

HARDWARE

PARALLEL PRO-TESTS

Weigh the pros and cons of the Microframe and the IBM PC

SOFTWARE

ZX81 ON SCREEN

Pep up your Sinclair with hi-res on a tape

PERIPHERALS

SCORPIO RISING

Multiple storage on Apple II—end of the drive for Winchester?

PCN MICropaEDIA

GRAPHICS, PART 1

Pixel power for Spectrum, Atari and Oric in the first of this series



Full hands-on the heavyweight from Tycom. Pro-Test, page 41.

BBC, DRAGON & ATARI GAMES FROM QUICKSILVA

DRAGON MINED-OUT

On Screen Features: Tricky Mines, Damsels in distress, Mine detection indicator; 7 levels of minefield, Safe area, Progressive difficulty, Scoring, High score feature, Full instructions.

Controls: Up-Down-Left-Right.

Special Features: Bill the Worm, Bugs (mines with legs).

Action Replay.

Author: **Ian Andrew**

ATARI 400/800 MAGIC WINDOW

Define characters on 8x8 grid. Save to tape. Load from tape. Freely merges character sets into existing programs. Hex & Dec. O/Ps. Character manipulation: Mirror, rotate, invert, left, right, up, down, hold, wipe, cancel. Redefine whole character set. Also works in colour mode. Excellent examples supplied. 16K RAM or more.

Author: **M. Walker**

As part of the plan to expand their range to cover all the most popular personal computers QUICKSILVA are proud to introduce 3 new programs for the BBC Computer, plus a version of their popular "MINED-OUT" game for the Dragon and also a character generating program for the Atari 400/800 "MAGIC WINDOW".

BBC GAMES MUSIC PROCESSOR

Exploits your BBC music potential to its limits.

Features: Full push button operation, over 30 separate functions for recording, mixing, editing and sound effects etc. 4 channels, 5 octaves, 100,000 envelopes easily selected. Over 2000 note storage capacity. Ready made music files included.

Author: **Andy Williams**

PROTECTOR

Features: Pods, monsters who kill on contact, mine laying UFO's, monsters increase in size as game progresses, new pods every 1000 pts., hyperspace function. Full colour hi-res graphics, sound. Joystick control.

For the model B with 16K + Joystick.

Author: **Andy Green**

WIZARD

The lands most beautiful maidens are being sacrificed by an evil King. Can you be their saviour, fighting off hordes of evil demons armed only with your wand and magical powers. A most compulsive and original game with hi-res colour graphics and full sound.

Author: **A. R. Buckley**

For the model B with 32K

MAGIC WINDOW FOR THE ATARI 400/800 FROM QUICKSILVA



CHARACTER GENERATOR
WITH FULL JOYSTICK CONTROL

MINED-OUT FROM QUICKSILVA



Quicksilva Limited,
Palmerston Park House,
13, Palmerston Road,
Southampton SO1 1LL
Telephone: (0703) 201655

Please send order to
Quicksilva Limited,
Palmerston Park House,
13, Palmerston Road,
Southampton.

BBC GAMES
Music Processor £14.95
Protector £7.95
Wizard £6.95

DRAGON GAME
Mined-Out £5.95

ATARI 400/800
Magic Window £8.95

WARNING: These programs are sold according to QUICKSILVA Ltd's terms of trade and conditions of sale. Copies of which are available on request.



Please send me the games as ticked.
Total cheque/PO enclosed Cheques
payable to Quicksilva Supplied on Cassette

Name _____

Address _____

CHARACTER SET

Editorial

Editor
Cyndy Miles
Deputy editor
Geof Wheelwright
Production editor
Keith Parrish
Sub-editors
Peter Worlock
John Lettice
News editor
David Guest
News writers
Ralph Bancroft
Wendie Pearson
Software editor
Shirley Fawcett
Systems editor
Max Phillips
Hardware editor
Richard King
Peripherals editor
Ian Scales
Listings editor
Sandra Grandison
Editor's assistant
Harriet Arnold
Art director
Jim Dansie
Art editor
Jimmy Eegton
Art assistant
Dolores Fairman
Publishing manager
Fiona Collier
Publishing assistant
Jane Green

Advertising

Advertisement manager
Mark Eisen
Assistant advertisement manager
Nic Jones
Senior sales executive
Sue Hunter
Sales executives
Robert Stallibrass
Matthew Parrott
Bettina Williams
Simon Treasure
Ian Whorley
Sarah Barron
Production manager
Eva Wroblewska
Advertisement assistant
Jenny Dunne
Subscription enquiries
Simon Maggs
Subscription address
53 Frith Street
London W1A 2HG
01-439 4242
Editorial address
62 Oxford Street
London W1A 2HG
01-636 6890
Advertising address
62 Oxford Street
London W1A 2HG
01-323 3211

Published by
VNU Business Publications
Evelyn House
62 Oxford Street
London W1A 2HG
© VNU 1983. No material may be
reproduced in whole or in part
without written consent from the
copyright holders. Typeset by
Quickset, 184-186 Old Street,
London EC1. Printed by Chase
Web Offset, St Austell, Cornwall.
Distributed by Seymour Press, 334
Brixton Road, London SW9
01-733 4444.

PCN SPECIALS

PC DOS Dilemma 18

Deenagh Brook unravels the mysteries of IBM PC DOS.

Praxis run 21



David Jacques teams up a Praxis daisywheel with the BBC Micro running Wordwise.

Sharp operator 25

Chris Pointer highlights the little things that give the tiny PC-1251 great potential.

PCN PRO-TESTS

Software 28

Put your ZX81 into Hi-Res gear with this new graphics package.

Peripherals 34

Is the new Scorpio 8 disk system going to push Winchester into second place? Francis Monkman gives this Apple II add-on the full PCN Pro-test.

Hardware: Cover story 41

In parallel Pro-Tests find out how the new heavyweight from Tycom and the IBM PC perform.

REGULARS

Monitor 2

The IBM PC-compatible bandwagon gathers pace, page 2; Software advances and software protection, page 3; the shape of things to come from the US, page 4, and a new Star from Micropro, page 5; openings for software marketers on page 6... and events of the past week on seven pages of news.

Random Access 15

Your space... your letters. Write to PCN and take a chance on winning the £10 note!

Routine Inquiries 16

Don't worry — write. Put your problems on paper and send them to Max. He'll solve them in his regular question and answer columns.



Microwaves 32

£5 for a hot hint. Turn your bright ideas into hard cash.

Gameplay 51

Amazing mazes for the Spectrum and science fiction for the Apple II in four new games.



PCN ProgramCards 55

Complete your Wacky Racers program for the Oric, calculate your mortgage in the Sharp MZ80K and add a utility for the BBC Micro to your ProgramCard collection — plus a subroutine and sample program.

Clubnet 69

PCN's at-a-glance guide to micro clubs puts the contacts at your fingertips.

Readout 72

More from PCN's selection keeps you up to date with what's new on the bookstalls.

Databasics 73

Your buyer's guide to micros: latest prices, detailed specs. . .

Billboard 80

PCN's free ad service gives you the chance to buy and sell micro kit.

Datelines 88

Where to go; what to see; who to get in touch with in this coming events column.

Cover photography of Tycom
Microframe by Ian McKinnell

Any Advance on IBM?

A wave of IBM PC compatibles will flood into UK shops this summer.

The announcement of no fewer than six machines came last week claiming IBM compatibility at prices that will either make you laugh or cry.

Cheapest of the lot is the Advance 86a. It is a British-made micro costing a mere £399. For the money you will get a cassette-based machine with 128K random access memory, 16-colour graphics and an 84-key IBM-style keyboard.

A disk version of the machine, the 86b, will be available for £999. It will have twin 320K disks and MS/DOS as the operating system. The memory can be expanded up to a total of 768K.

Corona Data Systems will also be offering two models. The Corona PC and the Corona Portable PC were launched in the US last year at prices that undercut the IBM machine by about £900. At the time of going to press the UK prices were not available.

Top end of the price scale is the Hyperion from Gulfstream — this is the same system as the Ajile launched by Anderson Jacobson last week (*PCN April 15*). Built by Dynalogic, it costs £2,900-plus. A re-run of the

Sirius/Victor confrontation looks likely between Gulfstream and AJ.

It's based on the 8088 running MS/DOS with 256K RAM, two 320K 5¼in floppy disks and a built-in 7in amber screen. It's portable, having a tiny footprint, a canvas travelling bag and weighing in at

drive between 80K and 160K. A similar user interface extends into the Ajile's two bundled software packages, Multiplan and a text processor called In:scribe.

AJ hopes to support the machine in a similar manner to its terminals. The Ajile will be available for outright purchase

mitted Logic Arrays (ULAs) in the way Sinclair has done to reduce the number of components required. Neither micro comes with a built-in screen.

The machines make use of the 8086 chip, which runs marginally faster than the 8088 used in the IBM. They also have 16K of RAM committed to the video display, which offers resolutions up to 640 × 200 for graphics and 80 × 25 for text.

Interfaces on the 86a will be cassette port, light-pen, joystick and a centronics parallel port. In addition, the 86b will have a RS232C serial interface. It will also have four IBM-compatible expansion slots and what are described as two true 16-bit slots.

The company says that the micros will go into production in June or July.

Corona has yet to announce its UK distributors, and no date has been fixed for the launch of its machines.

Both micros feature 128K RAM, 640 × 325 graphics, a single 320K disk as standard and monochrome screen displays. Serial and parallel interfaces are provided, as are IBM compatible expansion slots. Memory can be expanded on the main board up to a total of 512K.



Corona's IBM-compatible portable — one of two micros awaited.

Oh-minus-three pounds on the Osborne scale. The system has high resolution graphics and a battery backed-up real-time clock as standard.

Dynalogic has made some modifications to allow MS/DOS to be driven from the function keys, complete with on-line help and support for a RAM

or on company lease.

Advance Products is a company new to microcomputers, which may raise questions about its ability to supply machines in volume. With the prices it is quoting there will certainly be great demand.

Advance has kept down its costs by making use of Uncom-

Cabel videos with knobs on

Cabel Electronic is hoping to put your micro properly in the picture.

Until now, Cabel's monitors have supported only RGB inputs, and their vertical hold and contrast controls could be altered only by taking them apart.

But the company plans to launch two new machines in May that will have recessed controls on the outside, and will be more versatile in operation.

The £200 basic model will still handle only RGB input, but the brightness, vertical hold and contrast will all be controlled from the outside. The £250 version will sport RGB and composite video input (PAL),

as well as a colour and volume control.

The new models mark the beginning of Cabel's monitor production in this country. Until recently, all the monitors were produced in Italy, making it difficult to control quality and modify the equipment. But with its change to production in Wrexham, Cabel hopes to overcome those problems.

Although Cabel's existing monitor controls were placed inside the case of the machine to prevent people from unintentionally spoiling the display, the new controls will provide the same function by being recessed so that accidental adjustments will be unlikely.

Warranty promise as loTech fails

loTech, maker of the Iona business PC, is in the hands of the Receiver. But it is continuing to trade and will honour its warranties.

David Greatham, managing director, said: 'We are continuing to trade while the re-

ceivers examine our prospects further. They are making arrangements to make sure warranties are met.'

He continued: 'It's early days (the Receiver was appointed on April 8) but everything will be sorted out over the next eight weeks. Basically, we ran out of working capital.'

The company sells its own twin disk drives, software and colour printers for use on the £2,600 Iona, which runs CP/M.

On the trail of EOS . . .

Electronic Office Services (EOS), reputedly the biggest grey importer of IBM PCs in the UK, can now be found at Bridge House, 233-234 Blackfriars Road, London SE1, telephone 01-928 3377. But there is currently some mystery about EOS — PCN found it impossible to contract the company over several weeks.

PCN spoke to various dealers

who have done business with EOS and found that they had had no contact with the firm for at least six weeks.

For all users of grey PCs, IBM UK is prepared to provide service as long as the parts of your machine are standard IBM. Work will be carried out on a time-and-materials basis, but if your components aren't standard, extra will be charged.

Amber set to honour its warranties

Don't tear up the warranty on your Amber 2400 printer yet — it could be valid after all.

On April 1 PCN reported that Amber Controls, the company which introduced the printer late last year, had gone into receivership on February 17, and that the on-year warranty on the machine might no longer be honoured.

Amber and its parent company — W Lethaby and Company — have been sold, but it looks as though the new owners will honour Amber's old warranties. Although Amber Controls no longer exists, Amber managing director Dave Rayner has stayed with the new Lethaby Numbering Systems Ltd.

And Mr Rayner said last month that if the company was sold and he was still in charge of the printer operation, he would make sure all warranties were honoured. Mr Rayner was unavailable for comment this week, but Lethaby officials confirmed that he still holds the reins on the Amber 2400 printer.

Any anxious Amber owners can get further details by contacting the company.

Verbatim plans floppy shop scheme

You may soon find it easy to buy floppy disks when and where you want them, and in flexible quantities, when a new disc retailing scheme gets under way.

Floppy disk maker Verbatim plans to move into high street electrical appliance shops in June. And if its pilot scheme succeeds you might be able to buy disks in the same way you now buy notepaper.

Verbatim has also unveiled its new floppy disk coating factory in Limerick, Ireland. This could bode well for the future availability of floppy disks.

Verbatim's 3½in floppy seems poised to make in impact with its portability and media durability, and Verbatim expects the hard-cased microfloppies to be made in Limerick within the next two years.

Structure is bonus in M-TEC package

You can now get a new, BBC-approved on CP/M systems, and the promise of structured programming is the bonus.

This new software package from M-TEC Software of Norwich is BBC Basic (Z80) for use on CP/M machines — it costs £95 plus VAT.

Unlike the popular M-Basic this version of BBC Basic is claimed to provide users with advanced features like long variable names, multi-line named functions and procedure which can have local variables. BBC Basic (Z80)

also offers parameter passing and an in-line assembler.

File-handling commands are included so that, in addition to serial and random files, fully indexed and linked files with variable length records can be created and manipulated.

This version is only for use on a Z80 CPU running CP/M, whereas Acorn's version of BBC Basic will run only on machines using the 6502 processor. In its move towards structured programming it follows other producers of Basic interpreters — a trend is de-

veloping.

Grundys 8200 and Superbrain are just two examples of machines that will take the package, and M-TEC is currently talking to Torch, which hopes to be running this version on its machine by August.

You can now get the package direct from M-TEC Computer Services, telephone 0603-870620, or Software Limited, telephone 01-387 8832. Free updates are available for a year on both the program and the documentation.



HEAVY-DUTY PRAXIS — The Olivetti-manufactured Praxis has been a popular word processing companion to the Osborne 1. It is a reasonably portable printer at a reasonably light-weight price. The latest in the Praxis range is the Praxis 41. Olivetti claims to have engineered a heavier duty cycle with no higher cost. Users can choose the interface (serial or parallel) and the printer/typewriter costs £495.

The Praxis can also be used as a stand-alone typewriter. It claims 100 printable characters, interchangeable daisywheels and 17 function keys. (The Practical Praxis, page 21.)

Epson deals launched

Epson has struck up a deal with two software houses, Peachtree and Pearl, to produce packages for the new QX10 micro.

The QX will cost £1,735 plus VAT and has the vital statistics of 192K RAM, 2×320K floppy disk drives, qwerty keyboard, monitor, three processors and CP/M as its operating system.

Steve Forster, an Epson dealer, said: 'The QX10 looks better value for money than its competitors — IBM PC and Sirius I. And Peachtree and Pearl were chosen to supply software because Epson is concerned that their dealers are able to get good support for the system.'

The QX10 together with its software packages will be available from May 1 from Epson's 125 dealers and distributors.

CRA software saver

By David Guest

A scheme based to protect you if your software supplier goes out of business is expected to be adopted by the Computer Retailers Association (CRA) this week.

The CRA plans to hold source code copies of business software, so that if your supplier goes under the originals will be available. You will still have to pay for maintenance when you need it, but the idea is that you won't be left with an unserviceable relic.

The scheme has been approved in principle by the CRA's committee, and should be passed at a meeting on April 18.

CRA chairman Colin Stanley admitted that it had drawback, but he said that it represented a step in the right direction.

'The problem will be getting the suppliers to agree,' says Mr Stanley. 'Our canvassing of opinion among them has only been informal so far, but I think there should be no objection in

principle as long as the source code is held by an independent body.'

The independent body is likely to be the CRA's solicitors. Other rules are to be built up around the execution of the plan — the essential condition is that the software supplier should have gone out of business.

The CRA itself includes such software houses as Pegasus and Tabs, and these companies will be among the first subscribers to the plan.

VIEW FROM AMERICA



Micros in line for memory expansion

From Chris Rowley

Wanted — enormously improved virtual memory system. Must be as cheap or cheaper than today's floppy disk. Must offer several megabytes in a small and convenient package that will be used in an ordinary human environment without the risk of damage and loss of data.

You might be forgiven for thinking this an unreasonable demand, except that there seems to be an avalanche of new hardware for virtual memory storage falling into place.

New micro chips like the Intel 80286 have appeared on the scene — and they can support a full gigabyte of virtual memory. New 16 and 32-bit microcomputers that will appear in the next few years will put the processing power of a mainframe computer into a micro.

And within 18 months to two years, such marvels as the Drexon Lasercard will appear. Two megabytes of ROM on a playing card area will be available for \$10 or less!

By 1985, Toshiba plans to put out a micro floppy disk employing the new perpendicular magnetic recording technique, which will offer 50 megabytes or more of RAM for about \$50 more than today's 400K floppy disk.

Before these perpendicular magnetic recorded disks become available, of course, the three inch micro floppy will have reached the market in great numbers. However, the first generation of micro floppies will be linear magnetic recordings, and despite improvements over the current 5 $\frac{1}{4}$ inch disk, they will hold at most 0.5 megabytes per side.

Similarly, there will be lower-priced Winchester hard disk systems appearing. But there are many who doubt the value of a hard disk system outside of the business environment, where smoke, pet hairs, even dandruff, can be kept to a minimum along with temperature changes, humidity and all the rest of the serious threats to hard disk systems.

What is becoming clear, though, is that enormous improvements in virtual memory are becoming essential for the complex new software now coming of age in such forms as the Apple Lisa operating system, and the Vision multiple application software promised by Visicorp for release this summer.

These new systems — while wonderful to contemplate — need a great deal of memory. Even with 256K RAM, it won't be possible to run Vision with more than a desk top management system and one applications program; hence the need for cheap new forms of virtual memory that can be quickly accessed by microcomputers.

Which is why there are so many Japanese companies working hard on perfecting perpendicular magnetic recording. This will end the old problem of squeezing thousands of tiny magnets in linear arrangement onto a disk, each magnet representing a single bit of information. The problem of magnets demagnetising themselves puts an absolute limit on the memory storage potential of the linear method.

But with perpendicular magnetic recording, the tiny magnets are created in a forest of crystals standing out of the disk surface. They can be squeezed together much more tightly, and thus achieve five to 10 times as much memory storage capacity.

Even better, the new PMR floppy disks will be only 50% or more expensive than the current types, thus continuing the trend towards cheaper memory per byte.

However, while PMR offers a tremendous improvement in read and write memory capacity, the advances in laser disks and cards are opening up new vistas for software creators. Drexler Corporation's laser cards are now starting to enter the US market and they promise a dramatic lowering of software costs.

Sirius gets 512K



Gerry O'Prey — expanding business

To boost the capacity of your Sirius, Intelligence Research has produced a RAM board capable of storing 512K.

According to Sirius' UK distributor ACT, the largest add-on available until now for the Sirius was its own 384K board. 'We've managed to squeeze on 512K,' said Gerry O'Prey, managing director of Intelligence Research. 'And with it we provide free software to allow it to appear to the system as a pseudo-disk.'

Volume quantities of the board should be coming off the production lines in a week's time. It will be sold through dealers, and the one-off price to a dealer is £190.

Intelligence Research already sells a 256K board for

the Sirius, but the new product gives it a range to offer. The minimum configuration is 128K, and plug-in extra chips build it up to 512K.

The company recently introduced boards for the IBM PC and Apple systems. For the IBM PC it has a 64K board upgradable to 512K and a multifunction board with a communications adaptor, a parallel printer port, clock/calendar, software for a pseudo disk, and a printer buffer.

In the Apple line it produces RAM boards up to 256K for the Apple II, and screen conversion boards for the IIe.

Intelligence Research is an offshoot of Intelligence UK, which produced the modelling software Micromodeller.

Xerox copies Apple on US Easter price cuts

Hot on the heels of Apple, Xerox became the second PC computer giant to cut its US prices the week after Easter.

Its Model 820 dropped 26% from \$2,445 to \$1,795, while the Apple III's price for the 256K model fell from \$3,495 to \$2,695. The 128K Apple III dropped from \$2,995 to \$2,495, and Apple announced that it would be discontinuing this version.

An Apple spokeswoman

said: 'We are not in a position to comment on why prices have been cut and we cannot say whether our UK prices will follow suit.'

On the subject of possible UK price cuts, a Xerox spokesman said: 'Prices aren't being cut here on any of our models and as far as I know there are no plans to do so.'

A US price war need not affect the UK, as earlier sparring has shown.

Database on Televideo

A database management system for Televideo users is now available from software firm Midlactron.

It has just launched a new DBMS for the Televideo range. Called TeleDBMS, it is basically the CP/M system, Optimum,

adapted to work with Televideo's single user and networking systems. It costs £529.

TeleDBMS lets you create your own menus, data entry and display forms, output formats and customised reports.

It also takes advantage of Televideo's hardware features, with the result that many commands require only one keystroke.

A new Star in the firmament

Micropro has added a new database manager to its range of CP/M software packages.

The new Star that joins Micropro's constellation is called Infostar — there is still no sign of StarStar. Micropro describes it as a file processor and business report generator.

Infostar combines the features of two other Micropro products, Datastar and ReportStar for the price of £300.

Micropro says that experienced users will get the most out of Infostar, but adds that non-programmers can use it through an on-screen menu and a simple forms production routine.

According to Micropro the package also includes a selection of report qualities, a sort that can handle 560 records a minute, and hooks into other Micropro products such as WordStar.

Encotel's EDS for business



EDS System 2000 from Monte Carlo.

New business computers have reached the UK from Monte Carlo.

The EDS range of machines runs the souped-up CP/M-compatible TurboDOS operating system.

The EDS 1016 and 1516 dual processor models can run both 8 and 16-bit software, and disk storage ranges from 720K on floppy to 10Mb on a Winchester.

The 1516 costs around £2,716 plus VAT, while the 1016 is about £3,521 plus VAT.

The 1850 model has 50Mb of disk storage, uses a Z80A and an optional Intel 80186 processor chip — claimed to be twice the speed of the 8086. This model is available as an 8-bit system or in a 16-bit dual processor version and costs about £6,000.

All three can be networked together, so the range provides stand alone and multi-user capacity, and runs CP/M programs on TurboDOS.

Encotel Systems of Croydon is sole EDS distributor.

17,000 rush to Micronet

As Micronet becomes available to more machines the system's organisers have found themselves inundated with applications to join.

Since its launch (PCN, March 18) Micronet has received 17,000 applications to join and it is still catching up on a backlog of 2,000 BBC users, as well as processing applications from owners of other micros now eligible to join.

From the beginning of April users of the Commodore Pet, TRS 80 and RML micros have been able to hook up to Micronet

and download 100 free programs, providing, of course, they have the terminal hardware and software.

Prices vary according to the machine you own. TRS80 Model I and II owners can join for £60.95 and RML380Z users for £63.40. The price for Commodore Pet owners varies from £81.65 to £93.15, depending on the model.

It costs more for the Commodore Pet because Micronet has had to develop a special interface that includes a graphics chip and a serial port.

PCN Charts

PCN Charts follows the rise and fall of the UK's best-selling micros. This fortnightly top-of-the-shops list tells you what's selling best over the counter; it does not take account of mail order and does not count deposit-only orders. This week's figures show the number of machines sold in the two-weeks period ending two weeks before publication date (in this case April 15), so these charts tell the story in high streets between March 18 and April 1.

Machine prices quoted are for the no-frills models and include VAT. Information for the PCN Charts is culled from retailers and dealers throughout the country and compiled by MRIB, London. They will be updated every alternate week... so watch for the arrows to follow the ups and downs of the best-sellers.

Top Twenty up to £1,000

	MODEL	PRICE	DISTRIBUTOR
▲ 1 (3)	Sinclair Spectrum	£125	(SI)
▶ 2 (2)	Sinclair ZX81	£50	(SI)
▼ 3 (1)	BBC Model B	£399	(AC)
▲ 4 (7)	Dragon 32	£200	(DR)
▲ 5 (6)	Commodore Vic-20	£170	(CO)
▲ 6 (9)	Oric 1	£100	(OR)
▲ 7 (17)	Lynx 48	£225	(CA)
▼ 8 (4)	Atari 400	£160	(AT)
▲ 9 (14)	Sharp PC 1500	£170	(SH)
▲ 10 (11)	Commodore 64	£345	(CO)
▲ 11 (10)	Atari 800	£400	(AT)
▲ 12 (15)	Texas TI99	£150	(TE)
▼ 13 (5)	Newbrain A	£228	(GR)
▼ 14 (12)	Acorn Atom	£174	(AC)
▼ 15 (—)	Sharp PC 1251	£80	(SH)
▼ 16 (8)	Jupiter Ace	£90	(JU)
▼ 17 (13)	Apple II	£776	(AP)
▶ 18 (18)	Colour Genie	£224	(LO)
▼ 19 (16)	Epson HX20	£472	(EP)
▼ 20 (19)	Tandy TRS (C/C)	£240	(TA)

Top Ten over £1,000

▶ 1 (1)	Sirius 1	£2,754	(SI)
▶ 2 (2)	Osborne 1	£1,581	(OS)
▶ 3 (3)	Olivetti M20	£2,754	(OL)
▲ 4 (6)	Commodore 8032	£1,029	(CO)
▼ 5 (4)	HP 86A	£1,541	(HP)
6 (—)	IBM PC	£2,392	(KG)
▶ 7 (7)	Sanyo MBC 1000	£1,195	(SA)
▶ 8 (8)	Micro-Mimi 803	£1,720	(BM)
▼ 9 (5)	Apple III	£2,780	(AP)
▶ 10 (10)	Xerox 820	£2,415	(RX)

AC Acorn Computers. ACT — ACT Sirius. AP — Apple Computers. AT — Atari International. BM — British Micro. CA — Computers. CO — Commodore. DR — Dragon Data. EP — Epson. GR — Grundy Business. HP — Hewlett-Packard. IC — Icarus Computers. KG — KGB Micros. LO — Lowe Electronics. MM — Micro Marketing. OL — Olivetti. OR — Oric. OS — Osborne Computers Corporation. RX — Rank Xerox. SA — Sanyo Marubeni. SH — Sharp. SI — Sinclair. TA — Tandy. TE — Texas Instruments.

Genie owners join the club

Users of the Lowe Colour Genie will be able to join kindred spirits in the newly formed National Colour Genie Users' Club from April 16.

For £10 a year you'll get a bi-monthly magazine, access to a software library, and free technical help.

Lowe Computers is financing the club initially but intends the group to become self-financing — and therefore independent — as it grows.

This will be Lowe's first experience of a user group formed nationally.

Get it taped

Companies are queuing up to provide facilities that could set you on the road to software stardom.

In the south of England Direct Media Facilities (DMF) has set up a new division to help software authors develop a marketable product. And in the north, Spool Duplication has geared itself up to turn out 25,000 tapes a month.

DMF has extended the set-up that handles the bulk of its work in audio, audiovisual and video production to include cassette copying and the design of inlay cards.

'We'll deal with anyone who

gives us a call,' said DMF production control manager Mark Andrews. He explained that the service would consist of providing graphics design and cassette duplication for authors with a piece of software to sell.

Marketing manager Mike Phinn described it as a natural development for the company, and added that the service should leave programmers with more time to concentrate on programming.

To forestall any legal problems, DMF will ask anybody using the service to sign a statement accepting responsibility for the copies produced.

Spool Duplication's background is in digital computer cassette reproduction and audio work. Technical director Roy Varley said that its new service would aim for top quality tapes at a realistic price. 'We expect to be able to keep the price per thousand around 36p per tape,' he said.

Spool is aiming its service mainly at software houses, but DMF will accept individuals as well — its move was prompted by inquiries from individual programmers.

DMF is in Waterlooville, Hampshire on 07014 66337. Spool is on 0244 313778.

How to beat the burglars

One way of discouraging the burglars is to create the impression you are at home by switching lights and the TV on and off automatically.

Centec Electronic Systems has just brought out a little box that enables your micro to do this job for you.

The mains switching unit comes in three versions that can control one, two or four mains devices.

They cost £19.95, £29.95 and £49.95 respectively.

The unit needs its own 12 volt power supply, which Centec can provide for an additional £6.95. Centec is on Orpington 35353.

Micro cures?

Thousands of GLC workers will soon be able to diagnose their own ailments with the help of Medibank, a software package designed by Paul Membrey.

Mr Membrey, an architect with the GLC housing department at County Hall, says that Medibank is not a substitute for a doctor's diagnosis but a useful guide to a known symptom or symptoms.

He said: 'Through simple yes or no answers a preliminary diagnosis can be made quickly. For example if you have a sore throat, you call up the symptom on the appropriate page, and you are then asked a series of questions.

'For instance is your temperature 38°C or above? Do you have swellings or tenderness in your neck? Do you have a stuffy or runny nose? Or have you been sneezing? If your answer to all these questions is no, except the last one, you have a

cold. In all, 99 symptoms are listed.'

It took Mr Membrey six months to write the medical program on his BBC machine. And in total he has six disks with 325K of information.

Mr Membrey says that so far the response from the appropriate heads in the GLC has been good. And within two weeks he hopes to have Medibank installed on the GLC's mainframe computer.

With 500 terminals linked to the mainframe and the possibility of 23,000 employees being able to diagnose their illness, it could save a lot of trips to the doctor.

Mr Membrey says that medical people working in the GLC have also shown an interest in his package. He said: 'They will be looking at it with the possibility of expanding it for their own use. But there's no intention of storing data.'

Grappler interface for Apple

Apple users will soon be able to grapple with a device billed as 'The most intelligent Apple interface'.

It's the latest in the Grappler range from Orange Micro and it includes an expandable printer memory.

The Buffered Grappler is compatible with the Apple II,

II+, IIe and III computers and its standard 16K buffer is upgradable to 32K or 64K by the addition of memory chips.

The interface itself is claimed to be compatible with most popular dot-matrix printers including Epson, Okidata and Anadex and is configured by a simple dip switch setting. The device is due to come on the market here in May, and will cost around £160 depending on the exchange rate. It will be available from Pete and Pam Computers, telephone 0706 227011.



The Merlin is intended for the more hostile environment.

Merlin micro is dustproof

For those of you who need a micro that can take a few knocks, Xcalibur Computers has launched the Merlin.

The Merlin is cased in a chemical resistant foam material and weighs 25lbs. Its vital statistics are 445 x 470 x 130mm.

With an Apple II+ motherboard inside it, it comes with a 5in black and white monitor and a fold-away qwerty keyboard, priced £1,075 plus VAT. The same configuration with an Apple IIe motherboard costs £1,245 plus VAT.

Other options which can be fitted include a single disk drive, Eprom system or bubble memory. You can also buy the Merlin box on its own for £150.

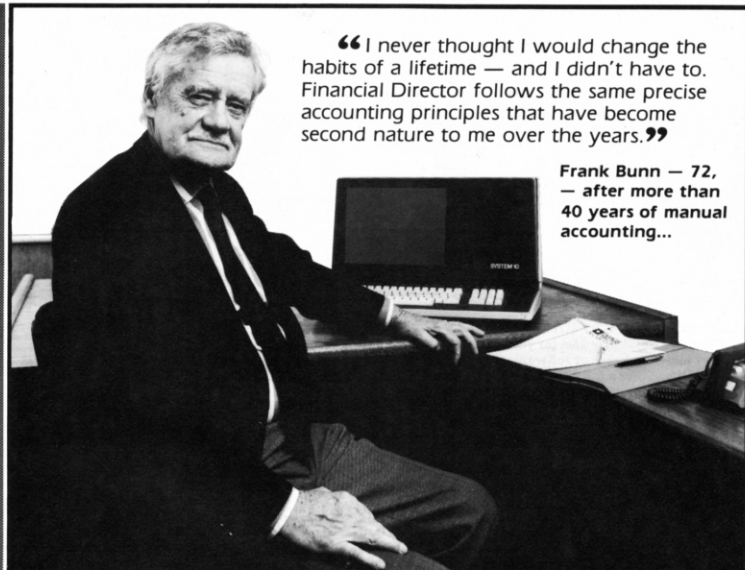
Xcalibur Computers sees its micro being used in hospitals,

laboratories and industrial areas — where computers are not normally used because of a harsh environment or lack of room.

Jeff Barringer, managing director of Xcalibur, said: 'Basically it's for the laboratory or industrial manager who uses an Apple in his office, but would like to put it out in the industrial environment for control purposes.'

The Merlin has been designed to be compatible with a variety of microcomputer motherboards, and Xcalibur will consider requests to meet specific requirements.

The Merlin computer will be available at the end of April from Xcalibur Computers, telephone Northampton (0604) 21051.



“I never thought I would change the habits of a lifetime — and I didn't have to. Financial Director follows the same precise accounting principles that have become second nature to me over the years.”

Frank Bunn — 72,
— after more than
40 years of manual
accounting...

More and more people are finding FINANCIAL DIRECTOR is Right for their Business

Financial Director is a complete business book-keeping and accounting software package for small and medium-sized businesses and proven in two years' field testing.

Financial Director has been designed by professional Accountants and conforms exactly to British Accounting principles with essential items such as automatic double entry and a complete audit trail which are fundamental to successful computer accounting.

Financial Director has been described as the 'accountant in a briefcase' — partly due to its unique presentation, partly because it provides the financial control skills of the professional accountant and enables the businessman to keep totally up-to-date with the progress of his business.

Financial Director works on most business micro's and is available from good computer dealers all over the country.

We recommend that you consult your accountant and implement your computer accounting system with professional assistance.

For full information and details of our training schemes and dealer network — call today.



**THE
FINANCIAL
DIRECTOR
SOFTWARE
LIMITED**

Asphalte House,
Palace Street,
London SW1E 5HS
Tel: 01-828 4377. Telex: 913001.



GREAT NEW SOFTWARE DEAL

GREAT NEW BUY 'N TRY SOFTWARE DEAL

There's a great new deal for your software shopping. We call it buy 'n try. And it's as simple as that!

Buy any item from our software range and use it as long as you wish. Whenever you want a new program we'll buy it back for a full 80% of the price you paid against your next purchase of equivalent or greater catalogue value any time within 1 month of purchase.

So you can always keep up to date with the latest software and games releases, without burning a hole in your pocket.

How it works

Example: Buy a game for £10 enjoy it to the full, and return it when you're ready to order something else. We'll buy it back for £8, so if you want another £10 game, simply send us the difference (£2). There's just one simple rule we can only agree to buy back software that's in working order.

* You get the enjoyment of £20 worth of software for just £12. * It gets even better the more often you change!

Look at our super selection and complete the order form to take advantage of the hottest software deal ever, or telephone your order to **Software Centre on 01-487-5974**, quoting your Access/Barclaycard number (24-hour telephone service).

B.B.C. MICRO

	Mem Req'd	Supplier	Code No	Price
Space Pirates	16K	Bug Byte	028001	£8.00
Space Warp	32K	Bug Byte	028002	£9.00
Golf	32K	Bug Byte	028007	£5.50
Dragon Quest 1	16K	Bug Byte	028004	£11.50
Fruit Machine	B	Bug Byte	038006	£5.50
B.B.C. Airlift	B	Bug Byte	028007	£5.50
Polars	32K	Bug Byte	028008	£5.50
B.B.C. Chess	32K	Bug Byte	028009	£5.50
B.B.C. Backgammon	A/B	Bug Byte	028010	£15.00
B.B.C. Multitile	16K	Bug Byte	028011	£5.50
B.B.C. Micro Derby	A/B	Bug Byte	028012	£5.50
Star Maze	32K	Database	158024	£7.50
Beeb-Chase	32K	Database	158025	£7.50
Cookbook Wizardry		Database	158026	£7.50
Hydraulics 14yrs		Database	158027	£5.50
Electric 14yrs		Database	158028	£5.50
Swoop B/A	32K	Micropower	248029	£6.95
Alien Destroyers	32K	Micropower	248030	£6.95
Galactic Commander	32K	Micropower	248031	£6.95
Time Trek	32K	Micropower	248032	£6.95
Laser Command B/A	32K	Micropower	248033	£6.95
Astro Navigator B/A	32K	Micropower	248034	£4.95
Chess B/A	32K	Micropower	248035	£6.95
Footer B/A	32K	Micropower	248036	£6.95
Adventure		Micropower	248037	£6.95
Cowboy Shootout	32K	Micropower	248038	£5.95
Munchyman		Micropower	248039	£5.95
Seek		Micropower	248040	£5.95
Eldorado Gold B/A	32K	Micropower	248041	£5.95
Roulette B/A	32K	Micropower	248042	£4.95
Reversi 2 B/A	32K	Micropower	248043	£4.95
Filer		Micropower	248044	£8.95
Micro Budget		Micropower	248045	£6.95
Constellation 3/A	32K	Micropower	248046	£5.95
Disassembler		Micropower	248047	£5.95
World Geography	32K	Micropower	248048	£5.95
Where B/A	32K	Micropower	248049	£5.95
Junior Maths Pack	32K	Micropower	248050	£5.95
Star Trek/Candyfloss	A or B	I.J.K. Software	338001	£5.50
6 Games	A or B	I.J.K. Software	338002	£4.50
Mutant Inv/Breakout	A or B	I.J.K. Software	338003	£6.50
Beeb Beeb B or A	32K	I.J.K. Software	338004	£4.50
Beebmunch B or A	32K	I.J.K. Software	338005	£6.50

B.B.C. MICRO cont.

	Mem Req'd	Supplier	Code No	Price
Super Hangman B or A	32K	I.J.K. Software	338006	£4.50
3D Maze B or A	32K	I.J.K. Software	338007	£4.50
Invaders A		I.J.K. Software	338008	£5.50
Invaders B or A	32K	I.J.K. Software	338009	£7.50
Wordpro B or A	32K	I.J.K. Software	338010	£10.50
Atlantis/Scramble	32K	I.J.K. Software	338011	£7.50
Flags	32K	I.J.K. Software	338012	£4.50
Hyperdrive	32K	I.J.K. Software	338013	£6.50
Strato Bomber	32K	I.J.K. Software	338014	£7.50
Creative Graphics	A/B	Accomsoft	538051	£8.65
Arcadians	B	Accomsoft	538052	£8.65
Slicing Block Puzzles	B	Accomsoft	538053	£8.65
Snapper	B	Accomsoft	538054	£8.65
Cube Master	A/B	Accomsoft	538055	£8.65
Desk Diary	B	Accomsoft	538056	£8.65
Tree of Knowledge	B	Accomsoft	538057	£8.65
Liso	A/B	Accomsoft	538058	£14.65

COMMODORE 64

	Mem Req'd	Supplier	Code No	Price
Monopoly 64		Rabbit	13K002	£9.99
Grave Robbers		Rabbit	13K003	£9.99
Sprite Editor/Graphic Generator		Rabbit	13K004	£9.99
Adventure Pack 1		Rabbit	13K005	£9.99
Attack of Mutant Camels		Llamosoft	52K006	£8.50
Rox 64		Llamosoft	52K007	£4.95
Gridrunner		Llamosoft	52K008	£8.50

DRAGON 32

	Mem Req'd	Supplier	Code No	Price
Ghost Attack (cart)		Dragon Data	17C007	£24.95
Cave Hunter (cart)		Dragon Data	17C008	£19.95
Starship Chameleon (cart)		Dragon Data	17C009	£19.95
Chess (cart)		Dragon Data	17C011	£19.95
Dragon Selection One		Dragon Data	17C012	£7.95
Dragon Selection Two		Dragon Data	17C013	£7.95

COPYRIGHT WARNING: IT IS ILLEGAL TO REPRODUCE THE ABOVE SOFTWARE

DRAGON 32 cont.

Mem Req'd	Supplier	Code No	Price
Personal Finance	Dragon Data	170016	£7.95
Graphic Animator	Dragon Data	170017	£7.95
Computa Voice	Dragon Data	170018	£7.95
Typing Tutor	Dragon Data	170022	£7.95
Acadraz	Microdeal	21C028	£8.00
Defence	Microdeal	21C029	£8.00
Dragon Invaders	Microdeal	21C030	£8.00
Escape	Microdeal	21C031	£8.00
Manson Adventure	Microdeal	21C032	£8.00
Jerusalem Adventure	Microdeal	21C033	£8.00
Williamsburg Adventure	Microdeal	21C034	£8.00
Ultimate Adventure	Microdeal	21C035	£8.00
Phantom Slayer	Microdeal	21C036	£8.00
Planet Invasion	Microdeal	21C037	£8.00
4 Games Pack 1	Microdeal	21C038	£8.00
4 Games Pack 2	Microdeal	21C039	£8.00
4 Games Pack 3	Microdeal	21C040	£8.00
Racer Ball	Microdeal	21C041	£8.00
Scarfman	Microdeal	21C042	£8.00
Space Monopoly	Microdeal	21C043	£8.00
Space War	Microdeal	21C044	£8.00
Storm	Microdeal	21C045	£8.00
Invaders Revenge	Microdeal	21C046	£8.00
Flipper	Microdeal	21C048	£8.00
Donkey King	Microdeal	21C047	£8.00
Katzenberg Attack	Microdeal	21C049	£8.00
Strategic Command	Romik	10C050	£9.99

BUY 'N TRY ... THE SURE WAY TO GET THE BEST FROM YOUR COMPUTER

Software Centre's great Buy 'N Try deal stops costly mistakes by making sure you only keep what you really want. It simply makes more sense to buy 'n try.



SINCLAIR SPECTRUM

Planet of Death	48K	Artic	25D001	£8.95
Inc. Game	48K	Artic	25D002	£8.95
Ship of Doom	48K	Artic	25D003	£8.95
Espionage Island	48K	Artic	25D004	£8.95
Reversi/Othello		Mo	26D005	£7.95
Club Record Contr	48K	ICL	27D006	£9.95
Collectors Pack	48K	ICL	27D007	£9.95
G1: Games 1		ICL	27D008	£4.95
G2: Games 2		ICL	27D009	£4.95
G3: Games 3		ICL	27D010	£4.95
G4: Games 4		ICL	27D011	£4.95
G5: Games 5	48K	ICL	27D012	£4.95
Pastimes 1		ICL	27D013	£4.95
Pastimes 2		ICL	27D014	£4.95
Space Raiders		Pison	27D015	£4.95
Planetoids		Pison	27D016	£4.95
Hungry Horace		ICL	27D017	£5.95
Biohythms		ICL	27D018	£6.95
History 1		ICL	27D019	£6.95
Geography 1		ICL	27D020	£6.95
Inventions 1		ICL	27D021	£6.95
Music 1		ICL	27D022	£6.95
English Literature		ICL	27D023	£6.95
Chess	48K	Microgen	06D004	£7.95
Flight Simulation	48K	Pison	28D025	£7.95
VU-CALC		Pison	28D026	£7.95
VU-3D		Pison	28D027	£7.95
Arcade		Pison	28D028	£7.95
Scramble		Imagine	05D029	£5.50
Master Chess		Micro Gen	06D030	£5.50
Scoomers Castle		Micro Gen	06D031	£5.50
Cosmic Raiders		Micro Gen	06D032	£5.50
Krazy Kong		Cotech	07D034	£5.50
Astro Scramble		Cotech	07D035	£5.50
Arcaidy 1		Cotech	07D036	£5.50
Spectral Invaders		Bug Byte	02D037	£5.00
Spectres		Bug Byte	02D038	£5.00
Aspect Editor/Assemble		Bug Byte	02D039	£5.00
Ultra Violet 16/48K		Software Masters	08D040	£5.95
Nightlife 16/48K		Software Masters	08D041	£5.95
Turtle 2 16/48K		Software Masters	08D043	£5.95
Ultra Violet 16/48K		Software Masters	08D044	£5.95
Obitler 16/48K		Software Masters	08D045	£5.95
Easy Speak	48K	Quicksilver	12D046	£4.95
Timegate	48K	Quicksilver	12D047	£4.95
The Chess Player	48K	Quicksilver	12D048	£4.95
Space Intruders	16K	Quicksilver	12D049	£4.95
Metecr Storm	16K	Quicksilver	12D050	£4.95
L-Game Basic	16K	Quicksilver	12D051	£4.95
Cookbook Wizardry	48K	Database	15D062	£7.50
Meteoroids		DK Tronics	09D063	£4.95

SINCLAIR SPECTRUM Mem Req'd

Supplier	Code No	Price
DK Tronics	09D064	£4.95
DK Tronics	09D065	£4.95
DK Tronics	09D066	£4.95
Micro Gen	06D067	£6.95
Micro Gen	06D068	£5.50
Micro Gen	06D069	£5.95
Silversoft	29D007	£5.95
Silversoft	29D002	£5.95
Silversoft	29D003	£5.95
Addictive	50D070	£5.95
2000D71	2000D71	£4.95
2000D72	2000D72	£4.95
2000D73	2000D73	£4.95
2000D74	2000D74	£4.95
2000D75	2000D75	£4.95
Imagine	05D076	£5.50
Imagine	05D077	£5.50

SOFTWARE CENTRE 24 HOUR HOT-LINE ORDER SERVICE 01-487-597

SINCLAIR ZX81

Space Invaders		Sinclair	20E001	£3.95
Breakout		Sinclair	20E002	£3.95
Bomber		Sinclair	20E003	£3.95
ZX Chess		Sinclair	20E004	£3.95
Scoomers' Castle		Sinclair	20E005	£3.95
1K ZX Chess		Sinclair	20E006	£2.95
Thro the wall/Scramble		Pison	20E007	£4.95
Super Gloopier/Frogs	16K	Pison	20E008	£4.95
1K English Lit. 1		Sinclair	20E009	£5.95
Planet of Death	16K	Artic	20E010	£5.95
Inca Curse	16K	Artic	20E011	£5.95
The Ship of Doom	16K	Sinclair	20E012	£5.95
Esperance Island	16K	Sinclair	20E013	£5.95
Toolkit	16K	Sinclair	20E014	£5.95
Reversi/Othello	16K	Mo	20E015	£6.95
Games 1		ICL	20E016	£3.95
Junior Education 2		ICL	20E017	£3.95
Business & Household 3		ICL	20E018	£3.95
Games 4		ICL	20E019	£3.95
Junior Education 5		ICL	20E120	£3.95
Family Quiz 6		ICL	20E121	£3.95
G12 Fantasy Games		Pison	20E122	£4.75
G13 Space Raiders		Pison	20E123	£4.75
G1 Super Program 1		ICL	20E124	£4.95
G2 Super Program 2		ICL	20E125	£4.95
G3 Super Program 3		ICL	20E126	£4.95
G4 Super Program 4		ICL	20E127	£4.95
G5 Super Program 5		ICL	20E128	£4.95
G6 Super Program 6		ICL	20E129	£4.95
G7 Super Program 7		ICL	20E130	£4.95
G8 Super Program 8		ICL	20E131	£4.95
G10 Backgammon		Pison	20E132	£5.95
G14 Flight Simulation		ICL	20E133	£5.95
E1 English Lit. 1		ICL	20E134	£5.95
E2 English Lit. 2		ICL	20E135	£5.95
E3 Geography		ICL	20E136	£6.95
E4 History		ICL	20E137	£6.95
ES Maths 1		ICL	20E138	£6.95
E6 Music 1		ICL	20E139	£6.95
7 Inventions 1		ICL	20E140	£6.95
EB Spelling 1		ICL	20E141	£6.95
G11 Chess		Pison	20E142	£6.95
GB Biohythms		Sinclair	20E143	£6.95
B3 VU-CALC		Sinclair	20E144	£7.95
B4 VU-FILE		Sinclair	20E145	£7.95
B1 Collectors		Sinclair	20E146	£9.95
B2 Club Records		Sinclair	20E147	£9.95
OS Scramble	16K	Quicksilver	12E148	£3.95
OS Invaders	16K	Quicksilver	12E149	£3.95
OS Asteroids	16K	Quicksilver	12E150	£3.95
OS Defenders	16K	Quicksilver	12E151	£3.95
OS Breakout	16K	Sinclair	20E152	£5.95
Computacalc	16K	Sinclair	20E153	£7.95
Constellation	16K	Sinclair	20E154	£8.95
Labyrinth	16K	Sinclair	20E155	£8.95
Magnus	16K	Sinclair	20E156	£9.95
Mazogs	16K	Sinclair	20E157	£10.00
Mugsy	16K	Sinclair	20E158	£5.95
Murgitrollys	16K	Sinclair	20E159	£5.95
Murgitrollys/Revenge	16K	Sinclair	20E160	£5.95
Nightmare Pix/Music	16K	Sinclair	20E161	£6.95
P.E.P.	16K	Sinclair	20E162	£5.95
Parli Banking System	16K	Sinclair	20E163	£9.95
Pict	16K	Sinclair	20E164	£5.95
Progmerge	16K	Sinclair	20E165	£5.95
Puckman	16K	Sinclair	20E166	£5.95
Space Intruders	16K	Sinclair	20E167	£5.95
Space Incheb	16K	Sinclair	20E168	£5.95
Star Trek 3D Cs/Xs	16K	Sinclair	20E169	£6.95
ZX81 Chess	16K	Sinclair	20E170	£6.95
Bumper 7	1K	Sinclair	20E171	£5.95
Games Pack	1K	Sinclair	20E172	£5.00
Super Tro	1K	Sinclair	20E173	£7.95
Ground Attack	16K	Sinclair	20E174	£5.95
Mazogs	16K	Bug Byte	20E175	£10.00
Invaders	16K	Bug Byte	20E176	£4.00
Adventure	16K	Bug Byte	20E177	£4.00

COPYRIGHT WARNING: IT IS AGAINST THE LAW TO COPY SOFTWARE PURCHASED FROM US

SINCLAIR Z81 cont.	Mem Req'd	Supplier	Code No	Price	VIC 20 cont.	Mem Req'd	Supplier	Code No	Price
ZXAS Assembler		Bug Byte	20E178	£5.00	Wacky Walkers		Imagine	05V149	£5.50
ZXTK Toolkit		Bug Byte	20E179	£5.00	Catcha Snatcha		Imagine	05V150	£5.00
ZXDB D/smbler & Debugger		Bug Byte	20E180	£6.50	Arcadia		Imagine	05V151	£5.50
Damsel and the Beast		Bug Byte	20E181	£6.50	Castlemath	16K	Audogenic	18V058	£8.95
Dactyls		Bug Byte	20E182	£9.00	Arcadia		Imagine	06V060	£5.50
Star Trek		Bug Byte	20E183	£5.00	Martian Raider		Romik	10V072	£3.99
Constellation		Bug Byte	20E184	£3.00	Mind Twisters		Romik	10V073	£3.99
Multifee		Bug Byte	20E185	£17.50	Shark Attack		Romik	10V074	£3.99
Award	16K	Sinclair	20E186	£6.95	Multisound Synthesizer		Romik	10V075	£3.99
Games Pack 1		Sinclair	20E187	£4.75	Sea Invasion		Romik	10V076	£3.99
Games Pack 2		Sinclair	20E188	£4.75	Space Attack		Romik	10V077	£3.99
Asteroids		Sinclair	20E189	£4.95	Vic Chess	16K	Bug Byte	02V078	£7.00
Centipede		Sinclair	20E190	£4.95	Vic Asteroids		Bug Byte	02V079	£7.00
Delauro		Sinclair	20E191	£4.95	Another Vic in the Wall		Bug Byte	02V080	£7.00
Space Invaders		Sinclair	20E192	£4.95	Vic Panic		Bug Byte	02V081	£7.00
Games Tape - 10 Games					Cosmids		Bug Byte	02V082	£7.00
Starfighter (Pyramid)	1K	J.K. Greye	32E001	£3.95	Vic Gammon	3K	Bug Byte	02V083	£7.00
Stratout	1K	J.K. Greye	32E002	£3.95	Vic Scramble		Bug Byte	02V084	£7.00
Catacombs	16K	J.K. Greye	32E003	£4.95	Martian Raider		Software Masters	08V085	£3.99
3D Monster Maze	16K	J.K. Greye	32E004	£4.95	Myriad		Software Masters	08V086	£3.99
3D Defender	16K	J.K. Greye	32E005	£4.95	Blitz		Commodore	04V103	£4.99
Football Manager	16K	Artic	50E193	£5.95	Hippit		Commodore	04V105	£4.99
Gobbleman	16K	Artic	20E194	£3.95	Race		Commodore	04V106	£4.99
Namir Raiders	16K	Artic	20E195	£3.95	Strategic Advance	16K	Commodore	04V107	£19.95
Galaxy Warrior/Startrak	16K	Artic	20E196	£5.50	Vic Stock Control	8K	Commodore	04V108	£19.95
Invasion Force	16K	Artic	20E197	£3.95	Vic Writer	8K	Commodore	04V109	£19.95
Assembler	16K	Artic	20E198	£3.95	English Language	8K	Commodore	04V110	£3.99
					Maths 1	8K	Commodore	04V111	£3.99
					Maths 2	8K	Commodore	04V112	£3.99
					Biology	8K	Commodore	04V113	£3.99
					Chemistry	8K	Commodore	04V114	£3.99
					Physics	8K	Commodore	04V115	£3.99
					Apple Tree Birds	3K	Commodore	04V116	£4.99
					Engine Shed	3K	Commodore	04V117	£4.99
					Lighthouse & Subtraction	3K	Commodore	04V118	£4.99
					Quizmaster	8K	Commodore	04V119	£3.99
					Know Your Own I.Q.	8K	Commodore	04V120	£3.99
					Know Your Child's I.Q.	8K	Commodore	04V121	£3.99
					Know Your Own Personality	8K	Commodore	04V122	£3.99
					Robert Carrier Menu Planner	8K	Commodore	04V123	£3.99
					Vic Money Manager	8K	Commodore	04V124	£3.99
					Vic Road User & Highway Code	8K	Commodore	04V125	£3.99
					B.B.C. Mastermind	8K	Commodore	04V126	£3.99
					Type & Tune	8K	Commodore	04V135	£4.99
					Programmers Aid Cart.		Commodore	04V136	£34.95
					Machine Code Monitor Cartridge		Commodore	04V138	£24.50
					Chicken Run		Database	15V140	£5.50
					Dambuster		Titan	22V141	£6.00
					Missile Panic		Titan	22V142	£5.00
					Road Runner		Titan	22V143	£5.00
					Android Attack		Titan	22V144	£5.00
					Space Hopper		Titan	22V145	£5.00
					Star Wars 2		Titan	22V146	£5.00
					Mawai Attack		Titan	22V147	£5.00
					Space Wars/Battle Zone		Titan	22V148	£5.00
					General Knowledge Data 1		Commodore	04V127	£1.99
					General Knowledge Data 2		Commodore	04V128	£1.99
					General Knowledge Data 3		Commodore	04V129	£1.99
					General Knowledge Data 4		Commodore	04V130	£1.99
					Specialist Knowledge Wine & Food		Commodore	04V131	£1.99
					Specialist Knowledge Sport & Games		Commodore	04V132	£1.99
					Specialist Knowledge Sport		Commodore	04V133	£1.99
					Specialist Knowledge Music		Commodore	04V134	£1.99
					Space Fortress		Romik	10V135	£3.99
					Space Attack		Romik	10V136	£3.99
					Quackers		Rabbit	13V137	£3.99
					Annihilator		Rabbit	13V138	£3.99
					Orbis		Rabbit	13V139	£3.99
					Night Crawler		Rabbit	13V140	£3.99
					Galactic Crossfire		Rabbit	13V141	£3.99
					Hopper		Rabbit	13V142	£3.99
					Sixamile		Rabbit	13V143	£3.99
					Alien Soccer		Rabbit	13V145	£3.99
					Tank War		Rabbit	13V146	£3.99
					Myriad		Rabbit	13V147	£3.99
					Space Phreeks		Rabbit	13V148	£3.99

CALLING DEALERS!

You've seen the massive growth of video... you've seen nothing yet! Software Centre's great new 'Vic 'n' Try deal offers the best software deal ever. If you want a bit of the action and a share of the success call us right away.

VIC 20

Vic Forth (cart)	1K	Adda	01V001	£38.95
Vic Star (cart)		Adda	01V002	£28.95
Vic Graph (cart)		Adda	01V003	£28.95
Facemaker	16K	A.S.K.	14V004	£8.95
Twister	16K	A.S.K.	14V005	£8.95
Number Chaser	8K	A.S.K.	14V006	£8.95
We Want to Count	16K	A.S.K.	14V007	£8.95
Frogger	3K	Rabbit	13V009	£3.99
Six-Run		Rabbit	13V009	£4.99
Space Storm		Rabbit	13V010	£6.99
Cosmic Battle		Rabbit	13V011	£4.99
Rainbow Towers		A.S.K.	14V012	£8.95
Number Guesser		A.S.K.	14V013	£8.95
Super Worm		Rabbit	13V014	£4.99
Night Flight	3K	Rabbit	13V015	£4.99
Rabbit Writer	16K	Rabbit	13V016	£19.99
Chartist	3K	Rabbit	13V017	£4.99
Rabbit Functions	3K	Rabbit	13V018	£4.99
Rabbit Base	16K	Rabbit	13V019	£14.99
Home Office	8K	Navajo	16V020	£12.95
Decision Maker		Creative	16V021	£14.95
Loan Analyser		Creative	16V022	£14.95
Car Costs		Creative	16V023	£14.95
Home Inventory		Creative	16V024	£14.95
Household Finance		Creative	16V025	£14.95
Forth (cart)		Audogenic	16V026	£24.95
Monitor (cart)		Audogenic	16V027	£19.95
Bonzo	8K	Audogenic	16V028	£7.95
Tomb of Drewan	16K	Audogenic	16V029	£21.95
Trainman (cart)		Audogenic	16V030	£19.95
Pit	3K	Audogenic	16V031	£7.95
Astro Blitz (cart)		Audogenic	16V032	£19.95
Boss	8K	Audogenic	16V033	£14.95
Tank Attack (cart)		Audogenic	16V034	£19.95
Outward (cart)		Audogenic	16V035	£19.95
Blockade		Audogenic	16V036	£6.95
Amok		Audogenic	16V037	£8.95
Vicatic		Audogenic	16V038	£8.95
Alien Blitz		Audogenic	16V039	£7.95
Sky Math		Audogenic	16V040	£6.95
Space Division	3K	Audogenic	16V041	£7.95
The Alien	3K	Audogenic	16V042	£7.95
Wool	3K	Audogenic	16V043	£8.95
Hangman/Hang Math		Audogenic	16V044	£7.95
Math Hurdler/Monster Maze		Audogenic	16V045	£7.95
Sea Wolf/Bounce Out/Vic		Audogenic	16V046	£8.95
Code Maker/Code Breaker		Audogenic	16V047	£7.95
Kosmic Kamikaze		Audogenic	16V048	£7.95
Minkit		Audogenic	16V049	£7.95
Golf		Audogenic	16V050	£7.95
Spiders of Mars (cart)		Audogenic	16V051	£19.95
Cloudburst (cart)		Audogenic	16V052	£19.95
Renaissance (cart)		Audogenic	16V053	£19.95
Satellites and Meteorites (cart)		Audogenic	16V054	£19.95
Meteo Man (cart)		Audogenic	16V055	£19.95
Magnificent Seven	3K	Audogenic	16V056	£4.95
Mikro Assembler (cart)		Audogenic	16V057	£48.95

**BUY 'N TRY
MEANS 30% OFF
YOUR SECOND
PURCHASE**

* Personal callers welcome come along see our super selection!

GREAT NEW GAMES CASSETTES FOR ATARI FROM THE U.S.A. THE ONES YOU'VE BEEN WAITING FOR!

Our list of latest releases from the States and extensive Atari range will be sent free with every order.

Mem Rec'd	Supplier	Code No	Price
Bug Off	16K Adventure Intrnl	34G052	£21.99
The Eliminator	32K Adventure Intrnl	34G053	£17.99
Preppie	16K Adventure Intrnl	34G054	£21.99
Sea Dragon	16K Adventure Intrnl	34G055	£25.49
Stratos	16K Adventure Intrnl	34G056	£25.49
Tutti Frutti	16K Adventure Intrnl	34G057	£17.99
Temple of Asaphi	32K Automated Simuls	35G058	£29.75
Upper Reaches of Asaphi	32K Automated Simuls	35G059	£14.75
Invasion Orion	24K Automated Simuls	35G060	£18.50
Hellfire Warrior	32K Automated Simuls	35G061	£29.75
The Keys of Achéron	32K Automated Simuls	35G062	£14.75
Danger in Drindisti	32K Automated Simuls	35G063	£14.75
Dalestones of Ryn	32K Automated Simuls	35G065	£14.75
Roscoe's Tower	32K Automated Simuls	35G066	£14.75
Marlock at Figel	32K Automated Simuls	35G067	£22.00
Star Warrior	32K Automated Simuls	35G068	£29.75
Crush, Crumble & Chomp	32K Automated Simuls	35G069	£22.00
Ricochet	16K Automated Simuls	35G070	£14.75
King Arthur's Heir	16K Automated Simuls	35G071	£14.75
Platter Mania	16K Automated Simuls	35G072	£29.75
Allen Garden	16K Automated Simul	35G073	£22.00
Action Quest	16K J/V Software	36G074	£29.75
Ghost Encounters	16K J/V Software	36G078	£22.00
Journey to the Planets	32K J/V Software	36G077	£22.00
Gorf	16K Roklan Corp.	37G078*	£33.25
Wizard of the Sor	16K Roklan Corp.	37G079*	£33.25
Battle of Shlich	48K Strategic Simuls	38G080	£31.00
Tigers in the Snow	40K Strategic Simuls	38G081	£31.00
Firebird	4K Gebelli Software	39G082*	£29.50
Embrago	8K Gebelli Software	39G083*	£33.00
Battle of the Gorn	32K In-Home Software	40G084	£22.00
Sentinel 1	24K In-Home Software	40G085	£22.00
Guard 400	16K Innovative Design	41G086*	£29.50
Choplifter	16K Broderbund	42G087*	£29.95
Stellar Shuttle	32K Broderbund	42G088	£23.55
Moon Shuttle	16K Datasoft Inc.	43G089	£31.40
Zaxxon	16K Datasoft Inc.	43G090	£31.40
Astro Chase	32K First Star Software	44G091	£22.00
Venus Voyager	16K English Software Co.	45G092	£19.95
Baja Bumpers	16K Gamemaster	46G093	£22.00
Claim Jumper	16K Synapse Software	47G094	£27.50
Claim Jumper	16K Synapse Software	47G095*	£29.95
Shamus	16K Synapse Software	47G096	£27.50
Shamus II	16K Synapse Software	47G097*	£29.95
Picnic Paranoia	16K Synapse Software	47G100	£27.50
Picnic Paranoia	16K Synapse Software	47G101*	£29.95
Necromancer	16K Synapse Software	47G102	£27.50
Necromancer	16K Synapse Software	47G103*	£29.95
Survivor	16K Synapse Software	47G104	£27.50
Shamus II	16K Synapse Software	47G105*	£29.95
Shamus II	16K Synapse Software	48G106*	£27.50
Stargate Courier	16K Synro	48G107	£18.50
Laser Ants	16K Synro	48G108*	£26.75
Laser Ants	16K Synro	48G109	£18.50

* Denotes cartridge

BUY 'N TRY CP/M* BASED BUSINESS SOFTWARE

These fully proven programs are designed to run on CP/M* based machines. They have been fully audited by H.M. Customs & Excise and the Commissioners of Inland Revenue wherever necessary, and have been planned and written in the U.K. All our business software has been extensively proved in the field through our substantial user base. And remember the usual Buy 'n Try terms apply ... so it's easy to upgrade as your needs grow.

All these programs come complete with systems specifications, manual and operating instructions. For further information just give us a ring.

N.B. You get a full 6 months buy-back option on our CP/M* business software.

- *TRYSAL-- Sales ledger. Balance brought forward, or open system option. Provides day books, audit trails, statements, cash posting, arrears schedule and account enquiry. £250.00
- *TRYPUR-- Purchase ledger. Choice of balance brought forward/open item system. Day books, audit trails, remittance advices, cheque posting. £250.00
- *TRYNOM-- Nominal ledger. Either direct posting from purchase ledger, or manual posting option. Trading A/C, P/L, balance sheet, management information ... all at the press of a button. £250.00
- *TRYSTOK-- Stock control. Controls raw materials and finished goods. Uses your number/code system. Can produce parts explosion & works orders, stock valuation, re-order levels and stock profitability. £250.00
- *TRYCOST-- Costing program. A remarkably versatile system suitable for manufacturers, builders etc. Ideal for those needing sophisticated cost control of time and/or materials, as well as sub-contract external supplies. Includes provision for both budgets and actuals. £300.00
- *TRYBILL-- Invoicing. Interfaces directly to the sales ledger and stock ledger as required. £29.50
- *TRYTRANS-- Transport route planner. Helps plan loading pick lists, schedules routes for optimal efficiency. Enormously valuable to transport fleet operators. Designed to be user friendly. £350.00

All Buy 'n Try business software is suitable for IBM PC, Sirius and all CP/M-based machines.

* Trademark of Digital Research

BUY WITH CONFIDENCE TRY AT YOUR LEISURE



When we send you software order, you'll find a return address label and a list of the buy-back prices for each item ordered.

Remember, we are pledged to buy back your software against a new purchase of equivalent or greater catalogue value, provided you purchase it from us. And you get a full month to decide whether to keep your software or benefit from the buy-back option.

Of course, if you wish to return two or more software items against the purchase of a more expensive item ... then provided that their initial purchase price does not exceed that of the new program you want ... we'll be happy to help.

SOFTWARE CENTRE 128 WIGMORE STREET LONDON W1 Tel 01-487-5974

ALSO AT: LEICESTER 9 Millstone Lane Leicester. Tel (0533) 532704, ILFORD 426 Cranbrook Road, Gants Hill, Ilford, Tel 01-554-6574.

Please rush me the following programs, and put me on the Software Centre mailing list for program up-dates and great special purchase offers. I confirm that I shall not attempt to copy any program bought from Software Centre.

Name	Code No	Price
Name	Code No	Price
Name	Code No	Price
Cheque () Postal order () enclosed.		
Total order value £		
Please debit my Access () Barclaycard () in the sum of £	Account no.	
My computer is (make)	Model	
Memory	Peripherals	
Name		
Address		
Post code	Customer Tel. No.	
Signed	Please allow up to 14 days for delivery.	

**SEND TO:
SOFTWARE CENTRE
128 WIGMORE STREET
LONDON W1
01-487-5974**

Business Tabs

A full business package for those preparing to take the plunge into computerisation is on offer from Andover software house TABS.

TABS has scaled down its accounting and business software to run on Sirius or IBM PCs under the name of Easy-Tabs. It will apply the hardware, peripherals, software, documentation and support.

You can buy the Easy-Tabs range of programs individually for £99 each plus VAT. They cover sales ledger, purchase ledger, cash book, a mail list, and word processing. The price includes a 12-month warranty, and the disk-based packages are now available from TABS

dealers. All five packages can be run separately or together and the idea is to show the businessman/woman all they need to know to computerise a small business.

Gillian Bissland, marketing assistant at TABS said: 'At present, the packages run on Sirius and the IBM PC and will soon be available for use on the CP/M operating system and the Apple IIe — possibly the BBC micro, too.'

The company says that if the user's business grows, it would be simple to upgrade your system to use the standard TABS range. Telephone 0264-58933 for more information from TABS.



APPLE BATTLES — Two new 'blast them off the screen' games for the Apple are available on disk from Pete & Pam Computers. Repton costs £28.70 and has you commanding a star fighter trying to defend your home planet against the invading Quorrons. You have in your armoury laser guns, nuke bombs and energy shields. The nasties have nova cruisers, single saucers, spy satellites, dyne-beam shooters and draynes. Wavy Navy costs £32.15 and puts you at the joystick (sorry, helm) of a PT boat taking on a squadron of enemy bombers, kamikaze fighters and 30ft waves in an ocean filled with mines. There are ten levels of difficulty. You start off as a galley slave and could end up as President of the United States. Pete & Pam is on 0706-227011.

£20 megabyte Acorn in the garden

Storage at £15 to £20 a megabyte is one of the promises Sintrom makes for the range of 5¼ inch Winchester disks it has just brought to the UK.

The CM6000 Series comes from US company Computer Memories — the disks will appear in OEM systems and in the micros produced by Sintrom's sister company Perex. Perex will also offer them as back-up devices to the Apple III's Profile disk.

The three models in the series are the single-platter CM6613 with 13Mb, the two-platter CM6626 with 26Mb, and the three-platter CM6640 with 40Mb. Data transfer rate is 5 megabits per sec.

Sintrom Electronics is on Reading (0734) 875464.

BBC users who don't know the difference between a pansy and a petunia may find a new program from Acornsoft extremely useful.

Called The Magic Garden, it is aimed at people who lack green fingers. All you have to do is tap into your BBC micro the colour and size of plant and where you want to put it in the garden. The program then produces a list of suitable plants.

The program will cost about £10 on cassette and is due out in mid-May.

It is being launched in conjunction with the book of the same name written by Shirley Conran, who has co-operated with the design of the software.

MEKOM Computer Services

OUTSTANDING VALUE PRINTERS & SUPPLIES

NEW FEATURE DAISYWHEEL PRINTERS
DY 311 SI Q/D DY 211

Software Control:	QUME DIABLO COMPATIBLE	DIABLO COMPATIBLE
Print Speed:	32 c.p.s. Bi-Directional	20 c.p.s. Bi-Directional
Print Pitch:	10, 12, 15 P.S.	10, 12, 15 P.S.
Interface:	RS232 Serial	IEEE Parallel/RS232 Serial
Support:	Nationwide from 17 Service Centres	

TRADE AND OEM ENQUIRIES WELCOME

NEW TECHNOLOGY JP 101 DRY SPARK INC. JET PRINTER NO IMPACT — NO NOISE £365.00 + VAT

Matrix Ribbons Printing on Plain Paper. Features include: Expanded/Condensed Print, Graphics, with zoom (double size), 10, 12, 16 characters per inch.

NEW UNDERWOOD RIBBONS FOR: QUME DIABLO RICOH NEC IBM OLIVETTI
Manufactured to the highest specification and available at unbeatable prices.

MEKOM Computer Services

Unit 20, Sloane House,
Sloane Street,
Birmingham.
Tel: 021-236 4577

LANDAU ELECTRONICS

THE ATARI 800 NOW WITH 48K!
at £399.95



INC. BASIC Huge range of software stocked

SINCLAIR ZX 81 SPECTRUM NOW IN STOCK

TEXAS INSTRUMENTS
We've got the Home Computer that makes learning fun, at a price that will make you smile.



OUR PRICE £149.95

Extensive range of Texas and third party software stocked

WE STOCK ATARI — INTELLIVISION — COLECO — IMAGIC ACTIVISION — PARKER BROS — SYNAPSE — DATASOFT — BRODERBUND — BIG FIVE — SIRIUS — DON'T ASK — INFOCOM.

PAY US A VISIT — It's well worth it at

Lion House
227 Tottenham Court Rd
London W1
01-637 3024

215 High Street
Sutton
Surrey
01-643 5494

MAIL ORDER PHONE 01-636 9613
FOR ENQUIRIES AND CREDIT CARD ORDERS

Micro capacity leaps

The rivalry between US and Japanese semiconductor makers is spawning a bumper crop of powerful devices that could be a big bonus for micro users.

Processor chips are moving towards 32-bit processing in production micros, and storage chips are growing in capacity towards 'infinite' potential. All in all, the next 12 months could see a massive jump in the capability of the micros on the market.

Motorola, Intel and National Semiconductor are all working

on 32-bit processors of the kind that give increased addressing power and speed.

Nat Semi has come out with the NS16000 family of VLSI processors. These are capable of handling 16 megabytes of virtual memory, and run at 6MHz at the moment, but will be upgraded to 12 and 14MHz next year.

From Intel the 80286 is following hard on the heels of the iAPX 80186; it can address no less than one gigabyte of virtual memory. Motorola's

NC6800 aims to occupy a similar niche.

Motorola has also brought out a 64-bit bi-polar RAM chip, the NC10H145, which has a three nanosecond access time. But the biggest advances in memory technology are being claimed by companies on the other side of the Pacific.

Nippon Electric (NEC) last week announced that it has developed a new technique to expand the capacity of memory devices dramatically.

Called Bloch Line Memory,

the technique allows a one square centimetre chip to store one billion bits. Koichi Yoshimi, of NEC's research laboratory, said the possible uses of such a memory are 'infinite'. He added that the chip would sit outside a computer and data would be safe if the system's power supply was switched off.

The NEC researcher said that his company has no immediate plans for mass-production of Bloch Line Memories, but the Japanese are not renowned for wasting time.

Tally printers out by May

Two new printers from Mannesmann Tally will be on sale by May, if not sooner.

The MT160 and MT180 printers, priced at £599 and £799 plus VAT, are aimed at small businesses. They can be used on practically any micro, as they have built-in parallel and serial interfaces.

They can fit in with data and word processing systems and

are said to be robustly made with very high quality print.

Both printers will be available nationwide through small High Street retail outlets, and will be distributed by MT Direct, which is a new division of Mannesmann Tally, located at the Wokingham headquarters.

MT Direct can be contacted on 0734-788711.

Commodore's business end

Attention newsgents and engineers — The Computer Room has produced two packages for you that will run on Commodore hardware.

Epic (Engineers Production Control System) is designed for the Commodore 8000 with a

hard disk. It is a suite of programs intended for production control in small to medium manufacturing companies.

Supernews is based on the Commodore 64, and sells as a complete package for £1,500 excluding VAT. It handles newspaper delivery organisation and accounting, the Computer Room says.

The Computer Room is on Tonbridge (0732) 355962.

BASF disk promise of a lifetime

A promise to replace a floppy disk if it goes wrong must be worth something. Perhaps that is why Pete & Pam Computers have started to sell the Qualimetric Flexy disks from BASF. BASF is so confident about the high standard of quality of

these disks that it is offering a lifetime warranty.

The jacket of the Flexy disk features a special two piece liner.

This is said to trap damaging debris away from the disk surface, and to create extra space in the head access area to ensure optimum media-to-head alignment.

A box of ten 5¼ inch single-sided, single-density disks costs £20.60, and Pete and Pam can be contacted on 0706-227011.



Apple pie-in-sky from USA

Desk-bound pilots among you may be interested to hear that three new flight simulation systems have arrived from the US.

Airsim-1, Spitfire Simulator and Cleared to Land are being sold in the UK by Beattie-Edwards Aviation. All run on Apple equipment — the Spitfire Simulator on the Apple II Plus, and the others on a standard Apple II with at least 48K of RAM.

Airsim-1 puts you in command of an aircraft over the New England coastline. You have the appropriate instru-

ments, and a plane whose movements are governed by the equations that apply to the real thing. It costs £39 plus VAT.

Spitfire Simulator is for the more belligerent, with a Battle of Britain backdrop and targets that will be familiar to all builders of Airfix kits. It also costs £39.

Cleared to Land is the most expensive of the trio, at £44.85 plus VAT.

Beattie-Edwards Aviation can be contacted on Crawley (0293) 20565 or direct at Biggin Hill.



CARDS FOR KIDS — After recipe cards and gardening cards come programming cards (no relation to our own ProgramCards), designed by Edu-Cal to make life easier for schoolkids. The company has produced a set of cards, called 'Programming Made Easy', to spare young programmers the trouble of leafing through books and manuals. The language of the cards is said by Edu-Cal to be a blend of computer terminology and the kind of speech children use. The set, which comes with a checklist to monitor progress, costs £8.90 plus 60p postage and packing from Edu-Cal, 28 Ingersoll Rd, Shepherds Bush, London W12 7BD, tel 01-743 1579.

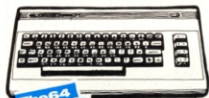
Chromasonic Hall of Fame No. 31

THE 'DOG PUNTER COMPUTER SHARK' HABITAT: BOOKIE SHOP, WITH HIS PORTABLE KEYBOARD. NEVER PLACES A BET BEFORE COMPUTING DOG AGE/RECORD-TRACK SPEED-TRAP PLACING-BEND CURVE-WEATHER-ODDS-AND HARE VELOCITY RATIOS. TO HIM, HIS SPORT IS NO MERE CHANCE, BUT SIMPLY A MATTER OF CALCULATING RANDOM VALUES INTELLIGENTLY. HAS LITTLE OR NO INTELLIGENCE. RELIES ON SOFTWARE WRITTEN BY HIS INFANT SON.



WE'LL FIT YOU OUT

AT CHROMASONIC, WE REGARD YOUR SATISFACTION AS SOMETHING MORE THAN THE FLIP OF A COIN, ALTHOUGH WHICH OF OUR EXPERT ASSISTANTS ACTUALLY SERVES YOU, IS A MATTER OF RANDOM VALUES. WE AGREE. BUT FITTING YOU OUT WITH JUST THE RIGHT EQUIPMENT IS NOT LEFT TO CHANCE. CALL ON US FOR SATISFACTION. WE'LL TAKE BETS ON IT!



The 64 from

commodore

OUR PRICE **£343**

- 16 COLOURS
- IEEE-488 & RS232C INTERFACE
- PET SOFTWARE COMPATIBILITY
- USED WITH MONITOR OR TV
- INTERNAL VHF MODULATOR
- OUTPUT FOR EXTERNAL AMPLIFIER
- FULL PET CHARACTER SET
- ACCEPT PLUG-IN APPLICATION CARTRIDGES

- 64K RAM
- 280 PROCESSOR OPTION
- DEDICATED VIDEO CHIP
- SPRITE GRAPHICS
- MUSIC SYNTHESIZER
- PRESTEL LINK
- HIGH RESOLUTION GRAPHICS (320 x 200)
- FULLY PROGRAMMABLE USER PORT
- 2 PORTS FOR JOYSTICKS OR LIGHT PEN
- NETWORKING
- PORTS FOR TWO SETS OF PADDLES
- NEW 6500 CPU WITH EXTRA I/O
- FULLY COMPATIBLE WITH 6502 ASSEMBLY LANGUAGE
- INTERFACE TO MANY PERIPHERALS

DRAGON 32

- 9 Colours
- 32K RAM memory as standard expandable to 64K
- Extended Microsoft style basic as standard
- Typewriter keyboard
- 68000 CPU
- Advance sound feature
- 32 Columns x 16 Lines

OUR PRICE **£189**



FREE Basic training manual supplied

VIC 20

NEW LOW PRICE **£129**
VIC PRINTER **£112.00**
VIC SINGLE FLOPPY **£286**
VIC CASSETTE DECK **£39.00**

VIC 20 GAMES		£18	£23	£10	£10
VIC JOYSTICK	VIC 20 MONSTERS	£18	£23	£10	£10
VIC 1905 "ADVENTURELAND"	VIC 1917 "WOODS CASTLE"				
VIC 1916 "MIDNIGHT CASTLE"	VIC 3501 "MULTI-MASTER"				
VIC 3502 "ROCK YOUR OWN IQ"	VIC 3511 "MISTER MIKE"				



Britain's First Tevised Instruction Course! Including NEW 12 OPERATING SYSTEM



GPI00A SEIKOSHA

FULL GRAPHICS CAPABILITY CENTRONICS PARALLEL INTERFACE

GPI00VC for VIC20 or 64 **£263**

TELEPHONE

Chromasonic Hall of Fame Album! Send 75p for your collection. Album says the cartoonist did the cartoon on this as one in a series of 60. We will send you three copies of your choice when finally ready to prep your build up. We's exclusive 1985 collection. Write for 1st full album presented to us!!

CHROMASONIC PERSONAL COMPUTERS

48 JUNCTION RD. ARCHWAY, LONDON N19 5RD Telex 22568



I am interested in a home computer. Please send me further details

- VIC 20 DRAGON 32 COLOUR GENIE
 ADD-ONS SOFTWARE

TERMS OF BUSINESS: All prices in 15% VAT. Delivery charged at Cost. Prices valid for cover date of this mag. I enclose stamped Address and Background codes welcome.

Please send me:

I enclose cheque/P.O. for £



Please send me "Hall of Fame Album" I enclose 75p.

NAME: _____

ADDRESS: _____

01-263 9493 or 5



Random Access is *PCN's* forum for readers with a point of view to express.

Letters come from people like you, so pull out your INKEY finger and feed us a line. If it's of star quality *PCN* will add £10 to your spreadsheet.

Address us at Random Access, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

Programming gains from gaming

D T Hartley (*PCN April 8*) agrees with Martin Banks in that micros are used 'to fire pretend rockets at pretend invaders from pretend space' and asks: 'Couldn't all that power be put to much better use?'

What a silly question; it can and is being put to 'better use'. But how does one learn to write a word processing package? One writes games — which are infinitely easier to write, and then the experience gained by writing games can be put to 'better use'.

And the people who buy games (I am not among them) are at least bashing 'pretend invaders' and not other people. With full employment now impractical, games could help keep the world habitable.

Andrew Mulholland,
Sherwood, Nottingham

PS On the page opposite Hartley's letter is an advert saying 'for the Unexpected Vic-20'. This conjures up visions of: 'Mum, I am afraid I am going to have a Vic-20.' A gunshot interface. As the computer expands, all its peripherals have to be bought second-hand, the social stigma . . . I could go on.

Open your eyes to young talent

May I take this opportunity to congratulate Mr J R Mortleman on his letter in *PCN*, April 8. If R J Parsons kept his eyes and ears open a little more, he would see that in many cases the capabilities of young people to program micros far exceeds that of the older generation.

Take Jeremy Ruston for instance. At 17, he is the author of books such as *Pascal for Human Beings* and *The BBC Micro Revealed*, currently number one in the Micro Book charts. Along with Tim Hartnell, he has written *The Book of Listings*, which, as a Beeb user, I praise highly. Eugene Evans,

author of games such as *Frantic*, *Wacky Waiters* and *Catcha Snatcha* is aged only 16.

May I suggest that Mr Parsons stops criticising young people because of their vandal-like stereotype, and acknowledge their skills. You never know, he might learn something!

D T Machin,
Longton, Stoke-on-Trent

Buyer's blues

I ask myself, do I have dandruff, do I have BO or do I have leprosy? No, I simply bought my BBC micro from the BBC rather than from the Acorn dealer network.

At the time I ordered my BBC micro I felt pleased to be supporting a first-rate British New Project. What is more, I wasn't alone. Thousands of us were prepared to put our money on the line even after months of delays.

Now we find we might just as well have the above named conditions and the reason for this case of hypochondria is as follows.

On occasion without number I am told by Acorn dealers that because of limited stock availability they can only supply certain items to people who bought their machines from them.

Now, while I can understand this from the dealer's point of view, it means that the very people who got the project off the ground and helped make it successful are now being penalised for it.

To add insult to injury, I notice (*PCN Monitor*, March 25) that Sinclair is to offer microdrives preferentially to those who purchased their Spectrums by mail order.

Why is it that Acorn cannot do something along these lines for their mail order customers when it comes to upgrading such things as power supplies and recently the 1.2 MOS?

John C Neal
Ilford, Essex

In defence of the Colour Genie

There has been a lot of controversy over the Colour Genie vs Dragon 32 affair. Many of the reviews in magazines give false information about the Genie's capabilities. For instance, many, if not all these reviews,

say that the Genie has eight colours and the Dragon has nine. This is untrue, as the Genie has 16 colours.

May I also point out that the sound on the Genie is of a much more useful nature than the Dragon's, as the programmable sound generator couples with the three channels and eight octaves to make a sound that, to quote one review, 'is comparable with the BBC micro'.

Many people also think that the Dragon's graphics are better than the Genie's. Admittedly, the graphic commands on the Dragon are comprehensive, but to the point of absurdity, whereas the Genie has straightforward, easy to use and flexible graphics commands.

With reference to Mr R J Parsons' letter on games that was published recently, I agree with J R Mortleman's comments. I am 12 years old and have a Colour Genie, and 75% of my time is spent writing programs other than games. I hope Mr Parsons will realise, if he reads this letter, that not all young users are 'sticky-fingered, bug-eyed games addicts'.

I think that *PCN* is great, but how about some Colour Genie Programs? Your 35p price tag is much appreciated, as pocket money is limited.

Anthony Asquith,
Lytham, Lancs

Free the Threebies

Do you have to put things like Threebies and competition forms on the back of articles, hence ruining these articles? Why not on the back of adverts instead? I did intend filing Keith Bowden's 'Simon's Not So Simple' article, but alas it is not to be. No one in their right mind passes up the chance of a free (?) BBC B.

I thoroughly agree with Mona Cundick (*PCN*, March 25,) that there is a definite need to try to get UK microcomputer prices in line with USA prices. Also, I agree with P Grumann (*PCN*, April 1) on sticking up for the 'Micro-Brotherhood'. But does he not think that friendly rivalry stimulates the market and leads to better quality hard and software? And surely we all like to think we've bought the best now and again.

Finally, I have a question. With firms rushing to undercut Sinclair and every aspect of his computers' peripherals and

software, why has someone not produced an upgrade for the BBC A substantially cheaper than £95? Is anyone interested?

Anthony Sherman,
West Bridgford, Nottingham

Good service from Grundy

I would like to break with convention and offer some praise to a British company — Grundy Business Systems.

I am a nurse tutor who over the past two years has become more and more interested in the use of computers in nurse education — that is, computer assisted learning.

After much thought and research I purchased a Newbrain computer to learn about computing and to 'try may hand' at writing educational software. I have been delighted with my purchase and it has lived up to all my hopes and expectations.

Perhaps even more important to a novice such as myself, working in an impecunious organisation such as the NHS, is the support offered to the consumer. In this respect, no company could possibly have been more helpful, constructive, and indeed generous than Grundy Business Systems.

Well done Grundy and good luck for the future.

P I Pleasance,
Nursing Lincolnshire School of
North
Boston, Lincs

Buy locally

I would like to give some advice to prospective computer buyers with £100-£500 to spend.

It is much better to buy from the local high street computer shops rather than buying from a manufacturer. This way you get a personal service and a chance to try the machine you are interested in. This is better than listening to an uninformative answer phone.

By buying from a dealer you get the machine directly rather than having to wait for 28 days' plus. I speak from experience as I ordered an Oriol over a month ago, and then found out I was not likely to receive it for four months.

Ian Ferreday,
Barmouth, Gwynedd,
North Wales



ROUTINE INQUIRIES

Max 'B DOS ERROR ON A' Phillips opens the pod door. Hal. Got a query? Send it here. No personal replies promised but you never know . . .

Write to: Max Phillips, Routine Inquiries, Personal Computer News, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

Vic joins the character set

I am 13 and own a Vic-20 personal computer. Can you tell me how to make my own characters? I know how to use CHR\$ but it only works for normal characters.

Jason Sprott, Edinburgh

The best place for this, and all sorts of other useful information, is the Vic-20 Programmer's reference guide. Get a copy if you can.

As you've guessed, Commodore doesn't make user-defined graphics easy. The Vic chip uses a pointer in location 36869 to tell it where to get its characters from. This is normally an area of ROM that contains the Vic's standard character set. To use your own characters, you need to:

- Prevent Basic from overwriting an area of RAM.
- Copy any of the standard characters you want (A...Z, .,0...9 and so on) from ROM into your bit of RAM.
- Poke in any new characters of your own design into your area of RAM.
- Alter 36869 to point to the new character set.

Sounds awful? Let's try a simple example of what can be done. Steal some of Basic's memory from location 7168 onwards with POKE 52,28; POKE 56,28; CLR. Now copy the standard character set from ROM to your bit of RAM:

```
FOR I = 7168 TO 7679:POKE I,PEEK(I+25600):NEXT I
```

Finally, tell the Vic chip to use your RAM based character set. POKE 36869,255.

If all goes well, you should see no change. The Vic is using an identical copy of its normal character set. But now it's in RAM, so you can POKE new character shapes into it.

Each character is formed from a set of eight 8-bit bytes. Where a 1 occurs in one of the bytes, a dot appears on the screen, where there's a zero, no dots appear. The first thing to do is draw your own character on an 8x8 grid. Then convert the shaded squares to 1s and the

blank squares to 0s. This gives you eight binary numbers. Here's my rather sad attempt at a space invader:

```
00111100
01111110
01011010
01111110
00111100
00100100
01100110
00000000
```

Convert the bytes, from the top down, into decimal numbers. This is easiest by writing the headings 128 64 32 16 8 4 2 1 above each of the columns. For each byte, add together the column headings with 1s underneath. The harmless space invader becomes 60, 126, 90, 126, 60, 36, 102, 0. Now all you have to do is POKE the new character over the top of one of the existing ones.

To change a particular character, POKE the definition starting from address 7168+8* the relevant screen code. The exclamation mark has screen code 33. So get the space invader, try the following program:

```
10 FOR I = 7432 TO 7439:READ B:POKE I,B:NEXT I
20 DATA
60,126,90,126,60,36,102,0
```

If you're lucky, the ! symbol will have changed to a space invader. That's only a quick summary of what has to be done. There are lots of ways of doing it and lots more things can be done. So it's worth experimenting or getting hold of the Programmer's reference guide.

Can micros use hi-fi decks?

Is it possible to use the cassette deck in my hi-fi system with the BBC micro I intend to buy? What leads should I use?

Neil Mackay, Halkirk, Calthness

The answer is a resounding maybe. Most people use cheap recorders with their computer systems because expensive hi-fi systems tend to mess the signal round so much it is unintelligible to the computer. But if you switch off filters, Dolbys and so on it might work. It may still be worth your while buying a cheap recorder, as it lets you keep the micro set up and saves you messing around with leads and switches.

Whatever you use, you'll

need to have a lead made up as appropriate. If you can't do it yourself, your BBC dealer and probably local Tandy or electrical store will do it for you. At the BBC end, you need a 7 pin DIN, and at the other end, you need plugs appropriate for the recorder. MIC and EAR will be either separate jacks or part of a 5 pin DIN plugged into a REC/PLAY socket.

You don't need remote control with the BBC, though its nice to have. It is usually a separate miniature jack connected to a socket marked REM or Remote. If you don't want remote control, then you can get away with a 5 pin DIN at the BBC end. Once you've got the system working, label the leads and mark the controls in place.

Teething troubles with the 16K Oric

I own a ZX81 and I feel I want to go up to a more sophisticated machine. I am still at school and my part time job doesn't bring a lot of money in. I was told that Oric had stopped producing this type of machine. Is this true? and is there much software available for the Oric? *Andrew Cannon, Three Bridges, Crawley*

Oric has yet to get round to delivering a 16K Oric 1, as the company has had problems with memory chips. It still intends to produce a 16K machine but says that its price might be 'slightly higher'. This will no doubt upset all those who have ordered the £99 machine Oric advertised.

There's not a lot of software available yet for any Oric model. Bugs in the Basic have made it hard for the usual rush of Basic programs to be flung onto the market, while Oric itself is presumably too occupied curing the bugs to be working on applications software.

So it might be worth waiting to see what happens with the Oric scene. It's a great machine, but it's still got a few teething problems. Being a ZX81 owner, you'll appreciate Sinclair design. If you can afford it, go for a Spectrum. At least you can walk into a shop and buy one along with a handful of tapes, which is more than you can say for many of the newer machines.

Graphics and text applied to Apples

On an Apple II/TTT 20, is it possible to mix text and high resolution graphics without recourse to shape table? Can you print text on low resolution graphics?

How do you print text on text page 2?

David Smith, Chester

There are lots of ways that have been developed to mix hi-resolution and text. The most effective is to use a software character generator, which draws the individual characters shapes on the screen as you print them.

Programs to do this get very sophisticated, but the Apple users had user-definable characters this way before it was standard on many machines.

Another trick you will see is that the programs can generate tiny characters, allowing up to about 70 characters a line without any special hardware.

Wander down to your Apple dealer and have a look at what's available.

The other way of mixing the two is to swap over the text screen and graphics screen at the right speed, giving the illusion of superimposed text. It sounds far-fetched, but try the Applesession demo program on a 3.3 master disk.

It might be possible to put text on page 1 and low resolution graphics on page two, and alternate them in this way. It is the only way you could mix the two.

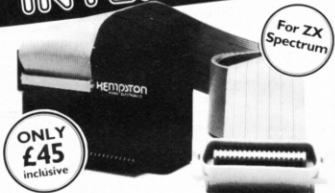
But I can't think of an application that would make it worth the trouble. The Apple doesn't have an immediate way of printing on text page 2.

You can write your own machine code output routine to do this, or better still just copy the ROM routine into RAM and change it. The other way is to write text to page 1 and then copy page 1 memory to page 2.

A short machine code routine is best for this as well. Remember that if you are using text page 2 from an Applesoft Basic program, you'll need to move LOMEM upwards.

Further information can be had from the Apple II reference manual or the Applesoft manual.

SIMPLE PLUG-IN CENTRONICS INTERFACE



ONLY
£45
inclusive

For ZX
Spectrum

- Recognises LLIST and LPRINT which allows programs to be listed directly from your Spectrum
- Also allows printout direct from BASIC listings without the need for special user calls
- Completely self contained with 1 metre of ribbon cable and connectors
- Works with any Centronics printer including all Epsoms, Seikosha 100A, OKI Microline 80 etc
- Includes driving software which allows up to 128 characters per line
- Full range of business software available
- Fully tested and guaranteed for 12 months

Trade Enquiries
Welcome

KEMPSTON

MICRO ELECTRONICS

Dept PCN5
180a Bedford Road, Kempston,
Bedford MK42 8BL

SIR COMPUTERS LTD CARDIFF

Agents for Acorn,
BBC and TORCH Computers

BBC Microcomputers

Model B.....	£399.00
BBC Model B with 1.2DS.....	£399.00
Model B with disc interface.....	£509.00
Single 100K disc drive.....	£249.00
Dual 2 x 100K disc drive.....	£389.00
The disc manual and utilities disc are both included	
Disc interface for the BBC Micro Kit.....	£95.00
Fitted.....	£110.00
Upgrade of BBC Model A to B.....	£90.00

Please telephone for up-to-date information on Prestel, Teletext speech synthesis, second processors etc.

TORCH Computers

Z-80 Disc Pack for the BBC Microcomputer£895.00
This unit connects to the BBC Micro in the same way as a normal disc drive, but as well as offering a dual 2 x 400K disc drive for use under BBC BASIC or other languages, it provides the option of using the wide range of CP/M software available for business and data processing applications. The firmware supplied with the machine allows switching between BASIC and CP/M, a powerful operating system developed from CP/M 2.2.

PERIPHERALS

Seikosha GP 100A Printer.....	£229.00
NEC PC 8023 Printer.....	£389.00
Kaga 12" RGB Monitor.....	£280.00
Sanyo 14" RGB Monitor.....	£270.00
High resolution 12" black, green monitor.....	£85.00

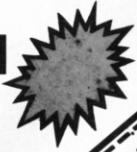
Delivery by Interlink if any of the above items £10.00.
Unless otherwise stated all prices include VAT.

SIR Computers Ltd., 91 Whitchurch Road, Cardiff.
Telephone: (0222) 21341

Home Computer Show Manchester

April
THURSDAY 21 (12am - 7pm)
FRIDAY 22 (10am - 6pm)
SATURDAY 23 (10am - 6pm)

AT THE
**Midland
Hotel**
PETER STREET



VISIT THE COMPLETE SHOW FOR THE HOME USER AND SEE:

A COMPLETE cross section of all hardware and software available to the home user.

A FULL RANGE of home computers priced from £50 upwards.

A COMPUTER ADVICE CENTRE run by independent experts for the answers to all your questions.

WIN WIN WIN TWO COMPUTERS — one for you, one for a school of your choice
— to be won at each show: FREE entry form with advance tickets

ADULTS: £2.00 UNDER 8s & OAPs: FREE 25% DISCOUNT for parties of 20 or more

COMING SOON
MAY BRIGHTON
JUNE BIRMINGHAM

Sponsored jointly by:

Computing Today Personal Software
Personal Computing Today
Home Computing Weekly ZX Computing

PCN

Home Computer Show One person per coupon only
Please enclose SAE

Send £1.00 Save £1.00

Mr. Mrs. Miss

Address

ASP Exhibitions
145 Charing Cross Road
London WC2H 0DE
01-437 1002

Problem: How to run MS-DOS and CP/M 86 programs on the IBM PC? Deenagh Brook reports.

Two-handed conversion for the IBM

By the time you've finished trying to convert existing MS-DOS (Microsoft DOS) or CP/M 86 programs to run on the IBM PC, you might end up calling it an irritating breed of machine.

There are two big problems. The first has to do with the IBM's unusual interrupt-driven screen handling, and the second with the way IBM's PC Basic protects programs.

To understand the first problem, you have to take into account the history of personal computers. The VDUs on most micros behave like the teletype machines they evolved from, while cursor addressing is handled by ASCII characters. But the IBM's cursor handling is interrupt driven, which means that assembler routines in PC

Basic handle screen addressing.

If you're programming from scratch, screen handling is made easy by this assembler routine system — but when converting existing programs this feature is a headache.

Screen-handling

It's a big enough headache for software houses to have already plunged in to solve the problem. Compact Accounting Services approached the conversion by tackling the screen-handling problem first.

The company has developed a large integrated accounting system that successfully runs on 65 micros and has a control program in which all the escape codes for the screen are set. But on the PC, where

there is no need for such codes, a different version of the package was written and compiled — immediately requiring that two source codes be maintained.

Because of the differences between Basic under MS-DOS and PC-DOS and the fact that operating systems are available only from original equipment manufacturers, you might find yourself missing some of the original MS-Basic, such as the WIDTH statement. The omission occurs because you are unlikely to get the extended MS-Basic from the original equipment manufacturers and therefore will miss out on extensions to the language.

Protected codes

The second problem faced by Compact revolved around PC Basic's unique internal representation of protected codes. This means that if you have a normal protected MS Basic program, certain key statements (such as READ and PRINT) have been assigned special codes.

Because Compact had to transport a compiled program to the IBM PC, they had the task of re-entering the original source code so as to arrive at a protected version of the program under PC DOS. And it also meant that every time a change was made to the original program, several source programs would have to be changed.

Compact felt the source code route would be time-wasting and inefficient because it would require maintenance of different versions of the same program suites for the sole reason that some micros need a different source code.

Instead, Compact abandoned the IBM-supplied BasicA in favour of MBasic compiler running under PC DOS. By substituting, Compact can use the same source code on all machines because the protected codes are the same.

The company also had to get round the problem of physically putting the MBasic compiler and source program on the IBM formatted disk. This can be done with a system available from IBM for program conversion for the PC.

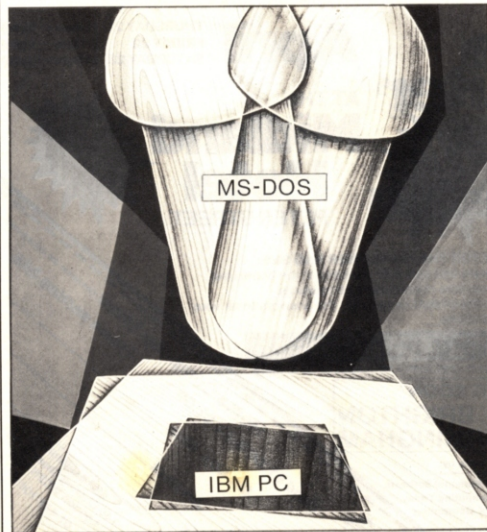
Asynchronous support

You'll need an asynchronous communication board for the IBM and an RS232 port on the master machine. Using a menu-driven asynchronous support package for the IBM, you can transfer the source code from another micro — such as the Sirius.

To solve the screen-handling difficulties, Compact has written its own assembler routines to access the address in storage which holds the screen image. These routines are called from MBasic.

During the initial set-up for any system, Compact specifies which micro is being used by setting the escape parameters to be used in any screen handling statements (such as LOCATE, PRINT AT, CLEAR SCREEN).

If the IBM is being configured, the system doesn't have any of these parameters but notes that the special assembler routines have to be called.



MEMORY & GRAPHICS BOARDS FOR THE ACT SIRIUS 1

Designed & Manufactured in Britain to the
Highest Standards – at Remarkably Low Prices

MEMORY BOARD available in two versions

- 256K (R.R.P. £399) **£279**
- 128K expandable to 256K (R.R.P. £285) **£199**

GRAPHICS BOARD

- 128K Bytes of RAM + graphics routines in ROM (R.R.P. £399) **£279**

Graphics Features include:-

- | | |
|---------------------------------------------------------------|---------------------------------------------------------------------------------|
| <input type="checkbox"/> CHARACTER LOAD AND PRINT | <input type="checkbox"/> RAPID PLOTTING OF POLYGONS, CIRCLES, ARCS AND ELLIPSES |
| <input type="checkbox"/> AREA FILL WITH USER DEFINED PATTERNS | <input type="checkbox"/> CHOICE OF FULL AND BROKEN LINES AND RAY LINES |
| <input type="checkbox"/> AREA DELETE | <input type="checkbox"/> ROTATION IN STEPS OF 1° |
| <input type="checkbox"/> RELOCATABLE SCREEN ORIGIN | <input type="checkbox"/> FULL SCREEN DUMP |

ALL PRICES EXCLUSIVE OF VAT

DEALER ENQUIRIES INVITED

MAGUS COMPUTER SYSTEMS LTD

DEPT. PCN, SOPWORTH MANOR, SOPWORTH, CHIPPENHAM, WILTS SN14 6PS
TELEPHONE: 045 423 231 & 022 122 3576

FORTH FOR THE DRAGON 32



'DRAGONFORTH' is an implementation of Fig-FORTH for the 'DRAGON 32' microcomputer but with a difference.

As well as the enormous power of the FORTH language, 'DRAGONFORTH' can also execute BASIC statements. This combines the superb DRAGON sound, graphics and Floating-Point commands with the tremendous speed of FORTH to produce an unparalleled hybrid. You can write a whole program in BASIC or a whole program in FORTH or any mixture of both.

If not already convinced send £2.50 for the 60-page manual (redeemable against first order.)

'DRAGONFORTH' is professionally packaged, sensibly priced, guaranteed for life and will be despatched by return complete with free demonstration graphics program.

AUTHORS:—Oasis Software will market high quality programs you write in 'DRAGONFORTH'. We pay a lump sum on acceptance and a generous royalty. Let's hear from you!

OASIS SOFTWARE, LOWER NORTH STREET, CHEDDAR, SOMERSET.

Telephone: 0934-515265

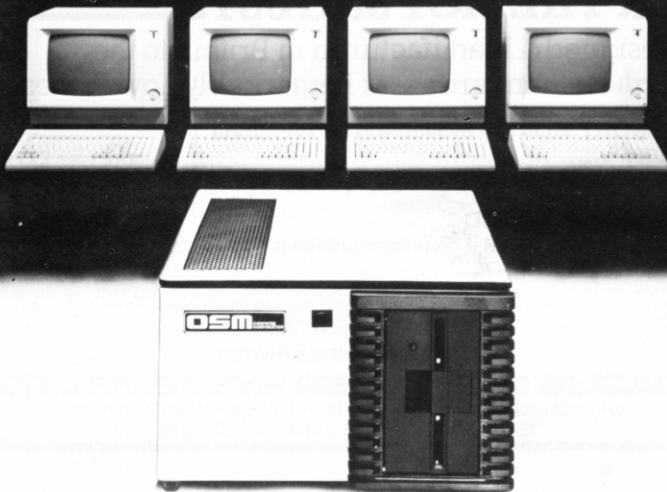
£18.95
INC. P&P AND V.A.T.

DEALER ENQUIRIES WELCOME



ACCESS ORDERS
TAKEN BY PHONE
24 HOURS A DAY





Multi-User Breakthrough.

The Multi-User Breakthrough

What is the multi-user breakthrough? It is a system which conforms to every major industry operating standard (including CP/M and MP/M) yet by design and architecture, delivers a level of multi-user performance previously only associated with minicomputers – at a microcomputer price. The Zeus range makes that breakthrough. Zeus multi-user systems are multi-user systems in the truest sense.

What Businesses Really Need

Today, most businesses are finding that the stand-alone microcomputer is simply not able to cope with the developing requirements of computerised business administration and control. Research suggests that over 70% of all business micro applications require a system with more than one terminal so that functions such as accounts, word processing, data processing, stock control and file retrieval plus 'new' applications like telex control can be handled simultaneously with management able to access and overview every operation.

The Zeus Range

There are three Zeus multi-user systems in the range.

- Zeus 4 – for one to four users.
- Zeus 3 – for two to eight users.
- Zeus 2 – for two to thirty two users.

Our expert sales staff and consultants can advise you on the configuration best suited to your present and future requirements. To complement the systems there is a range of peripheral equipment including data terminals, graphics terminals, daisywheel and high speed matrix printers, modems, telex systems ... and more.

Micro-Prices

The Zeus range brings micro prices to true multi-user capability for the first time by utilising all the cost benefits associated with micro computer manufacture, allied to innovative and exclusive new technology. The same benefits apply to software, the MUSE operating system allows use of the complete library of CP/M and MP/M compatible software.

Zeus – from 1 to 64 user multi-processor systems.

Millbank Computers

Millbank House, Amyand Park Road, Twickenham TW1 3HN. Telephone: 01-891 4691

CP/M and MP/M are registered trademarks of Digital Research, Inc. ZEUS and MUSE are trademarks of OSM Computer Corporation

Why buy a matrix when all you need is a typewriter? David Jacques checks out the Olivetti Praxis.

The practical Praxis



Kieren Phillips

Home word processing is now quite common and is mostly done by tacking dot-matrix printers onto home computers. But despite the lack of publicity, cheap daisy-wheel printers are now a realistic proposition for those looking for a word processor that can produce letter quality output.

I purchased my BBC Model B early in 1982, and at that time converters which would turn the Olivetti Praxis portable electronic typewriter into a printer were appearing in the computer press. I bought a package manufactured by Vertical Data Systems of Ontario from Datarite Terminals.

You need a monitor rather than a domestic television set to see the 80 characters per line you get on A4 size paper, and of course you also need a good word processing program.

I chose an early version of Wordwise from Computer Concepts.

I already had a tape recorder, so acquisition of Wordwise meant I had a word processing system for about £1,150:—

BBC model B	£399.00
12in monitor	£103.50
tape recorder	£50.00
Wordwise ROM	£46.57
converter	£221.38
soldering	£25.00
Praxis 30	£295.00
TOTAL COST	£1,140.45

The Praxis is now cheaper, and £1,100 would be nearer the mark today.

The Wordwise chip plugs into one of the sideways spaces on the Printed Circuit Board. It therefore takes no memory, and is accessed by typing *WORDWISE. A full range of commands can be given by

entering and leaving another mode, through pressing function keys f1 and f2. The editing commands are by and large excellent, and you can use the function keys to make up your own. These keys are worth using whenever there is anything repetitive.

Some useful information is given at the top of the screen. On the left hand side there is a word count, and on the right there is a countdown of how many characters are still free.

The greatest limitation is simply the computer's memory. Worldwise gives you 27,378 characters, and this is only about 4,500 words. At about 2,000 words it becomes impossible to display the text at 80 characters/line. Then, as the memory becomes very full, commands to move a lot of text are refused.

As a printer, the Praxis is much slower than those attached to office word processors. It takes about ten minutes to type 500 words, which is the number on a single spaced page of A4 paper.

There is also no automatic feed, and it's hard to get down to anything else if you have to return at intervals to feed the paper in.

But a more serious problem with my Praxis is that it can fail on occasion. For example, it may repeatedly print two or three characters in gibberish instead of text — this tends to happen on starting up. The only answer is to switch off to clear the cobwebs out of the Praxis's tiny brain.

It can also just seize up during printing. Once again, the only answer is to switch the Praxis off, but on these occasions you have to return to edit mode to move or delete the text successfully printed out before the seizure.

The BBC keyboard differs from the Praxis in several respects. First, the Praxis lacks some of the BBC's symbols, despite the great number allowed by the Keyboard 1/Keyboard 2 manual switch. It cannot print any of the ASCII symbols without equivalents in Teletext, nor greater-than/less-than signs, nor twin vertical bars, nor the Teletext arrows.

Second, many of the symbols are printed as other symbols. For example a dollar sign will print out as '¼' (see table below).

A Wordwise text of 27,378 characters would be 107 (Hex 6B) blocks long, and at three seconds per block this amounts to five minutes 35 seconds. The tapes to use are thus C12s, which give six minutes on each side. The best method of checking that saving has been successful is to CATalogue (*).

27,378 characters would be about 4,500 words. Although this is the theoretical capacity of Wordwise, it is more sensible to keep the text on any one tape down to 2,000 to 2,500 words. Beyond this previewing at 80 characters is not possible, and the saving and CATalogue procedure becomes boring, especially when SAVEing errors happen.

Is it worth stepping up to disks? You can cut the SAVEing and LOADING down to seconds. However, if you consider that 12 minutes at the end of, say, two hours is only an extra 10 per cent, then £400+ seems a lot for a home user to pay.

The Praxis may be the Citroen 2CV of daisywheel printers, but it is still good value. I am also enthusiastic about the Wordwise chip. Both have their flaws, it is true, but I have now submitted a manuscript to a publisher, and my wife now writes articles on the processor.

The surprise is perhaps that no one has yet built an electronic typewriter like the Praxis with a word processing program, a processor and a decent memory built in.

(i) Keyboard (ASCII)	(ii) Screen (Teletext)	(iii) Printer (KB1)	(iv) Printer (KB2)
!	!	.	¼
#	#	£	£
\$	\$	£	£
%	%	%	
&	&	&	
=	=	=	+
~	~	¼	¼
{	¼	¼	¼
£	£	¼	¼
}	¼	¼	¼
@	@	@	!
+	+	+	!
*	*	*	!
<	<	.	2
>	>	.	2
—	—	—	—
]	→	½	½
/	/	/	¥

You'll find a complete spectrum of software at W.H. Smith.

The range of software available for the Sinclair Spectrum is to say the least, extensive.

So every month at W. H. Smith, we review the range with particular reference to presentation, challenge, excitement and value for money. And because we're quite severe it's a difficult job finally to arrive at a Top Ten. But as you can see, not impossible.

You don't have to take our word for it.

At W. H. Smith we stock the widest selection of Spectrum Software, so you can judge for yourself.

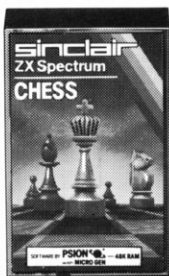


Flight Simulation
Sinclair
48K **£7.95**

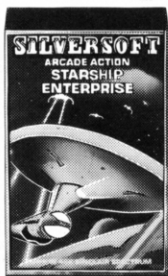


Penetrator
Melbourne House
48K **£6.95**

Title	Producer	K	RAM	Price
Arcade Games				
Meteor Storm	Quicksilva	16	£4.95	
Space Intruders	Quicksilva	16	£4.95	
Time Gate	Quicksilva	48	£6.95	
Gulpmen	Campbell	16	£4.95	
Spectral Invaders	Bug-Byte	16	£5.00	
Meteoroids	Softek	16	£4.95	
Planctoids	Sinclair	16	£4.95	
Hungry Horace	Sinclair	16	£5.95	
Space Raiders	Sinclair	16	£4.95	
Mazeman	Abersoft	16	£4.95	
Nightlight	Hewson	48	£5.95	
Ground Force Zero	Titan	16	£5.00	
Caterpillar	CDS	16	£5.95	
Leapfrog	CDS	16	£5.95	
Gobble-A-Ghost	CDS	16	£5.95	
Centi-Bug	DK Tronics	16	£4.95	
Cruising	Sunshine	16	£4.95	
Blind Alley	Sunshine	16	£4.95	
Derby Day	Computer Rentals	48	£5.95	
Jackpot	Computer Rentals	48	£4.95	
Escape	New Generation	16	£4.95	
Gobbleman	Artic	16	£4.95	
Galaxians	Artic	16	£4.95	
Invasion Force	Artic	16	£4.95	
Sentinel	Ahacus	16	£4.95	
Cyber Rats	Siversoft	16	£5.95	



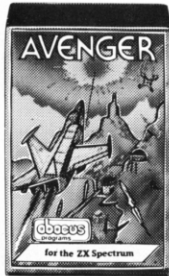
Chess
Sinclair
48K **£7.95**



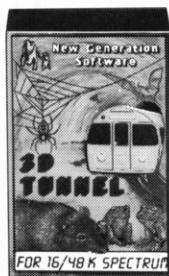
Starship Enterprise
Silversoft
48K **£5.95**



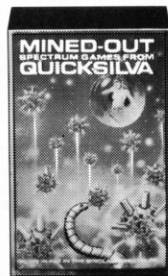
Horace Goes Skiing
Sinclair
16K **£5.95**



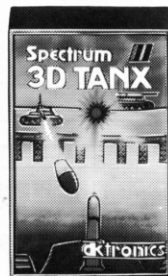
Avenger
Abacus
16K **£4.95**



3D Tunnel
New Generation
16K **£5.95**



Mined-Out
Quicksilva
48K **£4.95**



3D Tanx
DK Tronics
16K **£4.95**



Arcadia
Imagine
16K **£5.50**

Title	Producer	K	RAM	Price
Ground Attack	Silversoft	16	£5.95	
Orbiter	Silversoft	16	£5.95	
Slippery Sid	Silversoft	16	£5.95	
Strategy Games				
Battle of Britain	Microgame	48	£5.95	
Novotnik Puzzle	Phipps	16	£4.95	
Chess	Artic	48	£9.45	
Voice Chess	Artic	48	£9.95	
SuperChess II	C P Software	48	£7.95	
Football Manager	Addicive	48	£6.95	
Chess-The Turk	Oxford	48	£8.95	
Dictator	DK Tronics	48	£4.95	
Adventure				
Labyrinth	Axis	16	£5.95	
Planet of Death	Sinclair	16	£6.95	
Inca Curse	Sinclair	48	£6.95	
The Hobbit	Sinclair	48	£14.95	

Title	Producer	K	RAM	Price
Ship of Doom	Artic	48	£6.95	
Espionage Island	Artic	48	£6.95	
Rescue	Computer Rentals	48	£5.95	
The Orb	Computer Rentals	48	£5.95	
Transylvania Tower	Shepherd	48	£6.50	
Utility	Oxford	16	£9.95	
M/C Code Test Tool	Oxford	16	£9.95	
Editor/Assembler	Softek	16	£14.95	
Compiler	C P Software	48	£6.95	
Soft Talk II	C P Software	48	£6.95	
Family Games				
Reversi	Sinclair	16	£7.95	
Othello	CDS	16	£5.95	
Golf	R and R	16	£3.75	
Conflict	Martech	48	£11.95	
Test Match	Computer Rentals	48	£5.95	
Backgammon	C P Software	48	£5.95	

Title	Producer	K	RAM	Price
Draughts	C P Software	48	£6.95	
Practical				
Vu-Calc	Sinclair	16	£8.95	
Vu-File	Sinclair	48	£9.95	
Vu-3D	Sinclair	48	£9.95	
Collectors Pack	Sinclair	48	£9.95	
Club Record Controller	Sinclair	48	£9.95	
Address Manager	Oxford	16	£8.95	
Finance Manager	Oxford	16	£8.95	
Diction	Custom Data	16	£4.75	
Program Collections				
Shiva Special I	Shiva	16	£5.95	
Over The Spectrum 1	Melbourne House	16	£5.95	
Over The Spectrum 2	Melbourne House	16	£5.95	
Over The Spectrum 3	Melbourne House	16	£5.95	

WHSMITH

Prices correct at time of going to press. Subject to availability. At selected branches only.



SYSTEMATIC

BUSINESS COMPUTERS

For people with second thoughts about computing

**OSBORNE ACT SIRIUS EPSON
LSI DIGITAL MICROSYSTEMS**

Systematic Business Computers Limited, Ambersham House, 45 Woodbridge Road,
Guildford, Surrey, GU1 4RN. Telephone: Guildford (0483) 572222

**South London's Largest
MicroComputer
Centre**

VISION STORE

STOP PRESS IN STOCK NOW

Oric 1 48k.....**£169.95**
Commodore 64.....**£339.95**
Dragon 32.....**£199.95**
BBC Model B.....**£399.95**

Sinclair Spectrum 16K...**£124.95**
Sinclair Spectrum 48k...**£174.95**

P&P FREE. Immediate despatch on receipt of order
or come and collect over the counter.

VISION STORE

**3 Eden Walk Precinct,
Kingston-on-Thames, Surrey.
Tel: 01-546 9874**

To: Vision Store, 3 Eden Walk Precinct,
Kingston-on-Thames, Surrey.

Please supply



I enclose my cheque for £.....
or charge my Access/Barclaycard No.....
Name..... Signature.....
Address.....

Chris Pointer, who has lived with the tiny PC-1251, shows some of its nice little touches.

The calculator is growing up, and now a plethora of new hand-held machines are desperate to be crowned with the title of computer.

The battery-powered Sharp PC-1251 is no exception. At £180 for the rechargeable CE-125 microcassette drive, printer and pocket computer, the PC-1251 costs about the same as many 'real' computers.

It has 4.5K RAM, and the purchase price includes a suite of 20 programs. The machine itself combines calculator-style functions with several unique portable features.

You can define no fewer than 18 keys in the Shift mode — allowing you to allocate various Basic words, functions or small programs to those keys. In the machine's DEF mode, the same keys can be used to label lines of programming. You can enter a number of program routines with labels and then select and execute one of the routines.

You could use the DEF key to label and store a VAT routine under the label V. After that, you can RUN the VAT program by pressing V, because the PC-1251 has a non-volatile memory that doesn't forget the labels every time you turn the machine off.

The labels can be used to call sub-routines, or as programs are SAVED on tape. Extended program names can also be used — for example, you can label, SAVE and LOAD the program VAT, then RUN VAT.

Once you've figured out what all the keys do, you can begin programming. You'll notice that the PC-1251 will accept program lines up to 80 characters long and that multi-statement lines of the type 10 A=1:B=2, PRINT A+B will be executed without any trouble.

Your listings can be viewed on the PC-1251 display using the cursor controls to move the display window. When the program halts, the line at which the program halted can be displayed, showing the last statement.

The key to programming lies in the PC-1251's ROM, and there are lots of little goodies locked up in the machine's operating system that would make even owners of larger micros envious.

PEEK and POKE are accepted, as is CALL. Using the PEEK and POKE facilities, you should be able to write Renumber and Line Delete software for the machine. The PC-1251 also accepts abbreviations, including ER for ERROR; DEB for DEBUG; OF for OFF (although that 'abbreviation' isn't any shorter); CA for CALL; RO for ROM and K for KEY.

If you spend the extra money (about £100) for the CE-125 microcassette and printer unit, you'll have a miniature version of the average home computer system.

The PC-1251 automatically stops and starts the microcassette under remote control, although it can of course be operated manually. The microcassette can be used to store programs, data, variables and reserve memory. Programs can

A Sharp little operator

Four short routines which will give you an easy way of handling a range of tasks on your PC-1251.

These routines occupy only 459 bytes, leaving 3,027 bytes for other programs. The programs sit above line 900 (the maximum line number on the PC-1251 is 999). The programs can be called using the DEF key and their labels.

Value Added Tax

The VAT program labelled V, lines 953 to 971, calculates VAT paid on purchase/bills and from an input of purchase price displays price paid, VAT, price (value) less VAT, total for purchases entered and total VAT paid for those purchases.

Currency Conversion

The currency conversion program labelled H, lines 973 to 983, was written for pounds to guilders (HFL) or vice versa. The PC-1251 requests P Input for £s to HFL; H for HFL to £s, requests exchange rate HFL to the £, value to be exchanged. The exchange result is then displayed. This could be altered for other currency exchanges. But remember, the value must be expressed to the pound.

Cheque Book

The cheque book program labelled C, lines 993 to 999, requests cheque values and totalises withdrawals.

Shares

The share program labelled S, lines 985 to 991, requests share name, number held and current price per share. The name and total holding value are displayed as the result.

Program Lines 1 to 12 use PEEK to examine and display 20 bytes of memory. The top of the memory address range seems to be 64K (ie 65535) and ROM seems to be near the top of the memory map, although this is probably a reflection of lower memory. Finally line statements do not run into labelled routines.

```

1:A=2A16:A=A/2: WAIT 6
2: PRINT A
3:FOR I=A-20 TO A-1
4:PRINT I: PEEK I:
NEXT I
12:PRINT "END"
900:END : REM RESERVED
953:"V":S=0:G=0
955:" ": INPUT " VALUE ?
":IT
957:G=0+T
959:V=T*.15:N=T-V
961:S=S+V
963:WAIT 360: PRINT "VAT
":V
965:PRINT "VALUE="+*VAT=
":N
967:PRINT "TOTAL="+IG
969:PRINT "TOTAL"+* VAT=
":IS
971:GOTO "Y
973:"H": INPUT "P=POUNDS>H
":L:=HFL>PDS "?:P
975:INPUT "EX-RATE "?:E
977:INPUT "VALUE "?:N
979:IF P="H" THEN PRINT
":HFL="+N/E
981:IF P="H" THEN PRINT
":PDS="+N/E
983:GOTO "H"
985:"S": INPUT "SHARE NA
":E 7 LETTERS?" :IS
987:INPUT "NO. HELD "?:N
988:INPUT "PRICE NOW "?:P
989:PRINT S$:" VALUE="+P
*:N
991:GOTO "S"
993:"C":T=0
994:" ": INPUT "CHEQUE V
":ALUE "?:V
995:T=T+V: WAIT 360
997:PRINT "VALUE="+V
999:PRINT "TOTAL="+T:
GOTO "Y"

```

GET MORE FROM YOUR 64. WITH VIZAWRITE 64.

ONLY

£69 plus
VAT

THE PERSONAL WORD PROCESSOR

Vizawrite 64 is a high performance, low-cost word processor designed especially for the Commodore 64 computer. Vizawrite 64 takes full advantage of the colour, graphics and memory capabilities of the computer to bring you the power and style of a dedicated word processor.

Serious word processor users expect their word processor to format their text as they type,

Vizawrite 64 does this instantly. Tabs, indentation, centering are all clearly visible and easily altered, so you know exactly the format of your text all the time.

Vizawrite 64 is a disk-based word processing program — it is available NOW from your local Commodore dealer or direct from Viza Software. It costs just £69.00 plus VAT (£79.35).

VIZAWRITE 64 — SPECIFICATIONS

- Page based — formats text instantly, as you type.
- Format line to control margins and Tab stops.
- Full range of graphic word processing symbols.

- Full scrolling.
- Merge other documents into current document.
- Search for and selectively replace a phrase.

- Multi-line Headings and Footings.
- Mail Merge for names, addresses and labels.

- Go to selected page number.
- Function keys to page forwards, backwards.
- Go to next screen, previous screen.

- Automatic left margin indentation.
- Underlining and emboldening.
- Copy, Move, Delete any part of text.

- Tab Stops, Decimal Tabs, Centering.
- Justified printing.
- Full control over pitch, line spacing.

- Merge other texts directly into document — including Wordcraft, Wordpro, Silicon Office.
- Selectable colour modes.

- Supports virtually any printer — VIC, EPSON, QUME, DIABLO, SPINWRITER.
- No interface required for parallel printers.



SOFTWARE

VIZA SOFTWARE, 9 MANSION ROW,
BROMPTON, GILLINGHAM, KENT ME7 5SE.
TEL: MEDWAY (0634) 813780.

Dealer enquiries welcome.

OUT THIS MONTH — VIZASPELL 64.
£59.00
+ £8.85 VAT
A 90,000 word Dictionary
for spell checking
your
documents

also be merged with those already in memory so that memory contents are not overwritten.

The CE-125 printer uses thermal paper and produces 25 characters per line, all in upper case. It is threaded using the paper advance button, but the printer paper should be handled carefully as finger prints don't make program listings any easier to read.

The microcassette and printer unit (into which the PC-1251 fits) is no bigger than a large paperback book, just a little over pocket size.

The CE-125 also includes a low battery

indicator, an external cassette recorder input for loading ordinary cassette software. The recorder lead is supplied, so this shouldn't be a problem.

The four routines shown on page 25 are for business and home use, and demonstrates the machine's capabilities.

The PC-1251 has great potential, but has some limitations. String variables can only be declared seven characters long, while character arrays can be 255 characters long.

On the hardware side, the micro looks and feels well engineered but a slide switch is used to select mode (RUN, Program and

Reserve), which is a little tedious — it would be easier to use the keyboard, as on the PC-1500.

But these limitations are far outweighed by the advantages of the PC-1251.

In addition to software supplied with the CE-125, Sharp's PC-1211 software should be compatible or modifiable. One company in the US has already launched circuit analysis software on microcassette for the new Sharp machine.

It is early days yet, since the PC-1251 was launched on the UK market only in January. I wonder how many portables will be launched this year? They'll need to be good to match this one.



That amazing little window

Coming from 'real' computers like the Apple II and the BBC Micro to Sharp's little PC-1251 pocket computer made me feel very old.

Not only had middle-age stiffness set in prematurely in my knuckles as I tried to press the Sharp's little keys, but the small LCD screen tricked my apparently senile mind into thinking the machine wasn't very powerful.

Screen

Although I later decided the key size was Sharp's problem and not mine, I remain amazed at how much the little LCD screen can take. It will display a program line up to 80 characters long, using a scroll-across 'window' on the line, 24 characters at a time. Not only does it display across, but you can also move the screen up and down, making it simple to review a program quickly.

The inventive screen layout allows you to see what the machine is doing at any time by the five messages on the top line. 'Busy' tells you the machine is working on something, 'P' indicates that you can immediately output to the printer, 'DEF' lets you access the programs stored on your user-defined keys, 'DEGRAD' tells you whether your angular movement outputs are being expressed in degrees, radians or gradients, 'Shift' indicates your characters will be shifted while 'E' indicates an error.

I had a minor quibble with the Shift key,

as there is no shift lock and you must press Shift before every character you want to shift.

The 18 user-defined keys designated by the grey area at the bottom left-hand corner of the machine provide immediate access to common programs and routines that I had not expected to find on a £90 pocket micro.

Memory

The computer's non-volatile memory makes the key definition an even more useful tool, as you can permanently program useful routines into certain keys without having to download them every

time you use the machine (although you can do it that way if you buy the CE-125 printer and cassette unit). The machine's soft break key is well placed and nowhere near as dangerous as those on most micros. Because the PC-1251 has memory safeguard, you won't lose your whole program by hitting break. Break will interrupt only the work you are executing at the time you hit it and it will only work in Run Mode.

Overall, the PC-1251 seems to be a well-designed and useful little machine. Certainly the small keyboard is a limiting factor, but this has been traded-off, rightly, against portability.

GW

SPECIFICATION

Price:	£91.95 inc VAT.
Processor:	8-bit CMOS CPU.
RAM memory:	System 500 bytes, program/data Area 3.4K, reserve 48 bytes, fixed memory area 208 bytes.
ROM memory:	24K.
Text display:	24 character LCD with 5 × 7 dot characters.
Keyboard:	52 calculator keys including alphabetic, numeric, special symbols, and numeric pad.
Interfaces:	CE-125 printer/cassette unit, external cassette interface on the CE-125.
Storage:	Ordinary cassettes or Sharp microcassette.
OS/language:	Basic.
Manufacturer:	Sharp Corporation, 061-205 2333.

Ted Ball tries a cassette which — for the programming orientated user — peps up the pixels.

Hi-res taped for ZX81

The standard ZX81 screen, with 32 × 22 characters or 64 × 44 pixels, does not allow sophisticated graphics. However, with Computer Rentals' High Resolution tape you can now get 256 × 192 individually plottable points on the screen. The high definition is produced entirely by software and needs no extra hardware except a 16K RAM pack.

Features

High Resolution sets up an extra display file using 6K of memory to hold the graphics. The program provides eight commands which you can use in your own Basic programs with statements of the form LET ZZZ = USR address.

These commands allow you to clear the high resolution screen, invert the screen (changing black to white and vice versa), display the normal screen, save a display file on tape and load it back, print a 'mini-character' of eight dots, or plot/unplot a single point.

Only the PRINT and PLOT commands actually contribute to producing graphics, which means you need to do a lot of work to build up anything more than simple graphs and diagrams. A package of this type really needs higher level commands which would allow you to draw lines, circles and other shapes easily.

Another feature I would like to have seen is a command to copy the high resolution screen onto a Sinclair printer.

Presentation

The cassette is clearly labelled with the names of the three programs on the tape; the high resolution toolkit itself, and two demonstration programs which draw sine curves and a three-dimensional exponential graph.

The documentation consists of a neatly printed 44-page booklet the size of the cassette box, with the left-hand pages blank for notes. The instructions give a comprehensive explanation of the commands and how to use them, and also how to deal with some of the problems you may find while using the toolkit.

The booklet also includes some useful Basic programs and subroutines which give you more help in using the package.

In use

You need to read the booklet and try out the examples before you start writing your own programs. It takes a little while to get used to the commands as you have to make sure you get everything in the right order, but there is really not a lot to learn.

It is easy to draw simple line diagrams and graphs, but more complicated figures can be difficult because of the way the high resolution screen is organised.

Although all the 256 × 192 points can be set to black or white they cannot be set independently. The basic elements of the

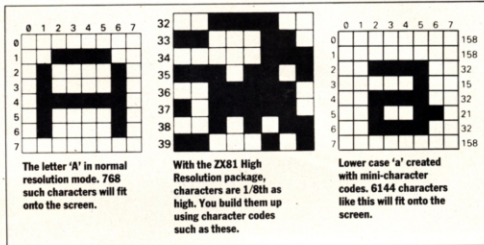
display are actually what the booklet calls 'mini-characters' — rows of eight dots.

In order to get full 256 × 192 resolution you need 256 different mini-characters, but only 128 codes can be used and the mini-characters corresponding to these codes are not all different.

The PLOT command automatically selects the mini-character nearest to what you want but it may not be possible to get

typing mistake, this also saves you having to look up command addresses all the time.

You also have to be careful to set RAMTOP according to the instructions before you load High Resolution, as otherwise any attempt to use it will crash the machine. The two demonstration programs test RAMTOP and give you an error message if it is not in the right place, but the high resolution toolkit does not,



all the fine detail you want, and even if it is possible it has to be worked out carefully in advance.

The graphics are rather slow. For example, drawing a straight line from one corner of the screen to the opposite corner takes about 45 seconds in SLOW mode, and the demonstration program that draws the three-dimensional graph takes about eight minutes in FAST mode.

Using Basic to call the high resolution commands is much too slow to make moving graphics possible. One of the example programs in the booklet produces a space invader figure and moves it around the screen in response to the cursor keys. The booklet describes the movement as 'rather sluggish' but it is really painfully slow — you can see the figure being wiped out line by line and redrawn in the next position.

The booklet does say that 'with machine code, movement would be as good, and probably better, than when using the normal screen', but I was not able to try this.

Reliability

You have to use the program carefully to avoid crashing it because all the commands are accessed by USR calls and any mistakes in typing the addresses can crash the program.

You can save a lot of trouble by using meaningful variable names for the command addresses, starting your program with 10 LET CLS = 16790 etc. and then you can use the commands in the form LET ZZZ = USR CLS. As well as making it less likely to crash the program through a

although you could add this test for yourself.

Verdict

The better your programming ability the more you can get out of High Resolution. If you are restricted to Basic you will be able to generate static displays which can contain a lot of detail, but to get full value and produce reasonably fast moving graphics you need to write machine code.

The high resolution commands can be translated directly into machine code, and if you have some experience with it you should not find it difficult to use the package from your own machine code programs.

On the whole, High Resolution is a worthwhile program and does almost the same job as hardware add-ons which are advertised at prices up to £50. However, its speed and usefulness are restricted by the limited number of commands provided.

A few more commands, allowing you to work with larger blocks than points or 'mini-characters', would probably make moving graphics possible from Basic.

RATING

Features	—	■	■	■	■
Documentation	—	■	■	■	■
Performance	—	■	■	■	■
Useability	—	■	■	■	■
Reliability	—	■	■	■	■
Overall Value	—	■	■	■	■

Name High Resolution Application High resolution graphics **System** ZX81 with 16K RAM **Publisher** Computer Rentals **Format** Cassette **Language** Machine code.

STARTECH

Absolutely
the lowest
prices!

STOP PRESS

16k RAM EXPANSION £28.95

- ATARI NEWSLETTER
- VIC 20 PRODUCTS
- COMMODORE 64
- ATARI PRODUCTS

All prices subject to
availability or change without notice.

PLEASE SEND ME

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

(24hr. ANSAPHONE SERVICE)

Name

Address

I enclose Cheque, P/O for

CREDIT CARD ACCESS BARCLAY CARD

PCN.1

STARTECH

208 Aigburth Rd, Aigburth, Liverpool L17.051 727-7267

Bottom Line Strategist promises to help you develop business strategies. John Wadkin tots it up.

Invested interests

According to the publisher dBase II colossus Ashton-Tate, Bottom Line Strategist is "a business program for evaluating financial and marketing strategies . . . completely programmed and requires no programming knowledge . . . a tool for increasing productivity and maximising profit."

You will use it, claims Ashton-Tate, to develop or evaluate business plans or marketing proposals; assess financial risks or investment opportunities; price products or services; make budgeting decisions; analyse the profitability of projects; and so forth. Enter your key business assumptions, and the Strategist will show you how practical and profitable your project is likely to be, in graphs and in tables.

In short it tackles the same kind of problems as a spreadsheet. But a simple spreadsheet with a spot of business graphics thrown in Bottom Line Strategist certainly is not. It is a CPM package, and I tested it on the Apple II.

Features

You may feed in your assumptions about growth, marketing, advertising, costs, productivity, inflation and depreciation accounting, cost of capital, and pricing policy. You may review your assumptions, and print out a summary of them. You can compute the likely sales and profits of your venture, and you can examine, analyse and plot those results in a number of ways.

But you cannot enter any information about the reasoning behind the figures you enter to start the whole program moving, and you cannot alter the formulae the program uses to decide whether your business will succeed or fail, based on that crude input data.

Presentation

This software comes bundled up in a nice folder with two demonstration disks and a sealed pack containing the system disks.

The introductory manual — all 126 pages of it — is very thorough, but much of its content is easier to grasp by working directly from the demo disk. Too much of the manual is nothing more than a direct copy of the information given by the demonstration, with a handful of minor additions, while a few sections are poorly explained.

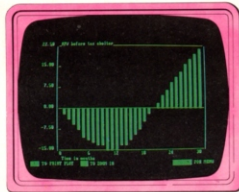
The glossary is an amalgam of computer-oriented references and a few of the commonest financial and business concepts.

The average businessman will be irritated by the latter, while computer experts will be similarly vexed by the former. Many of the definitions are over-simplified, if not banal, while others are academic and rarefied.

Getting started

Starting up is not straightforward, even though the manual suggests it is. There is no hint in the manual that the demo disk holds only the data for the first lesson. Lesson two is apparently only to be found on the sealed system disk.

You also need to be fairly familiar with CPM when starting up this package. A program of this nature — aimed at business people who are not necessarily highly computer-literate — needs to be friendly right from the start, and these first few steps do not give the right impression.



In use

You, the user, must assess the vital assumptions on which your business is based in detail, then enter accurate figures for those assumptions. That includes your beliefs about your market, productivity, financial costs and accounting concepts. In all, you need to look at eight aspects of your business before you can expect to get worthwhile results.

The central section of the manual deals with the typical layout of each screen you will encounter, and the meaning of each entry, but some of the entries are still not clearly explained. I found myself almost having to guess at the order of the options on the method of depreciation, for example.

All in all, though, the sequence of inputs to the assumption tables and the outputs available is well thought out. There is a HELP facility which you can call up at various times, to get more detail on what options are open to you.

The tables generated by Action 3 are helpful, but I feel you really need to print them out, if they are to be properly readable. There is no automatic pause at the end of each page on the screen — the figures are continuously scrolled.

Graphing the tables, with Action 4, gives you a menu with a further 14 options. There is a convenient facility for "zooming in" and out on the X or Y axis by a factor of two each time. But there seems to be no way to retain the plot on the screen, so it is essential to use the printer regularly during this phase. The axes stay, but the plot is temporary.

It would also be very useful to be able to plot and calculate three related sets of figures together — the likeliest, optimistic and worst figures for each possibility. BLS doesn't let you do this.

But it does have compensations, in the form of some pretty sophisticated functions. The manual mentions price elasticity as well as sensitivity, and risk analysis, though it does not make it clear how the BLS is to extract the relevant data.

I found BLS quick in its response when new data is input, though amendments take rather longer. Ashton-Tate also seems to have taken care to make the program crashproof, and the error codes within the system are informative.

Verdict

Once you have got over the initial hurdles to your understanding this package is quite user-friendly — indeed, parts of it are almost idiot-proof.

There are a number of concepts used which may not be relevant to the British user in the same way as they are to American companies; and some terms are poorly explained in the glossary, or even not explained at all.

The BLS could be a valuable tool for planning and assessing investment opportunities. But it is not particularly flexible beyond the limits of the figures you input to its assumption tables. And those figures themselves are wide open to misuse since, as with most models of its type, BLS uses relatively crude input figures to produce highly detailed and accurate results.

This can be highly misleading, and there is little emphasis on this in the manual.

RATINGS

Features — **AAA**
 Presentation — **—**
 Performance — **AAAA**
 User interface — **AAAA**
 Reliability — **AAA**
 Overall value — **AAA**

Name Bottom Line Strategist **Application** Business strategy evaluation **System** CPM 2.2, 64K. **Price** £316.25 **Publisher** Ashton-Tate **Format** Disk **Other versions** Apple II, MS-DOS, CPM-86 **Outlets** Pete and Pam Computers 01-769 1022/34.

PaperClip offers word processing at a budget price. Karl Dallas compares it to WordPro.

PaperClip's prose

PaperClip is a Canadian word processing program with many of the facilities of the much better known Commodore-based WordPro series. But it also comes complete with a stack of extra facilities such as the ability to move, format and sort columns of data, create contents tables, and use sophisticated printer set-up procedures.

It's quite a bit cheaper than WordPro, so even though it will memorise and manipulate considerably less text, it is worth while for Commodore users to take a look. It's also one of the first word processors on the spanking-new Commodore 64, but I tested the Commodore 8000 version.

Features

PaperClip has a mass of commands in common with WordPro, often using the same command key sequences. You can: insert blank line, delete line, print variable block, fill variable block from disk file or, in Wordpro, from extra text, set tab, set numeric tab on decimal point, clear tab, clear numeric tab, clear all tabs, exit to Basic, delete word/sentence, set range, move range, erase range, save range as disk file, duplicate (copy) range, find string.

The list goes on to include search string and replace, output to printer and output to video (all local and global), column add/subtract, screen read to status line, insert text mode and append text from disk file.

Some common formatting commands are:

Left and right margin, paper length, page length, right align, justify (with spaces between words), centring, page headers and footers (numbered), line feed, margin release, underline, force page, vary line spacing and (with some printers), use bold print.

So much for the things PaperClip has in common with WordPro.

Among its extra facilities are:

Verify **SAVE**d data file with text in memory, directory of both drives, change text between caps and lower case, change printer/disk device number, clear all non-numeric tabs, set italics, **SAVE** text as sequential file, **LOAD** sequential file, change line-length (plus horizontal scrolling), set/move/delete/erase/shift/repeat/sort column.

You can also **SAVE** to and **LOAD** from cassette as well as disk.

Presentation

The program comes on disk, with a clearly written, but unindexed manual of 112 pages, and a security chip which has to be fitted into socket UD11 on the main CPU board. This socket is normally vacant, unless another WP program is in use (VisiCalc-type programs usually use the neighbouring UD12 socket).

In use

LOAD and **RUN** in the normal way, and in a remarkably short time it is ready for text input. In addition to the format lines, which indicate cursor position by line and column and any special commands being inputted, it loads an initial blank line, which can be used for formatting.

Like WordPro, PaperClip is what is known as a 'post-formatted' system, which means that what you see on the screen as you type is definitely *not* what you get.

Typing is wrapped round from the end of one line to the next, taking no account of breaks between words, so that a five-letter word (like 'seven', for instance), may be broken with 'se' at the end of one line, and 'ven' at the beginning of the next.

This can be confusing at the start, but I have never found a typist who couldn't get used to it, while people (like me) who look

at the keys rather than the screen hardly notice it at all.

There is an 'output to video' option which allows the writer to view the file(s) on screen as they will be formatted for print, before printing hard copy. This is also useful when wishing to begin printing from the middle of the document, because it is possible to scroll through the unwanted pages fairly fast on the screen, switching to print-out at the appropriate page.

The column-formatting facilities, coupled with the capability to scroll horizontally across a page of from 80 to 126 characters wide, will probably appeal to those whose work is largely financial, giving a sort of simple VisiCalc facility.

The 'what if?' capability is limited to addition and subtraction, of course, and no formulae can be incorporated, but totals can be printed out at any pre-determined place, not merely at the bottom of columns of figures.

Sorting allows lines of text to be rearranged into alphabetical order, numerical or chronological, defining any particular column as the key field, and thus making it a fairly primitive database (though not so primitive bearing in mind the find and search/replace options).

Names and addresses could be created within the program, sorted into alphabetical order, and then **SAVE**d as a sequential file, allowing them to be accessed by a simple label printing program (they could also be printed from within the PaperClip program, of course).

WordPro text files can be called up and edited from within the PaperClip program, and vice versa, but since both programs have security chips in socket UD11, a socket switching device would be needed to use both on one machine.

The Commodore 64 version is protected by a dongle fitted to control port 1 which can be changed much more easily.

Verdict

PaperClip seems to perform pretty well. Its ability to cope with WordPro files should be a good selling point, despite the slight hitches you run into when moving between the two.

The main problem with PaperClip is its limited text memory — and that will be a real black mark as far as many users are concerned.

Nevertheless, at a cheaper price than WordPro, its extra facilities might make it more attractive if length of text in memory is not a prime consideration.

PAPERCLIP

has

114 lines of text = 9,120 characters

28 printer set-up options, plus user-

definable set-up program

LOAD/SAVE sequential files

VERIFY SAVEd file with file in memory

Both drives directory

Set, move, kill (erase) phrase, change

case of phrase (caps to l/case and vice versa)

Change disk, printer device number

Set, move (transfer), shift over, delete,

erase, insert before, and repeat columns

Set decimal point 0-38 places or floating point

Add row as well as column

Change line-length (40-126 columns on

40-col screen, 80-126 on 80-col screen)

with horizontal scrolling

Super/Subscribe begin and end for

multiple characters

Italics on/off

Indent with $1m+n$ command, reset by

$1m+0$

Link during print from within text to file

on disk, defined after user prompt

Switch from sheetfed to continuous

print during print, and vice versa

WORDPRO

has

Extra text facility

142 lines of main text + 23 lines extra

text = 13,200 characters

Selective directory of one or both drives

Directory displayed in four columns on

screen

Go to Line n

Print to disk (permits subsequent use of

keyboard during hard copy print out)

Global copy of linked text files from

one drive to another

Name PaperClip **Application** Word processor
System CBM 8000 series **Price** £171.35 **Publisher**
Batteries Included, Toronto **Format** Disk
Language Assembler **Other versions**
Commodore 64 (£98.90), Commodore 4000
 (£148.35) **Outlet** Kobra Micromarketing



MICROWAVES

Got a tip? Send it to PCN and get a cash reward. £5 for every hint printed.

If you've got something to crow about... a bit of magic that'll make the world a better place for micro users, then send it to PCN Microwaves—our regular readers' hints and tips page. We'll pay you £5 if we print it. We'll pay you even more if your little gem gets our vote as microwave of the month. Think on... and write to Microwaves, PCN, 62 Oxford Street, London W1A 2HG.

Neat numbers on the ZX81

Here's a useful subroutine for printing numbers neatly on a ZX81 screen. The subroutine displays the number (contained in A) rounded to two decimal places and lined up at column B.

```
900 LET AS = STR$(INT((A+.005)*100)/100)
910 LET AS = AS + ("."O" AND VAL AS = INT VAL AS)
920 LET AS = AS + ("."O" AND AS(LEN AS - 1) = ".")
930 PRINT TAB(B-LEN AS):AS
940 RETURN
John Conway,
Winton, Blaydon-on-Tyne
```

Lynx scroll discovered

The Lynx, which everyone seems to think cannot scroll, has hardware which enables some very complex scrolls to be achieved. Using the OUT command, the screen can be moved in any direction.

The Z80 I/O port 86 hex seems to control the direction, and port 87 hex the distance, of the scroll. For example:--

```
OUT &0086,12
OUT &0087,A
moves the screen 3*A lines above its normal position, while
OUT &0086,13
OUT &0087,A
will move the screen left by (A MOD 64)*4 pixels and up A DIV 64 lines. You can use these ports to scroll the screen upwards:--
```

```
10 REM Scroll demo
20 REM initialise scrolling
30 GOSUB 1000
50 REPEAT
60 PRINT "HELLO"
70 GOSUB 2000
80 UNTIL FALSE
90 END
```

```
1000 REM initialise scrolling
1020 CLS
1030 LET A=0
1040 OUT &0086,12
1050 OUT &0087,1
1060 RETURN
2000 REM Scroll 1 line
2010 OUT &0086,13
2020 OUT &0087,(A MOD 3)*64
2030 OUT &0086,12
2040 OUT &0087,INT(A/3+1) MOD 8
2050 LET A=(A+1) MOD 24
2060 RETURN
James Key,
Deighton, York
```

Deaden Oric's decibels

If you make an awful noise while programming your Oric 1, you'll need a quick way of turning the sound off. If the keyboard blip is on, simply press a key. If the blip is off, just type CTRL-F twice. Instant silence!

Barry Merrick, Egham, Essex

Play dirty at Planetoid

An undocumented *FX call on BBC MOS version 1.0 onwards is *FX 210,X. If X is 1 then the call will switch off all sound output. *FX 210,1 turns the sound back again.

Anyone who wants to get a really high score at the cassette based version of Planetoid could do worse than swallow their pride and try the following:--

```
Press [BREAK]
enter PAGE=&3C00[return]
LOAD "Planet 1"
[return]
```

When the program is loaded, enter:--

```
150 ?&276B = &99[return]
RUN[return]
After loading the rest of Planetoid, the game should start with a generous 99 lives!
```

James Brisdon, Barnsley, South Yorks

Lighten those long LOADS

If you're using your BBC micro for word processing, you can get into problems with long documents. Use Wordwise and often LOAD only parts of long files. To do this, you need to know roughly where in the file the piece you want is. Then use *OPT 2,0 and fast forward/

rewind to read only the blocks that you want.

The BBC will LOAD just this part, corrupting only the first and last blocks. As a rough guide, you get around 50 words in a block.

Colin Cohen, London W11

Track programs on your TRS-80

Not knowing the name for a system tape on a TRS-80 means you can't LOAD it in. But this program, when RUN with the cassette recorder going, will print a 'U', then the program name.

The cassette recorder will stop, then you can type the name in and LOAD it normally. You don't even need to rewind the cassette. The program is:--

10 INPUT # -1,AS: PRINT AS
David Marchant, Egham, Surrey

Banish those Atari blues

If the Atari's blue screen annoys you, try entering the following commands before you start programming.

```
POKE 1536,141
POKE 1535,198
POKE 1538,2
POKE 2,0
POKE 3,6
POKE 9,2
```

Press RESET and the screen colour will become dark grey. The POKES write a small machine code program that is executed every time the machine is reset.

S C Bickle, Kettering, Northants

LYNX ROUND-UP

We've had so many hints and tips for the Lynx, it's time for a quick summary. There are seven commands in the ROM that do not work. Trying to use them gives the message 'Not yet implemented'. Here they are, with their correct syntaxes:--

```
PAINT X,X,X
USER0(X)=X
USER 1(X)=X
USER2(X)=X
USER3(X)=X
PRINT LIGHTPEN(X)
PRINT JOYSTK(X)
```

To see the LYNX command table for yourself, use the command H 11E0 from the Lynx monitor. Simon Brookes

points out that you can fully reset the Lynx by entering the monitor and entering G.

The Lynx does have single dimension string arrays. To use them, dimension the length of the strings in the array and then include the number of strings in brackets afterwards. So DIM A\$(20)(10) creates an array of ten strings, all 20 characters long. The elements are accessed with A\$(0),A\$(1),A\$(2) and so on.

There are no two dimensional arrays but these are easily simulated. To access a 5x4 array at the point X,Y, use a statement such as DIM A(20) followed by PRINT A(X+5*Y).

Clive Newton of Sutton Coldfield notes that you can't enter every ASCII character from the keyboard but you can get a few more (such as \,., and) if you put the keyboard in its 'graphics mode'. He included a routine which makes a new copy of the keyboard scanning routine where the square bracket keys generate square brackets with the shift lock on and arrows with it off.

```
10 RESERVE 40424
20 CODE 21 BD 09 11 4D 9E 01
A9 01 ED B0 21 AB
9F 22 EF 9F 21 4D 9E 22 B2
9F 21 DE 9E 22 62 9E 21 06 9F
22 85 9E 21 6F 9F 22 90 9E 21
42 9F 22 9B 9E 3E 5B 32 38 9F
3C 3C 32 3D 9F 3E 7B 32 A 1
9F 3E 7D 32 A6 9F 21 EB 9F
22 04 62 C9
30 CALL LCTN(20)
```

ZX81 ROUND-UP

Continuing our series on ZX81 ownership, Jonathan Rhodes of Eccleshill, Bradford cured the problem of faulty line feeding. The trick is to wind selftape around the black roller so that it is in firm contact with the paper roll.

Mark Forrest of Aughton, Lancashire has been even greater trouble. Three or four minutes' work will help stop Rampack wobble and tilt the printer, which often helps to improve its print quality.

Open the casing on the printer's plug by removing the two screws underneath. Then turn the card over so that its wires are effectively on the other side of the card. Carefully replace the casing upside down (with the screws upwards). You can then plug the printer into the ZX81 the wrong way round and sit the printer on top of the ZX81.



FROM
CONCEPT COMPUTERS LTD.

Sirius with dedicated word-processing Keyboard

- No need to remember to press a sequence of several keys to do a function. Just press one clearly marked key and the job's done.
- Over 30 keys specially programmed and engraved for Wordstar word-processing. We can even set up functions to your specification.
- Makes Wordstar really friendly and fast to use.

Graphics systems on the Sirius

- Generate pie-charts, bargraphs and multiple line plots in minutes with user-friendly Sirius graphics systems.
- Draw your raw data for graphical display directly from a supercalc or multipan work sheet.
- Produce hard-copy either on a matrix printer or a line-plotter.

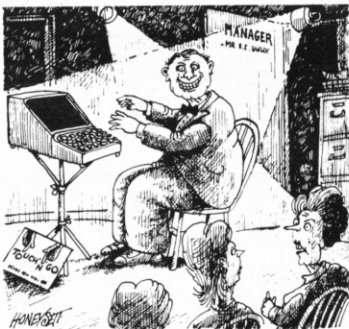
SIRIUS WITH 10Mb INTERNAL WINCHESTER NOW AVAILABLE!

Call us now for competitive quotation on your Sirius system

01-729 1800

Concept Computers Ltd.

445 Hackney Road, London E2.



"This is the bit where he gives it all ten fingers!"

Is your high-performance computer let down by your low-performance fingers? Touch 'n' Go will change all that. In just 24 hours you can master the computer's QWERTY keyboard and its numeric keypad. Forget boring drills and meaningless hieroglyphics. Touch 'n' Go introduces real words and phrases at the earliest possible moment. The computer gives you instant feedback on your performance and can even store the results for posterity. By the end of the course you should be capable of 40 words per minute

Why use two fingers when you have ten?

Touch 'n' Go is available from computer dealers and direct from Caxton for only £25 plus VAT. It is available in popular CP/M and MS-DOS formats. Please add £1 p&p when ordering direct.



Caxton Software Ltd 10-14 Bedford Street, Covent Garden, London WC2E 9HE

MORE FOR YOUR MONEY FROM KOBRA

COMMODORE 64 £299.00
EXC. VAT + £2.50 p&p

PLUS FREE COMMODORE CASSETTE DECK
VALUE £44.95 INC. VAT

COMMODORE 1541 DISKDRIVE £260.86
EXC. VAT + £2.50 p&p

PLUS FREE BOX OF TWENTY DISKETTES
VALUE £60.00 INC. VAT

COME & SEE THE MOST-UP-TO-DATE RANGE
OF 64 SOFTWARE IN
LONDON!

UP TO 50% OFF VIC SOFTWARE!*

* PERSONAL CALLERS ONLY

CALC RESULT

— new more powerful spread sheet for 8000 and 64

A new THREE dimensional spread sheet analysis package. This product includes up to 32 pages per model, with full page consolidation features, advanced formatting of both the screen and printer, an easy to use HELP function, production of mathematical formulas, and BAR CHARTS on the screen and printer.

'8000'	£149.00	Plus £1 p.&p.
'64'	£94.00	Plus £1 p.&p.

PAPER CLIP

— fantastic value powerful wordprocessor for 8000, 4000 and 64

A very sophisticated word processing package that allows easy manipulation of text when creating or revising a document. The advanced features include horizontal scrolling of documents up to 125 columns wide, column manipulation for ease of moving, copying, replacing and adding or subtracting columns of data, alpha-numeric sorting with up to 16 levels of sub-division of the sort, high level printer support with a user definable printer feature selection facility for non-standard printers.

'8000'	£149.00	Plus £1 p.&p.
'4000'	£129.00	Plus £1 p.&p.
'64'	£86.00	Plus £1 p.&p.

FORTH

— for 8000, 64 and Vic

A powerful operating system and programming language. Forth is a flexible way to program and use a computer. Forth allows interaction, structural program development and will work in any number base. A Text Editor and Macro Assembler are included with the 8000 and 64 versions. Forth has nearly 400 words which can be written in Assembler. This Forth is standard fig forth with many extensions, including double precision arithmetic, file handling words (trig, functions and

powerful string package and searching also on the Commodore 8000 series version).

'8000'	£179.00	Plus £1 p.&p.
'64'	£30.00	Plus £1 p.&p.
'Vic'	£33.00	Plus £1 p.&p.

PAL 64

— Personal Assembly Language for the 64

PAL 64 is the first truly sophisticated machine language assembler available for the Commodore 64 and includes a machine code monitor. Written by Brad Templeton, PAL takes only 4K bytes. In this way the PAL can reside in the machine so that it fits into the BASIC environment the PET owners know so well. Features include pseudo codes and labels, mnemonics, decimal and hexadecimal entering.

'64'	£69.00	Plus £1 p.&p.
------	--------	---------------

POWER 64

— programmers aid for the 64

Power 64 is for the adventurous programmers. A series of programming aid tools in the same style as Power for the 4000 and 8000 series machines, but with extra features to make use of the full power of the Commodore 64!

'64'	£69.00	Plus £1 p.&p.
------	--------	---------------

REL

— control relay for Vic and 64

Light up with REL. REL is a control relay that plugs straight into the user port to give simple, programmable switching of electrical apparatus in the home, office or factory. Its six relay outputs can control devices and two inputs allow the Vic to read signals from external sources. REL eliminates black boxes full of wires and represents one of the most exciting value-for-money, firmware additions to any Vic or 64 computer system.

'64'	£30.00	Plus £1 p.&p.
VIC	£30.00	Plus £1 p.&p.

MAIL ORDER
CALLERS

KOBRA MICROMARKETING
P.O. Box 28, Henley-on-Thames, Oxon RG9 1PS
Please add VAT at 15% plus p & p.

THE VIC CENTRE
154 Victoria Road, Acton, London W3
Telephone Sales: 01-992 9904

The Scorpio 8 is gunning for the Winchester mass storage market. Francis Monkman has it covered.

Fast on the draw?

When I was asked to review the Scorpio 8 disk system (for Apple II), I had already expressed an interest in the product.

It seems to have a long going for it while cheaper 5.25in Winchester drive prices seem to have levelled out (I am thinking of around £1,200 for a 6 Mb drive with controller, interface and software). Why not develop a new 'super-floppy', borrowing the Winchester concept of stacked platters, and cram each one with as many bytes (1.2 Mb) as the latest multi-density technology will allow? Bright idea, huh?

HAL's advertisement screams death (literally) to the Wild West Winchester that has, although expensively, opened up mega storage power to the micro.

Can Scorpio 8 make a dent in this new market? Or will the expected mini-mini Winchesters (micro-Winchesters?) take the price of mass storage so low that the floppy will just be the thing we hang on the front of the machine to exchange/install software?

I'll attempt to evaluate this product in terms of the maker's claims for it, as well as comparing it with the other two main alternatives: standard floppy and 5.25in Winchester.

Presentation

Physically, the Scorpio 8 resembles, not unnaturally, an oversized floppy drive. Presumably the extra length accommodates the unit's power supply, making the total weight about the same as an Apple. Construction is of metal, lending a robust appearance.

Hookup is via an impressive-looking controller card, originally destined for use with 8in floppies. The drive door, instead of the usual swivel-in-the-middle floppy arrangement, is a gate which swings down to reveal a slot big enough to hold five vertically stacked floppy disks in a special plastic cartridge.

Once inside the Scorpio individual floppies are grabbed by the mechanism when needed and dragged quickly into the drive. After being accessed by the read/write head they are slipped back into the cartridge.

This frantic activity is understandably accompanied by a series of strident clunking sounds.

These floppies can be swapped or replaced from the removable cartridge but there is one important point that you may have missed if you read the advert: these are not ordinary floppies.

There is a square cut-out to one side of the read area, which provides vertical alignment of the disks, and the write enable/protect cutout is now on the edge of the disk that faces the drive. You are also

warned not to use floppy hub reinforcers on Scorpio disks.

I am sure that disks are readily available, but this feature removes one of the immediate attractions of the unit as Apple users will have to duplicate many of their existing disks.

In Use

My experience on power-up, after some rather endearing clunks from the drive, began with the installation of the system software. This builds a version of DOS 3.3 which is then used to format the Scorpio.

Individual disks are formatted separately, which is obviously necessary but long-winded in the absence of a "0 = ALL" override to the prompt "DRIVE 1-5?".

Did I say format . . . ? Several hours, coffees, calls to Farnborough, and the removal of almost every other card in my Apple later . . . I try again. This time everything works, but be warned. Scorpio

uses DMA (direct memory access) to dump things in and out of memory quickly, and it doesn't like anything else that does.

Meanwhile, back at VFORMAT, things are progressing. Now the track/sector counter really does 'whizz by' like the manual says, instead of sitting glumly on zero while the screen spits random ASCII. All well, but I feel that the installation of a system should be made simple for the user, who may be a first-timer.

When it came to formatting for CP/M, I found myself having to invoke DDT in order to transfer installation files by block, although all this is clearly explained in the manual. If I'd had two floppy drives the thing would have been easier, but I think many potential customers will be considering a unit like this as an alternative to a second floppy.

Another point, which HAL has not properly considered is that in Apple DOS it is unnecessary to INITIALISE (format) a

FIGURE 1
Speed test for text file handling

	Disk II	Q/Charge	Scorpio 8	Q/Charge	Ice Winchester
BSAVE 32K	00:38.5	00:26.0	00:27.8	00:06.8	00:15.0
BLOAD 32K	00:32.7	00:09.2	00:25.0	00:03.6	00:10.8
WRITE	02:00.0	01:56.7	01:39.4	01:40.9	01:25.4
READ	01:50.5	01:50.4	02:47.7	02:08.0	01:33.9

	Disk II	Scorpio 8	Ice Winchester
WRITE	00:38.3	00:44.9	00:17.3
READ	00:36.0	02:52.7	00:16.7

FIGURE 2
Speed test for CP/M and MBASIC

	Disk II	Scorpio 8	Ice Winchester
CTRL-C	00:02.5	00:08.9	00:1.2
MBASIC	00:05.3	00:04.1	00:1.7

(all timings in mins:secs.tenths)

diskette before running COPYA. COPYA does it for you.

Certainly my experience with installing Winchester systems has been much less painful.

Next I tried some timings. Not being in possession of any standard benchmark programs, and being somewhat pressed for time, I reasoned thus: Apple disk files are of two main types, text and binary. The latter includes program files. These handle quite fast, but the former are used for data storage by much text/record-based software, and process notoriously slowly.

For comparison between the three media: Apple DISK II, Scorpio, and ICE Winchester — which also runs a modified DOS 3.3 and CP/M — I ran four tests in both operating systems.

These comprised BSAVE (binary file save to disk) a 32K byte block (the maximum allowed by Apple DOS); BLOAD (binary load from disk) a 32K block; WRITE a textfile to disk of 1000 strings of 32 characters + RETURN i.e. 32.25K; and READ 32.25K textfile from disk.

I appreciate that this does not begin to cover the multitude of multi-file, random access etc applications of daily use, but as most of these are largely dependent on the core of whichever operating system you have running, these simple tests give a good basis for evaluating HAL's claims of achieving hard disk speeds.

One more thing: HAL has provided a routine called Quickcharge which speeds up DOS 3.3, or at least some of it.

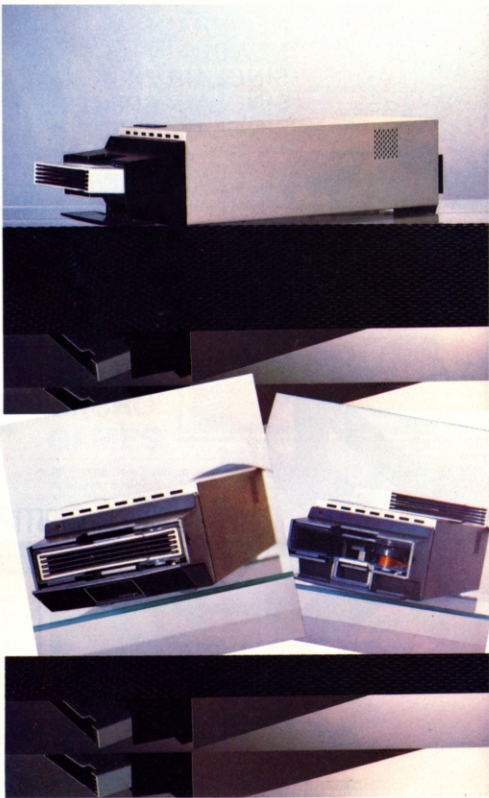
I have included timings for the four tests with and without Quickcharge, both on Scorpio and DISK II. I wish I could have got Quickcharge to run on the Winchester. The results for these and for CP/M 32.25K sequential files are given in Figure 1.

You may be as surprised by some of this as I was. In fact, I was so surprised at the slowness of Scorpio to read textfiles that I ran the test again. I won't tell you the result, because my thumb slipped on the stopwatch button, but it was over three minutes.

Mercifully, the second run of the CP/M textfile read was down to 2mins 27.6secs, a small encouragement. You may also notice that Quickcharge doesn't seem to affect textfile handling beneficially. Binary file timings, though, are extremely impressive, and I can imagine that the manual's demo for switching high resolution pictures looks very smart. I also did a few other timings in CP/M, notably for CTRL-C (system reboot) and for running MBASIC.

These are given in Figure 2.

Curiously, the Scorpio seemed consistently slow on reboot, but having found itself all was well. I was compelled to boot from DISK II, however, because when I booted from Scorpio my DISK II failed to appear (according to the manual it should come up as drive I; or J; in CP/M terminology). In fact, having provoked a system failure by looking for it, from which even <RESET> failed to rescue me, I discovered one of those things which



experience teaches better than words. Never power on/off with disk-pack in the drive.

It's inadvisable with floppies, but most of us do it all the time. With Scorpio it's definite — try it at your peril.

Verdict

As for HAL's claims — and I don't really think Winchesters are doomed, but ask HAL, they sell them too — I worked out the cost of Scorpio at about 5K per pound. Certainly, if you included tape stream backup for the Winchester, things would work out a lot dearer.

I agree HAL has got a strong advantage with its 'removable media', but forget to take the pack out of the drive and your media really will be removed.

So, to those people who run large, disk-dependent programs, and are considering Scorpio as a low-cost alternative to a Winchester, I would say: if you are sure that most of your data storage is in binary format, then this device may represent excellent value for money.

If, however, your program(s) make intensive use of textfiles (and that effectively includes the VisiCalc family, as well as most databases and commercial software packages) then you may find that the good ol' Winchester still has a decidedly faster draw.

Make Scorpio 8 disk sub-system Host computer
Apple II Price £895 plus VAT/Cartridge £45
plus VAT Contact HAL computers,
Farnborough (0252) 517171

WHO'S CUTTING THE HIDDEN COSTS OF MICROS?

SILICON VALLEY

Our present buying policy enables us to offer you some excellent value-for-money packages which give you the opportunity of making your microcomputer budget go further.

When you purchase one of the micros listed on this page you can add one of the following options most suited to your needs:

- 6 free accounts ledgers (saving between £1,500 - £3,600). Nominal, purchase, sales, invoicing, stock recording and payroll packages ready to use (CP/M and Sirius only).
- free 3-year warranty, parts and labour.
- free dot matrix or daisywheel printer (depending on system).
- free D-BASE II package (on Osborne only).
- free computer desk.



II E + III

OSBORNE

commodore



NEC

PC8000

TORCH



Other packages we sell are:

Bos, Peachtree, Padmede, Systematics, Vlasak etc.,
Visicalc, Visitrend/Plot etc.,
Supercalc, Micro modeller,
Wordstar, Spellstar, Mailmerge, Select, Perfectwriter,
Easywriter, Visiword,
The Last One, D-Base II, Cardbox.

In addition Silicon Valley provides a full "Ambassador" computing service for all professional business requirements covering the whole of Central London. We have a resident Chartered Accountant who is able to advise and recommend the most suitable system tailored to your individual requirements. Come and visit us to discuss how we can help you.



SILICON VALLEY COMPUTER CENTRE

London
Suite 104/5
Hatton Square
Baldwins Gardens
London EC1N 7RJ
01-242 2803

Manchester
12 Lever Street
Piccadilly
Manchester
061-228 1686
061-792 2723

Telex 8813271 GECOMSG

The Permanent Computer Show



Ian Scales makes the Dragon roar as he tunes up the new Sound Extension Module.

Bang! Splat! for Dragons

The Sound Extension Module comes in the guise of a games cartridge, and adds a sound score to your Dragon's tape-based programs. This can be any of a range of sounds, from synthesiser-type to photon torpedoes.

It plugs into the Dragon's expansion port and effectively occupies part of its memory. This means it's relatively easy to get to, and you don't have to POKE out of the computer to get some sound. Instead, the module adds another command to the Basic — MUSIC, and the various sounds are nominated by numbers and characters as MUSIC's variables.

The module is based on the AY-3-8910 sound chip, and most of the available sounds are controlled by the sound generator, not the processor. This means you are able to 'score' your programs as they unfold on the screen without dominating the attention of the processor.

It's possible to write a processor-hungry graphics program RUNning alongside a fairly musical piece without the problem of the system grinding to a halt under the work-load.

You can't expect too much for the module's price — £34.95 (inc VAT) and hardly surprisingly the SEM will not cause too many record company talent scouts to beat a trail to your door in search of the next Depeche Mode. Techno-pop it is not — it's just a lot of fun.

Music encompasses tone-specific noises of the ditty variety, percussive effects (just reminiscent of drums) and concussive effects emulating an entire arsenal (no, not the team) of destructive devices — bombs, torpedoes and firearms.

PCN's review model was actually a prototype, and the circuit board was housed in a black plastic box. But JCB says it is putting together a natty casing with an embossed logo for when it goes on sale to the public later this month.

Music commands must be specified by strings, not numeric variables. You set-up by entering statements like A\$="C3//"— C stands for the musical note c, while 3 stands for a middle-range octave.

Octaves run from 1 to 5 and the length of the note is measured by the /. Each / represents about .25 of a second. It's also possible to specify semi-tones by the addition of # (sharp) after the musical letter.

Once you've defined the string A\$="C3//", the note can be called in at the appropriate place later in the program by including MUSIC A\$.

JCB recommends that you save time and effort by using DATA and READ statements like:-

```
10 DATA C3//, E3//, G3//
20 READ A$, B$, G$
```

The sounds are then produced in the program by: MUSIC A\$, B\$, C\$—simple, huh?

Much of the sound operation is under the

control of the sound generator, but 'tempo' can be rather a hit or miss affair. If the processor is busy drawing on the screen it can lose its breath and become a little erratic when delivering the sound commands to the generator.

The solution is to insert compensating

The more murderous, staccato range of noises like gun-shots are controlled by the sound generator. These have the advantage of allowing the processor to continue with the other tasks while the sounds are generated. They comprise 'explosion', 'rifle-shot', 'pistol-shot', 'machine-gun'



READ and MUSIC statements in the critical places (on a loop, say).

Another problem is your music speeding up for the opposite reason — when the processor has nothing to do but pass on music commands. This is overcome by inserting spurious REMs or delay routines.

Volume variations may be inserted by adding numeric values from 0 to 15 in the data statement above:-

```
DATA C3//, E3//, G3// 12, 10, 8
```

Four pre-programmed percussion instruments — bass drum, tom-tom, snare and cymbals — are nominated by the letters A to D under the music statement. Admittedly, percussion is a difficult sound to reproduce, and even the most sophisticated equipment can sound a little tinny. The SEM drum sounds are reminiscent of a stereo system being repeatedly disconnected from a wall socket.

For the games fanatic the sound effects will be a favourite area. These are divided between generator-controlled and processor-controlled effects.

and 'ping'.

Processor-controlled effects seem to be those requiring more sustained sound. These comprise siren, laser zap, falling bomb and photon torpedo.

JCB will be adding other sounds, and these could include a 'raspberry', 'klaxon', 'American siren', 'waves' and 'car horn'. There are also facilities for redefining the musical note set in RAM and altering the generator-controlled effects.

As we said the SEM is not a state-of-the-art sound synthesiser but at about £35 all up it is very good value for the Dragon.

As PCN went to press proper documentation was not ready, but the rough draft was clear and comprehensive, and it's reasonable to suppose that the finished product will be adequate. With the proper casing and extended selection of sounds the Sound Extension Module should make the Dragon roar.

Machine Sound Extension Module for Dragon 32
Price £34.95 inc VAT **Manufacturer** JCB
Microsystems, tel 0202 423973

Gil Anthony Systems

LOW PRICES

WITH SUPPORT JUST A PHONE CALL AWAY
SOFTWARE FROM THE PEOPLE WHO UNDERSTAND IT
SOFTWARE FOR THE IBM PERSONAL COMPUTER

<p>LOTUS 1-2-3 Clearly the best of the new integrated software packages. A combined financial planning spread sheet with graphics and database capability. With a superb built in tutor to lead you rapidly through its extensive functions. £345.50</p>	<p>TUTORIAL SOFTWARE FROM ATI PC-DOS TUTOR £55.50 WORDSTAR TUTOR £55.50 VISICALC TUTOR £55.00 MULTIPLAN TUTOR £55.00 ATI TRAINING PROGRAMS MAKE SOFTWARE SIMPLE</p>
<p>MILESTONE Planning and scheduling projects with up to 200 activities using Critical Path Analysis. £332.50 including post and packing</p>	<p>dBASE II The powerful, easy to use RELATIONAL DATABASE £397.50 including post and packing</p>
<p>VISICALC 256K The classic favourite, freed to use the new larger memories and faster too on new CPUs. £158.50 including post and packing</p>	<p>MULTIPLAN From the people who brought you MSDOS. Reads Visicalc files. £179.50 including post and packing</p>
<p>WORDSTAR PLUS MAILMERGE For the purist, now kinder on the IBM PC, Sirius and TI PC generation of machines. With Mailmerge. £375.50 including post and packing</p>	<p>VOLKSWRITER Your secretary can use this word processor without a Ph D in Computer Science ... and so can you ... £149.50 including post and packing</p>
<p>SUPERCALC Flexible formatting, windowing and worksheet building provide a powerful tool for planners. £179.50 including post and packing</p>	<p>SELECT Menu-driven word processing for managers, authors and occasional users. With tutor. £285.50 including post and packing</p>

SOFTWARE FOR NORMS NOT NURDS
FOR PRICES ON OTHER SOFTWARE PRODUCTS
FOR THE IBM PC, PLEASE CALL
FOR SOFTWARE ON OTHER MSDOS SYSTEMS, PLEASE CALL

ALL PRICES, PLEASE ADD 15% VAT

SOFTWARE DISTRIBUTED ON 160K DISKETTE

POST AND PACKING INCLUDED IN UK

WE EVALUATE THE SOFTWARE WE SELL

SOFTWARE FROM THE PEOPLE WHO UNDERSTAND IT

CALL 0635-35831 (24 HRS)
7 DAYS A WEEK

Gil Anthony Systems

Shepherds, Tydehams, Newbury, Berkshire, RG14 6JT,
United Kingdom.
Newbury (0635) 35831



VDU EYES

AT LAST A CHEAP, PERMANENT
AND SAFE WAY TO UPGRADE
YOUR SCREEN.

Glarego

AS USED BY THE
DESIGN
COUNCIL

SIMPLY SPRAY ON TO GIVE HIGH
EFFICIENCY FINISH TO MINIMISE
REFLECTIONS AND GLARE TO
REDUCE EYE-STRAIN AND MIGRAINE

Complete kit just £7.95 (plus 75p p&p)

I enclose cheque for £..... or charge my

Access/Barclaycard No.....

Tel Orders on 02934 72208

name.....sig.....

address.....

..... to VISION PRODUCTS
(DEPT PW1) PO Box 14 No 1 warehouse
Horley Row Horley SURREY RH6 8DW

Let's face it — the sound from your Dragon 32
wouldn't win any prizes at an Eisteddfod.
You need a:—

Dragon 32

Sound Extension Module

- Fully-cased module plugs into cartridge port
- Provides 3 channels of sound; 3-note chords and harmonies over 5 octaves
- Uses new BASIC command. No need to 'Peek' or 'Poke'
- Many built-in sound effects (e.g. bomb, laser)
- Music and graphics can occur together without loss of speed
- Based on popular, well-proven sound generator
- Two Input/Output ports included
- User manual provided, with examples

Cheque/P.O. to:—

J.C.B. (MICROSYSTEMS)
29 SOUTHBORNE ROAD
BOURNEMOUTH BH6 5AE
Tel: (0202) 423973

ONLY
£34.95
inclusive

Write or phone for further details

IN THE HEART OF LONDON'S WEST END

FOR PERSONAL ATTENTION AND
ADVICE FROM
PEOPLE WHO KNOW COMPUTERS

ZX Spectrum 16K	£125.00 incl. VAT
ZX Spectrum 48K	£175.00 incl. VAT
Colour Genie 16K	£224.48 incl. VAT
Texas TI99/4A	£154.95 incl. VAT
Jupiter Ace (Forth)	£89.95 incl. VAT
Dragon 32K	£199.95 incl. VAT
Oric 1 48K	£169.95 incl. VAT
Sharp MZ80A 48K	£546.25 incl. VAT
Sharp 1251 + cassette & printer	£179.90 incl. VAT
Epson HX20 + cassette	£558.00 incl. VAT
Atari 400 16K	£159.00 incl. VAT
Atari 800 48K	£399.00 incl. VAT
Commodore 64	£345.00 incl. VAT
Lynx 48K	£225.00 incl. VAT

SOFTWARE

Atari	Rabbit	Allgray	Sinclair	Kuma
BBC	Oric	Molimerx	Texas	Dragon
	Commodore		Jupiter	

Also many Books

COMPUTERS of Wigmore Street

87 WIGMORE STREET, LONDON W1H 9FA
Telephone: 01-486 0373

MON-SAT 9am-5.30pm

We offer a full range of 8 bit and 16 bit

MICROCOMPUTERS

TO SOLVE THE PROBLEMS OF THE SMALL OR
MEDIUM BUSINESS

Contact us now for a demonstration particularly if you are in

AVON GLOS., WILTSHIRE SOMERSET

To solve the problems of small and medium businesses our applications include: SALES INVOICING, SALES, PURCHASE AND NOMINAL LEDGERS, FINANCIAL PLANNING, PAYROLL, COSTING STOCK CONTROL AND WORD PROCESSING PLUS DEDICATED APPLICATIONS FOR TRADES AND PROFESSIONS. We use a solution orientated approach. We will give your system room to grow and adapt as your business grows and changes.

To see how we can help you write, telephone or use the coupon.

**ADVANCED TECHNOLOGY LTD (PCN)
UNIT 16 PUCKLECHURCH TRADING ESTATE
PUCKLECHURCH, BRISTOL, AVON.
TEL ABSON (027582) 2054**

NAME _____ TEL _____

POSITION _____ COMPANY _____

ADDRESS _____

OUR MICROS INCLUDE
TOSHIBA, LOGICA, SHELTON, SIGNET AND SANYO

OSBORNE



BUSINESS PACKAGES

- * Osborne 1 with double density disk drive
- * Printer
- * Amber/Green screen monitor
- * All leads
- * Free Software

*INCLUSIVE OF MAILMERGE, WORDSTAR 3,
SUPERCALC BASIC, ACCOUNTS PACKAGE*

* Card Sort — this program will sort your cardbox in alpha numeric order on any field of a card £49.95

For further information send coupon to:
GEM SYSTEMS LTD (Dept MCS)
2 Crawford Road, Hatfield, Herts AL10 0PG

NAME

ADDRESS

TEL:

PCN 1

GEM SYSTEMS LTD (DEPT MCS)

2 CRAWFORD ROAD, HATFIELD,
HERTS AL10 0PG
TEL: (07072) 66148

Despite the sleek outer casing, Richard King detects some rough edges in its operation.

TYCOM Microframe

The Tycom Microframe must be one of the most highly-trumpeted computers ever launched in this country. From the initial publicity you would have thought somebody had put a Cray 4 in a box, and was selling it for the price of a good Cortina.

There's been much bandying of three-letter acronyms in its presence, too. Like OEM, PC and, most prominently, VBC. Suppose it impresses folks.

But what is this VBC, anyway? Versatile

Bus Connect—or Concept, depending on who's going on about it—that's what. Still doesn't mean much, though. I won't make the obvious cracks about the four-wheeled variety, or about 'omnibusses'.

VBC is an adman's way of telling you that you can put all kinds of gubbins in the back of your computer—up to and including a couple of other computers—and still make it work comprehensively.

This is actually what people have been doing with the Apple II for years, and that

isn't the only one either. What about S100? IBM PC with a Z80 card?

So what's the difference? The others don't have an impressive name for doing something unmentionable with some homebrewed dooberry, which you've foolishly plugged into your precious computer—they call it something dull like interfacing. VBC sounds so much better, doesn't it?

There is one small difference between this VBC and simple interfacing on all the others (except Apple).

On most machines, the chore of informing the operating system of its host's new capabilities is performed by adding a new driver to the system. You have to write this if it hasn't been supplied.

But on the Microframe this comes on the new peripheral—as it does on the Apple.

Presentation

The packaging for the Microframe is much as one has come to expect—foam shapes in a sturdy cardboard box. The fact that it's heavy therefore has nothing to do with the packing.

Yup, hernia time. They used to make railway engines out of cast iron, and they seem to have used the same stuff here—hit it and it goes *Ting!* Lovely crackle finish, too, in any one of three co-ordinated colour-schemes.

Everybody thinks it looks great, just like a computer ought to look. A couple of transient inhabitants of the office even said they'd buy it on the strength of that alone, and they've been booked into a nice home, just near Bexhill. We hope they'll be very happy.

I've no idea what possessed Tycom to build a computer in such a fat-headed material, but if anybody so much as mentions the phrase 'heat-sink' anywhere near me I just laugh.

You could cool a blow-torch with that lot, never mind a few harmless bits of silicon. Maybe Tycom has a fiendish plan to make a killing by selling reinforced desks.

As regards completeness, it was—even down to the plug and obligatory stencilled erratum/addendum, without which all machines are useless.

Documentation

The main documentation was in the form of an A5 ring-bound user manual of 99 pages. It had no index but was broken up into suitable sections, including a large one on installation and setting up. There was also an introduction and sections on the keyboard, fitting and removing cards, and CP/M-86.

The section on CP/M was usable only by somebody who had a good idea of what was going on, and unfortunately the same



Hernia time.
The Tycom Microframe series appears to be made of cast iron with elements of sheet steel, but it does look good.

41 applies to the rest. Beginners should therefore look elsewhere.

Construction

The physical construction of this machine bears a superficial resemblance to most other machines. That is to say, it has three parts: a main unit, a VDU, and a keyboard. From there on, it's different.

The mass of the machine (in both senses) appears to be cast iron with elements of sheet steel.

The main unit has enough fins to make one think it fell off a Japanese racing-bike. There are two 5¼in floppy disk drives in the top half, and a nameplate on the bottom.

Behind the nameplate is about the silliest place anyone could think of to put a small recess containing some pretty important controls. The reset button and the boot selector are there, as is a very important indicator, which is your only way of telling what's wrong with the machine when it won't work.

The nameplate swivels sideways to reveal the recess. Inside there's the red reset button, an LED, and a miniature rotary switch.

The reset button is much too accessible and tempting. It should be a real hassle to get at.

The boot selector sets which slot is to be used to load the operating system. This should also be a dark secret—not sitting in front of everybody, asking to be twiddled by any passing moron.

I have left the LED till last, because it's a real work of art. It's supposed to tell you what (if anything) happened when the machine was booted. Depending on the status, it flashes up to seven times. Once is OK, and means a successful boot. Two to seven means trouble.

The trouble is that nobody seems to have realised that the only time you'll know about a problem is *after* the light has started flashing—and who starts counting before they have a reason to?

The idea of just one light providing the necessary panic information for a range of problems is obviously a good one from a designers point of view, but where real people are involved it's not so smart.

The only other detail is a huge green band running across the top. There's a little hole in this beam, and to get the end of the little peg under the VDU into the hole, you just have some 25 pounds of fragile electronics sheathed in heavy engineering into the air.

You then have the problem of seeing through some 12in of something that'd slip you a neutrino to see where the little peg is in relation to the hole. You could gently drag the VDU about until it fell off the edge, or into the hole, but I didn't think it would be a good idea.

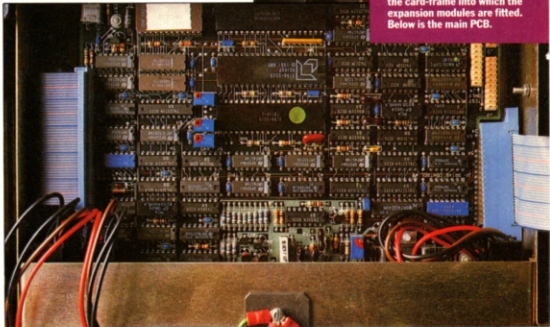
Keyboard

The keyboard appears to be built up from a modular system. The housing is cast metal, again, and instead of the usual panel through which the groups of keys protrude, the space is filled with little tiles, the same

size and shape as the keys.

There are also 'illuminated' tiles, each of which has an LED behind it. These can be controlled from a program, and can serve as indicators for the operator. There are seven of them at the top right of the keyboard.

The keyboard has the normal qwerty layout, a numeric keypad, a cursor-control pad, and ten function keys. The function keys are programmable and each may have three definitions: unshifted, shifted and



The physical design of the Microframe is very neat. Above is the card-frame into which the expansion modules are fitted. Below is the main PCB.

double-shifted. The first two are as normal, but the last is a real dinger.

To use it you have to push both shift keys at once, as well as the function-key itself. It isn't an easy movement for anyone, but anybody with a span of less than 160mm will find it isn't even possible for F4 and F5.

I suppose that, as the machine appears to have been designed and built in the grand old tradition of heavy engineering, the test-span used may have belonged to a horny-handed son of toil/steelworker.

Nevertheless, the mere pettiness of it will face real problems here.

Screen

The VDU screen is a separate unit which sits on top of the main unit. It tilts backwards from horizontal to about 15 degrees, and swivels. The tilt has not been thought out very well but would be just about right on a model 6.

I tested the Microframe 12, and didn't need any tilt at all, since it was at eye-level. But the model 22 is some inches higher, and so would need to tilt down if anything.

The silliest feature of the VDU is the fact that the only limitation on how far the VDU can turn is the cable. A careless elbow could catch on the screen, and I don't imagine that all that metal, rotating rapidly, will do a lot of good to the plug which stops it short.

The quality of the display was bad, to put it mildly. The interlace was grossly unstable, so each alternate line wobbled. At the corners some letters became quite unreadable (x, n, s, w, u for example), and

the edges of the signals were slushy, so that verticals disappeared when inverse mode was turned on.

On certain occasions, especially when displaying inverse at the top, the display literally fell apart. Considerable work needs to be done in this area.

Storage

Permanent storage is on the two 5¼in floppies, each holding a respectable 680K. There are a few oddities about the drives, the first being the incredibly long timeout.

If you access the disk, it keeps on spinning for about 20 seconds after the indicator light goes out. Normally I'd not have noticed, but for the noisiness of the drives themselves. Not the Trash-80 type of noisiness, but more abrasive, suggesting excessive head-pressure.

The least noticeable oddity of these drives is the fact that whichever drive you use, both start turning. Evidently, Corners Have Been Cut.

Expansion

The back of the main unit looks like something my grandmother might have had in her kitchen. There's a metal cover with vents cut in it covering a large empty space. This has 12 96-way Eurocard connectors at the back and guide-rails at the sides, and this is where the various interface cards are plugged in.

These connectors are not to any recognised format or standard. Even though no documentation was provided, I can't think of any published interface definition based

on a 96-way Eurocard connector.

The cards come in single and double Eurocard sizes. On the test machine and all basic configuration Microframe 12s, the only interfaces provided are the disk controller and the VDU/keyboard controller.

The disk-control card was a 2E size but too wide, causing it to bulge noticeably, and this can't be very good for it. The VDU card was a regular 1E size, so had one side left hanging. Tycom provides 'floating'

about the general operation of the machine. No news is good news.

There is a point, however, at which software has less bearing on the operation than the hardware, and this is where the Microframe began to show rough edges.

There was a noticeable delay between pressing a key and seeing the letter appear on the screen — too little to time, but still noticeable. In operation it didn't seem to make any difference, but then I'm not a proper typist.

It raises the question, though, of just what the machine is doing. I know the 8088 isn't the fastest chip in the world, but it isn't that slow.

Is it just my suspicious mind that asks if the Versatile Bus Concept is so damed complicated that the machine — just like

computers physically wear out. Making it in a foundry therefore won't help.

What about the 'upward compatibility' and expansion? I'm afraid that, as soon as anyone talks about the future of computers, I reach for my revolver.

A company suggesting it has something which will be able to use the circuits of the future as easily as those of today is asking for trouble.

At the rate of development current in chip design, it's silly to suggest that a machine purchased this year or next will be worth using in ten years, let alone supporting with new add-on products.

The time will no doubt come when technological development stabilise to this extent, but it hasn't come yet.

The simple fact is that the chip of the future probably won't work at the same currents and voltages, and even if it does, will work so much faster that the problems of making the two sorts of technology work together won't be worth solving.

The machine on sale in ten years will bear about as much resemblance to the Microframe as it will to any other machine available today — none. It'll fit in an average-sized pocket, most likely, and that will be the most obvious difference. Read a good science fiction book if you want to know more.

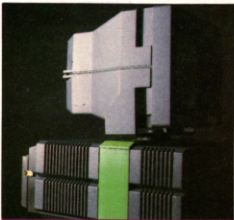
The Tycom Microframe is essentially a marketing exercise, and doesn't make any material contribution to the state of the art, though the admen would like you to think it did.

It does look good, and no bad thing that it should. Most computer manufacturers produce boxes which may be the embodiment of good function without achieving good design.

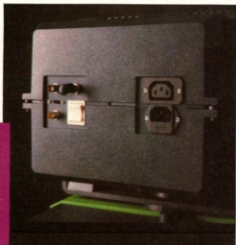
Apart from a slightly sluggish feel to the machine, it does the job of being a business computer quite adequately, thanks to CP/M. But this slowness in response bothers me. If it is noticeable with one user, what's it going to be like with several?

That's the problem with multi-tasking computers, and the sheer cheapness of micro-processors makes it possible to have several devoted to one user — multi-processing, in other words.

Tycom has decided to bet that the micro-computer will grow up to be a smaller version of its bigger cousins, the mini and the mainframe. I bet they're wrong.



Top: The side of the machine. Right: The back of the VDU carries the power input socket, and the power out socket on the right, signal in and out (for repeaters) on the left. Below: The modular keyboard.



guide-rails to take care of this, propping up the empty side.

Connecting the keyboard and monitor cables brought on an attack of brain-fade. At first sight it seemed the plugs would be too deep for the cover, but after a while I worked it out. The cables had to be bent sharply sideways and the lid pressed firmly home.

Then I realised that I needed one hand for each cable, one or more to press the lid in, and two more to get the lever-clips, which are neatly tucked away at the very bottom of the very back of a thing that's too heavy to move.

Trying to get three people to bear on the thing and to close the lid without permanently attaching somebody to the system could be a good party-game.

Operation

The Tycom Microframe is very much a business computer, and since it runs CP/M-86, there is little that one can say

the best mainframes — is spending most of its time trying to figure out what to do next?

Verdict

So how 'future-proof' is this micro? I shouldn't think it is worth buying because it'll last, as it isn't usually the case that

SPECIFICATION

Price:	£2,900
Processor:	8088 at 8MHz
RAM memory:	128K expandable to 768K
ROM memory:	bootstrap
Text screen:	80 × 25, green phosphor
Graphics screen:	None
Keyboard:	Full-travel keys, qwerty layout, ten function keys, numeric keypad, cursor pad control.
Interfaces:	System bus with 96-way connectors carrying specialised interface cards.
Storage:	Two 680K 5¼in floppies.
Operating system/language:	CP/M-86
Distributor:	Tycom, 01-248 4800



SAVES TIME

Imagine the time, energy, and frustration you could save by boosting your Apple's speed from 1 Mhz to 3.58 Mhz. That's 3½ times faster than normal, making the Apple II Plus arguably the fastest Micro on the market.

How is it possible? It's all down to ACCELERATOR II. This new plug-in board from Pete & Pam Computers contains a 6502C Processor and 64K of memory. The board runs all native Apple II software, including programs written in Applesoft, Integer, Machine Code, Pascal, Apple Fortran 77 and Forth.

Amongst the many thousands who could benefit from ACCELERATOR II are users of Visicalc, DB Master, Micro Modeller, Multiplan Tabs, and Systematics.

SUPER FAST

In November 1982, PCW published a bumper round up of all the Benchmark Timings since PCW began. The Olivetti M20 came out top of the 'league' with an average Benchmark timing of 11.5. Running the same Benchmark test programs,

the Apple II Plus with Accelerator II averages a timing of 8.58 — that's an incredible 25% faster than the Olivetti M20.

We have reproduced some of PCW's findings, incorporating Benchmark Timings for the Apple II Plus with Accelerator II.

Machine	BM1	BM2	BM3	BM4	BM5	BM6	BM7	BM8	Average
Apple II Plus with Accelerator II	0.3	2.4	4.5	5.0	5.5	8.2	12.9	2.98	8.6
Olivetti M20	1.3	4.0	8.1	8.5	9.6	17.4	26.7	1.6	11.5
IBM Personal Computer	1.5	5.2	12.1	12.6	13.6	23.5	37.4	3.5	17.6
Osborne 01	1.4	4.4	11.7	11.6	12.3	21.9	34.9	6.1	19.9
Intertec Superbrain	1.6	5.2	14.0	13.9	14.8	26.3	43.2	5.6	21.9
Apple III	1.7	7.2	13.5	14.5	16.0	27.0	42.5	7.5	24.7
ACT Sirius 1	2.0	7.4	17.0	17.5	19.8	35.4	55.9	4.3	24.8
Xerox 820	1.7	5.5	15.5	15.1	16.2	28.9	46.1	8.0	26.1
Apple II	1.3	8.5	16.0	17.8	19.1	28.6	44.8	10.7	30.4
Commodore CBM 8032	1.7	10.0	18.4	20.3	21.9	32.4	51.0	11.9	34.3

So don't wait — start to save time now. Contact your local dealer, or call us on (0706) 212321, or, in London on 01-769 1022. A faster, easier computing life is on its way.

— AVAILABLE NOW FROM —

Pete & Pam Computers



Head Office:
NEW HALL HEY ROAD,
Rossendale, Lancs. BB4 6JG
Tel: Ross. (0706) 212321 & 227011
Telex: 635740 PETPAM G

London Office:
103-5 BLEGBOROUGH RD.
London, SW16 6DL
Tel: 01-769 1022/3/4
Telex: 923070 PPCOMP G

THINKING ABOUT BUYING A COMPUTER SYSTEM? TALK TO DATALECT FIRST!

COMMODORE*

No. 1 best seller in the U.K. Tackles your bookkeeping, stock control and word processing. This system is reliable and superb value.



APPLE*

One of the most versatile on the market. Expandability up to 48 kbytes of user memory, supported by a large range of programs and peripherals.



HEWLETT PACKARD*

A portable (only 20 lbs) specialist computer with a fully integrated keyboard, display and printer.



ACT SIRIUS 1

A revolutionary personal computer developed from the outset for business and professional use.



* Registered trademarks of Commodore, Apple Inc., Hewlett Packard, ACT.

...because who else provides all this—at a price you can afford

We offer you a choice of these budget priced, easy to operate microcomputers. Starting in price from an amazing £200 for a computer, £1,500 for a complete system. All come with a versatile range of programs to meet today's modern business needs.

Try one out for yourself

If you're not sure how a microcomputer can help, call in at our WOKING or CROYDON SHOWROOMS.

Keeping you going

Fast reliable SERVICE if you're based in London and the South.

Buying your system

Attractive terms, leasing and the best deals available in London and the South.

Remember, when you buy from Datalect you're getting 10 yrs EXPERTISE, SERVICE, ADVICE and TRAINING and the best after-sales care.

SHOWROOMS:

CROYDON, 7, St. Georges Walk, Croydon, Surrey.
Tel: 01-680 3581
WOKING, 33-35 Portugal Road, Woking, Surrey.
Tel: 04862 25995

THE BEST PRICES AND THE BEST SERVICE IN THE SOUTH

DATALECT COMPUTERS

Your computer company for London and the South

Please send me details and price list.

Name _____
Company _____
Position _____
Address _____
_____ Post Code _____

DATALECT Computers,
Dept. PCN/83 33/35 Portugal Rd., Woking, Surrey GU21 5JF

Deenagh Brook revels in some of the finer details of the classic business micro.

The IBM PC, launched early this year and apparently selling smugly beyond its makers' expectations, makes an interesting contrast to the Tycom Microframe.

It arrived as the progenitor of a whole new concept in computer design, its significance lying in the fact that it was aimed squarely at the business user, not the hobbyist or programmer.

Both the Tycom Microframe and the IBM PC are marketed in the full sense of the word, but the IBM is being sold in a very different way.

The European model has fewer improvements on the US version than anticipated but, knowing IBM, this will not be the case for long as it is renewed for continuously upgrading all its machines.

Presentation

The machine is designed to be an 'open' computer; it can be configured to the user's requirements. Memory is expandable up to 576K.

The system consists of separate units, and each comes extremely well packaged in boxes which describe the contents either with a label or pictorially. A nice touch is the detailed way in which IBM describes in the manual supplied how to package the machine for re-location.

The first impression of the computer is that it is a quality product, sleek-looking and well-finished. Power leads are included with each unit, with moulded plugs appropriate to the country in which it is sold. Also included are the connecting leads for each unit to the main system unit.

The keyboard is separate and connects to the system unit by a coiled lead. A monitor can sit securely on top, making a compact unit.

Documentation

The *Guide to Operations* manual delivered with the computer is a dream in terms of presentation, clarity and the thoroughness with which it has been thought out and put together. It is divided into clear sections and, where necessary, directs the user to another section in the manual.

All the way through the book there are step-by-step instructions with drawings and examples; in fact, it resembles a very well defined flow-chart in its detail without patronising.

Getting started is therefore easy. When turned on the computer performs a self-diagnosis and comes up with a message if, for example, the keyboard isn't connected.

The manual explains precisely what should happen; that is, the LED light on the disk should light up before the beep on the main unit. If it doesn't then the user is directed step-by-step towards probable causes of this fault.

A useful section on problem diagnostics

IBM's original in retrospect



is included, as well as detailed instructions on how to install options available.

Construction

The Personal Computer is designed around the main system unit, which houses the disk drives and the usual logic circuits.

The screen can be bought separately, and the one sold by IBM is of high quality and capable of handling high resolution graphics with clarity and stability. (Nothing is more aggravating than to have a detailed picture on the screen wavering all over the place). It is buffer controlled and an address in storage which is held on the VDU adaptor card holds the screen image.

As there are different address ranges for the colour and the black-and-white screens it is possible to run both a black-and-white and a colour VDU at the same time, giving



opportunities for extremely good animation effects.

Keyboard

The keyboard on the IBM PC deserves special mention; it is easy to see why it is IBM's pride and joy, even though there are a few minor irritations for new users but still its quality shows. It is light enough to move easily, but heavy enough to make it feel secure.

Two little legs at the back swivel into place to change the angle. The Germans insist that the G and H keys are a precise distance above the surface on which the keyboard is placed, which is why these legs are there.

The keys are coloured in either grey or white; white indicates the standard typewriter keys and the grey ones are the special keys such as function, numeric, and attribute.

An improvement over a normal typewriter is the fact that if the CAPS LOCK key is on, the numbers still come out as numbers. Only in upper shift mode does one get the

symbols such as \$ and @.

There are at first sight ten special function keys, but by clever use of the ALT, CONTROL and UPPER CASE shifts these function keys can produce 40 options. The function keys are easy to program (explained thoroughly in the Basic manual supplied), using the KEY statement in Basic.

Typing KEY 3, HELLO would cause the computer to display HELLO on the screen every time function key number 3 is depressed.

The format is KEY, n, x\$ and x\$ can be up to 15 characters long.

To display the functions assigned to each key, one simply has to type KEY ON or KEY LIST. In Basic, common Basic commands can be set up by using the ALT key with one of the normal keys, such as ALT I for INPUT, or ALT F for FOR.

To the right of the keyboard are the numeric keys, which double up as cursor control keys when the NUMERIC LOCK is not on. It can be a little confusing for the new user to remember to put this

NUMERIC LOCK on when using these keys as a numeric pad, but use of the UPPER CASE key turns off the NUMERIC LOCK temporarily.

The PRINT SCREEN key, though, is nice to have. It is so useful to be able to get a screen dump at the drop of a hat, without needing special piece of software.

The CTRL and BREAK keys can be particularly useful when running or listing programs. Using the keys together allows exit from Basic. In Basic, the ESC key clears the screen.

Depressing the CTRL and NUMLOCK keys causes a temporary stop, useful when listing or printing, which continues until any key other than the SHIFT, BREAK, and INS keys are pressed.

Storage handling

Storage can be on cassette or disk; There is an option to have one or two floppy disk drives with either 160K or 320K or a mixture of both. Installing disk drives is explained in great detail, and is easy to do.

One of the criticisms levelled at IBM at the moment is that the capacity of these drives is low in comparison to those of competitors. It is interesting to note, therefore, that on the back of the machine there is an extra plug which is not mentioned in the current manual but looks as though it could be for a disk drive.

The disk operating system includes an option to create backup disks when there is only one drive present.

Expansion

There are five expansion slots inside the system unit which are used for extra memory boards, communications adaptors, game control adaptor, diskette drive adaptor, colour graphics adaptor and so on.

These are easy to get at; the internal workings of the system unit are exposed by undoing two screws and sliding off the casing.

Improvements over the US PC are memory expansion boards that can hold 64K of memory as opposed to 16K, in 16K chips, and an extra expansion slot. Another improvement is that the basic system in the European model comes with 64K RAM.

There are two sets of switches inside the system unit that have to be set differently according to add-ons being used. An advanced diagnostic kit is available which makes fault-identification seem like child's play, so maintenance of this machine ought to be very good.

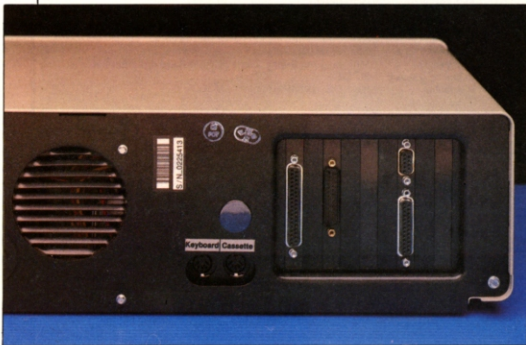
Operation

The operating system is in ROM, and includes start-up diagnostics and the lowest of three levels of Basic. So, on booting the machine, you have instant access to Basic.

The disk operating system comes at a small extra charge. A comprehensive manual describes the DOS utilities in detail.

A useful utility for a European machine

Peter Smith



Above: The back of the main unit has the fan outlet, keyboard, and cassette connectors and user-installed interfaces. Below: The keyboard is to the ISO standard, but some people may dislike the small Shift keys.



is the creation of a national DOS disk from the master disk, which sets the keyboard up for the basic European languages automatically.

Programming languages available are Basic, Fortran, Pascal, Cobol and Assembler.

'The IBM PC is expensive, but a Rolls Royce costs more than a Metro'

IBM has divided Basic into three levels, one resident in ROM, the second referred to as Advanced Basic within DOS, and the third available for use with the colour/graphics monitor adaptor.

A comprehensive manual takes one through the options available in Basic and states at what level it is in use. With the DOS diskette comes a diskette of sample programs.

Use of the graphics adaptor enables you to obtain medium and high resolution on the screen. Selection is made by using the SCREEN statement, while other state-

ments used for graphics in Basic are CIRCLE, PAINT, COLOR, DRAW, GET, LINE, PRESET, PSET and PUT. Basic will support statements for control of a light pen, joy sticks, and sound.

The statement SOUND makes a single sound of given frequency and duration and PLAY plays music as indicated by a character string.

Editing can be done either within a line as it is being entered, using the DOS editing keys, or on complete lines within a file using the EDLIN program. Special editing rules can be defined when using the Basic program editor.

Maintenance

Maintenance of the PC is supported by IBM and can be undertaken either by the company, its authorised dealers or by third-party agreements. All units are under warranty for parts and labour for six months.

Support

User queries should be directed to the dealer from whom the machine was bought and the dealers have a hot-line to a special department at IBM's Basingstoke offices.

Overview

To set up a configuration comparable to those of its rivals, the IBM PC is marginally more expensive at £4,940 (including VAT), but then a Rolls Royce is a lot more expensive than a Mini Metro. Given that it is beautifully simple to use from start to finish and that there is a great deal of software available for it, it must be good value for small businesses or executives in large companies.

There are going to be many enhancements for this machine, either from OEMs or from IBM itself now that it has come to Europe.

SPECIFICATION

Processor:	8088 running at 4.7MHz.
RAM Memory:	128K minimum, expandable to 576K.
ROM Memory:	40K consisting of Basic and self-checking code.
Text screen:	80 x 25
Keyboard:	83 full-travel moving keys with built-in click.
Interfaces:	Centronics parallel plus 5 expansion slots.
Storage:	360K on 5 1/4 in floppy. Extra drives or hard disk optional.
Operating systems:	PC-DOS
Distributor:	IBM UK, (0256) 56144.

WE MAKE COMPUTERS

-but to run our business we bought a Transtec

PAXTON
BUSINESS
DESK SOFTWARE
FREE IN
APRIL

Control Universal are manufacturers of Eurocard-based industrial computers, and are no mean experts in micro-systems. So when the Transtec appeared, we knew a good thing when we saw it.

Our entire accounting system runs on Transtec, using the Paxton Business Desk suite of software. To prepare an invoice we first enter the customer's code, which the computer uses to retrieve the name and address. We then enter a quantity and a product code. The description and price of the product is

retrieved, and the invoice line is extended to a line total taking into account the discount allowed to this customer on this product. When the invoice is complete, stock records are amended, the sales ledger updated, and the nominal ledger balanced, all without further effort.

Statements, stock valuations, period-end accounts, purchase ledger records and many more are all produced as required. Once a piece of information is entered, it is available to the whole suite, which saves both work and errors.

Naturally, the Transtec supports a wide range of other CP/M software, including WordStar, CalcStar and DataStar. It can also be used with a wide range of printers, both matrix and daisy-wheel; our free catalogue lists the options.

So it all sounds good, but yes it's been done before, so what's new and different? Look at the price tag!



Twin Floppy £1695
SMB Hard Disk with
Floppy Back-up £3185

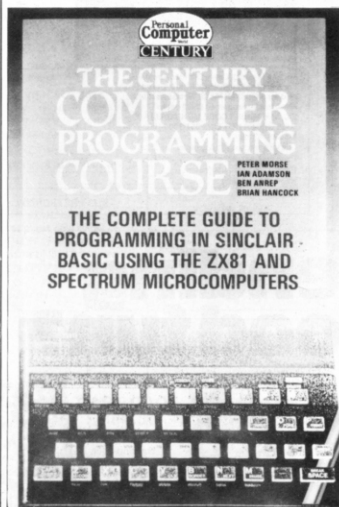
Control Universal Ltd
The Hardware House
Unit 2, Andersons Court,
Newnham Road, Cambridge CB3 9EZ
Telephone (0223) 358757



THE CENTURY COMPUTER PROGRAMMING COURSE

PETER MORSE
IAN ADAMSON
BEN ANREP
BRIAN HANCOCK

The complete guide to programming in Sinclair BASIC
using ZX81 and Spectrum Microcomputers



Sinclair have sold over 600,000 ZX81's and Spectrums, which means that somewhere out there are 600,000+ potential programmers.

There are enough books and collections of programs on the market to help you get beyond the user manual. **The Century Computer Programming Course** aims to transform any Sinclair owner into a serious programmer – whether they own a Spectrum or a ZX81, whether they are totally new to computing or simply have ideas in advance of their current expertise.

Beginning with the elements of BASIC syntax, **The Century Computer Programming Course** takes you right through to the creation of sophisticated applications programs. More than 500 pages and 200 programs and routines makes this a monumental project. Without it Sinclair owners are likely to remain games players for the rest of their computing lives...

*Illustrated with line drawings 544pp
£9.95 (paperback)*

Available through your local bookshop

To: Department CC8
George Philip Services Ltd
Arndale Road, Wick
Littlehampton
West Sussex BN17 7EN

Please send me copy/copies of
THE CENTURY COMPUTER
PROGRAMMING COURSE at £11.50 per
copy (post paid). (£13.50 post paid for
overseas addresses)

I enclose my cheque/postal order

for £.

(Please make your cheque/postal order
payable to George Philip)

Name

Address

.....

.....

Please allow up to 28 days for delivery

CENTURY

VIC 20 GAMES

Fantastic games from
N. America from only... **£3.99**

- FROGGER** Guide your frog across the highway, over the boats, logs and turtles and into home.
- BUG DIVER** Sneak past the killer fish to steal their eggs. Then try to get back to the surface.
- ROBOT MOUSE** Collect atomic cheese from the floor of the space maze avoiding the malfunctioning androids.
- NEW YORK BLITZ** Try to drop bombs from your airplane to flatten the city below before you crash into a skyscraper.
- 3-D MAZE** Will your oxygen last long enough for you to find the only way out of a three dimensional maze?

All games use excellent graphics, sound and machine code.
For the unexpanded VIC 20 using joystick or keyboard.
Guaranteed service and seven day delivery.

Any single game **£4.95**
Any three games **£ 13.95**
All five games + FREE Space Shuttle **£ 19.95**
OFFER ENDS APR. 30th



Galactic Software

Send Cheque/P.O. to: Galactic Software, Lambrook Road,
Shepton Beauchamp, Somerset TA19 0LZ. Tel: (0460) 40744.

NEW FOR VIC OWNERS



**G E N E R O U S
D E A L E R
D I S C O U N T**

Games available: 'DEMON DRIVER' for any Vic 20 'LUNAR RESCUE'.
For any (2 pack) 'Crazy Climber/Apple Bug'.
For any (2 pack) 'Nuclear Attack/Grand Prix'.
And for 3K and 8K Vic 20 'Space Assault'.
All above super games £5.99 each.
VIC 20 MACHINE CODE MONITOR £14.95.
MAIL ORDER HOT LINE 051-708 7100.

Please justify _____ (Game Name)
I enclose my cheque/postal order for £ _____
Please debit my Access Barclaycard No. _____
Expiry date _____ Signature _____
Name (Block letters) _____
Address _____

Mind Bending or just good fun?

TOBOR
48K SPECTRUM

You are relentlessly pursued by Robots as you move through their city.
£7.95



JAWZ
16/48K SPECTRUM

Don scuba diving gear to shoot the killers of the deep.
£4.95



ROAD TOAD
16/48K SPECTRUM

You hop your Toad across the road.
£4.95



Elfin have created 3 new games for family enjoyment. There's TOBOR a test of skill and strategy, ROAD TOAD a test of reflex actions as you hop around the hazards and JAWZ to test your ability to fire at moving objects. All games are machine code to give fast arcade action and lively colourful graphics on your screen.

If you can't find them in your favourite store just fill in the coupon and post it to us with your remittance or phone your card number to us and we will see you have them by return post.

Trade enquiries. All games for 1 or 2 players.

Buy any 2 tapes and get the third for £1.25

ELFIN SOFTWARE



More than fun and games.

Please send me:

Quantity	TOBOR £7.95
Quantity	JAWZ £4.95
Quantity	ROAD TOAD £4.95

or use my credit card Access _____ Barclaycard _____

Card No. _____

Name _____
Address _____

To Elfin Software: Hudsons House, Battery Rd.
Gt. Yarmouth NR30 3NN - Phone 0493 53170

Add 25p for postage & packing

AMAZING MAZES

Spectrum

Name Mined-out. System 48K Spectrum. Price £4.95. Publisher Quicksilva (0703-20169). Format Cassette. Language Basic. Other versions Dragon soon. Outlets Mail order, Boots, and most main dealers.

Oh, blast!

Everyone is fond of saying what makes for a good game, but there are no real rules. Some are simple and boring, while others are endlessly complicated — and equally boring. Some though — and Mined-Out is one of them — are simple in concept but maddeningly addictive.

Objectives

The screen becomes a minefield, and you have to move across from bottom to top. In fact, you have to crawl across nine minefields if you are to achieve the game's apparent objective of rescuing Bill the Worm; you plot your way across one square at a time using the arrow keys.

First impressions

Quicksilva's annual turnover is now fast approaching £10 million, and clearly the firm can now afford decent packaging for its games. This one is a first-class professional job and is well-designed and printed.

In play

As you make each step into the minefield, you are told how many mines are in the four squares adjacent to you, but not where they are.

The game becomes a process of deduction, and while there *should* be no logical reason why you should step on a mine and get blown to smithereens . . . well, you just try it.

You're not playing against the clock, though you do get bonuses for speed, and also for rescuing damsels in distress in later levels.


There are other complications, in that when you reach level 3 the game will be stopped from time to time if you're too slow, and a few extra mines scattered around. These new mines are at least visible, which helps, but what doesn't help in the least is the creature that appears at level 4 and which solemnly hops after you.

Verdict


I find it impossible to fault this game, simple as it seems. The instructions are clear, and are available after every round if you want them. The graphics are effective; the sound effects are as good as you can expect from the Spectrum, if that's not an insult; there is a high-score facility, with much rejoicing when a new high is reached; there is an action-replay to show you where you went wrong.


Can you praise any game higher than by saying it's one of those where you decide you'll have just one more go, then find yourself still playing half an hour later?

Mike Gerrard

Lasting appeal — 

Playability — 

Use of machine — 

Overall value — 



Spectrum

Name Transylvanian Tower System 48K Spectrum Price £6.50
 Publisher Richard Shepherd Software (0628-21107) Format Cassette Language Basic Other versions None Outlets Mail order, WH Smith and other dealers

Bat battle

Hot on the wheels of the original text-only Adventure games, where you merrily tapped in 'North', 'South', or more frequently 'Help', have come the 3D Adventures, where you can actually see where you are, and the directions you can move in. What next, one wonders . . . being dragged from the keyboard and pushed out into the real world?

If one don't want to get any closer to a Transylvanian dungeon than this simulation, thank you very much.

Objectives

Each of the five floors of the tower in this game is made up of a hundred rooms. Naturally, you start in the dungeon, on the bottom floor, and as far from the exit as possible.

On this first level there are no objects to hunt for, and no bats or other nasties to fend off, so it's a good way of getting used to the movements you make with the arrow keys.

Your objective is to make your way safely up to the fifth level for your encounter with Count Kreepie who bears a startling resemblance to Sir Keith Joseph, so this is not recommended to those of a nervous disposition.

First impressions

As with most games of this type, the instructions are fairly de-

tailed. But everything is fully explained on the cassette insert, and then again on the screen when the tape is LOADED.

In play

Once you've been set down in the dungeon you use the arrow keys to take you from room to room through whichever dark door you choose. The '6' key will turn you through 90 degrees, so pressing it twice turns you round completely.

But it's only when you get out of the dungeon that your troubles really begin. You start finding objects, such as garlic, a cloak, a dagger and a sword, and can carry up to three of these, but you also begin to encounter bats, which flit about the top of the room while you try to shoot them down.


You could easily leave them and move on to the next room, but in the first place only bats carry maps from here on in, and in the second place you have to kill a certain number before you can move to the next floor. If you reach the exit without the required tally of dead bats, you'll be moved back to a random room on the same level. This is not a good thing.

Verdict

Transylvanian Tower is an excellent game at a reasonable price, and should stand the test of repeated playings, despite the drawback of the slow maze construction. I couldn't progress beyond Level 3, where I was seen off by an unexpected vampire while I wasn't carrying a clove of garlic. Mike Gerrard

RATING

Lasting appeal — 

Playability — 

Use of machine — 

Overall value — 



Each week in this section PCN tests new games for you to play.

SCIENCE FICTION

APPLE II

Game for a laugh

Name Lunar Leeper **Application** Science fiction **System** Apple II
Publisher Sierra Vision **Format** disk
Language Machine code **Outlets** SBD Software 01-870 9275 **Price** £19.95

What a relief to play a game, get absolutely thrashed, collapse in heaps of laughter and then have another attempt . . . then another . . . and another . . .

If you happen to be like me, you'll laugh at the wrong times and forget what you're doing. It gives the program an extra advantage as you laugh away another life.

Objective

There you are in your little spaceship high above the moon, running out of fuel. Your shipmates have somehow contrived to be stranded on the surface.

All you have to do is pick them up — by the head! Easy, you think. Well, it would be if only the Lunar Leepers with their voracious appetites would stop eating the castaways and spaceship.

Once you have completed this task, stage two commences. Your mission: to boldly go where no spaceship should ever be and ('Perisher' fanatics will love this) shoot the eyeball in the sky.

As luck would have it, the eyeball is at the end of a cave defended by Trabants, but they should really have been crabs!

First impressions

I am wary of glossy boxes bearing strange illustrations, in this case a red cycloptic blob contriving to avoid/eat a spaceship. The game is on one disk with accompanying fold-over instruction card.

The instructions are brief but accurate and the game allows a keyboard, joystick or Atari joystick options for controls. If the keyboard is selected the player is asked to define which keys are to be used during play. Once into the game the graphics and sound are excellent.

In play

Starting at level one (easiest) of eight, the play is relatively easy, as long as you suppress the odd chortle. In fact, it's worth making a few mistakes just to see the results. As you move up through the levels, more Leepers and spaceship-like Trabant's hinder your mission.

Eventually, Trabant's start appearing in stage one with the added problem that they are unkillable. Unfair this might be, but it definitely increases the excitement.

Verdict

I so thoroughly enjoyed this game I assumed I was being biased. However, I coerced a couple of non-game players to have a go. Result — addiction. Need I say more?

Nigel Cross

RATING

Lasting appeal —

Playability —

Use of machine —

Overall —



APPLE II

Test of survival

Name Evolution **Application** Science Fiction **System** Apple II
Publisher Sydney Development Corporation **Format** disk **Language** Machine code **Outlets** Apple dealers **Price** £29.95

'Only the strong survive' — it announces from the cover of Evolution. How true! You need the wrists of a gorilla, the constitution of an ox and the patience of Job to even consider playing Sydney Development Corporation's version of Evolution.

Objective

Starting as a lowly amoeba basking in protozoic slime, you have five theoretical lives to advance through an evolutionary cycle.

This cycle consists of six phases including amoeboid, tadpole, rodent, beaver, gorilla and human.

Negotiating the plethora of hazards and techniques in each phase passes you on to the next (assuming you have any lives left) until you manage to kill ten mutants during the human phase.

As long as you can do this (I couldn't), then you 'witness the end of the human race'. The logic behind this statement totally bewilders me — you've won so why end the race?

First impressions

I must admit I expected more to the packaging. All you get is the disk in an envelope proclaiming 'Sydney', with a fold-over sheet

of cardboard giving instruction on the inside.

The instructions are brief but, thankfully, accurate and starting the game couldn't be easier.

Once up and running it's well worth the time just to let the program run through to acquaint yourself with the structure of each phase.

In play

Three levels of skill are available: beginner, intermediate, and expert — classed at levels 1, 7 and 13.

Considering that 99 levels are programmed into the game I can't contemplate the impossibility factor of the higher levels as 13 was way beyond me.

All phases use the same keys or joystick controls. If keyboard is used then 'up' and 'down' could have used a better layout than 'A' and 'Z'.

Poetic licence has been taken to extremes. Amoebae with a shield facility, tadpoles eating water flies, and gorillas in Africa throwing coconuts.

If in any phase you lose your lives then the whole thing starts again from the first phase. Deft use of the pause function ('ESC') is a necessity.

Verdict

Really, this is just a series of six loosely linked games, none of which is likely to maintain more than minimal interest. On the basis of this game, if Charles Darwin were around today he'd be preaching the Old Testament.

Nigel Cross

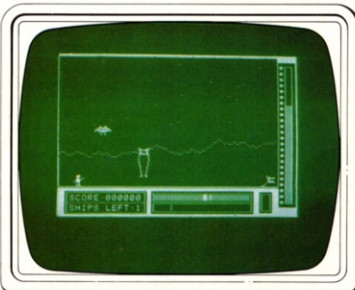
RATING

Lasting appeal —

Playability —

Use of machine —

Overall —



IJK

the one to watch

MODEL A/B

Cassette 1: Star Trek/Candy Floss (very popular) **£6.50**
 Cassette 2: Family Games (hours of fun) **£4.50**
 Cassette 3: Mutant Invaders/Breakout **£6.50**
 Cassette 8: Model A Invaders (M/C) **£5.50**

MODEL B (or A+32K)

Cassette 4: Beep-Beep (Super Simon Game) **£4.50**
 Cassette 5: Beebunch (full colour Munchman) **£6.50**
 Cassette 6: Super Hangman (animated, educational) **£4.50**
 Cassette 7: 3D Maze (fast and intricate) **£4.50**

CASSETTE 9

MODEL B Invaders (or A+32K) (M/C) **£7.50**

CASSETTE 10

WORDPRO. (Cassette W.P. system). **£10.50**

CASSETTE 12

FLAGS. (Countries and Capitals). **£4.50**

CASSETTE 13

HYPERDRIVE (M/C arcade). Destroy the Drone aliens in the caverns with your laser tank. **£6.50**

CASSETTE 14

STRATOBOMBER (M/C arcade). Keep the enemy fleet at bay in order to destroy the rogue star ships nuclear reactor. **£7.50**

CASSETTE 15 - LEAP FROG

The fabulous 'frogger' arcade game reaches the BBC micro. Superbly written full colour machine code version for the Model B (or A+32K). Help the frog cross the road avoiding the vehicles travelling at different speeds, and cross the multi current river to reach the safety of the lilly pads. The game gets progressively harder - perfect for arcade addicts
Only £7.50 for MODEL B (or A+32K)

CASSETTE 11

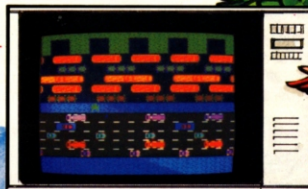
ATLANTIS. The superb fast action arcade game written in machine code to illustrate to the full the machines fantastic colour graphics and capabilities. This game includes all the usual ATLANTIS/SCRAMBLE features. Guide your submarine Nautilus along the undersea landscape through the caverns avoiding mines, depth charges, rockets, jelly fish, serpents etc.
Only £7.50 for MODEL B (or A+32K)

BBC MICRO GAMES



ATLANTIS

- All Programs will run on all operating systems
- All software in stock before we advertise
- Send SAE for Brochure



LEAP FROG

ALL PRICES FULLY INCLUSIVE
 OF VAT AND P&P -
 NO MORE TO PAY

IJK
Software Limited



24 HOUR
ANSAFONE

48 hour despatch

9 King Street, Blackpool, Lancashire.
(0253) 21555

**SUBSCRIBE TO
PERSONAL
COMPUTER
NEWS
NOW
AND GET 8 WEEKS FREE!**

As one of the very first readers of Personal Computer News, you are eligible for our special Founder Subscriber Offer — 15% discount on a year's subscription, that's 8 weeks' copies absolutely free. For just £15 you will get 51 copies of Personal Computer News. That's got to be good value.

If YOU want to be sure of getting your copy *every* week — If YOU would like the luxury of having it delivered direct to your door —

If YOU want to receive 8 full issues for nothing —

Don't Delay. Fill in the special Founder Subscriber coupon, and send it with your remittance, straight to us.

Don't forget — the quicker you send it off, the quicker those weekly copies of Personal Computer News will start dropping through your letterbox every week. And you'll be better off in more ways than one!

**FILL IN THE TEAR-OFF COUPON IN
THIS MAGAZINE *NOW* WHILE THE
OFFER LASTS.**

PCN ProgramCards

This week there is a slight change in this section because some of our previously published programs are causing a bit of confusion for some of you. We will try to clear things up.

SPIDER, VIC-20, April 1

This program has been responsible for the greatest confusion and we have received many telephone calls asking for clarification. Neil Mullings, of Halesowen, Alex Posner, of Cockfosters, and S Paterson of Washbrook, Ipswich, also wrote in asking for an explanation of some of the symbols used in the program.

Lines 20, 730, 810, 815, 875, 915 and 1010 contain statements using square brackets: [and]. These statements mean that when the program is typed into the machine the characters inside the brackets (including the brackets) must be replaced by the special characters that the Vic-20 uses to perform that function.

For instance, in line 730 [HOME][6CR][8CD] should be changed to one cursor home character, six cursor right characters, and eight cursor downs.

There was another problem in line 100 which contained a character not on the Vic keyboard. This symbol, \ast , should be replaced by the up arrow (next to the RESTORE key), meaning 'raise to the power'.

With these changes the program will run without error.

SHAPE TABLE UTILITY, APPLE II, March 18

A vital piece of information was omitted from the introduction to this program and has caused Dave Bland, of Biggleswade, a few problems.

The missing note is that the program requires a dummy shape table to be resident on disk.

The quickest way to do this is to enter the Monitor program (type in CALL-155). When \ast appears on the screen type in 5000:46 00 8E 00.

As soon as the RETURN key is pressed the values are stored in memory. At this point return to Applesoft or Integer and save the dummy table on disk with BSAVE Filename, A\$5000, L\$4400, D2.

Once this is done the program can be used without any of the frustrating error messages appearing.

ANALOGUE CLOCK, BBC MODEL B, March 25

Roderick Buchanan of Stockport was not very happy with this program and has suggested a few modifications.

First, add the line:-
55 VDU 29, 512; 512

which sets the origin to 512, 512. Then all X+ and Y+ can be removed from succeeding PLOT85, MOVE and DRAW statements.

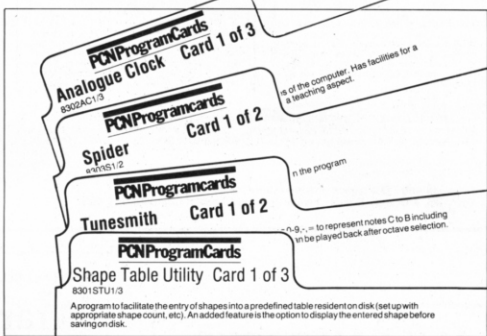
For example, line 230 becomes:-
230 PLOT85, R2*SIN(TH), R2COS (TH)

Also, MOVEX, Y becomes MOVE0,0.

Secondly, if any key other than "A" or

invested in a BBC Model B and has sent in another program. This utility is very useful as it allows function key set-up and date and time initialisation.

Our sub-routine this week is a solution to the perennial problem of calculating the day of the week for a given date. It returns a value of 0 to 6 representing Sunday to Saturday.



A program to facilitate the entry of shapes into a predefined table resident on disk (set up with appropriate shape count, etc.). An added feature is the option to display the entered shape before saving on disk.

"O" is pressed the clock gains time. To safeguard against this, the time-lapse section of the program should be rewritten using a WAIT until TIME MOD 100 = 0 construct.

TUNESMITH, ORIC-1, April 8

Another omission occurred in this program and was ably spotted by Steve Mellin from Wolverhampton. Line 5090 should read:-

5090 IF N(C) = 16 THEN MUSIC 1,1,1,0:GOTO 5160

This means that the breath function will act correctly instead of repeating the last note played.

This Week

We start with four more ProgramCards for Wacky Racers, by MM Tew of Coventry. The final pair will appear next week.

Mr G T Childs of Winchcombe, Glocs, has produced a very useful program for those of you with mortgages. His Sharp MZ80K program takes simple information and produces a list of the monthly repayments per year for both old (tax relief) and new mortgage schemes.

The ubiquitous Miklos Shawl of Paddington Green, London (remember his Pascal program in our first issue?), has now

This method means that it is left to you to define your own preference for day names, perhaps French or German? In our example program the calculated day of the week is used as an index to the children's rhyme in the program.

See your name in print!

Become a legend in your own lunchtime. Send your example of programming expertise on disk or cassette with a plain paper printout to the address below.

We'd also like a brief description of what the program does, and notes including memory requirements, special hardware needed etc.

All programs are checked by a referee before publication so that only fully debugged programs are published.

As if the promise of fame was not enough we'll even pay you for them, at our standard rates.

Should you require your material to be returned please enclose an SAE.

If you are interested in becoming a referee for submitted programs then send details of experience, machines covered etc to: Programs Editor, Personal Computer News, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.



M. C. LOTHLORIEN

A message for all Dragon and Sinclair owners

BEWARE THE IDES OF MARCH!

(all the best prophecies are late)



ROMAN EMPIRE

Our largest selling Spectrum game will be available for the Dragon 32 from April 1983 (yes we have avoided the Ides of March, poor old Caesar). The game will test your generalship as you build your armies, appoint generals and fight campaigns in your attempt to conquer armies in provinces of the Roman Empire. This challenging game takes full account of troop morale, fighting efficiencies, leadership ability, etc. Three levels of play giving many hours of satisfaction. DRAGON, SPECTRUM 16K, ZX81 16K.

WARLORD (Dragon 32 and ZX81 16K)

Rule a village in 13th Century Japan, plan food production, attack and defend against other Warlords and their Samurai. Face leadership challenges. The penalty for failure is DEATH for you and your family! Three levels of play (ZX81 version does not contain ALL the above features).

TYRANT OF ATHENS (ZX81 and Spectrum 16K) Dragon

Can you survive long enough to turn Athens into the most feared state in the Mediterranean? Train troops, build warships, fight battles by land and sea against hostile Greek States and the vast Persian Empire. Many more features in this, our best selling game.

SAMURAI WARRIOR (ZX81 and Spectrum 16K) Dragon

How would you have fared as a Samurai in 13th Century Japan? Face challenges from other Samurai; give aid to villages and resist attacks by groups of marauding bandits. 7 levels of play, a most fascinating game. Are you a survivor or will you commit ritual suicide?

For ZX81 16K only PELOPONNESIAN WAR (see previous adverts for details).

All games contain comprehensive playing instructions, all Dragon titles feature high resolution graphics (many with maps), all ZX81 need 16K Ram, all Spectrum will run on 16 or 48K. PRICE DRAGON £6.95; SPECTRUM £5.50; ZX81 £4.50.

Cheques and PO's please, made payable to: M. C. Lothlorien,
Dept. 1, 4 Granby Road, Cheadle Hulme, Cheadle, Cheshire SK8 6LS.



16 K RAM PACKS FOR VIC 20

To the trade only

PLUS 80 GUARANTEE

To beat any manufacturers price on 16K
and 24K RAM packs with full one year
guarantee.

This offer applies to a minimum order of 10 units.

Write or phone for details to:

PLUS 80

31-33 LOWER ROAD
HARROW
HA2 0DE

Tel: 423 6393

FOR ALL YOUR COMPUTER SUPPLIES CONTACT

Marlowfield Ltd

Wabash Diskettes

5 1/4" SSSD £15.00 per box
8" SSSD £17.50 per box

Verbatim Diskettes

5 1/4" SSSD £17.50 per box
8" SSSD £19.50 per box

FREE Library Case with every box of Diskettes

Disk Head Cleaning Kits

5 1/4" and 8" £16.00 each

Diskette Storage Boxes

5 1/4" Storage Capacity 30/40 £17.50
5 1/4" Storage Capacity 60/80 £21.00
8" Storage Capacity 30/40 £23.00
8" Storage Capacity 60/80 £27.00

POST & PACKING IS FREE

Listing Paper

9 1/2 x 11 Plain 2000 Sheets £9.50
14 1/2 x 11 Plain 2000 Sheets £10.50

Delivery Charge £3.00 per box

All prices exclude VAT.

Send for new price list to:

MARLOWFIELD LTD

Hesketh Bank House
7-11 Yellowhouse Lane, Southport, Merseyside
PR8 1ER Telephone (0704) 36082

Wacky Racers Card 4 of 9

8306WR4-9

```

1550 DATA*****
1552 DATA*****
1554 DATA*****
1556 DATA****          i          *****
1558 DATA***          ****          *****
1560 DATA*** **          ****          *****
1562 DATA*** **          ****          *****
1564 DATA*****          *****          *****
1566 DATA*****          *****          *****
1568 DATA*****          *****          *****
1570 DATA*****          *****          *****
1572 DATA***          *****          *****
1574 DATA*** i          *****          *****
1576 DATA***          *****          *****
1578 DATA**          *****          *****
1580 DATA**          *****          *****
1582 DATA**          *****          *****
1584 DATA**          *****          *****
1586 DATA**          *****          *****
1588 DATA**          *****          *****
1590 DATA**          *****          *****
1592 DATA** i          *****          *****
1594 DATA***          *****          *****
1596 DATA*****          *****          *****
1598 DATA*****          *****          *****
1599 DATAE,15,23,6,9
1600 DATA*****
1602 DATA*****
1604 DATA***          *****          *****
1606 DATA*****          *****          *****
1608 DATA*****          *****          *****
1610 DATA***** i          *****          *****
1612 DATA*****          *****          *****
1614 DATA***** **          *****          *****
1616 DATA***** **          *****          *****
1618 DATA***** *          *****          *****
1620 DATA*****          *****          *****
1622 DATA*****          *****          *****
1624 DATA*****          *****          *****
1626 DATA*****          *****          *****

```

1550-1626 Circuit data statements (cont)

Wacky Racers Card 5 of 9

8306WR5-9

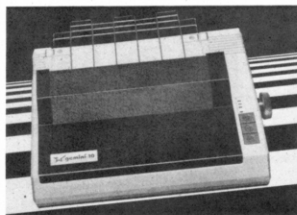
```

1628 DATA*****          *****          *****
1630 DATA***          *****          *****
1632 DATA** **          *****          *****
1634 DATA* **          *****          *****
1636 DATA** **          *****          *****
1638 DATA***          *****          *****
1640 DATA***** i          *****          *****
1642 DATA*****          *****          *****
1644 DATA*****          *****          *****
1646 DATA*****          *****          *****
1648 DATA*****          *****          *****
1649 DATAE,20,23,7,8
1650 DATA*****
1652 DATA*****          *****          *****
1654 DATA*****          *****          *****
1656 DATA*** **          *****          *****
1658 DATA*** **          *****          *****
1660 DATA**          *****          *****
1662 DATA*          *****          *****
1664 DATA*          *****          *****
1666 DATA**          *****          *****
1668 DATA**          *****          *****
1670 DATA*          *****          *****
1672 DATA*          *****          *****
1674 DATA*          *****          *****
1676 DATA*          *****          *****
1678 DATA*          *****          *****
1680 DATA*          *****          *****
1682 DATA*          *****          *****
1684 DATA*          *****          *****
1686 DATA**          *****          *****
1688 DATA**          *****          *****
1690 DATA***          *****          *****
1692 DATA***          *****          *****
1694 DATA*****          *****          *****
1696 DATA*****          *****          *****
1698 DATA*****          *****          *****
1699 DATAE,18,22,14,8
1700 DATA*****          *****          *****
1702 DATA*****          *****          *****

```

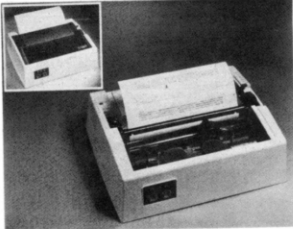
1628-1702 Circuit data statements (cont)

A NEW STAR IS BORN
FROM THE LARGEST RETAILER IN THE UK
OF STAR PRINTERS COMES THE:-
NEW STAR 510



True Descenders 9x9 Matrix
100 CPS Bidirectional & Logic seeking 5, 6, 8.5, 10, 12, 17 cpi 40,
48, 68, 90, 96, 136 cpi
Italics, Emphasized, Double strike, Super & Sub Scripts
Hi-Resolution & Block Graphics
Continuous Underline, Backspace, Vertical & Horizontal Tabs
Friction & Tractor Feed: Accepts up to 10 Inch Paper
2.3K Buffer Standard
Centronics Interface Standard others available
STAR 515 (Accepts 15 Inch Paper) Available

£310.00 + £46.50 VAT = £356.50
**PACKAGE PRICE FOR BBC MICRO/DAGON/
ORIC**
STAR 510 + Cable + Delivery + VAT £370.00



SPECIAL NEW LOW PRICE ON STAR DP 8480
£217.39 + £32.61 = £250.00

RS232 Interface as standard
7 Needle Head 7x9 Character Matrix
80cps Bidirectional & Logic Seeking
5, 6, 8.5, 10, 12, 17 cpi 40, 48, 68, 80, 96, 136 cpi
Block Graphics or Optional Hi-Res Graphics
Friction & Tractor Feed accepts up to 10 inch Paper

Hi-res Graphics option for DP8480 complete with software for
BBC Micro Screen Dump £15.£20.

BBC Package
(Star DP8480 + Hi-res option + Cable + Delivery + VAT) **£275.00**

Printer Cables

BBC to 36 Way Centronics Type connector	£17.50
Dragon to 36 Way Centronics Type Connector	£17.50
Oric to 36 Way Centronics Type Connector	£17.50
Torch to 36 Way Centronics Type Connector	£20.00
BBC to 25 Way D Type (for use with RS423)	£9.50
BBC to 40 Way Edge Connector (Centronics 737/739)	£20.00

Delivery: Cables 50p: Printers 24 HR Securoir £8.00
Send SAE for Full Price List of BBC Accessories

C. J. E.
Microcomputers

Dept (PCN), 25 Henry Ave
Rustington, W. Sussex
BN16 2PA
(09062) 6647

For the best deal in Micros

A great deal of service from Tap Micros. We offer helpful friendly advice and a selection of the finest equipment.

Our aim is to ensure that your choice of microcomputer will be ideally suited to your individual needs.

Our after sales support and service will help to guarantee the success of your investment.

**tap
micros**



Tap Micros Limited,
30 Cursitor Street,
London EC4A 1LT.
Tel: 01-405 9125/9129



1. GREAT BRITAIN LIMITED.

You are PM and Chancellor. Fight INFLATION and UNEMPLOYMENT, balance the BUDGET and try to stay POPULAR

ACORN USER: "Highly enjoyable"
ZX COMPUTING: "A challenging game"
MICRO UPDATE: "A dream for megalomaniacs"

£5.95 on cassette

★★ A MUST FOR ELECTION YEAR ★★

2. INHERITANCE

A 2 part game packed full of features. Try to gain your INHERITANCE in part 1 and if successful takeover the PARADISE COLA Co. in part 2. PERSONAL COMPUTER WORLD: "Well presented and good value for money"

£5.95 on cassette

3. THE WORLD TRAVEL GAME

A game for 1 or 2 players
Your aim is to collect 6 souvenirs from around the world (from Russia to Falklands) in the shortest possible time
Cope with HIJACKS, STRIKES, THIEVES, CASH SHORTAGES, BANKRUPTCIES, BAD WEATHER, ETC... World Map & full instructions supplied.

BBC ONLY:

£6.95 on cassette

Available from your local computer shop or direct from:

SIMON W HESSEL SOFTWARE, Dept. P
15 Lytham Court, Cardwell Crescent,
Sunninghill, Berkshire. Tel: Ascot 25179

24 Hour despatch

1 Year guarantee

BBC 32K

SPECTRUM 48K

Wacky Racers Card 6 of 9

8306WR6/9

```

1704 DATA**** * **      ***  *****  1 **
1706 DATA*** 1 ****  ** **  1**  *****  1 **
1708 DATA**  ***** ** **  **  *****
1710 DATA**  ***** ** **  **  *****
1712 DATA**  ***** ** **  1 *  *****
1714 DATA**  ***** * ** **  **  *****  1 **
1716 DATA**  ***** ** ** **  *****  1 **
1718 DATA**  ***** ** ** **  *****  1 **
1720 DATA**  ***** ** ** **  *****  1 **
1722 DATA**  1 *****  0 ****  **
1724 DATA**  ***** ** ** **  *****
1726 DATA* 1 ***** 1 ** ** 1***  * **
1728 DATA**  ** *  *  **  **  **  **
1730 DATA**  ** **  **  **  **  **  **
1732 DATA***** ** *  ***** **
1734 DATA***** ** 1 *  ***** **
1736 DATA***** ** **  ***** **
1738 DATA**  ***** ** **  ***** **
1740 DATA**  ***** ** **  ***** **
1742 DATA***  ** **  ***** * **
1744 DATA**** 1 ***** 1 ***** **
1746 DATA***** ***** 1 **
1748 DATA***** ** 1 *  ***** **
1749 DATA@,17,22,17,@
1750 DATA*****
1752 DATA*****
1754 DATA***  1 1 ****
1756 DATA**  ***** ** **  ***** **
1758 DATA**  ***** ** **  ***** **
1760 DATA*  ***** ** **  ***** **
1762 DATA*  ***** ** **  ***** **
1764 DATA*  ***** ** **  ***** **
1766 DATA*  ***** ** **  ***** **
1768 DATA*  ***** ** **  ***** **
1770 DATA*  ***** ** **  ***** **
1772 DATA*  ** **  ***** **
1774 DATA* 1 1 **|*****| 1 1 **
1776 DATA*  ** **  ***** **
1778 DATA*  ***** **  ***** **
1780 DATA*  ***** **  ***** **

```

1704-1780 Circuit data statements (cont)

Wacky Racers Card 7 of 9

8306WR7/9

```

1782 DATA**  ***** ** **  ***** **
1784 DATA**  ***** ** **  ***** **
1786 DATA**  ***** ** 1***  ***** **
1788 DATA**  ***** ** **  ***** **
1790 DATA**  ***** ** **  ***** **
1792 DATA***  ***** ** **  ***** **
1794 DATA****  1 1 *****  1 **
1796 DATA***** *****
1798 DATA*****
1799 DATA@,29,23,12,@
1800 REM
1801 REM
1802 REM
1803 REM
1804 REM
1805 REM*TO ADD EXTRA SCREENS START DATA WITH A '@'*
1806 REM*THEN TYPE IN 25 LINES OF DATA AS ABOVE IN LINES*
1807 REM*1750 TO 1798.DO THIS IN SPARE LINES*
1808 REM*1415 TO 1999*
1809 REM*END THIS DATA WITH 'DATA@,X,Y,N'.*
1810 REM*WHERE 'X' IS THE X COORDINATE OF THE CAR'S*
1811 REM*START POSITION & 'Y' IS THE Y COORDINATE*
1812 REM*OF THE CAR'S START POSITION,'N' IS*
1813 REM*THE NUMBER OF '1' ON THE TRACK.*
1814 REM*FINALLY UPDATE THE NUMBER OF TRACKS IN LINE 1.*
1815 REM
1816 REM
1817 REM
1999 REM*INITIALISE VARIABLES.*
2000 GOSUB1000
2010 DIM C(8),D(8)
2020 FOR I=1TO8:READ(I),C#:C(I)=ASC(C#):NEXT
2030 HS=0
2050 DIMSD(10)
2060 FOR I=1TO8:READSD(I):NEXT
2190 RETURN

```

1782-1799 Final circuit data statements

1800-1817 Description of how to set up user defined circuits

2000 Load initial data statements at 1100-1180
 2010-2020 Load car direction data statements at 1400-1470
 2030-2060 Load data statements at 1475

2190 Return to mainline

What the experts say:

Sinclair User... "QUALITY"

•USE AND LEARN

Sinclair User... "EXCELLENT"

What Micro... "TREMENDOUSLY VALUABLE...
GET THE BEST OUT OF SPECTRUM BASIC"

ZX Computing... "EXCELLENT... A GREAT
ASSET... FANTASTIC VALUE... VERY HIGHLY
RECOMMENDED"

•THE DATABASE

Sinclair User... "EXCELLENT"

•THE SPREADSHEET

Personal Computer News... "EASY
TO USE... PLENTY OF USES... STREETS AHEAD"
(OF GEMINI'S SPREADSHEET)

Sinclair User... "EXCELLENT... MUCH
CLEARER" (THAN VU-CALC)

What Micro... "QUALITY"

MiCROL[®]

Not available in any Store -
Order TODAY for fast
convenient delivery



MICROL[®]

SERIOUS SPECTRUM SOFTWARE only £9.95 each!

USE AND LEARN

Your perfect Spectrum starter Kit. 25 original BASIC programs you can use immediately, PLUS 118 page manual to help you get the most from your 16or48K Spectrum. 25 programs include:

Music Composer, World Atlas, Computer Term Glossary, Screen Designer, Star Maps - PLUS games and powerful routines to use in your own programs: graph-drawing, text-editing, sorting, searching and much more. 118 page manual includes detailed description of programming techniques, full listings of all programs, and articles to develop your own program-writing skills.

"Excellent" A.R. West, Surrey. "First-time loading, user-friendly, superb documentation" J.E. Mann, Leeds.



THE DATABASE

Whether you want to update mailing lists, manage customer accounts, or simply produce an index of your record collection, THE DATABASE makes it easy and enjoyable. A breakthrough in power and practicality, THE DATABASE allows you to store information on any subject in the way you want, and gives you a full range of commands to display, update, sort, search and print - even perform calculations.

Massive storage capacity: 1,000 lines in memory at a time over 7,000 names and addresses on a single C90 cassette. See for yourself why THE DATABASE is the most advanced 48K Spectrum database available - far more powerful and practical than Sinclair's VU-FILE and all other "competitors".



THE SPREADSHEET

Based closely on Visicalc, the world's best-selling program, THE SPREADSHEET turns your 48K Spectrum into a "super-Calculator" that helps you solve all kinds of number-based problems quickly and easily. Hundreds of applications in business, engineering and science - and just as versatile for home finance management. Invaluable in education too, helping develop maths ability and confidence.

In power, flexibility and ease of use, THE SPREADSHEET outperforms all other Spectrum spreadsheets - including Sinclair's VU-CALC. See for yourself, with the security of MICROL'S 14 day money-back Guarantee.



THE WORD PROCESSOR

The only full feature, professionally-written word processor for 48K Spectrums. Use it to produce memos, letters, reports.

~ THE WORD PROCESSOR has the features you need, including flexible editing, justification, centering, and automatic "word wrap". Simplicity itself to use, THE WORD PROCESSOR uses the same "what you see is what you get" principle as word processors costing hundreds of pounds more. 20,000 character storage capability for real-work applications, and it's easily adapted to work with full size printers. Once again, MICROL sets the standard in serious Spectrum software.



To order: (UK Orders Only).

Simply complete the coupon, and FREEPOST with your cheque, made payable to MICROL (UK Mail Order). All products normally available from stock and despatched by return. Credit Card Orders: By phone 9-5.30 Mon to Fri. stating name and address, Card No. and item(s) required.

MICROL[®]

31 Burleigh Street, Cambridge CB1 1BR.

(0223)312453

Post to:- MICROL (UK Mail Order) Freepost
31 Burleigh Street, Cambridge CB1 1BR

PCN422

Please send mecopy/copies of USE AND LEARN Vol. 1
Please send mecopy/copies of THE DATABASE
Please send mecopy/copies of THE SPREADSHEET
Please send mecopy/copies of THE WORD PROCESSOR



I enclose cheque/P.O. for..... (£9.95 + 50p p+p - £10.45 total each)

Or I wish to pay by Access/Barclaycard/Visa

Card Number

Please print name and address

Name

Address

Credit Card
holder's signature

Extra Memory

Dealer enquiries welcome

From Britain's
premier manufacturer
of micro computer
memory boards

Sirius
+ **Victor 9000**
128k
256k

Apple IIe
80 column card
+
80 column card
with 64k RAM

Apple II
16k
64k
128k
256k

IBM_{PC}
64k
128k
192k
256k

For further information
please contact Debbie:



Intelligence Research Limited
Nelson House, 271 Kingston Road
London SW19 3NW
Telephone 01-543 3711
Telex CALLIN G 444423

Mortgage Comparison

8306MC1/2

Card 1 of 2

A program to take mortgage and years of payment as input producing a list of monthly payments due. This list compares the new mortgage repayments scheme with the old system of tax relief on mortgages. It is interesting to note that the new system is usually beneficial in the long run.

```

10 U = 30: V = 10
20 DEF FNA(X) = INT(X*100 + 0.5)/100
30 PRINT "[CH][3CD]"
40 PRINT "DO YOU WANT TO CHANGE TAX (30%) OR
50 PRINT "MORTGAGE RATE (10%)? Y/N."
60 GET Z$: IF Z$ = "" THEN 60
70 IF Z$ = "N" THEN 100
80 INPUT "[2CD]ENTER TAX RATE. "; U
90 INPUT "[2CD]ENTER MORTGAGE RATE. "; V
100 PRINT "[2CD]ENTER TOTAL MORTGAGE.
110 INPUT "£ "; T

120 PRINT "[2CD]OVER HOW MANY YEARS?"
130 INPUT Y
140 GOSUB 390
150 C = A: S = T
160 W = U: U = 0

170 GOSUB 390

```

Sharp MZ80K

Sharp Basic

General interest
Author: G T Childs

To avoid possible errors during the printing process of this program all cursor control characters have been replaced with a string embedded within "[.]" at the appropriate point. Do NOT type in the string or brackets but replace with the indicated special character in the accompanying text.

```

10 Set tax (U) and mortgage rate (V) to 30% and 10%
20 Function to express a number to two decimal places
30 CH = clear screen and cursor home character. 3CD = 3 cursor down Prompt for tax and rate changes
40-50
60-70 Single key response. Blank entry not allowed. "N" — skips past change routine
80 2CD = 2 cursor down characters.
110 Input total mortgage value. Note mortgage relief only acts up to £30,000
120 2CD = 2 cursor down characters.
130 Input number of years of repayment period
140 Calculate of monthly net payments
150 C — new system monthly payment, S — running total owed
160 W — standard rate of tax, U — set to 0% tax rate for old system calculations
170 Perform calculation

```

Mortgage Comparison

8306MC2/2

Card 2 of 2

```

180 PRINT "[CH]";
190 PRINT "YR. "; "NET PER MONTH", "STILL OWING
200 PRINT " NEW", "OLD", "NEW", "OLD"
210 FOR N = 1 TO Y
220 PRINT STR$(N): FNA(C), FNA(A - T*W*V/120000),
230 T = T - 12*A + T*V/100
240 S = S - 12*C + S*V*(100 - W)/10000
250 J = J + 12*(A - T*W*V/120000)
260 PRINT FNA(S), FNA(T)
270 IF INT(N/21) <> N/21 THEN 300
280 PRINT "PRESS ANY KEY TO CONTINUE."
290 GET Z$: IF Z$ = "" THEN 290
300 NEXT
310 PRINT "TOTAL PAID :", FNA(C*Y*12),
320 PRINT FNA(J)
330 PRINT "ANOTHER ONE? Y/N";
340 GET Z$: IF Z$ = "N" THEN END
350 IF Z$ = "Y" THEN RUN
360 GOTO 340
370 REM Subroutine to calculate monthly
380 REM net payments.
390 K = 1 + (100 - U)*V/10000
400 IF (K > 2) + (K < 1) + (Y > 40) THEN GOTO 460
410 B = K*Y
420 A = B*(K - 1)*T/(B - 1)/12
430 RETURN
440 REM Avoid absurd entry and crash in
450 REM line 410.
460 PRINT "Is your building society on Mars?"
470 PRINT "TRY AGAIN!": FOR N = 1 TO 2000: NEXT: RUN

```

```

180 CH = clear screen and cursor home character
190-200 Page headings
210 Year calculation and print loop
220 Print year number, new systems net, old system net
230 T — running total under old system (owing)
240 S — running total under new system (owing)
250 J — cumulative total paid old system (net)
260 Print new system owed, old system owed
270 Page overflow check
280-290 If page end then allow operator response to go onto next page
310 Print end heading and new system total paid
320 Print old system total paid (net)
340 Single key response.
350 If "Y" then program re-runs itself
360 Do follow the instructions!

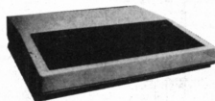
390 First part of calculation routine
400 Trap for possible overflow error in line 410
410 Second part of calculation
420 Third part of calculation

460-470 Oh dear!

```

GTM

BBC DEALER IN LEEDS



BBC Machines

Model 'A' 16K RAM 32K ROM. Full colour, high-resolution graphics **£299 (+£7 p&p)**
 Model 'B' 32K RAM 32K ROM 16 colour graphics **£399 (+£7 p&p)**
 14" RGB colour monitor (as used in the BBC computer programme) **£279 (+£9.50 courier)**
 Sanyo colour monitor **£228.85 (+£9.50 courier)**
 Lead for Sanyo **£8.63 (+£1 p&p)**
 12" Green Monitor **£95 (+£6.50 courier)**
 BBC Joystick **£13 p.pair (+£1 p&p)**

BBC Software

Monsters, Meteors, Rocket Raid, Tree of Knowledge, Philosopher's Quest, Sphinx

Adventure, Snapper, Planetoid, Arcadians, Super Invaders, Castle of Riddles.

All at **£9.95 (+£1 p&p on each item)**
 Forth **£16.85**
 Arcade Action **£11.90 (+£1 p&p)**

Simon Hessel Software

Inheritance (good graphics) **£5.95**
 Great Britain Ltd (so you think you could run the country!) **£5.95**
 The World Travel game **£6.95**

GTM Software

Word Build: An educational game using colour and full graphics, sound and encouragement fully error trapped, supplied with full documentation for own word list input. Fully adaptable to any child needs (4 to any age). **£5.95**

Smiler (phonic spelling game); aids the teacher teaching of the letter sounds and spellings. Emphasises consonant and vowel recognition. **£5.95**

Word Build and Smiler together — Special Offer **£11 (+£1 p&p)**

Accessories for BBC Computers

Cassettes per 10 **£4 (+£1 p&p)**
 Verbatim single sided double density disks, box of 10 **£19.99 (+£1 p&p)**
 GP80 and GP100 ribbon **£4.75 (+£1 p&p)**
 Printer cable (parallel) **£15 (+£1 p&p)**
 6522 buffers **£4.75 (+£1 p&p)**
 DIN to Jack cassette leads **£3.50 (+£1 p&p)**
 BBC Machine dust covers **£3.95 (+£1 p&p)**

Printers

Acorn GP80A Printer. Lowest ever price! **£199 (+£4.50 p&p)**
 Acorn GP100A Printer **£228 (+£4.50 p&p)**



Barclaycard and Access welcomed.

ALL PRICES INCLUDE VAT

GTM
 864 YORK ROAD, LEEDS 14
 TEL: 0532 647474

TURN YOUR PROGRAMS INTO CASH

Written a good adventure program lately but got lost in the jungle when you try to sell it? Is your Frog still a tadpole when it comes to sales? Is your Donkey an ass in the marketplace?

Don't just sit there — get in touch with us at Microage Electronics for the best possible advice.

We've set up a new software company to look after the interests of all small programmers who want a better deal out of software writing.



The man who didn't go to MICROAGE

We want to hear from anybody with well written programs for BBC, Sinclair, Dragon, Lynx, Oric. We can then turn them into hard cash.

Try to make it as original as possible. We can't help you sell programs that are already on the market.

OUR PROMISE TO YOU

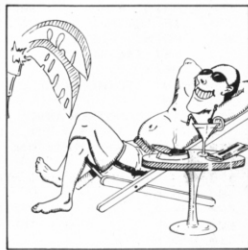
First, send us a cassette or disk of your program, registered post, to the address at the foot of this advertisement. Alternatively come and see us at our Edgware store. Always keep a copy of your program — we may need to retain the original, if we decide to go ahead with selling your software.

We will sit down and evaluate, with you, the potential of your program, and tell you the chance we think it has of succeeding. We could also make suggestions on how you can improve your programming and writing techniques.

If, between us, we agree to go ahead and register your program, we will guarantee to: Offer you the best possible royalties deal, protect your copyright, handle all packaging, duplication and advertising matters.

WE KNOW YOUR MARKET

This year, Microage is spending over £5,000 per month on television and computer press advertising, to make sure your programs meet the most receptive market. And of course, you'll have 'us' back up of one of London's longest — established computer dealers, and the Wong's worldwide distribution network.



The man who did go to MICROAGE

MICROAGE ELECTRONICS

135 HALE LANE EDGWARE MIDDLESEX HA8 9OP TEL. 01 959 7119 TELEX 881 3241

NEW FROM Micro Marketing

ORIC SOFTWARE

TWO TERRIFYING ADVENTURE GAMES FOR THE 16/48K ORIC

zodiac

- ★ You're on a frozen glacier. The Ice giant attacks you. You survive. A giant dragon confronts your path. The knife will kill it. Can you find it?
- ★ What's inside the Houses of the Zodiac — Aries and Virgo are but two.
- ★ Can you find the magic potion, will you ever reach the House of Immortality — the only safe place, or is it?

JUST £6.95

DEATH SATELLITE

- ★ On a strange planet. The time machine has landed. Without fuel. The atmosphere is electric. Will the Robot see you? Can you discover the radiation suit, find it or die.
- ★ The Transporter Cabinet — can you get any information from it, failure and you will be marooned with all the deadly perils of an alien planet.
- ★ Succeed or death may be your penalty.

JUST £6.95

WARNING: THESE PROGRAMS ARE NOT FOR THE WEAK OF HEART

- ★ Buy one and experience the thrills and spills, suspense and subtlety of these original games.
Buy two for just £12.00 post & packaging 50p extra.

Expand your horizons Spectrum owners

Now available a 32K internal memory expansion kit for your 16K Spectrum. Four 8K chips simply plug into the circuit board. Full instructions supplied with every kit.

Just £34.95 inc p&p

*Buy before April 30th and we will send a free 48K program with every kit. Usually £6.00

Strictly limited stocks available, all orders filled on a first come first served basis.

DEALERS: Micro Marketing distribute, TITAN; A&F; and LOTHLORIAN SOFTWARE as well as the JUPITER ACE and 16K Rom packs for the ZX81, JUPITER and Vic-20. PHONE TODAY FOR PROMPT SERVICE.

SEND CHEQUES AND POSTAL ORDERS TO:

MICRO MARKETING, 92-104 CARNWATH ROAD, FULHAM, LONDON SW6. TEL: 736 1683.

Day of Week Card 1 of 1

8306SubDOW

A sub-routine to calculate the day of the week for any date from 1752 (adoption of the Gregorian calendar) to an arbitrary limit of 7999 using the Gaussian formula.

```

6300 REM CALCULATE DAY OF WEEK
6310 REM
6320 REM REQUIRES D% - DAY OF MONTH
6330 REM
6340 REM M% - MONTH NUMBER (1-12)
6350 REM
6360 REM Y% - YEAR (FULL NUMBER)
6370 REM
6380 REM USES C% - CENTURY NUMBER
6390 REM
6400 REM
6410 REM
6420 REM RETURNS DN% - NUMBER OF DAY IN WEEK
6430 REM
6440 REM 0-6 = SUNDAY, MONDAY, ... SATURDAY
6450 REM
6460 REM -1 = INVALID
6470 REM
6480 DN% = -1
6490 IF Y% < 1752 OR Y% > 7999 THEN RETURN

6500 M% = M% - 2: IF M% < 1 THEN M% = M% + 12: Y% = Y% - 1
6510 C% = INT(Y%/100): Y% = Y% - C%*100
6520 A% = INT(2.6*M% - 0.19) + INT(Y%/4) + INT(C%/4) + D% + Y% - C%*2
6530 DN% = INT((A%/7 - INT(A%/7))*7 + 0.1)
6540 RETURN

```

Although written in Microsoft Basic this can be modified to run on all machines

6320 D% should be verified prior to entry (1-31, 30, 29, 28)

6340 M% should be verified prior to entry (1-12)

6360 Y% is full four digit year number

6420 DN% is a value (-1 to 6) returned to the program. -1 is error, 0 = Sunday, 1 = Monday etc

6480 Set to error value

6490 Check year range. If out of range return to mainline

6500 Shift month round to compensate for leap years

6510 Calculate century number and year number in century

6520 Intermediate stage in calculation

6530 Final result

6540 Return to mainline

Birthday Rhyme Card 1 of 1

8306BR

A simple program to demonstrate the use of the Day of Week sub-routine by taking a date and returning the appropriate extract from the children's rhyme

```

6000 REM BIRTHDAY RHYME PROGRAM
6010 REM Demonstrates the use of CALCULATE DAY OF WEEK Sub-routine
6015 MODE 0
6020 CLS: PRINT: PRINT "By inputting your date of birth the program will display the appropriate line(s) from the rhyme is:"
6030 RESTORE: PRINT

6040 FOR N = 1 TO 8: READ R$: PRINT R$: NEXT N
6050 INPUT "INPUT DAY (1-31)", D%
6060 IF D% < 1 OR D% > 31 THEN PRINT "PROGRAM ENDED": END
6070 INPUT "INPUT MONTH (1-12)", M%
6080 IF M% < 1 OR M% > 12 THEN GOTO 6070
6090 INPUT "INPUT YEAR (FORMAT YYYY)", Y%
6100 IF Y% < 1 OR Y% > 7999 THEN GOTO 6090
6110 REM
6120 GOSUB 6480
6130 IF DN% < 0 THEN PRINT "YEAR OUT OF RANGE - RETRY": GOTO 6090
6140 IF DN% = 0 THEN DN% = 7

6150 RESTORE
6160 FOR N = 1 TO DN%
6170 READ R$
6180 NEXT N
6190 PRINT R$
6200 IF DN% = 7 THEN READ R$: PRINT R$
6210 GOTO 6090
6220 DATA "MONDAY'S CHILD IS FAIR OF FACE"
6230 DATA "TUESDAY'S CHILD IS FULL OF GRACE"
6240 DATA "WEDNESDAY'S CHILD IS FULL OF MOE"
6250 DATA "THURSDAY'S CHILD HAS FAR TO GO"
6260 DATA "FRIDAY'S CHILD IS LOVING AND GIVING"
6270 DATA "SATURDAY'S CHILD HAS TO WORK FOR ITS LIVING"
6280 DATA "THE CHILD THAT IS BORN ON THE SEVENTH DAY"
6290 DATA "IS BONNIE AND BLITHE AND GOOD AND GAY"

```

BBC Model B

BBC Basic

General interest

6015 Set screen mode

6020 Clear screen. Print instructions

6030 Set read pointer to 1. Space one line

6040 Display whole rhyme

6050-6060 If day input is out of range program ends

6070-6080 Verify month input

6090-6100 Verify year input

6120 Perform sub-routine

6130 Error — re-enter year

6140 If Sunday then set DN% to line 7 of rhyme

6150 Set read pointer to 1

6160-6180 Loop to read correct line in rhyme

6190 Display line from rhyme

6200 Second line for Sunday

6210 Round again

6220-6290 Data statements for rhyme

YOUR SEARCH FOR COMPUTER GAMES ENDS HERE AT...

MICROSPOT

MERSESIDES LARGEST SOFTWARE STOCKISTS. We have in stock over 400 fantastic programmes all at highly competitive prices and suitable for your Atari, Dragon or Vic 20 computer. Ring us on our hotline **NOW** for a copy of our latest price list. It's all you'll ever need!



ATARI
Over 250 programmes by more than 50 software houses.

NEW ATARI PROGRAMMES
Up, up and away
Zaxxon
Miner 2049 er
Fort Apocalypse
Choplifter (ROM)



VIC 20
Over 70 programmes in stock by
Imagine Bug-Byte
Rabbit Commodore
Romik Thorn
Postern Llamasoft

Happy Disk £199.00
48K Upgrade £90.00
Atari 800 48K £399.00



DRAGON
Over 50 programmes in stock by
Microdeal
Abacus
M.C. Lothlorien
Romik
Dragon Data

NEW DRAGON PROGRAMMES
Donkey King
Caterpillar
Maths Tutor
Earth Rescue



£21.95
For Atari



You need look no further than
MICROSPOT
15 Moorfields, Liverpool L2 2BQ.
Hotline: 051-236 6628

LLAMASOFT!! AWESOME GAMES SOFTWARE! — for VIC, COMM 64, ATARI, SPECTRUM

● NEW FROM THE DESIGNER OF GRIDRUNNER

● SO GOOD IT WILL BLOW YOUR MIND!!

● SO FAST IT WILL BLOW YOU AWAY!!

● The BIGGEST ADVANCE in Video Games design since Defender hit the Arcade!

● Experience Laser Zone—an utterly NEW, TOTALLY ORIGINAL MASTERPIECE of Video Games Design!!

● Learn to control two spaceships at once. FEEL THE EXHILARATION as, after long hours of practice, you control the two ships so that they function as a SMOOTH, CO-OPERATIVE TEAM!!

● LASER ZONE. Quite simply the BEST VIC-20 Game in existence!!



● Feel the RAW POWER as you lunge for the Electro Button and BLAST your enemies into expanding clouds of SPACE JUNK!!

● Laser Zone requires a Joystick, 8 or 16k, and DEDICATION!!

● FEEL THE HUMILIATION as a carelessly-aimed BLAST SLAMS into the side of your last remaining ship!!

● Designed and Programmed by Jeff Minter for the VIC-20 with 8 or 16k Ram Pack. If you don't yet have the memory, LASER ZONE IS THE ONLY EXCUSE YOU NEED TO BUY IT!

£6.00
+ 50p p&p

● A COMMODORE 64 version will be available soon.

LLAMASOFT — 49 Mount Pleasant, Tadley, Hants. Tel: 07356-4478

Please add 50p p&p to all orders

CLUBS

AVON

Worle Computer Club. Meets at Woodsprings Inn Function Rooms on alternate Mondays at 7-10.30pm (annual subs: £12).

Contact S W Rabone, 18 Castle Road, Worle, Weston-super-Mare, Avon, tel: 0934-513068

BEDFORDSHIRE

Bedford Amateur Computer Club. Meets at Star Rowing Club, Bedford, on the first and third Tuesday of each month at 8pm (annual subs: £3).

Contact Rowan Bird, 74 High Street, Great Harford, Beds MK44 3LB, tel: 0234-870763.

Chilren Computer Club. Meets at Five Beds, Eaton Bray, Near Dunstable, Leighton Buzzard on second and fourth Monday of each month (annual subs: £2 senior members, £1 under-14s).

Contact Steve Butts, 42 Wallace Road, Eaton Bray, Bedfordshire MK46 2JF, tel: 0753-220922.

Luton College Computer Club. Contact John Rodger, tel: 0582-3411.

Luton Computer Club. Contact J P Fletcher, 1 Trowbridge Gardens, Luton, Beds LU2 7JY, tel: 0582-450687.

BERKSHIRE

Easthampstead Computer Club. Meets at Easthampstead Park School, Easthampstead Park Mansions, Bracknell, on the first Wednesday in month at 8pm.

Contact Brian Poulton, 0344-84423.

Small Processor User Group. Contact Roger Knight at the Department of Meteorology, University of Reading, Earley Gate, Whiteknights, Reading, tel: 0734-875123.

BIRMINGHAM

Birmingham Amateur Computer Club. Meets at CBS Consultants, Watery Lane, Small Heath, Birmingham 10, on the first and third Wednesday of each month at 7pm (annual subs: £4.20 adults, £1.50 juniors).

Contact Dr M Bayliss, 125 Berryfield Road, Sheldon, Birmingham B26 3UU, tel: 021-743 7197.

BUCKINGHAMSHIRE

Aylesbury Computer Club. Meets at Quarendon Youth Club every Friday at 7.30pm (annual subs: £5).

Members also meet at Mandeville County Secondary School the first Thursday of each month at 7pm.

Contact Ken Knight, 22 Mount Street, Aylesbury, tel: 0296-5181.

Chiltern Microcomputer Club. Meets at the Garden Centre, School Lane, Chalfont St Giles, on the first Wednesday of each month (annual subs: £4 for six months).

Contact Mrs W Tibbits at Ellwood, Deanway, Chalfont St Giles, Buckinghamshire, tel: 024-07 4906.

IWER COMPUTER CLUB

Contact P A Seal at 1 Ormonde Flats, Church Road, Iwer Heath, tel: 0753-652792.

CAMBRIDGE

Cambridge Microcomputer Club. Meets on the third Wednesday of each month.

Contact Derek Tripp at 3 Spurgeons Avenue, Waterbeach, tel: 0223-861804.

Havehill Microcomputer Club. Meets at St Marys Church Hall, Camps Road, Havehill, on the second, third and fourth Wednesday of each month at 7.30 to 10.30pm (annual subs: £3 adult; £1 OAP and students; meetings 25p).

Clubnet keeps you in touch with the microcosm of personal computer enthusiasts throughout the UK. It is divided into two sections — clubs and user groups.

We will publish a list of each section on alternate weeks, and this week is the turn of clubs.

Entries include up-to-date information as far as possible, and group organisers should let us know of change.

And if you've just started your own club drop us a line and we'll spread the word. Write to: Clubnet, *Personal Computer News*, VNU, 62 Oxford Street, London W1A 2HG.

Contact Andrew Holliman, at 5 Trinity Close, Balsham, Cambridge CB1 6DW, tel: 022-029-583.

CHESHIRE

Altrincham Computer Club. Meets at N. Cestrian Grammar School, Durham Road, Altrincham, fortnightly.

Contact Martin Hicking at 39 Barrington Road, Altrincham, Cheshire WA14 1JZ, tel: 061-941-4547.

Brunel Computer Club. Meets at St Werburgh Community Centre on alternate Wednesdays at 7 to 10pm.

Contact Mr R Simpson at 4 The Coats, Stockwood, Cheshire.

Cheshire Computer Club. Contact W Collins at 37 Garden Lane, Chester, Cheshire.

Crewe Computer Users Club meets at Balfallos Club, Earl Street, Crewe, Cheshire, on the third Thursday of each month at 8pm.

Contact Bram Knight on 0270-623375.

Holmes Chapel Micro Club meets at Holmes Chapel at 12.30 to 9.30pm on the first and third Tuesday of each month (annual subs: £5 adults; £2.50 children, OAP and students; Or weekly subs: 30p adults, 20p children).

Contact Margaret Baker, at 1 Helton Close, Crewe, Cheshire, tel: 0477-34238.

New Mills & District PCC meets at New Mills School, fortnightly on Fridays at 9 to 9.30pm, meetings 35p.

Contact Mr G M Flanagan, at 11 Sandown Close, New Mills, Stockport, Cheshire SK12 3DH, tel: 0663-44051.

Northwest Computer Club meets fortnightly, meetings 25p.

Contact John Lightfoot at 13 Aston Drive, Frodsham, Warrington, Cheshire WA6 7PL, tel: 0728 31519.

Northwest Computer Club, weekly meetings. Annual subs: £1; meetings 30p (visitors 50p).

Contact Tom Wyatt at 29 Summer Lane, Halton, Runcorn Cheshire WA7 5PG, tel: Runcorn 77545.

CLEVELAND

Cleveland Micro Club meets on the second and third Tuesday of each month, under 18s on second of the month, over 21s on third Tuesday of the month.

Contact J Telford at 13 Weston Crescent, Norton.

Stockton Amateur Computer Club meets at Stockton YMCA every Monday at 7pm, meetings 20p to be reviewed.

Contact J P Cheshire at 60 Croft Road, Eaglescliffe, Stockton-on-Tees, Cleveland. TS16 0DY.

CORNWALL

Cornish Radio Amateur Club — Computing Section.

Contact Bob Reanon at 24 Mitchell Road, Camborne, Cornwall.

Cornwall Area Computer Club. Contact M F Grove at 35 Causeway Heard, Penzance.

St Austell Computer Club and **Computer Town** meets at ECIP Labs, Penzance Road, St Austell, fortnightly on Mondays at 7.30pm.

Contact N G Day at 2 Clendene Close, St Austell, Cornwall PL25 3DD.

DERBY

Glossop Computer Club. Contact John Dearn, 2 Spinney Close, Glossop, Derbyshire.

Derby Micro Society meets at Littleover Church Hall, Sheperd Street, on every other Thursday at 7pm. Annual subs: £5, £2.50 children, £7.50 for families, 50p entrance non-members.

Contact Mike Riordan, tel: 0332-769440.

DEVON

Exeter & District Computer Club meets at Exeter School, Magdalen Road, Exeter, on the second and fourth Tuesday every month.

Annual subs: £7.50 adults, £2.00 for students. Technical library.

Contact L Hodgson, 21 Dean Street, Exeter, tel: 0392-50812.

Exeter & District Amateur Computer Club meets second Tuesday every month. Annual subs: £7.50.

Contact Doug Bates, Fortescue House, Stoke Cannon, Exeter.

Specialist meetings on third and fourth Tuesday.

Torbay Users Computer Club meets at Devon Computer Services, 96 Dartmouth Road, Paignton on Mondays fortnightly. Annual subs: £2.00 juniors, £5.00 adults, meetings 20p, children welcome. Technical library available.

Contact J D Parker, tel: 0803-843964.

DORSET

Bournemouth Area Computer Club meets at Kinson Community Centre on the third Wednesday every month.

Contact Peter Hibbs, 54 Runnymede Avenue, Bournemouth, Dorset BH11 9SE, tel: 0202 576547.

TOPIC meets at Canteen English Truck Centre on the second and fourth Wednesday every month at 7pm.

Annual subs: £5, reduced fees for students.

Contact David Washford, 1 Alexander Road, Bournemouth, Dorset BH6 5JA.

Purbeck Computer Club, contact 31 North Street, Wareham, Dorset BH20 1AD.

DURHAM

Darlington Computer Club, weekly meetings and informal discussion. Technical library available.

Contact L Boxell, 8 Vane Terrace, Darlington DL3 7AT, tel: 0325-67766.

ESSEX

Brentwood Amateur Computer Club, proposed new club.

Contact R Sadler, 18 Wanescot Road, Brentwood, Essex CM15 9HD.

Springfield Computer Club meets on the first Friday of every month.

Contact Stephen Cousins, 1 Aldborough Way, Springfield, Chelmsford, Essex CM1 5PB, tel: 0245 90155.

Colchester Microprocessor Group meets at University of Essex on the second and fourth Wednesday of every month at 7.30pm. Annual subs: £5.

Contact Information Centre, University of Essex, near Colchester.

Rowford Computer Club, new club.

Contact Mr D Norden, 138c Church Road, Romford Essex.

South East Essex Computer Society meets at Hockey Club at Roots Hall, near Southend Football Stadium on Wednesdays at 7.30pm. Open to members over 14.

Contact Robin Knight, 128 Little Wakering Road, Little Wakering, Southend-on-Sea, Essex, tel: 0702-218456.

Stanway School Computing Club, only school members at present.

Contact G Floyd, c/o Physics Department, Stanway School, Stanway, Colchester, Essex.

GLoucestershire

Cheltenham Amateur Computer Club meets on the third Tuesday of each month at 7.30pm.

Contact Mike Pullin on 0242-25617 or Robin Phelps on 0242-584343.

British Amateur Electronics Club. Independent club with newsletter, beginner's section, library, annual exhibition catering for all ages.

Contact Mr J Margets, 33 Bishopstone Close, Golden Valley, Cheltenham.

GCHC, Contact D W Adam, 16 Court Road, Presbury, Cheltenham.

Cheltenham Amateur Computer Club meets at Presbury Scout Headquarters, on the third Tuesday of every month at 7.30pm. Annual subs: £3.

Contact M Hughes, 36 Riverviews Way, Cheltenham, Glouceus.

HANTS

Fareham and Portsmouth Amateur Computer Club.

Contact Alan Smith, c/o Francis Close, Lee-on-the-Solent, Gosport, Hants PO13 8HB, tel: 0705-550907.

RAF Odiham Computer Club. Contact c/o Officer i/c, Royal Air Force, Odiham, Nr Basingstoke, Hants.

Southampton Amateur Computer Club meets at Medical Science Building, Bassett Crescent, East Southampton, on the second Wednesday of every month at 7.30pm. Annual subs £5, £3.50 students & OAPs.

Contact P Maddison, 'Gardenways', Chilworth Towers, Chilworth, Southampton SO1 7JH.

HEREFORD

Hereford Amateur Computer Club, proposed new club.

Contact Stuart Edinburgh, 2 Warwick Walk, Bobblestock, Hereford HR4 9TG, tel: 0432-269700

HERTFORDSHIRE

Harrow Computer Club meets at Harrow College of Higher Education, Room W24 on alternate Wednesdays at 7pm. When college is closed meetings are held in the Plough, Kenton.

Contact Bazyle Butcher, 16 St Peter's Close, Bushey Heath WD2 3LG, tel: 01-950 7068.

Harpden Microcomputer Club meets at Silver Cap, Harpenden on alternate Mondays. Annual subs £2.50.

Contact David James, 5 Ox Lane, Harpenden, Hertfordshire AL5 4HH.

HUMBERSIDE

Forum 80 Users Group. Contact Frederick Brown, 421 Endike Lane, Hull HU6 8AG.

Grimby Computer Club meets at Grimby Central Library fortnightly on Mondays at 7.30pm.

Contact Jenson Lee, 29 Park View, Cleethorpe, tel: 0472-42559.

Scunthorpe & District Microprocessor Society meets at Community Centre, Lindun Street, Scunthorpe, every Tuesday at 7.30pm. Annual subs £2. families £5.

Contact G Hinch, 21 Old Crosby, Scunthorpe, South Humberside DN15 8PU.

KENT

Cantebury ACC proposed new club. Contact L Fisher, 21 Manwood Avenue, St Stephens, Canterbury, Kent CT2 7AH.

Medway Amateur Computer & Robotics Organisation meets on the first Tuesday and third Wednesday of every month. Annual subs £5.

Contact Paul Cameron, Small Community Centre, Lordwood Lane, Lordwood, Chatham, Kent, tel: 0634-63036.

Amateur Computer Club, annual subs: £4.50 (£2 for under 18s. OAPs).

Contact Rupert Steele, St John's College, Oxford OX1 3JP.

North Kent Amateur Computer Club meets at Lecture Theatre, Charles Darwin School, Jail Lane, Biggin Hill, Kent, on the first Thursday of every month at 7.30pm. Annual subs £3, £1 students.

Contact Iain Howe, 228 Canadian Avenue, Catford SE6 3AS, tel: 01-690-5441.

Orpington Computer Club meets at The Large Hall, Christ Church, Chaterhouse Road, Orpington, Kent, every Friday at 8pm-10.30pm.

Insurance cover for all members' equipment while on club premises.

Contact Mr R Wyatt, 23 Arundel Drive, Orpington, Kent BR6 9JF, tel: Orpington 2081.

National Personal Computer User Association, annual subs £12.

Contact Eric Keeley, 11 Spratling Street, Marston, Ramsgate, Kent.

Sevenoaks School Computer Club. Contact G Sommerhoff, Technical Centre, Sevenoaks School, Sevenoaks, Kent, tel: 0732-456490.

Tonbridge & Tonbridge Wells ACC. Contact Ray Szatkowski, 1 Cromer Street, Tonbridge, Kent, tel: 0732-355960.

Computer Users Club. Contact Tony Latham on 01-304-3910.

LANCASHIRE

Blackburn Micro Computer Club. Contact Roger Longworth, 12 Sharp Close, Accrington, Lancs.

Bolton Computer Club meets at E4-24 Bolton Institute of Higher Education, Deane Road, Bolton, on Thursdays. Annual subs: £1.

Contact David Atherton, 16 Douglas Street, Asherton, Manchester M29 9FB, tel: 0422-876210.

Burnley Computer Club meets at Carleton Hotel, Standish Street, on Tuesdays 7.30-11pm.

Contact Clive Tallon, 27 Bassett Street, Burnley, Lancs BB10 3EQ.

Ribble Valley Computer Club meets at Staff Canteen, Pendle Carpets Ltd, West Bradford, on the second and fourth Monday of every month at 7.30pm.

Contact Ian Thornton-Bryard, 25 Southfield Drive, West Bradford, Clitheroe, Lancs BB7 4TU.

Lancaster & Morecambe Computer Club. Contact Sarah Blackler, tel: 0524-33553.

Chorley Computer Club meets at Towley Arms, Chorley, every other Tuesday at 8pm.

Contact Chris Hicks, 131 Market Street, Chorley, Lancashire.

South Chadderton Computer Club meets at Turf Lane Centre, Turf Lane, Chadderton, on Thursdays at 7.30pm.

Contact Mr Jakeman, 26 Mandale Street, Dorker, Oldham, Lancs, tel: 061-682 120.

LEICESTERSHIRE

East Leake Computer Club. Contact Andrew Jones, 59 Bateman Road, East Leake, Loughborough, Leicestershire LE12 6NN.

LINCOLNSHIRE

Lincoln Computer Club, meets at Blandings Public House, High Street, Lincoln on the first and third Wednesdays of every month.

Contact John Clifford, 448 Newark Road, Lincoln LN6 8RX, tel: 0522 2168.

LIVERPOOL

SBC Microcup Liverpool meets at Old Swan Technical College, Liverpool, on the first Wednesday of every month.

Contact Nick Kelly, 56 Queens Drive, Walton, Liverpool L4 6SH.

LONDON East London Amateur Computer Club meets at Harrow Green Library, Cathall Road, E11, on the second and fourth Tuesday of every month at 7.10pm. Annual subs: £5.

Contact Fred Linger on 01-554 3288.

Harrow Computer Group meets at Harrow College of Higher Education, Row W24, Northwick Park, on alternate Wednesdays at 7pm.

Contact Bazyle Butcher on 01-950-7068.

Grovedon Micro-Computer Club meets on the first and fourth Tuesday of every month.

Contact Vernon Gifford, 111 Selhurst Road, Selhurst SE25 6LH, tel: 01-653 3207.

Post Office HQ Microcomputer Club meets off route B145, River Plate House, 12-13 South Place, off Moorgate, on the second Thursday of every month.

Contact Vernon Quaintance, British Telecom Enterprises, Cheapside House, 138 Cheapside EC2U 6JH, tel: 01-726 4716.

THE SOBAT Computer Club meets the first week of every month. Annual subs £5.

Contact T Kayari, 12 Calderon Road, London E11 4EU.

Laserbug, contact 4 Station Bridge, Woodgrange Road, Forest Gate, London E7 0NF.

Paddington Computer Club meets at Paddington College, Paddington (Green), London W2 1NB.

Contact Peter Hill on 01-723 5762.

Forum-80 Wembley, contact Victor Saleh on 01-902 2546.

North London Hobby Computer Club meets at the Polytechnic of North London, Holloway, London N7 8DB, on every Monday, Tuesday, Wednesday and Thursday during term time and on one evening a week during holidays. Annual subs: adults £25, family £40, jobless, pensioners, poor students £5.

Contact Robin Bradbeer 01-407 2789.

Wednesday Computer Club, annual subs £2.50.

Contact Panos Koumi, 33 Chandos Avenue, London N14.

Richmond Computer Club meets at Richmond Community Centre, Sheen Road, Richmond, on the second Monday of every month at 8pm.

Contact Bob Forster, 18a The Barons, St Margarets, Twickenham, Middlesex, tel: 01-892 1783.

South East London Microcomputer Club meets at Thames Polytechnic, Greens Ends, Woolwich SE18, on alternate Wednesdays at 7pm. Annual subs: £5.

Contact Peter Phillips, 61 Graingerie Road, SE3, tel: 01-853 5829.

Southgate Technical Computer Club meets at Room W102 Southgate Tech, fortnightly on Thursdays at 7.30pm. Annual subs: £5.

Contact Kevin Pretorius on 01-882 2282.

ITN Computer Club meets on Fridays. Contact A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, tel: 0485 62035.

West London Personal Computer Club meets at Back Room, Fox & Goose pub, Hanger Lane, Alperston, on the first Tuesday of every month at 7.45pm. Annual subs: £5 adults, £2.50 under 16s & pensioners.

Contact Graham Brain on 01-997 8986.

London School Computer Club. Contact Burlington Danes School, Dane Building, DuCane Road, Hammersmith, London.

Forum-80 London, contact Leon Jay on 01-286 6207.

Imperial College Microcomputer Club meets at room 145, level 1, on Tuesdays at 7.40pm.

Contact Tim Panton, c/o I.C. Union Office, Prince Consort Road, London SW7 2BB.

Metropolitan Police Amateur Computing Club meets on the first Thursday of every month at 7pm.

Contact S Farley on 01-725 2428.

MANCHESTER

Manchester Computer Club meets at the Department of Computer Science, Manchester University, Oxford Road, Manchester, on the first and third Thursday of every month at 7.30pm.

Contact David Wade, 061-941 2486.

MERSEYSIDE

Wirral Microcomputer Users Group meets at Birkenhead Technical College every Monday.

Contact J Phillips, 14 Helton Close, Birkenhead, Merseyside L43 9HP.

Merseyside Microcomputer Group meets at Merchant Taylor's School, Crosby, on second Thursday every month.

Contact Mr F Shaw, 14 Albany Avenue, Eccleston Park, Prescott, tel: 051-426 5536.

Bolton Computer Club meets Room E4/E24 Bolton Institute of Higher Education, Deane Road, Bolton, on Thursdays. Annual subs: £1.

Contact David Atherton, 16 Douglas Street, Atherton, Manchester M29 9FB.

Southport Computer Club meets weekly.

Contact Ian Bristone, 28 Weld Road, Southport, Merseyside PR8 2DL, tel: 0704-64524.

MIDDLESEX

68 Microcup meets at Regents Park Library, Robert Street, NW1, on the third Tuesday of every month at 7.30pm. Annual subs: £5.

Contact Jim Anderson, 41 Peabworth Road, Harrow, Middlesex.

Richmond Computer Club meets at Richmond Community Centre, Sheen Road, on the second Monday of every month at 8pm.

Contact Bob Fisher, 18a The Bacons

St Margarets, Twickenham, Middlesex, tel: 01-892 1873.

Sunbury Computer Club meets at St Benedicts Hall, Napier Road, Ashford, on the last Tuesday of every month at 8pm.

Contact Simon Taylor, 8 Priory Close, Sunbury-on-Thames, Middlesex.

Contact Simon Clark, 83 Watling Street, Towcester, Northants NN12 7AG.

NOTTS

Ashfield Computer Club meets at Carse Junior School, St Mary's Road, Sutton in Ashfield on the first and third Thursday every month. Annual subs £3.

Contact Derick Daines, c/o Cuttings Avenue, Sutton in Ashfield, Notts.

Nottingham Microcomputer Club meets at Friends Meeting House, Clarendon Street, Nottingham, on the first Tuesday of every month. Annual subs: £5.50 adults, £2.50 juniors, OAPs.

Contact Mr E Harvey, 6 Roseleigh Avenue, Nottingham NG3 6FH.

Eastwood Town Micro Computer Club meets at Devonshire Drive Junior School every Wednesday at 4.45pm. Annual subs: £5.50 adults, £2.75 juniors, £4.50 OAPs.

Contact Ted Ryan, 15 Queens Square, Eastwood, Nottingham NG16 3BJ.

East Midlands TRS-80 Users Group. Contact Costello, 17 Langbank Avenue, Rise Park, Nottingham NG5 5BU.

NORFOLK

Association of Computer Users Group meets at Cromie Community Centre, Telegraph Lane, Norwich.

Contact Gill Rijzi, 88 St Benedicts, Norwich.

Anglia Computer User Group. Contact Ian Rejzl, 128 Templemere, Sproton Road, Norwich, tel: 0603-28652.

South Northants Computer Group meets at Anchor House, Moat Lane, Towcester, on Wednesdays at 7.30pm.

OXFORDSHIRE

Microsoc meets at Clarendon Lab, Parks Road, Oxford, every week during term.

Contact Rupert Steele, St John's College, Oxford OX1 3JP.

Association of Computer Clubs, Annual subs: £5, £2.50 under 18s and OAPs.

Contact Rupert Steele, St John's College, Oxford OX1 3JP.

Orford Personal Computer Club, Annual subs: £8.

Contact Len Phelps, Southport Cottage, Sutton Courtenay, Nr Abingdon, Oxon OX14 4AU.

Ridgeway Computing Club meets at Swan Hotel, East Isley, on the second Tuesday every month.

Contact Mike Magnay, Beavers, South Street, Blunbury, Didcot, Oxon OX11 0JU.

SHROPSHIRE

Telford Computer club meets at Telford ITEC on every Monday 6-9pm. Annual subs: £3.50, £1.50 unemployed.

Contact John Murphy, 10 Birchmore, Brookside, Telford TF3 1TF, tel: 0952-595959.

Ludlow & District Microcomputer Club meets at Diocesan Education Centre, Lower Galdeford, Ludlow, on the second of every month at 7.30pm. Annual subs £7.50 family, £5 adult, £2.50 student.

Contact David Law, MEB Shop, Ludlow.

SOMERSET

Sharp M280 Club, contact Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset.
Yeovil Computer Club, Contact D G Carrington, 2 Romney Road, Yeovil, Somerset BA21 5XN.

STAFFORDSHIRE

Alasger Computer Club, meets at Alasger Comprehensive School, Stoke-on-Trent, Staffs, fortnightly on Tuesday.

Contact Rex Charlesworth on 09363-72720.

The Amateur Computer Club of North Staffs meets on the third Wednesday every month. Annual subs £3.

Contact J Roll, 16 Hill Street, Hednesford, Staffordshire WS12 5DS.
Tame Valley Computer club, contact Tim Marshall, 32 Milton Avenue, Leyfields, Tamworth, Staffordshire B79 8JG.

ICL Birmingham Branch Micro Club, c/o WBA Ecclestone, 26 Browns Lane, Tamworth, Staffs.

SUFFOLK

Suffolk Microcomputer Club meets monthly. Annual subs £5.
 Contact Mr S Pratt, c/o Microtek, 15 Lower Brook Street, Ipswich, Suffolk.

SURREY

Thames Valley Amateur Computer Club meets at Griffon, Caversham, on the first Tuesday every month.

Contact Brian Oram, 25 Roundway, Camberley, Surrey GU15 1NR, tel: Camberley 22186.
Ashted Computer Club meets on the last Thursday of every month.
 Contact P Palmer, 8 Corfe Close, Ashted, Surrey.

Ewell Micro Club, contact Dave De Silva, 319 Kingston Road, Ewell, Surrey KT19 9SU.

Farnham Computer Club, meets at Farnham 6th Form College, Morley Road, Farnham, Surrey on the second Wednesday every month. Annual subs: £2.

Contact Adam Sharp, 14 Thorn Road, Boundstone, Farnham, Surrey.
West Surrey Computer Club meets at Paddock Room, Green Man Public House, Burpham, Guildford, the first Thursday of every month. Annual subs £5.

Contact Chris Karney on 0483-68121.

Guildford Area Microcomputer Group, contact Mr M Bawtree, Royal Grammar School, Guildford, Surrey GU1 3BB, tel: 0483 502424.

TI Home Group, annual subs: £12.
 Contact P Dicks, 157 Bishopford Road, Morden, Surrey.

Sutton Library Computer Club meets at Central Library, St Nicholas Way, Sutton, Surrey, on the first Friday of every month at 6pm and second and third Tuesday of every month. Annual subs: £6, £4 OAPs, £2 family.
 Contact Dave Wilkins on 01-642 3102.

CBIS London meets on Sundays 4-10pm. Contact P Goldman, PO Box 100a, Sarnbury, Surrey KT5 8HY.

Thames Valley Computer Club meets in Griffin Pub, Caversham. Annual subs £1, 50p a meeting.

Contact Phil Warn, Reading 594874.
Association of London Computer Clubs, contact Len Stuart, 89 Mayfair Avenue, Worcester Park, Surrey KT4 7SJ.

Worthing & District Microcomputer Club meets at Rose Wilmot Youth Centre, Littlehampton Road, Worthing, on alternate Sundays 11am-1pm. Annual subs £4 adults, £2 students, £5 family.
 Contact T Pearson, 142 King Edward Avenue, Worthing.

SUSSEX

Arum Microcomputer Club meets at Wick Amenity Centre, Wick Farm Road, Littlehampton, W Sussex, on the first Monday of every month at 8pm, and third Sunday of every month at 6pm. Fees: £3 six months, £1 joining fee.

Contact P Cherriman, 7 Talbot Road, Littlehampton, West Sussex DN17 7BL.

Micro Enthusiasts, new club proposed. Contact G Diannage, 16 Malvern Street, Hove, Sussex BN3 3YR.

Mid-Sussex Microcomputing Club, Contact Jeff Hayden, 2 Hillary Close, East Grinstead, W Sussex RH19 3XQ.

West Sussex Microcomputer Club meets at Room R06, Robinson Road Annex, Crawley, on the first and third Monday every month. Annual subs: £6 adults, £3 students.

Contact J Clarke, 31 Hyde Heath Court, Pound Hill, Crawley, W Sussex, tel: 0293-884207

TYNE & WEAR

Newcastle-upon-Tyne Personal Computer Society meets at Room D103, Newcastle Polytechnic on the first Tuesday of every month. Annual subs £5.

Contact Pete Scargill, 21 Percy Park, Tynemouth, tel: 0632-573905.

WEST MIDLANDS

West Midlands Amateur Computer Club meets at Elmfield School, Love Lane, Stourbridge, on the second and fourth Tuesday every month. Annual subs £4, £3 full-time students.

Contact John Tracey, 100 Booth Close, Briery Hill, King'swinford, W Midlands, tel: 0387-0197.

Walsall Computer Club meets at Park Hall Community School on the second and fourth Monday every month 6.45-9.45pm. Annual subs £5 adults, £3.50 students.

Contact Alison Hunt, 58 Princes Avenue, Walsall, W Midlands, WS1 2DH, tel: 0922-23875.
Cannock Computer Society meets at Cannonock Computer Systems, Old Penkridge Road, Cannock, fortnightly. Annual subs: £3 adults, £1 students.

Contact Terry Sale, 20 Redwood Drive, Chase Terrace, Walsall WS7 8AS.

Birmingham Computer Club meets at CBS Consultants, Watery Lane, Small Heath, Birmingham, on the first and third Wednesday every month.

Contact Dr Mike Bayliss, 125 Berrford Road, Sheldon, Birmingham B26 3JU, tel: 021-743 7197.

National Westminster Personal Computer Society, Contact P Moore 021-236 6176, ext 382.

WILTSHIRE

Chippenham and Calne, proposed new club.
 Contact Matthew Jones, Pinhills, Calne SN11 0LY.

WORCESTER

Worcester & District Computer Club meets at Old Pheasant Inn, New Street, Worcester, on the second Monday every month at 8pm.

Contact D Stanton, 55 Vaushall Street, Rainbow Hill, Worcester WR3 8PA.

WOLVERHAMPTON

Central Program Exchange, annual subs: full membership £25 Europe, small users service £10 Europe.

YORKSHIRE

Barnsley Co-Operative Computer User

Group meets at Co-Op Social Club, Pogmore, Barnsley, on the last Tuesday every month at 7.30pm. Annual subs £1.

Contact James Bridson, c/o 39 Keresford Hall Road, Barnsley, South Yorks S70 6NF, tel: 0226-41753.

Doncaster Amateur Computer Society meets in YMCA, Wood Street, on the first Wednesday every month.

Contact John Wilkinson, 316 Bawtry Road, Doncaster, S. Yorkshire, tel: 0302-868379.

York Computer Club meets at the Enterprise Club every Monday at 8pm.

Contact K Thomas, Green Lea, Ripon Road, Harrogate, North Yorkshire HG1 2BY, tel: 0904-38239.

Program Power, contact R Simpson, 5 Wemley Road, Leeds LS7 2BX, tel: 0532-683186.

Shipley College Computer Group meets on Tuesdays. Contact Paul Channell, 0274-595731.

South Yorkshire Personal Computer Group meets at General Lecture Theatre, St Georges Building, Mappin Street, Sheffield, on second Wednesday every month at 7.30pm.

Annual subs: £4.
 Contact Paul Sanderson, 8 Vernon Road, Tetley, Sheffield S17 3QE.

Pennine & District Computer Club meets at 26 Mill Hey, Haworth, W Yorks, on Saturday and Sunday.

Contact Douglas Bryant, 26 Mill Hey, Haworth, W Yorkshire, tel: 0535-43007.

West Yorkshire Microcomputer Group meets on Tuesdays.

Contact Phillip Clark, c/o Suite 204, Crown House, Armsley Road, Leeds LS12 2ES, tel: 0532-632532.

Huddersfield Computer Club meets every Monday. Contact Chris Townsend, 7604 Manchester Road, Lintwhaite, Huddersfield, tel: 0484-657299.

Leeds Microcomputer Users Group meets at 8 Regent Street, Chapel Allerton, fortnightly on Thursday at 6pm.

Contact David Parsons, 22 Victoria Walk, Horsforth LS18 4PL.
Greenhead Grammar School Computer Club.

Contact Brian Smith, Greenhead Road, Keighley, West Yorks BD20 6EB, tel: 0535-62828.

81 Club annual subs: £30+22.
 Contact Mike Hayes 0223-371732.

SCOTLAND

Kennyay Computer Club meets weekly. Contact S Stubbs, 15 The Glebe, Kennyay, Inverurie, Aberdeenshire.

Central Scotland Computer Club meets at Falkirk College Of Technology, Grangemouth Road, Falkirk, on the first and third Thursday every month.

Contact James Lyon, 78 Slamannan Road, Falkirk FK1 5NF.

Scottish Amateur Computer Society, contact Mike Anthony, 46 Moreuden Park Gardens, Edinburgh EH17 7JR.

File Computer Users Club, Contact Murray Simpson, 31 Tom Steward Lane, St Andrews, Fife, Scotland KY16 8YB.

Grampian Amateur Computer Society meets at 53 Thistle Lane, Aberdeen, on the second and fourth Monday every month at 7.30pm. Annual subs: £12, £5 student, £2 50 junior.

Contact Alan Morrison, 21 Beech Row, Westhill, Skene, Aberdeenshire AB3 6WR.

Skye and Lochalsh Computer Society, proposed new club.
 Contact C Manvell, 25 Breacais Isle, Isle of Skye IV42 8QA.

Strathclyde Computer Club meets at Wolfson Centre, 106 Rotterdown, Glasgow, on the third Wednesday of every month.

Contact B Duffy, 24 Lomond Drive, Conditarr, Cumbernauld G4 8NW.

Perth & District Amateur Computer Society meets at Hunters Lodge Motel, Bankfoot, on the third Tuesday of every month at 7.30pm. Annual subs £5.

Contact Alastair McPherson, 154 Oakbank Road, Perth PH1 1HA.

WALES

Gwent Amateur Computer Club meets at St Mary's Institute, Stow Hill, every Thursday at 7.30pm. Annual subs: £3.50.

Contact Rothery Harris, 16 Alanbrook Avenue, Newport, Gwent, Wales NP17 6QJ.

Swansea & South West Wales Amateur Computer Club meets on the last Friday every month.

Contact Paul Griffiths, 1 Prescilli Road, Penlan, Swansea SA5 8AF.

Colwyn Computer club meets at the Greens Hotel, Colwyn Bay, at 7pm.
 Contact D Bivan, c/o Abergele Road, Colwyn Bay, Cwyd LL29 7PA.

Abergele Computer Club meets at Abergele CI Offices every Thursday at 7.30-10pm. Annual subs: £5 adults, £2.50 juniors.

Contact W Jones, 77 Millbank Road, Rhyl, Cwyd, North Wales.

Pontypool Computer Club meets at The Settlement, Roachhill Road, Pontypool, Gwent, on every Friday.

Contact Graham Loveridge, on Pontypool 2827.

EIRE

Cork Amateur Computer Club, Talks and demonstrations. Hardware, programming and games.

Contact T Moriarty, Tiger Bay, Rochestown, Douglas, Cork, Eire.

Remember

Let us know about your micro club or user group so we can be sure the information printed here is up to date. Drop a card to Sandra Grandison, Listings Editor, at *Personal Computer News*, 62 Oxford Street, London W1A 2HG, or give her a call on 01-636 6890.

THE ORIC-1
and how to get
the most from it



The Oric 1 and how to get the most from it by Ian Sinclair, published by Granada at £5.95 (paperback, 136 pages)

It's Oric's fault. If manufacturers stopped their selfish practice of marketing products with awful manuals then we wouldn't need books like this one.

Ian Sinclair's book is yet another of those rushed pulp jobs that saves the hapless beginner from rotten documentation. It may be a sad fact, but if you know nothing about computing *The Oric-1* could actually help.

Mr Sinclair goes through the basics of using the machine. The first section of the book is about the core of Basic and is general enough to be adaptable to several micros. Only the last few chapters and appendices deal with Oric-specific stuff such as sound and graphics.

The book isn't easy to use, breaking down into large chunks that often don't follow the chapter breaks referred to in the text. Mr Sinclair is less detailed than the Oric manual and skimps on the points that need explaining, such as the display attributes.

It's not the reference bible that the publishers seem to believe it is. There's not enough information to allow you to progress very far. Mr Sinclair even makes mistakes such as claiming INT (-23.6) = -23. If only he had checked it on an Oric!

Worst of all, his book is so rushed that he had to work with a pre-production Oric — he continually admits there might be differences from the Oric you buy in the shops. So there's no reference to any of the bugs that still infest the Oric Basic.

If you are new to computing and you've bought an Oric,

then a look at Ian Sinclair's book should get you going. But take it in the spirit it was meant. Borrow a copy from a friend. **MP**

Tricks for VICs



'Tricks for Vics' by Winfried Hofacker published by Ing. W Hofacker (paperback, 116 pages).

This book, proclaims the author/publisher, 'is published as a service to Vic-20 personal computer users worldwide.'

Well, 'service' is not quite the right word.

In the preface Herr Hofacker also says he has to thank 'Franz Ende for the translation'. Again, 'thank' is not quite the right word. As an example I offer the following from a section on programming for use with joysticks:

'You should get a value of 243 if the button on the right joystick is depressed. Be aware that the same value will also appear if you move the right joystick to the east and west simultaneously. This is physically impossible and the programmer has to rectify this situation.'

A nice trick if you can do it.

On the face of it, *Tricks for Vics* offers good value for money with more than a dozen ready-to-run programs, an introduction to machine code, input/output programming and a section of hardware projects.

The latter offers a 16K RAM-ROM board and an experimenter board which Herr Hofacker (via translator Ende) assures us 'gives you the permission to connect external expansions'.

There is a fair selection of programs here, including a word processor in 8K, a simple machine code monitor and a range of games. But I can't recommend you to follow the book into hardware experi-

mentation. This is risky in the best of circumstances for anyone with less than a solid grounding in electronics. That coupled with the additional dangers of the translation make for an adventure fraught with the risk of destruction.

On the whole there are better books for Vic owners worth the investment of a few pounds. And it's disconcerting to observe the schizophrenic authorship: the cover bills the author as Sam D Roberts, but inside it's all Herr Hofacker. **PW**



'Atari Pilot for Beginners' by Jim Conlan and Tracy Deliman, published by Prentice-Hall International at £11.95 (paperback, 230 pages)

Aimed at children and adults who wish to learn about computers, *Atari Pilot For Beginners* is a manual-type book which presents you with a step by step guide to using Pilot on the Atari.

The whole object of Pilot (Programmed Inquiry Learning or Teaching) is the turtle, which accepts commands to draw on the screen.

In this book you learn about the Atari 400 and 800 micros, and how to use the Pilot commands on these machines. In no time, you will be able to make 32 sounds related to the piano and draw some simple graphics.

Each chapter is set out to a standard format, with an introductory section telling you what you are about to learn, then a series of text/screen diagram lessons, a self-test section, and finally a brief section telling you what you have (or should have) learned.

The book is intended to let the beginner learn to use computers through play and experimentation with programming. This means, in effect, that it combines fun programming with learning, and slightly humorous illustrations with serious information.

If you do work your way through it properly, you'll certainly find yourself knowing a good deal more than you did when you started.

But at £11.95 Jim Conlan and Tracy Deliman's paperback is overpriced for what it offers. And there's one subtle point — it's not worth buying if you haven't got the Pilot cartridge. **SG**

Roger Graham



'Practical Pascal for Microcomputers' by Roger Graham, published by Sigma Technical Press at £7.50 (paperback, 200 pages)

This book is more for the enthusiast than the beginner. If you have already decided that you wish to program in Pascal and want to find out how then you will find the book useful.

But if you have no knowledge of Pascal and want to discover what it is all about this book may put you off.

Not that Roger Graham is lacking in his grasp of the subject. On the contrary, he demonstrates a full understanding of the complexities of the language.

The problem is that he presents the material in a dull style. And he is not helped by the design and layout of the book, which is equally boring.

The treatment of the subject is full if not comprehensive. Program design and structures are covered, as are mathematical functions and record types. The section on disk files is, however, somewhat cursory.

As befits the title, the text is amplified by the generous use of example programs. It is therefore a book that encourages learning by doing rather than by reading. **RB**

DATA BASICS

This five-page guide lists as many of the micros on the market for under £12,000 as possible. In Databasics you'll find all the specifications for the machines, add-ons and software necessary to make your buying decisions.

PCN keeps you up to date in three-week cycles, starting with hardware, then peripherals and finally software.

PRICE Specifications listed for each machine indicate what you get for the basic price quoted, which includes VAT.

PROCESSOR TYPE A microprocessor is the heart of the computer. The Z80 and 6502 are popular 8-bit chips. The 8088 and 68000 are common 16-bit chips. If a machine has an 8-bit and a 16-bit processor we have listed the 16-bit only. Cust. means custom-built.

SPEED IN MHz Speed of the clock used to drive the microprocessor, measured in MegaHertz (thousand cycles per second).

STANDARD RAM Amount of main memory used on the system. The capacity is expressed in kilobytes.

MAX RAM normally at extra cost Amount of memory to which the system can be expanded.

MAX CHARACTER columns × lines The number of characters that can be displayed across the screen and the number of lines down.

METHOD (at extra cost) This indicates the way the computer displays information. **M** on its own means that a monitor is included in the basic price.

Tv indicates that you can plug the computer into a television set. **(M+)** indicates that the monitor costs extra. **LCD** = Liquid crystal display.

COLOUR CAPABILITY tells you whether the machine can give colour at the basic price quoted.

MAX DOT RESOLUTION gives the maximum number of points across the screen by the number of points down the screen that are available for graphics.

KEYBOARD This tells you the type of keyboard that comes with the machine. **W** = word processing, **C** = calculator and **T** = touch-sensitive.

No of FUNCTION KEYS refers to the number of keys that can be used for different jobs by different programs.

NUMERIC PAD indicates whether the machine has a separate calculator-style group of number keys to enter data quickly.

INTERFACES BUILT-IN shows the number of standard connections built into the machine.

CASSETTE FACILITY gives a yes or no as to whether or not the machine can use a cassette to store data.

CAPACITY PER DISK AND DISK SIZE tells you how many disk drives come with the machine, and the amount of data in kilobytes (K) or megabytes (Mb) that can be stored on each drive. There are two sizes for disks, 5¼" or 8", and they can be floppy (F) or hard (H).

OPERATING SYSTEM gives the program that looks after the general running of a computer.

LANGUAGES INC is a column which lists the programming languages that come with the machine at the basic price.

OTHER LANGUAGES AVAILABLE indicates whether or not other programming languages are available for the machine.

DISTRIBUTOR To find which company distributes the machine refer to the distributor table from the code listed in this column. The table is at the end of the listings, and gives the distributor's name and telephone number.

All details given are the latest available. We ask distributors to let us know as soon as machine specifications change so Databasics can be kept right up to date. This guide has been meticulously researched and the information collected from individual distributors listed.

PRICE GUIDE

Sinclair ZX81	£50	Commodore 4016	£632	Transam Truscan	£1,983	LSiM4	£2,472	DECPC 325	£3,080	Corvus Concept	£4,887
Tandy TRS-80 Pocket	£57	Research Machine 480Z	£650	IDS Datamachine	£1,995	Canon CX-1	£2,500	Direct 1000	£3,093	ICI PC Model 31	£4,939
Sharp PC1251	£68	DAI PC	£684	Tandy TRS-80 Model I	£1,999	Adler Alphatronic P2U	£2,539	Equator	£3,099	Cromemco System 3	£5,170
Jupiter Ace	£90	Apple II	£776	Kenilworth B3N	£2,012	IO Tech Iona	£2,539	Clenio Table-Tops 925	£3,105	Model Five 1000	£5,175
Casio FX702P	£90	Commodore 500	£799	Calixt Micro	£2,019	HP87XM	£2,571	ITT 3030	£3,105	Fortune 32:16 System 2	£5,204
Orc 1	£100	HP 75C	£883	LSiM3	£2,064	Quantum 2000	£2,587	Monroe OC 8810	£3,162	Zeus 4	£5,400
Sinclair Spectrum	£125	Sharp MZ20B	£900	Haywood 9000 Composite	£2,064	Seed System 19	£2,600	HP Series 200 Model 16A	£3,211	Hawk Model 2110	£5,405
TIT1-99-4A	£150	Commodore 8032	£1,129	Hawk Model 110	£2,070	Enterprise 1000	£2,645	Samurai	£3,214	Molecular M200	£5,462
Atari 400	£160	Commodore 710	£1,144	Positron 9000	£2,134	Facit 6520	£2,645	Torch	£3,214	Altos 800-15	£5,663
Commodore VIC 20	£170	Microdecision	£1,144	Research Machines 380Z	£2,147	Olympia Boss Model A	£2,645	Sord M223	£3,277	Durango F85	£5,744
Sharp PC1500	£170	Fujitsu FM8	£1,150	Future Computers FX-20	£2,156	Brilliant Baby	£2,657	Kontron RS 180	£3,306	Marin Chip M9900	£5,750
Acorn Atom	£174	Sanyo MBC 1000	£1,195	Comart Communicator	£2,180	Adler Alphatronic P3	£2,696	Columbia PC 1600-1	£3,392	SW Tech. Products 50/9	£5,750
Tandy TRS-80 Pocket2	£179	Positron 9000	£1,259	Adler Alphatronic P2	£2,197	Eagle II	£2,702	Digico Prince	£3,392	Basin 7100	£5,805
Tandy TRS-80 Model I	£199	Commodore 8096	£1,374	Genie III	£2,242	Almarc 801	£2,708	Barcelona AMT 100	£3,450	Sord M243	£5,842
Dragon 32	£209	Pascal 640	£1,437	Pamilton K2000E	£2,242	DEC Rainbow 100	£2,714	Katamazo 1050	£3,450	Archives IV	£5,905
Sord M5	£218	NEC PC8000	£1,454	Rair Black Box 320S	£2,242	ICI PC Model 10	£2,754	Cromemco System 2	£3,560	ICI PC Model 32	£6,037
Colour Genie	£224	Irvine Business Systems	£1,489	Sanyo MBC 2000	£2,242	Milbank SX10	£2,754	Digital Microsystems 3	£3,576	Rair Business Computer	£6,037
Computers Lynx	£225	Televideo TS-800 Series	£1,495	Toshiba T-200	£2,242	Olivetti M20D	£2,754	Decision-1 Computer 012	£3,674	Digital Microsystems 4	£6,210
Tandy TRS-80 Colour	£240	HP 86A	£1,541	TM 352	£2,242	Sirius I	£2,754	Televideo TS 1602-C	£3,714	Superstar	£6,296
New Brain A	£269	Osborne I	£1,581	Bonsai SM 3000	£2,294	Victor 9000	£2,754	Adcis Multivision	£3,795	Rascal 6000	£6,327
BBC Micro Model A	£299	Signet 10025	£1,599	CAL PC	£2,294	North Star Advantage	£2,766	Clenio Pronto	£3,795	Eagle 1600	£6,497
Genie II	£299	APL Signet	£1,610	North Star Horizon	£2,294	Apple III	£2,780	Panasonic JDB00M	£3,795	Ti System 200-250	£6,695
Multitech MPS II	£299	Zenith Z99-81	£1,668	Sanyo MBC 1250	£2,294	Sanyo MBC 4050	£2,817	Kemtron K3000	£3,850	Compucorp 675	£6,780
Nascom 2	£327	Basix 108	£1,683	CasuMini C2	£2,300	Bonsai SM 4000	£2,842	DEC PC-350	£3,850	Sundance I	£6,969
Genie I	£330	Tandy TRS-80 Model III	£1,699	Seed System I	£2,300	Logica VTS Vitessse	£2,863	Vector 4	£3,852	Pascal Mod. Microgenie	£7,003
Commodore 64	£345	Commodore Spr. Pet 9000E	£1,719	Sharp PC3201	£2,300	Decision-1 Computer 011	£2,869	Sage II	£4,019	Dialab 3000	£7,250
BBC Micro Model B	£399	Gemini Galaxy 2	£1,719	HP 85	£2,360	Eagle III	£2,950	Eagle IV	£4,190	Onyx 5001 MU	£7,607
Atari 800	£400	British Micro Mini 803	£1,720	HP Series 100, 120	£2,362	Zenith Z99-81	£2,978	C-1010	£4,197	Sundance II	£8,205
Datasc Micro Controller	£431	Microsolution Brit. Genie	£1,840	Sord M23P	£2,369	Monroe EC 8800	£2,990	Tandy TRS-80 Model 16	£4,199	Haywood Hinet	£9,550
Cortex	£454	Toshiba T-100	£1,900	IBM PC	£2,392	Philips P3500	£3,000	Hytch H4500	£4,310	Altos 856-10	£9,631
Epson HX20	£472	Sord M23	£1,932	Superbrain JR	£2,403	Tanberg EC10	£3,000	BMC DK11 F800, Model 20	£4,360	Micro Five 3000	£10,350
Nascom 3	£549	Translec BC2	£1,939	Xerox 820 Model II	£2,415	Archives 1	£3,003	Sundance 16	£4,500	Arch 4	£10,480
Sharp MZ80A	£549	Kenilworth B3G	£1,953	Haywood 3000	£2,439	Cromemco System 1	£3,025	Televideo TS-802H	£4,533	Spectrum	£11,442

ABBREVIATIONS

Ap: APL
As: Assembly
Ba: Basic
Co: Cobol
Cm: Comal
Fr: Forth
Fn: Fortran
Pa: Pascal

Make and model	Price inc VAT	Processor type	Speed in MHz	Standard RAM	Max RAM ... normally in extra cost	Display			Graphics		Keyboard		Interfaces built-in				Storage		Operating system	Languages inc	Other languages available	Distributor	Comments
						Max characters columns x lines	Method (for extra cost)	Colour capability	Max dot resolution	Type of keyboard	No. of function keys	Numeric pad	No. of RS232	No. of Centronics	No. of IEEE 488	No. of others	No. of expansion slots	Cassette facility					
Acom Atom	£174	6502	1	2K	40K	32x16	Tv(M+)	●	256x192	W								Cassette	BaAs	●	A1	Hobbyist micro	
Adds Multivision	£3,795	8085A	5	64K	256K	80x25	M		640x240	W	28	1	1			1x350K5¼F	CP M2, Muon	Ba	●	A2	Multi user system		
Adler Alphatronic P2	£2,197	8085A	3	48K	64K	80x24	M			W	6	●	2	1	3	2x160K5¼F	CP M	Ba	●	T1	Good software choice		
Adler Alphatronic P2U	£2,524	8085A	3	64K		80x24	M			W	6	●	2	1	3	2x320K5¼F	CP M	Ba	●	T1	£327 buys extra storage		
Adler Alphatronic P3	£2,696	8085A	3	64K		80x24	M			W	6	●	2	1	3	2x790K5¼F	CP M	●	T1	16 bit option-promised			
ADS 42	£4,500	8085A	4	32K		40x8	M		40x8	W		●	3		3	1x82K5¼F	Holland Automation	Ba		A3	Intelligent cash register		
Almarc 801	£2,708	Z80	4	64K	512K	80x25	(M+)	●		W	2			11		2x800K5¼F	CP M		●	A4	8-bit range goes to 20Mb		
Almarc 1601	£3,445	8086	8	128K	1M	80x25	(M+)	●		W		2		11		2x800K5¼F	CP M86		●	A4	Pseudo 16-bits go to 20Mb		
Altos 800 15	£5,663	Z80	4	192K	208K	80x24	M			W	8	●				1x450K5¼F	MP M		●	L1	Multi user business machine		
Altos 856-10	£9,631	8086	10	512K	1Mb	80x24	M			W	16	●	6			2x500K5¼F	Xenix	Xenix	●	L1	The 16-bit version		
APL Signet	£1,610	Z80A	4	64K		80x25	Tv(M+)	●		W				2		2x188K5¼F	APL, CP M	Ap	●	M1	'APL terminal recommended		
Apple II	£776	6502	1	48K	128K	40x24	Tv(M+)	●	256x192	W								●	8		●	A8	Plenty of software and extras
Apple III	£2,780	'6502	2	128K	256K	80x24	(M+)	●	560x192	W		●	1		4	1x140K5¼F	SOS, DOS	Ba	●	A8	Will emulate Apple II		
Archives I	£3,003	Z80	4	64K		80x25	M	●	240x100	W	23	●	2	1	5	2x386K5¼F	CP M	●	S1	Standard CP M + graphics			
Archives IV	£5,905	Z80	4	512K		80x25	M	●	240x100	W	23	●	1	1	3	1x10Mb5¼H+1x7445¼F	CP M, MP M	●	S1	Hard disk version			
Atari 400	£160	6502B	1.79	16K		40x24	Tv	●	320x160	T							Cassette		●	A5	Games computer. Basic extra		
Atari 800	£400	6502	1.8	16K	48K	40x24	Tv(M+)	●	320x192	T							Cassette	Ba	●	A5	Versatile, good graphics		
Barcelona AMT 100	£3,450	Z80A	4	64K	256K	80x24	TvM	●		W	8	●	1	1	2	3	2x500KB	CP M	BaCo	●	B1	Up to four users	
BASF 7100	£5,805	Z80A	4	64K		80x24	M			W	26	●	1	1		3x163K5¼F	BOS	Ba	●	C1	Hard disc promised		
Basis 108	£1,683	6502	1	64K	126K	80x24	TvM	●	820x168	W	15	●	2	1	6			●	C12	Apple bus, Z80, 80 columns			
BBC Micro Model A	£299	6502	1.8	16K	32K	40x30	Tv(M+)	●	320x256	W	10				1		MOS	BaAs	●	A1	Upgradable to Model B		
BBC Micro Model B	£399	6502	2	32K		80x30	Tv(M+)	●	640x256	W	10			1	5	3	MOS	BaAs	●	A1	Versatile and expandable		
BMC OKI 800, Model 20	£4,360	Z80B	5	64K	256K	80x25	M	●	640x200	W	15	●	1				2x340K5¼F	CP M	Ba	●	E1	Built-in printer	
Bonsai SM 3000	£2,294	Z80	2	64K		80x24	M		80x24	W	14	●	1	1			2x350K5¼F	CP M	●	B2	CP M business machine		
Bonsai SM 4000	£2,842	8088	5	128K	256K	80x24	M			W	14	●	1	1				CP M, MP M, MS-DOS	●	B2	Z80 for 8 bit software		
Britannia Baby	£2,657	8085	6.14	64K		80x25	Tv(M+)		80x25	W	11	●	2	1			2x500K5¼F	CP M	AsBaCo	●	B3	Cobol language included	
British Micro Mimi 803	£1,720	Z80A	4	64K		80x25	(M+)		512x256	W	17	●	1	1	1		2x400K5¼F	OS M	●	B4	This is CP M compatible		
C-1010	£4,197	6502	1	64K	128K	80x24	TvM	●	256x192	W	12	●	1	1	1	8	1x1405¼F+1x10MbH	CP M, DOS, UCSD-P	Ba	●	C2	Apple II compatible	
CAL PC	£2,294	8088	5	128K	256K	80x25	TvM	●	256x512	W		●	2	1	1	5	2x400K5¼F	CP M	Ba	●	C3	Also Z80B Processor	
Caltech Micro	£2,019	Z80A	4	64K	256K	80x24	TvM	●		W	36	●	1	1	3		2x400K5¼F	CP M	●	C3	Range of software included		
Computers Lynx	£225	Z80A	4	48K	192K	40x24	Tv(M+)	●	248x256	W		●	1	1			Cassette	Ba	●	C5	Unusual — promise of CP M		
Canon CX-1	£2,500	6809	4	128K	256K	80x24	M		80x25	W	15	●	3	1	1	2	2x320K5¼F	MCX	BaAs	●	C4	Pascal, Fortran as extras	
Casio FX 702P	£90	Cust.	2K			20x1	LCD			C							Cassette	Ba	●	C6	Pocket computer		
Casu Mini C2	£2,300	Z80A	4	64K			(M+)			"			4	1	6		2x1MbBF		●	C7	'Choose your own terminal		
Clenio Pronto	£3,795	Z80A	4	64K	1Mb		Tv(M+)			"			2	2	18		2x600KB	CP M	Ba	●	C8	'Choice of terminal	
Clenio Table-Top 925	£3,105	Z80A	4	64K	128K	80x25	M			W	11	●	2	2			2x600KB	CP M	●	C8	Watch out for the weight		
Columbia PC1600-1	£3,392	8088	4.77	128K	1M	80x24	M	●	640x200	W	10	●	2	1			2x320K5¼F	CP M, MS-DOS	Ba	●	I1	An IBM lookalike	
Commodore VIC 20	£170	6502	1	5K	32K	22x23	Tv(M+)	●	176x158	W	8				3	1		Kernal	Ba	●	C9	Very popular home micro	
Commodore 64	£345	6510	1	64K		40x25	Tv(M+)	●	320x200	W	8							Kernal	Ba	●	C9	Good value for money?	
Commodore 800	£799	6509	1	128K	896K	40x25	Tv(M+)	●	320x200	W	10	●	1	1	3	1		Kernal	Ba	●	C9	Available by summer?	
Commodore 4016	£632	6502	1	16K	32K	40x25	TvM	●		W								Cassette, PETDOS	Ba	●	C9	The original PET	
Commodore 710	£1,144	6509	2	128K	896K	80x25	TvM	●		W	10	●	1	1	3			Kernal	Ba	●	C9	Might be a long wait	
Commodore 8032	£1,129	6502	1	32K	96K	80x25	TvM	●		W								Cassette, PETDOS	Ba	●	C9	The 80-column PET	
Commodore 8096	£1,374	6502	1	96K		80x25	TvM	●		W								Cassette, PETDOS	Ba	●	C9	Fully expanded PET	
Commodore Super Pet 9000	£1,719	6502	2	96K		80x25	TvM	●		W				1	1	2		Cassette, PETDOS	Ba	●	C9	Top of the range	
CompuCorp 675	£6,780	Z80	4	64K	256K	80x20	M			W	20	●	1		4		2x655K5¼F	CompuCorp	●	C10	Unusual O/S		
Comart Communicator CP100	£2,180	Z80	4	64K	512K	80x24	M			W		●	2	1	10		2x390K5¼F	CP M		●	C13	Business CP M micro	
Cortex	£454	9995	12	64K	1Mb	40x24	Tv(M+)	●	256x192	W	12	●	1						BaAs	●	M2	Mainly sold as £340 kit	
Convex Concept	£4,887	68000	8	256K	1Mb	120x60	M		720x560	W	10	●	2	1	4			Merlin	Pa	●	K1	A4 shaped screen	

SYSTEMS INTERNATIONAL, INC.

Let us be your purchasing agent/exporter in the United States.

We have access to most microcomputer and American products such as the following:

Columbia Data Products

Tandon

Condor

Davong Systems

Quadram

Tecmar

Oki Data

Verbatim

Tally

Corona

Seequa

Eagle

Apparat

Ast Research

Memory Technologies

Per Syst

Televideo

Dysan

IBM

Corvus

Keytronics

Compaq

We offer microcomputers, printers, terminals, IBM-add-ons, IBMPC-spares, IBM compatibles, software.

If you do not see your requirements, please contact us for your exact needs.

SYSTEMS INTERNATIONAL, INC.
15918 LUANNE DRIVE
GAITHERSBURG, MARYLAND 20877 USA

Make and model	Price inc VAT	Processor type	Speed in MHz	Standard RAM	Max RAM - normally at extra cost	Display		Graphics	Keyboard	Interfaces built-in				Storage	Operating system	Languages inc	Other languages available	Distributor	Comments		
						Max characters columns x lines	Method (if extra cost)			Colour capability	Max dot frequency	Type of keyboard	No. of function keys							No. of numeric pad	No. of RS232
Cromemco System 1	£3,025	Z80	4	64K		80×24	(M+)	●	450×735	W	20	1	1	8	2×390K5¼f	CDOS, Crom		●	C13	Designed for business	
Cromemco System 2	£3,560	Z80	4	64K		80×25	(M+)			W	20	1	21	2×390K5¼f	CDOS, Crom		●	C13	Large business machine		
Cromemco System 3	£5,170	Z80	4	64K		80×25	(M+)			W	20	1	21	2×1.2Mb8F	CDOS, Crom		●	C13	Top end Cromec		
DAI PC	£684	8080	2	48K		60×24	Tv(M+)	●	255×335	W	1	1	1	●	Cassette		Ba	D9	Optional maths chip		
Debit Micro Controller	£431	Z80	2	16K		40×24	Tv(M+)	●	80×60	W	1	1	1	●			Ba	D1	Mainly used in labs		
DEC Rainbow 100	£2,714	8088	N/A	64K	192K	132×24	M	●	960×240	W	20	2	3	3	2×400K5¼f	CP/M		●	D2	Competitor for IBM PC	
DEC PC 325	£3,080	PD111.23	N/A	256K		132×24	M	●	960×240	W	20	2	2	4	2×400K5¼f	P-OS		●	D2	Mini in micro clothing	
DEC PC 350	£3,850	PD111.23	N/A	256K		132×24	M	●	960×240	W	20	2	2	4	2×400K5¼f	P-OS		●	D2	Mini in micro clothing	
Decision-1 Computer MDC-011	£2,869	Z80A	4	64K	192K		(M+)	'		*	3	1	1	1	2×400K5¼f	CP/M	Ba	●	I2	"Buy your own terminal"	
Decision-1 Computer MDC-012	£3,674	Z80A	4	64K	192K		(M+)	'		*	3	1	1	1	1×400K5¼f+1×5Mb5¼H	CP/M	Ba	●	I2	"You choose the terminal"	
Diablo 3000	£7,250	8085	3	32K	64K	80×24	M			W	8	1	1	4	2×1.8Mb8F	DACL	Ba	●	B5	Unusual O/S	
Digico Prince	£3,392	Z80A	4	64K		80×25	M			W	50	2	7	7	2×400K5¼f	CP/M		●	D3	Unusual keyboard	
Digital Microsystems DMS-3	£3,576	Z80A	4	64K			(M+)	'		*	3	1		2	2×512K8F	CP/M		●	D4	"Choice of terminal"	
Digital Microsystems DMS-4	£6,210	Z80A	4	128K	½Mb		(M+)	'		*	4			2	2×512K8F	MP/M		●	D4	"Depends on terminal chosen"	
Direct 1000	£3,093	Z80	4	64K		80×25	M		132×28	W	2			2	2×300K5¼f	CP/M		●	D5	Standard CP/M machine	
Dragon 32	£200	6809E	1	32K	64K	32×16	Tv(M+)	●	256×192	W	1	4	1	●	Cassette		Ba	D6	Tandy colour lookalike		
Durango F85	£5,744	8085A	5	64K	196K	80×64	Tv(M+)			W	●	4	1	12	2×1Mb5¼f	Star Basic	BaCo	●	C3	Built in printer	
Eagle II	£2,702	Z80A	4	64K		80×24	M		80×24	W	●	2	1	1	2×500K5¼f	CP/M		●	M3	Includes WP/SS software	
Eagle III	£2,950	Z80A	4	64K		80×24	M		80×24	W	●	1		1	2×1Mb5¼f	CP/M	Ba	●	M3	Includes WP/SS software	
Eagle IV	£4,190	Z80A	4	64K		80×24	M			W	●	2	1	1	1×1Mb5¼f+1×12.5Mb5¼H	CP/M	Ba	●	M3	Includes WP/SS software	
Eagle 1600	£6,497	8086	8	128K	512K	80×25	M	●	720×352	W	24	2	1	1	1×1Mb5¼f+1×12.5Mb5¼H	MS-DOS, CP/M 86		●	M3	High speed IBM copy	
Enterprise 1000	£2,645	'	8	64K			M			W	10	2	2	2	2×358K5¼f	Enterprise		●	D7	Micro Nova 16-bit	
Epson HX20	£472	6301	1	16K	32K	20×4	LCD		120×32	W	13	2	2	●	Cassette		Ba	E2	Powerful portable		
Equator	£6,842	Z80A	4	64K	448K	80×24	M		255×560	W	14	7	1	1	1×5Mb5¼f+1×750K5¼f	CP/M, MP/M, Turbo DOS		●	E3	Two bigger models available	
Facit 6520	£2,645	Z80	4	64K	128K	80×24	M		80×24	W	8	2		2	2×320K5¼f	CP/M, Facit DOS	Ba	●	F1	Concurrent printing	
Fortune 32-16 System 2	£5,204	68000	6	256K	1Mb	80×24	M	●	1024×1024	W	16	1	1	20	2×800K5¼f	Unix		●	I3	Genie 16-bit	
Fujitsu FM8	£1,150	6809	1	64K		80×25	(M+)	●	640×200	W	10	1	1	4	1	●	Flex		Ba	S2	Good for business graphics
Future Computers FX-20	£2,156	8088	8	128K	1Mb	80×25	M		800×400	W	20	2	2	2	2×800K5¼f	CP/M 86, MS-DOS		●	E1	Still on a promise	
Genie I	£330	Z80	1.7	16K	48K	64×16	Tv(M+)		128×48	W	1	1	1	●	Cassette		Ba	●	L2	Compatible with TRS 80 I	
Genie II	£299	Z80	1.7	16K	48K	64×16	Tv(M+)		128×48	W	4	1	1	1	●	Cassette		Ba	●	L2	Speeded-up Genie I
Genie III	£2,242	Z80A	3.2	64K		80×24	M		160×72	W	8	1	1	1	3	2×700K5¼f	New DOS	Ba	●	L2	CP/M costs extra
Colour Genie	£224	Z80	2.2	16K	32K	40×24	Tv(M+)	●	160×96	W	8	1	1	2	1	●	Cassette		Ba	L2	Home games machine
Gemini Galaxy 2	£1,719	Z80	4	64K	512K	80×25	M		160×75	W	10	1	1	5	●	2×400K5¼f	CP/M		●	G1	Low cost British system
Hawk Model 110	£2,070	Z80A	4	64K	256K	'	(M+)	●	'	'	'	2	1	3	2×390K5¼f	CP/M, MP/M2		●	L6	"Choose your terminal"	
Hawk Model 2110	£5,405	Z80A	4	64K	256K	'	(M+)	●	'	'	'	2	1	3	1×390K5¼f+1×21MbH	CP/M, MP/M2		●	L6	"Choose your terminal"	
Haywood 9000 Composite	£2,064	Z80A	4	64K	192K	80×25	M		64×255	W	34	2	1	8	2×320K5¼f	CP/M	As	●	H1	Designed for network	
Haywood Hinet	£10,982	Z80	4	64K	128K	80×24	M			W	34	3	1	1	1	1×11Mb8H	CP/M		●	H1	Large network machine
HP 75C	£883	Cust	N/A	16K	24K	32×1	(M+)	'		C				1	4	●	1.3K card reader	HP	Ba	H2	Calculator computer
HP 85	£2,360	Cust	N/A	16K	32K	32×20	'		255×191	W	8	1	1	4	4	●	Cassette		Ba	H2	Engineers' machine
HP 86A	£1,541	Cust	N/A	64K	512K	80×2	'		544×240	W	1	1	2	4	4	●	HP	Ba	H2	CP/M optional	
HP 87XM	£2,571	Cust	N/A	128K	640K	80×2	'		544×240	W	14	1	1	3	4	●	HP DOS	Ba	H2	Special technical uses	
HP Series 100, 120	£2,362	Z80A	3.68	64K		80×24	M		80×24	W	8	2	1	1	1	●	CP/M	Ba	H2	Top end HP business system	
HP Series 200 Model 16A	£3,212	68000	8	128K	750K	80×25	M			W	5	1	1	2	2	●	HP	Ba	H2	Genie 16-bit	
Hylech H4500	£4,310	Z80	4	64K	208K	80×25	M		80×25	W	26	1	1	3	3	2×403K5¼f	CP/M		●	H3	Standard CP/M micro
IBM PC	£2,392	8088	4.7	64K	576K	80×25	(M+)	●	640×200	W	10	1	1	5	5	1×360K5¼f	MS-DOS	Ba	●	K2	Slow but reliable
ICL PC Model 10	£2,754	8085	3	64K	256K	80×24	Tv(M+)			W	11	2	8	8	2×700K5¼f	CP/M	Ba	●	I4	Repackaged Reli Black Box	
ICL PC Model 31	£4,939	8085	3	128K	256K	80×24	(M+)		80×24	W	11	4	8	8	1×250K5¼f+1×5MbH	CP/M, MP/M	Ba	●	I4	Multi user Black box	
ICL PC Model 32	£6,037	8085	3	256K		80×24	(M+)		80×24	W	11	●	8	8	1×250K5¼f+1×5MbH	CP/M, MP/M	Ba	●	I4	Top of ICL range	
IDS Datamachine	£1,995	Z80	4	64K	1Mb	'	Tv(M+)		'	'	2		15	15	2×400K5¼f	CP/M	Ba	●	I8	"Depends on terminal"	

IO Tech Iona	£2,539	Z80	4	69K	960K	80×24	M	●	160×75	W	12	1	1	8	●	2×400K5¼F	CP/M	●	I5	Good colour versatility	
Irvine Business Systems	£1,489	Z80	4	64K		80×25	M			W	●	2				2×400K5¼F	CP/M	●	I6	Inexpensive CP/M machine	
ITT 3030	£3,105	Z80A	4	64K	256K	80×24	Tv(M+)		80×24	W	8	●	1	1	1	2×280K5¼F	CP/M, BOS	●	I7	Top end business system	
Jupiter Ace	£90	Z80	3.25	3K	51K	32×24	Tv(M+)		64×64	C	●				1				Fr	J1	Native Forth machine
Kalamazoo 1050	£3,450	8086	6	64K		80×24	Tv(M+)		80×24	W	10	1				2×250K5¼F	Kalamazoo	●	K3	Only Kabol language	
Kemtron K2000E	£2,242	Z80	4	64K		80×24	(M+)		80×24	W	●	2		14		1×300K5¼F	CP/M	●	K4	Scientific Keyboard	
Kemtron K3000	£3,795	Z80	4	64K	256K	80×24	(M+)		80×24	W	●	2		14		2×1Mb8F	CP/M, MP/M	●	K4	For scientific use	
Kenilworth 83G	£1,953	Z80A	4	64K		80×25	TvM		160×75	W	10	●	1	1	5	2×350K5¼F	CP/M	●	K5	British portable	
Kenilworth 83N	£2,012	Z80	4	64K		80×25	TvM		160×75	W	10	●	1	1	5	2×350K5¼F	CP/M	●	K5	Includes Basic	
Kontron RSI 80	£3,306	Z80	4	64K	128K	80×25	M		256×512	W	16	●	2	1	8	2×303K5¼F	Kontron	●	K6	O/S CP/M based	
LSI M3	£2,064	Z80	2.5	64K		80×24	M		80×24	W	31	●	1	1		2×200K5¼F	CP/M	●	L3	Big, British and CP/M	
LSI M4	£2,472	8088	5	128K	256K	80×24	M		160×72	W	31	●	2	1	1	2×400K5¼F	CP/M, MS-DOS	●	L3	Z80 for 8-bit software	
Logica VTS Vitesse	£2,863	8086	5	64K	256K	80×24	M	●	640×288	W	12	●	1	1	4	2×1Mb5¼F	CP/M, MS-DOS	●	L4	High-res colour graphics	
Marr Chip M9900	£5,750	9900	3	64K	1.6Mb	24×80	M		24×80	W	8	●	4	12		2×1.2Mb8F	MOS, MDEX	●	M2	Genuine 16-bit	
Micro Five 1000	£5,175	8086	5	128K	512K	25×80	TvM		512×512	W	20	●	10	2		2×1M5¼F + 2×6.3M5¼H		●	F2	*Choose your own O/S	
Micro Five 3000	£10,350	8088	8	128K	1Mb	25×80	TvM		512×512	W	20	●	5	3	●	1×10Mb8F		●	F2	*Choose your own O/S	
Microdecision	£1,144	Z80	4	64K		80×24	(M+)			*	2					1×200K5¼F	CP/M	●	I2	*Terminal extra	
Microsolution British Genesis	£1,840	Z80	4	64K		80×24	TvM		80×24	W	21	●	1	1		2×160K5¼F	CP/M	●	M4	Genesis by nature?	
Milbank SX10	£2,754	Z80A	4	65K	256K	80×25	M		80×25	W	10	●	2	1		2×350K5¼F	CP/M	●	M5	Scientific applications	
Molecular M200	£5,462	Z80	4	64K	320K		(M+)			*	2		1	16		1×10Mb8H + 1×500KB	CP/M	●	G2	*Terminal required	
Monroe EC8800	£2,990	Z80A	3	128K		40×24	M		240×240	W	32	●	3	3		1×320K5¼F	Monroe	●	F3	Only 40-character screen	
Monroe OC8810	£3,162	Z80A	3	128K		80×24	M		80×24	W	32	●	3	2	1	1	1×320K5¼F	Monroe	●	F3	Bigger model available
Multitech MPFII	£299	6502	1.2	64K		40×24	Tv(M+)	●	280×192	C	●			1	1	●		Cassette	●	F4	Apple soft compatible
Nascom 2	£327	Z80A	4	2K	64K	16×48	Tv(M+)	●	48×96	W	1			4	●		NAS, SYS	●	L5	LDI reliable	
Nascom 3	£549	Z80	4	48K		16×48	Tv(M+)	●	48×96	W	1			4	●		NAS, SYS	●	L5	Fully expanded Nascom	
NEC PC8000	£1,454	Z80	4	32K	64K	80×25	M	●	160×100	W	10	●	2	1		2×300K5¼F	CP/M, NEC, DOS	●	N1	Superb colour graphics	
New Brain A	£269	Z80A	4	32K	512K	80×30	Tv(M+)	●	640×220	C	2			1	●		Cassette	●	G3	A lot of promise	
North Star Advantage	£2,766	Z80	4	64K		80×24	M		640×240	W	15	1		6		2×360K5¼F	CP/M	●	T9	16-bit option	
North Star Horizon	£2,294	Z80	4	64K	512K					*	2	1	1	9		2×360K5¼F	North Star DOS	●	T9	*Choose your own terminal	
Olivetti M20D	£2,754	Z8000	3	160K	512K	80×25	M	●	512×256	W	●	1	1	5		2×320K5¼F	PCOS	●	B6	Real 16-bitter	
Olympia Boss Model A	£2,645	Z80A	4	64K		80×28	M	●	80×28	W	10	●	1	4		2×140K5¼F	CP/M	●	O1	Useful 28 lines on screen	
Oryx 5001 MU	£7,607	Z80A	4	128K	256K					*	5	1		1	●	1×7Mb5¼H	CP/M	●	T2	*Terminal extra, other models	
Oric 1	£100	6502A	1	16K	48K	40×28	Tv(M+)	●	240×200	C	●	1	1	1	●		Cassette	●	O2	Expected Delivery delays	
Osborne 1	£1,581	Z80	4	64K		52×24	M		128×32	W	10	●	1	1		2×185K5¼F	CP/M	●	O3	Portable, includes software	
Panasonic JD 800M	£3,795	8085A	4	60K		80×24	M		80×24	W	21	●	3			2×250K8F	CP/M	●	P1	Larger model costs £5,002	
Pasca 640	£1,437	Z80A	4	64K		80×24	M			W	●	1	1			2×250K8F	CP/M	●	W1	Regular CP/M micro	
Pascal Modular Microengine	£7,003	WD9000	2	128K						*	4			8		2×1.2Mb8F	UCSD-P	●	P2	*Terminal extra	
Philips P3500	£3,000	Z80A	4	64K	320K	80×25	M			W	11	●	2		8	2×0.6Mb5¼F	Turbo-DOS	●	P3	Fast O/S as standard	
Positron 900	£1,259	6809	1	64K	256K		(M+)			*	4		1	3		O/S 9	CP/M	●	P4	*You choose your terminal	
Positron 9000	£2,134	6809	1	64K	256K	80×24	TvM	●	480×240	W	12	●	4	1	3		O/S 9	CP/M	●	P4	Multi user version
Quantum 2000	£2,587	Z80A	4	64K	192K	80×25	M		160×75	W	18	●	1	1	5	3×860K5¼F	CP/M	●	Q1	Mono, low-res graphics	
Rair Black Box Model 3/20S	£2,242	8085	5	64K	512K	80×24	(M+)			*	2			8		2×1Mb5¼F	CP/M	●	R1	*VDU extra, many versions	
Rair Business Computer	£6,037	8088	5	256K	1Mb	80×25	M			W	10	●	2	4	8	1×19Mb5¼H + 1×1Mb5¼F	CP/M, PCDOS	●	R1	Hybrid 8/16 bit	
Racal 6000	£6,327	Z80	5	64K	256K	80×26	M		80×26	W	21	●	1	1	4	1×600KB	CP/M	●	R2	CP/M languages available	
Research Machines 380Z	£2,147	Z80A	4	32K	56K	40×24	Tv(M+)	●		W	●	1	1	4	●	2×144K5¼F	CP/M	●	R3	Widely used in schools	
Research Machines Link 480Z	£650	Z80A	4	32K	256K	40×24	Tv(M+)	●		W	4	●	2	1	2	●		Cassette	●	R3	CP/Net version available
Sage II	£4,019	68000	8	128K	512K		(M+)			*	2	1	1			2×640K5¼F	UCSD-P System	●	T10	*Terminal extra	
Samurai	£3,214	8086	4.6	128K	768K	80×25	M	●	720×400	W	●	3	1	3		2×1.2Mb8F	MS DOS, CP/M 86	●	M6	High-res colour graphics	
Sanyo MBC 1000	£1,195	Z80A	4	64K		80×25	M		80×25	W	17	●	1	1		1×320K5¼F	CP/M	●	L1	Standard CP/M model	
Sanyo MBC 1250	£2,294	Z80	4	64K		80×40	M		640×400	W	●	1	1			2×640K5¼F	CP/M	●	L1	High-res graphics	
Sanyo MBC 2000	£2,242	8085A	5	64K		80×24	M		80×24	W	24	●	2	1	2		2×328K5¼F	CP/M	●	L1	Big disc model costs £3,622
Sanyo MBC 4050	£2,817	8086	5	128K		80×24	M		80×24	W	●	1	1			2×640K5¼F	CP/M 86	●	L1	Pseudo 16-bit	
Seed System 1	£2,300	6800	2	32K	64K	80×24	M		80×24	W	3	●	2	8		2×160K5¼F	DOS 8 Flex	●	S3	Ageing business machine	
Seed System 19	£2,600	6809	2	48K	1Mb	80×24	M			W	3	●	2	8		OS-9		●	S3	Latest from Seed	
Sharp MZ80A	£549	Z80	2	48K		40×25	M		80×50	W	●	2			●		Sharp Basic	●	S4	CP/M facility extra	
Sharp MZ80B	£900	Z80A	4	64K		80×25	M		320×200	C	10	●			●		Sharp Basic	●	S4	Unusual keyboard	

Make and model	Price inc VAT	Processor type	Speed in MHz	Display	Max RAM - normally at extra cost	Max characters columns x lines	Method (at extra cost)	Colour capability	Max dot resolution	Keyboard	Interfaces built-in						Storage	Operating System	Languages inc	Other languages available	Distributor	Comments
											Type of keyboard	No. of function keys	Numeric pad	No. of RS232	No. of Centronics	No. of IEEE 488						
Sharp PC1251	£79.95	Cust.	58	4.2K				LCD	24×1	C 18	●						Sharp Basic	Ba	S4	Pocket computer		
Sharp PC1500	£170	Cust.	1.3	3.5K	11.5K	26×1		LCD	156×7	C 6	●	1	1				Cassette	Ba	S4	Optional 4-pen plotter		
Sharp PC3201	£2,300	Z80A	2.6	64K	112K	80×25	M		160×50	W 10	●					2×500K5¼F	Sharp Basic	Ba	●	Powerful Sharp Basic		
Signet 10025	£1,599	Z80B	6	64K		80×24	M	●	512×512	W	●	2	1			2×200K5¼F	CP/M, Macros	Ba	●	A6	Choice of keyboards	
Sinclair ZX81	£50	Z80A	3.5	1K	16K	32×24	Tv		64×44	C							Cassette	Ba	●	S5	Sold a million	
Sinclair Spectrum	£125	Z80A	3.5	16K	48K	32×24	Tv		256×192	C							Cassette	Ba	●	S5	Very popular home micro	
Sirius I	£2,754	8088	5	128K	896K	80×25	M	●	800×400	W 7	●	2	1	4		2×600K5¼F	CP/M 86, MS-DOS	Ba	●	A7	IBM style	
Sord M5	£218	Z80A	4	4K	16K	40×24	Tv(M++)	●	256×196	C			1	2			Cassette	Ba	●	S6	Japanese home computer	
Sord M23	£1,932	Z80A	4	128K		80×25	M	●	80×25	W 14	●	2	1	2	3		2×330K5¼F	Sord O/S, SB80	BaPips	●	S6	CP/M compatible
Sord M23P	£2,369	Z80A	4	128K		80×25	Tv(M++)	●	640×200	W 14	●	2	1	2	2		2×290K3¼F	Sord O/S, SB80	BaPips	●	S6	Complete with suitcase
Sord M223	£3,277	Z80	4	64K		80×25	M	●	80×25	W	●	2		4			2×350K5¼F	Sord O/S, SB80	BaPips	●	S6	Standard business machine
Sord M243	£5,842	Z80	4	192K		80×25	M	●	640×400	W 15	●	4	1	4			2×1Mb8F	Sord O/S, SB80	BaPips	●	S6	Large and powerful
SW Technical Products SO-9	£5,750	6809	2	256K	1.2Mb	80×24	M	●	80×24	W 15	●	1	1				2×1.5Mb5¼F	Flex, Uniflex	Ba	●	S7	Top end SWTP
Spectrum	£11,442	68000	8	256K	4Mb		(M++)										2×720K5¼F	Mirage	Ap	●	M1	*As terminal
Sundance I	£6,969	Z80A	4	64K	256K	132×24	M			W 4	●	4	1				1×7Mb5¼H	CP/M	Ba	●	T2	Ordinary CP/M machine
Sundance II	£8,205	Z80A	4	128K	256K	132×24	M			W 4	●	1					1×7Mb5¼H	CP/M	Ba	●	T2	Middle-range Sundance
Sundance 16	£10,480	Z8001	6	256K	1Mb	80×24	M			W	●	5	1				1×14Mb5¼H	BOS	Ba	●	T2	Tape backup for hard disk
Superbrain JR	£2,403	Z80	4	64K		80×24	M		560×240	W	●	1		1			2×160K5¼F	CP/M	Ba	●	I1	Bigger models available
Superstar	£6,296	Z80	4	64K		80×24	Tv(M++)	●	80×24	W	●	1		8			1×10Mb5¼H+1×400K5¼F	CP/M 80	Ba	●	B7	Includes hard disk
Tandberg EC10	£3,000	8080A	2	64K		80×25	M			W	●	7					1×250K8F	CP/M, TOS	Ba	●	T3	Very early machine
Tandy TRS-80 Model I	£199	Z80	1.7	16K	48K	64×16	Tv(M++)	●	128×48	W	●							TRS-DOS	Ba	●	T4	Old faithful
Tandy TRS-80 Model II	£1,999	Z80A	4	64K	256K	80×24	M		80×24	W 2	●	2	1				1×500K8F	TRS-DOS	Ba	●	T4	Big business machine
Tandy TRS-80 Model III	£1,699	Z80A	2	48K		64×16	M		128×48	W	●	1	1	1			2×184K5¼F	TRS-DOS	Ba	●	T4	Latest TRS80
Tandy TRS-80 Model 16	£4,199	68000	8	128K	512K	80×24	M			W 2	●	2	1				2×1.2Mb8F	TRS-DOS	BaAs	●	T4	True 16-bit
Tandy TRS-80 Colour Computer	£240	6809E	1	16K	32K	32×16	Tv	●	256×192	W	●							Cassette	Ba	●	T4	Very popular
Tandy TRS-80 Pocket Computer	£57	Cust.	1	1.9K		24×1	LCD		24×1	C 5	●							Cassette	Ba	●	T4	Single-line display
Tandy TRS-80 Pocket Computer 2	£179	Cust.	1.3	2.6K	16K	26×1	LCD		156×7	C 6	●							Cassette	Ba	●	T4	Plotter available
Televideo TS-80ZH	£4,533	Z80	4	64K		80×24	M		80×24	W 15	●	2	1				1×256K5¼F+1×7Mb5¼H	CP/M	Ba	●	C11	Recently upgraded
Televideo TS-800 Series	£1,495	Z80A	4	64K		80×24	M		80×24	W 15	●	2	1					CP/M	Ba	●	C11	Standard CP/M machine
Televideo TS 1602-C	£3,714	8088	5	128K	256K	80×24	M		576×424	W 15	●	2	1				2×256K5¼F	CP/M-86	Ba	●	C11	Graphics, but no colour
Texas Instruments TI-99-4A	£150	9900	3.5	16K	52K	32×24	Tv(M++)	●	256×192	W	●			2	●			DOS	Ba	●	T5	This has sprite graphics
TI System 200-250	£6,695	9900	4	64K		80×24	M		80×24	W 12	●	1					1×5Mb5¼H	UCSD-P, PX10	Ba	●	T5	Bigger version available
TMK 332	£2,242	8085A	5	64K		80×24	M		190×96	W 22	●	2	1				2×320K5¼F	CP/M	Ba	●	P5	*6502 I/O processor
Torch	£3,214	Z80*	4.2	96K		80×30	TvM	●	640×256	W 15	●	1	1	4	●		2×400K5¼F	CPN	Ba	●	T6	CP/M compatible
Toshiba T-100	£1,900	Z80A	4	64K	96K	80×25	TvM	●	640×200	W 8	●	1	1	1	2		2×256K5¼F	CP/M	Ba	●	O4	Pro test March 18
Toshiba T-200	£2,242	8085	2.6	64K		80×24	M		80×24	W 15	●	1	1				2×256K5¼F	CP/M	Ba	●	O4	Standard CP/M machine
Transam Truscan	£1,983	Z80A	4	64K		80×24	TvM		640×288	W	●	2	1	1	5		2×190K5¼F	CP/M	Ba	●	T7	S-100 machine
Translec BC2	£1,949	Z80A	4	64K	256K	80×24	M		80×24	W 13	●	2	1	8			2×386K5¼F	CP/M	Ba	●	T8	Fully definable characters
Vector 4	£3,852	8088	5	128K	256K	80×24	M	●	640×312	W 15	●	1	1	1	2		2×630K5¼F	CP/M, CP/M 86	Ba	●	A4	8-bit and pseudo 16-bit
Victor 9000	£2,754	8088	5	128K	896K	80×25	M	●	800×400	W 7	●	2	1	4			2×600K5¼F	CP/M 86, MS-DOS	Ba	●	B8	Same as Sirius 1
Wilkes YD8110	£4,025	8086	5	128K	896K	80×24	M	●	960×624	W 21	●			1	6		2×1.2Mb8F	CP/M 86	Ba	●	W2	Standard CP/M machine
Xerox 820 Model II	£2,415	Z80A	4	64K		80×24	M		1024×512	W	●	2	2				2×160K5¼F	CP/M	Ba	●	R4	Powerful graphics
Zenith 120-22	£2,978	8088	5	128K	192K	80×25	M		640×225	W 18	●	2	1	1	5		2×320K5¼F	CP/M, MS-DOS, Z Basic	Ba	●	Z1	Graphics includes turtle
Zenith Z89-81	£1,668	Z80	2.5	48K	64K	80×24	M			W	●	2	1				1×100K5¼F	CP/M	Ba	●	Z1	Elderly CP/M machine
Zeus 4	£5,400	Z80	4	64K	320K	80×25	(M++)		80×25	W 11	●	10					1×6Mb5¼H+1×250K5¼F	CP/M, Muse	As	●	M5	Designed as multi-user

K1 Keen Computers Nottingham 412777 **K2** KGB Micros Slough 38581 **K3** Kalamazoo Business Systems 021-475 2191 **K4** Kemion Chester 21817 **K5** Kenilworth Computers Kenilworth 512127 **K6** Kontron Computers St Albans 68222
L1 Logan Computers 42644 **L2** Logicon Electronics 52121 **L3** LSI Computers Ltd Woking 23411 **L4** Logica VTS 01-637 5171
L5 Logic Logic Computers 52421 **L6** Logix Computers Ltd Slough 38581
M1 Macro APPL Ltd 01-834 2887 **M2** Microcomputer Engineering Southampton 775462 **M3** Mediatech 01-903 4372 **M4** Microsolution Chipping Norton 3256 **M5** Millbank Computer 01-891 4691 **M6** Micro Networks Ltd 01-602 7405
N1 NCC 01-366 6100 **N2** Net Systems 01-262 6788 **N3** Oric Products International Ascot 27966 **N4** Osborne Computer Milton Keynes 01 5274
O1 Overseas Business Equipment (UK) Slough 75841 **O2** Pronto Electronic Systems 01-554 6222 **O3** Philips Business Systems
O4 Questar 975115 **P4** Precision Computer Ltd Newton-le-Willows 29741 **P5** PHL 021-745 3033
R1 Raw Ltd 01-638 6921 **R2** Racal Reading 782156 **R3** Research Machines Ltd Oxford 249869 **R4** Rank Xerox Libridge 51137
S1 Salmon Electronics Darlington 721368 **S2** Shining Microsystems 01-486 7671 **S3** Speed Brownhills 378151 **S4** Sharp Electronics
 01-205 2203 **S5** SSI 01-250 1177 **T1** Tech Cambridge 08166 98 **Sord** 01-530 4214 **S7** SWTP Peterborough 234433
T2 Texas Instruments Bedford 67466 **T8** Torch Computers Cambridge 841000 **T7** Transam Microsystems 01-465 5240 **T8** Transic
 Bristol 277462 **T9** TRW Datacom International Ltd Windsor 59183 **T10** TDI Bristol 242796
Z1 Zenith Ltd 01-578 0607 **Z2** Wilson Computers Bristol 277399
Z3 Zenith Data Systems Gloucester 28461

A1 Acorn Computers Cambridge 245200 **A2** Adds (UK) Ltd 01-949 1272 **A3** Adis Ltd 01-947 4881 **A4** Almarc Data Nottingham
 01-474 1111 **A5** Amstrad International (UK) 02044 **A6** Anglotech Computers Slough 74201 **A7** ACT 021-454 8585 **A8** Apple
 Computers Hereford 42644
B1 Barcelona Ltd Leicester 541574 **B2** Bonaal 01-580 0902 **B3** Britannia Computer Ltd Dudley 233433 **B4** British Micro Watford
 48222 **B5** Business Computers Ltd 01-207 3344 **B6** British Olivetti 01-785 6666 **B7** Bromley Computer Consultancy 01-697 8933
B8 British Telecom Computers Ltd Slough 75841 **B9** British Telecom Computers Ltd Reading 29826 **C5** Computer Ancillaries, Egham 36455 **C4**
 Canco (UK) Ltd 01-680 7700 **C6** Cascom Computers Ltd Slough 75841
C7 Cascom Computers Ltd Slough 75841 **C8** Cascom Computers Ltd Slough 75841 **C9** Commodore Business Machines Slough 70932 **C10** Commodore Computers Ltd Slough 01-907
 0186 **C11** Colt Computer Systems 01-577 2686 **C12** Community Computers Peterfield 87567 **C13** Comart Furlingdon 215005
D1 Data Communications Ltd Slough 75841 **D2** Datacom International Ltd Slough 75841 **D3** Digico Lechlworth 78172 **D4** Digital Microsystems Reading 343885 **D5**
 Direct (UK) Ltd 01-266 814075 **D6** DSI Reading 343885 **D7** Hening Hill 744700 **D7** Data General 01-512 7455 **D8** DRG Weston-Super-Mare
 01-5398 **D9** Data Applications Cranecaster 61829
E1 Encore Systems 01-666 9697 **E2** Epson (UK) 01-900 0466 **E3** Equinox 01-739 2387
E4 ERM Computers 01-266 814075 **F1** F20 Technology Lutchedale 57701 **F3** FI Cont 061-445 7716 **F4** Flight Electronics
 South Acton 01-27721
G1 Gemini Micros Amersham 28321 **G2** Gecas 01-629 3758 **G3** Grundy Business Systems 01-997 1171
H1 Hayward Electronic Assoc Ltd 01-428 0111 **H2** Hewlett Packard Bracknell 63100 **H3** Hytech Microsystems Oxford 726644
I1 ICL Computers 01-485 01-2424 **I2** Ingram Computer Systems 01-475 5325 **I3** IBR Microcomputers Reading 664111 **I4**
I5 ICL 01-1111 **I6** Interactive Data Systems Milton Keynes 313997
J1 Jupiter Cantab Crafts Hill 80437

Linsac's ZX Companion series has received excellent press reviews:

"Far and away the best" — *Your Computer*

Thoughtfully written, detailed and illustrated with meaningful programs ... outstandingly useful" — *EZUG*

'The Spectrum Games Companion' is the latest addition to the series and is aimed at the games player and programmer alike. Twenty-one games designed specifically for the ZX Spectrum are explained fully with complete details on how it is designed and written. Introductory chapters show how to set up and use the Spectrum and how to create your own games. Later sections cover number games, word games, board games, simulation games, dice games, card games and grid games. If you want to enjoy your ZX Spectrum and learn its secrets at the same time then this is the book for you!

Bob Maunder is co-author of 'The ZX80 Companion' and author of 'The ZX81 Companion'. He is a Senior Lecturer in Computer Science at Teesside Polytechnic, holds an MSc degree in Computer Science, and is a Member of the British Computer Society.

The Spectrum Games Companion is available from good book shops, or send £5.95 to:

LINSAC (P.C.N.) 68 Barker Road, Middlesbrough, Cleveland TS5 5ES

Postage is free within the U.K. — add £1 for Europe or £2.50 outside Europe.

Bob Maunder
LINSAC
 ONLY
£5.95
 ISBN 0 907211 02 X

CBS
SUPPLIES LTD.
 Computer & Business Supplies

NEW '83 CAT.

YES! only top quality products
YES! Competitive prices
YES! Good service with a smile
YES! An extensive range
YES! We supply everything for the min, micro and larger computer users

ONE SUPPLIER FOR ALL YOUR SUPPLIES

Compare our range:-

High Quality Dyan Discs	Copy Holders
High Quality Flexette Discs	Anti Static Mats
Disc Storage Fan Files	Disc Racks
Disc Storage Library Cases	Fire Safes
Disc Storage Locking Boxes	Fire Extinguishers
Disc Cleaning Products	Work Stations
Anti Static Spray	Micro Desks
V.D.U. Screen Cleaner	Ergonomic Furniture
Pressurised Air Dusters	DP Binders
Listing Paper all sizes	DP Storage Units
Ribbons: full range includes Commodore, Qume, Diablo	Computer Labels
Cassette Tapes	Dust Covers (extensive range)
Digital Tapes	Computer Books
Large Reel Tapes	Shredders
Turntables	Busters
Anti Glare Screens	Decolorators
	Air Conditioners
	Hard Disc Packs
	Anti Static Carpets

NEW '83 CATALOGUE AVAILABLE NOW

Tel Sales Hot Line 0782 23745
Computer & Business Supplies Ltd.,

Bowmaker House, Hanley, Stoke-on-Trent ST1 5NH.

PC Board

ing Machine Code on Your ZX81 book. £5. Tel: Frinton 2451.

Apple Silentyte printer with interface, £230.00. £230.00 high speed serial card £50. £230.00 language card £50. Musicomp program on diskette £15. All items with manuals and in excellent condition. Tel: Northampton 405598.

Exchange Intellivision console plus 7 cartridges (Soccer, Auto Racing, Space Battle, Star Striker, Tron, Utopia, Taxi for 48K Spectrum. Tel: Paul 01-406 8811 ext 100-103, 9.30 — 1 pm only, weekdays.

T199/4A, extended Basic, cassette leads, good condition, all manuals, new £250. Sprites, 16 colour graphics, 16K usable RAM, expansion options. TV lead, takes any 2 cassettes. £210 ono. Tel: 01-388 4222 ext. 4027 days.

Sinclair ZX81 and 16K RAM with three tapes; Invaders, Scramble, Gulp. Leads, power pack and Basic manual. Excellent condition. Cost me £100, selling for £60. Tel: 021-426 3685 after 4.30 pm.

Apple II green monitor twin disk drives, numerical keyboard, language card, manuals, software all good condition. £950 ono. Tel: Romford 751796 anytime.

Scisay's Chess Computer System III. Mains powered with memory and rechargeable pack, only six months old, never used, still boxed. Swap Spectrum or Vic 20 or similar computer. Tel: 0181-776 0921, can post.

ZX81 16K RAM, A one taped games. Cassette leads, manuals etc, £45 including insured post to buyer. Tel: Northwick (0606) 79616.

Atari 400, 16K, cassette recorder, Basic and manuals, many, many programs including several arcade games, superb graphics demos, educational, joysticks. Price £250 for quick sale. Tel: (0204) 655393 evenings or weekends. Could possibly deliver.

Sharp MZ80K includes various games and utilities Database Knight Commander etc. All manuals £325 available in Leeds of London. Tel: 0572-57406.

48K Microsoft system with Tangerine keyboard, PGM, ESC and programmer, clock, Games, utilities, Database, Finance, and TUG's Columbia word processor software. All manuals, newsletters, books etc. Offers to John McGregor. Tel: 021-744 3257 after 6.30pm.

Wanted colour RGB monitor. Good condition for use with BBC B. Also wanted Acornsoft or other finished with software willing to pay £150 for monitor. Tel: 01-788 6993, 5-9pm.

Vic 20 cassette deck, super expander, joystick, 3K RAM expansion, toolkit, machine code monitor plus books and loads of programs including games cartridges. £250 ono. Tel: Fleet 20587 evenings.

Home energy audit: A rather splendid package for the BBC Model B which asks questions about your house and helps you cut those fuel bills. Just £7.95. Chandler, 9 Appleton Fields, Bishops Cleeve, Stafford.

ZX81 1K plus cassette with ten games and 3 Sinclair programs magazines only 4 months old. Cost £57 sell for £30 ono. Tel: 01-297 7207 after 5 (Tamer Osman).

ZX81 plus 16K RAM, 4K graphics ROM, plus user-definable graphics RAM (2K) plus professional keyboard and case plus 50 programs. Worth £200, bargain for £130 ono. Tel: Cranleigh 272402.

Atari 400 48K typewriter keyboard cassette deck, 2 game controllers £150+ of games, £40+ manuals, all less than 3 months old, including Basic. Over £600 worth, £485 nooffers. Tel: Stone 816053.

Tapes 33 88K in manual terminal. Mechanics just overhaul. No electro-

nics. Buyer collects. £40. Tel: Basildon 44520.

Arcade programmable TV game. As new boxed. Everything from Space Invaders to Mastermind. Cost £170, am getting married so must sell, includes over 200 games variations, only £50. Tel: Camberley 64246.

Commodore PET 2001 with 58 cassettes and over 150 programs, sound included, only £190 ono. Tel: Shanklin 106 6492

Kilohard, 80 Microcomputing, and other PC magazines available for sale, and Worcester. Smith, 84 Edenfield Gardens, Worcest Park, Surrey KT4 7DY.

Vic 20 8K plus C2N cassette, with carrying case, and programmers aid, ROM with over a £100 worth of software. Offers of £330. Tel: 021-543 8666 evenings.

Portable computer, Dragon 32, many books and tapes plus free 1976 model. Opel Kadett, 56,000 miles, genuine bargain, 8885 ono. Tel: 01-942 3262 (day) or 01-977 1496 (evening/weekends).

ZX80, Mole Attack and Jupiter Lander game. Commodore, cost £20 each, sale price £10. Cartridges arrived after sold Vic. For details tel: 05827 69152.

ZX81 plus 16K RAM. Game tape: Thor the Wall (Scramble/Breakout). All worth £100. New one year guarantee, only £80, bargain. Tel: 021-356 2288 after 4pm. H. Bhatti, Birmingham.

Vic 20 plus Super Hi-res Expander (3K), excellent condition, all leads and manuals, £100 ono. Mr. P. Watson, 27 Dundee Road, Hartlepool, Cleveland TS25 5DZ.

Four ZX Spectrum books. £12 ono, worth £25. Sell or swap Meteor Storm £3, Space Intruders £3, Nightlife £3, Escape £3. RS Software Games £3. Tel: Coarbridge 29808 (after 6pm).

Nascom 2 48K graphics, NAS-SYS 3 cased, Hobbit digital cassette drive, IMP printer, Sargon Chess, Zeap NAS-DIS Naspen. Much software magazines, books, spare tapes, complete working system. £550 ono. Tel: Colchester (0206) 841293.

Tandy Color Computer, 16K, excellent condition. Extended code Basic, EDTASM+ assembler editor with debug, joysticks, manuals, leads. Six months old, hardly used, £265 ono. Tel: Medway (0634) 407604 evenings or weekends.

Vic 20 3K RAM pack, £23. Rat race cartridge, £16.50. Missile Command, £5.50. Invader Fall, £5.50. Vic Asteroids, £5.50. 3D-Maze, £5.50. VicGamon, £5.50. PADP included. N. Bradshaw, 12 Rosegill, Albany, Washington, Tyne & Wear. Tel: 0632 460144.

New Packard 38E, Statistical calculator, +5 function, LCD quartz, man's watch. Offers please, 01-997 3560, Steve. If I am not in please leave my telephone number and I will call you ASAP.

BBC micro Model A with 32K RAM, 9" monochrome monitor and cassette recorder, all leads included. Offers around £350. Tel: 01-581 4689 after 6pm.

Atari VCS, 20 cartridges, new joysticks, adaptor, cartridge rack and books. Cost well over £600, sell for £350 (will pay postage), will not split. Everything in original packing. Tel: 041-946 9110.

Vic 20 software, Swap Asteroids or Amok, will swap for Frogger, Arkanoid, or any Bug-Byte games. Tel: Northampton 402750 after 6pm.

TRS-80, Level 2, 16K VDU, tape recorder, all leads, plugs, power supply, manuals, many books, plenty of software (Invaders, Pacman, Asteroids, Chess, etc), good condition. £250, genuine bargain. 01-346 0095 after 6pm.

FOX ELECTRONICS

Products for the ZX81 SPECTRUM VIC 20 and JUPITER ACE



SPECTRUM

UPGRADE KIT: Upgrades your machine to 48K, without soldering. Uses 2 machines only.

£24.50 INCL P&P

ZX81

A replacement keyboard with a calculator type feel. Peel off backing and press to fit. Incredibly low price of

£10.00 INCL P&P

VIC-20

THE VIXEN RAM CARTRIDGE for the Vic 20. Switchable between 16K or 8K & 3K. Gives you the option of full 16K RAM or 8K and 3K RAM in one package. Simply plugs into the rear expansion port and fully compatible with all motherboards and modules available. No addressing of existing BASIC programs needed.

£39.95

FOX ELECTRONICS

141 Abbey Road, Basingstoke, Hants. RG21 9ED

OVERSEAS CUSTOMERS PLEASE ADD £2.50 POST AND PACKING.

SPECTRUM

A 42 key full travel keyboard. Simply unscrew the ZX printed circuit board and screw it into the keyboard case. No soldering required.

£29.95 + £2.00 P&P

ZX81

The unique ZX-PANDA the professionally produced 16K RAM PACK that is expandable to 32K simply by plugging in our expansion module. Solidly built, attractively cased to fit perfectly on to ZX81 without wobble. Includes LED power indicator.

16K expandable RAM £19.00 + 95p P&P
16K expansion module £14.00 + 50p P&P
or full 32K £33.00 + £1.50 P&P
or the really big one 64K at £44.00 + 2.00 P&P

ITEM	QUANTITY	PRICE	TOTAL

Name _____
Address _____

ALL PRODUCTS FULLY GUARANTEED FOR ONE YEAR
Deliveries 10 days from receipt of order

PASCAL FOR THE ZX SPECTRUM

Hisoft are pleased to announce the availability of Hisoft Pascal 4 for the 48K ZX SPECTRUM.

No longer do you have to put up with the slow execution speed of BASIC programs; Hisoft Pascal 4 produces programs that run between 40 and 100 (yes 100!) times faster than the equivalent programs written in ZX SPECTRUM BASIC. For example, a program to sort a 100 element array of numbers into ascending order takes 60 seconds in BASIC, while HP4 produces a program which does the same thing in 0.6 seconds!

NOW you and your children can learn to program in an efficient and structured way by using Pascal, the favoured language in schools and universities.

NOW you can write games programs etc. which run as fast as you need them to without having to resort to assembler or machine code.

NOW you can use a language which requires minimal re-learning when you move from your SPECTRUM to another computer; Hisoft Pascal 4 has all the essential features of Standard Pascal as detailed in the Pascal User Manual and Report by Kathleen Jensen and Niklaus Wirth, the man who designed Pascal. Hisoft Pascal 4 is a professional piece of software designed by a team who have been writing Pascal compilers for many years — you will find it to be powerful, flexible and very easy to use.

To top it all, we are offering the package (which includes a 60 page manual), for a limited time, to 48K ZX SPECTRUM users at an INCREDIBLE price of: **ONLY £25 INCLUSIVE.**

We also have a powerful assembler, disassembler and debugger package called DEVPAK. This includes a fast assembler that allows conditional assembly and has many assembler commands, a labelling disassembler and a debugger which is very easy to use and has single step facility. The entire package comes with a forty page manual giving full details of the system and DEVPAK costs only £12.50 inclusive.

Write for more details TODAY to:



HISOFT
60 Hailton Moor
Lidex SHIRDOR
SN3 6LS

Tel. (0793) 26616 (Answering machine)

CROSSHOP

Rates: £10 per single column cm. Series discount available. **Mechanical Data:** Column width, 1 column 57mm. 2 columns 118mm. 3 columns 179 mm. **Publishing Dates:** Every Friday. **Copy Dates:** 10 days prior to publication. **Contact:** Ian Whorley on 01-323 3211.

Software

Small School Software

Study Packages are designed to a high specification by experienced specialist teachers for use both at home and in school. Based on the well-established techniques of individualised learning schemes, the Packages consist of a suite of objective matched programs using to the full the capabilities of the BBC-B Micro, supported by software documentation, course notes, exercise materials, Revision program and Post Test.

Package Titles include:

- The Theorem of Pythagoras ••• First Steps in Algebra •••
 - Mental Arithmetic Tests •••
- all priced at £6.95 inc

But send for a full description and List of Titles enclosing a s.a.e., to—**SMALL SCHOOL SOFTWARE, 41 Sinah Lane, Hayling Island, PO11 0HJ.**



: GO FORTH & * ;

Laboratory Microsystems Z-80 FORTH Version 2.0 now includes multi-tasking, editors, assemblers, utilities, good manual and games:

CP/M-86	CAS + VAT	CP/MS*	£50 + VAT
CP/M-86	C35 + VAT	IBM PC or SIRIUS	£35 + VAT

DIY FORTH kits

Installation manual £7
How to do it + model + definitions + editor £7
Source code listing for one processor £7
£502, 6800, 6800, 8080, 280, 8086, 9086, 9900, 1802, 68000, Z8000, VAX, Apple II, LS-11, Eclips
Jupiter Ace — excellent FORTH micro £78 + VAT
Good range of FORTH books and implementations.



Microprocessor Engineering Limited
21 Hainley Road, Skirby,
Southampton SO1 5AP.
0783-775482

SCIENTIFIC SUBROUTINE LIBRARY

VOLUME 1 — STATISTICS AND FITTING FUNCTIONS

Mean, SD, normal distribution, partial expectation, Chauvenet's criterion, least squares fit to polynomial and arbitrary function, repetitive least squares fit, covariance matrix, chi-squared statistic, matrix inversion, solution of simultaneous equations.

VOLUME 2 — LINEAR PROGRAMMING

Reduction of a Simplex tableau, integer programming, partial integer programming, conventional linear programming system, least cost mix problem.

VOLUME 3 — FURTHER STATISTICS

Ranking, quantiles, frequency, 2-way table, correlation coefficient, T, chi-squared and F distributions and their inverses, T test, chi-squared test, linear and multiple regression, ANOVA 1-way and 2-way.

VOLUME 4 — TRANSFORMATIONS & SORTING ALGORITHMS

Fourier, FFT, Laplace, numerical integration and differentiation. Exchange sort, Quick-sort, Shell sort, Tree sort. Manuals including full source listings with implementation notes and documentation — BASIC £25 per volume

PASCAL £30 per volume

Software to CP/M (8 SSSD) or DEC RT-11

(RX01) formats — £75 + VAT per volume.

CP/M to DEC FILE TRANSFER

Software to read and write RT-11 format RX01 diskettes under CP/M. Supplied on 8 SSSD diskette — £25 + VAT.

MICRO LOGIC CONSULTANTS LTD

57 Station Road, Southwater,
Horsham, W. Sussex.
Telephone: 0403 731818

CASSETTE SOFTWARE

For TRS 80 Model I Level 2 Video Game 3003

MACH 4 — 2000 Baud write, verify, load, Basic & System (TRS 80 only), relocates £14

AID — Seven function basic toolkit, R-number, move lines, compile, search, relocates £9

DISPLUS — 12 Function disassembler; Printer support, search, arithmetic, reloc. codes £10

Just three from our ranges send C/P/O, or 20p for details. S.A. not req.

Dealers welcome.

JK Godwin Software.

Tineilip, 13 Ashdean Common, Ashdean, Surrey KT21 2ED

TRS-80 L2 GENIE SOFTWARE (16K)

Cassette 1: Space Invaders (m.c), Mastermind (links your code in seconds), Apollo (m.c), Machine code copier, Defuse and Rate.

All SIX PROGRAMS ON ONE CASSETTE FOR £3.95

Cassette 2: Space Defender: A fast professional quality m.c game in graphics with a top 10 ladder continuous display of Score etc. A fast, real time, action packed game. Apollo 7: An exciting m.c game with sound effects and graphics.

BOTH PROGRAMS ON ONE CASSETTE FOR £3.95

Each cassette costs £5.00 (incl. p.p.) from
K. Meenan, 32 Lismore Road, S. Croydon, Surrey CR2 7QA.

M & J SOFTWARE

Dragon Companion Book £4.95

Discover 7 extra graphic modes.

Study the workings of BASIC with the disassembler

Take complete control of video memory mapping

Increase the processor speed (not a hardware mod)

Append programs from tape

Incorporate useful routines from BASIC in your m/c prog

Add commands to BASIC

Dragon Implementation of Forth £15

This is a cassette based implementation and is fully documented.

Forth Listings £7

£502, 8080, 280, 6809, 6800, 1802 in stock

Installation Manual £5

Necessary for implementing FORTH and its editor.

All prices inclusive of postage and packing. Cheques and P.O.s made payable please to:

M & J SOFTWARE

34 Grays Close

Scholar Green

Stoke-on-Trent ST7 3LU

TEL (0782) 517876

DEALER ENQUIRIES WELCOME

THE 'BIG' O
FREE! D BASE II still available whilst stocks last
phone NOW OSBORNE
Telephone (0295) **67551**
North Bar, Banbury, Oxon. OX16 0TF

microcentres ltd

WANTED URGENTLY

Arcade-type games programs for Spectrum, ZX81, Vic20, Cric, Dragon, BBC Micro and Lynx.

We pay top royalties or buy your copyright for cash.

National mail order and dealer sales ensure you get the best reward for your genius.

Write or call into

NORTHWICK LTD

THE GROUND FLOOR, RALLI BUILDINGS, STANLEY STREET, MANCHESTER M3 5PD

or Tel: 061-832 9143

Mike York Ph.D. — Microcomputer Services

9 Rosell Hill Road, London SW18 2NY. Tel: 01-874 6244

Nascom Gamini computers with UCSD

The renowned UCSD p-system has now been implemented for the Nascom Gamini Multibank Galaxy Quantum and Kinowith Computers. The unique p-code portability (which extends to virtually any computer) has been complemented by a unique disc portability which enables the reading and writing of most standard formats.

Any of the above computers (64K, Z80A 80 × 25 screen, two floppies or a £1495 for a Galaxy 2) can be supplied, ready to run UCSD. Also Sage II or Sage IV. The full range of UCSD basic applications software can be supplied with a minimal "run time" only system (please enquire).

Alternatively, the full UCSD "Development System" includes a top quality screen editor, file linker, macro assembler, ONE compiler (Pascal, BASIC or FORTRAN) and many utilities.

Price £275 (£414 complete, £150 each).

An optional "Native Code Generator" is also available (£75)

and "LunaticGraphics" Prices sent at time of writing and exclusive of VAT. See to above address.

RENT!

Daily, Weekly, Monthly

IBM PC from £89.06

SIRIUS 10 Mb WINCHESTER ... from £93.75

APPLE IIe from £37.50

APPLE II + from £28.13

Plus all peripherals and software.

Prices above are pw + VAT.

ATLANTA DATA SYSTEMS

350/6 Old Street
LONDON EC1V 9DT
01-729 1411

VIC SOFTWARE HIRE

Are you a Vic 20 owner?

Why not find out more about our Vic 20 Software Hire?

Fire fees start at just £2.50 per week, and we offer a large selection of the best programmes available.

Full details, write or phone,

Peak and Pulse Software Supplies,

110 Drummond Street, London, NW1.

Telephone 01-380 1213/01-651 2861

We also stock Atari 400/800 Software etc.

BBC32K

FOR YOUNG CHILDREN (1-5 YRS)

"A First Book of Micro-Rhymes"

5 traditional nursery rhymes

See the words — Hear the tunes

Watch the moving pictures

Listen to the sound effects

only £4.95 (incl. post)

Peter Gordon, 20 Despard Road, London N19 5NW

START THEM YOUNG!!

MICROSHOP

Software

01-6756197 ★★ JUST PHONE ★★ 01-6756197

If you have ACCESS or VISA just phone us your order and we despatch the goods

Special Offer · Special offer · Special Offer

A FREE games program with each order of a Micro listed below

Commodore-64 £343 Atari-400 £199 Atari-800 £399 Dragon-32 £199 Vic-20 £PDA
Newbrain-A £239 BBC-B £399 Spectrum £399 PAF at cost

FROM A SOFTWARE LIST OF OVER 500 WE GIVE YOU A FEW EXAMPLES

Commodore-64	£9.99	Adventure Pac	£9.99	Frogger	£3.99	Chess (b)	£7.99	DragonTrek	£3.95
Grave Robbers	£3.99	Skramble	£9.99	Time Trek	£7.99	Golf	£7.95	Database	£19.95
Monopole-64	£3.99	Quackers	£3.99	EDG Graphics	£24.95	WizardWar	£7.95		
Sprite Editor	£9.99	Annihilator	£3.99						

No Card? Just send cheque to: TRAVEL SOFTWARE, 106 Narbonne Ave, London SW4
PROGRAMMERS CASH OR GENEROUS ROYALTIES

NewBrain

CARD INDEX £35

A versatile multipurpose data management program. Functions include search, sort, insert, amend, delete.

FILE MANAGER £23

A file management program for sequential tape file handling. Formats and maintains the records. Can be used as a stand-alone program or merged into user's own programs.

Because our programs are written in a modular format we can write programs to customers' requirements quickly and cheaply by mail-order. Please contact us for a quotation.

Priority Limited, Ebbwasi, Denway, Chalfont St Giles, Buckinghamshire HP8 4DS £2,407 4900

Newbrain Stockist

Keep the bank manager at bay with . . . Homac

ZX Home Accounting System

- Database of up to 1,000 records (Spectrum 3,000) for book-keeping and financial forecasting
- Fast data entry
- Manages most accounts; bank, credit card, cash, savings, standing orders, direct debits
- Predicts credit card bills
- Up to 94 account headings covering an eighteen month period (Spectrum, 30 months) with annual carry forward
- Printed or displayed summaries and statements for any account or period
- Spectrum version provides for up to twenty currencies or individuals, ZX81 for any single currency only.

HOMAC£8.95

Please state if ZX81 (15K) or Spectrum (48K) version is required. Prices include cassette and instructions. Post and packing £1.85.

David Martin Associates

71A Princeps Road, Richmond, Surrey TW9 1DD
Telephone: 01-948 1053

SPECTRUM SOFTWARE

- FLEXICALC - Versatile spreadsheet program all usual features + you control number of rows & columns + edit your formulae at any time. Full manual. (48K only) 9-95
Consolidation & report generator. 6-95

- FIGARO II - Business graphics + forecasting + statistics + fast data entry + date utilities. Powerful but easy to use. (48K only) 14-95

Saxon Computing

3, St. Catherine's Drive, Laconfield, Beverley, Humberside
Phone Access or Barclaycard orders to 0401-50897

To Advertise

Call

Ian Whorley

PERSONAL
COMPUTER
NEWS

01-323 3211

THE NEW NAME IN THE SOFTWARE

ESTABLISHED 1978

E.S.P. 42 MONTHS AND SINCE INCLAIRED SOFTWARE

HITCH-HIKERS
GUIDE TO THE GALAXY

FOR 48K SPECTRUM £8.95 Also available for Apple II plus Please allow 14 days delivery

20 VICTORIA AVT, SOUTHWOOD ON SEA, ESSEX, S.S.17 9JL
07072 43568

ORIC GAMES ARE HERE
GREAT USE OF COLOUR AND SOUND
4 TAPES TO START YOU OFF

1. SAS - ALL NEW ACTION GAME.
2. 6 ACTION GAMES.
3. 6 MIND GAMES.
4. GRAPHICS - LEARN FROM THESE EXCELLENT PROGRAMS.

£5 EACH

B. L. JOHNSON,
61 HIGHFIELD ROAD,
SALISBURY, WILTSHIRE.

THE WAR MACHINE

is the specialist magazine for micro owners who want conflict games of strategy and skill — games which retain their interest. Discount offers on software from independent suppliers, and innovative games from Emjay, are available only to TWM subscribers.

Single issue £1.15 (overseas £1.65)
6-issue subscription £6.50 (overseas £9.50)
Emjay, Room AP, 17 Langbank Avenue,
Nottingham NG5 5BU, England.

PROGRAMMERS

New, software marketing company seeks quality game and educational programs. Top royalties paid.

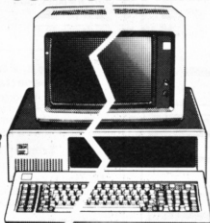
Write in first instance to:

PAUL HARRIS,
32 Windsor Road, London N13

Maintenance

MICRO-COMPUTER MAINTENANCE

APPLE
IBM
SIRIUS
VICTOR



NATIONAL
ON-SITE
24 hr
CONTRACTS

COMMERCIAL DATA SYSTEMS LTD.

Telephone: 0268-710292 (ask for sales)

SHORT-LENGTH COMPUTER/AUDIO TAPES

If you have searched without success for high quality low cost short-length tapes then sit back and relax.
Premium Grade Agfa R.F.W. Cassettes. For example, with a minimum order of 25, you can purchase 25 cassettes of 2½ minutes each side for only £8.75p plus postage & packing of £1.95p. Fill in the coupon and post with your remittance to: R.F.W. Recording Supplies, Green Acres, Northlands, Sibsey Nr. Boston, Lincolnshire PE22 0UA.

All prices are inclusive of VAT at 15%

To: R.F.W. Recording Supplies,
Green Acres, Northlands,
Nr. Boston, Lincolnshire PE22 0UA.
Please send me high-quality audio tapes in the quantity indicated (tick where applicable)

25 cassettes

(including £1.95 p&p)

<input type="checkbox"/> 2½ mins	£10.70
<input type="checkbox"/> 5 mins	£10.95
<input type="checkbox"/> 6 mins	£11.20
<input type="checkbox"/> 7½ mins	£11.45
<input type="checkbox"/> 10 mins	£11.95

50 cassettes

(including £2.49 p&p)

<input type="checkbox"/> 2½ mins	£19.95
<input type="checkbox"/> 5 mins	£20.45
<input type="checkbox"/> 6 mins	£20.99
<input type="checkbox"/> 7½ mins	£21.49
<input type="checkbox"/> 10 mins	£22.49

100 cassettes

(including £3.50 p&p)

<input type="checkbox"/> 2½ mins	£38.50
<input type="checkbox"/> 5 mins	£39.50
<input type="checkbox"/> 6 mins	£40.50
<input type="checkbox"/> 7½ mins	£41.50
<input type="checkbox"/> 10 mins	£43.50

Including inlay card & side-labels.

Total Remittance £

NAME _____

ADDRESS _____

I enclose my cheque/PO

Please make cheque/PO payable R.F.W.

Insurance

MICRO-COMPUTER INSURANCE

* All risks cover (incl. Transit) up to £8,000 for £20

* Increased Cost of Working — to reinstate lost data

* Breakdown & Derangement — alternative to maintenance agreement
Comprehensive cover at a reasonable premium—

Talk to us before taking a Maintenance Contract
Write with details of equipment and value to —

Geoffrey Hoodless & Associates

Freeport (no stamp required)

Woking, Surrey GU21 4BR

Tel: Woking (04862) 61082 Answering Service.

DRAGON'S TEETH

The Dragon Dungeon vaults are filled with the widest selection of software and peripherals for the Dragon 32 available in the UK. Descriptive catalogue on request. We are also the home of the largest **Dragon User Club** in existence and publish the monthly news letter "Dragon's Teeth". Annual membership £6.00 (6 months' trial subscription £3.25).



THE DRAGON DUNGEON,

PO Box 4, Ashbourne, Derbyshire DE6 1AQ.

TEL: ASHBOURNE 44626

Programming the

PET/CBM

By Raeto West

The Reference Encyclopedia for Commodore PET and CBM Users
Comprehensive teaching and reference book on programming Commodore's 2000, 3000, 4000 and 8000 microcomputers and peripherals.

Many programs, charts and diagrams. 17 chapters, appendices, and index. iv + 504 page large-format paperback. ISBN 0 9507650 0 7. Price in UK and Europe £14.90 each (includes post and packing). Five or more £12.90 each. 48 hour order turnaround guaranteed.

From dealers and bookshops or direct:

Trade Manager, Edward Arnold (Publishers) Ltd, Woodlands Park Avenue, MAIDENHEAD, Berks SL3 3LX.

Tel: (062882) 3104

*A masterpiece — Creative Computing

*"Essential" — Educational Computing

*"Excellent" — Jim Szymanski

*"Comprehensive & Accurate" — Jim Butterfield

Send orders and make cheques payable to

Trade Manager, Edward Arnold (Publishers) Ltd, Woodlands Park Avenue, MAIDENHEAD, Berks SL3 3LX.

Send _____ copies/ies Programming the PET/CBM at £14.90

I enclose cheque/PO for £ _____

NAME _____

ADDRESS _____

Second User Equipment

*** SALE ***	
NEW EQUIPMENT	
ZM 34 Colour Monitor, 13 inch, Resolution 684 x 480, TTL levels	£400.00
ZM1114 Matrix Printers, Serial	£195.00
DUAL Binchives, case, psv.	£195.00
ZM2121 Draw-Snap Plotter	£75.00
EX-DEMONSTRATION EQUIPMENT	
Z47 Binch Drive plus Controller	£80.00
DUAL O 1602/320 30p	£925.00

PMS

Developments

222 Twatfield Road, Winstford, Hampshire RG9 4AA

Tel: +44 (0)875 7955, Telex: 8465 (SITEL) CMC621

BERKSHIRE MICROS LTD.

Second-hand home and business microcomputers and peripherals bought and sold.

We specialise in second-hand Apple equipment also best prices on many new micros and consumables.

(0344) 84423

WANTED PERSONAL COMPUTERS

Morgan Camera Company
180 Tottenham Court Road,
London W1 Tel: 01-388 2562

DRAGON 32 or TANDY TRS-80 Colour?

Lots of programs — lots of useful hints and information EVERY single month in "RAINBOW", an exciting new 200-page magazine from U.S.A.

Send £2.25 (plus large 56p s.a.e.) for sample issue to
ELKAN ELECTRONICS (Dept. PCN),
FREEPOST,

11 Bury New Road, Prestwich,
Manchester M25 6LZ
or telephone 061-798 7613
(24 hour service).

DRAGON 32 JOYSTICKS

Top quality, easy to handle joysticks, for the enthusiastic game player.

ONLY **£14.95** plus 75p p&p
Available from

CASCOM

67 ELSTOW ROAD,
BEDFORD MK42 9NT.

BBC

GRAPHICS TABLET

on an attractive 8 x 8 inch base

PLUG-IN READY TO GO

Trace, draw, save and load screen. Delete, rub-out, instant circles, triangles, polygons, arcs, vertical/horizontal brush lines. Shapes can be dynamically ROTATED and filled or part-filled with COLOUR or COLOUR SHADES. Cassette based. £45, p&p included + 18% VAT. 1-720, 1 Abbots Place, London NW6.
TEL: 01-624 5404

Oric 1, BBC, Lynx

cassette leads

(with motor control)

Din to Din and remote jack or

Din to three jacks

£2.95 inc p & p

Texas TI99/4A

cassette leads

No need to pay £11.50 for Texas leads

Ours are only £4.95 inc p & p.

Single recorder only

CLARES

222 Twatfield Road,

Winstford,

Cheshire CW7 4AX.

TEL: 06665 51374.



clamp 1 clamp 2

Mains voltage clamp plugs

Protection for your computer against crashes, data loss and program loading failure caused by mains voltage surges, spikes and transients. Protection and improved performance for your hi-fi system by eliminating the damaging effects of the same faults.

These plugs comprise Voltage Dependent Resistors built into the best mains plug we could find.

Clamp 1 is fitted to each component of your computer or hi-fi system in place of the conventional 13A plug.

Clamp 2 Lighting strike protector. This is not fitted to any equipment, but is plugged into the mains at a vacant socket somewhere on the same ring. Protects your home computer, television, hi-fi system etc. from lightning strike.

From your dealer or direct (including VAT & p&p) from:



Russ Andrews
TURNABLE
ACCESSORIES
EDGE BANK HOUSE
SHEL OSMERGH
KENDAL CUMBRIA
LA8 5AL
TELEPHONE: SELSIDE (053803) 247

COMMODORE COMPUTERS

SOUTHAMPTON

HIRE Commodore equipment by the week, all including manuals, cassette deck, media etc.
4032 £25, 4040 Disk or 4022 Printer £25
Nearly new equipment with guarantee available
4032 (large screen) £475, 4040 £525, 4022 £295

Send us your unwanted equipment
COMMODORE £4 £299

Special Offer for April

FREE C2N CASSETTE DECK with 64
700 and 500 series computers available May
710B 128K, monitor, £995
500P 128K, colour, £695
All prices are cash-and-carry and include VAT
OFFICIAL COMMODORE DEALER

SUPER-VISION

13 St James Road, Shirley, Southampton
Telephone: (0703) 774025
After hours: (0703) 554488

MINI COMPUTERS PERSONAL COMPUTERS MICRO COMPUTERS

Dectrade carry large stocks of various machines including
DEC, SUPERBRAIN, ALTOS and
HITACHI

We also carry extensive ranges of
VDUs and printers

Dectrade Ltd

Network House
20 Ludlow Hill Road
West Bridgford, Nottingham
Tel: 0602 232265
Telex: 377678 NETWRK

THIS ADVERTISEMENT

R
E
A
D

Remember the Rubik Cube? They were great fun, but did not have a real practical use.

Now from ideal the latest cube for executives — Rubiks Calendar, a permanent desk top calendar, that re-organises every day will stimulate your brain and ensure you keep track of time!

Our bulk purchase direct from supplier enables us to offer you the full size ideal cube for only £2-99 which comes boxed and includes post and packing. At £2-99 inc we are indeed selling these at under half manufacturer's recommended price of £5-99. Don't delay, send off today!



NORTHBOURNE MAIL ORDER
2 HAGBOURNE ROAD DIDCOT OXON

£2-99 inc

APRIL '83 NEW LOW PRICES!

VIC-20

VIC-20 COMPUTER only £118!
16K RAM only £53!
CASSETTE RECORDER only £40!

TEXAS

TEXAS 99-4A COMPUTER only £152!

COMMODORE 64 £45 OFF

ATARI

ATARI 400 COMPUTER only £148!
• ATARI 400 & BASIC only £194!
• ATARI 800 & BASIC only £320!
• ATARI 800-48K BASIC only £375!
DISK DRIVE only £278!

Software at huge discounts also available

MAIL ORDER: (01)-647 1713
8 COSDACH AVE,
WALLINGTON, SURREY SM6 9RA

Full colour
catalogue available

NEW FLOPPY DISC STORAGE SYSTEM.

ALPHA DISC FILE STORE

A RIGID plastic binder with 10 double dust free leaves, each will hold 2 standard disc's (10 leaves 20 pockets) each disc has its own file card, available for both 5 1/4" and 8" disc's.
Binder Colours: Red and Blue for 5 1/4"; Ref. 520R or 520B
Green for 8"; Ref. 820

P&P £1.25 per binder

Alpha, PO Box 125, Cheltenham, Glos GL51 6TP



Services

HOBBYIST LIMITED

Open 6 days 10am-7pm. Wednesday and Saturdays
5.30pm.

Authorised Apple Service Centre.

Apple IIe, Epson HX20 Portable Computer and Epson FX80 Printers all now in stock. Also, wide range of supporting peripherals and books.

3 The Broadway, Manor Hall Road,
Southwick, Brighton BN4 4ND

Tel: 0273 593345

Avoid damage to your computer or printer by using a Sherborne Dust Cover. Large stocks available for most makes or made to measure service.

Dragon, Atari, Vic 20 — £2.95
BBC, TI, Epson — £3.95
Sharp M260 A/R — £4.95

SHERBORNE DESIGNS
Victory House,
8A The Rank, North Bradley, Trowbridge, Wilt.
Tel: 02714 4429

Dealer Enquiries welcome.

My name is Simon Stable. I specialise in direct data duplicating for the following cassette-based micros: BBC AB, ZX Spectrum, Oric and Dragon.

My prices are very competitive with a fast turnaround. Do not matrix printed labels to order or blanks (tractor).

"COMPETITIVE RATES" 08692 2831 "COMPETITIVE RATES"

For further information about real-time cassette copying

• write or phone •

46 WEST END, LAUNTON, OXON. OX8 0DG.



THE 'BIG' O

FREE! D BASE II

still available

while stocks last phone NOW

OSBORNE

48
microcentres ltd

Telephone (0295)

67551

North Bar, Banbury,
Oxon. OX16 0TF

MICRO USER T-SHIRTS

EPSON 2381 SHARP SPECTRUM SIRIUS 1 SORD ORIC 1

Available in white, blue and red

MICRO FUN T-SHIRTS

"I'M USER FRIENDLY"

"HAVE YOU SEEN MY PERIPHERALS?"

Available in white or blue

small, medium, large and x-large sizes

CLUB T-SHIRTS ALSO PRINTED

£3.25 EACH INCLUSIVE

Mail Order only from

ONE PER CENT SCREENS






UNIT 12, STAR LANE INDUSTRIAL ESTATE

GREAT WAKERING, ESSEX.



ENGLISH SOFTWARE

WE MAKE CONCEPT REALITY!

-  concept evaluation
-  creative development
-  program assistance
-  multi-system formatting
-  6 month development plans

If you write videogame programs in 16K machine for Apple, Atari, IBM, PC, Commodore 64, NEC or any other major system, learn how to make your concept reality!

The English Software Company

IN THE USA
PO BOX 388
REDONCO BEACH
CALIFORNIA
92771
(619) 372-3440

IN UNITED KINGDOM & EUROPE
50 NEWTON STREET
PICKADILLY
MANCHESTER, M20A
ENGLAND
(060) 236 7204



ENGLISH SOFTWARE
MAKING CONCEPT REALITY!

Please include all documentation with demo submissions

RUN YOUR OWN COMPUTER RETAILING OPERATION

Valuable investment opportunity with UK's biggest growth market. We invite enquiries from businessmen interested in acquiring a profitable software based computer franchising operation.

The franchise involves the retailing of software-based business computer systems through prestige outlets to commercial and industrial businesses. The franchise package is complete with total business format, including training, marketing and documentation systems. It represents a unique investment opportunity with considerable profit potential.

Enquiries are invited from businessmen with an investment capital of £10,000-£30,000.

You will not be pioneering. The business concept is based on a 3-year track record in this rapidly developing market.

Part finance and independent assessment available, financial report and status report available from Barclays Bank.

For further details write to Franchise Administrator, Dept. 6, Charles Walls & Partners Ltd., Calverley, Leeds, West Yorkshire LS28 5SS.

BUG-BYTE SOFTWARE



URGENTLY REQUIRE Z80/6502 PROGRAMMERS

We are Britain's foremost developers of microcomputer software, and have an unbelievable range of exciting games for the most popular machines, e.g. VIC, ZX81, Spectrum, BBC etc. We are looking for young, dynamic, innovative people to produce original ideas on a freelance basis. Turn your favourite hobby into hard cash! All replies treated in the strictest confidence. Write to: Programming Dept., Bug Byte Software, The Albany, Old Hall Street, Liverpool SE9.

Showroom Consultant

To demonstrate range of micro (soft and hardware) products. Must have good working knowledge of micros.

Age: 18-30.

Salary:
to £8,000!

Also — Technical Support
Staff for West End and
Suburban to 12K + Car!
PLEASE TELEPHONE LINDA
ON 01-409 0382

Business People

RECRUITMENT CONSULTANTS

Duke Street House, 415-417 Oxford St.,
London W1 Telephone: 01-629 9863

To Advertise

Call

Ian Whorley

PERSONNEL
COMPUTER

01-323 3211

MAKE A START IN PERSONAL COMPUTER SALES

Salary circa £6,500

We are looking for someone aged at least 19 years who is keen to develop a sales career with a world leading manufacture.

Your first job will be Customer Liaison with Personal Computer distributors.

On our special development plan, for 6 to 12 months, you will deal largely with clerical and telephone duties, then you will assist customers by installing their computer systems, train their staff and help our field sales force. Subsequently you should move to a sales territory where high earnings, through good base salary and commission are possible.

You must already have:—

1. Sold products in a shop or over the telephone.
2. Education to "A" level standard or above.
3. Own your own PC or have programming skills in BASIC.

Write giving your personal details to:
Ms Irene Woodcock, Personnel Department,
NEC Business Systems (Europe) Ltd.,
NEC House,
164-166 Drummond Street,
LONDON NW1 3HP.

NO PREVIOUS APPLICANTS NEED APPLY

New!



WE STOCK ATARI 400/800, SINCLAIR, VECTREX COMPUTERS.

WE STOCK ALL ATARI, ACTIVISION, PARKER, SPECTRAVISION, APOLLO, IMAGIC, MATTEL & COLECO CARTRIDGES.

WE STOCK COMMODORE 64/VIC /SINCLAIR SOFTWARE

WE STOCK LOTS and LOTS of ATARI SOFTWARE. E.g. Zaxxon, Nautilus, Jumbo Jet Pilot, Apple Panic, Centipede, Miner 2049er, Slime, Intruder, Alien Swarm, Preppie, Pacman, Mathpack, Choplifter Rom, Soccer!, Airstrike — plus many, many more titles

— Call now for our latest batch of detailed brochures!

We will keep you up to date on all the new software releases!!! — Upgrade to 32K/48K today!

CALL FOR BEST PRICES!

CALL FOR BEST PRICES!

CALL FOR BEST PRICES!

2 YEAR GUARANTEE ON ATARI COMPUTERS

WE SERVICE ALL ATARI & COMMODORE COMPUTERS
SERVICE DEPT : 061-236 3395

ATARI INDEPENDENT SERVICE CENTRE

FAST NATIONWIDE MAIL ORDER ON ALL PRODUCTS.

FULL RANGE OF CHESS COMPUTERS IN STOCK

GEMINI ELECTRONICS
Dept. P, 50 Newton St. Off Piccadilly, Manchester M1 2EA. Tel: 061-236 3083/7259

NEW! ATARI VCS COMPUTER KEYBOARD
CONVERTS YOUR ATARI INTO A REAL COMPUTER! CALL NOW FOR DETAILS!!

ATARI 400 TYPEWRITER KEYBOARD
NOW IN STOCK AT £59.95
CALL NOW FOR DETAILS!!

VECTREX
sinclair

Take YOUR COMPUTER with you to the CLUB — SCHOOL — OFFICE

SPECTRUM/ZX81 MICROCASE

turn your Sinclair computer into a portable system with the benefit of CONVENIENCE — PROTECTION — SECURITY



from only
£28.95
inc. VAT

This smart, neat case is designed to hold your computer, power supply, printer, rampack etc. and has space for your own cassette recorder or microdrives. All firmly held in place. Wires hidden. Cable faults reduced.

The shallow tray containing the system is only 35mm deep forming an attractive desk console. The detached lid provides your TV stand. When closed this smart, lockable, lightweight, professional case can be carried with ease and confidence. Your system is operational in seconds, wherever there is a power supply.

SEND FOR YOUR MICROCASE / CONSOLE NOW!

Name please supply by RETURN of POST
Address Qty Model Price Total
..... Spectrum £29.95
..... ZX81 £28.95
..... carriage £2.50
Tel Date
Either use this form or write
quoting ref. MC1 Cheque/PO to Micro Aids

MICRO AIDS, Freeport, 2 Boston Close, Culcheth Warrington WA3 1BR. Tel: 092 576 2613

Many other microcases available BBC Dragon/VIC/Oric/Texas etc.

P.M.S. Developments

0432-265768

22 Tarsmill Court
Rotherwas Ind. Est.
Hereford

ZENITH 16-Bit Computer (45K) with High Resolution colour Graphics (640 by 225), 8088 and 8085 processors, 128K user ram, 2 DSDD 320KB drives, 2 Serial ports, 1 Parallel port, Disk controller supporting 4 each 8" drives and 4 each 5.25" drives, 4 slots of S-100 bus for options, Light-pen socket. Supplied with MSDOS, CP/M85 and 16-Bit Micro-soft Colour Basic with FULL GRAPHICS implementation, complete documentation including MSDOS assembler listings (7 manuals).

With 12 Month Warranty. From £2,072

8" DISK SUBSYSTEM, Capacity: 2.4Mbytes, 2 Double-sided Double Density Drives in case 9" w x 10" h x 18" d with PSU, Fan, 50-way data connector, 1.5M data cable, mains cable. **Only £1,050**

ZENITH ZVM-121 12" Green screen monitors £85.00
OSBORNE I personal computer and software £1,250
OSBORNE II Double Density Disk monitor £1,375
Supplied with FREE 12" Green Monitor!

INTELLIGENT EPROM PROGRAMMER: 4K Buffer RS232 interface. Programs 2716, TMS 2716, TMS 2516, TMS 2508, TMS 2708, 2732, 2532, TMS 2532. Can be used with Terminal Only. Supplied with software for use under CP/M operating system. **Price: £349**

ZENITH ZVM 134 13" Colour Monitor, TTL level RGB input 20MHz bandwidth, resolution 684x480 £400
Colour WORDSTAR V3.2 (MS DOS) £240
Colour SUPERCALC (MS DOS) £175
ZENITH 2nd-user equipment at very favourable prices

OLYMPIA ESW 100/RO Daisy Printer Special Offer £495

We are unable to list all our items. If you would like details of these or more information on the above, please contact us.

Please add VAT to all prices.

PAPERCHASE-

finishing line

Bet you're dying to know what the paperchase proverb is . . . well . . . since the closing date was last Friday, April 8, we'll put you out of your misery.

It's: *Great oaks from little acorns grow.*

And, as many hundreds of you know, the missing word

was, of course, 'acorn'.

Clever stuff. However, due to overwhelming response from entrants who must have caused havoc in the home playing with little bits of paper, we haven't yet been able to draw the four winners.

So, sorry but suspense con-

tinues, at least till next week when we'll publish the winners' names.

Some of you have already telephoned the Oxford Street office to know the result. But don't waste your cash — we really won't let the secret out till we publish it next week.



Champagne feedback

We were not too sure whether you get a free bottle of champagne with every 12 copies of rescue or 12 copies of Rescue with every bottle of champagne. Life is never so simple. What you have to do is buy a copy of Rescue database package then send back a printout of your VDU's parameters, if yours is the lucky name drawn out of the hat you get the champers—a whole case of the stuff. The catch is that the package costs £340. Details from Microcomputer Business Systems on 01-253 3998.



Laughline—win £20

This cartoon was sent to us for publication. We all looked at it — 17 of us in PCN's editorial office—and with the exception of a bit of bluffing from the more macho among us, none could see the joke. So we've decided to put it to the reader test.

And for incentive we're offering £20 to the wit who comes up with the funniest line. Funniest, that is as judged by the cartoonist and the editor.

Get your entries to us by April 29. Write them on a postcard putting Laughline in the top left-hand corner.

PCN DATELINES

PCN Datelines keeps you in touch with up-coming events. Make sure you enter them in your diary.

Organisers who would like details of coming events included in

PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

UK EVENTS

Event	Dates	Venue	Organisers
Computer Technology Exhibition	April 13-16	Recreation Centre, Newton Aycliffe, Co Durham	Jan Huntley, Sedgefield District Council, Spennymoor 816166
Computer Open Day Exhibition	April 14	Midland Hotel, Manchester	Tony Kaminiski, Couchmead Communications, 01-778 1102
4th London Computer Fair	April 14-16	Central Hall, Westminster, London	Sue Manning, ALCC, 01-226 9874
Manchester Home Computer Show	April 21-23	Midland Hotel, Manchester	Peter Freebrey, ASP Exhibitions, 01-437 1002
HP 1000 Users Exhibition & Conference	April 26-28	Heathrow Penta Hotel, London	Conference Services, 01-584 4226
Computer Trade Show	April 26-28	Wembley Conference Centre, Wembley	John Cole, Reed Exhibitions, 01-643 8040
Midland Computer Show	April 28-30	Bingley Hall, Birmingham	Roy Bratt, Reed Exhibitions, 01-643 8040
RIBA Computer Conference & Micro City '83	May 10-12	Bloomsbury Crest Hotel, London	Joe Hunting, RIBA Services Ltd, 01-637 8991
Computer Open Day Exhibition	May 12	Bristol Exhibition Complex	Stephen Hybs, Tomorrow's World Exhibition, 0272 292156
Compec Scotland	May 17-19	The Post House, Southampton	Tony Kaminiski, Couchmead Communications, 01-778 1101
		Kelvin Hall, Glasgow	Tracey Cannon, Reed Exhibitions, 01-643 8040

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
International Computer, Computer & Robot Exhibition	April 13-20	Seoul, Korea	Korea Economic Daily, 441 Chungrimdong, Chung-ku, Seoul 100
Information Management Exhibition & Conference	April 26-28	M McCormick Place, Chicago, USA	Tony May, Clapp & Poliak, 021-384 3384
Compec Europe Exhibition	May 3-5	Centre Rogier, Brussels	Tracey Cannon, IPC Exhibitions, 01-643 8040
National Computer Conference & Exhibition	May 16-19	Anaheim, USA	American Federation of Information Processing Societies, 1815 N Lynn Street, Arlington, VA 22209
Computers, Communications & Electronic Technology Exhibition & Conference	May 31-June 3	Melbourne, Australia	CETIA, PO Box 259, Roseville, Sydney, N S W 2069

Spectrum Games

"The world's greatest arcade games"

for –
**ZX Spectrum
 and VIC 20**

Featuring:

- Hi-Resolution Graphics
- Sensational Sound Effects
- Authentic Arcade Action
- Machine Code Thrills



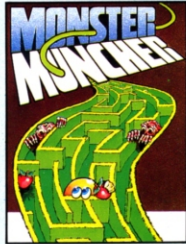
■ **COSMIC INTRUDERS**
 The original and best intruders game with some new twists – how long can you last?



■ **ROAD FROG**
 Guide Froggy across the road, then the river and finally home – but beware the Evil Monster!



■ **ROCKET COMMAND**
 Speed across the planet surface to defeat the aliens and save the Human race – smart bombs and hyperdrive to aid you.



■ **MONSTER MUNCHER**
 Chomp the apples in the maze before the monsters eat you – if you can swallow the boosters you might even eat them!

ANY GAME JUST

£5.50

Including, VAT, post & pack and OUR NO QUIBBLE REPLACEMENT GUARANTEE

SPECTRUM GAMES
 FREEPOST MANCHESTER M3 8BB



INSTANT CREDIT CARD SALES
 LINE (24 HOURS)

061-832 9143

Dealer enquiries invited

POST COUPON NOW TO:

SPECTRUM GAMES, FREEPOST MANCHESTER M3 8BB

	Any ZX Spectrum	Any VIC 20
Please rush me a copy of –		
Monster Muncher	<input type="checkbox"/>	<input type="checkbox"/>
Rocket Command	<input type="checkbox"/>	not available
Road Frog	<input type="checkbox"/>	<input type="checkbox"/>
Cosmic Intruders	<input type="checkbox"/>	<input type="checkbox"/>

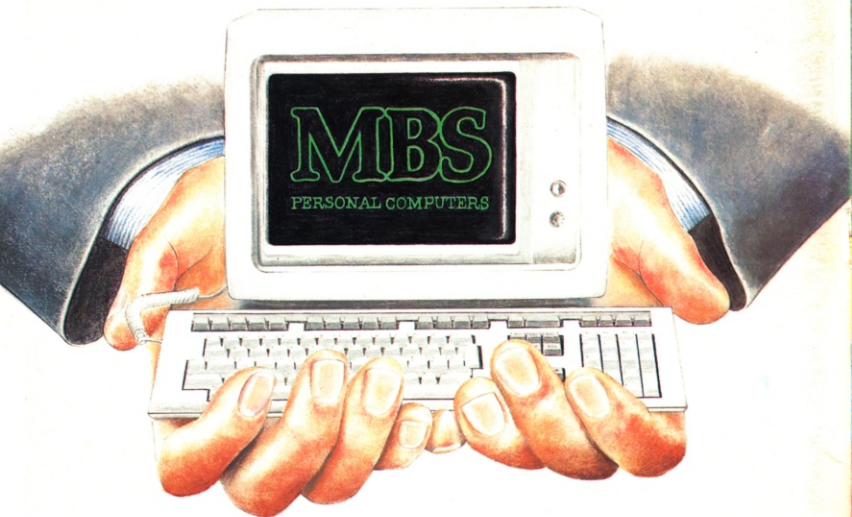
**SPECIAL OFFER – SAVE ON TWO –
 SAVE £2.00 ON ANY TWO GAMES – PAY ONLY £9.00**

I enclose cheque/P.O. for £ _____
 or please debit my Access Card No. _____

NAME _____
 ADDRESS _____

FREEPOST NO STAMP NECESSARY

PC 1



Before you buy a personal computer, try it first by renting from us.

You probably know just how much the right personal computer could help you in your business or profession.

But how do you decide on the right machine without making expensive mistakes? We have a very simple solution.

See the very best personal computers and software in action at one of our demonstration centres. Make your selection and then rent your chosen system from us until you're sure you've made the right decision.

When you are ready, simply convert to a purchase agreement. If the system isn't right for you, we'll help you choose a more suitable one.

Naturally, you can continue to rent long term... which may be financially advantageous to you. Alternatively, we can arrange leasing or, of course, direct purchase at the outset.

However you purchase, you'll have a good deal with MBS. And you can rely on unbiased, expert guidance from the computer professionals at our centres.

Call in today.

Nationwide MBS personal computer centres:

London St. Mary Abchurch House
123 Cannon Street London EC4N 5AX
Telephone 01-621 1122

Bristol 14-16 Baldwin Street Bristol BS1 1SR
Telephone 0272 277243

Edinburgh Old Terminal Building
Turnhouse Airport Edinburgh EH12 0AL
Telephone 031-333 1000 Ext. 3144/5

Eton 119/120 High Street Eton
Windsor Berkshire SL4 6AN
Telephone 07535 68171

Warrington The Genesis Centre
Garrett Field
Birchwood Science Park
Warrington WA3 7BH
Telephone 0925 822261

Wirksworth Blind Lane Wirksworth
Derbyshire DE4 4EZ
Telephone 062 982-3120



MBS

MBS Personal Computers Ltd

119/120 High Street Eton Windsor Berkshire SL4 6AN