Maritime Street, Edinburgh EH6 6SB
Telex: 728298 Fax: 031-554 2581

COMPUTERS

WHAT IS FASTER THAN C AND SMOOTHER THAN PASCAL

JPI MODULA-2

JPI Modula-2 allows you to write programs and libraries in a structured, efficient, safe and flexible way. It is a powerful, modern language for the 8087 and 80287.

Here are the facts:

Sieve Benchmark*	Code size	Execution Time
Turbo Pascal	229	19.7
JPI Modula-2	95	3.2
Turbo C	115	4.4
MS-C	130	7.4
Logitech Modula	213	10.5

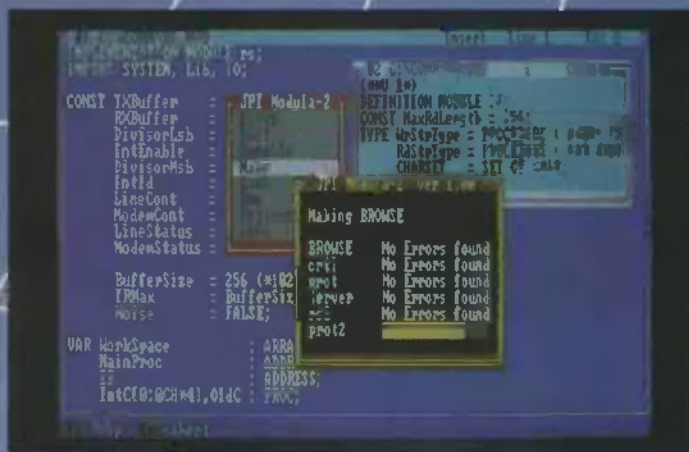
Compiler Highlights

Full version 3.0 implementation as defined by Wirth.
Compiles 1-5000 lines/minute (PC AT 8MHz).
Up to 1M code and data.
Long and short pointers.
Short pointers supported in all segments.
Total segment control (memory models).
Generates standard OBJ files.
Separate compilation of modules.
Automatic "Librarian".
Built-in automatic "make" facility.
Supports multi-tasking.
8087 support.
Complete MS-DOS support.

Environment Highlights

Multiple window editor with re-configurable commands.
Edit several files simultaneously.
Compile, link and run programs with a single keystroke.
Pin-points compile time and run-time errors in the source instantaneous.
Context sensitive built-in help system.
Built-in data-communications package which will connect you to JPI's TechLine.
All environment commands and menus are re-configurable.
Windows may be resized, re-coloured and moved around at any time.

*Modula-2 was developed by Niklaus Wirth, the father of Pascal, as a powerful successor to Pascal.
*25 iterations on Compaq 286 at 8MHz.



Technical support 24 hours a day

Technical support is available 24 hours a day via J&P's exclusive TechLine which allows you to connect via modem directly to our computer. With TechLine you can send technical questions and receive answers, browse our information database and even receive free useful utilities, all without leaving the JPI Modula-2 environment. Technical support is of course also available during normal business hours via telephone or mail.

For only £79.95 inc. VAT you get all of the above including full source code to the libraries and the window manager. Shipped free of charge in the U.K.
Runs on all IBM PCs and compatibles, including the Amstrad 1512 and 1640.

No-questions-asked 30 day money back guarantee.

ORDER NOW

Dial 0800-444143 free of charge 24 Hours (orders only). COD and all major credit cards accepted.
We ship within 24 hours

For further information or to order by mail write: J&P Ltd. 63 Clerkenwell Rd. London EC1M 5NP. Phone: (01) 253 4333

Brand and product names are trade marks or registered trademarks of their respective holders.

```

MODULE Sieve;
FROM IO IMPORT Write;
CONST NumberOfIterations = 25;
VAR Sieve = 0;
VAR I: CARDINAL; (* unsigned 16-bit int *)

PROCEDURE Sieve;
VAR I, Prime, Count: CARDINAL;
    Primes: ARRAY [0..Sieve] OF BOOLEAN;
BEGIN
    Count := 0;
    FOR I := 0 TO Sieve DO
        Primes[I] := TRUE;
    END;
    FOR I := 0 TO Sieve DO
        IF Primes[I] THEN
            Prime := I + 1 + 3;
            K := I + Prime;
            WHILE K < Sieve DO
                Primes[K] := FALSE;
                K := K + Prime;
            END;
            INCR Count;
        END;
    END;
END Sieve;

BEGIN
    Write("Start..");
    FOR I := 1 TO NumberOfIterations DO
        Sieve;
    END;
    Write("Stop");
END Bench;
    
```


MICROSIPS

PHONE ORDERS WELCOME



37 SEAVIEW ROAD WALLASEY MERSEYSIDE
L45 4QN Telephone: (051) 630 3013 24 Hr ANSAFONE

AMSTRAD PC1512 ABILITY SOFTWARE & 4 US GOLD GAMES

An amazing Package from the leaders in Personal Computers, MICROSNIPS are offering the Amstrad PC1512 further enhanced by the simple to learn, simple to use Migent Ability software package. In addition they are also including 4 US Gold Games: The Dam Busters, PSI-5 Trading Company, Bruce Lee and Tag Wrestling. This unbeatable offer from MICROSNIPS enables the end user to purchase multi-purpose equipment for the office, home and entertainment.

Amstrad PC1512 & Ability & 4 US Gold Games & Disc Storage Box & 10 Discs

SDMM Single Floppy, Mono Monitor.....	£449.00
SDCM Single Floppy, Colour Monitor.....	£629.00
DDMM Twin Floppies, Mono Monitor.....	£569.00
DDCM Twin Floppies, Colour Monitor.....	£739.00

NO OTHER PC OFFERS SO MUCH, FOR SO LITTLE!

MICROSIPS are proud to be able to offer the latest fully professional business computer, the amazing PC1640, with enhanced colour display supporting a palette of up to 64 colours the PC1640 offers colour definition and variety unsurpassed by any other personal computer in its price range. The ultra high resolution of an astounding density of 640 x 350 lines enables the PC1640 ECD to produce graphics approaching photographic quality. The PC1640 ECD is the obvious choice for running computer graphics software exploiting the full potential of all EGA software including Desk Top Publishing and CAD.

SD MD Single Floppy, Mono Display.....	£569.00
DD MD Dual Floppy, Mono Display.....	£679.00
SD CD Single Floppy, Colour Display.....	£739.00
DDCD Dual Floppy, Colour Display.....	£859.00
HD MD 20 Mb, Mono Display.....	£999.00
HD CD 20 Mb, Colour Display.....	£1199.00

The following models feature the high resolution enhanced colour display

SD ECD Single Floppy, Enhanced Colour Display.....	£899.00
DD ECD Dual Floppy, Enhanced Colour Display.....	£999.00
HD ECD 20 Mb, Enhanced Colour Display.....	£1299.00

AMIGA A500

The latest development in 68000 technology is Commodore Amiga A500. Slimline design with built in 3.5" Disk Drive, this amazing computer will slot neatly into many areas of computing. From highly sophisticated games to Desk Top Publishing. The A500 includes a 2 button Amiga Mouse 512K Ram, 256K Rom, Amiga Dos, (kickstart operating system, in Rom) Amiga Basic on disk (Microsoft), text to speech synthesis and 4 channel stereo sound. RGB (A1081 monitor) and RGBI (1901C monitor), facilities for 2 external drives and the following interfaces, parallel, serial, stereo audio, monochrome video. RGB Video, mouse/joystick or mouse/joystick/light pen.

* Every A500 now includes a free copy of Deluxe paint

A500 Amiga Computer with Built in 3.5" Drive.....	£469.00
A500D Computer (A500) + Disc Drive (A1010).....	£755.00
A500M Computer (A500) + Monitor (A1081).....	£869.00
A500DM Computer (A500) + Disc Drive (A1010) + Monitor (A1081).....	£1050.00
A1081 RGB Colour Monitor.....	£399.00
A1901C RGBI Colour Monitor.....	£299.00
A1010 External Disc Drive.....	£266.00
A520 TV Modulator.....	£24.00
A501 512K Expansion.....	£113.00
CAX354 Cumana Brand Disk Drive, 80T, double-sided 720K, No PSU.....	£139.00



051-630 3013
CUSTOMER ENQUIRIES

051-691 2008
MAIL ORDER

051-630 5396
ACCOUNTS

**PERSONAL CALLERS
WELCOME**

PRINTERS

PANASONIC KXP-1081.....	£179.00
CITIZEN 120D INC INTERFACE.....	£199.00
AMSTRAD DMP3160.....	£199.00
STAR NL10 INC INTERFACE.....	£249.00
AMSTRAD LQ3500.....	£389.00
STAR NL10 RIBBONS (4 PACK).....	£23.00
DMP2000/3000 RIBBONS (4 PACK).....	£16.00
PCW RIBBONS (4 PACK).....	£16.00
CITIZEN 120D RIBBONS (4 PACK).....	£16.00

IBM

WORDSTAR 1512.....	£59.00
GEM WRITE.....	£85.00
PC WRITE.....	£95.00
TASWORD PC.....	£27.00
FLEET ST. EDITOR.....	£85.00
DIGITAL-DESKTOP PUBLISHER.....	£249.00
PS10N-PC FOUR.....	£59.00
SUPERCALC 3-1.....	£69.00
SCRATCHPAD PLUS.....	£47.00

PCW

TASWORD 8000.....	£22.00
DR DRAW.....	£39.00
DR GRAPH.....	£39.00
SAGE POPULAR ACCOUNTING COMBO PACK.....	£125.00
CHIT-CHAT COMBO.....	£85.00

ST

SUPERBASE PERSONAL.....	£85.00
D BASE II.....	£82.00
DEVPACK ST.....	£40.00
1st WORD PLUS.....	£57.00

3 1/2" SONY SSDD (PER 10).....	£16.00
3 1/2" KAO SSDD (PER 10).....	£18.00
5 1/4" PRECISION DISCS SSDD (PER 10).....	£8.00
LOCKABLE STORAGE BOX (HOLDS 100 5 1/4" DISCS).....	£12.00
LOCKABLE STORAGE BOX (HOLDS 20-3" DISCS).....	£10.00

HOME COMPUTERS

SPECTRUM PLUS 2 complete with joystick interface and software.....	£139.00
SPECTRUM PLUS 3 complete with joystick and games on disc.....	£199.00
COMMODORE 64C 1530 DATACORDER + complete with joystick, 5 games and sports holdall.....	£169.00
ATARI 520 STFM + 10 FREE DISCS.....	£289.00
ATARI 1040 ST + SC1224 COLOUR MONITOR.....	£799.00
AMSTRAD CPC6128 (COLOUR) PACK.....	£399.00
AMSTRAD CPC6128 (MONO) PACK.....	£299.00
AMSTRAD 464 (COLOUR) inc joystick + £100 worth software.....	£299.00
AMSTRAD 464 (MONO) inc joystick + £100 worth software.....	£199.00

AMSTRAD PCWB256

£339.00

A complete disc-based personal computer Word Processor, including printer + 5 free Maxell discs + 1000 sheets paper

CPU 256K RAM, 280A microprocessor, 8 bit computer, 82 key keyboard.

MONITOR High Resolution Green Monitor, 90 columns, 32 lines of text.

DISC DRIVE 3" disc drive, built into monitor, 360K formatted. Optional second drive may be fitted (FD2) of 1 Mb unformatted capacity, 720K formatted.

PRINTER Dot matrix, with letter quality at 20 cps or draft quality at 90 cps. Features pitch, italics, boldface, underline, super and sub-script. Tractor and single sheet operation and automatic paper alignment.

SOFTWARE LocoScript (word processing) Locomotive Software's Mallard Extended Basic interpreter (featuring Jemsam record management and double precision arithmetic). CP/M + with GSX graphics enhancement. DR Logo.

PCW 9512 THE WORD PERFECT ADDITION TO THE AMSTRAD STABLE. £569.00

The very latest word processor from Amstrad is now available from MICROSNIPS. Aimed specifically at the business user, the PCW 9512 when linked with a professional keyboard and daisywheel printer attains word processing standards hitherto unsurpassed. With the addition of LocoScript, Mail Merge and 75,000 word spell checker, must mean the demise of the office typewriter. Plus 5 free 3" discs + 1000 sheets paper.

CPU 512K Ram, 280A Processor, 82 Key PC STYLE Keyboard.

MONITOR High Resolution Paper White Display 90 x 32 lines of text.

DISC DRIVE 3" Floppy Disc Drive, 720K formatted with optional second drive.

PRINTER Daisywheel with bidirectional printing at 20 CPS, paperloading by bail bar action. Cover up safety switch, exchangeable daisywheels (10, 12, 15, cpi) 15" Carriage with single sheet or tractor feed facilities included.

SOFTWARE Two 3" discs with LocoScript 2 Locomotive Mail Merge, LocoSpell, spelling checker with 78,000 word dictionary, CP/M plus with Mallard basic, GSX and DR Logo. User Manual.

★ ALL OUR PRICES INCLUDE VAT & CARRIAGE ★

ALL ORDERS DEALT WITH SAME DAY AS RECEIPT
FULL PRICE LIST AVAILABLE WITH FIRST ORDER

EXPORT EUROPEAN CUSTOMERS PAY PRICE SHOWN — VAT COVERS CARRIAGE.

NON-EUROPE ADD 5%. OFFICIAL ORDERS ARE ACCEPTED FROM EDUCATIONAL AUTHORITIES, GOVERNMENT AND MAJOR COMPANIES

CORRECT AT TIME OF GOING TO PRESS. ERRORS AND OMISSIONS EXPTED

Introducing a uniquely flexible package – designed to help you keep your display screen crystal clear and your peripherals clean and dust-free.

Kleerit Cristal moist wipes contain a specially formulated cleaning agent (with anti-static properties) that's tough on dirt but gentle on your hardware. The neat re-sealable packs (containing 10 or 30) keep the wipes in perfect condition and ready for use.

So now, you have at your fingertips, software with the power to maintain your system at one hundred percent efficiency.

For details of your nearest stockist please telephone (04 446) 48977 or order by mail direct from the manufacturers.

**KLEERIT
CRISTAL** ...totally compatible.

Essential software.

SPECIFICATION

Moist cleaning wipes
size: 180mm x 220mm (approx)

Packaging: re-sealable
(10 or 30 wipes)

Anti-static properties

Non-toxic

Compatible with all systems

Price (RRP inc. VAT)

39p (10 wipe pack)

59p (30 wipe pack)

Manufacturers:

Hygiene Industries Limited

204 London Road, Burgess Hill

West Sussex RH15 9RD

Tel (04 446) 48977

Telex 878508 HYGIEN G

Fax (04 446) 48978

Enquiries from trade and OEM's
welcome.



**KLEERIT
CRISTAL**



WET WIPES
CHIFFONS HU
FEUCHTE PU
STROPPINA

**KLEERIT
CRISTAL**

DR SOLOMON'S £10 SOFTWARE

DR SOLOMON'S DATA RECOVERY SERVICE

We offer a data recover service.

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 get data off formatted disks, corrupted disks, disks with bad directories, disks that claim to be 160k floppies and are actually 30 Mb hard disks, and disks that claim not to be there.

Deleted files and directories are our meat and drink. Its expensive, - but no fix no fee.

We can tackle anything - phone for a quote.



180 PROGRAMS
NOW AVAILABLE
PLEASE PHONE FOR FREE
CATALOGUE

QUALIPRINT

Lets a cheap dot matrix printer do high quality printing. Works with IBM, Epson and compatible printers.

10 FONTS for £15

Available for business and decorative use.

example fonts:

Slimline Font
Italic Typewriter
Bold Upright Font
Broadway Font
Superstar Font

further font sets available £8.

- SNAPSHOT*** Dumps the contents of a screen to a file.
- GRAFSHOT*** Dumps the contents of a graphic screen to a file.
- UNFORMAT/ RESCUE** Recovers data from formatted hard disks and data from corrupted hard or floppy disks. £39
- IANKEY 1** Crash course in typing for beginners. £26
- IANKEY 2** Two fingers to touch typing conversion course. £26.00
- INDEX** Gives you a master list of all the files on all subdirectories, sorted alphabetically.
- FILES -AT-RISK** Shows you which files are not backed up, lets you delete the ones you don't want, and puts you in the right subdir.
- SOLID 123** Consolidates many LOTUS 123 or SYMPHONY spread into a total. £15

PROGRAMS MARKED *
ARE FOR IBM'S AND COMPATIBLES ONLY

PC-PRESTALK*

A comms package; all speeds including 1200/75, and does Prestel graphic £20

DOSMENU

A menu-driven front end for DOS, lets you Choose any application (e.g. 123 or WordStar) or DOS command with a single keystroke command from a menu.

UNDELETE

Lets you recover files that you have accidentally deleted from floppy or hard disk; also works in subdirectories. Works on all versions of DOS. £15

REDIRECT*

Lets you redirect the printer to a file.

SIDELINE

Prints your wide spreadsheet printouts, sideways. Needs IBM graphics printer or EPSON or compatible.

BURN*

Blanks the screen after a given time to prevent burn-in.

QPRINT*

Lets your printer run while you use your PC for other jobs.

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.

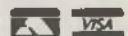
**CHOOSE ANY
FIVE FOR £40!**

£10 & £15 Programs only

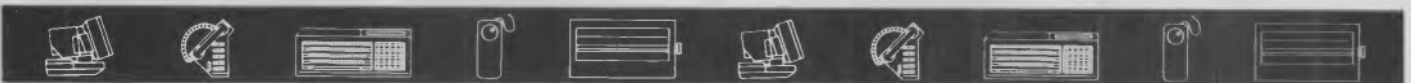
All programs cost £10.00 except where stated +VAT
You can buy a package of any nine programs for £65pr any five for £40.

This offer only includes our £10 and £15 programs

PLEASE ADD VAT TO ALL ORDERS



S&S ENTERPRISES (AMERSHAM) LTD. (02403) 4201 & 28095



MULTI-USER SYSTEMS

DESK TOP PUBLISHING

ON SITE TRAINING

ON SITE SERVICING

AFTER SALES SUPPORT

**CALL FOR A PRICE
AND GET
PROFESSIONAL ADVICE
(0280) 816087**



Visit our demonstration showroom and see the complete Apricot range including the Xen multi-user system.

Also see Apricot's high performance Desk Top publishing system incorporating Aldus PageMaker and both the Kyocera and the Apple Laserwriter Plus printers.

Bristle Hill Buckingham
Bucks MK18 1EZ
(0280) 816087



FRASER
Associates Limited

apricot

Panasonic
Office Automation

EPSON

Amstrad

DIGITISED PICTURE STORAGE AND RETRIEVAL

with **PIXIEFILE**

Easy to use filing software for digitised pictures.

- ☐ Stores tagged pictures and information
 - ☐ Classification and search by class or keyword
 - ☐ Quick and easy retrieval and display
- Couple this with your favourite database.

and **PIXIEFILE PLUS**

A quick to master circuit board and software package as **PIXIEFILE Plus**. The power of video picture capture from camera or VCR and then – at the touch of a button – you can:

- ☐ Improve it
- ☐ Re-size it
- ☐ Re-position it
- ☐ Crop it
- ☐ Borderline it
- ☐ Cut and combine it

The results are **spectacular** with other images and more

Features output to laser printer either direct, or via your DTP system. – That's publishing power!

For further information contact:
PIXIE Computer Vision Systems Ltd.

19 HWC, St Johns, Woking,
Surrey GU21 1UE, England.
Tel: (04867) 2555. Telex: 858699 G.
Fax: (04862) 28303.

Dealer enquiries welcome.

PIXIE

DAMSON COMPUTING

01- 803 7074
01- 807 7577

6 RAYS ROAD,
EDMONTON,
LONDON N18 2NX

DAMSON COMPUTING – SANYO AUTHORISED DEALER, AMSTRAD DEALER, 400 MASTER DEALER ATARI DEALER, MICRO PUJUNTI AUTHORISED DEALER, TAXAN AUTHORISED DEALER, AMSTER AUTHORISED DEALER, DAMSON COMPUTING

NEWS FLASH		
*New Epson PC-10MHz	£675	
20MB 640K RAM 360K floppy Par+ Ser		
5 Exp Slots Monitor Card Enh Keyboard		
Ask for other Epson range		
Sanyo 16PLUS PC Compatible, 20MB, 4.77MHz	£785	
MS DOS 3.2 + GW BASIC VER 3.2 MONO		
- Dux 20 MB Hard Disk + 640K RAM upgrades		
- RS-232C Serial + Centronic interfaces		
- Colorgraphic & mono test video I/F		
- 12 months on-site on basic unit		
- 12 months warranty on Hard Disk		
- Free membership of Sanyo MU Assoc		
DAMSON-SANYO DEALER, ASK FOR SANYO RANGE		
SANYO IBM PC COMPATIBLE RANGE		
SANYO IBM COMPATIBLE		
With On-Site Maintenance		
FOLLOWING INCLUDE GW BASIC VER 3.2 & MS DOS 3.2		
SER 3 PAR 1 PORTS, 3 SLOTS (1 RESERVED)		
MBC 16PLUS1.1K360K 5.25" DRIVE 256K RAM £475		
MBC 16PLUS2.2X360K 5.25" DRIVES		
640K + MONITOR	£650	
DAMSON + DUR OWN UPGRADES FOR SANYO		
MBC 16PLUS3.1X360K + 20MB DRIVE + MONITOR	£785	
MBC 16PLUS3 + 30MB DRIVE	£835	
PR 241 24-PIN FULL SIZE DOT MATRIX PRINTER	£559	
Sanyo MBC 885 (IBM Compatible)	£699	
Sanyo MBC 955 2 2.360K DRVS, VER2 11-128K RAM	£775	
Sanyo MBC 955 2X800K DRVS VER2 11, 256K RAM	£895	
Sanyo MBC 955 2X800K DRVS, 256K, Monitor, Print	£925	
Sanyo DM4112 12" Mono Monitor	£75	
Sanyo DM555 RAM Upgrade 128K to 256K	£35	
Sanyo disk drive upgrade 2 800KB	£25	
20 MB/30MB UPGRADE IBM Compatible	£225/£275	
AMSTRAD		
(On-site maintenance recommended)		
CPC 464 GREEN	£164	
CPC 464 COLOUR	£245	
CPC 6128 GREEN	£245	
CPC 6128 COLOUR	£335	
PCW 8256 WORD PRC	£269	
PCW 8512 WORD PRC	£309	
PCW 9512 WORD PRC	£475	
PC 1512 SD M + 30MB	£665	
PC 1512 DD Mono	£530	
PC 1512 SD C + 30MB	£645	
PC 1512 DD Colour	£619	
PC 1512 SD Mono	£379	
PC 1512 SD Colour	£529	
PC 1640 SD Mono	£479	
PC 1640 DD Mono	£559	
PC 1640 SDW + 30MB	£729	
PC 1640 SD Colour	£609	
PC 1640 SD EGA	£739	
PC 1640 DD EGA	£829	
PC 1640 SD + 30MB EGA	£1039	
AMSTRAD PRINTERS		
DMP 3150 80 COLUMN	£189	
DMP 4000 132 COLM	£325	
LQ 3500 80 COLUMN	£329	
AMSTRAD RIBBONS		
PCW8512PCW8512DM3160	£59/DOZ	
PRINTERS		
DOT MATRIX (Special Offers)		
CANON LBP6A1 8PAGE/MIN	£1595	
CANON A50 180 CPS/IN/80COL	£275	
EPSON GD3000 LASER 8 PAGE/MIN	£1295	
EPSON FX800 180 CPS/IN/120COL	£305	
EPSON FX1000 160 CPS/IN/132COL	£391	
EPSON LX8000 150 CPS/IN/180COL I/F	£189	
EPSON LQ800 180CPS/IN/180COL	£446	
EPSON EX800 300CPS/IN/132COL	£395	
EPSON EX1000 300CPS/IN/180COL	£530	
AMSTRAD DMP 3160 110 IBM	£189	
Panasonic 1081	£149	
MP 125 135 cps, 80 column F/T	£129	
MP 165 185 cps, 80 column F/T	£169	
MP 201 200 cps, 132 column F/T	£299	
NEC PRINTERS P650 RRP £549 – OUR PRICE £384		
FUJITSU DX2100 DOT MAT RRP £435 OUR PRICE	£335	
CITIZEN 1200 120CPS/80COL	£149	
ASK FOR CITIZEN, FUJITSU AND NEC RANGES		
DAISYWHEEL (Special Offers)		
Juki 6100 B/d (10 Period)	£259	
Juki 2200 Typewriter/Printer	£209	
Sanyo PR5200 20cps renewed What Micro May 87	£249	
Bondwell		
BW18 TRANSPORTABLE	£829	
BWB PORTABLE	£899	
THE SBC FD (FREE ON SITE MAINTENANCE CONTRACT) CLAIMED TO BE THE BEST VALUE PC IN EUROPE TODAY		
SBC FD Twin Drive 360K with Mono Monitor	£589	
SBC HD20 as FD but with 20MB Hard Disk	£999	
Add £190 above for Colour Monitor		
Atari 520 STM	£163	
Atari 520 STE + Mouse	£229	
Atari 1040 STE + Mouse	£339	
Atari 20 MB SH 204	£529	
Atari M Mon SH 125	£109	
Atari C Mon SC 1224	£299	
Amiga System please ask for SPECIAL offers		
BBC (Master) 128K	£344	
Amstrad Modes Card	£135	
MIRACLE TECHNOLOGY WS4000 Modem	£125	

Prices do not include VAT and delivery.

We are moving to a bigger premises soon.

DAMSON COMPUTING (MAIL ORDER) 6 RAYS ROAD, EDMONTON, LONDON N18 2NX.
CALLERS BY APPOINTMENT, EASY 400 P.O. BOX 100, LONDON N18 2NX.
TELEPHONE: 01-803 7074 and 01-807 7577 TELEX 895051 ONEONE G, ATN: 14514001.
WE SELL ONLY BEST VALUE GUARANTEED COMPUTING AT MOST COMPETITIVE PRICE.

FREE ONE TO ONE ELECTRONIC MAIL BOX WITH EVERY ORDER

SOCKET TO ME, SUSAN!

File Shuttle

Select Directories to Send (Press CR when Done)

Directory Name-----

~MEDIANAS

~CALC

~SF

~PD2

~SP

~SFEN

~SHUTTLE

~SMART

~MEMBER

~GRVSDERO

~UNIMANUL

~PPPLAN

~ENU

~MSUNING

~CDM

~20-directories, ~746-user-files-----

Flight Plan

Harp Speed on LPT1

On-Off

Autoland: ☐

Skip Dups: ☐

Modified: ☐

Color: ☐

Fast Video: ☐

Record Macro: ☐

Midcard: 1.4

Dates: 01-10-1987

for help

Charge-Buy-Location:-----Space-Remaining: 3620804-bytes-----

CLV

Copyright (C) Getc-Software-Inc., 1986, 1987

- COPY FILES DIRECTORIES HARD DISKS
- FROM TO 3 1/2" - 5 1/4"
- FROM TO LAP TOP - DESKTOP
- ANY IBM PC XT AT PERSONAL SYSTEM 2
- NETWORK COMPATIBLE
- SINGLE KEYSTROKE SELECTIONS
- NO COMMUNICATIONS JARGON
- NO DEVICE DRIVERS, MODEMS OR EXTRA CABLEING
- 1 MEGABYTE A MINUTE USING YOUR PARALLEL PORT AND PRINTER CABLE WITH THE REVOLUTIONARY ROCKET SOCKET (TM)

SIMPLY THE BEST VALUE FILE TRANSFER PROGRAM AVAILABLE. £85 INCLUDING VAT AND P.P.

- UP TO 100 ITEMS PER MENU 15 LEVELS DEEP
- OPTIONAL FULL AUDIT TRAIL OF SYSTEM USAGE
- PASSWORDS AND SCREEN LOCK
- PROGRAMS AND DATA MAY BE ON DIFFERENT DIRECTORIES AND DRIVES
- SCREEN SAVER
- MINIMAL MEMORY OVERHEAD
- SINGLE KEYSTROKE SELECTION SIMPLE CONFIGURATION
- NETWORK COMPATIBLE
- ANY HARD DISK IBM PC INCLUDING PERSONAL SYSTEM 2

SIMPLY THE BEST VALUE HARD DISK MENU AND PROGRAM MANAGEMENT SYSTEM AVAILABLE. £60 INCLUDING VAT AND P.P.

Lazy Susan

Lazy-Susan-- 0:00 aa--Oct-10, 1987--

- BUSINESS FORECASTING
- GAMES
- ACCOUNTING AND ADMINISTRATION
- SPREADSHEET
- WORD PROCESSING
- SMART DATABASE/WP/SPREADSHEET/CONS
- COMPUTER AIDED DESIGN
- DOS SERVICES & SYSTEM UTILITIES
- DATA COMMUNICATIONS FACILITIES
- OPERATING SYSTEM
- TEXT EDITING
- LINK TO ICL SYSTEM 10 / 25
- FILE SHUTTLE
- PRODUCTION PLANNING - UNIMAN
- OSBORNE PC TO TANDON PC TRANSFER
- MEMBERSHIP ADMINISTRATION SYSTEM

Copyright-Getc-Software-Inc.-1987

Menu-Setup-----

Change Program Information

Add a Program to Menu

Delete a Program from Menu

Change Menu Information

Add a Menu to Menu

Delete a Menu from Menu

Change Menu Password

Record Usage (On / Off)

Log-Is-On

Send Cheque/P.O. or Order to:

SKYE INDUSTRIES LTD, 11 WESTHILL ROAD, WESTERN PARK, LEICESTER LE3 6GB

TELEPHONE: (0533) 858744

File Shuttle & Lazy Susan are Manufactured & Distributed by Skye Industries Ltd under exclusive license from Getc Software Inc. Vancouver Canada.

We're making our mark in the UK

LONDON LONDON OF WESTMINSTER
THREADNEEDLE ST
EC2

Before establishing your criteria for purchasing computer equipment, there are some questions you should ask yourself.

CONSIDER THE FOLLOWING:

Tulip Computers are a highly successful European microcomputer manufacturer and our reputation in Britain is growing fast. Every Tulip Computer is made of 90% European components and is developed, assembled and tested in Europe, where high technology production materials and systems are probably the best in the world.

Already chosen by many large corporations in The Netherlands as their leading

microcomputer supplier, we have introduced in the UK an exciting family of high quality, high performance, competitively priced microcomputers.

Our quality control systems are more rigorous than those of other manufacturers and we have an envied reputation for reliability, after sales support, maintenance and meeting delivery deadlines.

Another reason for our success is our ability to provide business solutions through an extensive network of Tulip trained dealers.

To find out more about Tulip Computers call 0293 562323 (10 lines) or, fill in the coupon provided.



Tulip
computers uk plc

Unit 6 The SateWire Building Village
Fleming Way, Crawley, West Sussex RH10 2NE
Telephone: 0293 562323 (10 lines)
Facsimiles: 0293 553307
Telex: 879674 Coliba X TULIP

The new name for quality

Please send me further information on Tulip microcomputers

Name

Company

Address

Postcode

Telephone

PRINTER SWITCHES

DIRECT from the MANUFACTURER

LINK TWO OR MORE MICROS TO ONE PRINTER, PLOTTER, MODEM ETC. OR VICE VERSA.



- ROBUST METAL HOUSING
- ELECTRONICALLY TESTED
- 28 DAYS APPROVAL
- 12 MONTHS GUARANTEE
- OFFICIAL ORDERS ACCEPTED
- 24 HOUR DESPATCH

SERIAL DATA SWITCHES

RS 232/V24.25 way 'D' sockets

ALL 25 LINES

MODEL	SWITCH	PRICE
DV2	2 way	£59
DV3	3 way	£69
DV4	4 way	£79
DV5	5 way	£89
DVX	2 way cross-over	£79

LINES 1 to 8 & 20

DR2	2 way	£49
DR3	3 way	£57
DR4	4 way	£65
DR5	5 way	£73
DR8	8 way	£109
DRX	2 way cross-over	£65

9 way 'D' sockets ALL 9 LINES

DN2	2 way	£45
DN3	3 way	£52
DNX	2 way cross-over	£59

PARALLEL DATA SWITCHES

CENTRONICS.

36 way Amphenol sockets

MODEL	SWITCH	PRICE
DC2	2 way	£65
DC3	3 way	£79
DC4	4 way	£95
DC5	5 way	£109
DCX	2 way cross-over	£95

IBM PC.25 way 'D' sockets

DP2	2 way	£59
DP3	3 way	£69
DP4	4 way	£79
DP5	5 way	£89
DPX	2 way cross-over	£79

IEEE-488.24 way Amphenol sockets

DE2	2 way	£89
DE3	3 way	£109
DEX	2 way cross-over	£129

PLEASE ADD VAT AT 15%. ALL ITEMS CARRIAGE PAID

Trade, Educational & Export enquiries welcome. Cables also available. Ex stock & Custom built.

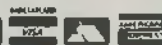


©1987

HOMESTEAD DATA PRODUCTS LTD

145 EDINBURGH AVENUE, SLOUGH. SL1 4UA
Fax (0753) 691037 Telex 846086 CABLIN-G

Tel: (0753) 691661



**EVEN DEALERS CAN'T BUY FOR THE PRICES
WE SELL AT — AND THAT'S A FACT**

STAR

NL10 (Parallel etc)	£179.00
NL10 (Serial only)	£205.00
NK15	£272.00
ND10	£249.00
ND15	£342.00
NR10	£320.00
NR15	£412.00
NB24/10	£419.00
NB24/15	£530.00
NB15	£615.00

EPSON

LX800	£186.00
FX800	£294.00
FX1000	£379.00
EX800	£384.00
EX1000	£509.00
LQ800	£429.00
LQ1000	£569.00
LQ2500	£715

AND RIDICULOUS LASER PRICES

Epson Ga 3500	£1255.00
Canon LBP8 Series II	£1575.00
HP LaserJet Series II	£1940.00
Brother HL-8	£1645.00
Citizen Overture	£1395.00
QMS Postscript Lasers	£ POA

SPECIAL OFFER:

Ring 0752 74470 to find out how to command
Unrivalled discount on all Printers even on one offs.
(Excludes Epson)

All prices exclude VAT and carriage.

Carriage on Dot Matrix Printers £8 + VAT.

Carriage on all Laser Printers £12 + VAT

Various cables available to suit
your requirements

KIRKLANDS BUSINESS SYSTEMS LTD

KIRKLAND HOUSE, LYTTON ST, STOKE-ON-TRENT ST4 1DH

TEL: 0782 744700 TELEX: 36393 KBS LTD G FAX: 0782 744566



Master your way to a fortune and enjoy a world journey in the process.

Do you enjoy challenging puzzles and brain teasers?
Lateral thinking?

Are you a Sir Rannulph Feinnes on logistical detail with
the tenacity of Captain Cook?

If so you'll really enjoy playing the Travel Game,
a testing world trip in pursuit of a real cash sum which
certainly isn't trivial.*

You'll be stranded in the strangest places with only a
handful of small change unless you get the answers right.
You could catch malaria. Miss your plane. Run into strikes.

On top of all this to unearth the treasure you'll have to
crack a critical sequence of clues dotted around the globe –
with foresight, planning, persistence and perception.

In fact the remarkably life-like and educational Travel
Game has most of the pitfalls and a lot of the pleasures of
travel.

Anyone with access to an IBM compatible PC can play at
their own difficulty level simply by following the screen
prompts and using hard copy print-out if necessary.

At just £24.95 (plus 95p p & p) the Travel Game is
priceless in terms of enjoyment. And you could be much
richer when you return home.

Complete the
coupon to secure
your game or
telephone
051 708 8202
for credit card orders.

THE
TRAVEL
GAME

Allow 10 days for delivery. Money back guarantee if not
delighted.

*An initial £5,000 prize will be increased by £1 for every
game sold.

To: The Travel Game, FREEPOST, Liverpool L1 8AB.
Telephone 051 708 8202

Please send me _____ copy(ies) of the Travel Game at
£24.95 per game plus 95p postage and packing. Total
cost £25.90. I enclose a cheque to the value of £_____

Alternatively please debit my Access ☐ Visa ☐ credit
card number.

Please indicate your credit card address if different
from the one below.

Name _____

Address _____

_____ Post Code _____

Telephone _____

ADVERTISERS INDEX

3	MD Digital Design & Developments Ltd	237	Designer Pixels	67	L	Riverbridge	226
A	ABC Holdings	222	Digital Research (UK) Ltd	167	Link International Products	Robert Erkal Ltd	245
AJP Business Computers	184	Digital Research (UK) Ltd	264	Layview	23	Rockfort Products (Vignesh)	77
ATT Corporation Ltd	8	Digitask Business Systems Ltd	38			Rovoned	230
ATT Corporation Ltd	9	Digitask Business Systems Ltd	39	M		Rule Format	277
Abbot Computer Products Ltd	32	Digitask Business Systems Ltd	40	M-Tech Computer Services	255	S	
Acorn Computers Ltd	79	Digitask Business Systems Ltd	41	Manor Court Supplies Ltd	255	S & S Enterprises	273
Advanced Memory Systems Ltd	65	Digitask Business Systems Ltd	42	Matmos Ltd	223	SL Data Ltd	53
Advanced Microcomputer Applications		Digitask Business Systems Ltd	43	Maxell (UK) Ltd	62	Samsung UK Ltd	74
		Digitask Business Systems Ltd	44	Mayfair Micros	119	Sector 7 Software	240
Alain Computer System	33	Digitask Business Systems Ltd	45	Maygoe Systems	53	Seltec	30
Amstrad Consumer Electronics plc	6	Digitask Business Systems Ltd	46	Magatech	250	Seltec	31
Amstrad Consumer Electronics plc	150	Digitask Business Systems Ltd	244	Messiter Software	238	Semaphore Systems Ltd	242
Amstrad Consumer Electronics plc	34	Digitask Business Systems Ltd	63	Micro Computer Aided Technology	101	Shareware Marketing	248
Amstrad Consumer Electronics plc	35	Dimension Computers Ltd	239	Micro General	24	Shareware Marketing	249
Amstrad Consumer Electronics plc	80	Duncan Databases Ltd	241	Micro Media	69	Sierra Computer Consultants Ltd	221
Amstrad Consumer Electronics plc	81	Dynamic Speed Control	227	Micro Minder	225	Silics Shop Ltd	57
Amstrad Consumer Electronics plc	87			Micro Peripherals	184	Sky Industries Ltd	274
Annex	23	E		Micro Processor Engineering	22	Slough Computers	16
Arkel Computer Services Ltd	21	EFI Computers & Electronics (UK) Ltd	251	Micro Remi	175	Slough Computers	17
Autodesk Ltd	115	Electronic Software Ltd	247	Microtalk Express	271	Smalltalk Express	113
		Electrone	82	Soft Options	253	Soft Options	22
B		Elonex	54	Softouch Computers	220	Spectrum Group plc	232
BRK Computer Services	229	Enigma Technologies UK Ltd	103	Spectrum Group plc	52	Spectrum Group plc	233
Banat Software Ltd	252	Evesham Micro-Centre Walltone	235	Star Micronics (UK) Ltd	84	Star Micronics (UK) Ltd	108
Board Technology Corp	230			Musik Software Inc	218	Star Micronics (UK) Ltd	109
Borland International (UK) Ltd	72	F		Mountaineer Ltd	17	Star Micronics (UK) Ltd	121
Borland International (UK) Ltd	73	Farnham Computers	224	Mydisk Ltd	68	Stem Computing	19
Bridgen Technology	237	Felspar Ltd	225			Stirling Microsystems	7
		Fortransoft	17	N		Surplus Computer Sales	12
C		Fraser Associates Ltd	273	Nabitchi Computing	246	Swanley Electronics	224
CAS	219			National Laser Products	220	System Science (Systematika)	67
Cal Abo (UK) Ltd	47	G		Ness Industries Ltd	266		
Calend	208	Goto Computer	27	North West Computer Supplies	223	T	
Cardcheck Ltd	23	Greymatter	279	Northern Technology Systems Ltd	23	Tandon Computer (UK) Ltd	134
Citizen	90	Guiltronics	56			Tasman Software Computers	130
Complex	244			O		Tasman Software Computers	18
Commodore Business Machines (UK) Ltd		H		Oasis Electronics Ltd	238	Technology Ventures	175
Commodore Business Machines (UK) Ltd	176	Harvester Information Systems Ltd	267	Olympia Business Systems	254	Technomatic Ltd	60
		Hi Voltage	58	Olympic Systems Ltd	158	Technomatic Ltd	61
Compshop Ltd	262	Hi Voltage	59	Optimum Technology Ltd	13	Telapost	53
Compshop Ltd	263	Homestead Electronics	276	Opus	155	The Electric Studio	93
Compstead	16	Homesview	237	Opus	157	The Software Factory	258
Computacenter Ltd	11	Hubeourt Ltd	223	Opus	66	The Software Factory	259
Computer Express Ltd	36	Hygiene Products	272	P		Thoughts and Crosses	26
Computer Express Ltd	37			P & C Shien Enterprises Co Ltd	221	Transform Ltd	245
Computer Intelligence	237	I		PC Club	243	Tulips Enterprises Ltd	275
Computer Line	7	IBRS Ltd	255	Piccadilly Micros	29	V	
Computer Manuals Ltd	236	ISC Ltd	4	Pinner Wordpro	7	Viglen Computer Supplies	88
Computer Precision Ltd	15	ISC Ltd	5	Pixie Computer Vision Systems	274	Viglen Computer Supplies	89
Computers by Post	257	Inter Orient	234	Plus 5 Engineering Ltd	55	W	
Continental Ltd	28	Intercompany Communications Technology	260	Prospero Software Ltd	64	West One Galaxy Business Systems	14
Continuous Listing Paper	19	J		Paxon Ltd	141	Ltd	14
Creative Logic Ltd	113	Jensen & Partners	270	Paxon Ltd	171	Wilding Office Equipment	48
		Jitu Tech	46	Q		Wilding Office Equipment	49
D		Juki (Europe) GmbH	1FC	Quatrestar	18	Worldstream Ltd	113
Da Vinci Computers Ltd	236	K		Quicknet (UK) Ltd	265	Worldwide Computers Ltd	268
Danison Computing Ltd	274	KK Stationery Ltd	223			Worldwide Computers Ltd	269
Database Publications Ltd	231	Kado	230	R		Y	
Dataplus Ltd	252	Keele Codes Ltd	6	RGP Microsystems	220	Yu Tai Industrial Corporation	245
Datek Computer Supplies	228	King Power Computer Accessories Co	236	RSC Ltd	19	Z	
Dell Computer Corporation	96	Kirin Computing (Erima UK Ltd)	256	RTM Systems	16	Zorland	50
Dell Computer Corporation	97	Kirklands Business Systems Ltd	276	RTM Systems	20	Zorland	51
Delta PI Software	225	Kudos Systems Ltd	133	Ragley Data Systems Ltd	19		

MICROMART ADVERTISERS INDEX

A	A & L	183	Delostar	200	L	Salt Disk Co	204
A & L	185	Dr Graff	204	LCL	206	Sound Creation	201
ACD Computer Services	198	Duplicate/2486	207	M		Sovereign Mail Order	193
AL Downloading Services	190	E		MDS Computer Supplies	190	Steam Line Mailings	197
Access Computers	198	Ekra Technology	208	MEAC Designs	189	Suredata	188
Advanced Technology Trading	190	Electro Tech Services	207	Micro Concepts	194	Swallowsoft Publications	192
Aldex Software	186			Micro Design Services	206	Syntax Systems	209
Altek Instruments	193	F		Micro Mail	194	Syntonic Marketing	197
Arima Systems	209	Four Party Services Ltd	193	Microcom Systems	203	Systems Marketing Ltd	187
Ascom	191	G		Mr C Bryant	191		
Ashling UK	200	Guel Computer Services	186	Mr G Muller	204	T	
Athene Consultants	198	Gould Computer Services	186	P		T-Systems Ltd	189
Atom Style Ltd	191	Innovation Ltd	201	Pace Electronics Ltd	192	Tech Supplies	202
Avon Computer Exchange Ltd	199	International Software Distribution	205	Pacific Computers (UK) Ltd	195	The Computer Superstore	187
B		I		Panther Software	202	Think-Spare Ltd	207
BBD Computer Dust Covers	197	International Software Distribution	205	Prospec Computer Systems	188	V	
C		J		Protech Product Technology Ltd	206	V Marshall	196
Caspell Computer Services	192	John Holmes Computers	208	R		W	
City Disc Conversions Ltd	202	K		R-Tek Research	201	Wight Scientific	187
Computer Facilities	194	Kintech	196	S		Wordwork	189
D				SP Electronics	209	Z	
Dart Computers	200					Zone Electronics	188

C LIBRARIES

DATABASE

Btrieve v4.10	MS-DOS	£180
Btrieve/Multi user	MS-DOS	£430
Btrieve/Network	MS-DOS	£430
XQL	PC-DOS	£430
CBTREE (source any C)		£ 80
C-Index/Plus (source any C)		£175
C-ISAM (L,MS)	MS-DOS	£225
C-to-dBase (source CI)	MS-DOS	£120
C-tree (source any C)		£230
R-tree	MS-DOS	£175
db-VISTA (most C's)	MS-DOS	£160
db-VISTA (with source)	MS-DOS	£405
db-VISTA multi-user	MS-DOS	£405
db-QUERY single-user	MS-DOS	£160
db-QUERY single (w.sce)	MS-DOS	£405
Lattice dBCII (L)	MS-DOS	£160
Lattice dBCIII (L,MS)	MS-DOS	£160
SoftFocus Btree (source any C)		£ 55
Softfocus ISAM (source any C)		£ 30
Virtual Memory File Man.	PC-DOS	£150

GRAPHICS

Enhanced Graphics Tlkt	PC-DOS	£170
Essential Graphics	PC-DOS	£145
GFX Graphics	PC-DOS	£ 50
GraphiC (CI,L,DS,MS)	PC-DOS	£255
GSS Kernel	PC-DOS	£350
GSS Lattice Binding	PC-DOS	£110
GSS Graph.Tlkt (L,MS,+)	PC-DOS	£335
GEM Prog.Toolkit (L)	PC-DOS	£405
GSX Prog.Toolkit (DR)	PC-DOS	£270
HALO (CI,L,MS)	PC-DOS	£175
MetaWINDOWS (CI,L,MS)	PC-DOS	£110
MetaWINDOWS Plus	PC-DOS	£155
Turbo WINDOWS/C (Turbo)	PC-DOS	£ 55

SCREEN & WINDOWS

Blaise View Mngr. (s'ce)	PC-DOS	£245
Curses Screen Mngr. (L)	PC-DOS	£120
Entelekon Windows (s'ce)	PC-DOS	£ 99
Multi-windows (MS,L)	PC-DOS	£220
Panel Plus (source)	PC-DOS	£295
Vitamin C (source)	PC-DOS	£145
Windows for Data (most)	PC-DOS	£270
Windows for C (most C)	PC-DOS	£170
Greenleaf Datawindows	MS-DOS	£110

GENERAL FUNCTIONS

Greenleaf (source)	PC-DOS	£ 95
Smorgasbord (source)	PC-DOS	£150
Blaise Tools Plus (s'ce)	PC-DOS	£110
ESI Utility Lib.(source)	PC-DOS	£105
Entelekon Funct.(source)	PC-DOS	£ 95
Phoenix Pforce (source)	PC-DOS	£235
Phoenix Pforce C++ (s'ce)	PC-DOS	£235
Pro-C (most C)	PC-DOS	£720
Security Library object	MS-DOS	£ 95

ADA COMPILERS

AdaVantage V2.00 is now validated by the US Department of Defence.

AdaVantage v1.5	PC-DOS	£ 380
AdaVantage v2	PC-DOS	£ 700
Artek Ada v1.25	MS-DOS	£ 350
JANUS/Ada C-Pack	MS-DOS	£ 75
JANUS/Ada ED-Pack	MS-DOS	£ 285
JANUS/Ada D-Pack	MS-DOS	£ 825
JANUS/Ada S-Pack	MS-DOS	£2890
Augusta (with source)	CP/M-80	£ 75
JANUS/Ada C-Pack	CP/M-80	£ 80
JANUS/Ada D-Pack	CP/M-80	£ 260
Supersoft Ada	CP/M-80	£ 250

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.

COMMS LIBRARIES

Blaise Asynch (source)	PC-DOS	£120
Essential Comms (L,MS)	PC-DOS	£110
Greenleaf Comms (source)	PC-DOS	£ 95
Multi Comms (L,MS)	PC-DOS	£120
Novum Comms. (source)	PC-DOS	£140

SCIENTIFIC LIBRARIES

Wiley Scientific Lib.	ANY C	£120
Mathpak 87 (L,MS)	MS-DOS	£ 80

PROGRAMMERS UTILITIES

PC-Lint v2.0	MS-DOS	£ 80
Pre-C (Phoenix Lint)	MS-DOS	£175
Figureflow C-DOC	MS-DOS	£165
C-BROWSER	PC-DOS	£190
C Toolset	MS-DOS	£ 90
Lattice Cross Ref.	MS-DOS	£ 40
Lattice Text Utilities	MS-DOS	£ 85

REAL TIME & MULTI-TASKING TOOLS

Csharp (CI,L2,MS3) s'ce	MS-DOS	£445
Concurrent C (PC/MPX)sce	MS-DOS	£ 60
Multi C (L,MS,CI)	PC-DOS	£110
Multiforms (L,MS)	PC-DOS	£125
Op.Sys.T'box (MS) s'ce	PC-DOS	£ 60
Timeslicer v3.01 (L)	PC-DOS	£ 90
Timeslicer v4.01M (MS)	PC-DOS	£165

THE C LANGUAGE

New Aztec V4.1 is ANSI compatible and new MW Lets C now has large model.

C COMPILERS

Alcor C	280 + CP/M-80	£ 85
Aztec C Personal 1.06D	CP/M-80	£120
Aztec Commercial 1.06D	CP/M-80	£200
BDS C 1.60	280 + CP/M-80	£ 70
Eco-C v3.48	280 + CP/M-80	£ 50
Hi-Tech C	280 + CP/M-80	£ 99
Mix C	280 + CP/M-80	£ 35
Toolworks C/80 v3.2	CP/M-80	£ 45
Advantage C++	MS-DOS	£440
Aztec C86 Professional	MS-DOS	£120
Aztec C86 Developer	MS-DOS	£185
Aztec C86 Commercial	MS-DOS	£285
CI C86 Plus	MS-DOS	£290
CI C86 Optimizing	MS-DOS	£230
De Smet C88 Starter	MS-DOS	£ 85
De Smet C88 Programmer	MS-DOS	£125
De Smet C88 Enhanced	MS-DOS	£165
De Smet C88 Prof.	MS-DOS	£200
ECO-C88 V3.22	MS-DOS	£ 50
HIGH C (Metaware) v1.4	MS-DOS	£415
HIGH C 386 v1.3	MS-DOS	£610
Hi-Tech C	MS-DOS	£ 99
Lattice C v3.20	MS-DOS	£235
Mark Williams LETS C	MS-DOS	£ 60
Microsoft C v4.0	MS-DOS	£245
MIX C	MS-DOS	£ 29
Turbo C v1.0	PC-DOS	£ 65
Toolworks C v3.2	MS-DOS	£ 45
Zorland C v2.05	PC-DOS	£ 29
Zorland C Power Pack	PC-DOS	£ 59
Zorland C Optimiser	PC-DOS	£ 29
Aztec C86 Developer	CP/M-86	£250
Aztec C86 Personal	CP/M-86	£150
CI Optimizing C86	CP/M-86	£270
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	£ 99

DISK COPYING SERVICE

We can copy files to and from 400 disk formats including CP/M, CP/M-86, MS-DOS, PC-DOS, ISIS, APPLE, SIRIUS, BBC, TORCH, APRICOT, HP150, TRSDOS, DEC RT-11, IBM BEF, ATARI520, AMSTRAD.

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.

PROGRAMMING TOOLS

Ada Compilers	Algol Compilers
Assemblers	Assembler Libs.
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
Lisp	Modula-2
Nial Interpreters	OPS 5
Pascal Compilers	Pascal Libraries
Prolog	Rexx
Screen Libraries	Smalltalk
Snobol	

We stock many items for which there is no space in these advertisements.

LINKERS

Plink-86 Plus v2.23	MS-DOS	£285
Link & Locate	MS-DOS	£265
Plink-II	CP/M-80	£315
SLRNC (Z80)	CP/M-80	£ 45
SLRNC-PLUS (Z80)	CP/M-80	£150

Lattice C v1.04	CP/M-86	£260
HIGH C (Metaware)	C-DOS 286	£415
Aztec C65 V1.05	Apple DOS	£195
Aztec C65 V3.20	Apple PRO-DOS	£250
Aztec C65 Prime	Apple DOS	£ 75
Aztec C68 Commercial	MACINTOSH	£285
Aztec C68 Developer	MACINTOSH	£185
Hi-Tech C	ATARI	£ 99
Lattice C	ATARI	£ 75
Mark Williams C	ATARI	£140

C CROSS COMPILERS

We supply Aztec, Lattice, IAR and Hi-Tech Cross Compilers hosted on MS-DOS and targeted on Z80, 8085, 6502, 6801, 68011, 6301, 8051 and 68000. Please call for information or advice.

C INTERPRETERS

C-terp	PC-DOS	£180
Interactive C	PC-DOS	£195
Introducing C	PC-DOS	£ 85
Living C-personal	PC-DOS	£ 60
Living C Plus	PC-DOS	£135
Instant-C v2.0	MS-DOS	£380
RUN/C	MS-DOS	£ 60
RUN/C Professional	MS-DOS	£120
Instant-C v1.27	CP/M-86	£380

PROLOG LANGUAGE

Arity Standard	PC-DOS	£ 85
Arity Prolog v4.0	PC-DOS	£260
Arity Interpreter+Compil.	PC-DOS	£585
Chalcedony Prolog /I	MS-DOS	£ 90
PROLOG Prof.Int.v1.5	MS-DOS	£265
Micro-PROLOG v3.1	MS-DOS	£ 75
Prolog-86 v2.01	MS-DOS	£115
Prolog-1 v2.2	MS-DOS	£299
Prolog-2 Personal	PC-DOS	£145
Prolog-2 Programmer	PC-DOS	£495
Prolog-2 Professional	PC-DOS	£995
Turbo-Prolog v1.1	PC-DOS	£ 60
ADA Educ.Prolog	MS-DOS	£ 45
ADA FS Prolog	MS-DOS	£ 55
ADA VMI Prolog	MS-DOS	£ 85
ADA VML Prolog	MS-DOS	£165
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

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

Writing about computer products can be hard, sometimes. Making them sound exciting on radio can be hell. At the PCW Show, one radio reporter was accosted by a manufacturer certain that his product was just what radio audiences wanted to know about. 'He wanted me to cover continuous stationery on the

radio,' marvelled the reporter.

Also at the show, a manufacturer of Psion Organiser products had investigated the possibility of using the pocket computer in hostile environments. 'We discovered that the best protective cover was a condom,' he chortled.

Hold the back page!



In a move which could rival its much-publicised Marks & Spencer deal, Organiser manufacturer Psion is set to come to the rescue of the International Nativist Association (INA).

Falling attendance at some of its camps has prompted the INA to follow Butlins 'up market' and make a play for the Yuppie visitor. However, market research has revealed that there were two issues which were deterring yuppies from casting off the last of their lower-class inhibitions along with their clothes: where to carry their abundance of money; and how to cope without their Filofaxes or 100% compatible personal organisers.

To the rescue has come Psion in conjunction with London-based computer system house, Transform. A specially-designed Organiser programming centre at each INA camp will use an OCR/scanner to copy all of a new visitor's names, addresses and favourite wine bar phone numbers from his or her Filofax-compatible into an Organiser EPROM cartridge. At the same time, a credit balance for the duration of the holiday — with a value determined by a cash advance paid over to the INA operator — will also be stored in the cartridge.

The visitor is then kitted out

with what becomes the barest of essentials — a pre-programmed Organiser and a special carrying holster.

When a visitor wants to make a purchase at the camp, the Organiser is plugged into a POS terminal and, after keying in a security password, a debit is registered in the EPROM. Anyone running out of credit is allowed access to their credit cards to build up further electronic funds.

The Organiser's EPROM can also be used by the visitor during their stay to store new phone numbers and other incidental details, and these will be provided in suitably-punched hard-copy form at the end of the stay.

Psion's chief evangelist and managing director, David Potter (who, we are reliably informed, takes all his clothes off at least once a day), has welcomed any opportunities, however barefaced, to further the spread of Organisers. 'It's about time that this most primitive of leisure pursuits — taking one's clothes off — was dragged into the electronic age.'

It is thought that the Psion/Transform product combination will further appeal to those stockbrokers who lost their shirts in the recent stock market tumble.

Psion is on (01) 723 9408. Transform is on (01) 658 6350.

Harvester's next product will be called 'The French Letter Organiser'.

Epson's current advertising campaign trots out the old 'yesterday's computer vs today's computer' line with today's computer being one of the company's new PCs. The old computer — why an Epson QX16?

To judge by the pile of press releases, you'd think that members of the Royal Family had never used electronic mail before. (We can think of at least one Duke with a Prestel mailbox of his own.) The Princess Royal used Mirror II on a PC to despatch a car to Uganda for the Save the Children Fund. Perhaps she was beta-testing it for Alan Sugar's new PC portable.

You may have seen the Victor laptop at the PC User show in June. Apparently, the empty box in a case was only there because the show's catalogue compilers turned Victor's vague possibility of a launch into a front-page certainty. Victor felt obliged to save face and show at least something. The laptop has yet to arrive, even though our expectations were raised by a press release headed 'Victor Micronic launches new handheld computer'. Calm down — it's just a data capture unit.

IBM has proudly announced that the recent stock market crisis would have been much worse had it not been for computers — particularly its own. There are two sides to this story.

Most analysts are convinced that the crisis was made worse because computers based in the New York Stock Exchange are allowed to buy and sell without human intervention. While human operators might not be panicked into selling by

further non-action on the US economy by President Reagan, the computers believed every word he said.

Secondly, IBM itself bought \$1 billion worth of its own shares and prompted something of a recovery. So that's what they mean about computer companies helping the stock market.

The story about original versions of Lotus 1-2-3 being incapable of handling a '£' sign has a successor. A recent order by a dealer to UK-based but US-owned software distributor Softsel came complete with its internal-use-only 'Internal Order Schedule'. Apart from the fact that the dealer's name and address were spelled incorrectly, he noticed that all the prices — UK ones, that is — were preceded by a '\$'. Either Softsel hasn't been able to convert its US software, or the warehouse is being run on a very early version of 1-2-3.

The wickedest toy of all to have at a computer show must be Eaton's electrostatic discharge simulator. Designed to test the static-immunity of computers, it weighs a mere 29ozs and is 10ins x 3½ins x 3½ins in size. With this device, it is possible to apply up to one million volts up the ports of an unsuspecting micro — more than enough to make sure that it never works again. To deter those of a less responsible nature from buying it, the price is a very sensible £2500.

Finally, the question you've all been asking. What has generated more post and phone calls to the PCW office than practically any other news item for months? Where to get a six-hole punch (PCW, 'Chipchat', October). Perforex is on (061) 223 7971 and the price is around £14.

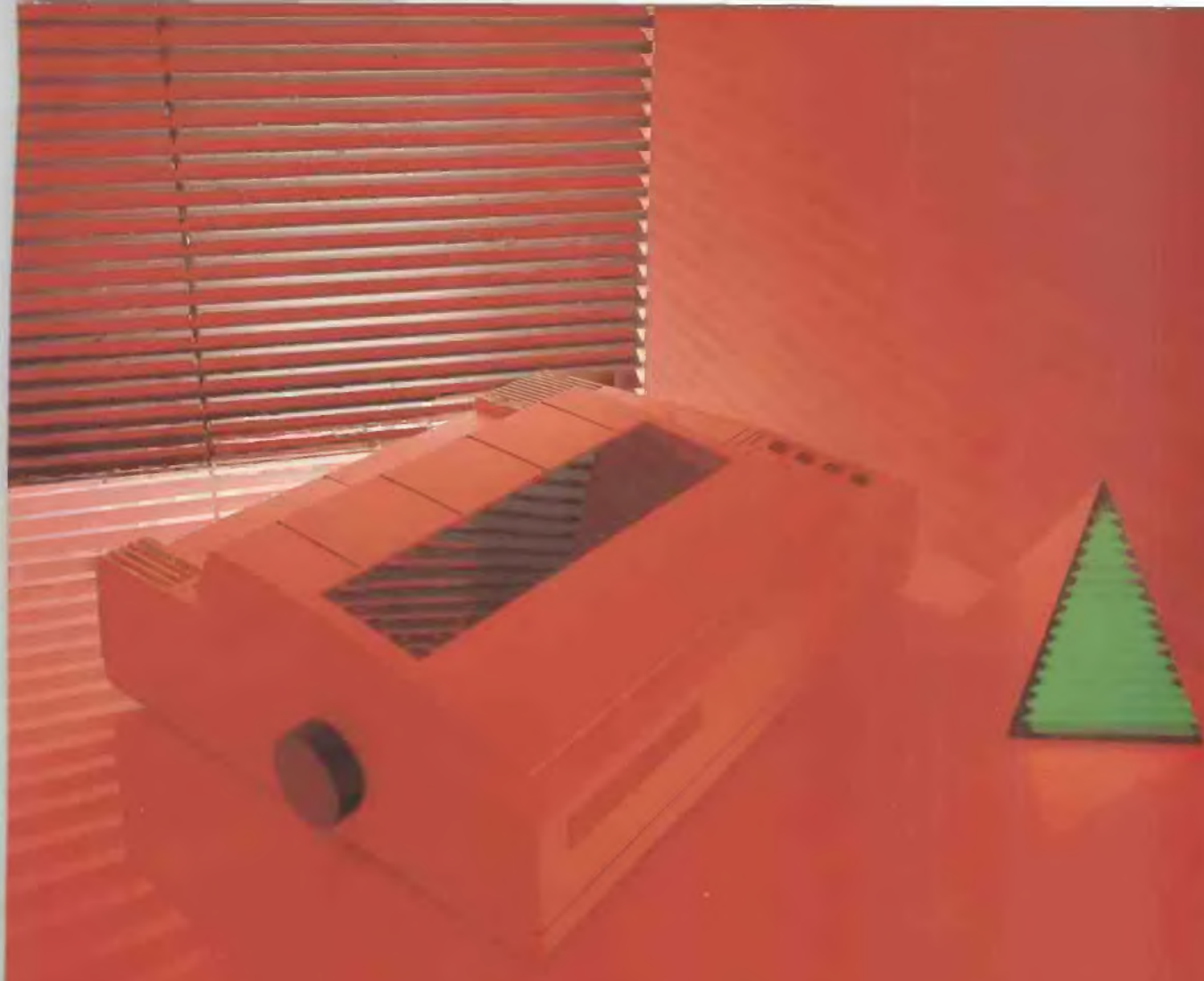
This month

We all take pull-down menus, mice, icons and windows for granted these days, but ten years ago they were just research tools inside Xerox PARC. We're very pleased to be able to bring you an exclusive interview with the man who was one of the 'fathers' of modern computer interfaces — Alan Kay. Using Smalltalk, he designed what was to become the present-day Apple Macintosh. What's more intriguing is that his present project is working with children designing an electronic zoo. Read the interview on page 128 and discover what relevance these

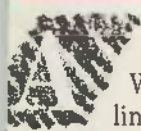


developments have to the future of personal computing.

Also this issue sees the first in our Teach Yourself Smalltalk series. There's a special offer where you can get a full, working version of Smalltalk for only £5.



Accountability.



ccountability] sic. responsible, liable.

With a print speed of 480cps or rather 360 lines per minute the MP480 has a great accountability, ideal for invoice runs, statements, reports and much, much more. When you want fast throughput at an economical price you can't get better value for money. Furthermore, there is a whole family of Micro P matrix and daisywheel printers each tailored for individual needs, whether for home, business or educational use. This accounts for the fact that in a recent industry survey of matrix printers, the MP range

Whatever the Words - We've Got the Abilities.

was voted as some of the best buys - another example of MP printers accountability.

For a copy of the best buys report and print samples contact:-

Exclusive Distributor:

**Micro
Peripherals Ltd**

Intec 2, Wade Road, Basingstoke,
Hampshire RG24 0NE.
Tel: 0256 473232 (32 Lines).

&

Micro P

Unit 5/6, Newhallhey Road, Rawtenstall,
Rossendale, Lancashire BB4 6HL.
Tel: 0706 217799 (16 Lines).

MP480 (Pictured above).
Speed: 480cps draft, 74cps NLQ. Columns: 80. Compatibility: IBM/Epson. Price: £369.



MP135

A low cost, high performance printer using the latest technology to produce print that makes draft quality look like NLQ. Speed: 135cps draft, 27 NLQ. Columns: 80. Compatibility: IBM/Epson. Price: £169.



MP165

This proven best selling NLQ printer offers the user the very best in low cost matrix printing. Speed: 160cps draft, 35cps NLQ. Columns: 80. Compatibility: IBM/Epson. Price: £229.



MP201

This 136 column, 200cps. NLQ printer offers the best value in the market place - you can't buy better. A range of font cards are available. Speed: 200cps draft, 40cps NLQ. Columns: 136. Compatibility: IBM/Epson. Price: £349.



MP26

A feature rich very quiet (57dB) printer. Universal compatibility with almost all personal computers at an unbeatable price. Speed: 26cps. Columns: 132. Compatibility: Diablo 630 Interface: Parallel + serial. Price: £259.



MP40

A very fast, quiet printer packed with features, compatible with virtually all computers and at a fantastic price. Speed: 40cps. Columns: 132. Compatibility: Diablo 630 Interface: Parallel + serial. Price: £379.



Why waste time with BASIC, PASCAL or C when you can develop faster programs more quickly with PCL...

PCL is a major fourth generation high level language, implemented as the fastest interpreter on earth. It is specifically designed for the IBM PC/XT/AT and compatibles.

PCL gets the maximum performance out of its hardware. It combines the flexibility of an interpreter with an execution speed that puts most compilers to shame.

PCL is a well structured procedural language along the lines of C or Pascal but without the restrictions and idiosyncrasies of either. It is easier to learn yet offers considerably more features than both.

PCL has over 330 built-in functions, providing high level support for:

- ★ sophisticated windowing and menu building commands. Extremely fast screen displays
- ★ extended text-manipulation and scientific function set
- ★ array arithmetic
- ★ character and numeric sorting
- ★ powerful file I/O, directory and disk management
- ★ dynamic record structures
- ★ DOS command interface
- ★ RS232 communications up to 19200 Baud handled by built-in background tasks

...and much more.

Apart from its high level functions **PCL** also offers HEX and binary arithmetic and most standard assembler mnemonics. Arrays can make use of all DOS addressable memory. Decimal arithmetic to 16 digits. Automatic 8087/80287 support.

Any program can call on the **PCL** interpreter itself at run time and pass it one or more source lines for immediate execution. Useful for spread-sheets, data dictionaries etc.

Any application written in **PCL** can be made RAM-resident with a single command. It can then be invoked from any other application with just two key strokes. **PCL** can also be used as a RAM-resident full scientific calculator.

PCL sample program to display a sorted list of all files on the current disk directory:

```
CHAR DIRECTORY[300,45],X; INTEGER N
X=?DIR "*. *"; N=0
WHILE LEN X > 0 THEN DO
  N=N+1; DIRECTORY[N]=X; X=?DIR
ENDDO
DIM DIRECTORY,N; SORT DIRECTORY
? DIRECTORY
```

PCL is the ideal language for beginners and experts alike since it is easily learned and offers great programming power. **PCL** has a clear and simple syntax, without reserved words, and a block structure which encourages the writing of very readable programs. Extensive built-in debugging features help you to pinpoint errors, should your program ever go wrong.

You will find that program development is much quicker with **PCL** than with third generation languages where you have to waste time re-inventing the wheel.

PCL allows you to concentrate on making sophisticated and extremely fast programs in record time.

Benchmarks, comparing TURBO PASCAL 3.0 with **PCL 2.0**

Description	PASCAL	PCL	
Empty loop x 10000	.25	.04	525%
BYTE Magazine decimal arithmetic Benchmark:	31.88	14.82	115%
With 8087:	6.29	6.09	3%
Display 24 lines of 80 characters on standard colour display:	2.7	.15	1700%
Mono or EGA display:	2.45	.04	6025%
Format & display 100 decimal numbers:	1.51	.42	260%
With 8087:	1.35	.25	440%
Convert 1000 decimals to character strings:	3.89	3.17	23%
With 8087:	2.87	1.04	176%
Convert 1000 character strings to decimals:	8.18	2.43	237%
With 8087:	3.48	1.12	211%
Catenate two 10 byte strings x 1000:	58	.32	81%
String search x 1000	1.03	.28	268%
Sequential write, 1000x90 byte records	7.5	2.9	159%
Sequential read, 1000x90 byte records	7.4	2.5	196%

All timings are in seconds. They were taken on a standard IBM PC with PC DOS 3.1, a real-time clock and a 10MB hard disk.

Minimum system requirements: 256K RAM, mono or colour monitor, 1 disk drive, PC DOS or MS DOS version 2.1 or later.

PCL comes on a 5 1/4" diskette with a comprehensive manual including many programming examples. Not copy protected. 30 days money back guarantee.

Order **PCL 2.0** for £100 (including VAT and UK postage) from:

CALEND
P.O. BOX 94
TWICKENHAM TW2 6DD
Telephone: 01 894 7409