

PERSONAL COMPUTER

EVERY THURSDAY

50p

NOV 24-30 1983 Vol1 No 38

NEWS

THE COMPLETE COMPUTING WEEKLY

THIS WEEK

DRAGON SCRAMBLE
Arcade action in an
all m/c listing

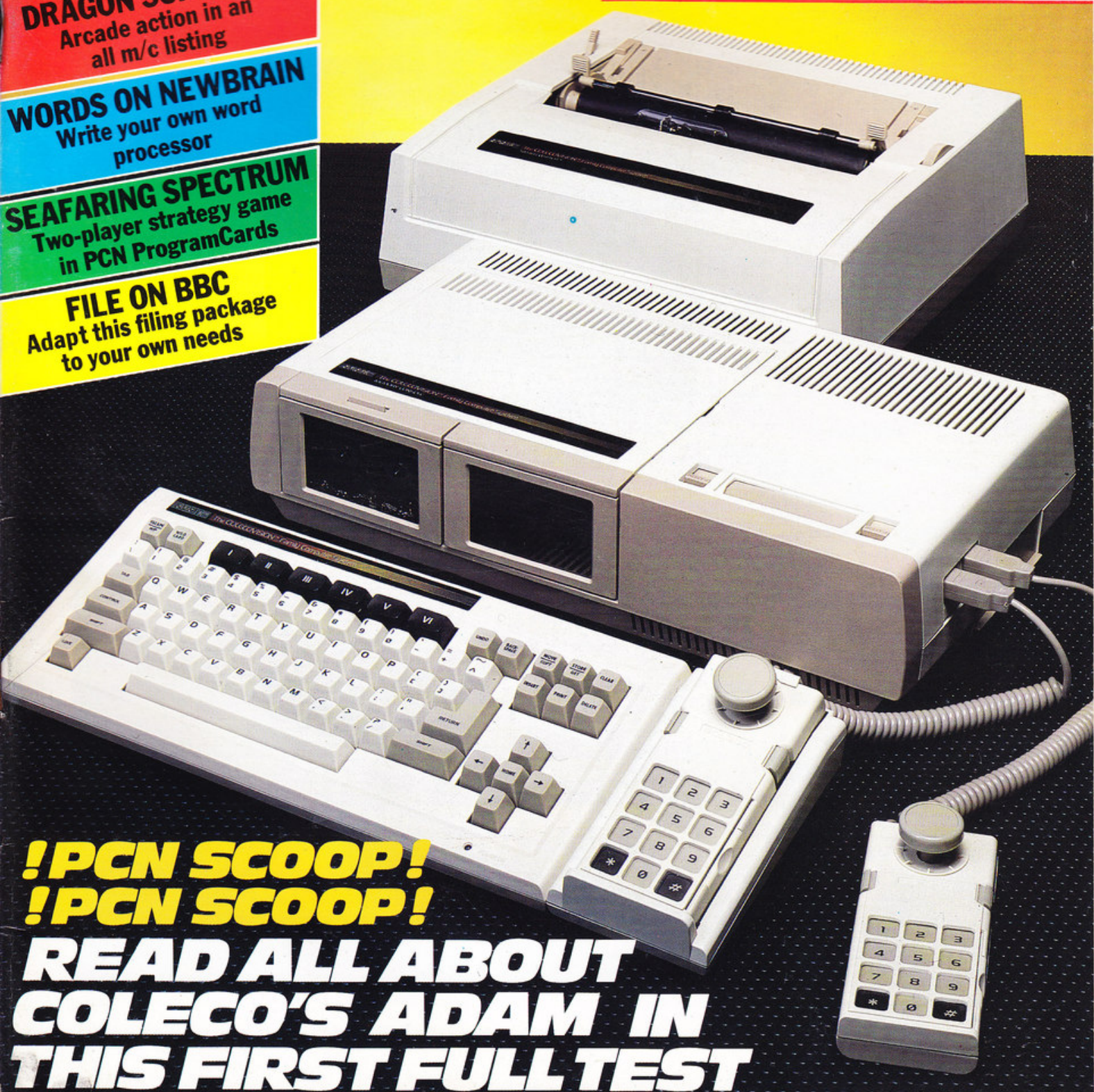
WORDS ON NEWBRAIN
Write your own word
processor

SEAFARING SPECTRUM
Two-player strategy game
in PCN ProgramCards

FILE ON BBC
Adapt this filing package
to your own needs

PULL-OUT MICROPAEDIA

Your complete guide to monitors



**!PCN SCOOP!
!PCN SCOOP!**

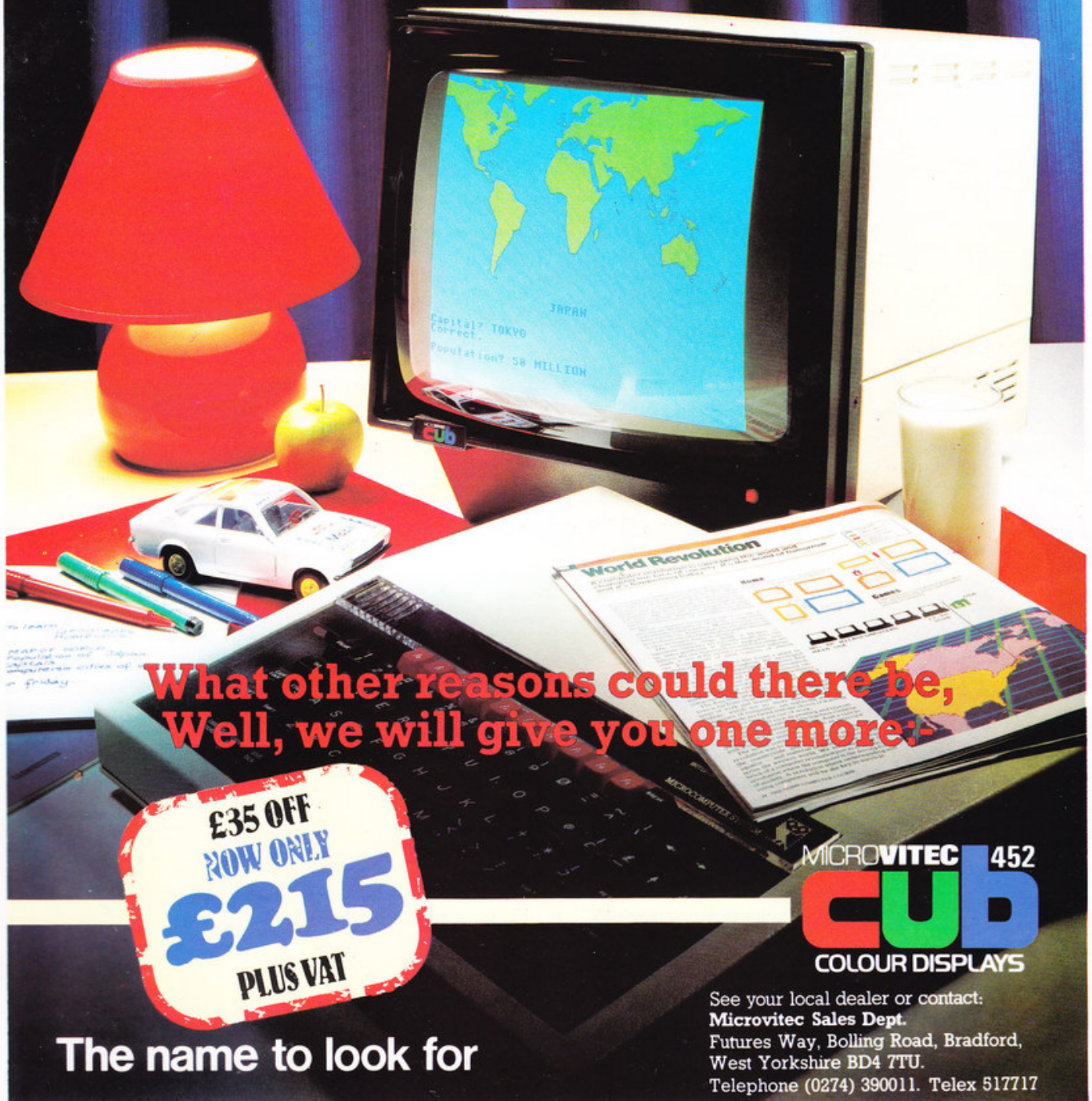
**READ ALL ABOUT
COLECO'S ADAM IN
THIS FIRST FULL TEST**

*For the Brightest
and Best*

Microvitec Cub 452 is by far the largest selling colour display for the BBC microcomputer:-

WHY?

- * It is the only colour monitor approved and recommended by both Acorn and the BBC.
- * 95% of schools have chosen Cub 452 under the Department of Industry Micros in schools scheme.
- * Cub is designed and manufactured in the U.K.



**What other reasons could there be,
Well, we will give you one more:-**

**£35 OFF
NOW ONLY
£215
PLUS VAT**

**MICROVITEC 452
Cub
COLOUR DISPLAYS**

See your local dealer or contact:
Microvitec Sales Dept.
Futures Way, Bolling Road, Bradford,
West Yorkshire BD4 7TU.
Telephone (0274) 390011. Telex 517717



Pull-out and keep Micropaedia

Your guide to monitors: which ones work with your machine, how to measure the specifications, why you should think about buying one.

REGULARS

Monitor 2

Acorn prices shock on second processors — page 2, Compec — a complete report — page 3; a window on the world — page 4; Goodbye Mr Chips: educational computing appraised — page 5; Microsoft glazes MSDOS — page 6; Hitachi moves into PC fray — page 7.

Random Access 8

Get it off your chest! Send your letters here and we might even pay you for it.

Routine Inquiries 9

Your questions answered: this week Spectrum, ZX81 and Oric owners get a helping hand.

Microwaves 18

Your hints and tips for the popular machines.

ProgramCards 62

Free listings with full explanatory notes for the Spectrum, Oric and Commodore 64.

Readout 72

PCN Binders 74

Keep your collection in perfect order.

Databasics 75

Your guide to hardware from the cheapest of home computers to powerful business machines.

Billboard 81

Pick up a computing bargain in our buy-and-sell page.

Quit 88

Cover photo by Andy Willis.

Spectrum contest revisited

Many apologies to all of you who searched in vain through last week's PCN to find the entry form for our Spectrum Micropaedia competition. A production mix-up caused its non-appearance, but in this issue you will definitely find it on page 44. To compensate for this delay we've doubled your chances of winning by offering an extra 10 prize Spectrums, so there are now 20 to be won. We've also extended the closing date to December 15.

PCN PRO-TEST: HARDWARE



The first Adam

20

A micro offering built-in high speed storage, printer, 80K of RAM and word processing software as well sounds too good to be true. But that's what Coleco's Adam promises. Brian Power gets his hands on one.

PCN SPECIALS

Apple soft-security

24

John Noad reveals his method of making your Apple programs safe from prying eyes.

Words on the brain

26

Until software support for the recently rescued Newbrain gets cranked up, how about a free word processor? Chris Rust presents a complete program.

Dragon Scramble

37

Let your Dragon take flight in Darren Eteo's all machine code game.

PCN PRO-TEST: SOFTWARE

Accountable Spectrum

39

Can your humble Spectrum compete with the bigger machines in aiding your business? Bill Quentin looks at one application.

BBC files

42

Data filing is one of the most useful applications for a home micro, and Simon Williams finds a package for the Model B that might handle most smaller applications.

PCN PRO-TEST: PERIPHERALS



Stars of the small screen

46

in conjunction with Micropaedia, PCN Pro-Tests brings you the low-down on some of the best-selling monitors.

GAMEPLAY

Another bumper bundle of the new games for Dragon owners

51

Aerial combat on the Atari in zeppelins and biplanes

53

More aerobatic antics — this time on a BBC Micro

58

EDITORIAL: Editor Cyndy Miles Deputy editor Geoff Wheelwright Managing editor Peter Worlock Sub editors Harriet Arnold, Leah Batham News editor David Guest News writers Ralph Bancroft, Sandra Grandison Hardware editor Ian Scales Features editor John Lettice Software editor Bryan Skinner Programs editor Kenn Garroch Listings Editor Wendie Pearson Editor's assistant Nickie Robinson Art director Jim Dansie Art Editor David Robinson Assistant art editor Floyd Sayers Publishing manager Mark Eisen Assistant publishing manager Sue Clements **ADVERTISING:** Group advertisement manager Pat Dolan Advertisement manager Nic Jones Assistant advertisement manager Mark Satchell Sales executives Christian McCarthy, Marie-Therese Bolger, Julia Dale, Dik Veenman, Alison Hare, Deborah Quinn Production manager Eva Haggis Microshop Production Nikki Payne Advertisement assistant Jenny Dunne Subscription enquiries Gill Stevens 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. Photoset 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. Registered at the PO as a newspaper

Acorn reveals price shock

By Kenn Garroch

One possible reason for the delayed appearance of the legendary BBC second processors has emerged — to give you time to save up for them.

Acorn staff revealed last week that the 6502 add-on will cost between £300 and £400 when it appears. But the Z80 second processor will come out of the traps at a staggering £800 or £900.

The fabled processors both made an appearance at Compec last week and the Crown Jewels would hardly have attracted more attention. The promise of additional processors has been on the tip of Acorn's tongue since the launch of the BBC, but like the Loch Ness monster reliable sightings have been few and far between.

The 6502 is now expected to become available in spring next year. It will come with 64K of RAM, 16K of which will be occupied by Basic if you are using it. The Z80, four or five months after the 6502, will be supplied with some CP/M-based software packages, indicating that it will be intended for business rather than for home users.

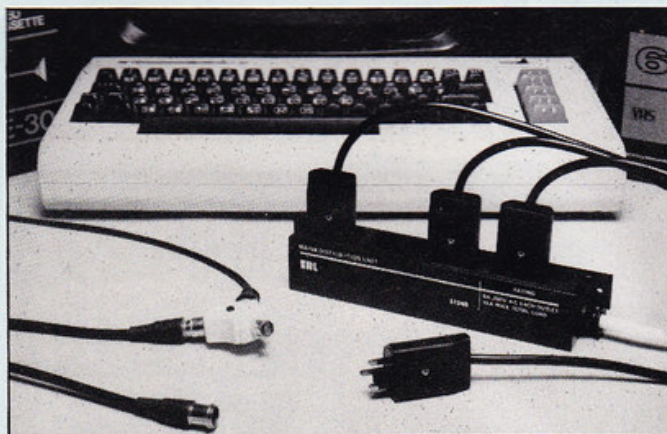
The BBC's contract with Acorn

comes up for renewal in autumn 1984, and Sinclair is known to be interested in bidding against Acorn. The second processor shambles should give Sir Clive the ammunition he needs, particularly now that Sinclair has the Microdrive and other launches successfully behind it.

Sinclair challenged for the original contract to supply the BBC with a micro worthy of its name but was beaten out by Acorn. Since then, the BBC micro has underwritten Acorn's success with sales estimated at £200,000.

■ A chip shortage is apparently responsible for the scarcity of Electrons. Acorn said last week that certain chips were in short supply (without specifying which) but it also admitted that demand for the new machine had exceeded estimates. There were some Electrons on show at Compec, but none was for sale.

WH Smith caused short-lived excitement when it claimed to have stocks of Electrons for its new store at London's Heathrow airport, but it later confessed that its supplies of Electrons were irregular and unpredictable.



SPAGHETTI JUNCTION — Electro Replacement wants to help you with the piles of spaghetti pouring out of the back of your home micro. It won't totally solve the problem, merely reduce it to a manageable size. Its ERL multiplug is a compact, four-way mains distribution box that can be either screwed to the wall or, ERL suggests more hazardously, to the back of a television monitor. The box costs £7.95 from electrical, hi-fi and computer shops. Also on offer is a two-way coaxial adaptor that saves you the hassle of unplugging the TV aerial every time you want to use your micro. It costs £1.50.

BBC toolbox sorted out

The BBC has acted on a PCN review to document faults in its Toolbox suite of programs.

The problems were revealed in Issue 37. PCN's reviewer found that it was possible to corrupt an entire disk simply by pressing Break, and he lost a word processing package in

this way. He also noted that the command to turn on the printer had, in the BBC's words, 'been accidentally omitted from the setup routine in the object code' of the graphics dump routine.

BBC Publications now says that it is aware of the problems and that it has produced a technical note which is available to users from: The Software Assistant, BBC Publications, 35 Marylebone High St, London W1M 4AA.

Copylock repels pirates

Uncrackable software may well have arrived at last. Copylock, produced by Export Software International (031-556 3266) reduces the pirates' chances of breaking into a protected disk to around one in several thousand million.

Mathematically it's not uncrackable, but the software's liable to have been superseded and the machine consigned to the Science Museum before you've done it.

Copylock operates using a fingerprint and encryption. A fingerprint is normally a small piece of metal on the disk which uses a code. This must be unlocked in order to read

the disk. Copylock's fingerprint, however, is invisible, and the code is considerably more complex than previous efforts. It also has the advantage that it doesn't take up any space on the data area.

You can make backup copies of your fingerprinted master disk, but you can't read them without a master disk. So if you damage your master, you have to exchange it for a replacement master before you can read the backup.

Copylock is currently in use on Export Software's own CP/M-86 Toolbox and Expert-Ease. It costs £6.50 a disk for up to 50 disks.

Jupiter to move back into orbit?

By Ralph Bancroft

The stricken Jupiter Ace (Issue 35) may be given a new lease of life before Christmas following the creditors' meeting earlier this month.

The creditors appointed Dennis Cross of accountants Chater and Myhill to act as liquidator of Jupiter Cantab, which had run up total debts of £140,000. Mr Cross is currently looking for would-be purchasers of the company and has already had several inquiries.

'Most of them are for parts of the

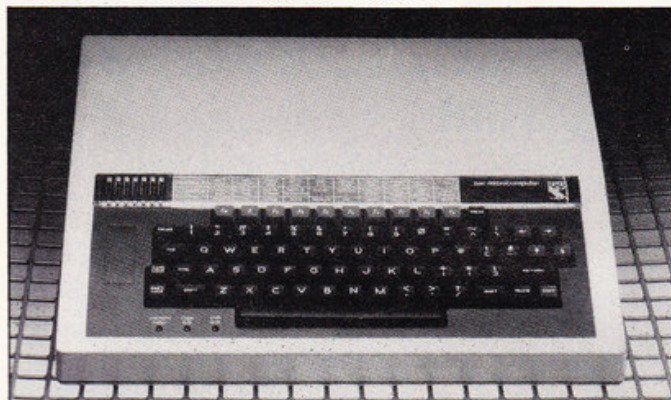
company,' Mr Cross said, 'but there are a few people who are interested in buying the whole company.'

He stressed that his job as liquidator is to sell the assets of the company, which includes a stock of 1,600 Aces, to pay off the creditors. Any buyer of the company would not be taking on the £140,000 debt.

The inquiries have come from companies already in the micro business. 'Most of them are interested in widening their product range,' said Mr Cross. He would not however say who the companies are. 'I don't want to prejudice the outcome of my negotiations,' he said.

Although still open to offers, Mr Cross said that he hoped to finalise the sale soon.

Chater and Myhill is on 0223-66692.



The BBC micro — another few months in solitary for its processor.

Midas touch

A new micro from Sirton (01-640 6931) holds out the promise of trouble-free running in the most hostile of environments.

The Midas 2D/TE is a Z80/64K RAM/twin floppy machine that is designed to cope with high temperatures, dusty environments and wildly fluctuating or non-existent mains supplies.

The micro has not one but two internal cooling fans. One keeps the main circuit board cool and the other deals with the disk drives. The temperature-tolerant components are evenly spaced throughout the unit to keep heat dissipation at the optimum level.

Two large dust filters are mounted externally and can be easily removed for servicing.

The micro works with a battery back up that switches in if the mains power fails or fluctuates beyond acceptable limits. Sirton claims that the switching is so instantaneous that even disk operations won't be affected. You can carry on writing to disk even in a power cut without fear of corrupted data.

Reflecting the micro's go-anywhere image, it will work off ordinary car or truck batteries.



Sirton's go-anywhere Midas 2D/TE.

Computers feels the CP/M strain

The £445 Computers Lynx 128K is with us at last — in spirit.

Computers was showing the beast at Compec and promising its appearance in the shops in the next few weeks. But the CP/M system, though running after a fashion on the company's stand, wasn't quite ready yet.

In the Hostage to fortune department, Computers' current brochure claims 'the key feature of the 128K Lynx is that it runs CP/M

The version of CP/M on show still had a few teething troubles, including a nasty screen judder when you asked it for a directory. Computers says this should all be cured in the next few weeks, but this puts the store-launch of the complete Lynx 128K, CP/M and disk drive system perilously close to Christmas.

The CP/M system itself is only likely to run on the 128K version, and as it was originally intended that CP/M would be given free with the machine, it's possible that this could hold up distribution of the expanded Lynx.

The idea of distributing it free with the disk drives is being considered, but this will be almost pointless if you're using the drives with the 96K machine. Upgrades, however, are currently planned for the difference in cost between the machines plus carriage.

Jonos joins the heavyweights

A armour-plated IBM workalike? If you're doing a really big outdoor job and you need a lot of power on site, then this one may be for you.

Jonos International (Windsor 54272) was showing a range of chunky portables, from the Jonos 2100 with dual 3.5in Sony drives (2,424) through to the £4,295 2600, which sports a single 10Mb Rodime on top of its Sonys.

In between these you can get varying configurations of assorted Winchester and floppies.

The basic machine is around the size of a Hyperion.

The display machines were mounted on vibrating stands to show how they worked in inclement conditions. Staff seemed prone to switching the vibration on without warning, provoking comments on the lines of, 'strewth, drives run a bit rough, don't they?'



Solid power — the Jonos with hard disks.

Compec compiled



Drives link up in Perfect range

Perfect Software has added to its range with Perfect Link, an advanced communications program mainly for the IBM PC or compatible computers.

The software is completely menu driven, even down to specifying baud rates. One of its main features is the ability to read and write disks from any of a set of specified machines. Perfect says that it will be increasing the number of compatible machines at a later date. At the moment the software can cope with most of the major IBM lookalikes, running CP/M and MSDOS.

Other facilities include automatic setting up in which the computer remembers previously defined settings. File transfer via X-Modem protocols, terminal emulation, flexible file storage, automatic dialing, and on-screen time display are among its other attractions. It will cost £149.

Midlectron on the Morrow

One of the quietest debuts at the show must have been the Morrow Designs MD2 sitting on the Midlectron stand.

The Morrow is a CP/M Z80A system from the US, where it has been picking up orders steadily during a year that has sorted out some better known names. It has 64K of RAM and is supplied with either twin 250K or twin 500K floppies, plus WordStar, LogiCalc, Microsoft Basic, Personal Pearl and other packages.

The box has an RS232 port to communicate with a modem or a printer, and an expansion port will let you link four drives to the machine. A hard disk version is due in January.

Midlectron (077382 6811) is selling the MD2 for £1,534 and the MD3, with the 500K floppies, for £1,755.

Taskmaster in business

Business users trekking around Compec may have found Dacoll's £3,335 micro, Taskmaster, an attractive proposition.

Although it runs the company's own operating system it also takes CP/M.

It comes with twin 1Mb 5¼ disk drives, CP/M interface, monitor and keyboard and will act as a micro or communicating terminal.

The company has produced its own suite of software for Taskmaster — financial applications include sales, nominal and purchase ledgers, sales invoicing, payroll, financial modelling and Wordstar word processing. They also have production applications, and the starting price for each piece is about £230.

Applications can be bought separately or together from Dacoll (021 351 5451) and will be available at the same time as the hardware, in early January.



Dacoll's Taskmaster — jobbing micro.

Fuji hedges bets on mini disks

Fuji has responded to speculation that IBM will produce a 3½in disk drive for the PC. Suitable disks have now rolled off Fuji's presses and are expected to sell from early February for under £4 each.

These disks will be suitable for the Apricot (Pro-Test, issue 36) and

any other micro using 3½in drives.

Fuji also has 3in diskettes out which will fit the Hitachi disk drive, and if data is lost on any disk sold by Fuji, distributors Magnum Media guarantees to pay for the data to be put back on.

Anyone interested in these products should call Fuji's two distributors — Bosledge in Manchester (061 834 7339) or Magnum Media (0734 734874).

Software house Microfocus, in Berkshire, now has a companion to its Personal Cobol. It is Bostel, a pre-compiler allowing you to do structured programming in Cobol, for £805, on anything running CIS COBOL, or Level 2 COBOL. Microfocus is on 0635-36246.

Cromemco set for UK re-launch

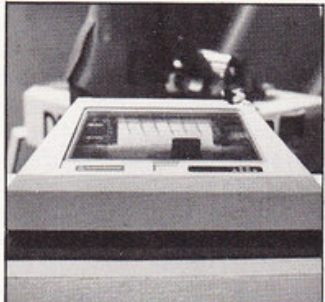
Cromemco's micros are due to get a face-lift in a re-launch of the full range in the UK.

Enhancements to Cromix, the Unix-like operating system that runs on its 68000-based machine, and improvements in disk capacities should be made in coming months. More immediately the company plans to implement Micro Focus' Level 2 Cobol.

The Cromemco distributorship in the UK has passed from Comart to Jarogate and Jarogate managing director Robin Tracey intends to re-introduce the systems, from the C-10 personal computer to the 68000-based machine, to UK business micro users. There are about 3,000 Cromemco systems installed in this country but the Cromemco name has never had the prominence here that it has in the US.



Jarogate's Robin Tracey — relaunching Cromemco.



Anadex DP-9001B — £910 performance.

VIEW FROM AMERICA



By Chris Rowley

Everyone's peeking in windows

Texas hold 'em is what they call the game they play in the annual World Series poker contest held in Las Vegas' Horseshoe Club. This is big money poker, with as much as \$700,000 in a single pot by the end, when after days of play, things have come down to 3 or 4 of the very best, most ornery players with nerves of steel and very fat wallets.

1984's competition stands to be considerably enlivened, however, by the entrance of a player with nerves of silicon.

In a \$1 million challenge, poker writer Mike Caro, also known as the Mad Genius of Poker, is pitting his Pascal poker program on an Apple II against the best in the world. The game will take place at the Horseshoe during the regular World Series and will be one on one, freeze out, \$100,000 buy in, winner takes all.

The current champ, Tom McEvoy is in, so is two-time champ Doyle Brunson, and the flamboyant Bob Stupak, alias the 'world's greatest player', has said he will bet \$1 million to beat the computer and he promises to give his Rolls to Mike Caro if he loses. Caro doesn't have a Rolls, so if the program fails this awesome task he will give Stupak a hammer and 'let him smash my computer in front of the whole world'.

Some things can happen only in America. Software news is the rushed announcement of Microsoft's Windows to go toe-to-toe with Visicorp's VisiOn in the rapidly intensifying windowing wars. VisiOn and Windows are radically different approaches, Windows being cheaper by far (\$250 maximum) and basically just an expansion of the environment of MSDOS allowing graphical applications, while VisiOn is a complete environment system requiring 2Mb of memory and offering Lisa-like capabilities.

Windows will face problems in attracting PC users because it cannot handle some of the popular 'misbehaved' software, such as Lotus 1-2-3, which circumvent MSDOS.

But VisiOn won't work with them either, and Visicorp will release a whole new line of applications programs. Meanwhile, Quarterdeck Software of LA's recently completed Desq is another inexpensive windowing system that will be open to existing software allowing flexible integration of old programs on an IBM PC: sure to be popular with small businesses.

The next few months will see heavy ad-fall from VisiOn, Quarterdeck and Microsoft, and by next summer at least half a dozen other competitors for the IBM windowing market expect to have their wares on the streets. Far too early to tell the winner in the resulting crunch, though one interesting point to note, perhaps, is that while software developers working on VisiOn are having to use a DEC Vax mini, programming for Windows will take only a PC.

More and more new hardware products are in the works. Watch for an IBM-compatible MSDOS TRS80 launch in the spring. CompuSource of Minneapolis has announced the Abacus portable, Apple-compatible system that can run CP/M and Apple software. The machine will come in an aluminium case with 9in amber monitor, 64K RAM, with optional disk drives, ports, and will weigh 28lbs. A single drive system will cost \$1,595.

Further good news for Apple users was the announcement by Rana systems of an MSDOS 16-bit software box for the Apple IIe and II+. Quoth Apple chief John Sculley: 'This is a gateway to the MSDOS world.'

The display of PC Jr brought further mixed reviews and allowed Atari and Coleco to safely boost their prices on new systems. Atari's 600XL rose from \$140 to \$180 and the 800XL rose from \$240 to \$280. Coleco put up the wholesale price of the Adam by 25 per cent to \$650, thus ensuring a store price in excess of \$800. Coleco is now not seen as able to reach its goal of 400,000 units by Christmas. And big retail chains (JC Penney, K-Mart) will not stock Adams.

The PC Jr did, however, stir up excitement among magazine publishers. US micro magazines are booming and nobody wanted to be left out of the potential Junior pie. Three titles have already been announced for January launches, and more may be in the works.

Sanyo string

Users of Sanyo's desk-top micros can now link their systems — at a price, but with the possibility of bringing in other manufacturers' micros.

Logitek has launched its networking system using Micromite hardware and software that it has developed with Science Systems.

The Micromite box has a built-in hard disk, and a tape streamer can be added. It will support as many as 254 Sanyo micros, but the fact that the data is held in a CP/M-compatible format means that it can also be accessed and updated by any CP/M-based micro.

The system incorporates a hard disk that can be from 10Mb to 40Mb depending on your requirements.

The rest of the network consists of co-axial cable and an interface card for each micro. Its data transfer rate is 78,000 cps.

An automatic file-locking mechanism takes care of security on the network but the tape streamer, as a second line of defence (in a different context), can save 20Mb in six minutes.

The Sanyo range starts below £1,000 (for the 1100) and at this level it will soon be joined by the MBC-555 IBM-compatible micro, running MSDOS and CP/M86.

The cost of networking from Logitek (0257 426644) runs to £4,315 for a unit with 10Mb, or £5,795 if it includes the tape streamer.



Logitek brings Sanyo into the net with Micromite hardware.

ZX81 goes on-line with a modem

The ZX81 may be puny but it doesn't stop people bringing out new add-ons and software. Latest goodie to appear is an adaptor that allows you to hook up the ZX81 to a modem.

The device comes from Micro-computer Resources (0727 72917) and is aimed at the user who wants to dial up Prestel or one of the several hobbyists' bulletin boards in operation around the country.

For £29.95 you get a device the size of a Rampack which contains all the hardware and software to hook into a modem.

It generates Prestel compatible

graphics but only in black and white. The firmware also turns the ZX81 into a viewdata terminal with functions programmed into the keyboard.

To call up Prestel you will also need a modem which the company will supply for £69.95.

In addition to accessing the pages of Prestel, you can use the adaptor to download software, save frames to tape or print them out on the ZX printer.

To dial up the bulletin boards a different kind of modem will be required because they use a different transmission protocol.

In downloading software the unit will accept syntax that is incompatible with Sinclair Basic, reading the incoming lines as REM statements for you to edit as necessary.

Software can be either edited and RUN, or stored on tape.

Fourth generation Ramis arrives for IBM XT

One of the mainframe world's more sophisticated pieces of software has been scaled down to fit on the IBM XT/370, launched last month.

Ramis II, the fourth-generation language produced by Mathematica Products Group, should be available for the XT/370 PC derivative when IBM starts shipping it in

the second quarter of next year. Mathematica is now continuing to develop the software to run on micros built around the Motorola 68000 and running the Unix operating system.

For the XT/370 it will cost £995. Mathematica in the UK is on 01-580 3681.

Learning the hard way

By Bryan Skinner

In the last few months, Sinclair, Heinemann, John Wiley, Griffin & George, Macmillans and many others have launched a wide range of educational software aimed at primary school children. This sudden interest can only be due to estimates such as the one by CAP that the educational market could grow to some £75m by the end of 1984. Certainly, the involvement of CAP (one of Europe's largest software producers) with ASK (an English software house specialising in educational programs) points to a booming market.

The Government likes to take much of the credit for this flourishing industry, pointing to its two recent schemes; MEP (Microelectronics Education Program) and MIS (Micros In Schools). While there may be an element of truth in the claim, the fact of the matter is that to date, the Government's policies have been insubstantial, ill-formulated and misapplied across the land. It often seems as if its micro schemes are mere window dressing hiding cuts in other, crucial, areas of education. Certainly, a micro in every school looks good on paper, but who, for one moment, can believe that one Spectrum between 1,500 children teaches anything more about technology than tolerance and an acute

awareness of the meaning of time-sharing?

The reality is that since the Government did not, would not or could not provide any direction in terms of how micros were to be used in schools, local education authorities, education computer centres and individual head teachers have had the final say in the matter. This is, of course, in the best tradition of British education. It is also, in this particular instance, the best recipe for disaster that could have been devised.

The reason for this is that all too often, head teachers, LEA officials and even educational advisers haven't a clue what a micro is, let alone how it could be used effectively in schools. What tends to happen is that a handful of BBCs are virtually monopolised by privileged CSE and O-level Computer Studies students in the 4th and 5th years.

Ironically, the CSE and O-level syllabi and exams are anachronistic, bearing little relationship to the pupil's needs or experiences with microcomputers. Dreamt up by University boards raised on administration programs written in Cobol and running on mainframes, they are a far cry from assembly language graphics programs being turned out by the more advanced students in enlightened regions.

That, at least, is one saving grace

of the flexibility of the system. There are several areas in England, where, by the efforts of a few far-sighted individuals, microcomputing is not only being taught well but also used to raise revenue from high-quality programs written by children. In such areas you can also find teachers from other disciplines.

The reasons most teachers don't use micros in their subjects is that they lack familiarity with the machines and there simply aren't the resources to let each pupil get a fair crack at using a program.

The Government does provide some training, usually via a local education computing centre but these are often staffed by ex-mainframe programmers who view micros as mere toys — the head of one such establishment was overheard to say but a year ago that he'd smash any Spectrums he found in any schools in the borough.

Since most schools can only send one or two teachers on the obligatory four day course (two days for primary schools) it's hardly surprising that most teachers know very little about the subject. Moreover, since many micros in schools are, for internal political reasons, given over to maths departments (and the myth that mathematical fluency is a prerequisite for computer literacy is still rife), it's hardly surprising that

there are pupils who know far more about the subject than their teachers.

Kenneth Baker, Minister for Information Technology, claimed recently (at a launch of educational software) that Britain led the world in the area. His horizons are somewhat limited. In France, for example, there has been considerable governmental expenditure, (far higher than that in Britain and for far longer) on the supply of equipment, teacher training and program development.

The quality of a great deal of educational software leaves much to be desired. All too often the publishers make extravagant claims for their products, failing to distinguish between teaching and drill/rehearsal or testing. It's quite easy to write a program to test an area of knowledge, but quite another thing to produce a program that will teach something. Even with advice from 'leading educationalists' many of the programs are dull and boring, merely replacing text and exercise books with the screen.

The sad lack of imagination and ingenuity in this area reflects the parlous state of education in this country.

Education is a white elephant which no-one knows what to do with — micros in education seem to be going the same way.



RISING THERMAL — This sub-£100 thermal printer will be available early next year from Lo-Kata. The Cosmoprint takes 4 1/2 in paper and boasts both Centronics and RS232 interfaces. Lo-Kata claims the printer will print over 20, 40 or 60 columns and can handle dot-addressable graphics. It is expected to cost £99. Lo-Kata can be contacted on (0326) 73636, but its equipment is more usually found on the seven seas — the Cosmoprint has developed from its work on a device called Navtex, a micro-controlled teleprinter for navigation information, and it comes from Lo-Kata's marine electronics division which usually supplies the likes of Chay Blyth.

Zita launch for bag and baggage

Zita Computers has taken the next step in its rehabilitation (Issue 36) by launching an IBM-compatible portable, the Zita-PC.

With 128K and twin 320K floppies the Zita-PC costs £1,895 in its standard form. This undercuts IBM's price by a large margin but the difference is even more pronounced in the Zita-PCW, which includes a 6Mb Winchester and a 500K disk for £2,995.

With unintentional hilarity Zita's press announcement of the machines referred to 'a 16-bit IBM compatible intelligent briefcase' — the Zita-PC, like the company's other systems, comes in a leather case complete with shoulder strap.

CP/M-86 is optional on the machines; PASDOS and GWBasic are supplied as standard. Zita (0784 63212) also plans to offer software packages bundled with the systems — the Perfect range is one option.

Zita is offering free on-site maintenance on all its systems, and for the duration of Compec it was giving away either a BBC B or a Smith Corona TP-1 printer with each Zita-E or Zita-P sold.

Acorn adds on sponsorships

If you ever wondered why Acorn has such trouble with promised add-ons you may be less than happy to learn that the company is spending large sums of money as a sports sponsor.

Following its £90,000 sponsorship of James Hunt's brother as a Formula 3 racing driver, Acorn is sponsoring the World Chess Championship Semi-Finals that started on Monday.

Apart from putting up £48,000 in prize money, Acorn is also footing the bill for staging the event at London's Great Eastern Hotel and paying the contestants' expenses during their month long stay.

On top of all this Acorn has splashed out with full page adverts in the national press which not only suggest that Acorn is the 'brains behind these battles of mental giants' but also go on to say that the humble BBC micro was used to predict the likelihood of each contestant getting through to next year's finals.

The semi-final line up pits twice-defeated finalist Victor Korchnoi

against the latest Russian prodigy Gary Kasparov, and Russian veteran Vassily Smyslov against Hungarian Zoltan Ribli.

The Korchnoi-Kasparov match promises to be a real bruiser. Many will remember the psychological warfare in the last two world championships between Korchnoi, who had defected from the Soviet Union, and Anatoly Karpov, hero of the Russian people.

According to Acorn's ad the probabilities of victory for each contestant is 89 per cent for Kasparov, 60 per cent for Ribli, 40 per cent for Smyslov and a mere 11 per cent for Korchnoi.

It will be interesting to see how accurate Acorn's predictions are. The question is, if it has got it wrong will it receive yet another rap over the knuckles from the Advertising Standards Authority?

Micro chess fans who want to see the action should go along to the Great Eastern Hotel, between 4pm and 9pm every day until the scheduled end of the semi-finals on December 23.

MSDOS gets upgrade

Microsoft has scored a major coup with its announcement last week of a windows extension to MSDOS that is backed by most leading micro manufacturers and many software houses.

Windowing allows the user to switch quickly from one task to another and was pioneered on micros by Apple with the Lisa. It has been designed to work with Microsoft's other recently announced product, a mouse interface.

Companies that have already

agreed to support the Microsoft Windows include Apple, Tandy, Hewlett-Packard, Texas, Digital Equipment and Wang. Software firms backing the concept include Lotus, Peachtree, Ashton Tate and Software Arts.

The level of endorsement for a new product is unprecedented in the micro business and was clearly designed as a pre-emptive strike by Microsoft to emphasise MSDOS's claim to be the industry standard operating system for 16-bit micros.

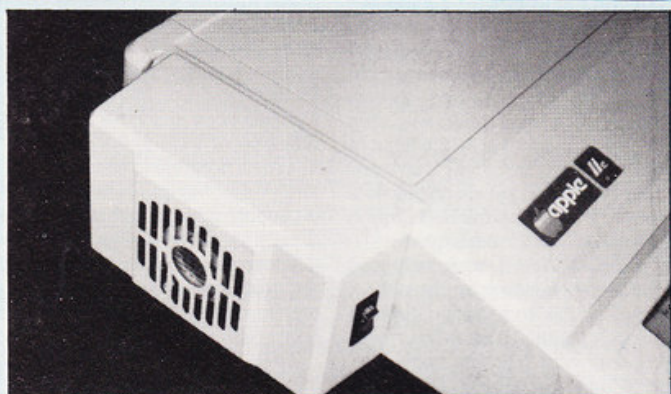
Windows will not be available

until April next year and as yet it is not possible to forecast what it will add to the cost of a new system. However, some American observers are suggesting that the additional cost might be of the order of \$100 to \$150.

UK general manager of Microsoft, David Fraser, said that Windows is part of a continuing process to provide an upgrade path for MSDOS users. In the pipeline is a multi-tasking, multi-user capability and a networking extension. 'Our network will include parts of Ether-

net and parts of other networking protocols,' he said.

With the addition of all these extensions MSDOS is looking more and more like Unix, the supermicro and minicomputer operating system devised by Bell Laboratories in the USA. This is no accident. Microsoft has its own version of Unix called Xenix. 'With these new enhancements Microsoft can now offer a clear upgrade path from MSX-DOS on low cost home computers through MSDOS to Xenix,' said Mr Fraser.



FAN MAIL — As people try to cram more and more high-powered circuitry into the humble Apple (see last week's Apple report) some form of cooling becomes essential. Riding to the rescue comes Pete and Pam Computers (0706-212321) with colour-matched fan and case that simply hooks on to the side of your Apple II or IIe. It is by no means the first such device on the market but at £44.85 it is one of the cheapest and just the thing if you are trying to squeeze a 68000 processor and 256k of RAM into one of your Apple's expansion slots.

dBase II group

Ashton Tate held a meeting in London last week to establish a UK dBase II User Group.

About 150 people attended, and the group will aim to be independent of Ashton Tate although the company is willing to provide secretarial services plus some finance.

A committee and chairman are likely to be elected in the near future — dealers are expected to dominate the committee. A subscription has yet to be decided on.

An application register is being set up so that you can look

up who is doing what with dBase II and contact them for advice.

For further information, contact Ian Turner at Ashton-Tate (UK) Ltd on 0908 568866.

● Ashton Tate has released dBase 11 version 2.4 which it says is fully compatible with earlier versions while adding new features. The most significant appear to be the ability to manipulate screen colour and set customised functions from the keyboard.

Other facilities include improved debugging diagnostics.

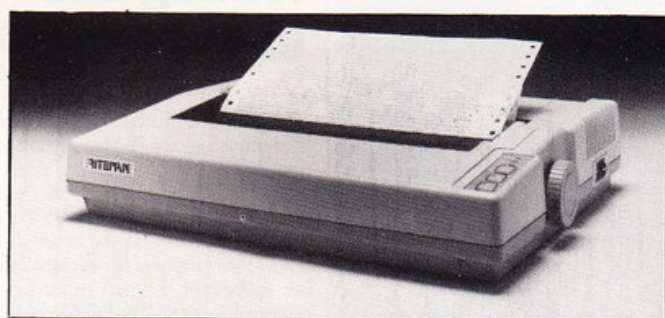
PERIPHERALS

Printers: Micro Peripherals (0256 3232) has three new dot-matrix printers from the Star range. These are two versions of the Star Gemini, the 10X and 15X with 80 and 132 columns respectively, and they run at 120 cps. The 10X costs £344 and the 15X £458. The Star Delta is an 80 column unit that runs at 160 cps; it includes an 8K buffer, and serial and parallel interfaces are fitted as standard. The company has also launched the Riteman A1 matrix printer for £344. It prints at 120 cps across 80 columns and features graphic and italic typefaces. Zygal (08692 3361) has also announced a trio of printers, two

of which are daisywheel units. The Fujitsu SP320 is a 48 cps daisywheel that costs £850 and comes from the same range as the SP830 80 cps model. The Diablo 630 ECS (Extended Character Set) is a daisywheel printer with firmware incorporated to reproduce the IBM 192 character set. Zygal has also become a distributor of the Mannesmann-Tally MT-80 dot matrix printer, which it is selling for £285.

Data Entry: Some years ago a company called Quest pioneered the idea of hand-written data entry, and its Micropad has been taken a stage further by BCU Computers (0689 75334) with its

PCN rounds up the latest add-ons.



Riteman A1 with graphics and italics

Telepad. The Telepad is a 13in by 11in pad, a screen of 40 characters, and an electronic pen. It runs CP/M and interfaces to most computers through V24 or RS232 interfaces. The snag — it costs just under £2,000.

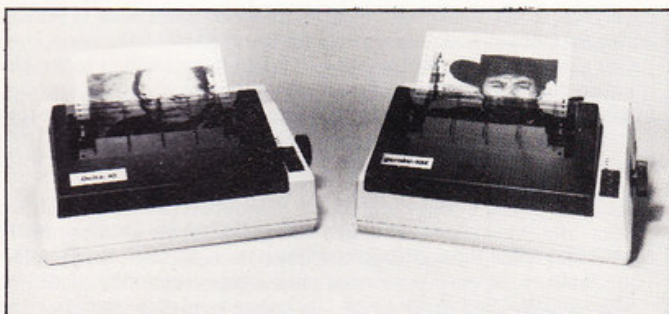
Communications: Modular Technology (08692 3361) has moved into fibre optics with its Interfibre FD 192 modem, which costs £150. It is designed for users operating in harsh environments or where the possibility of electrical interference is particularly high.

Mass Storage: The Alpha 10+10 offers users of a number of business micros 20Mb of storage in a unit that includes a 10Mb hard disk and a 10Mb removable

cartridge. It comes from APS Microsystem (0273 420195) and runs on the Duet-16, IBM PC, Sirius, Apple, Superbrain, Commodore and DEC systems. The price is £3,400.



20Mb on the Alpha 10+10.



Delta and Gemini Stars.

Hitachi high-flyer

Japanese giant Hitachi has launched its Personal Computer with more than the usual care to see that it stands out from the pack.

The PC carries a two-year on-site warranty, exceptional graphics with 192K to drive the monitor, and for the first six months at least, a system generator package from Compact Software included in the price.

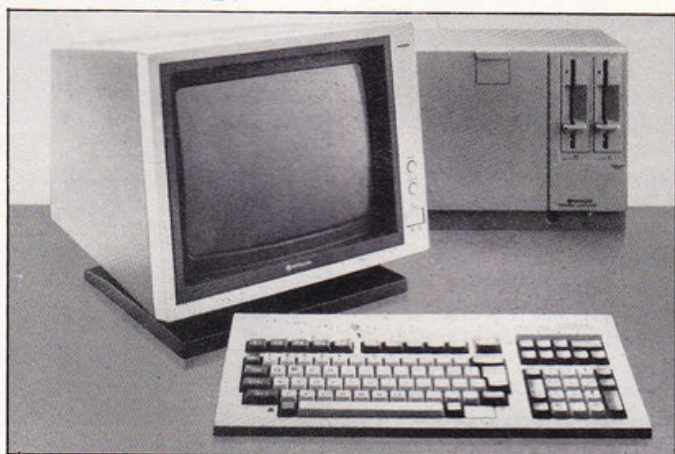
The Hitachi system runs MSDOS on an Intel 8088 with 320K of RAM, of which 128K is available to the user. The memory can be expanded to 576K. It also has twin half-height, double-sided double-density 5¼in floppies and an expansion slot that will accommodate a Winchester drive.

For £2,595 you get the basic system with a slim keyboard, the two floppy drives, and a 14in high-resolution colour monitor.

This unit also carries built-in interfaces for printers and light pen, with Centronics and RS232 as standard.

The graphics on a forerunner of this system, the Hitachi Peach, were immediately eye-catching and Hitachi seems to be building on it with the PC. From the spec it looks unexceptional, with 15 colours and definition of either 320 or 640 by 200, but Hitachi makes a distinction between active and passive colour and its active implementation is striking.

The Hitachi Nucleus System Generator has come out of cooperation between Hitachi and Compact; it is a series of programs designed to give non-technical users an immediate means of getting started. It can be integrated with other applications packages that Hitachi is offering in a conspicuous attempt to avoid the traditional



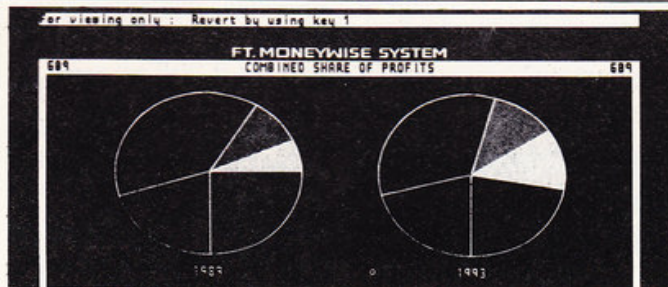
Hitachi's PC: designed to bring colour to your cheeks.

'Japanese software' syndrome.

The two-year warranty reflects the equally traditional Japanese concern for quality control. The

terms of the warranty guarantee you the attention of Hitachi's own engineers on your site.

Hitachi (UK) is on 01-848 8787.



Moneywise's graphics: pie charts, bars or line graphs.

Moneywise has FT's blessing

Spreadsheets came of age this week as The Financial Times put its name behind FT Moneywise.

This 16-bit Fortran-based package will be available in January 1984

on the Sirius and IBM (the latter with optional colour graphics). Costing £395 the only problem may be that it needs 256K to run in. This does, however, allow you to use 67,000 cells in the processing. Offering extremely fast calculations, on-screen graphics, full report and graph generation via dot-matrix printers, help files and a security dongle, FT Moneywise looks a cut above the rest of the spreadsheet challengers.

SOFTWARE NEWS

Business

CP/M: Moving down from the mainframe arena the statistical package Minitab is now available from Cle.Com (021-443 4392). Besides CP/M 2.0 you'll need twin floppies with at least 250K each or a hard disk, and 64K of memory. The range of features in the package reflects its mainframe origins. The price is £750.

Unix: Bivius Systems (0903-212481) has approached Unix via RM Cobol and has produced a number of packages in the financial area. There are general accounting applications like ledgers, order processing, and payroll, a membership system, and a patient administration and accounting system for hospitals. So far they have been ported on to Plexus, Onyx, Bleasdale and Tandy systems — ABS, Wicat, Cifer and Britannia are next on the list.

IBM, Apple: Kempner Tregoe (Windsor 56716) has launched Decision Aide for users of IBM and compatible micros and the Apple IIe. The package is aimed to help managers make correct management decisions, and besides the central suite it includes a variety of help functions.

Unix: Office automation and financial management on Unix systems are what Precision Software (01-330 7166) is aiming for with its Unigem software. Using menus to keep you away from the deepest mysteries of Unix it combines such functions as text editing and document retrieval with ledgers and sales analyses. Precision also has Mistress, a relational database, running under Unix.

Education

Spectrum, Commodore: Wigit Software is adding to its programs for pre-school and primary school-age children and converting its range to run on the Commodore 64 and Acorn machines as well as the 48K Spectrum, which it has written for so far. Its next release, to be published by Mirrorsoft, will be Quick Thinking, a pair of games to practice mental arithmetic on. The price is £6.95. Wigit is on 01-444 5285.

Graphics

BBC Micro: Two programs from Jamssoft (01-262 7441) are now available to budding artists who have an RH Electronics light-pen as well as a BBC system. Artfun is

for cubists, building images from simple solid squares. Paint handles lines, points, squares, circles, rectangles and triangles and you can fill areas from the size of a single pixel to a full screen. Prices are £9.95 each.

Sirius: Bargraf-Drawit is the first product in Hi-Tek's (0954 81931) Thinksoft range. The Bargraf section is self-explanatory; Drawit treats the screen as an 800 by 400 page; and a third element, Slide-Show, allows you to save images created by the first two. You'll need a minimum 256K, and output can be as simple as an Epson dot-matrix printer.

Duet-16: As a package with the Japanese-built Duet, Itch (0438 316561) is offering the Graphite general purpose graphics software for £7,000 — this buys you the micro, a plotter, a tablet, and the Graphite software.

Games

Atari: Hard to believe, but Atari is billing Donkey Kong as a new show-stopper in its latest user magazine. Eastern Front (1941) is less hackneyed and shows much more promise, pitting you as the German commander fac-

ing the machine as Russia. It needs 16K of RAM, a joystick, and costs £29.99.

Lynx: So named, presumably, because you need sharp eyes to spot any software for it. Bus-Tech aims to fill the gap with new programs that include a 100 per cent machine code space invaders called Ynxvaders for £7 and Jumping John for the same price. Bus-Tech is at 19 Landport Terrace, Portsmouth.

Spectrum: Mushroomsoft (0752 362985) has sprung up in the West Country and its first product, for the 48K machine, is called Big-Time. It takes you into the wheeling and dealing of pop music, for less than the price of an LP at £4.50.

Spectrum: From PSS (0203 667556) come Crazy Kong and Hopper, both for the 48K machine and both at £5.95.

Various: Or to put it another way, the Spectrum, Commodore 64 and BBC are the machines on which Vision Software Factory's (01-748 7478) latest games will run. For the Spectrum Moon Buggy, Sci-File, 1994 and Arcturus are due for release this month, for the BBC Pengi and Digger, and for the 64, Boris.

PCN correspondents are all at sea

I must ask this question. Is America really at a point south west of Lands End? Or does your correspondent secretly write his 'View from America' column from the Azores?

Way back in Issue 6 Chris Rowley's article is headed by a map-section with an arrow pointing roughly to the Azores. America? That's 3,000 miles away to the west!

You repeat this error in the following three issues, then in Issue 11, Japan seems to have moved around the hemisphere, and then in Issue 15 it's called 'Paris'! And so it goes on; the error is continued right up to my latest copy.

Is it a trick to stop the Russians finding Silicon Valley, I ask myself.

Perhaps a latter-day Columbus can get on his ship and search for this new land in the middle of the Atlantic.

Or, perhaps PCN could use an Atlas.

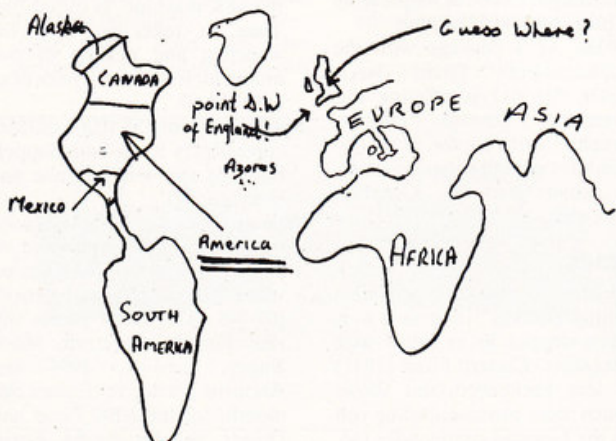
PCN £10 Star Letter



To help all PCN editors, columnists etc in the future, I hope you will issue copies of the standard reference guide to the positioning of America below.

Jeff Best
Brighton,
E Sussex.

I feel like cracking the one about how the earth moved — but I'll claim artistic licence instead. But you win the £10 — Ed.



RANDOM



ACCESS

Don't carry a LOAD on your shoulders,
unburden yourself on PCN's letters page.

CUP educational software for home

I refer to the letter from Mr R Hughes (Issue 29). He is certainly correct that there is a shortage of good educational software available for home users, but we and other publishers are very conscious of this shortage and we are doing our best to alleviate it.

Educational software produced in conjunction with the MEP and CET is available to the public, although at a slightly higher price than the MEP subsidised price at which it is made available to the UK education market. If your correspondent is interested in making a purchase, he should apply direct to us.

We are also in the process of developing educational software packages specifically for home use, which we hope will be available at a more economical price than the very high quality, heavily documented publications required by

schools. If your correspondent will 'watch this space' over the next few months, I am sure he will find that his complaint is satisfactorily answered.

Thomas Hardy,
Editor, Software Unit,
Cambridge University Press

Small feet problem requires binders

Having recovered from that most dreaded of diseases PCN-itus, I have now come over all peculiar with a particularly nasty bout of . . . Micropaedia.

This strange complaint has nothing to do with having excessively small feet, but due to the fact that my much treasured collection of the above is strewn all over the bedroom floor.

I hear you ask . . . what's the cure? Well, may I suggest an all expenses paid trip to Hawaii? Failing that how about bringing out binders exclusively for one's accumulation of Micropaedia?

R Willis,
Fairwater,
Cardiff.

Fret not; aware that a build up of paper deposits can affect your health, we have designed a Micropaedia binder. It's yours for £3.50 — Ed.

Another slant on software piracy

While many authors have written numerous articles in the computer press describing in gruesome detail how to beat the programmer's curse, the soft-

ware pirate, none to my knowledge have asked the most fundamental and basic question imaginable *ie* is the software worth protecting?

Many would no doubt say yes, arguing that copying a world shattering games tape to give to a friend is unfairly robbing the programmer of the royalties they would receive had the recipient of the copy bought the real McCoy.

But what of the numerous programs sold on cassette which are written in Basic, or any other high level language when it comes to it?

After all, any reasonably competent programmer could well write his own version of a commercially produced Basic game. Or, after studying the listing, rewrite pieces of the code and utilize them in a home-made program.

I have sympathy, however, for authors who write complex machine code programs who get their royalties taken away by someone who couldn't care less whether the author got them. Such blatant theft should be heavily fined and the big fish tracked down and made to pay a reasonable amount of compensation.

I call upon programmers everywhere to stop and think awhile. Is your program *really* that good? If so, then go ahead and get your little masterpiece published commercially.

If the answer to this question is no, then why not send it in to PCN? It's much better for someone to pay 50 pence for a magazine incorporating your program, than have some poor sap blow six quid, as I have done in the past, on a program not worth the screen space. Isn't it?

Stuart Adamson
Hedon,
Hull.

We offer fame (not exactly a fortune) and fun, so why not put your programming skill on the line, do as the man suggests and send your programs in to PCN — Ed.

Share your thoughts in the UK's liveliest micro weekly letters columns. Funny, feisty or fanciful, your letter could win you £10 if it's of star status.

WRITE TO: Random Access,
Personal Computer News,
VNU, Evelyn House, 62
Oxford Street, London W1A
2HG.

Lost in a maze of bits and bytes, trapped in a forest of errors, bugged by Basic? Whatever the problem, CALL on us. Our panel of experts is at your command.

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

When BBC B drives mean extra expense

Q I am thinking about buying a model B microcomputer with disk drives and, not being all that familiar with drives and the like, I enclose the following questions.

If I buy disk drives that are advertised as BBC compatible, will I be able to connect them to a BBC (fitted with a disk interface and DFS) without any further hardware modifications? Are they all as good as one another?

Joachim Fleury, Amsterdam, The Netherlands.

A When the BBC B has been fitted with the disk interface and the DFS (Disk Filing System) it is capable of being attached to a number of drives, as it uses one of the industry standard disk interface chips.

One of the main things to note about the Acornsoft DFS is that it contains no Format program. This is vital when using new disks. If the BBC drives are bought, then this program comes as part of the package on a disk. If the Acornsoft DFS is purchased by itself, then you need to buy a separate format program, probably from the same dealer you get your drives from. If one of the other DFS's is used *ie* Watford or Amcom, then things are a little different (see issues 33 and 34).

The Watford DFS provides a format program and so does the Amcom. Both provide a few other extras all as part of the DFS chip.

All the DFSs will operate any compatible drive, the hardware needed being part of the BBC interface.

There is also a set of links (three and four at the bottom right hand of the keyboard) which can be made or unmade to operate various different drive types. The four main types are, Olivetti, Tandy, Cumana (which use both links unmade); MPI drives (4 made, 3 unmade); Tandon, Shugart or any 6msec access (3 made, 4 unmade); Tandon 4msec (both

links made). As you can see, the easiest drives to attach to a BBC are those that require both links unmade. Be careful as any alterations may invalidate your warranty, if you do it yourself.

The only extra hardware you will need is a connector cable. This should be provided by the dealer, as should the link setting.

To sum up, the BBC is capable of being attached to a wide range of disk drives, all of which are pretty much the same. The best thing to do is to buy your drives from a source that is capable of giving you any help you may require.

VHF problems with ZX81 can be foiled

Q I own a 16KZX81 and use it on a UHF portable black and white television. As we also have a colour television, which is VHF because of the wavelengths transmitted in Ireland, my ZX81 causes great interference. Please tell me if there is a way of solving this problem as it causes arguments in the household.

Could you also tell me if I would need to buy a new tape recorder if I purchased an Acorn Electron, as my tape recorder doesn't have a DIN socket.

James Webb, Co Tipperary

A The way to deal with this involves screening off the ZX81 from the telly, so sandwich a piece of metal foil between two pieces of card, open up the ZX81, put in your foil between the keyboard and the circuits, then put it back together again so the foil makes contact with the heatsink. But make sure the foil doesn't short out any connections. This approach, incidentally, should work for any micro, although it will invalidate your warranty.

You won't need a new tape recorder for an Electron — what you will need is to get a new lead, from a dealer.

Joystick options for the Spectrum

Q Is it possible to set up the Spectrum Interface 2 so that the joysticks will work with any game? Is it programmable in this sense?

P Bennett, Lewisham, London.

A Interface 2 isn't programmable at all, but is simply a device that plugs into your edge connector and allows you to use two Atari-type joysticks. It won't work with all games, but a number of software houses — check the Sinclair ads — are now making their games compatible with it, and this number is likely to increase.

A programmable joystick interface is a completely different beast altogether. What these do is simulate any keyboard function. So, if you have a game that reacts to the cursor keys, the interface can be programmed to fool the micro into thinking your joystick movements are actually these keys being pressed.

The snag is, of course, that if you want to use cartridge software you've still got to get Interface 2, but if you're not worried about this try Stonechip on Aldershot 318260, or Fox on Basingstoke 20671.

Two-key rollover, BBC Model B

Q In many micro magazines, I have read adverts where 'two key rollover' is mentioned; some are for my own micro, a BBC model B. I have yet, however, to find the meaning of this troublesome term. Could you please enlighten me?

David Machin, Longton, Stoke On Trent.

A The term 'two key rollover' means that if one key is pressed and then another is pressed while holding the first, the computer will identify both keys.

This can be demonstrated quite easily. Simply press one key, ignore any repeats, then press another, while holding down the first, and see if this one is printed onto the screen after the first. If it is, then you have two key rollover.

If you now press another key, while holding down the first two, probably nothing will happen and it will be ignored (unless you have three or more key rollover). What is happening is that the keyboard monitor routine will take notice of the first key pressed, and the second, but after this, any more will be ignored.

Machine code on the Oric

Q I would like to get into 6502 machine code; please could you explain the difference between an assembler and a disassembler, and the difference between these and a machine-code monitor?

Also, I would like to know what the POS command does on my Oric as this is not explained in the manual.

Lastly, please tell me if there is an Oric equivalent to the Spectrum's IN command, which lets several keys be pressed at once as opposed to INKEY\$ which only lets one key be pressed at a time.

Jasper Mallinson, Weymouth, Dorset.

A Put simply, an assembler is a program which allows you to enter a 'machine code' program consisting of what are called mnemonics. These are the short-hand words which programmers use to tell the microprocessor what to do. For example, there is a mnemonic 'STY', which means store a value in the Y register. An assembler will literally 'assemble' the op-codes into the numbers needed for the processor to 'understand' the codes.

A disassembler does the reverse. It will go through a section of memory and tell you the mnemonics represented by the numbers in each byte. It's the sort of thing you would need to de-bug a program you had written using an assembler.

A monitor is a program which allows you to edit sections of memory by doing things like moving blocks of it about. It will also let you run parts of your program; look at the contents of the registers and so on.

On the Oric, POS tells you the current column position of the cursor. It takes the form C = POS(0).

The Basic command IN on the Spectrum can be used to read the input/output bus and since the keyboard is connected to this, you can get information about keys pressed.

There is no direct equivalent to either IN or OUT on the Oric because its input/output is memory mapped, whereas the Spectrum has a separate, addressable bus.

**SEND NOW
FOR
DETAILS**

**New
Generation
Software**

**FREEPOST
BATH BA 2 4TD**

**DSS DISCOUNT
SOFTWARE
SUPPLIES**

8 PORTLAND RD, LONDON W11 4LA

01-221-1473

**AMAZING
SOFTWARE BARGAINS
BY MAIL**

**TELEPHONE ORDERS WELCOME
100s OF TITLES AVAILABLE**

SPECTRUM	OUR PRICE
1. MANIC MINER BUG BYTE	£4.50
2. JET PAC ULTIMATE	£4.50
3. ATICATAC ULTIMATE	£4.50
4. LUNAR JETMAN ULTIMATE	£4.50
5. PSST ULTIMATE	£4.50
6. ZZOOM IMAGINE	£4.49
7. ZIP ZAP IMAGINE	£4.49
8. ARCADIA IMAGINE	£4.49
9. HALL OF THE THINGS CRYSTAL	£6.50
10. ROMMELS REVENGE CRYSTAL	£6.50
11. THE DUNGEON MASTER CRYSTAL	£6.50
12. TRANS TOWER RICHARD SHEPHERD	£5.25
13. DEVILS OF THE DEEP RICHARD SHEPHERD	£5.25
14. KONG OCEAN	£5.20
15. PENETRATOR MELBOURNE HSE	£5.95
COMMODORE 64	
1. KONG ANIROG	£6.99
2. SCRAMBLE ANIROG	£6.99
3. ATTACK OF MUTANT CAMELS LLAMASOFT	£6.50
4. GRID RUNNER LLAMASOFT	£6.50
5. HOOVER BOWER LLAMASOFT	£6.50
VIC 20	
1. METALLAMA'S LLAMASOFT	£5.25
2. GRID RUNNER LLAMASOFT	£5.25
3. ARCADIA IMAGINE	£4.75
4. BEWITCHED IMAGINE	£4.75
5. JET PAC ULTIMATE	£4.75

SPECIAL OFFERS FOR SPECTRUM
THE HOBBIT — MELBOURNE HSE £10.95
VALHALLA — LEGEND £11.95

ALL PRICES INCLUDE POSTAGE + PACKING
 SEND CHEQUES/POSTAL ORDERS TO:

DBS DISCOUNT SOFTWARE SUPPLIES
8 PORTLAND ROAD, LONDON W11 4LA.
 ACCESS WELCOME

PCN Charts

This top 30 games list is compiled from both independent and multiple sources across the nation. It reflects what's happening in high streets in the two weeks up to November 10 and, like the micro charts, does not take account of mail order sales. The micro charts this week show the number of machines sold in the same two-week period so they tell the story in the high street between October 27 and November 10.

GAMES

Top Thirty

		GAME TITLE	PUBLISHER	MACHINE	PRICE
▲	1 (—)	Lunar Jet Man	Ultimate	Spectrum	£5.50
▶	2 (2)	Manic Miner	Bug Byte	Spectrum	£5.95
▲	3 (8)	Flight	Psion	Spectrum*	£5.95
▲	4 (5)	Hobbit	Melbourne	Spectrum*	£14.95
▲	5 (—)	Valhalla	Legend	Spectrum	£14.95
▲	6 (14)	Hovver Bovver	Llamasoft	C64	£7.50
▼	7 (4)	Zoom	Imagine	Spectrum	£5.50
▼	8 (1)	Kong	Ocean	Spectrum	£5.95
▼	9 (3)	JetPac	Ultimate	Spectrum	£5.50
▼	10 (9)	Gridrunner	Llamasoft	Vic 20*	£7.50
▼	11 (6)	Penetrator	Melbourne	Spectrum	£6.95
▲	12 (—)	3D Ant Attack	Quicksilver	Spectrum	£5.95
▲	13 (28)	Heathrow ATC	Hewson	Spectrum	£5.50
▲	14 (—)	Chukkie egg	A&F	Spectrum	£5.50
▼	15 (13)	Horace and the Spiders	Psion/Melbourne	Spectrum*	£5.95
▼	16 (15)	ZipZap	Imagine	Spectrum	£5.50
▲	17 (25)	Halls of the Thing	Crystal	Spectrum	£7.50
▶	18 (18)	Scrabble	Psion/LG	Spectrum	£15.95
▲	19 (21)	3D Deep Space	Postern	BBC*	£8.00
▲	20 (30)	Hunchback	Superior	BBC	£7.95
▲	21 (—)	Purple Turtles	Quicksilver	C64	£7.95
▲	22 (—)	Splat	ISL	Spectrum	£5.95
▼	23 (7)	Harrier Attack	Martech/Durell	Oric	£6.95
▶	24 (24)	Xadom	Quicksilver	Spectrum	£6.95
▲	25 (26)	Blue Max	Showcase	Atari	£27.95
▲	26 (—)	Football Manager	Addictive	Spectrum*	£5.95
▼	27 (16)	Golf	Computer Rentals	Spectrum	£5.95
▲	28 (—)	Corridors of Genon	New Generation	Spectrum	£5.95
▲	29 (—)	Bugaboo	Quicksilver	Spectrum	£6.95
▲	30 (—)	Transylvania Tower	Shepherd	Spectrum	£6.00

*Denotes available on other machines

COMMODORE 64

The best 6 games 4 the best micro send s.a.e. for full list

KONG anirog, GRIDRUNNER anirog, SKRAMBLE anirog, 3D TIME TREK anirog, HOOVER BOVER llamasoft, ATTACK OF THE MUTANT-CAMELS llamasoft

All games rushed to your door for only £7.95 each which includes P.P.



NAME

ADDRESS



STICKY FINGERS SOFTWARE

69 Dorset St, Bradford, West Yorks BD5 9QP. Programs wanted now!

PCN Charts

Neither mail order nor deposit-only orders are included in these listings. The prices quoted are for the no-frills models and include VAT. Information for the top-selling micros is culled from retailers and dealers throughout the country and, like the games, is updated every alternate week.

PCN Charts are compiled exclusively for us by MRIB (Computers), London, (01) 408 0250.

HARDWARE

Top Twenty up to £1,000

MODEL		PRICE	DISTRIBUTOR
▶ 1 (1)	Spectrum	£99	(SI)
▲ 2 (3)	BBC B	£399	(AC)
▼ 3 (2)	CBM 64	£229	(CO)
▶ 4 (4)	Vic 20	£140	(CO)
▲ 5 (8)	ZX81	£45	(SI)
▼ 6 (5)	Oric 1	£99	(OR)
▶ 7 (7)	Dragon 32	£170	(DD)
▼ 8 (5)	TI/994a	£99	(TI)
▲ 9 (10)	Atari 800	£300	(AT)
▼ 10 (9)	Atari 400	£150	(AT)
▲ 11 (17)	Apple 11e	£750	(AP)
▼ 12 (10)	Sharp MZ80A	£349	(SH)
▲ 13 (14)	Lynx 48/96	£225	(CA)
▼ 14 (13)	Aquarius	£60	(MA)
▲ 15 (16)	Sharp MZ700	£240	(SH)
▲ 16 (20)	Tandy Colour	£240	(TA)
▲ 17 (—)	Electron	£199	(AC)
▼ 18 (15)	CGLM 5	£150	(SO)
▼ 19 (11)	Colour Genie	£168	(LO)
▼ 20 (18)	Epson HX20	£472	(EP)

Top Ten over £1,000

▶ 1 (1)	ACT Sirius	£2,525	(ACT)
▶ 2 (2)	IBM PC	£2,390	(IBM)
▲ 3 (7)	HP86A	£1,438	(HP)
▼ 4 (3)	Apple 111	£2,780	(AP)
▶ 5 (5)	Commodore 8000 series	£1,200	(CO)
▶ 6 (6)	Epson QX10	£1,995	(EP)
▲ 7 (9)	Olivetti M20	£2,180	(OL)
▼ 8 (4)	DEC Rainbow	£2,359	(DEC)
▲ 9 (—)	Apricot	£1,760	(ACT)
▼ 10 (8)	British Micro	£1,495	(BM)

AC Acorn Computers. ACT — ACT. AJ — Anderson Jacobson. AP — Apple Computer. AT — Atari International. BM — British Micro. CA — Computers. CO — Commodore. DEC — Digital. DR — Dragon Data. EP — Epson. HP — Hewlett Packard. IBM — IBM. LO — Lowe Electronics. LL — Lucas Logic. MA — Mattel. OL — Olivetti. OR — Oric. SH — Sharp. SI — Sinclair. SO — Sord. TA — Tandy. TI — Texas Instruments.

LYNX SOFTWARE

FROM BUSTECH. NEW RELEASES!!

YNXVADERS

100% M/C arcade game for the Lynx. Good implementation of space invaders with smooth fast graphics.

£7

Dealer enquiries welcome. Send SAE for full software list of 15 titles.

ROBORUN

This game has seven levels to progress through with the hazards of radio-active barrels, guards, etc. Each level is harder till eventually you have to face XP2 and defeat him. Great entertainment with a hall of fame.

£6

NAME

ADDRESS

Please tick boxes and send cheques/PO to: Bustech, 19 Landport Terrace, Portsmouth, Hants.

ALL ORDERS DESPATCHED WITHIN 14 DAYS.



PROGRAMMERS

Softek is continuing its search to the furthest outposts of the galaxy for Superstars of Machine Code Programming to expand its force of Game Masters. (Particularly for Spectrum, CBM 64 and the Acorn Electron)

In return we will offer formidable outright payments or the potential of achieving No 1 Slot in the Charts & possible royalty payments of the galactic proportions of £50,000 a year or more!

If this is you then phone immediately or write to ...

SOFTEK

INTERNATIONAL LTD

12/13 Henrietta Street
Covent Garden London WC2 8LH
Tel: 01-240 7877



LUNAR JET

FIRST GAME EVER —
STRAIGHT IN AT NO. 1

FROM

**ULTIMATE PLAY
THE GAME**

THE GREEN
ASHBY DE LA ZOUCHE
LEICESTERSHIRE LE6 5JU

SPECTRUM

NEWS from SPECTRUM

DISK DRIVE for ZX SPECTRUM

Now from SPECTRUM a Disk Drive for the ZX SPECTRUM exclusive to SPECTRUM stores see our ad for full details

Super new add-on for ZX SPECTRUM

● New! SINCLAIR INTERFACE 2 and ROM CARTRIDGES plus new software -see our ad for details.

● Quality printer at under £200

SEIKOSHA GP-100A now only £199.95 from Spectrum.

LATEST NEWS

● For up-to-date news, information & offers from SPECTRUM - see PRESTEL page 600181 for full details.

Spectrum GIFT VOUCHERS

● Not sure what to buy? Why not give a SPECTRUM GIFT VOUCHER - available in any value over £5. See your local SPECTRUM dealer NOW!

NEW SPECTRUM MEMBERS

Check our address page! - there are many new SPECTRUM dealers throughout the UK so there's a good chance there'll be a SPECTRUM centre near you.

AFTER SALES CARE

SPECTRUM service centres will ensure that should your machine 'go down' we will get it running again as quickly as possible. We also offer extended warranties at reasonable prices too! - ask your SPECTRUM HOME COMPUTER CENTRE for full details

COMPUTER DEALERS

(or prospective Computer dealers!) If you would like to know more about becoming a SPECTRUM APPOINTED DEALER on an exclusive area basis, please write to MIKE STERN, Spectrum (UK) Ltd., Burrowfield, Welwyn Garden City, Herts. or telephone (07073) 34761

Fantastic Value from Spectrum! COMMODORE 64 BUSINESS PACKAGE SAVE **£200** OVER



Includes:

- COMMODORE 64
- DISK DRIVE
- COLOUR MONITOR
- COMMODORE PRINTER
- FUTURE FINANCE PROGRAM
- Plus!
- FREE! GAMES DISK WITH SIX GAMES

FOR THE SMALL BUSINESSMAN... this has to be the business computer opportunity of a lifetime! This superb, top-value package includes everything you need to set up your own powerful small business/home Micro system.

There's the high-power Commodore 64 computer with its huge 64K RAM memory built-in and brilliant graphics capability, with full colour. The system's completed with a Commodore disk drive - store your entire filing system, accounts, sales records, etc. - plus tractor-feed printer, and a 1701 colour monitor.

It really is tremendous package - at SPECTRUM'S incredible low price, it's unbeatable!

ALL THIS FOR ONLY

£899⁹⁹

OR LESS!

All items can be purchased separately - ask your local SPECTRUM dealer for price.

COM-64 Home Entertainment Package

ONLY

£239⁹⁹

(Normal retail price £282.85)

SAVE OVER **£40**

- Includes: ■ COMMODORE 64
■ CASSETTE INTERFACE ■ CASSETTE RECORDER ■ QUICK-SHOT JOYSTICKS ■ CASSETTE WITH 4 GAMES

Sensational COMMODORE VIC-20

Offers from Spectrum!



**VIC-20
ONLY**

£99⁹⁵

**VIC-20
EXPANDER PACK**

**All this for
under £200!**

Includes:

- Vic-20 computer
- Tape Interface
- Tape Recorder
- 64K RAM Expansion pack
- Quickshot Joysticks
- 4 Cassette Games

SAVE £67.80

£195⁹⁵

Normally £263.75

HURRY! Only while offer lasts!

STACK LIGHT RIFLE



**For Commodore
64 & VIC-20**

Available for the SPECTRUM, VIC-20, and the COMMODORE 64 (Arriving Now!), comes complete with 12 feet of cable and three exciting action software games including "HIGH NOON SHOOTOUT" with full sound effects.

Spectrum Price £29.95 Including 3 FREE Games

**SINCLAIR
ZX-81
Super-Deal Offer!**



**ZX-81 COMPUTER
Plus 16K RAM PACK
Plus 4 Games
ALL FOR ONLY**

£56⁹⁵

ZX-81 ACCESSORIES

64K RAM PACK	£54.95
16K RAM Pack	£24.95
ZX Printer	£39.95

BBC



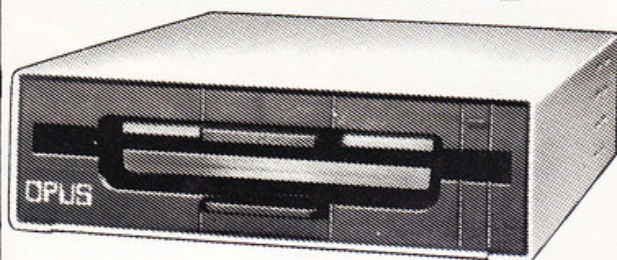
Model B Micro
SPECTRUM PRICE £399

BBC Model 'B' with Disk Interface Fitted £469.75

Sensational Offer for BBC Owners!

OPUS

**DISK DRIVE
for BBC Model 'B'**



Now from SPECTRUM - a DISK DRIVE for the BBC at under £180. Compare this price with any other Disk Drive for the BBC and we're sure you'll agree that this really is terrific value for money - But **HURRY!** stocks are limited and are sure to sell fast - so get to your local SPECTRUM dealer NOW!

£179⁹⁵

**Other equipment
for the BBC**

BBC Single Disk Drive 100k	£265.00
BBC Dual Disk Drive 800k	£803.85
BBC Tape Recorder	£29.90
Acorn Software Cassette-Based from	£9.95
Acorn Disk-Based software	£11.50
BBC Cassette-Based software from	£9.95
BBC BUGGY Spectrum Price	£189.00
IKON FLOPPY TAPE DRIVE for the BBC - the ideal alternative!	
Spectrum Price	£155.25
QUICK-SHOT JOYSTICK Especially for the BBC - Spectrum Price	£19.95

**BBC
BUGGY
£189.00**

**Now available:
RC DIGITAL
TRACER
for the BBC
£55.50**

**Turn the page for more super
offers from Spectrum . . .**

SPECTRUM

SOFTWARE

The Top sellers from leading British Software houses.

Micro Dealer UK

ZX SPECTRUM

Legend "Valhalla"	£14.95
Ultimate "Lunar Jet Man"	£5.50
Ultimate "Atic Atac"	£5.50
Bug-byte "Manic Miner"	£5.95
Quicksilver "3-D Ant Attack"	£6.95
A & F "Chuckie Egg"	£6.90
CDS "Pool"	£5.95
Crystal "Halls of the Things"	£7.50
Ocean "Kong"	£5.90
Quicksilver "Games Designer"	£14.95
Imagine "Zoom"	£5.50
Incentive "Splatt"	£5.50
New Generation "Corridors of Genon"	£5.95
Quicksilver "Bugaboo"	£6.95
Ultimate "Jet Pac"	£5.50
Artic "Dimension Destructors"	£5.95
Protek "Hunter Killer"	£7.95
Red Shift "Apocalypse"	£9.95
Ocean "Transversion"	£5.50
Ultimate "Tranz Am"	£5.50
Addictive Games "Football Manager"	£6.95
Quicksilver "Aquaplane"	£6.95
Doric "Oracles Cave"	£7.95
Artic "3-D Combat Zone"	£5.95
Hewson "3-D Space Wars"	£5.95

Commodore 64

Llamasoft "Hover Bover"	£7.50
Llamasoft "Attack of the Mutant Camels"	£7.50
Melbourne House "Hungry Horace 64"	£5.95
Interceptor "Siren City"	£7.00
Games Machine "The fabulous Wanda and the secret of life, the universe and everything"	£7.95
Bubblebus "Exterminator"	£5.99
Quicksilver "Purple Turtles"	£7.95
Ocean "Armageddon 64"	£6.90
Melbourne House "The Hobbit 64"	£14.95
Interceptor "Vautex Raider"	£7.00
Llamasoft "Matrix 64"	£7.50
Anirog "H-expert"	£7.95
Quicksilver "Quintic Warrior"	£7.95

VIC-20

Ultimate "Jet Pac"	£5.50
Llamasoft "Meta Galactic Llamas battle at the edge of time"	£6.00
Imagine "Bewitched"	£5.50
Quicksilver "Skyhawk"	£7.95
Llamasoft "Matrix"	£6.00
Interceptor "Crazy Kong"	£6.00
Imagine "Arcadia"	£5.50

BBC

Software Invasion "Attack on Alpha Centauri"	£7.95
Pson "Saloon Sally"	£7.95
DoctorSoft "Flight Simulator"	£7.95
Amcom "Space Highway"	£7.95
Alligator "Bug Blaster"	£7.95

ORIC

Softek "Dracula's Revenge"	£6.95
UK Software "Zorgon's Revenge"	£8.50
Martech "Harrier Attack"	£6.95

DRAGON 32

Softek "Ughl"	£8.95
J Maurice Micros "Maurice Minor"	£7.95

SUNSHINE

Cruising (Dragon 32)	£6.95
Cruising (ZX Spectrum)	£4.95
Blind Alley (ZX Spectrum)	£4.95
Androids (ZX Spectrum)	£5.95
Galaxy Attack (ZX Spectrum 48K)	£5.95
Sword Fight (ZX Spectrum)	£5.95

MICRODEAL

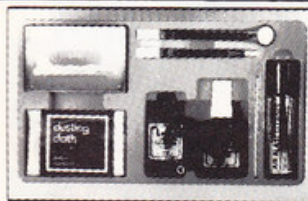
DRAGON

The King	£8.00
Space War	£8.00
Defence	£8.00
Alcatraz	£8.00
Katerpillar Attack	£8.00
Space Monopoly	£8.00
Mansion Adventure	£8.00

SALAMANDER

Franklin's Tomb (Dragon, BBC, Oric)	£9.95
Lost in Space (Dragon, BBC, Oric)	£9.95
737 Flight Simulator (BBC B)	£9.95
Grid Runner (Dragon)	£7.95
Night Flight (Dragon)	£7.95
Dragon Trek (Dragon)	£9.95
Grand Prix (Dragon)	£7.95
Salamander Graphics System (Dragon)	£9.95
Golf (Dragon)	£7.95
Wizard War (Dragon)	£7.95

LEDA COMPUTER CARE KITS



For Cassette
£9.95



For Disk
£12.95

BOOKS

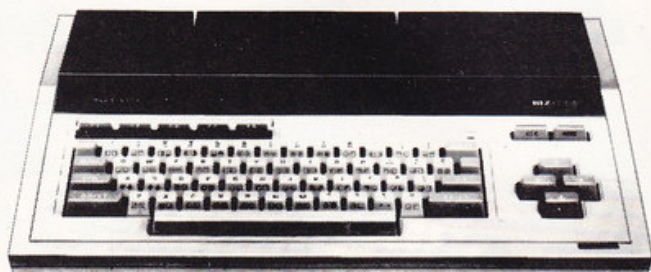
GRANADA PERSONAL COMPUTING TITLES

The ZX Spectrum and how to get the most from it	£5.95
The Spectrum Programmer	£5.95
The Spectrum Book of Games	£5.95
Introducing Spectrum Machine Code	£7.95
The Apple II Programmer's Handbook	£10.95
Programming with Graphics	£5.95
The Dragon & how to make the most of it	£5.95
Computing for the Hobbyist & small Business	£6.95
Simple Interfacing Projects	£6.95
The BBC Micro An expert guide	£6.95

Commodore 64 Computing	£5.95
The Oric-1 and how to get the most from it	£5.95
The Dragon 32 book of games	£5.95
Computer Languages and their uses	£5.95
Lynx Computing	£6.95
21 Games for the BBC Micro	£5.95
Choosing a Microcomputer	£4.95
Databases for fun & profit	£5.95
Introducing the BBC Micro	£5.95
SUNSHINE	
The Working Spectrum	£5.95
Functional Forth for the BBC	£5.95
The Working Dragon 32	£5.95
Dragon 32 Games Master	£5.95

The Working Commodore 64	£5.95
Commodore 64 Machine Code Master	£6.95
The Working Dragon	£5.95
The Working Spectrum	£5.95
The Working CBM 64	£5.95
Dragon 32 Games Master	£5.95
Functional Forth for the BBC	£5.95
BBC	
Androids for the 16K Spectrum	£5.95
Sword Fight for 16K Spectrum	£5.95
Galaxy Attack for 48K Spectrum	£5.95
Blind Alley for 16K Spectrum	£5.95
Cruising for 16K Spectrum	£5.95

SHARP MZ 711 (MZ-700 Series Computer)



FREE! 10 CASSETTE BASED GAMES

The super new colour computer from SHARP. Now available in limited quantities - including 10 FREE CASSETTE BASED GAMES from SPECTRUM

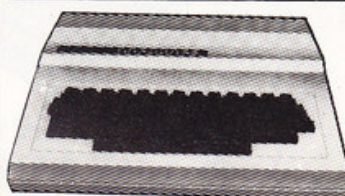
SPECTRUM PRICE

£249⁹⁵

SHARP PRINTER £129.95
CASSETTE RECORDER £39.95

SHARP MZ80A £399

DRAGON



Sensational

HALF PRICE offer!

Buy the DRAGON 32 from SPECTRUM for £175 and get an ACCESSORY PACK for DRAGON including ■ COMPUTER CASSETTE RECORDER ■ JOYSTICKS ■ DRAGON CASSETTE TAPE (Total value £50)

ALL FOR ONLY £25

DRAGON Single DISC DRIVE Now available £275.00
JOYSTICK INTERFACE allows connection of ATARI type Joysticks £14.95

ORIC-I



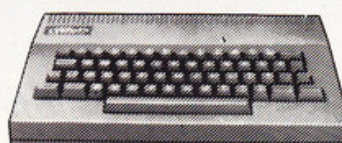
SPECTRUM PRICE

£139⁹⁵

HALF PRICE OFFER!

Bring a copy of this ad to your local SPECTRUM dealer when you purchase an ORIC-1 48K and it will entitle you to purchase the following 4 titles of Software at HALF-PRICE! ■ MULTIGAMES ■ ORICFLIGHT ■ CHESS ■ ZODIAC

LYNX 96K



For the Lynx owners who're ready to take the next step, the 48K machine can be upgraded to full 96K specification for just **£89.95**

LYNX 48K Model -
SPECTRUM PRICE **£199**

SPECTRUM PRICE

£299

Everything you've ever wanted for your ZX SPECTRUM

Superb ZX add-on's from your local Spectrum dealer

New & exclusive to Spectrum!

INDESCOMP

Superb quality add-on's for the ZX SPECTRUM



**INDESCOMP
KEYBOARD**
WITH FULLY
ADJUSTABLE SOUND

£59⁹⁵

**INDESCOMP
SOUND AMPLIFIER**



ONLY £10.95

**INDESCOMP
JOY
STICK
INTER-
FACE**



£14.95

**INDESCOMP
32K
RAM
PACK**
£39.95



**INDESCOMP
DOMESTIC
CONTROLLER**
£49.95

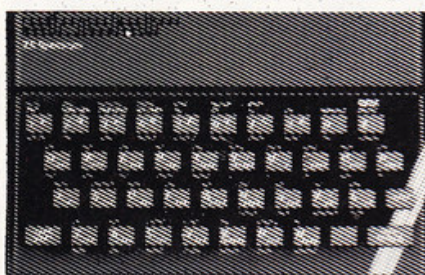


**INDESCOMP RS232 & CENTRONICS
PRINTER INTERFACE £49.95**

**ALPHACOM Thermal Printer for ZX
SPECTRUM - NOW DOWN TO £59.95**

DIGITAL TRACER

**From RD Labs
for the ZX
Spectrum**
£55.50



**ZX SPECTRUM
16K
£99.95
ZX SPECTRUM
48K
£129.95**

Spectrum Computer Centres have no connection whatsoever with the ZX Spectrum Computer manufactured by Sinclair Research Ltd.

VISCOUNT DISK DRIVE

Now from SPECTRUM a Disk Drive for the ZX SPECTRUM. The VISCOUNT 5 1/4" DISK DRIVE with interface system and complete with all leads.

**ONLY
£245**



**PROTEC
Joystick
Interface
£14.95**



**KEMPSTON
Joystick
Interface
(Joysticks opt. extra)**

£15
Joysticks with interface £24.95
Centronics Interface £45.00



**CURRAH
Speech
Synthesiser
£29.95**



**CHEETAH
32K RAM
Pack
£39.95**



DK'TRONICS Keyboard £45.00
DK'TRONICS Lightpen £19.95
STACKLIGHT Rifle with
3 FREE GAMES £29.95

PRISM VTX 5000 MODEM



Now, your ZX SPECTRUM is your key to the world with the incredible PRISM VTX 5000 MODEM

■ Versatile modem for ZX Spectrum (16K or 48K) versions ■ Slim design fits easily, matches your micro ■ Instant access to Prestel™ & Micronet 800 information services ■ Instant communication with other ZX Spectrum users ■ Use the Prism VTX 5000 with a Sinclair printer - and print Prestel frames. Ask your local SPECTRUM dealer for further details - NOW!

SPECTRUM PRICE

£99⁹⁵

Sinclair ZX INTERFACE 2
The new ROM Cartridge/Joystick interface. Loads programs instantly! Takes two joysticks! Just plug in and play.

ONLY £19.95

Plus! New ROM cartridge software.

**Turn the page for more super
offers from Spectrum . . .**

SPECTRUM

ATARI

New! 600XL



- 16K RAM expandable to 48K
- Full stroke keyboard
- Full sound with 3½ octave range
- 11 Graphic Display modes
- Full colour (256 colours - 128 colours can be displayed at one time. Ask to see this super new micro at your local SPECTRUM dealer NOW!

SPECTRUM PRICE

£159.99

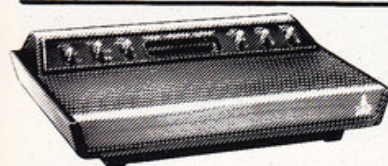
ATARI 800

Check with your local SPECTRUM dealer for our SUPER LOW price.

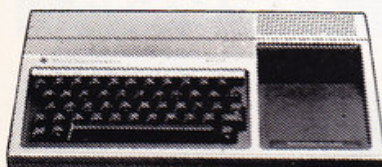


ATARI VCS GAMES MACHINE

With all these FREE extras: FREE PADDLES
■ FREE JOYSTICKS ■ FREE COMBAT CARTRIDGE ■ FREE PAC-MAN CARTRIDGE ALL FOR ONLY **£69.99**



TEXAS



TI-99/4A

Exceptional value from SPECTRUM and representing probably the finest home micro computer value on the market today! - The TEXAS TI-99/4A is built to an extremely high standard and is highly recommended by SPECTRUM for its utter reliability.

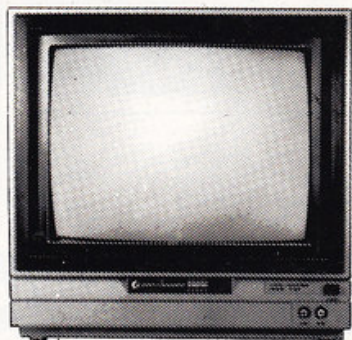
SENSATIONAL
NEW LOW PRICE

£88⁹⁵

Wide range of software available for TEXAS from your local SPECTRUM dealer.

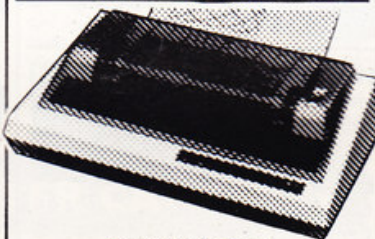
MONITORS

- COMMODORE 1701
with sound **£230.00**
SANYO 14" Colour TV
(ideal as a monitor).... **£229.95**
SANYO CDD 3125NB
Colour Monitor..... **£285.35**
SANYO 12"
Green Monitor..... **£99.95**



SEIKOSHA GPI00 A £199.95

- | | |
|------------------------|----------------|
| SEIKOSHA GP100 VC..... | £199.95 |
| SEIKOSHA GP100 AS..... | £199.95 |
| SEIKOSHA GP250 X..... | £249.95 |
| EPSON FX 80..... | £459.95 |
| EPSON RX 80..... | £314.95 |
| MICROLINE 80..... | £249.95 |
| MICROLINE 82A..... | £349.95 |
| MICROLINE 92..... | £495.95 |
| ALPHACOM 42..... | £99.90 |



PRINTER BARGAINS



New! MEMOTECH MTX500

Here's the super Memotech MTX500 Micro - specially designed for versatility in a wide variety of applications. Its 16K ROM contains several languages & routines to suit users with differing levels of computer skills. Its RAM is a powerful 32K - expandable to a massive 512K - with full 16-colour high-definition graphic capability, and a superb top-quality keyboard. It's a superb Micro and you can see it at SPECTRUM now!

**SUPERB VALUE
AT ONLY**

£275

MY TALKING COMPUTER

"My Talking Computer" by Electropay is a marvellously simple and clear children's Micro that's perfect for the younger child or the slow learner. There's a range of brightly coloured, bold programs - such as "Talking Story", "Talking Numbers" or "Talking Games" - giving a wide selection of educational AND fun games, on easy-load cartridges.



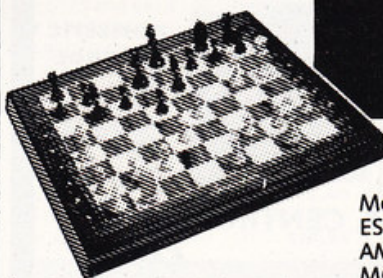
£59⁹⁵

SPECTRUM PRICE

CONCHESS CHESS COMPUTER

'The intelligent
CHESS COMPUTER'

- Models available:
ESCORTER **£179.99**
AMBASSADOR... **£229.99**
MONARCH..... **£279.95**



ACCESSORIES

- | | | | |
|---|---------------|--|----------------|
| C12 DATA CASSETTES..... | £0.50 | TELEVISIONS | |
| C15 DATA CASSETTES..... | £0.58 | 12" T80 B&W PORTABLE..... | £59.95 |
| VISCOUNT SINGLE SIDED, DOUBLE DENSITY (10) (FOR APPLE, COMMODORE, ATARI, TANDY)..... | £21.25 | CTP3131 14" COLOUR PORTABLE..... | £229.95 |
| VISCOUNT SINGLE SIDED, SINGLE DENSITY (10)..... | £21.25 | COMPUTER CASSETTE RECORDERS | |
| VISCOUNT DOUBLE SIDED, DOUBLE DENSITY (10) (FOR SHARP SUPERBRAIN, ETC)..... | £33.81 | from £27.50 | |
| VISCOUNT SINGLE SIDED DOUBLE DENSITY 96 TRACK (10) (FOR NASCOM, COMMODORE 8050, ETC)..... | £51.36 | ZETA Joystick | |
| EMPTY DISK CASES (FOR 5¼" DISKETTES)..... | £1.95 | for ATARI, COMMODORE, VIC-20 & 64, SPECTRUM & ORIC | |
| DISK HEAD CLEANER KIT..... | £16.10 | ONLY £10.95 | |

There's a Spectrum Centre near you..

AVON

BATH Software Plus, 12 York St. TEL: (0225) 61676
BRISTOL Bynal Computers Ltd., 24 Park Row. TEL: (0272) 294189
WESTON-SUPER-MARE K. & K. Computers, 32 Alfred St. TEL: (0934) 419324

BEDFORDSHIRE

BEDFORD Stand Ltd., 115 Midland Rd. TEL: (0225) 49341
DUNSTABLE Dormans, 7-11 Broad Walk. TEL: (0582) 65515
LEIGHTON BUZZARD The Computer Centre at Milton Keynes Music, 17 Bridge St. TEL: (0525) 376622
LUTON Terry-More, 49 George St. TEL: (0582) 23391/2

BERKSHIRE

READING David Saunders, 8 Yield Hall Place. TEL: (0734) 580719
WINDSOR Wycombe Video, 44 King Edward Court. TEL: (07535) 67441

BUCKINGHAMSHIRE

BLETCHLEY Rams Computer Centre, 117 Queensway. TEL: (0908) 647744
CHESHAM Reed Photography & Computers, 113 High St. TEL: (0494) 783373

CAMBRIDGESHIRE

CAMBRIDGE K. P. Ltd., 12a Kings Parade. TEL: (0234) 68087
PETERBOROUGH Peterborough Communications, 91 Midland Rd. TEL: (0733) 41007

CHANNEL ISLANDS

GUERNSEY Grit's, 3-5 The Pollit, St. Peter Port. TEL: (0481) 24682
JERSEY Audio & Computer Centre, 7 Peter St. St. Helier. TEL: (0534) 74000

CHESHIRE

ALTRINCHAM Mr. Micro, 28 High St. TEL: (061) 941 6213
CREWE Microman, Unit 2, 128 Nantwich Rd. TEL: (0270) 216014
CHESTER Oakleaf Computers Ltd., 100 Boughton. TEL: (0244) 310099
MACCLESFIELD Camera & Computer Centre, 118 Mill St. TEL: (0625) 27468
NORTHWICH Camera & Computer Centre, 3 Town Sq. TEL: (0606) 45629
STOCKPORT Wilding Ltd., 1 Little Underbank. TEL: (061) 480 3435
WARRINGTON Wildings, 111 Bridge St. TEL: (0925) 38290
WIDNES Computer City, 78 Victoria Rd. TEL: (051) 420 3333
WILMSLOW Swift of Wilmslow, 4-6 St. Annes Parade. TEL: (0625) 526213

CLEVELAND

MIDDLESBROUGH McKenna & Brown, 206 Linthorpe Rd. TEL: (0642) 222868

CORNWALL

ST. AUUSTELL A B & C Computers, Duchy House, 6 Lower Aylmer Sq. TEL: (0726) 67337

CUMBRIA

BARROW-IN-FURNESS Barrow Computer Centre, 96 Church St. TEL: (0229) 38353
CARLISLE The Computer Shop, 56-58 Lowther St. TEL: (0228) 27710
PENRITH Penrith Communications, 14 Castlegate. TEL: (0768) 67146. Open Mon - Fri till 8 p.m.
WHITEHAVEN P. D. Hendren, 15 King St. TEL: (0946) 2063

DERBYSHIRE

ALFRETON Gordon Harwood, 69/71 High St. TEL: (0773) 832078
CHESTERFIELD The Computer Centre, 14 Stephenson Place. TEL: (0246) 208802
DERBY C T Electronics, at Camera Thorpe, The Spot. TEL: (0332) 360456

DEVON

EXMOUTH Open Channel, 30 The Strand. TEL: (03952) 4408
PLYMOUTH Bynal Computers Ltd., 76 Cornwall St. TEL: (0752) 28705
TIVERTON Actron Micro Computers, 37 Bampton St. TEL: 0884 252854
TORQUAY Devon Computers, 8 Torhill Rd., Castle Circus. TEL: (0803) 526303

DORSET

BOURNEMOUTH Lansdowne Computer Centre, 1 Lansdowne Crescent. TEL: (0202) 20165

DURHAM

DARLINGTON McKenna & Brown, 102 Bondgate. TEL: (0325) 459744

ESSEX

BASILDON Godfrey's 28-32 East Walk, Town Centre. TEL: (0268) 289379
CHELMSFORD Maxton Hayman Ltd., 5 Brookfield Rd. TEL: (0245) 354595
COLCHESTER Colchester Computer Centre, 16 St. Botolphs St. TEL: (0206) 47242
GRAYS H. Reynolds, 79 Orsett Rd. TEL: (0375) 5948
ILFORD Woolfman's, 76 Ilford Lane. TEL: (01) 478 1307
LOUGHTON Micro & Movie Channel, 309 High Rd. TEL: (01) 508 1216

GLOUCESTERSHIRE

GLOUCESTER The Model Shop, 79-81 Northgate St. TEL: (0452) 410693

HAMPSHIRE

ALDERSHOT David Saunders, 51 Station Rd. TEL: (0252) 20130
ANDOVER Andover Audio, 105 High St. TEL: (0264) 58251
BASINGSTOKE Fisher's, 2-3 Market Place. TEL: (0256) 22079
PORTSMOUTH Cygnus Computers Ltd., 261 Commercial Rd. TEL: (0705) 833938
PORTSMOUTH Waterlooville G B Microland, 7 Queens Prde. TEL: (07014) 59911
SOUTHAMPTON R. J. Parker & Son Ltd., 11 West End Rd., Bitterne. TEL: (0703) 445926
WINCHESTER Winchester Camera & Computer Centre, 75 Parchment St. TEL: (0962) 53982 (Just Opening)

HEREFORD

HEREFORD Melgray Hi-Tech Ltd., 49 Broad St. TEL: (0432) 275737

HERTFORDSHIRE

BOREHAM WOOD Master Micro, 36 Shenley Rd. TEL: (01) 953 6368
HITCHIN Camera Arts (Micro Computer Division), 68a Hermitage Rd. TEL: (0462) 59285
POTTERS BAR The Computer Shop, 197 High St. TEL: (0707) 44417
ST. ALBANS (Herts) Clarks Computer Centre, 14/16 Hollywell Hill. TEL: (0727) 52991
STEVENAGE D. J. Computers, 11 Town Sq. TEL: (0438) 65501
WATFORD SRS Microsystems Ltd., 94 The Parade, High St. TEL: (0923) 26602

HUMBERSIDE

GRIMSBY R. C. Johnson Ltd., 22 Friargate, Riverhead Centre. TEL: (0472) 42031
HULL The Computer Centre, 26 Anlaby Rd. TEL: (0482) 26297

ISLE OF MAN

DOUGLAS T. H. Colebourn Ltd., 57-61 Victoria St. TEL: (0624) 3482 (Just Opening)

KENT

CANTERBURY Kent Micro Systems, Conquest House, 17 Palace St. TEL: (0227) 50200
DOVER Kent Photos & Computers, 4 King St. TEL: (0304) 202020
ORPINGTON Ellis Marketing Ltd., 25 Station Sq., Petts Wood. TEL: (0689) 39476
RAINHAM Microway Computers Ltd., 39 High St., Medway Towns. TEL: (0634) 376702

SEVENOAKS Ernest Fielder Computers, Dorset St. TEL: (0732) 456800
SITTINGBOURNE Computers Plus, 65 High St. TEL: (0795) 25677
TUNBRIDGE WELLS Modata Computers Ltd., 28-30 St. Johns Rd. TEL: (0892) 41555

LANCASHIRE

ACCINGTON PV Computers, 38A Water St. TEL: (0254) 36521/32611
BLACKBURN Tempo Computers, 9 Railway Rd. TEL: (0254) 691333
BURNLEY IMO Computer Centre, 39-43 Standish St., BB11 1AP. TEL: (0282) 54299
BURY (Lancs.) Micro-North, 7 Broad St. TEL: (061) 797 5764
OLDHAM Home & Business Computers Ltd., 54 Yorkshire St. TEL: (061) 633 1608
PRESTON Wilding's 49 Fishergate. TEL: (0772) 556250
ROCHDALE Home & Business Computers, 75 Yorkshire St. TEL: (0706) 344654

LEICESTERSHIRE

LEICESTER Youngs, 40/42 Belvoir St. TEL: (0533) 544774
MARKET HARBOUROUGH Harborough Home Computers, 7 Church St. TEL: (0858) 63056

LINCOLNSHIRE

GRANTHAM Oakleaf Computers Ltd., 121 Dudley Rd. TEL: (0476) 76994/70281
LINCOLN MKD Computers, 24 Newlands. TEL: (0522) 25907

LONDON

E6 Percivals, 85 High St. North, East Ham. TEL: (01) 472 8941
E8 McGowans, 244 Graham Rd., Hackney. TEL: (01) 533 0935
E11 Sidney Levy, 17-19 Leather Lane. TEL: (01) 242 3456
E12 Devon Computer Centre, 155 Moorgate. TEL: (01) 638 3339/1830
N14 Logic Sales, 19 The Broadway, The Bourne, Southgate. TEL: (01) 882 4942
N20 Castlehurst Ltd., 1291 High Rd. TEL: (01) 446 2280
NW4 DA Vinci Computer Store, 112 Brent St., Hendon. TEL: (01) 202 2272/3/4
SE1 Vic Odden's, 6 London Bdg Walk. TEL: (01) 403 1988
SE9 Square-Deal, 373-375 Footscray Rd., New Eltham. TEL: (01) 859 1516
SE11 Gatwick Computers, 328 Kennington Pk. Rd. TEL: (01) 587 0336
 Adjacent to Oval Tube
SE15 Castlehurst Ltd., 152 Rye Lane, Peckham. TEL: (01) 639 2205
SE25 Ellis Marketing, 79 High St., South Norwood. TEL: (01) 653 4224
SW6 Chelsea Micros Ltd., 14 Jordan Place, Next to Fulham B/Way. TEL: (01) 385 8494
SW19 Emcom, 31 High St., Wimbledon. TEL: (01) 947 7678
W1 Devon 4 Edgware Rd. TEL: (01) 724 2373
W1 Computers of Wigmore Street, 87 Wigmore St. TEL: (01) 486 0373
W1 Sonic Foto & Micro Centre, 256 Tottenham Court Rd. TEL: (01) 580 5826
W7 T K Electronics, 11-13 Boston Rd., Hanwell. TEL: (01) 579 2842

MANCHESTER GREATER

MANCHESTER Lomax Ltd., 8 Exchange St., St. Ann's Sq. TEL: (061) 832 6167
SWINTON Mr. Micro Ltd., 69 Partington Lane. TEL: (061) 7282282
 'Late Night Friday'
HYDE Pase, 213-215 Market St. TEL: (061) 366 5935
BOLTON Wilding Ltd., 23 Deansgate. TEL: (0204) 33512
WIGAN Wilding Ltd., 11 Mesnes St. TEL: (0942) 44382

MERSEYSIDE

BIRKENHEAD Fairs Cameras & Hi-Fi, Dacre Hill, Rock Ferry. TEL: (051) 645 5000
HESWALL Thorngate Computer Systems, 46 Pensby Rd. TEL: (051) 342 7516
LIVERPOOL Beaver Radio, 20-22 Whittehall. TEL: (051) 709 9898
LIVERPOOL (Aintree) Haggreaves, 31/37 Warbeck Moor. TEL: (051) 525 1782
SOUTHPORT Central Computers, 575 Lord St. TEL: (0704) 31881

MIDDLESEX

EDGWARE Breaker 1-4, 130 High St. TEL: (01) 952 7488/8860
HARROW Camera Arts (Micro Computer Division), 24 St. Ann's Rd. TEL: (01) 427 5469
HAYES Chipstop, 1000 Uxbridge Rd. TEL: (01) 673 2511 (Just Opening)
TEDDINGTON Teddington Camera Centre, Broad St. TEL: (01) 977 4716
UXBRIDGE JKL Computers Ltd., 7 Windsor St. TEL: (0895) 51815

NORFOLK

FAKENHAM Fastview, 12 Norwich Rd. TEL: (0328) 51319
NORWICH Sound Marketing, 52 St. Benedicts St. TEL: (0603) 667725
THETFORD Thetford C B & Micros, 21 Guildhall St. TEL: (0842) 61645

NORTHANTS

NORTHAMPTON Basic Computers & Systems Ltd., 72 Kingsthorpe Hollow. TEL: (0604) 710740

NOTTINGHAMSHIRE

NOTTINGHAM Cameo Computers, 8/9/10 Trinity Walk. TEL: (0602) 742912
NOTTINGHAM Basic, 39-41 Trent Boulevard, West Bridgford. TEL: (0602) 819713
WORKSOP Computagraphics, Bridge St. TEL: (0909) 472248

NORTHERN IRELAND

BELFAST Arthur Hobson Ltd., 37 Gl. Victoria St. TEL: (0232) 246336
CO. ARMAGH Pedlows, 16 Market St., Portadown, Craigavon. TEL: (0762) 332265
LONDONDERRY Foyle Computer Systems, 3 Bishop St. TEL: (0504) 268337
NEWRY Newry Computer Centre, 34 Monaghan St. TEL: (0693) 66545

EIRE

DUBLIN Edtek Computer Co. Ltd., Unit 6, Powerscourt, Townhouse Centre, South William St. TEL: Dublin 719934

OXFORDSHIRE

ABINGDON Ivor Fields Computers, 21 St. St. TEL: (0235) 21207
BANBURY Computer Plus, 2 Church Lane. TEL: (0295) 55890
HENLEY ON THAMES Family Computers Ltd., 40A Bell St. TEL: (0491) 575744
OXFORD Ivor Fields, 7 St. Ebbes St. TEL: (0235) 21207

SCOTLAND

ABERDEEN North East Computers, 1-3 Ellis St., Peterhead. TEL: (0779) 79900
AYR Vennals, 6a New Bridge St. TEL: (0292) 264124
DUMFRIES Vennals, 71 English St. TEL: (0387) 54547
EDINBURGH The Silicon Centre, 6-7 Antigua St. TEL: (031) 557 4546
GLASGOW Victor Morris Ltd., 340 Argyle St. TEL: (041) 221 8958
HAMILTON Tom Dickson Computers, 8-12 Cadzow St. TEL: (0698) 283193
KILMARNOCK Vennals, 49 Foregate. TEL: (0563) 32175
KIRKCALDY Kirkcaldy Photographic Services, 254E High St., Fife. TEL: (0592) 204734
STIRLING R. Kilpatrick, 58 Port St. TEL: (0786) 5532

SHROPSHIRE

SHREWSBURY Computarama, 13 Castlegate. TEL: TBA

SOMERSET

TAUNTON Grays, 1 St. James St. TEL: (0823) 72986

STAFFORDSHIRE

STAFFORD Computarama, 59 Forgate St. TEL: (0785) 41899
STOKE-ON-TRENT Computarama, 11 Market Sq., Arcade, Hanley. TEL: (0782) 258620

SUFFOLK

BURY ST. EDMUNDS Bury Computer Centre, 11 Guildhall St. TEL: (0284) 705772
FELIXSTOWE K. M. Communications Ltd., 4 Manning Rd. TEL: (0394) 271113 or 273459
IPSWICH Brainwave, 24 Crown St. TEL: (0473) 50965

LOWESTOFT John Wells, 44 London Rd., North. TEL: (0502) 3742

SURREY

CAMBERLEY Camera Arts (Micro Computer Division), 36 High St. TEL: (0276) 65848
CHERTSEY Chertsey Computer Centre, 1 Windsor St. TEL: (09328) 64563
GUILDFORD The Model Shop, 23 Swan Lane. TEL: (0772) 0483 39115
HASLEMERE Haslemere Computers, 25 Junction Place, adj. Rex Cinema. TEL: (0428) 54428
NEW MALDEN Surrey Micro Systems, 31 High St. TEL: (01) 942 0478
WALLINGTON Surrey Micro Systems Ltd., 53 Woodcote Rd. TEL: (01) 647 5636
WOKING Harpers, 71/73 Commercial Way. TEL: (04862) 25657

SUSSEX

BEXHILL-ON-SEA Computerware, 22 St. Leonards Rd. TEL: (0424) 223340 (Opening Mid-October)
CRAWLEY Gatwick Computer Services, 62 The Boulevard. TEL: (0293) 37842
LITTLEHAMPTON Alan Chase Ltd., 39 High St. TEL: (09064) 5674/4545

TYNE & WEAR

NEWCASTLE-ON-TYNE Newcastle Camera & Computer Mart, 16 Northumberland Ct. TEL: (0632) 327461

WALES

ABERDARE Inkey Computer Services Ltd., 70 Mill St., The Square, Treccynon. TEL: (0685) 881828
ABERYSTWYTH AberData at Galloways, 23 Pier St. TEL: (0970) 615522
CARDIFF Randall Cox, 18/22 High St. Arcade. TEL: (0222) 31960
LLANDUDNO (Gwynedd) Computer Plus Discount, 15 Clonmel St. TEL: (0492) 79943
NEWPORT (Gwent) Randall Cox, 118 Commercial St. TEL: (0633) 67378
PEMBROKE Randall Cox, 19 Main St. TEL: (064) 668 2876
PORT TALBOT Micro Gen, 6 Royal Buildings, Talbot Rd. TEL: (0639) 887730
WREXHAM T E Roberts, 26 King St. TEL: (0978) 384404/364527

WARWICKSHIRE

LEAMINGTON SPA IC Computers, 43 Russell St. TEL: (0926) 36244
RUGBY The Rugby Micro Centre, 9-11 Regent St. TEL: (0788) 70522

WEST MIDLANDS

BIRMINGHAM Sherwoods, Gt. Western Arcade. TEL: (021) 236 7211
DUDLEY Central Computers (Dudley), 35 Churchhill Precinct. TEL: (0384) 238169
ERDINGTON The Gamekeeper Grand Fare, High St. TEL: (021) 3846108
WEST BROMWICH Bell & Jones, 39 Queens Sq. TEL: (021) 553 0820

WILTSHIRE

SALISBURY Whymark Computer Centre, 20 Milford St. TEL: (0722) 26688

WORCESTER

WORCESTER David Waring Ltd., 1 Marmion House, High St. TEL: (0905) 27551

YORKSHIRE

BRADFORD Erricks Foto-Sonic House, Rawson Sq. TEL: (0274) 309266
HUDDERSFIELD Richards (formerly Lauries) 12 Queen St. TEL: (0484) 25334
LEEDS Bass & Bligh, 4 Lower Briggate. TEL: (0532) 454451
SHEFFIELD Superior Systems Ltd., 178 West St. TEL: (0742) 755005
SKIPTON Look & See, 45 Belmont Bridge. TEL: (0756) 60078
YORK York Computer Centre, 7 Stonegate Arcade. TEL: (0904) 641862



MICROWAVES

Scaled a new PEEK in microcomputing? If printed your tip will earn you a fiver.

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.**

Debugging Oric PRINTing

There seem to be three ways of overcoming the Oric LPRINT and PRINT TAB 'bug'.

The location 48 contains the print position but is cleared to 13 each time instead of 0. Thus, if one POKES 48,0 before each TAB, the position should be correct.

A second method is to use SPC instead of TAB. Often a simple SPC(N) is sufficient, but for an equivalent to PRINT-TAN(N) AS, use PRINT SPC(N-POS(0)) AS.

A third method is to POKE 617 with the required position plus 2 (you have to add two, as the screen printing position starts in column 2 not column 0). Now POKE 617, N+2: PRINT AS is equivalent to PRINT TAB(N) AS.

The biggest complication arises, however, when it is necessary to have two or more TABs per line. The POKE & 30 method will not work for PRINT, but it is the only method that does work for LPRINT. On the other hand, the line PRINTSPC (N1-POS(0)) AS; SPC(N2-POS(0)) BS; SPC(N3-POS(0)) CS; etc works. The POKE 617 method is not satisfactory for either PRINT or LPRINT.

*John A Green,
Bolton Computer Club,
Leigh, Lancs*

No scroll area on Oric screen

Here is a handy way of producing scroll protection on the Oric. To prevent upper portions of the screen from scrolling:

POKE#26F,27-(number of lines to be protected)
DOKE#26D,48000+(40*the

number of lines to be protected)

The POKE and DOKE are paired and must always be done as a pair, otherwise strange things will happen to the display. To restore to normal:

POKE#26F,27
DOKE#26D,48000

To prevent the lower portions of the screen from scrolling use #26F only.

POKE#26F,27-(the number of lines to be protected).

*P A Lockerby,
Nelson, Lancs*

Take a BREAK with your Lynx

The following program for the Lynx can be used to determine whether the BREAK key is pressed. This key is not used by the normal keyboard routine, but is connected to the Z80's maskable interrupt. Unfortunately, the video chip also causes an interrupt, so this program times the interval between the two interrupts to determine the cause of the interrupt.

To use the program, first enter DPOKE&6297, &4DED.

The routine is called by CALL LCTN (100). The variable HL will be set by the routine, to 1, if the break key is depressed, to 0, otherwise. The routine itself is:

100 CODE ED 56 FB 76 AF
67 6F ED 4F FB 76 ED 5F FE
30 F0 2C C9

*D P Akerman,
Coundon, Coventry.*

Restoration without OLD

The Lynx lacks an OLD command to restore a program after it has been NEWed. For simple programs,

POKE &694D,&C0 is successful, but will not work if a program needs to be edited or contains arrays. This is because the end of Basic pointer at &61FC is set to start of Basic (&694D) after NEW.

The procedure to use is:

1. Find the end of Basic marker, by calling up MONITOR, W 694D 8080
2. Take note of the first location number in the listing eg &895F (it must be less than HIMEM, &9FF8)
3. Return to Basic with the J command.
4. Reset the end of Basic pointer with the location from

instruction 2 by using:
DPOKE &61FC,&895F

5. Remove the new end of Basic marker at &694D and replace it with &CO. POKE &694D,&CO

The program will now run satisfactorily. The first line of the restored Basic program will be renumbered to 1 by instruction 5 but can be edited in the normal manner by Control E.

*R Towers,
Hamilton, Scotland*

Quick access to CBM64 control codes

Many Commodore owners may not realise that the control key can be used with the alphabetic keys to produce the CHR\$ codes one to twenty six.

ie 'CTRL' and 'A' = CHR\$(1)
'CTRL' and 'B' = CHR\$(2)
etc.

These controls may either be used in direct mode, or printed within quotes in a program.

*David Gristwood,
Sunderland, Tyne and Wear.*

Foolproof Oric ink and paper

There is a popular method of doing a hard reset on the Oric; the call is to #EA59, but try this if you have set the INK or PAPER colours and the machine crashes. A much more foolproof location is #F426. This waits for a few seconds, then performs a hard reset no matter what the screen colour is. Note that any defined characters will revert back to their old selves.

*James Eibisch,
Cheltenham, Glos*

Oric INVERSE substitute routine

Try the following routine as a substitute for INVERSE on the Oric.

10FOR A=46336 TO 46343
20POKEA,127:NEXT A
30FOR B=48000 TO 48039
40POKE B,0:NEXT B
50FOR C+46344 TO 46351
60POKEC,0:NEXT C

Lines 10 and 20 define space as a solid block of foreground colour. As the Oric screen is made up (except for the two left hand columns) of a series of spaces, it displays in foreground colour.

Printing, or plotting, on the screen maintains the character in its foreground colour,

but still on a block of (old) background colour.

The routine is most effective when the background is black, as the two left-hand columns merge with the border.

Lines 30 to 40 obliterate the status line. Lines 50 to 60 redefine ! as a solid block of (old) background colour, so that the window effect may be preserved.

*David Harrison,
Wirral, Merseyside.*

Oric user achieves the 'impossible'

Did you know that it is possible to draw off the Oric screen, without receiving a syntax error. Try the following:

10 HIRES
20 CURSET 238,199,1
30 CIRCLE 127,1

This is only one example, experiment for other effects.

The following routine is very handy for impressing people with the double height facility of the Oric. It side scrolls the line and is very effective for titles and the like.

10CLS:PAPER4:INK0

20A#="PERSONAL
COMPUTER NEWS IS
THE BEST"

30DOKE#26B,#010A

40CLS

50PLOT0,10,17:PLOT0
13,17

60PLOT0,11,LEFT\$(A,38)

70PLOT0,12,LEFT\$(A\$,38)

80A\$=MID\$(A\$,2)+LEFT\$(
A\$,1)

90WAIT 10

100GOTO 60

*Anthony O'Dawd,
Dublin, Ireland*

Shrinking your Newbrain

Here is an interesting way of decreasing the size of the Newbrain screen. To change the width use:

Set X=PEEK(92)+PEEK
(93)*256

then to change the width:
POKE X+5,width required
and to change the depth:
POKE X+4,depth required

The following program will halve the dimensions of the screen:

10X=PEEK(92)+PEEK
(93)*256

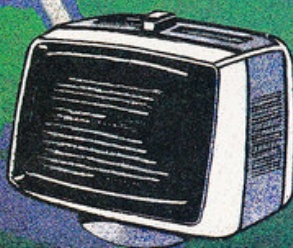
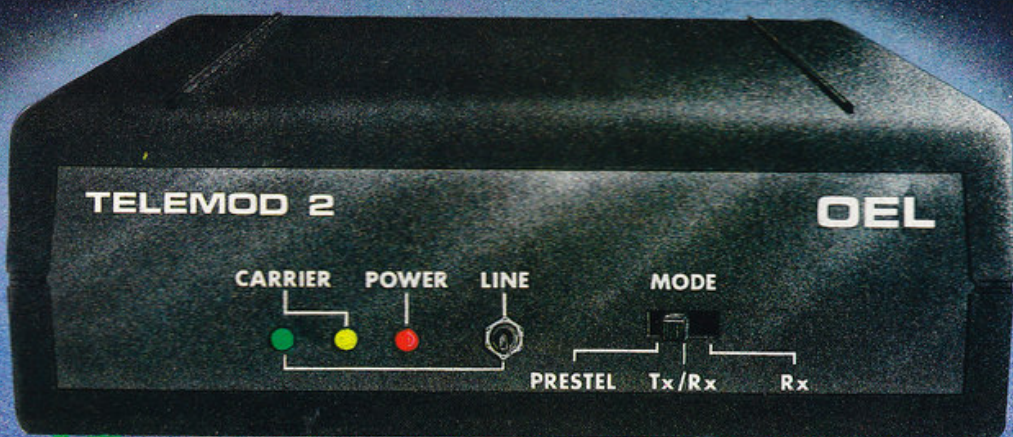
20POKE X+5,20:

POKE X+4,12

30END

*David Waterson,
London SW*

We CAN talk to each other....



- LINK INTO A WORLD OF COMPUTER INFORMATION BANKS.
- EXCHANGE INFORMATION OR PROGRAMS FROM USER TO USER DIRECT.
- CONNECTS TO YOUR MICRO* OR TERMINAL VIA AN RS232 SERIAL LINK.
- OPERATES TO A V23 (PRESTEL) STANDARD AND AT 1200/ 1200 BITS PER SECOND HALF DUPLEX FOR USER TO USER.
- SOFTWARE COMMUNICATIONS PACKAGES AVAILABLE FOR MOST POPULAR MICRO'S.
- BT APPROVED S/ 1399/3/D/02 1907

Designed to fit neatly under a telephone handset, the TELEMOD 2 modem simply connects to the telephone line via the new BT modular plug. An extension socket on the rear of the modem allows you to connect in your own telephone making the system truly compact.

TELEMOD 2 is designed with the latest integrated technology to not only give you a more reliable modem but also one that won't cost you a fortune!

OEL has specially designed communications packages for popular micro's that include a serial interface unit (if required), software, connecting leads and full instructions.

Within a few minutes of connecting TELEMOD 2 and a Viewdata comms package to, for example, an APPLE IIe you can have access to 240,000 pages of PRESTEL information including a link to Telex, Mailbox, Teleshopping, Homebanking and even Telesoftware for your micro!



O.E. Limited,
Industrial Estate,
Appleby-in-Westmorland,
Cumbria CA16 6 HX

Telephone: 0930 51909
Mailbox No.: 093051909

Please send me the TELEMOD II.

I enclose a cheque/postal order made payable to O.E.Ltd. for **£84.95** inc.VAT

Name _____ Company _____
Address _____
Tel. No. _____

Distributor: SYNCOMP SERVICE LTD

P.O. BOX 42. SOUTHPORT
MERSEYSIDE. PR9 0UR

PLEASE ALLOW 28 DAYS FOR DELIVERY

Prestel and the Prestel symbol are trademarks of British Telecommunications.

Will the Adam initiate a price revolution? Brian Power investigates Coleco's industry-shaker.

The Eve of Adam

A lot of computer makers talk about giving you more for your money. Every month there is yet another system hustled onto the market with promises of a larger memory and more power — all for a smaller investment.

Coleco is basing its much-publicised new Adam on that premise. This computer is offered at such a radically lower price that the industry is watching to see if Adam can live up to its advance billing.

What makes this computer so different is that the entire system, including a letter-quality printer, will sell for just \$700 in the US. (U.K. price is expected to be about £700). You would expect that kind of a

price breakthrough from one of the larger American companies such as Apple or IBM. But Coleco? Isn't it best known for its toys and games?

The company isn't talking much about how it managed such a coup. But the vertically-integrated company was able to develop its own printer and tape drive and other new technology such as simpler motors. You end up with 80K of internal memory, a full keyboard, a good mass-storage tape system, built-in word processing and a letter-quality printer in the basic system. Here's how the Adam is put together.

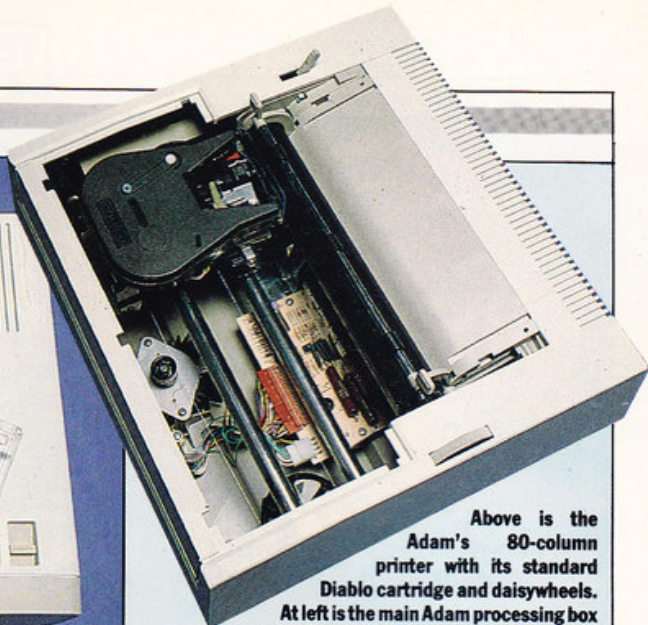
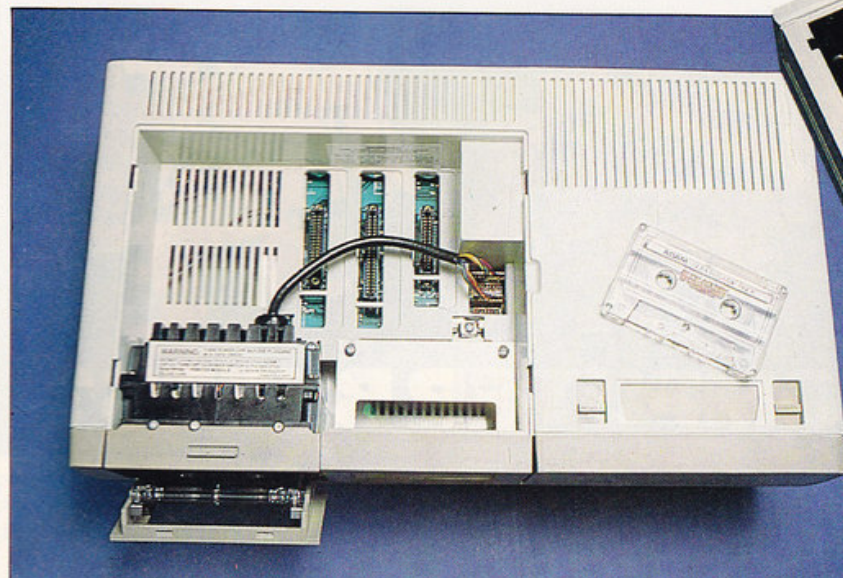
Presentation

Coleco obviously knew that Adam will go into the homes of a lot of first-time computer buyers, and the machine had to inspire confidence just sitting in the box. It does. Blessed by the fact that the computer connects to the television set, Coleco can package the Adam without a monitor and make for a more compact unit.

The whole thing comes in one 40-pound box that one average adult could wrestle in and out of taxis and even through train stations, if it had to come to that. The Adam is smartly, and safely, packaged inside a bright box. I have seen them cause



Deborah MacNeill



Above is the Adam's 80-column printer with its standard Diablo cartridge and daisywheels. At left is the main Adam processing box with cartridge software slot (bottom right), floppy cassette tape drive (bottom left) and plug-ins for further expansion (they are the slots pictured above the tape drive).

a real stir among air travellers as they spun round the baggage sections at a major airport.

Documentation

The Adam comes with three books, a 64-page set-up manual and two larger binders for word processing and programming in BASIC. You can see the way Coleco rushed the Adam onto the market by the fact that pages in the word processing book have newly-written instructions glued over the old ones.

It is obvious that Coleco expects some Adam buyers will never get beyond the set-up manual. That manual contains enough information for simple word processing so that you don't really need the more extensive binder. It also tells readers that programming is a hobby like sewing or carpentry, and they don't have to bother learning it if they don't want to.

This set-up manual is a welcome change to many instruction books — it is actually easy to follow. A no-nonsense book that doesn't pander to the novice, it contains simple instructions and plenty of clear

photos that take you from unpacking the box to changing the printer ribbon. The on-screen help menus are extensive enough to get you going without the manual once Adam is taken out of the box and plugged in.

Construction

We now move into the heart of the matter. Coleco has created Adam from three main components, the memory console, the keyboard and the printer. The console includes the system's Z80A microprocessor, meaning compatibility with the CPM operating system, the RAM and a high-speed tape drive.

The microprocessor addresses 64K of RAM but the computer also contains a separate processor for the video display that includes an additional 16K of memory just for graphics, bringing the total to 80K. Another 64K of RAM is available as an option, bringing the total up to 144K.

The sculptured keyboard has 75 keys, including six programmable function 'smart keys' that correspond with six labelled boxes on the screen. The

keyboard has the feel of more expensive systems and I give it a good rating.

Coleco was thinking of word processing when it designed the keyboard, including keys such as *insert*, *delete*, *move/copy* and *store/get* to provide quick access to specific word processing functions. In addition to ten command keys, there are cursor arrow keys.

Two game controllers come with it. While they are primarily for playing games, one of them can be attached to the keyboard to move the cursor, as an alternative to the arrow keys, and can also be used for entering numbers.

The keyboard and printer have separate microprocessors, and a communications system Coleco calls Adamnet ties the whole thing together. It is enough to allow the computer to do simple multi-tasking.

Screen

The screen for the Adam is likely to be your own television set. It had better be colour or you will miss a lot of what Adam offers. During some operations the screen contains four different sections, with four different colours.

The screen is set up to convince you that working on Adam is no different than typing on a typewriter. I wish computer makers wouldn't bother because the screen is going to start looking tedious once you get used to the system.

There are graduated markers up the left side and across the top of the screen, to set the margins for a printout. There is a band of six blue boxes across the bottom of the screen that correspond to the 'smart keys.' Above that is a roller, shaped like a typewriter roller, which you write into. After writing two lines, the lines begin rolling up the screen.

If it sounds cluttered, it is. There isn't much room on the screen for your work by this point. Coleco is assuming you are incapable of thinking for yourself and need to be shown everything.

Storage

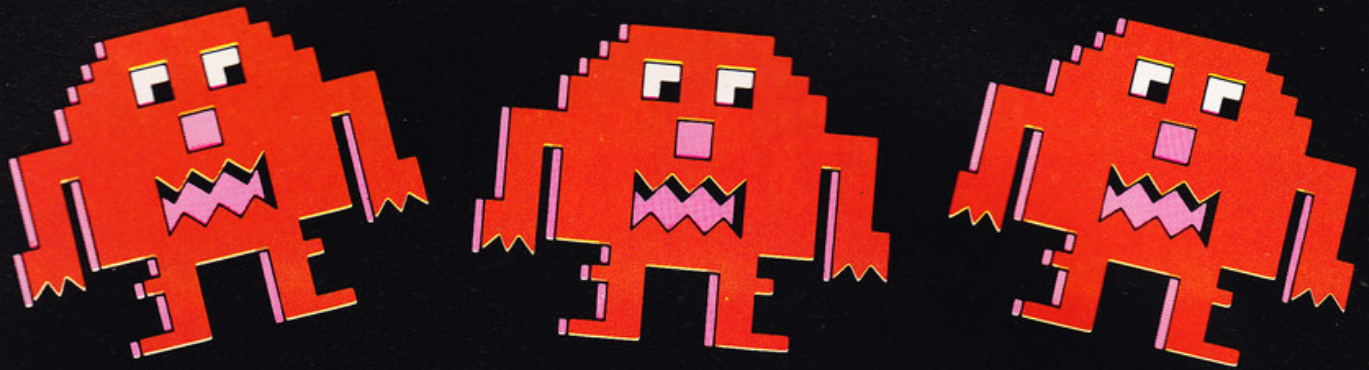
A lot of people prefer the faster and more reliable disk drives to tape cassette storage. But Coleco has got around that, and



The Coleco games machine — released in the UK this past summer (and Pre-Tested in Issue 2) — will be able to take an optional upgrade that turns it into the Adam. The Adam, in fact, is built around the games machine's main board. In the picture opposite, you'll see that board — with the Z80 processor nearest to the front of the machine and the cartridge software socket just behind it.

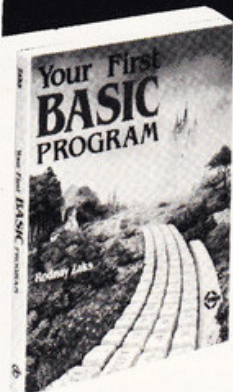
The games machine Adam adaptor will be available in this country before the actual complete Adam system itself — but no-one should be fooled into thinking there is any difference whatsoever between the adapted games machine and a completed Adam. They are the same machine.

The games machine adaptor is expected to sell for about £450 when it reaches this country — but the price is likely to fall on the higher side to ensure that an adapted games machine will be more expensive than it would be to buy a complete Adam system.



WARY OF COMPUTER BYTES?

READ ON...



Are you missing out on all that your computer can do. These books show you how easy it is to improve your programming. Clear and concise, they will help you make the most of your computer's memory power, for more advanced uses and more exciting graphics.

YOUR FIRST BASIC PROGRAM

"How-to-Program" book for the first time computer user with colourful illustrations and simple diagrams to help you write your own first program in just one hour.

PROGRAMMING THE Z80

Instructive text, clear, precise diagrams and easy to follow examples explain everything you need to know about programming using Z80 microprocessors. Important for Sinclair, ZX81, Spectrum and TRS 80 Model users.

PROGRAMMING THE 6502

You need no prior programming knowledge to make use of this detailed book. By applying simple assembly language, you will quickly learn to make your microprocessor perform the way you want it to. Important for BBC users wishing to extend their programming capability, plus Apple, Atari and VIC 20 users.

THE VIC 20 CONNECTION

Learn the simple techniques for putting your VIC 20 computer to work controlling external devices. Control lights, electricity, burglar alarm system and other non-computer devices in your own home or office.

THE EASY GUIDE TO YOUR COMMODORE 64

A jargon-free publication that explains the practical operation of your Commodore 64 in word processing, maths, budgeting, filing and more. This friendly guide explains how to use commercially available software, as well as teaching you the basics of programming.



All these books are published by Sybex, renowned for their excellent, helpful publications for computer users and distributed by Computer Bookshops Limited, the UK's specialist computer book and program wholesaler. All are available from good bookshops and computer stores including Lewis's and John Menzies.

Request for catalogues: Send SAE to:- Dept. PCN 24/11/83

Computer Bookshops Limited

Lincoln Road, Olton, Birmingham B27 6PA.



lowered the cost of Adam, by developing a high speed tape system with a transfer rate to the microprocessor of 19.2K bits per second — eight to 16 times faster than other cassette systems. While it was still slower than a floppy disk, I found it worked quickly and transferred the information without any problems.

The closed-loop bidirectional tape is preformatted to hold 500K of information (about 250 pages of text). Information is stored sequentially on the tape, with the initial information stored in the middle of the tape and later files added on either side.

Printer

So far I have been fairly positive in detailing Adam, but when it comes to the printer I begin to worry. By advertising Adam as a complete system, it could live or die if the printer doesn't hold up.

To be positive, a lot of letter-quality printers alone cost as much as Adam. Coleco has developed an 80-column bidirectional printer with a 91/2-inch carriage that uses standard Diablo daisy wheels, allowing you to choose your type face, as well as standard ribbon cartridges.

For the price, I suppose I could live with the 120 words per minute speed, although it seems painfully slow.

But here's the rub. Most of the printer is made of a hardened plastic and doesn't look all that sturdy. I have doubts that it could run well for any length of time. It looks like a small child could do a lot of damage quickly. Coleco swears it has tested the printer extensively, but I couldn't help wondering how well the printer could stand up to six months or a year of printing.

Expansion

The entire Adam can be an expansion module, so to speak. You can buy a stripped-down version of the Adam which allows you to fit your ColecoVision video game system into the memory console.

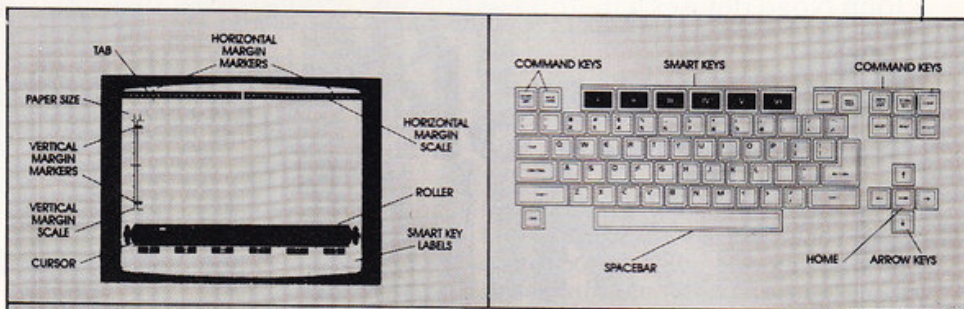
Coleco plans to introduce an expansion module early next year, which will contain a floppy disk drive and an 80-column card for those who are going to do more serious work. It will sell for \$300 in the US.

Adam has four expansion slots, three for peripheral cards and one for the upcoming expansion module. The slots can be used for such options as the 80-column card, Coleco's steering wheel for its turbo game or an adapter for Atari 2600 game cartridges.

At this point, none of these are available. last summer they expected the expansion module ready by the end of the year, but that has obviously proved too optimistic.

Software

In most systems the word processing package comes on a separate cartridge or disk, but on Adam the Smartwriter word processing program is built right into its ROM. Turn on the computer and it is automatically in a typewriter mode, where every letter you strike on the keyboard is typed onto the printer.



The Adam's keyboard and screen layout are shown in the above diagrams from the Adam Smartwriter Easy Reference Guide. The Adam's built-in Smartwriter word-processor can operate in two modes — as a straight electronic typewriter using the daisywheel printer and as a full scroll-across 80-column word-processor.

The diagram at left shows what the screen looks like when you're word-processing, while the keyboard layout sketch shows the position of the Adam's function keys above the main board. The function keys handle things such as search and replace/margins/tabs, line spacings and storage.

A keystroke switches to the word processing program, which offers on-screen correction, deletion and text-searching. It highlights the text to be moved or deleted. It has an *undo* key to retrieve material if you change your mind or have made a mistake.

Adam has only 36 columns, which is hardly adequate if you are going to write often. Adam has several ways around this. There is a scrolling function that lets you move a window back and forth. A modelling function simulates the 80-column format by showing only the characters near the margins. In a word, they seem clumsy and an inadequate replacement for a wider character display.

The computer comes with two data pack tapes, the Smartbasic language and the Buck Rogers — The Planet of Zoom game, a product much more sophisticated than the game currently available on ROM cartridges.

Smartbasic's source code is compatible with most Applesoft Basic statements. While most programs written in Applesoft Basic will run on Adam, there are differences in the use of PEEK, POKE and CALL commands.

Coleco is currently working with software companies to convert some CP/M programs to the Adam tape system. It remains to be seen just how many software developers will convert their systems, although a disk drive module would probably increase the number.

Coleco isn't waiting. It is developing a Smartfiler database management program, to be released early next year, to

manage spreadsheet analysis, telephone directories and personal planning diaries.

Verdict

Coleco has set a rock-bottom price for the Adam system, but this puts the whole system out on a limb if one section such as the printer doesn't work.

I think Coleco is going to have to prove that its printer is really sturdier than it looks. I would like to see it used for six months before I am convinced it can stay the distance.

Also, why put all this emphasis on word processing and then make a system with 36 character lines. It doesn't make sense. The moving window that lets you scroll across the width of the line doesn't impress me as any kind of practical alternative. I think a lot of people who plan to write more than two letters a week to Aunt Millie are going to want the 80-character upgrade — and will have to pay more for it.

Yet in the end, providing the printer holds up and you can use 80-character lines, I think the Adam is a welcome addition. At the very least, if it sells heavily it is going to force the price of other computers down.

PRICES

Main unit including cassette drive, printer and computer unit **\$700 US**
Anticipated price for floppy disk and 80-column card **\$300 US**
Anticipated price for Adam conversion unit for Coleco games machine **\$500 US**

SPECIFICATION

Price	\$700 US
Processor	Z80
RAM	80K
ROM	32K
Text screen	36x24
Graphics	Screen same as Coleco's high-resolution games machine
Storage	Cassette tape digital data pack — 500K formatted storage per tape — (included with machine) and optional disk drives available in future
Interfaces	Daisywheel printer included with machine using non-standard (for disks drives, 80-column cards and others)
OS/Language	Coleco's SmartBasic
Distributor	CBS/Ideal Toys, Hedley Road, East Woodley, Berkshire, 0734 698188

John Noad devises a method of hopping around programs and baffling inquisitive intruders.

Superskip security

Have you ever thought about security? You've probably considered ways of locking your programs, or putting the odd mug-trap in. But instead of making them difficult to break into, why not just make it practically impossible for unauthorised eyes to understand what's going on in them? Well it can be done, and there are other advantages.

At the risk of teaching my granny to suck eggs, I want to start with a brief description of what I call the 'Line Header Blocks' used by the Apple when storing Basic programs.

If you've ever delved into the make-up of a Basic program, as stored in RAM, then you will know that each line of a program has its own 'header block' which is four bytes long:

- BYTE 1** carries the low byte of the starting address of the next header block
- BYTE 2** carries the high byte of same
- BYTE 3** carries the low byte of the number of the current line
- BYTE 4** carries the high byte of same

So whenever a GOSUB or GOTO command is processed in a program the computer must search through every header block, starting from the beginning of the program (pointed to by TEXTTAB at \$67 and \$68) until it finds one with the target line number in bytes 3 and 4. It is able to do this fairly quickly because it can jump directly from block to block using the information in bytes 1 and 2.

I've already mentioned the use of one pair of zero page locations — at \$67 and \$68. Now I want to introduce an even more delightful couple who reside at \$B8 and \$B9, known to the Apple as TXTPTR.

Even if you know nothing about how a computer works it will be obvious that it must be keeping track of its whereabouts at any given point during the RUNNING of a program. In fact it does this in the Apple by constantly updating the contents of \$B8 and \$B9, which hold the address of each byte in the program as it is fed to the interpreter. But, and this is the important bit, the computer doesn't care what addresses TXTPTR checks out as long as the interpreter keeps receiving valid information. Thus it is theoretically possible to fill \$B8 and \$B9 with any pair of numbers you like as long as you meet that last condition.

Perhaps because I don't use much machine code on my own programs, it was some time before I realised that if Applesoft was inactive, then TXTPTR would remain static and could be changed at will. Obviously all I had to do was to CALL a machine code routine to do the job for me.

The point is that machine code routines don't need a program point as they don't use the interpreter. So when Basic executes a CALL the contents of TXTPTR will be preserved until an RTS returns

program control to Applesoft and TXTPTR goes back to work.

In order to work its way through a Basic program the interpreter uses a routine called CHRGET, which reads the byte pointed to by TXTPTR, feeds it to the interpreter, and then increments TXTPTR for a new byte — unless CHRGET collects a 0 (End of Line byte) or a : (End of Statement byte). In either of the latter cases (assuming that the 0 or : is not inside inverted commas), CHRGET halts while the last statement is executed. This means that when a machine code routine is CALLED, TXTPTR is left pointing at the zero or colon following the CALL.

```
$0300:A5 B8 LDA $B8 ;Store
TXTPTR low byte at $08
```

```
$0302:85 08 STA $08 ; (becomes
RETURN address low byte for second
CALL)
```

```
$0304:A5 B9 LDA $B9 ;Store
TXTPTR high byte at $09
```

```
$0306:85 09 STA $09 ; (becomes
RETURN address high byte for second
CALL)
```

```
$0308:A5 06 LDA $06 ;Transfer
POKED target address low byte
```

```
$030A:85 B8 STA $B8 ;to TXTPTR
low byte
```

```
$030C:A5 07 LDA $07 ;Transfer
POKED target address high byte
```

```
$030E:85 B9 STA $B9 ;to TXTPTR
high byte
```

```
$0310:A5 08 LDA $08 ;Store old
TXTPTR low byte at $06
```

```
$0312:85 06 STA $06 ;for RETURN
if wanted
```

```
$0314:A5 09 LDA $09 ;Store old
TXTPTR high byte at $07
```

```
$0316:85 07 STA $07 ;for RETURN
if wanted
```

```
$0318:60 RTS ;Return to
BASIC
```

Superskip GOS TO places other programs cannot reach.

So what happens when the machine code routine ends — when it reaches RTS? Well it seems (from my experiments) that TXTPTR it first incremented and then CHRGET goes back to work. In other words, when you alter TXTPTR it must point to the byte *preceeding* the statement you are jumping to, though it can safely 'return' to the byte it was sent from.

Superskip uses three commands — two POKES and a CALL. If you want to unskip — the equivalent of RETURNing from a GOSUB — then only the CALL is needed. In both cases the same location — 768 — is CALLED (unless you wish to relocate the routine). What the routine does is to move four pieces of information around like this:

Stage 1 the current value in the low byte of TXTPTR is moved to \$08, and the high byte to \$09

Stage 2 the values that you POKED into \$06 (low byte) and \$07 (high byte) are transferred to TXTPTR so that it now points at the target statement

Stage 3 the old values of TXTPTR are moved down from \$08 and \$09 to allow a RETURN if it is wanted.

In Basic terms, we would have written GOSUB or GOTO (or THEN) we must now write POKE 6, (target address low byte); POKE 7, (target address high byte); CALL 768. Where we would have written RETURN we now write CALL 768 only. And where no RETURN is required then, as in Basic, we write nothing at all.

I've boiled Superskip down to 5 steps:

(1) Enter the entire program as normal with all GOSUB/GOTO/THEN statements in place (making sure that they are *not* nested) and get a listing. It might be easier to use Superskip if all sub-routines are collected at the end of the program, but it certainly isn't essential.

(2) Working through from the start of the program replace each GOSUB/GOTO/THEN with POKE 6,000 : POKE 7,00 : CALL 768. Replace each RETURN with CALL 768.

(3) Working through the target statements in the order in which they are accessed replace the target statement with PRINT PEEK (184) and RUN the line. Now deduct 8 from the result and place the result in the appropriate POKE 6,000 statement (leading zeros will be ignored when the POKE is executed). Go to step **(4)** before repeating step **(3)**.

Note: What you are doing here is reading the low byte of TXTPTR. Deducting 8 takes you back to the byte before PRINT.

(4) Repeat step **(3)**, but this time alter PEEK(184) to PEEK(185). Unless your program is very long (more than 23 000 bytes) the result of this PEEK is unlikely to be more than two digits. The result of PEEK(185) will give you the high byte of TXTPTR. However, if the result of step **(3)** was 7 or less then deduct 1 from the result of step **(4)** before placing it in the appropriate POKE 7,000 statement. Go to step **(5)** before repeating step **(3)**.

(5) Replace the PRINT PEEK(185) command with the original program statement and return to step **(3)** if required.

Remember, you don't need to keep track of 'return' address as Superskip is already equipped to deal with this.

YOU HAVEN'T SEEN ANYTHING LIKE THIS ON A COLOUR MONITOR BEFORE.

An RGB monitor from JVC offering a resolution of 370 x 470 pixels for less than £150?

We guarantee you won't see another bargain like that in this or any other micro mag—or in any other supplier's showroom.

For we've managed to acquire the sole distribution rights to these superb machines and we are able to offer them at an unbeatable price.

There are two models available: medium resolution (370 x 470 pixels) at £149.95; and high resolution (580 x 470 pixels) at £229.95. (Both excluding VAT.)

The units have a 14" screen and are suitable for the BBC Micro, Lynx, Oric, Apple, and most other leading micros.

They are robustly constructed in a handsome cream casing. And come with a full year's guarantee.

Delivery is good: your monitor should arrive by courier service within ten days of our receiving your order.

You can order by filling in the coupon below and posting to: Opus Supplies Ltd., 158 Camberwell Road, London SE5 0EE. Or by telephoning 01-701 8668 quoting your credit card number. Or, of course, you can buy in person at our showroom between 9am-6pm Monday-Friday, 9am-1.30pm Saturday.

MODEL REFERENCE	1302-1 Medium Resolution	1302-2 High Resolution
RESOLUTION	370 x 470 Pixels	580 x 470 Pixels
C.R.T.	14"	14"
SUPPLY	220/240v. 50/60Hz.	220/240v. 50/60Hz.
E.H.T.	Minimum 19.5kv Maximum 22.5kv	Minimum 19.5kv Maximum 22.5kv
VIDEO BAND WIDTH	6MHz.	10MHz.
DISPLAY	80 characters by 25 lines	80 characters by 25 lines
SLOT PITCH	0.63mm	0.41mm
INPUT: VIDEO	R.G.B. Analogue/ TTL Input	R.G.B. Analogue/ TTL Input
SYNC	Separate Sync on R.G.B. Positive or Negative	Separate Sync on R.G.B. Positive or Negative
EXTERNAL CONTROLS	On/off switch and brightness control	On/off switch and brightness control



To Opus Supplies Ltd., 158 Camberwell Road, London SE5 0EE.

Please send me _____ Medium Resolution Colour Monitor(s)
at £149.95 each (ex. VAT).

_____ High Resolution Colour Monitor(s) at
£229.95 each (ex. VAT).

_____ Connection lead(s) at £6.00 each.

I understand carriage per monitor will cost an extra £7.00.

(N.B. A Medium Resolution Monitor including VAT, lead, and carriage costs £187.39. A High Resolution Monitor including VAT, lead, and carriage costs £279.39.)

I enclose a cheque for £_____. Or please debit my credit card account with the amount of £_____. My Access/Barclaycard (please tick) no. is _____

Please state the make of your computer _____

Name _____

Address _____

Telephone: _____

Opus.
Opus Supplies Ltd.
PCN2

Write your own Newbrain software; Chris Rust introduces us to a word processor package.

Newbrain Editor

The Newbrain's rescue stresses one thing about the micro — at least one company thinks it has a lot going for it. And in time the support it desperately needs may still arrive.

Unfortunately this may not be of any help to the large numbers who kept Grundy afloat for so long by buying the Newbrain as a home computer. Most of them have despaired of ever seeing the vast range of cheap software that competing machines can offer.

So writing your own software seems to be the best course.

This series of articles will help those of you who are still determined to master one of the most interesting and flexible computers on the market. Over the next few weeks it will provide a step by step guide to the development of a word processing program which uses many of the interesting features of the Newbrain.

By the end of the series you will have a useful piece of software, tailored to your own needs. You will also have a much better understanding of the technical features of the Newbrain, which should help you write more effective programs for games, education, business and science.

Why a word processor?

The Newbrain screen editor is so good that word processing can be done with a relatively simple program. So we can concentrate on the special features of the machine and tailoring the program without too much mind-crunching detail.

The program will be based on a cassette-based one which I wrote for my own use a few months ago. Since then I have used it for correspondence, technical reports, records, notekeeping and business paperwork. Naturally I am using it to write this article.

Can you afford it?

One accessory that you'll need sooner or later is a printer. I use the Radio Shack CGP-115 four pen printer/plotter, which costs £150 from any Tandyshop. It writes in four colours and 64 text sizes, and can produce line drawings with real pens. The manual, unlike the Newbrain's, is delightfully clear. Unlike many dot-matrix printers, it photocopies well.

The only drawback is the paper width. At 115mm it is about half what you expect. However there are ways round that, so don't be put off what is otherwise a tremendous bargain.

If you have a different printer, don't worry, the program will still work for you.

When developing a program the first move should be to work out the structure. This program must be compact, because without a disk drive, every byte of extra Basic cuts down the space for text.

Setting up routines

CLOSE STREAMS

Close any devices left open by previous programs

CONSTANTS

Line 1000 gives names to keyboard, printer and tape stream numbers. It also names constants for all the main screen editor codes. These are described in detail in Appendix 3 of the NewBrain manual.

Line 1010 specifies page format:

tl = No of lines per page
cc = No of columns per line
ss = No of screens
mt is required by the menu routines which are not covered in this article.

STRING CONSTANTS

Largely self explanatory.
In\$ is a row of 40 x chr\$(129). To enter it, type Graphics/A 40 times and you should have a horizontal line the full width of the screen.
The array of control strings, sp\$(0-3), has several graphics characters which will not print out in the listing. The asterisks are a temporary measure, I will explain the construction of each string as we bring it into use.

OPEN UP

Open keyboard input device on stream ky
Open 600 baud printer stream (stream pr)
Open 24 line x 40 column text screen on stream 0 (default display)
Note: 600 baud is the rate for my printer. If yours is different enter the right value between the quotation marks

SCREENS

Open screens 1 to ss with subroutine SCREEN.
RET

SCREEN

Close TARGET screen tg.
Open 60 line x 40 column text screen on TARGET stream using stream number as port number.
Print Header to screen with FORMAT
RET

FORMAT

Set page title pg\$(tg) as blank line with page number at left hand end.
Print line ln\$ below title.
RET

PAGE TITLE

Place cursor at home position on TARGET screen
Print Page Title pg\$(tg)
RET

99 REM CLOSE STREAMS =====
100 FORa=1to255:CLOSE#a:NEXTa

999 REM DECLARE CONSTANTS =====
1000 ky=105:pr=108:lp=101:rd=5:cu=6:cb=7
:lt=8:hm=12:cr=13:ln=17:st=18:sc=19:rc=2
0:yx=21:xy=22:rt=26:es=27:hl=28:bl=30:cl=31
1010 ll=60:cc=40:ss=5:lt=3:mt=7

1099 REM STRING CONSTANTS =====
1100 In\$="

1110 mu\$(1)="Edit page"
1111 mu\$(2)="Load from tape"
1112 mu\$(3)="Save to tape"
1113 mu\$(4)="Print out"
1114 mu\$(5)="Cut and Paste"
1120 pt\$(0)="What next?"
1121 pt\$(1)="TO page No : :"
1122 pt\$(2)="FROM page No : :"
1123 pt\$(3)="Set up Tape"
1124 pt\$(4)="Play Tape"
1125 pt\$(5)="ok?"
1126 pt\$(6)="Another Page?"
1160 sp\$(0)="**"
1161 sp\$(1)="*****":REM elspc
1162 sp\$(2)="*****":REM bl,0-9
:left,right,newline,escape

1199 REM OPEN UP =====
1200 OPEN#ky,5:OPEN#pr,8,"600":OPEN#0,0:
RET

8999 REM SCREENS =====
9000 FORtg=1TOss:GOSUB9100:NEXTtg:RET

9099 REM SCREEN =====
9100 CLOSE#tg:OPEN#tg,0,tg,"60":GOSUB9200:
0:RET

9199 REM FORMAT =====
9200 pg\$(tg)=MIN\$(STR\$(tg),2,LEN(str\$(tg)-2)+CHR\$(46):PUT#tg,cl:GOSUB9400:tg,ln\$:PUT#tg,cc:RET

9399 REM PAGE TITLE =====
9400 PUT#tg,hl,bl:tg,pg\$(tg):RET

The screen editor can do most of the donkey work of manipulating text, so you don't have to worry about formatting or special editing routines. Text storage is

also very easy on the Newbrain. You can set up a number of duplicate screens or pages and flip between them at will. All of the text will be stored on screen displays.

Go 4th
with



apricot

The 4th generation personal computer

A computer that, for the first time, works with you rather than just for you. Hardware and Software co-ordinating perfectly, Apricot arrives complete and ready to work.

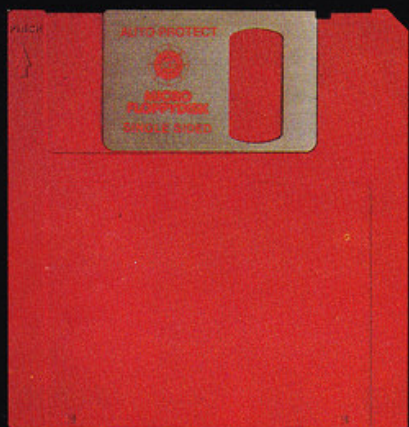
The MicroScreen™ on the keyboard, unique to Apricot, performs a variety of practical functions—as a calculator, calendar, time display, and as a window on the screen. Most significantly the MicroScreen™ prompts and assists the user by presenting simple options whilst running applications.

As you'd expect with a 4th generation system, Apricot offers true 16-bit processing, multi-processor architecture and 256k RAM as standard.

With Pulsar 16-bit business software and compatibility with the best selling ACT Sirius 1 and IBM PC, Apricot already has the largest available software library.



Incorporating the very latest advances in computer technology, Apricot uses 3 1/2" pocket-size diskettes. Secure and compact, yet offering increased storage capacity.



ot



Apricot includes over £750 of software—SuperCalc spreadsheet, business and communications software—to ensure that your system is immediately effective.

And because executives are not office bound, Apricot offers portability, a further feature aimed at improving efficiency.

Powerful sleek and sophisticated—and all at an amazing 4th generation price.

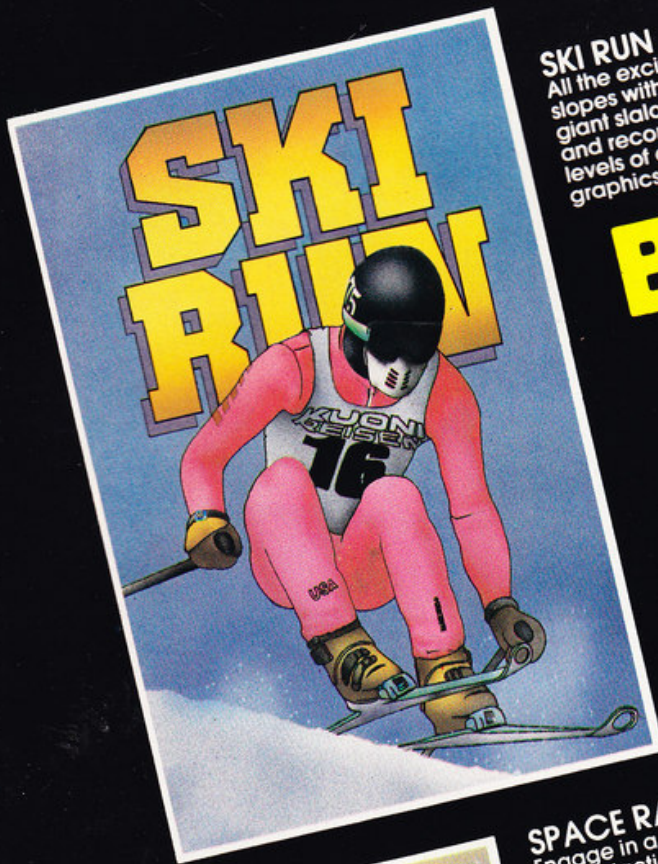
**Go 4th
from £1495**



ACT (UK) Limited
FREEPOST, Birmingham B63 1BR
or call 021-501 2284

Please send me the latest information on Apricot—the 4th generation personal computer.

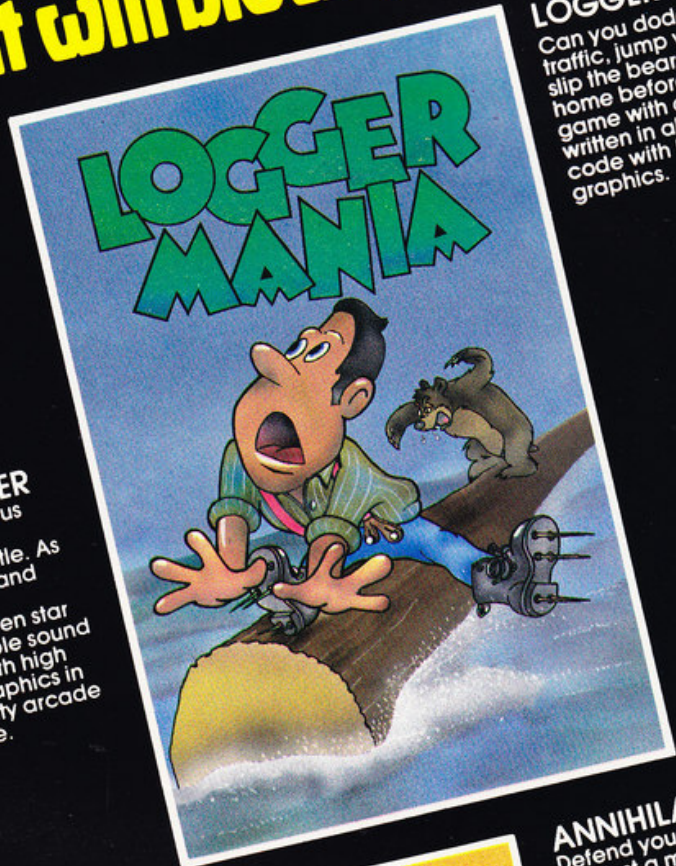
Name _____
Company _____
Address _____
Post Code _____



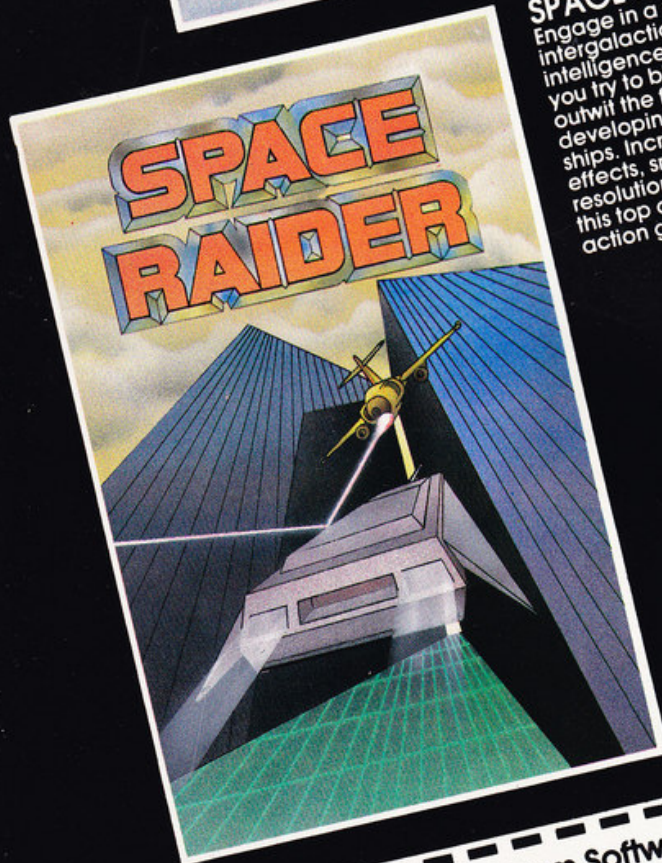
SKI RUN
All the excitement and skill of the ski slopes with downhill, slalom and giant slalom. Put yourself to the test and record the fastest time! Nine levels of difficulty. High quality graphics and brilliant sound effects!!

Boom Software

It will blow your mind



LOGGER MANIA
Can you dodge the traffic, jump your logs, slip the bears, and get home before sunset? A game with a difference written in all machine code with high quality graphics.



SPACE RAIDER
Engage in a furious intergalactic intelligence battle. As you try to blast and outwit the fast developing alien star ships. Incredible sound effects, smooth high resolution graphics in this top quality arcade action game.



ANNIHILATOR II
Defend your planet against a mighty alien invasion. All machine code makes for fast and brilliant arcade action!

Post this coupon now to Boom Software
2-4 Chichester Rents, Chancery Lane,
London WC2A 1EG

Please send me the following:

Ski Run	£5.50	Annihilator II	£5.50
Logger Mania	£5.50	Space Raider	£5.50
Annihilator II (VIC 20)	£4.75	Trek (VIC 20)	£4.75

Total cheque/PO enclosed £

Name

Address

..... payable to 'Boom Software'

commodore 
and VIC 20

Editor routines

EDITOR

Position cursor at top left of screen to
Set flag m1 for TRAPKEY
Get keystroke from KEYBOARD
Check with TRAPKEY for special function
If key pressed was ESCAPE then RET
Use TRAPKEY flag, m3, to select action
Restart at "Get keystroke"
(lines 3000-3040 don't concern us just
yet)

KEYBOARD

Wait for keystroke
When key pressed set variable ks to ASC
number of keystroke and RET

TRAPKEY

Compare keystroke ks with control string
sp\$(m1)
If ks calls for special action set flag
m3 to routing number. This flag tells
EDITOR which subroutine to use
If no special action called for set m3
to 1
RET

PUTKEY

Execute keystroke ks on TARGET device tg
RET

NEWLINE

Send carriage return to TARGET device tg
Follow with home left code to cancel
unwanted effects of carriage return
RET

IGNORE

Take no action on this keystroke
RET

READ TITLE

Don't ask awkward questions, just type
it in and I will explain later.

```
2999 REM EDITOR =====
3050 PUT#tg,xy,1,3:m1=FALSE
3060 GOSUB2000:GOSUB2010:IFks=esTHENGO
SUB22100:RET
3070 ONm3GOSUB20200,21000,21100:GOTO3060
```

```
19999 REM KEYBOARD =====
20000 GET#ky,ks:RET
```

```
20099 REM TRAPKEY =====
20100 m3=INSTR(sp$(m1),CHR$(ks+40))+1:RE
T
```

```
20199 REM PUTKEY =====
20200 PUT#tg,ks:RET
```

```
20999 REM NEWLINE =====
21000 PUT#tg,cr,hl:RET
```

```
21099 REM IGNORE =====
21100 RET
```

```
22099 REM READ TITLE =====
22100 RET
```

FOR

a = 1TO10:GET#105,b:PUTb:

NEXTa

The cursor will disappear. Press a few
keys and see the letters appear. After ten
keystrokes, execution will end and the
cursor reappears. Now try this:

PUT6 : FORa#1TO10 : GET#105,b :
PUTb+2:NEXTa:PUT7

and you have an editor which displays a
cursor and modifies text. Where will it
end?

By now you should be able to make some
sense of most of the listing. There is one
routine, essential to the Editor, left to
explain.

Trapkey

A modified screen editor needs a way to
recognise the keystrokes which need
special treatment. Trapkey uses the string
handling function INSTR to find if and
where a keystroke comes in a list of special
keystrokes.

The list is contained in the string
sp\$(m1). Each character represents one
keystroke, its ASCII number is the ASCII
number of the keystroke plus 40. (We
cannot use the actual ASCII number as
some characters in the control code set
below 31 will not SAVE or LIST very
easily.)

Editor instructs Trapkey to use sp\$(0),
which traps control codes 13 (newline) and
31 (shift/home). We will add other special
functions later.

The string is an easy one to enter. On line
1160 of the listing, where the string is
shown as "***" enter "5G" instead.

The special routines modify Newline to
avoid deleting the line below. They also
ensure that Shift/Home, which clears the
page, is ignored. You can probably see the
potential of this function for sophisticated
text editing.

The listing

Obviously the listing published here is
incomplete. It lacks the menu and text
handling functions which we will look at in
later articles.

But you can still get it into limited
operation. Insert a temporary END line
after setting up routines. If you now RUN
it, the program will do all the setting up
needed for Editor to function.

To use Editor you must set the stream
flags tg and pg to the page number which
you require. You can then GOSUB to the
Editor thus:

tg=1:pg=1:gobsub3050

This will display screen 1 and allow you
to type merrily away until you get bored
and press Escape, which causes Editor to
RETURN. In this case RETURN will
jump out of the program and you will be
back in charge.

If you are too impatient to wait for the
next instalment you could try adding a few
extra functions to Editor by extending
sp\$(0) and writing some more subroutines.
Alternatively, see if you can get Editor to
run the printer as a typewriter. You might
learn a bit about your printer which will
come in useful later.

426

The only need to convert text to strings is
to communicate with an outside device
(tape or printer), or use cut and paste to
shunt text about. The program will be
modular, so each routine will perform one
simple job and be as flexible as possible.

This is a good way to get trouble-free
programs and avoid those sprawling,
untidy flowcharts.

The Newbrain offers a simple system of
setting up multiple screens, and gives easy
access to the screen editor. These features
are the foundation of this project.

The program will set up a number of
pages, from one large sheet to 400 record
cards. You'll be able to type on each page
with full correction an editing and you'll
also be able to move text between pages
and shuffle paragraphs.

Screens

The normal screen which is available when
you plug in your Newbrain is a simple 40
column x 24 line display. We will be using
this, unmodified, to display an index and
menu.

To open an additional screen you must
specify a stream number, device type, port
number and screen size eg:
OPEN#0,1,"L50"

The first number 1 is the stream number
— an identifying number which you will
use to specify that screen when you want
access to it later.

The zero is the device number, and
device 0 is a screen display. We could have

specified another device such as the printer
output (device B) in which case stream 1
would be the printer port number.

The second number 1 is the port
number. Specify it whenever you open
more than one device of a type. Port and
stream numbers can be any whole number
between 1 and 255. Each device that you
open must have unique port and stream
numbers.

Editor

If you try to open a few text screens by this
method you will find that nothing happens.
This is because the Newbrain, which
knows what it likes, always reverts to the
default screen on stream 0 unless execution
continues.

But the screen is open; to have a look try
this:

PRINT#1,"TEST":FORa = 1TO1000:
NEXTa

You will now get your first glimpse of a
duplicate text screen. A PRINT or PUT
command which specifies a duplicate
screen will display that screen until another
screen is used or execution ends.

That is one half of the function of the
Editor, to display the screen and add to or
change it. The other job is to receive
commands from the user via the keyboard.

There are two keyboard devices, 5 and 6.
Device 6 is a bit tricky so we will stick with 5
for now. Open it thus:

CLOSE#105:OPEN#105,5

Now try this short test:

AGF

PROGRAMMABLE JOYSTICK INTERFACE for Spectrum or ZX81

MICRODRIVE
COMPATIBLE

ONLY
32.95
+£100pp

ABOUT OUR INTERFACE

The AGF Programmable Joystick Interface is a unique design offering the use of any Atari-compatible joystick with absolutely all software, whether it is cassette or ROM cartridge, with the Sinclair Spectrum or ZX81.

The hardware programmable interface requires no additional software and accurately replicates the keys of the computer in a manner which is responsive to absolutely ALL key reading methods, both BASIC and Machine Code.

The interface does not interfere with key operation and can therefore be used simultaneously with the keyboard.

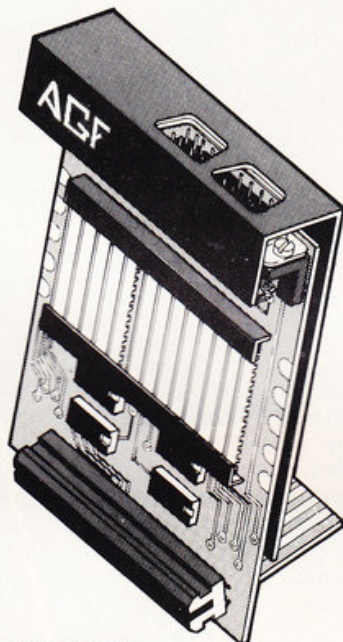
There is no need to remove the interface once fitted as the rear extension connector will accommodate further expansion, i.e. printers or RAM packs etc. This important feature avoids excessive wear to the expansion port.

The key replication principle pioneered by AGF means that your own programs can use eight directional joystick movement by utilising simple key reading BASIC.

Two joystick sockets are provided which share the same keys, for use with the majority of two player games. Several interfaces may be used on the same computer for multiple joystick applications.

The interface is programmed by a two digit code, which is looked up on a programming chart supplied, for each direction and firing button. The two numbers are then selected on a pair of leads which are clipped onto appropriately numbered strips on the interface.

Once configured this can be marked on a Quick Reference Programming Card for storing with the game. As the programming is *not* power dependent the interface retains the last configuration made and can be immediately used when next switched on.



KEY FEATURES

- ★ Programmable design gives TOTAL software support.
- ★ Accepts Atari, Competition Pro, Wico, Starfighter, Quick Shot, Le Stick etc.
- ★ Rear extension connector for all other add-ons.
- ★ Free demo program and instructions.

PACKAGE CONTENTS SUPPLIED

- Programmable Interface Module as illustrated, complete with clip-on programming leads.
- Self adhesive programming chart detailing how to define which key is simulated by UP, DOWN, LEFT, RIGHT, and FIRE. This can be fixed on to the case of your computer or if preferred the protective backing can be left on. The chart is made of a very durable reverse printed plastic and is extremely easy to read.
- One pack of ten Quick Reference Programming Cards for at-a-glance setting to your games requirements. The card allows you to mark the configuration in an easy to read fashion with space to record the software title and company name.
- Video Graffiti demonstration program which is written totally in BASIC to illustrate how all eight directions and fire can be read. This is also a useful high resolution drawing program.
- 12 months guarantee and full written instructions.

JOYSTICKS

CONTROLLERS

FOR USE WITH OUR INTERFACE
Module or VIC 20, Commodore 64,
Atari VCS, Atari 400, Atari 800

If you require extra Joysticks for our
original interface module mark order
'OLD' Joysticks

ONLY £7.54 inc VAT + P&P

FROM: MR/MRS/MISS

ADDRESS

SEND C.W.O. (NO STAMP NEEDED) TO: A.G.F. HARDWARE, DEPT. PCN 1

FREEPOST, BOGNOR REGIS, WEST SUSSEX, PO22 9BR

QTY	ITEM	ITEM PRICE	TOTAL
	PROGRAMMABLE INTERFACE	33.95	
	JOYSTICK(S)	7.54	
	PACK(S) QUICK REFERENCE CARDS	1.00	
ONE	VIDEO GRAFFITI	FREE	

ZX81 ☐ ZX SPECTRUM ☐ Please tick
DEALER ENQUIRIES WELCOME EXPORT PRICES ON APPLICATION

FINAL TOTAL

Enter the deadly depths of Darren Eteo's machine code arcade game for the Welsh micro.

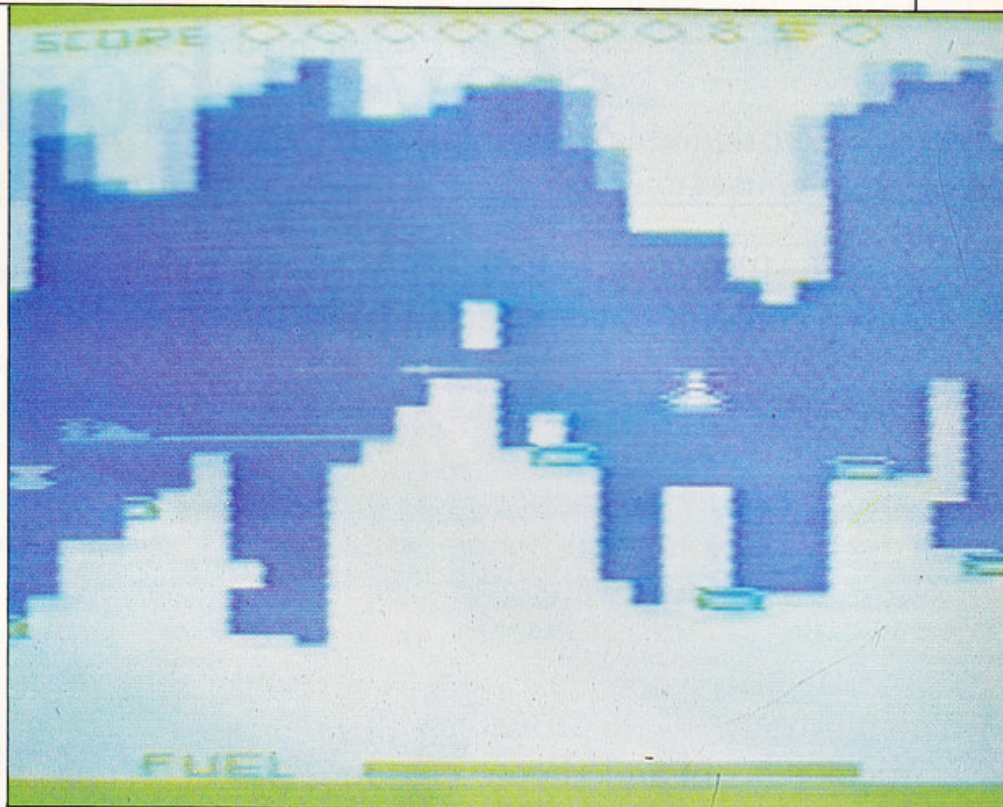
Fast arcade games are nowadays almost inevitably written in machine code. But although it's easy to go out and buy a version of Scramble, it's—initially at least—a lot more difficult to write about it. However, you can learn a lot about machine code programming by looking at how existing programs are constructed—and you can have a lot of fun, too.

The listing we begin here will eventually give you a fully machine-coded Scramble-type arcade game for the Dragon 32. The game resides at &H6000 onwards, and takes up just over 3K of memory for the scenery. The source codes take up a lot more memory, so you may want to split the game into two parts, and bearing in mind the length of the listing, you're likely to need an assembler. When you assemble it always SAVE both codes.

If you have to type the hex codes into data statements, watch the addresses and assemble it in parts, as the addresses (first column) tend to jump about. The general format for loading data statements is: DATA6B A9

DATAB1 39

FORT = lowest address to highest address



The Dragon's Cave

READ A\$: POKE T, VAL("&H" + A\$)
NEXT

When you're typing anything, always SAVE your work before trying to RUN it. Otherwise, if the program destroys your data you have only yourself to blame. When you CSAVEM the syntax is: CSAVEM"NAME", start address,end address,executable address(&H6097).

Before you start here are a few hints.

I feel it's best to use a structured approach. Start by defining what you want to do, then split the program up into smaller modules. You continue to divide up your program until you get the definitions in such a state that you can write them easily into code.

When I wrote this program I decided to use two different techniques. Keeping things in tables turned out to be a very successful way of operating, while putting them on the screen and moving them around with a scroll routine turned out to be inefficient and hard to control. So I'd recommend that newcomers to machine code use tables.

The other method involves putting an object on screen first. Then, to identify the object, the program would compare the one on screen with one held in memory.

This proved ineffective, first because if you have similar objects on screen then the program could mistake one for the other, and second because if one object passes over another the program may be confused. The first problem could be overcome by extra coding, but the effort probably isn't worth it.

SS Ram listing

```
0001 5415514545514551 41 PRT
0001 5415514545514551 50 WPSCORE FDB #5415, #5145, #4551, #4551
0003 51455415 50 FDB #5145, #5415
0000 541551555155515 50 FDB #5415, #5515, #5515, #5515
0015 55155005 50 FDB #5515, #5005
0019 5415514555515545 50 FDB #5415, #5145, #5551, #5545
0021 54155001 50 FDB #5415, #5001
0025 5015554554155545 50 FDB #5015, #5545, #5415, #5545
0020 55455015 50 FDB #5545, #5015
0031 5545550554455145 60 FDB #5545, #5505, #5445, #5145
0039 50055545 60 FDB #5005, #5545
0030 500151555005 60 FDB #5001, #5155, #5005
0043 555150055555 60 FDB #5551, #5005, #5555
0049 554555155455 60 FDB #5545, #5515, #5455
004F 511551455015 60 FDB #5115, #5145, #5015
0055 5001555155455545 60 FDB #5001, #5551, #5545, #5545
0050 55155455 60 FDB #5515, #5455
0061 5415514554155145 70 FDB #5415, #5145, #5415, #5145
0069 51455415 70 FDB #5145, #5415
0060 5415514554055545 70 FDB #5415, #5145, #5405, #5545
0075 55155515 70 FDB #5515, #5515
0073 505150515151 80 WPFUEL1 FDB #5051, #5051, #5151
007F 045414545454 90 FDB #0454, #1454, #5454
0085 515151515101 80 FDB #5151, #5151, #5101
008B 001515001500 80 FDB #0015, #1500, #1500
0091 454545454540 90 FDB #4545, #4545, #4540
0097 100 #START
0097 5E6174 100 LDX #0STAGEA
009A 8F0FBA 100 STX @PLAYER-22
009D 8F04 100 LDA #4
009F 67AFB2 100 STA @PLAYER-30
00A2 6000 110 LDA #11
00A4 3E70CC 110 LDX #01SCORE
00A7 108E70CA 110 LDY #0USCORE
00AB 110 @LW
00AB 0F00 110 CLR ,X+
00AD 0FA0 110 CLR ,Y+
00AF 4A 110 DECA
00B0 20F9 110 BNE @LW
00B2 120 #START1
00B2 8600 130 LDA #0
00B4 B7704E 130 STA @TABLE
00B7 B770C2 130 STA @TBOMB
00BA B770A0 130 STA @THOMER
00BD B7708A 130 STA @TABLE1
00C0 6001 130 LDA #1
00C2 B770C0 130 STA #5472
00C5 B77FC3 130 STA #5475
00C8 B77FC5 130 STA #5477
00CB 0E00 130 LDA #0E0
00CD B77F22 130 STA #5314
00D0 6003 130 LDA #3
```

The listing we begin here will provide you with a full machine code version of the 'scramble' type of arcade game. It's a lot of typing, but provided you're careful not to make mistakes when you enter it, it's well worth the effort. Remember to SAVE the program before running it, OR disaster will strike. You'll need a joystick if you're to enjoy the game to the full, and you'll need a lot of practice if you're to master it. We'll be continuing the listing over the next few weeks.

```
00D2 B7FFC9 130 STA #5481
00D5 B7FFC7 130 STA #5479
00D8 00AA 140 LDA #0AA
00DA 8E0600 140 LDX #0600
00DD 140 @CLS
00DD A780 140 STA ,X+
00DF 0C10FF 140 CMPX #010FF
00E2 23F3 140 BLS @CLS
00E4 8E1000 140 LDX #01000
00E7 B70FC0 140 STX @PLAYER-10
00EA 8E1E00 150 LDX #01E00
00ED CC5555 150 LDD #05555
00F0 150 @LOK
00F0 ED03 150 STD ,--X
00F2 8C1CC7 150 CMPX #000+312
00F5 22F9 150 BHI @LOK
00F7 BE0600 150 LDX #0600
00FA 150 @LOPPS
00FA ED01 150 STD ,X++
00FC 8C0730 150 CMPX #000+312
00FF 25F9 150 BLO @LOPPS
0101 8E1D24 160 LDX #01DFF-219
0104 108E6079 160 LDY #0PFUEL1
0108 8605 160 LDA #5
010A B70FCF 160 STA @PLAYER-1
```


Not all home computers stay at home.

The BBC Micro is the ideal family computer—simple to operate, yet fast, powerful, with enormous potential.

But it's nice to know, when you buy one for your home, that the business, educational and scientific worlds agree with your choice.

Here are a few stories to illustrate how the BBC Micro gets out and about. And one to remind you how helpful it can be when it stays at home.

A practical lesson in business admin.

The contribution of the BBC Micro in the classroom has long been recognised at Perins Community School in Hampshire.

The School has 12 BBC Micros used extensively across the syllabus: in fact some pupils are using them to study for their GCE O Levels in computing.

One of the programs available to Perins teachers

such as David Beck, pictured below with his class, is "Newsagent."

This program contains all the necessary information for the class to run a newsagent's shop; allowing them to organise daily deliveries, make up bills and keep an eye on stock control and ordering.

It's a nice example of how the BBC Micro can be used not only to acquaint a class with the language of computers, but also with some of the realities of the community in which they live.

Correcting Jodrell Bank.

The BBC Micro is a familiar worker around Jodrell Bank.

You'll find it in the reception area explaining the workings of a radio telescope to visitors, for example.

But it's also been helping in a more testing task: to improve the performance of the Defford telescope.

In this application it has been used to make calculations necessary to determine the precise parabolic shape of the dish.

Theodolites are used to do the measuring—then the BBC Micro works out the necessary corrections.



The end of the scrawl.

If any of you have noticed how much easier it is to read and understand labels on drugs and medicines these days, then you can most probably thank the BBC Micro. John Richardson, a Preston pharmacist, was first to realise how a micro with a suitable printer could produce labels that were accurate and legible and which could include, automatically, such information as drug reaction warnings.

At the same time it could record drug usage for better stock control.

He chose the BBC Micro for its versatility and potential for expansion.

John Richardson believes that this system will be recognised as standard in the profession and be used in hospitals, health centres and pharmacies throughout the UK.

Meanwhile back at home.

Dr. & Mrs. Yarwood bought a BBC Micro as a birthday present for their 12 year old daughter.

programs. Mrs. Yarwood is particularly proud of one program she has compiled to help teach her daughter French vocabulary.

They all agree that although the Micro is fast and powerful enough to be at home in Jodrell Bank, it is also the ideal computer at the Yarwood home:

simple to set up (virtually any TV set and cassette player is all you need) and simple to use.



All this for only £399.

The BBC Micro comes with a comprehensive, step-by-step User Guide which introduces you to your micro and shows you how to construct useful programs of your own.

You will also receive a free "Welcome" cassette which contains 15 different programs for you to experiment with, ranging from music and graphics to games like Kingdom and Bat 'n' Ball.

The BBC Micro is available from WH Smith Computer Shops, Boots, John Lewis and local Acorn stockists.

Alternatively if you would like to order one with your credit card or if you want the address of your nearest supplier just phone 01-200 0200 or 0933-79300.



However, it quite quickly became common property.

All three can now write their own

The BBC Microcomputer System.

Designed, produced and distributed by Acorn Computers Limited.

PAN AND PERSONAL COMPUTER NEWS PRESENT

MICROPUZZLES

PLUS A CHANCE TO WIN A NEW ACT APRICOT!

A new ACT Apricot computer is being offered as first prize in a competition featured in *Micropuzzles*. The prize includes keyboard (with built in micro screen), monitor, dual disk drive system unit offering 630K of storage and full supporting software. Approx total retail value of £3,000.

20 runners-up prizes of annual subscriptions to PERSONAL COMPUTER NEWS.



MICROPUZZLES BY J J CLESSA

The renowned puzzle-master of PERSONAL COMPUTER WORLD'S *Leisure Lines* feature has written a new paperback for the PAN/PCN Computer library to be published on November 11th 1983 at £2.95.

Stretch Your Mind – with more than a little help from your micro to find the answers. Test your mental ability with the Quickie Questions, or tackle the conundrums of the Puzzle Posers. Access the answers if you're baffled.

The Prize Puzzle awaits you – if you stay the course. Solve the three prize puzzles and enter the competition to win an ACT Apricot. Hours of puzzling pleasure for computer

enthusiasts...or for anyone with an insatiable appetite for twenty-four carat brainteasers.

How to enter

You need a copy of *Micropuzzles* to enter the competition, so *fill in the coupon below and send it to Pan Books Ltd, FREEPOST, PO Box 109, 14-26 Baker Street, High Wycombe, Bucks HP11 2TD *or go to your nearest bookshop *or ring 01-200 0200 for immediate 24 hour service and use your credit card.

Full details of the above competition and the rules of entry are available from *Micropuzzles* Competition, Pan Books Ltd, 18-21 Cavaye Place, London SW10 9PG. Offer closes 31st January 1984.



WIN A NEW ACT APRICOT WITH...

MICROPUZZLES

POST NOW, NO STAMP NEEDED To Pan Books Ltd., FREEPOST, P.O. Box 109, 14-26 Baker Street, High Wycombe, Bucks HP11 2TD. YES Please send me _____ copy/ies of **MICROPUZZLES** at £2.95 each plus 35p for the first book ordered plus 15p for each additional book to a maximum charge of £1.25 to cover postage and packing.

name (Mr/Mrs/Miss/Ms) _____

address _____

post code _____

I enclose my cheque/postal order for £ _____ payable to Pan Books Ltd or debit my Visa/Access Account



no. _____

Signature _____

Allow up to 15 days for delivery. This offer available within UK only.

Pan Books Ltd

Registered in England

Registration No. 389591



PCN

ADMAN ELECTRONICS

Add on the Adman way

The Vic 20 really can speak...but only if you use an ADMAN SPEECH SYNTHESISER. It's word power is endless as there is no set vocabulary. Yet operation is simple. The 64 elements of English speech are pre-programmed to let you put your own words together as soon as you switch on. Just imagine...program adventure games with characters that can actually talk!

Also for your Vic 20 there are 8K and 16K RAM PACKS and the ADMAN 3 PORT EXPANSION MOTHER BOARD. With proven designs of the highest quality they are the best value for money around.

Available from Spectrum, Dixons and other major computer accessory shops

Prices around:

8k Ram Pack £39.95
16k Ram Pack £49.95
Motherboard £19.95
Speech Synthesiser . . £49.95

To find out more about these products, why not take a lead from our speech synthesiser...go to your local dealer and ask for it! Or post the coupon.

Dept. C, Adman Electronics Ltd., Ripon Way,
Harrogate, N.Yorks, HG1 2AU. Tel. 0621 740972

Adman Electronics Ltd. is a member of the Adam Leisure Group PLC

The Vic 20 speaks out!

Please send me information on Adman Vic 20 Accessories

Name

Address

PCN/11/83

3D COMPUTERS

THE HOME COMPUTER SPECIALIST ONE STOP SHOPPING FOR ALL YOUR COMPUTER NEEDS

BBC MICRO



MODEL B
£399

commodore 64

£199.00

DRAGON 32

£155.00

ORIC-1

£129.00

SHARP 48K MZ-80A

£399.00

ELECTRON

£199.00

SOFTWARE

LLAMASOFT
EPYX
INFOCOM
INTERCEPTOR
ON-LINE
DATASOFT
BRODERBUND
RABBIT
SUPERSOFT
ABRASCO
COMPUTER ROOM

PERIPHERALS

DISCS SINGLE/DUAL
TORCH Z80 DISCS
CUMANA DISCS
PRINTERS
JOYSTICKS
MONITORS
B&W/COLOUR
LIGHT PENS
BBC BUGGY

LARGE RANGE OF BOOKS,
DISKETTES, CASSETTES &
PRINTER PAPER ALWAYS
IN STOCK

Easy parking at all branches

TOLWORTH
230 Tolworth Rise South,
Tolworth, Surbiton,
Surrey KT9 9NB.
01-337 4317

SUTTON
30 Station Road
Belmont, Sutton
Surrey SM2 6BS.
01-642 2534

EALING
114 Gunnersbury Ave
Ealing
London W5 4HB.
01-992 5855

LUTON
1 Manor Road
Caddington
Luton
Beds LU1 4EE
(0582) 458575

MILTON KEYNES
Unit 1, Heathfield
Stacey Rushes
Milton Keynes MK12 6HP.
(0908) 317832

NEWBURY
26 Stanley Road
Newbury
Berks RG13 7PB.
(0635) 30047

Bill Quentin looks at a package that might ease some of your accounting burdens.

Business Spectrum

There is a sharp distinction between programs written for educational or recreational markets, and programs for use in business. While an error in 'Earnest goes skiing' can cause mild irritation, an error in an accounting package can cause thousands of pounds worth of damage, and even bankruptcy.

Errors occur periodically in all electronic devices, but good circuit design and well composed software minimise both the effect of an error and its frequency.

Errors are normally the result of corrupted data. Data can be corrupted by electrical interference, radiation, tape mechanisms and a wide variety of other phenomena. Errors can also be caused by software bugs or mistakes by the human operator.

When considering how a computer can help your business or private finances you must first decide what errors you're prepared to accept.

Verification should be present on data entry, memory storage, tape storage and tape playback. The program should also allow the cross-checking of results. Even with these precautions it would be sensible to keep a 'skeleton' manual record — just in case.

The Spectrum can play a very valuable role in the administration of your business if it is used conservatively. The computer can be very useful for checking existing records, performing calculations and any area of 'non-vital' data manipulation. It should be used with extreme caution in any task where the results cannot be cross-checked with another system.

the minimum of study. There are several diagrams and tables which help to split up the text. It is written with the small businessman in mind and requires a basic understanding of the Spectrum. However, there is no index and only a brief list of contents. The manual is a little difficult to follow in places.

Colour displays are extensively used by the program. Clever use of the border and ink colours gives an indication of the state of your business, from no profit/bank overdrawn to profit and cash in the bank.

Features

The program complements the main book-keeping requirements of a small

program analyses the figures during data entry and makes the appropriate changes to the Profit and Loss A/c, Balance Sheet, Trading A/c, and the VAT Return, as well as the Nominal Ledger.

This allows the state of the business to be reviewed and provides some of the basic information required for Management Accounting.

The Nominal Ledger has 15 expenditure accounts allowing broad analysis to be performed in the normal divisions of fixtures and fittings, motor vehicles, etc.

The VAT return is an analysis of Sales and Purchases totals for the quarter and year. At the bottom of this screen is the

Manual Accounting Entry:

Cash Book credit — £100.00 — 2/9/83 — John Brown Esq.
credit — £100.00 — 2/9/83 — Andrew Smith Esq.

Purchase Ledger debit — £200.00 — 2/9/83 — Cash A/c.

Willden Accounts Entry:

Cash Book Out — £100.00 — 2/9/83 — j brown
— £100.00 — 2/9/83 — a smith

Alteration to Willden Accounts (saved on tape):

Nominal Ledger — Creditors — £200.00
Bank out — £200.00
Balance Sheet — Creditors — £200.00 Owe Bank — £200.00



The program Small Business Accounts was written for Sinclair and is the only accounting package to be featured in the Spectrum 'Software & Peripherals Catalogue', June 1983.

Sinclair advertises it as having 'high standards of performance, quality and documentation'.

Presentation

The package contains a cassette and instruction manual which runs to 32 pages (A6 size). The manual is well-constructed and allows you to be up and running with

business. Its main use is in the provision of management accounting information, which allows monitoring of a business's performance in order to take appropriate action before trouble arises.

In conventional terms, the books kept by the program are the cash book, petty cash book, and nominal ledger. Specific details of each transaction are not available once the data has been entered into memory. See the example above.

The information saved on tape is the only data available for later analysis. The

total amount outstanding; input tax less output tax.

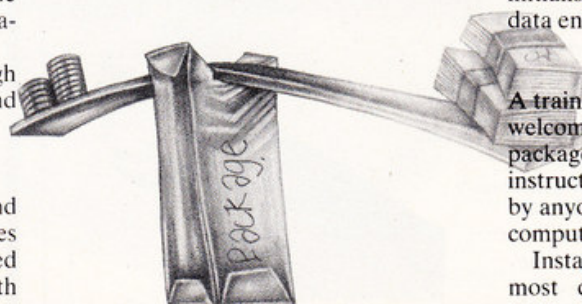
The trading account gives a bottom line gross profit figure which is brought down into the profit and loss A/c. Gross profit is calculated from sales less purchases after adjustment of stock levels. The calculation of gross profit entails the computation of a gross profit level derived from historical data and input into the Spectrum during initialisation.

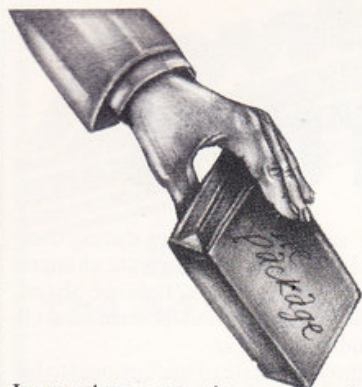
The Profit and Loss Account/Balance Sheet contain information entered during initialisation and data resulting from the data entry parts of the program.

In use

A training program is provided which is a welcome introduction to any program package. The use of menus and 'on-screen' instructions makes the package easy to use by anyone with limited accounting and/or computing knowledge.

Installing the system is probably the most difficult task a user will face.



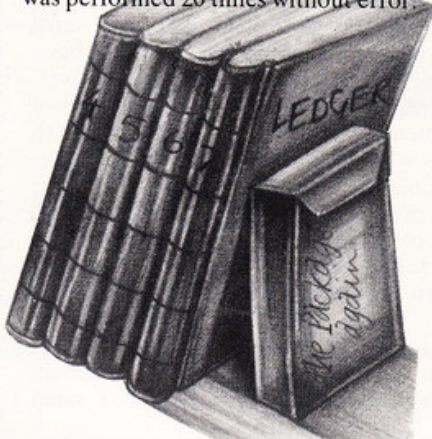


the wrong keys can result in a crash which necessitates either reloading the program or a BREAK and RUN command.

Great care must be taken at all stages of data entry that the information is being entered into memory correctly. There are no in-built validation routines and the operator is left to test data entry by cross-checking the totals from the manual records with the totals accumulated in the Ledger.

Validation is performed on both loading and saving from tape. The validation procedure involves a *save* and *load* procedure. The data from memory is first saved on the tape. Then the tape is rewound and the data from the tape is loaded back into memory to be compared, bit by bit, with the original memory.

The storage of data from memory to tape was performed 20 times without error.



Verdict

The program is a worthwhile training aid, and as such it may be attractive to many people. A business user considering the purchase of a large business computer and the student wanting to learn basic accounting procedure, will both benefit.

The program is well written and the manual is informative, if a little vague in parts. A little knowledge of both the Spectrum and accounting techniques will greatly help your understanding. Willden has managed to put quite a lot into a very small package.

RATING

Features
Documentation
Performance
Usability
Reliability
Overall Value



Name Small business accounts System Spectrum
Price £12.95 Format Cassette Publisher Willden
Services, 0892-852539 Distributor Sinclair.



Instructions are given as to how the program can be adapted to different types of business, from a simple trading operation to a more complex manufacturing company.

The standard 'data entry' methods given in the main menu are very straightforward. The issuing of Credit Notes and Stock Adjustment are equally as easy to perform. Problems arise when dealing with Sale of Assets and general adjustments of data entered during the initialisation stage. These alterations involve changing variables in the program itself. Although full instructions are given, it's likely to be a daunting task, but not impossible, to a non-programmer. The main limitation of the program is its inability to store details on individual transactions. This reduces its potential from a full book-keeping system to a management aid.

The cash-book has no contra facility which necessitates extensive checking of the system with test-data before it can be used for any vital calculation. Gross profit is calculated on a percentage of sales basis.



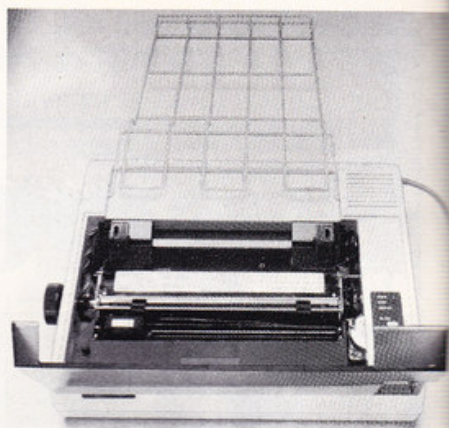
It would be difficult to allow for sales with numerous profit margins.

The system is designed for a simple trading business with few transactions. The further your business departs from this model, the more problems you will encounter during installation.

Reliability

Loading the program takes about five minutes. Accounting data is stored on a separate cassette which loads in one minute.

The program is easy to operate during data access, as return to the main menu is executed at any stage by pressing *n*. During data entry it is much easier to become trapped in a routine which can only be exited by entering some figures. Pressing



Specifications of the new Walters WM80

Printing method: Impact dot matrix.

Printing format: Alpha-numeric: 7 x 8 in 8 x 9 dot matrix field. Semi-graphic (character graphic): 7 x 8 dot matrix. Bit image graphic: Vertical 8 dots parallel, horizontal 640 dots serial/line.

Character size: 2.1mm w x 2.4mm h / 7 x 8 dot matrix.

Character set: 228 ASCII characters. Normal and italic alpha-numeric fonts, symbols and semi-graphics.

Printing speed: 80 CPS, 640 dots/line per second.

Printing direction: Normal: Bidirectional, logic seeking. Superscript and bit image graphics: Unidirectional, left to right.

Dot graphics density: Normal: 640 dots/190.5mm line horizontal. Compressed characters: 1,280 dots/190mm line horizontal.

Line spacing: Normal: 4.23mm. Programmable in increments of 0.35mm and 0.118mm.

Columns/line: Normal size: 80 columns Double width: 40 columns Compressed print: 142 columns Compressed/double width: 71 columns The above can be mixed in a line.

Paper feed: Adjustable sprocket feed and friction feed.

Paper type: Fanfold. Single sheet thickness: 0.05mm to 0.25mm.

Paper width: 101.6mm to 254mm.

Number of copies: Original plus 3 copies by normal thickness paper. (Max 0.25mm. Total thickness of 4 ply).

MTEB: 5 million lines (excluding print head life).

Dimensions: 377mm w x 295mm d x 125mm h, incl. sprocket cover.

Weight: 5.3Kg approx.

Power requirement: 240 v ac.

Data transfer rate: 4,000 CPS max.

Synchronization: By external supplied STROBE pulses.

Handshaking: By ACKNLG or BUSY signals.

The Walters Warranty

The new WM80 is supplied direct from Walters Microsystems International, the company who makes the dot matrix printer for the Department of Trade and Industry's Micros in Schools Scheme.

Under the Walters guarantee, all warranty work is carried out at our factory, normally within 48 hours of receipt of the machine at our service reception.

The first matrix printer at a truly micro price.

£199.

Now you can have a ruggedly built, handsomely styled, highly versatile printer with a performance as impressive as its price.

The new WM80 is an 80 CPS dot matrix printer which interfaces with most popular micro and personal computers. It comes direct from Walters Microsystems International at the unprecedented price of £199 + delivery + VAT by security courier.

Impressive performance

The WM80 is bi-directional and logic seeking. It prints normal and italic, upper and lower case alpha-numeric characters at 80 columns per line, compressed characters at 142 columns, double width, plus symbols and semi-graphics.

Programmable functions

The standard interface is Centronics parallel, RS-232C (SERIAL) is available as an optional extra. Programmable functions include variable margins and line spacing, horizontal and vertical tabulation, and 7 international language character sets. In total, it offers a 228 ASCII character set and has self-test facilities.

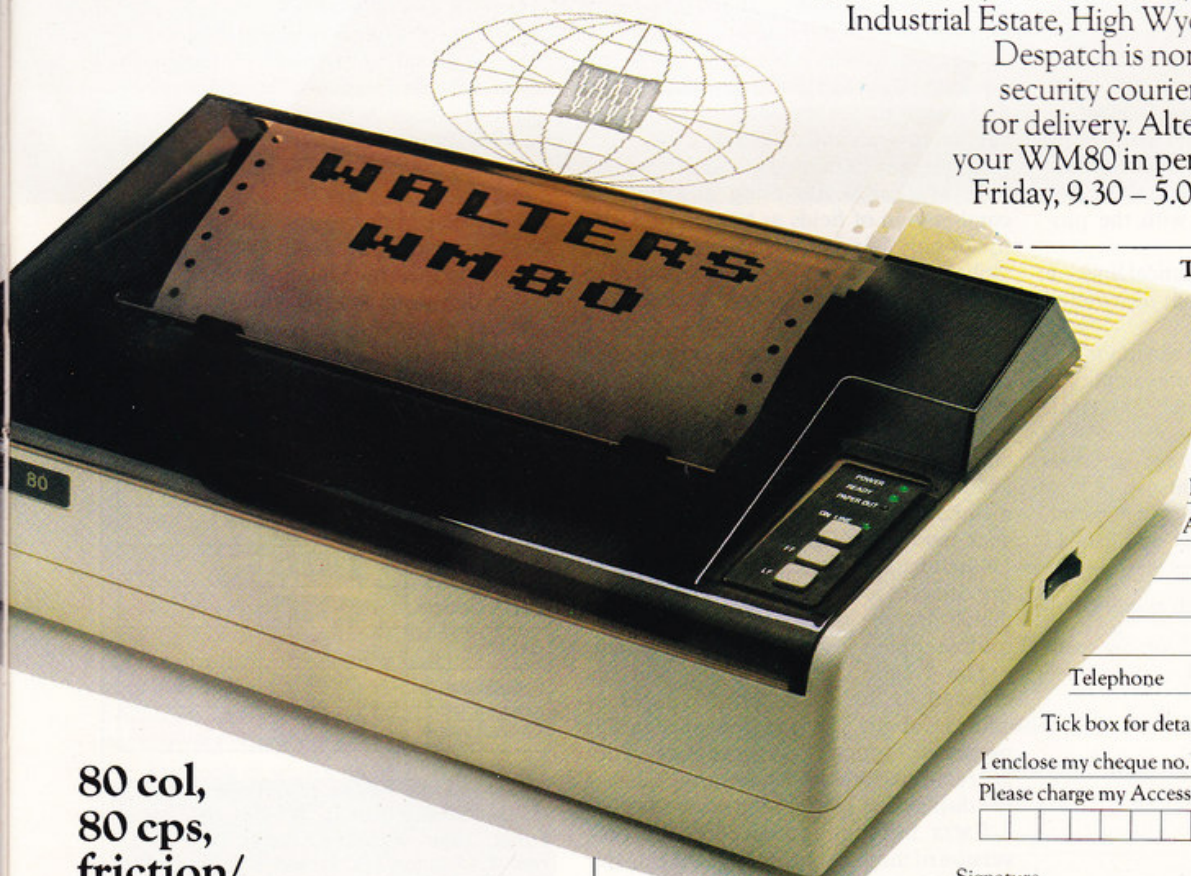
Major control codes include NUL, buzzer, backspace, line feed, horizontal and vertical tabulation, paper advance, carriage return, shift in, shift out.

Paper transport is by adjustable sprocket feed or friction. It uses fanfold paper, from 4" to 10" wide, printing up to three clear copies from an easily changed cartridge ribbon. Life expectancy of the print head is approximately 30 million characters.

Ordering your WM80

The WM80 can be ordered by 'phone on 0494-32751; or by sending this coupon to: Walters Microsystems International, 'Matrix House', Lincoln Road, Cressex Industrial Estate, High Wycombe, Bucks HP12 3RD.

Despatch is normally within 7 days by security courier, but please allow 28 days for delivery. Alternatively, you can collect your WM80 in person from Monday to Friday, 9.30 - 5.00, Saturday 9.30 to 12.30.



80 col,
80 cps,
friction/
tractor feed

To: Walters Microsystems
International Limited
'Matrix House', Lincoln Road,
Cressex Industrial Estate,
High Wycombe, Bucks HP12 3RD.

Please send me
WM80 printers at £199 + £10
delivery + VAT = £240.35 each

Name

Address

Postcode

Telephone

Tick box for details of optional serial interface ☐

I enclose my cheque no. for £

Please charge my Access/Amex/Barclaycard Card No.

Signature



WALTERS MICROSYSTEMS INTERNATIONAL

Simon Williams finds an adaptable program for smaller databases — Masterfile for the BBC B.

One of the main uses for a home computer, is the storage of data. To handle this data effectively, some kind of filing system is required which will allow the user not only to add, amend and delete files, but also to search through them for specific items and to sort them into various categories. Masterfile is available on cassette or disk and PCN tested both.

Features

Masterfile offers the facilities of setting up a file of individual records, each containing a number of fields. These records may be amended, deleted, searched, sorted or printed out in a variety of formats. The same program may be used to handle many different sets of data, so the user could set up a record index, club membership file or list of customers and handle them all at different times under Masterfile.

Documentation

Both cassette and disk versions of the program come with a slim manual which explains the various functions of the program. The disk manual is smaller in format but better presented. It is also longer, because it covers the extra facilities offered. Both manuals describe the program well, although the cassette manual would benefit from the use of larger headings. Since it also has no index (unlike the disk version), it is difficult to use it for reference.

In use

The fundamental difference between cassettes and disks is that with the latter, use can be made of a random access file. This means that any record held on the disk may be read off in a couple of seconds. With cassettes, either a data cassette must be reloaded and read for each data item, which is not really practical, or all the data must be loaded at once and held in the computer's memory along with the program.

This, of course, puts a practical limit on the number of records that may be handled at any one time.

The limit on the cassette version is 550 data items, which means, for example, 55 records with 10 fields in each or 275 records with only 2. This does, in fact, prove quite a limitation to the program's use. Within this limit, however, the program works very well in most respects. The main menu, which is presented on start up, lists 11 options:

- A Set up file name
- B Enter file description
- C Look at, or alter a record
- D Printer line length
- E Load data file
- F Save data file
- G Enter search date
- H Print (and/or search) file
- I Sort
- J Start again completely
- K Stop the program



Master your file

The file is named using Option A and the fields associated with each record are set up with Option B. Each field must be titled, given a set length and be defined as containing string, integer or numeric information. Option C is the main part of the system and is used to view and update any record on the file. Records may be selected at random by calling their record number, or cycled through sequentially.

On the cassette version there are separate options to load and save data files and these options are adapted on the disk version to open and clear a disk file.

A sort may be carried out on the records in a Masterfile file using any field or combination of fields as key/s. For a disk file of only 50 records, however, a simple alphabetical sort on one field will take in excess of 7 minutes. This can't be described as fast.

The cassette system is quicker, since all its files are held in memory, but even so can take a good while.

Searches can be carried out using a variety of 'matching' criteria so, for example, the user could extract all male members of a club who joined in a given year and lived in a particular town. Unfortunately there is a bug in this part of the cassette program and certain types of match are not recognised by the search routines unless also selected for printout.

The output from searches may be directed to the VDU, printer paper or address labels. The screen layout on this particular option is very untidy, with instructions or requests appearing all over the display and overwriting each other.

Extra facilities available on the disk version of the program include the transfer of files from tape to disk and vice versa, the

ability to append one disk file to another and the option of performing global calculations on numeric fields in a similar way to a spreadsheet program. This last ability is very powerful, as virtually any mathematical function available on the BBC micro may be used.

Verdict

Apart from the bug mentioned, Masterfile works well and offers an efficient program for small-scale databases. It could be much improved with a faster sort algorithm, possibly in machine code, and Beebug intend to include this in a future version. Unlike many software houses, Beebug has not protected this program and positively encourages the purchaser to dive in and adapt it to their own requirements.

The disk program, by virtue of its use of random access files, is a very different animal from the cassette, and anyone considering the latter should bear in mind the maximum size of file that the program will handle.

RATING	disk	cassette
Features	★★★★	★★★★
Presentation	★★★★	★★
Performance	★★★★	★★
Usability	★★★★	★★
Reliability	★★★★	★★
Overall value	★★★★	★★

Name Masterfile System BBC B Price £10.00/
£19.00 Publisher Beebug, PO Box 109, Baker
Street, High Wycombe, Bucks HP11 2TD
Format Cassette/Disk Language Basic Outlets
Mail Order and Dealers.

**Are you the QX-10 that undertakes
financial modelling, stock control,
word processing, information analysis,
book-keeping...?**

"I am"



With over 20 years of experience in producing high quality printers, Epson have now perfected a fully integrated desktop computer. All the evidence has gone to prove that the QX-10 is capable of performing all the tasks you will ever require of it, quickly and efficiently.

Installation of the QX-10 can be carried out with the minimum of interruption, and with its easily understandable keyboard, it is simplicity itself to operate.

Having such a diverse range of software packages available such as database from Pearl and office productivity and accountancy from Peachtree with C P/M and multifont BASIC as standard, the QX-10 can supply all the answers whatever your business.

Just look at what's on offer: a big memory - 192k upgradable to 256k RAM and all the graphics you'll ever need - and high resolution graphics at that.

The ability to communicate easily with other machines, including our own HX-20 and

the advantage of using our fine range of printers, make the QX-10 a totally versatile system at a price you'll find impossible to equal - £1735 plus VAT.

If you're looking at micros, look at the QX-10.

The system with all the answers.



EPSON

**Extraordinary product.
Exceptional quality.**

Epson (UK) Limited, Freepost,
Wembley, Middlesex HA9 6BR.
Sales Enquiries: Freefone EPSON.
General Enquiries: 01-902 8892.
Telex: 8814169.

- ☐ I would like a demonstration of the QX-10.
☐ Please ask my Epson dealer to contact me.

Name

Position

Company

Address

Tel: PCN 11 10

WIN A SPECTRUM!

It's here. This page was expected to be published in last week's issue but is making a sadly overdue appearance so you can complete your entry for the Micropaedia competition. Many apologies for the production problems that caused its vanishing act and we extend the deadline for competition entries to December 15.

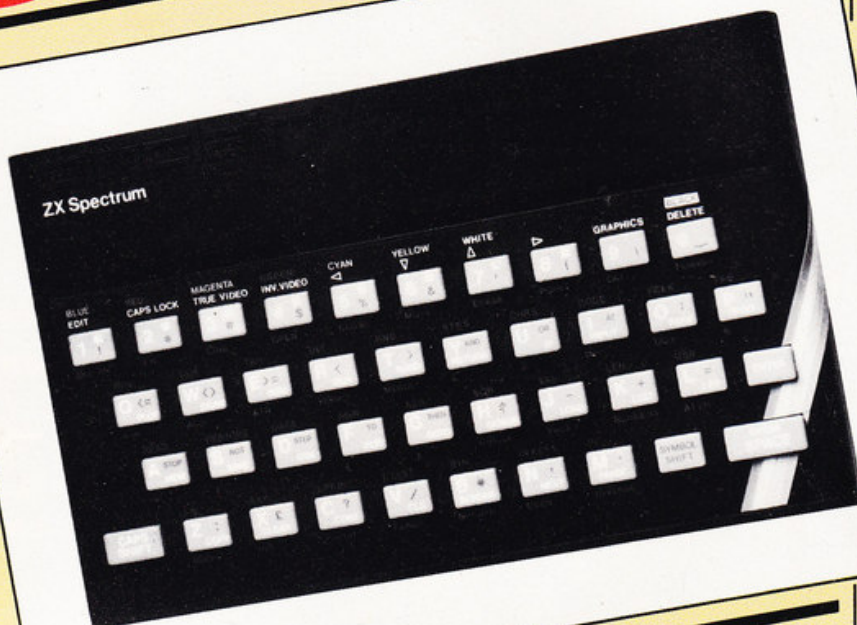
After eight long weeks here at last is your chance to win one of the ten Sinclair Spectrums we have up for grabs.

Having collected the coupons from the last eight issues you are now at the last hurdle – a simple test of how closely you've been following the programming Micropaedia. Just answer the eight questions below, each one relating to a part of Micropaedia, and send it to us before the closing date on December 15.

The first ten correct solutions opened after December 15 will win the Spectrums.

Send your coupons, and the entry form, to:

Spectrum Competition,
Personal Computer News,
62 Oxford Street, London W1A 2HG.



Not ten but twenty Spectrums. Because you've had to wait an extra week to enter, we've doubled the prize and increased your chances of winning. The first 20 correct entries opened win a Sinclair Spectrum.

1 What is the name of the processor used on the BBC Micro?

2 What does the term Basic stand for?

3 Basic supports two types of arrays. What are they?

4 How much would 16K of memory have cost you in the early 1970s?

5 Who originally developed the Forth programming language?

6 When was the European Forth Users Group founded?

7 Complete this sentence: 'One of the first adventure games for micros was Hunt the'

8 What does FIFO mean?

NAME ADDRESS

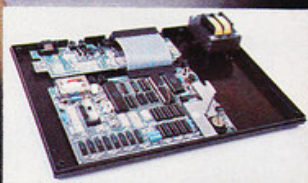
TEL NO. CURRENT MACHINE OWNED

Power to your Fingertips.



All keys on the FDS keyboard contain all the Graphic Characters of the ZX Spectrum

Microdrive Interface 1 easily adapted to fit inside the case



Transform your Spectrum with the FDS Keyboard and feel the newly acquired power flow from your fingertips as you enter data with lightning fast accuracy.

The Fuller FDS Keyboard has been especially designed for the professional user. This elegant, slim line, desk top system has a keyboard that inclines toward you and contains all the graphic characters of the ZX Spectrum, plus, additional function keys, shift keys on either side and a space bar. With all the entry keys double size, lightning fast accurate data entry is now made easy. Other amazing features of the FDS include:-

Gold plated key switch contacts, guaranteed for 10^6 operations. 4 cursor control keys, 2 functions for direct entry into E mode.

Based on the popular FD42 system, the Fuller FDS is simple to install; it requires no soldering or technical knowledge. For the user who is reluctant to install his computer circuit board inside the FDS, a buffer is available (£8.75 + 80p+p) which simply plugs into the expansion port and connects directly to the keyboard.

£49.95

Fuller

MICRO
SYSTEMS

Fuller Micro Systems
The ZX Centre, 71 Dale Street,
Liverpool 2. Tel: 051-236 6109.

At Fuller Micro Systems we strive to maintain the highest quality in both research and development, ensuring our products are the very best. We have now built a brand new mail order department to ensure our service is also the very best. Our stock includes a full range of components and kits that will make the most of your Spectrum; all our products enjoy an excellent reputation for reliability and carry a world-wide one year guarantee.

Please supply me with..... FDS Keyboard(s).

I enclose a cheque/PO payable to

Fuller Micro Systems foror debit my credit card.

Card No. ☐ Barclaycard ☐ Access Card

Signature

Name

Address

Fuller Micro Systems, The ZX Centre,
71 Dale Street, Liverpool 2. Tel: 051-236 6109



Need a monitor for your micro to maintain familial bliss? Bill Davies presents a run-down.

Talking of tubes



Sony's Trinitron: not the cheapest domestic TV on the market but its high definition makes it a popular choice for television watching computer enthusiasts.

The Zenith green screen monitor provides a steady high resolution picture for a resolutely low price.

Many people have spent the last few months annoying the rest of the family by monopolising the television set with the computer. We've taken a look at the alternatives on offer at the lower end of the price bracket.

It's possible to spend many hundreds of pounds on a monitor; in fact, the sort used by the professional TV companies at the BBC and ITV sometimes cost well into four figures. It's not really necessary for the home computer user, tempting though it may be if you have the money.

What you use your computer for will influence your choice of visual display unit and in most cases you are restricted about the methods of feeding a signal from the computer itself.

Micropaedia in this issue goes into more detail of the various types of monitor and what they mean.

You usually have three options — composite video, RGB and RF modulated as on a normal TV set. Some computers have all three outputs, some two, but all have RF. We put a number of different types of visual display units to the test using a BBC model B computer. All the sets we chose for review are equipped to the PAL television standard and would be compatible with any home computer on the British market which has the relevant video output connections.

The BBC machine has facilities to hook up all three types of output, but the composite video is only in monochrome. If you use the computer for word processing or business and accounts work you will probably find that a monochrome display will be perfectly adequate. This can consist

of a black and white television set or a dedicated green or amber screen monitor. Either of these options provides the cheapest way of obtaining a display.

Green/Amber screen monitor Zenith Data Systems make both green and amber screens. Amber are generally £15 to £20 more expensive than the more common green screen.

I usually use a Zenith green screen monitor for my word processing work, but for this test I also looked at the newer amber screen. The main advantage of having a dedicated monitor comes home to you whenever you find yourself sitting in front of a television screen for hours on end.

The screen display is flicker-free and the letters are clear and precise. When used in Mode 7 (Teletext mode) there is little to choose, but if you switch to 80 column (mode O) the monochrome monitor really pays off.

Whether the extra cost of the amber screen is worth it or not is very much a personal decision.

The Zenith monitors come with a minimum of controls, brightness and contrast being the most used. On the new models all the controls for adjusting vertical/horizontal hold, brightness, contrast and vertical screen size are positioned on the front. Zenith have also added an LED by the on/off switch to indicate if the set is powered or not.

Dedicated Colour Monitor I tested a new all British made Cabel colour monitor. Cabel Electronics has been making monitors for the home computer market since early this year and pricing them at about £230

including VAT which means they are very competitively priced at the moment.

The Cabel monitor is RGB fed, although the company says they are planning to bring out another model in the New Year which will be capable of taking either RGB or composite video.

At that price you inevitably get a very basic monitor. The screen display is sharp and flicker-free, but the definition is not really good enough to use with Mode O on the BBC machine with 80 column display.

I found the colours generally good and reasonably true and working at about three feet away from the screen wasn't too much of a strain.

The monitor comes with six feet of cable and an RGB lead compatible with the BBC Micro. If you wish to use it with any other make finding a compatible lead shouldn't be too much of a problem.

The monitor is in an attractive white plastic case with the screen sloping back slightly so if it's placed just behind the micro it is easy to see and read. It does, however, weigh about 16 kilos.

On the front is an LED to indicate power on/off, a brightness and contrast control and the on/off push button switch. All the other controls are underneath the set and require tuning wands, thereby keeping out prying fingers.

Fidelity has recently announced a monitor priced at £199 including VAT which will accept both RGB and composite video, but unfortunately at the time of writing this review the set wasn't available. This monitor could be handy for someone who might have more than one computer, which have different video outputs.

For the Commodore 64

SOFTWARE
you can afford!

Mondatta
Ltd.

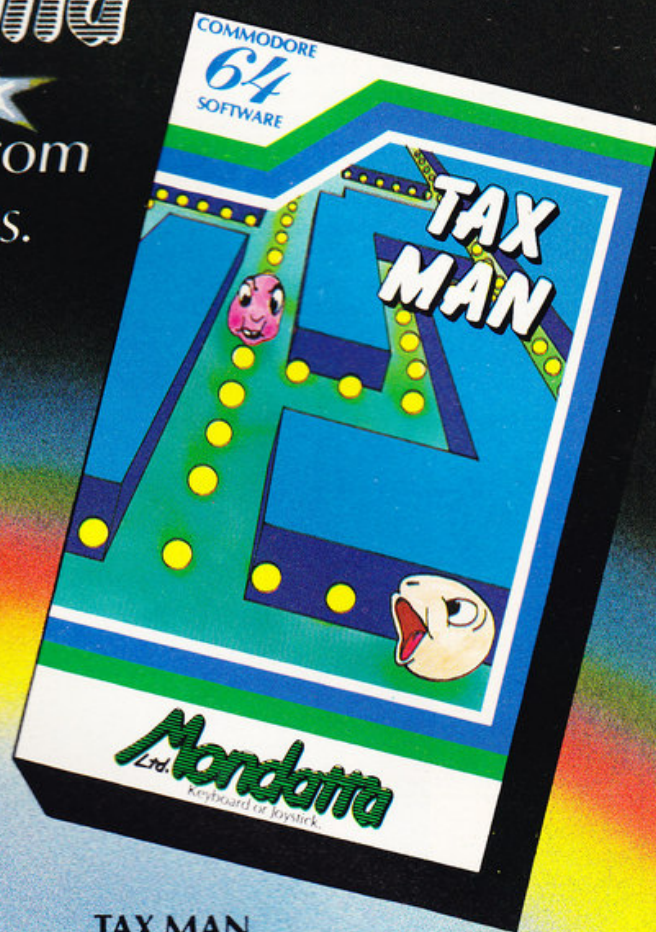
Software from
the States.



SUPER COPTOR

Fly Super Copter in a Mission to Save your Country from destruction. Beware of "Air Missiles", "Radar Balloons", "Laser Screens". Control your "Super Copter" with split second timing — are you up to it — 9 nerve popping, action packed levels of play.

ONLY £5.65.



TAX MAN

You are on the run, gathering as much money as possible while being pursued by Taxmen with tax bills in their hands. Ready to pounce on you and make you bankrupt. Can you outsmart them or will they ambush you by hiding in the background.

6 exciting "Arcade Action" levels of play. A completely new version of this "nerve popping" game.

ONLY £5.65.

DO YOU WANT A SHARE OF THE ACTION - £55,000

Mondatta will pay up to £55,000 for good quality games software. Send details to the Software Development Manager at the nearest address below.

**DEALER
INQUIRIES
WELCOME.**

POST COUPON NOW

Please rush me _____ Tax Man at £5.65 each
_____ Super Copter at £5.65 each
+ 50p post & packing.

I enclose Cheque/P.O. for £ _____
(Make payable to Mondatta.)

Name _____

Address _____

Post to: Mondatta Ltd., 38 Cuddington Avenue,
Worcester Park, Surrey KT4 7DB, England.
Tel: 01-3370806.
Mondatta Ltd., Darwen House,
200 Rathfarnham Road, Dublin 14, Ireland.
Tel: 01-963250.
Mondatta Ltd., 888 Seventh Avenue,
New York, N.Y. 10106, U.S.A.

**FREE
ENTRY TO A
DRAW
FOR C.B.M. 64
DISK DRIVE
& PRINTER.**

Television/Monitors A recent trend on the market has been the introduction of the domestic television set that is also a monitor. There are a number around, but we took a look at the cheapest one from Normende.

The screen size is 14in and it is small enough to be used comfortably just behind the computer.

Priced at £250 the model 1534 comes with a fully tuneable 12 channel television and the option of operating your computer via a 7 pin cable. When the RGB cable is plugged in the normal television tuning controls are disengaged, so it doesn't matter what channel you have the set tuned to; a fact that might take a little time to get the hang of, since the instruction manual that comes with the set, made in Singapore, appears to have been translated from the German into Chinese and back again.

You have the option of using your computer through either the RF tuner or

through the monitor direct. Using it through the tuner you tune the set to channel 36 and use the channel 12 button, so with this particular set it was possible to make a true comparison between RF and monitor. The signal through the RF modulator was appreciably worse than direct through the monitor.

The big advantage of this set is that for a little more than the price of a regular television portable you can have a set which can be used well through the computer for playing games and using 40 column text; and of course if it is a second set you have a spare if the main one breaks down — or someone wants to watch a TV programme.

It has to be said that the monitor picture quality, though good, is not as clear as the one I looked at on the Cabel dedicated colour monitor, and although I don't recommend using the colour monitor for 80 column work, I found that on the

Normende, 80 column was virtually unreadable even in monitor mode.

The review set was only capable of accepting an RGB input, but with a slight modification the set may possibly be made capable of accepting composite video — ie for the Dragon.

A further advantage of buying a television/monitor is that because there's sound with it you can use it with computers which feed sound through the TV set, or with a video recorder using the video/sound output.

Sony Trinitron The Sony is not the cheapest domestic portable colour TV on the market, but because it has exceptionally good, clear definition, it has become very much the 'industry standard'.

The picture is fed from the RF socket at the back of the computer and it will work with any home computer. Tuning the set to around channel 36 should give you a picture from the computer.

The secret of the Sony is that the Trinitron tube, unlike those of rival manufacturers, has only one 'gun' at the back. This means that there is little or no chance of convergence problems. For normal domestic TV viewing this doesn't cause too much of a problem, but when you are using a computer often, working closer to the screen than normal, and with a lot of text to read, it gives a brighter, sharper picture. Perhaps Sony will introduce a cheaper monitor using the Trinitron tube and aiming at the home computer market.

Verdict

What you finish up buying is very much up to you. If you want a monitor purely for business use, such as word processing or accounts work then an inexpensive green or amber screen monitor will probably suffice.

If you are sufficiently dedicated and use the machine a lot for games playing, and can afford to have a television set which is used for that and nothing else then a dedicated colour monitor will be for you. If your family is looking for a second television set, either as a spare if the main set breaks down or so that the rest of the family can go off and watch *Crossroads* while you improve your mind with *Sale of the Century* with a better than average display on the computer, then the television/monitor is your best bet.

Finally, if you want a better than average television which also gives you an adequate computer output then you should consider the Sony. At the end of the day the decision lies between you and your bank balance.

Zenith Monitors Zenith Data Systems, 0452 29451 **Price** £109 (Green screen) £115 (Amber screen) **Outlets** retail.
Cabel Colour Monitor Model CE370A **Price** £199.50 + VAT **Outlets** Cabel Electronics, 0684 298840, Mail Order, some retail.

Normende TV/Monitor Model 1534 **Price** £259 inc VAT **Outlets** Microstyle 0635 42570

Sony Sony UK Ltd. 01-941 5717 **Price** £250 approx **Outlets** Retail.



Text handling benefits from the stability of a monitor but even small television screens are capable of displaying information and graphics with acceptable resolution like the 9 inch Panasonic below.



AVID COMPUTER CENTRES

Fantastic Pre-Xmas Computer Offers

All our
prices
include
VAT

Compare our prices with other dealers!

COMMODORE 64

CBM 64 £199.95

C2N Cassette Deck
£44.95

1541 Disk Drive

£219.95 (inc. £105
of software FREE)

1525 printer £219.95

Standard Joystick

£7.95

CBM 64 Software —

cassettes from £4.95 plug-in cartridges from £9.95



VIC-20

VIC-20 Computer
£99.95

VIC-20 Starter Pack

inc. Cassette Deck

Intro to Basic

& 4 games

£139.95

C2N Cassette Deck

£44.95

16K RAM pack £29.95 16K/3K switchable RAM pack £34.95

VIC-20 Software Cassettes from £4.95

Plug-in Cartridges from £9.95



SINCLAIR SPECTRUM

Sinclair Spectrum 16K

Phone for latest low Price

Sinclair Spectrum 48K

Phone for latest low Price

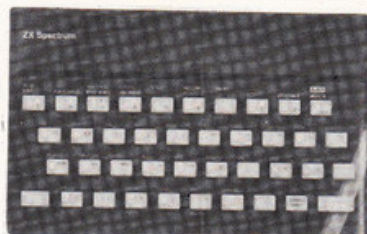
Spectrum Memory Upgrade

Kit 16K to 48K £24.95

Sinclair ZX Printer £39.95

Kempston Joystick Interface

£14.95



BBC MODEL B

BBC Model B
£399.95

BBC Model B with

Disk I/F £469.95

Disk Interface Kit

(Fitted) £95.95

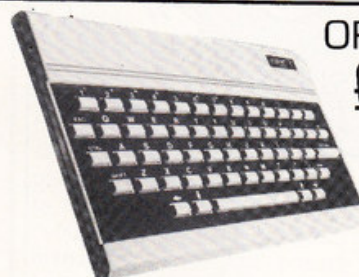
Cumana 100K Disk Drive £239.95

Wordwise W/P ROM (Fitted) £45.95

Quick-Shot BBC Joystick £23.95



ORIC-1



ORIC 48K
£129.95

Quick-shot Joystick

for Oric £23.95

Oric Colour Printer/

Plotter £129.95

(inc. £40 discount
voucher)

JOYSTICK

Pro-arcade Joystick

Heavy duty construction

micro-switch contacts std.

for Commodore Atari, etc

£17.95

BBC version

£19.95

MAIL ORDER

All the equipment in this
advertisement is available by
Mail Order. FREE delivery by
Securicor. Phone your
nearest branch for details.

SOFTWARE

Most branches carry a wide
range of software for these
computers. Ask for details.



Also available at certain branches:
ATARI · TEXAS · DRAGON

Bolton (Lancs)
Cleartone Video
166 Blackburn Road
Tel: 0204 384024

Bradford
Erricks of Bradford
Fotosonic House
Rawson Square
Tel: 0274 309266

Bristol
Radford Hi-Fi
52-54 Gloucester
Road
Tel: 0272 428248

Croydon (Surrey)
Vision Store
96-98 North End
Tel: 01-681 7539

**Chelmsford
(Essex)**
Rush Hi-Fi Centre
5-6 Cornhill
Tel: 0245 57593

Dunstable (Beds)
Target Electrical
45 Katherine Drive
Tel: 0582 67750

**Kingston-on-Thames
(Surrey)**
Vision Store
3 Eden Walk Precinct
Tel: 01-546 8974

Liverpool
Beaver Radio
20-22 Whitechapel
Tel: 051-709 9898

Nottingham
ENL Audio Visual
116-118 Alfreton Rd
Tel: 0602 784015

**Palmer's Green —
London N13**
SPI Sound Vision
359 Green Lanes
Tel: 01-882 5888

Preston (Lancs)
Goodrights
1 Friargate
Tel: 0772 57528

Warwick
JCV Hi-Fi & Video
Wharf Street
Tel: 0926 493796

PRINTER BONANZA!

EPSON

PRINTERS AT UNBEATABLE PRICES

EPSON RX80T £225 + VAT	STAR 510 £239 + VAT
EPSON RX80FT £250 + VAT	STAR 515 £350 + VAT
EPSON FX80 £334 + VAT	CT1CP80 £249 + VAT
EPSON FX100 £485 + VAT	MT80 £266 + VAT
EPSON MX100 £390 + VAT	
SEIKOSHA GP 700A £337 + VAT	

THE NEW 'STAR' AND 'CP' PRINTERS –
AS GOOD AS EPSON

STAR & EPSON – THE BEST ON THE MARKET.



All printers carry a 1 Year Guarantee and come with paper. Shipment is by TNT Overnight Express to your door – Please add £7 VAT carriage.

Payment by Cheque, Access, Visa etc.

As our prices vary from week to week send for our full weekly stock/price sheet which will cost you only a sae.

Shipments throughout UK. We can export to most countries in the world. Please phone for Access or Visa buying details.



**IMMEDIATE
DELIVERY.**

Micro-Spares

We cannot and will not be beaten on Price!

Note our change of address
104-106 Hanover Street, Edinburgh EH2 1DR
031-226 3345

LANDAU ELECTRONICS LTD.

SPECIALISTS IN

software

Programmes for all leading home computer & video games including:

APPLE, ATARI, BBC, COLECOVISION, COMMODORE
DRAGON, ELECTRON, INTELLIVISION, ORIC
SINCLAIR, SORD, TEXAS, VECTREX
& MANY OTHERS!

LANDAU ELECTRONICS LTD.

IN:

LIONHOUSE, 227 TOTTENHAM CT. RD.
LONDON, W1

TEL: 01-637 3024

AND AT: 215 HIGH ST., SUTTON., SURREY

TEL: 01-643 5494

SUPA CATCHA TROOPA

GOLF



NEW FOR THE
COMMODORE 64
ONLY £7.50 EACH



SUPA CATCHA TROOPA

Be astounded by the superb hi-res graphics, the six levels of play and amazing sounds. Destined to be one of the most sought after games this Christmas.

GOLF

We created it for the Spectrum, now also available for the 64. An extremely realistic challenging and fun experience. The authentic computer golf, addictive whether or not you play the outdoor game.

Call in at your local stockist or contact us now for these and the rest of our range on the Vic-20, Commodore 64, Spectrum and Dragon.

Abrasco Ltd., The Grange Barn, Pikes End, Eastcote, Middx. HA5 2EX.
Tel. 01-866 2518.

ABRASCO

a touch of magic



Handful of Dragons

GOLF

Being a fan of Microdeal software since *The King*, I was very disappointed with the graphics offered by *Golf*. Perhaps I've been spoiled or was expecting too much.



You play a round of up to eight holes with a maximum of four players. The player who finishes with the least number of strokes is the winner. You define the course beforehand as either easy, tough or unbelievably difficult.

At first the selection of clubs available for each stroke was bewildering. Being a novice, I was lost by the choices of four woods, eight irons and a chipper.

Mis-hits occur during play and you can end up in the rough, the water or a sandpit (that's a bunker). The display is limited to a bird's eye view of each hole, with the number, par, distance and player details on screen. Once the club type and number have been selected, direction is chosen using a clockface, you hit the spacebar and the ball takes off.

Dither over a shot too long and the machine prompts you with terse messages. When you finally make the green, the display changes to a circular green and all you need to specify is the distance you want the ball to travel and in which direction.

Fun for a group of would-be golfers on a wet Sunday afternoon, but there's nothing more frustrating than seeing your ball sail straight over the hole, or perch on the edge, or land again in the rough.

Needless to say I didn't manage a hole-in-one, but on one or two holes (on the hardest setting) I did get a respectable one over par.

UXB

You are presented with a monster bomb and told to defuse it. While this game won't give you the sweaty palms of the real thing, it was exciting to play.



You have to select six tools

from a list of 12 for your task and with the exception of one, these must be taken as you need them. A wrong decision at any time results in the bomb exploding, taking you with it.

An attractive use of graphics and text throughout. Once you've been blown up you can return to the start or go back to the last stage. Unfortunately, if you pick up the wrong tool there's no apparent way of dumping it, and carrying more than six will result in your early demise.

Help is occasionally offered — when asked — and a menu is instantly available, as is a look inside the bomb.

Having played the game through to the end and defused the bomb there's yet another obstacle to overcome, which I'll leave you to find out.

You're offered the chance of another go at the very end, but as the combinations and the scoring seem to remain the same I didn't see much point in replaying it.

INTERGALACTIC FORCE

Microdeal hasn't overlooked the homicidal maniacs among their customers, and for those whose greatest delight is seeing how many millions of aliens they can zap at a sitting comes *Intergalactic Force*. Here you are in command of a spaceship flying along a three-dimensional corridor that comes out of the screen towards you. Above you is a fighter ship firing lasers down on you, while beneath you from time to time will pass an air-shaft down which you must drop a bomb to destroy the alien invaders in their spaceships below.

With three skill levels and a choice of fast or slow speeds, this is the type of game to present a challenge to most people, the kind which is reasonably easy to master but then grips you as you play and play and know that one mistake could be fatal.

You begin with five ships and receive a bonus one for each 1000 points, the scoring being



ten points for a fighter above you and 200 for a bomb down a shaft. You only have a limited number of bombs, and when these have run out you replenish your supply by moving your ship up off the top of the screen and back down again past the fighter.

A joystick is vital for this one, which has the requisite zap-blast sound effects with the TV on at full volume, and the machine code action ensures a smooth and fast game.

Not a game for everyone, but a good version of its kind.

KEYS OF THE WIZARD

The same might be said of *Keys of the Wizard*, the first adventure game that Microdeal have released for a while. This one originating with Spectral Associates.

To really succeed you need to find all 32 treasures and take them to a place called the Sanctuary, if you can manage to find that. For all this you will be rewarded with 662 points, music, a special winning message, and, for all I know, a line of dancing chorus girls and a 21-gun salute.

There are three skill levels, the easiest being for novices and only revealing part of the game. This level is recommended so that you can get used to the various commands and the general make-up of the game, and should be completable in less than six hours.

Level two is a little more complicated, as the creatures who are out to get you are of a nastier frame of mind, and this should keep you occupied for up to ten hours. On level three you get the works.

The commands are mostly entered in the usual verb-noun fashion.

There is nothing particularly unusual or different about *Keys of the Wizard*. The seasoned adventurer might prefer to look elsewhere, but for the rest of us it's a program that should provide value for money and accompany many a late-night drinking session . . . sorry, thinking session.

INVALID
MOVE!
SOUTH--
CMD

LANDER

Not another Lunar Lander, I thought at first, but this version from Software Scene is a cut above some I have seen. The object is, of course, to land your lunar module as gently as possible. Landing too fast, either vertically or horizontally, too far from base, without your landing gear down or running out of fuel results in your demise. This is marked by a rather dull screen display in block graphics (and a welcome to the celestial choir).



You start by choosing your rank, between marshal and cadet, though the only difference this seemed to make was to vary your initial fuel quantity. The module's instrument console is well designed and shows you all the relevant detail — vertical and lateral speeds, altitude, distance from base, fuel, landing gear down, main or secondary engines and so on (the secondary engines have to be brought into play to negotiate the final landing phase). A neat touch is a warning panel through which various messages scroll.

If you're struck by a meteor you should don your space suit. Once landed, or if you decide to abort a bad attempt to land, you reach the second phase — which seems to have been tacked on as an afterthought. Here you have to take off, then dock with the mother ship in orbit by matching altitude and velocities.

This is an unexciting affair, though just as hard as a good landing. Apart from being told that I was leaving orbit when I should have been told that I was reaching escape velocity, this fairly simple game is effective and encourages you to have just one more go to get right, but I doubt that it would have much long-term appeal.

Golf, Intergalactic Force, Keys of the Wizard (£8 each), Microdeal, 41 Truro Road, St Austell, Cornwall.

UXB (£6.95), Virgins Games Ltd, 61/63 Portobello Road, London W11.
Lander (£5.95), Brooklands Computer Graphics, 13 Castle Street, Dover, Kent

COMMUNICATIONS

Tandata

SMART MODEMS
Auto dial, direct connect, with 8 telephone & 8 ID store on modem, 1200/75bps or full multirate (1200/75, 75/1200, 300/300 full duplex 1200/1200 half duplex). Many advanced features. From £99.

Also special terminal, Prestel and down-loader software for BBC - APPLE - COMMODORES with more following

**ELECTRONIC MAIL
PRESTEL
BULLETIN BOARD
TELECOM GOLD
COMPANY DATA BASES
MICRONET 800
TELESOFTWARE
MICRO-TO-MICRO "CHAT"**

Tandata Marketing Limited,
Albert Road North, Malvern, Worcs. WR14 2TL
Telex: 337617 Prestel * 799 # Telecom Gold: TAN 001

Please send me Smart Modem literature and Order Form

NAME _____
COMPANY _____
ADDRESS _____

PCN 24/11

PRINTERS

STAR Dot Matrix £
DP510 (100CPS-80COL) £235
DP515 (100CPS-136COL) £325
Friction & Tractor

SUPER VALUE

EPSON Dot Matrix
RX80 (100CPS) Friction £248
FX80 (160CPS) F&T £370
JUKI (18CPS) Daisywheel £375

Paper
Ribbons
& Refills
Etc



INTERFACES to fit most MICROS

e.g. **SPECTRUM**™ PRINTER DRIVER (Parallel)
WITH FREE CABLE & WORDMANAGER £30

ATARI™ PRINTER DRIVER (Parallel)
WITH FREE CABLE £40

AND MANY MORE ON OFFER!

DISK DRIVES

5 1/4" SS/DD 400K £150
(Both 80 track)

5 1/4" DS/DD 800K £210

8" SS/DD £230

APPLE Cased £200
Compatible 5 1/4"

Disk Controller £40

TANDY Model 3/4 drive kit £375
(Controller, fittings, power supply, DDS, 1 Drive)

PLEASE ADD 15% VAT

MICRO RESEARCH LTD
Industrial Unit 5, Knightsbridge East,
LIVINGSTON, EH54 8LJ, West Lothian, Scotland.

10 Floppy Disks
5 1/4" £15
Lockable Case
for 100 Disks
Just £19

LOOK

**FREE
DELIVERY !**

SPECTRUM JOYSTICK

£9-95 INCLUDES
VAT, P&P
**NO INTERFACE
NEEDED**

SS
Spectrum - Stick

DIRECTLY
OPERATES THESE
KEYS



TO GIVE PRECISION JOYSTICK CONTROL

- ESSENTIAL FOR FLIGHT-SIMULATION & SIMILAR GAMES.
- INCREASES SKILL LEVEL ON GAMES USING CURSOR KEYS.
- SPEEDS GRAPHIC PLOTTING AND DRAWING.
- NO ELECTRICAL CONNECTIONS — ALL REAR SOCKETS FREE.
- FITS & REMOVES IN SECONDS — NO TOOLS REQUIRED.
- NO MODIFICATION NEEDED TO SPECTRUM CASE OR KEYS.

TO:— GRANT DESIGN LTD, BANK HOUSE, REEPHAM, NORFOLK, NR10 4JJ
PLEASE RUSH ME A SPECTRUM-STICK CONTROLLER. I ENCLOSE
CHEQUE/P.O. FOR £9-95 (PAYABLE TO GRANT DESIGN LTD)
PLEASE CHARGE MY ACCESS ☐ VISA ☐ CREDIT CARD NUMBER

NAME _____

ADDRESS _____

NEW
FOR 16K AND 48K
SINCLAIR SPECTRUM



PO'S
CHEQUES
ACCESS OR
BARCLAYCARD
NUMBERS BY POST
FOR DESPATCH BY RETURN
CREDIT CARD HOLDERS MAY
PHONE 0603 870852 FOR
IMMEDIATE DESPATCH





ATARI 400/800

Up, up and away

Name Zeppelin System Atari 400/800/XL series **Price** £24.95
Publisher Synapse, USA **Format** Disk, cassette & cartridge
Language Machine code **Other versions** none **Outlet** Norwich Camera Centre, 20 White Lion Street, Norwich NR2 1QB, 0603 612537

Forget all about your hyper-space-jumping, multi-rock-eted, laser-lancing planetary cruiser — that's so much old fashioned scrap metal. To be really up to date these days, you've got to go back in time to the days of barrage balloons. You need a Zeppelin.

Objectives

The gaseous atmosphere of the cave world of Zarkafir has led to the development of hot air technology. Into this world in a superzeppelin you come, bent on destroying the evil Time-lords whose base this is.

In play

The tape takes a fair time to load but don't turn the sound of your TV down or you'll miss two pieces of classical music.

The action starts with your large white zeppelin gently powering through the seventh level of the cave system. Joystick movement controls your direction, although you are always moving forwards through the cave system.

Your zeppelin can fire in two directions at once, and you certainly need that firepower. The caves seem alive with small

hot air balloons and zeppelins which you must avoid or destroy.

Rocks and earthquake debris cascade upon your frail craft and when an earthquake occurs, the whole screen shakes, making your passage a nightmare.

Barriers and laser gates must be blasted through if you are to explore all of the 250 rooms of the caverns. The screen scrolls gently in the direction you are heading, and forks to other caverns seem to appear from any compass point. Shooting the various switches turns some enemy defences on or off. Although each switch has only one function that never varies, it's up to you to discover which that function is.





Other problems include picking up keys for dropping into keyholes, gathering hamburgers (for feeding to the hamburger creatures, of course) life markers for rejuvenation, TNT and plungers. These are tricky; you must shoot the plunger to bring it into the up position, deposit the TNT and then shoot the plunger again — your reward for this feat is entry to the next level.

Verdict

As usual with Synapse games, this has stunning graphics, colour and sound. Another winner — and that's not just hot air!

Bob Chappell

RATING

Lasting appeal 
Playability 
Use of machine 
Overall value 



Snoopy's day-dream

Name Blue Max System Atari 400/800 **Price** £24.95 **Publisher** Synapse, USA **Format** Disk & Cassette **Language** Machine code **Other versions** Commodore 64 (soon) **Outlet** Home Computers, 234 Church St, Blackpool FY1 3PX Tel. (0253) 22340

Bored with firing at foreign beings from outer space? Fed up to the teeth with bashing bugs and beetles? Weary of wading into wizards and warlocks? Blue Max will change all that. This is a game with its feet planted firmly in history and its head, literally, in the clouds.

Objectives

In 1915, Max Chatsworth's entire squadron was cut to ribbons by enemy planes. The RAF pilot vowed revenge and the following month shot down 13 enemy planes. The Axis offered the most prized medal — the Blue Max — for his defeat. From then on, he was nicknamed 'the Blue Max'.

You are Blue Max of the RAF, in charge of a fighter bi-plane. Your mission is to pulverise the enemy by bombing and strafing their airfields, bridges, ships, buildings, anti-aircraft batteries, vehicles, tanks and fighter planes.

In play

With this theme, what else could start the game but a rendition of 'Rule Britannia'? The screen provides an aerial view of the scene below with information such as speed, altitude, score, remaining fuel and bombs being displayed at the bottom of the screen.

Your bi-plane is revving up on an airstrip and soon starts to taxi down the runway. When its speed reaches about 100mph, pulling the joystick has it lifting off smoothly into the air, its shadow helping you to gauge its height. Below is a smoothly scrolling and fine-detailed landscape of fields, rivers and bridges. Ships moored or steaming up river let rip with anti-aircraft fire as do a host of gun emplacements. Enemy planes come at you from below and above, behind and in front, but only one at a time.

Diving slightly and firing releases one of your bombs. The sound effects and graphics are superb; if a bomb lands harmlessly in the river, there is a loud splash and it disappears beneath the water. If it hits the ground, there is an impressive explosion and a crater opens up. A direct hit on a bridge leaves a gaping hole through which you can see the river.




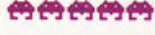
Strafing is most effective when flying at around 25 feet and holding the fire button down releases a barrage of white tracer bullets with tremendous explosions on striking enemy tanks. When the action is fierce, it is easy to be dazzled by the amount of on-screen movement.

Verdict

One of those programs to make you 'Ooo!' and 'Ahh!' with delight at the brilliantly detailed graphics and action. The sound effects are spot on, too. Deserves a medal of its own.

Bob Chappell

RATING

Lasting appeal 
Playability 
Use of machine 
Overall value 

ANIROG SOFTWARE

COMPUTER GAMES
OF TOMORROW
AVAILABLE
NOW!

**AS SEEN ON
T.V.!!**



HEXPERT



MOON BUGGY



SKRAMBLE



3D TIME TREK

COMMODORE 64

NEW

GALAXY

AVOID CAPTURE BY THE ALIEN MOTHER SHIPS TRACTOR BEAM AS THE FIGHTERS DIVE BOMB YOU. 100 SCREENS WITH A TWO PLAYER OPTION. K.B./J.S. £7.95

KONG K.B./J.S. £7.95

4 SCREENS WITH BRILLIANT ANIMATED GRAPHICS.

SKRAMBLE J.S. £7.95

6 SECTORS TO TEST YOUR SKILL.

HEXPERT J.S. £7.95

TRAIN BERT TO BE HEXPERT ON THIS 3D HEXAGONAL PYRAMID.

MOON BUGGY J.S. £7.95

MANOEUVRE YOUR PATROL CRAFT OVER GIANT POT HOLES AS YOU DEFEND THE MOON BUGGY FROM ALIEN ATTACK.

FROG RUN K.B./J.S. £5.95

A POPULAR ARCADE GAME. FUN FOR THE WHOLE FAMILY.

3D TIME TREK K.B./J.S. £5.95

SPECTACULAR 3D GRAPHICS STAR TREK GAME.

DUNGEONS K.B. £6.95

ENTER THE REALMS OF FANTASY IN THIS ROLE PLAYING GAME.

DARK DUNGEONS K.B. £6.95

2ND IN THE SERIES OF FOUR. DEFINITELY NOT FOR THE FAINT HEARTED.

**NEW APPROVED GAMES FOR
THE STACK LIGHT RIFLE**

INDIAN ATTACK £5.95

COSMIC COMMANDO £5.95

VENGEANCE OF ZENO £5.95

24 HR. CREDIT CARD SALES HORLEY (02934) 6083
PAYMENT BY CHEQUE, P.O., ACCESS/VISA

8 HIGH STREET HORLEY, SURREY.

Overseas 50p post & packaging

TRADE ENQUIRIES WELCOME

29, West Hill, Dartford, Kent. (0322) 92513/8



COMMODORE

Scramble
angle

Name Skramble System
Commodore 64 Price £7.95
Publisher Anirog Software, 8 High Street, Horley, Surrey
Format Cassette
Language Machine Code
Other Versions None
Outlet Retailers/Mail Order.

It was always on the cards that a version of the arcade Scramble would soon appear on the 64, and here it is.

It's one of the easiest I've played, but that said, I still can't get beyond the fifth section (out of six).

Objectives

The aim is to get through all six of the levels right up to the Cobron base. On the way, life is made pretty unpleasant for you by a whole range of different methods.

In play

Another joystick-only game from Anirog, but even if you vastly prefer keyboards, you'll still find Skramble is fun. Your interest is maintained by wide variety and the game is fast and packed with action.

The delay between games, however, is very tedious, and looks like it's just a way of proving that Anirog have the technical ability to move their company logo around the screen. It's interesting to see once, but once only.

You control a small fighter/spacecraft and fly it from left to right. You can move up and

down, going forward speeds you up, backwards slows you down.

The fire button gives you bombs and bullets at the same time, and it's almost essential to keep firing. If you don't, you're liable to miss out on the ammo dumps and fuel supplies, without which you die, or get killed which spreads your wreckage across the screen.

First you cross mountains, and rockets launch up towards you. If you negotiate this section you then find a series of up and down UFOs waiting for you. They tend not to wait around, so you must shoot them down quickly. If you can.

Section 3 has fireballs coming at you. And you can't shoot them down either, so it's worth dodging them. If you can. Section 4 boasts a city with very tall tower blocks, which means staying at the top, and, if you get through this, you run into the maze. This is the bit I haven't yet mastered. The ups and downs of the maze are pretty tricky, and at this stage you need four-way controlling on the joystick.

I have yet to get on to section 6.

Verdict

I enjoyed this game a great deal, and can thoroughly recommend it. Quite fast, not too hard, but not too easy either, and fun to come back to.

Piers Letcher

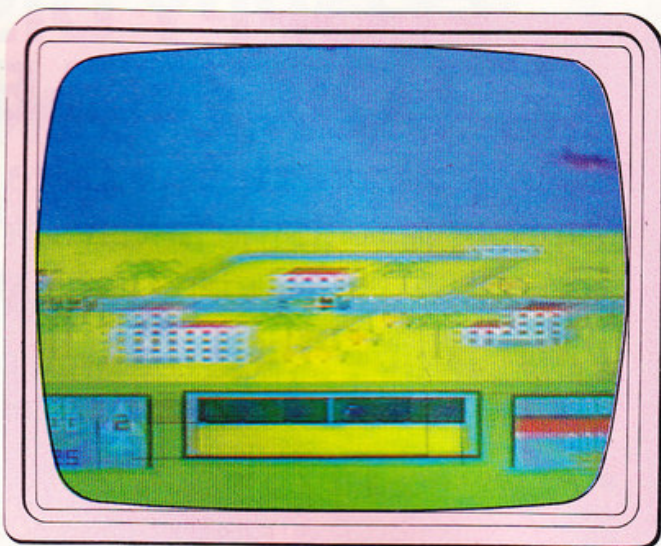
RATING

Lasting appeal

Playability

Use of machine

Overall value

Shoot
'em up

Name Falcon Patrol System
Commodore 64 Price £6.95
Publisher Virgin games, 61/63 Portobello Road, London W11 3DD
Format Cassette
Language Machine code
Other versions None
Outlets Mail Order and retailers.

Some Virgin Games products have had exciting publicity and then not really lived up to their promise. However, one of their latest offerings, Falcon Patrol, is a first rate game and Virgin looks set to hit the jackpot with it.

Objectives

Flying a VTOL (vertical take off and landing) jet fighter armed with 100 anti-aircraft missiles, your job is to defend fuel and armament installations against enemy aircraft. The enemy come barrelling in with their bombs and must be shot down. The more enemy planes you destroy, the greater the subsequent reinforcements.

In play

The game begins with some stirring chords to put you in the mood for the drama to come. Most of the screen is taken up with an impressively detailed landscape, showing buildings, roads, palm trees, transport and fuel depots. At the bottom left of the screen is the score board, giving current score, highest score and lives remaining. Bottom centre is the radar window showing your current position as a vertical band with moving white dots indicating the whereabouts of enemy aircraft. Fuel and missile informa-

tion is clearly provided at bottom right.

Your jet gently lands on a fuel base to take on initial supplies. Movement of the joystick has the jet turning and flying in the appropriate direction.

The graphical depiction of the jet is excellent. Flying up or down has the angle of the plane turning in the relevant direction. Executing a sudden U-turn doesn't result in the usual abrupt about-face; instead, the plane slows and turns to the front before moving off in the chosen direction. Altogether, there are seven different views of the plane in flight.

As you fly, a generous landscape scrolls evenly below you and the red enemy fighters swoop across the sky. Bombs hitting buildings or the ground cause fires which go out if you leave the scene for a while. If you touch an enemy plane, your jet catches fire and ploughs into the earth. Pressing your fire button releases a missile which blows the enemy plane to bits.

You need to keep your wits about you.

You also need to keep a watch on your remaining fuel and missiles — further supplies are obtained by landing carefully on an appropriate base. The enemy have no scruples about bombing you while you sit serenely on a refuelling base.

Verdict

A fast-action and compelling game which I highly recommend.

Bob Chappell

RATING

Lasting Appeal

Playability

Use of Machine

Overall Value



mws FLOPPY DISC SYSTEMS FOR THE BBC MICRO

announce a complete range of Disc Drives that are compatible with the BBC Micro and other micro-computers that utilise the Shugart SA400 Interface.

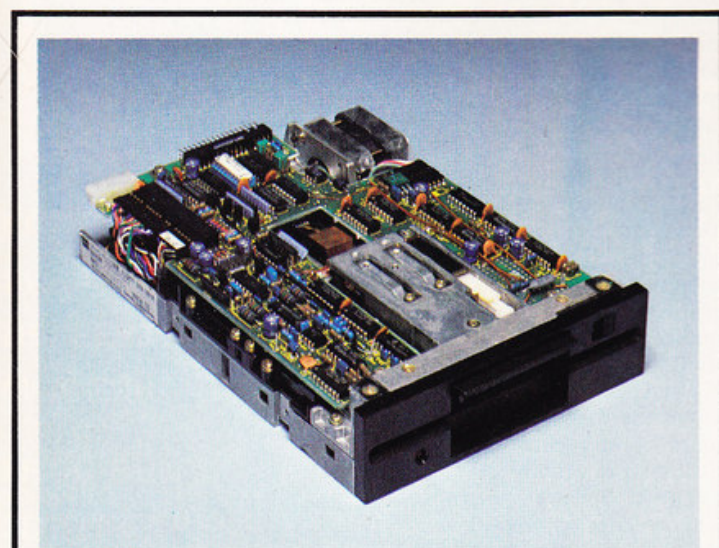
- **DISC DRIVE UNITS** come complete with high quality steel box, 40/80 Track Formatting Disc, Interface Cable and manual.
- All you need to do is plug into your BBC and you are ready to have access to large amounts of storage space.
- All single units can be upgraded to double units.
- All units carry a 1-year warranty.
- Optional power supply available. £35



**MWS Dual 400K Drives
(Total 800K)**



MWS Single 400K Drive



MWS Single 400K Upgrade £220

mws systems ltd.

Matrix House
Lincoln Road
Cressex Industrial Est.
High Wycombe
Bucks
Tel (0494) 450341

ORDER FORM

Please send me the following items	Quantity	£
Dual 400K Drive Unit (800K) at £399		
Single 400K Drive Unit at £233		
Single 400K Upgrade at £220		
Power Supply at £35		
Sub total		
VAT at 15%		
TOTAL		

Please debit my



AMERICAN EXPRESS

I enclose a cheque for £..... made payable to MW Systems Ltd

Name _____ Company _____

Address _____

_____ Tel No _____

All prices are exclusive of VAT
Available from Stock - Disc Interfaces P.O.A.



48K SPECTRUM OWNERS (READ THIS FROM) ...LET'S GET DOWN TO BUSINESS...

★ ★ ★ FINANCE MANAGER ★ ★ ★

FINANCE MANAGER is a powerful, flexible and fast MENU DRIVEN general purpose program carefully designed to handle up to 255 separate accounts for domestic and business accounting applications. The magic of MACHINE CODE has enabled us to produce the very latest "on the page" presentation which lets you enter and edit data naturally, as if with a pencil and paper.

These screens are just a sample to show the style of the program:

But that's not all, not by a long way. This program automatically raises a corresponding debit or credit for every entry, and will even open a new account if an entry features an unrecorded account name.

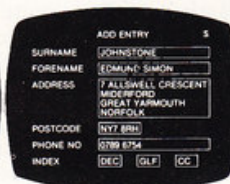


Accounts can be **MERGED**, **DELETED**, **ANALYSED**, **MARKED** as priority, **RENAMED**, **EDITED** and **SCROLLED**. Transactions can be **RECONCILED**, **AMENDED**, **DELETED**, **PRINTED**, **DESCRIBED** for analysis and **RENAMED**. Standing orders can be **APPLIED**, **REMOVED**, **DESCRIBED**, **AMENDED**, **DELETED** and even **DUMMIED** for planning purposes. Other features include **DATE CHANGE**, **RUNNING TOTALS**, **2 KEYBOARD MODES**, **PRINT PAGE/LINE/BLOCK/FROM END/FROM START/FROM DATE** etc., **LIST BALANCES**, **FIELD ERASE/INSERT/DELETE**, **EXIT TO BASIC**. You may not want all these features but they are there just in case.

★ ★ ★ ADDRESS MANAGER ★ ★ ★

ADDRESS MANAGER utilises the same "on the page" presentation as **FINANCE MANAGER** and offers Spectrum owners a professional standard address filing, indexing and retrieval system. Below are examples of the screen presentations.

ADDRESS MANAGER has been carefully constructed to provide the user with a tool that is extremely friendly and easy to use, the speed and presentation of this program are second to none.



ADDRESS MANAGER features **MULTIPLE INDEXING** via our 3 way 3 character index, an ability to store over 400 full names and addresses or 1500 individual names/titles.

USES include storing and updating names, addresses and phone numbers, printing out Xmas card lists, etc, mail order work, customer classification by type size (doctors have used this program to catalogue patients by treatment).

★ ★ ★ 80 COLUMN — 'PLUS 80' VERSIONS ★ ★ ★

80 column versions of both these programs are available. These work in conjunction with the Kempston Centronics Interface and Centronics Printer. Write to us for a quotation for the software, the interface and the latest high performance Japanese Dot Matrix Printer — you will find our prices very competitive.

VISIT YOUR LOCAL SOFTWARE STORE NOW AND ASK FOR FINANCE MANGER AND ADDRESS MANAGER BY NAME —

also available from selected branches of WH SMITH, BOOTS and MENZIES



SOFTWARE ★ ★ ★ SIMPLY THE BEST ★ ★ ★

If you experience difficulty obtaining your copies of these programs send a cheque or postal order for £8.95 (£19.95 for **PLUS 80** versions) or telephone your details to (0753 888866):

Oxford Computer Publishing Ltd.
4 HIGH STREET, CHALFONT ST PETER, BUCKS SL9 9QB

BBC MODEL B

Flight of fancy

Name 737 Flight Simulator **System** BBC micro B **Price** £9.95 **Publisher** Salamander Software, 17 Norfolk Road, Brighton, Sussex BN1 3AA **Format** Cassette **Language** Machine code **Outlets** Mail order and dealers

With a home computer it is possible to try your hand at flying anything from a single-engined light aircraft to a 747 jumbo jet. Somewhere in between these two extremes, both in size and complexity, fits Salamander's 737 simulator.

First impressions

Packed very smartly in the kind of plastic package normally reserved for video cassettes, the simulator consists of a single cassette and a 28 page, neatly-printed flight manual. This manual covers the practicalities of loading the two-part program, details all the simulator instruments and controls, offers some flight theory, and even provides a basic flying lesson. It makes extensive use of diagrams to illustrate the instrumentation of the simulator.

Airfield charts of Edinburgh airport are enclosed (courtesy, apparently, of British Airways) as this is the preset airfield used in the program. The documentation is very comprehensive for a program of this type.

In use

Unfortunately, the first copy of

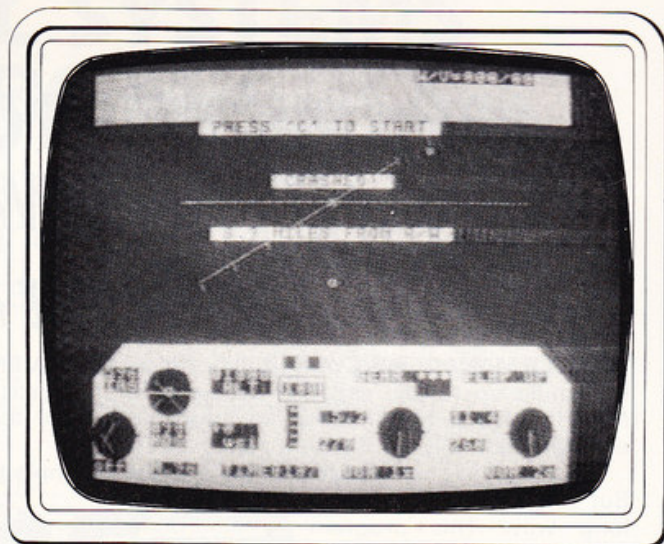
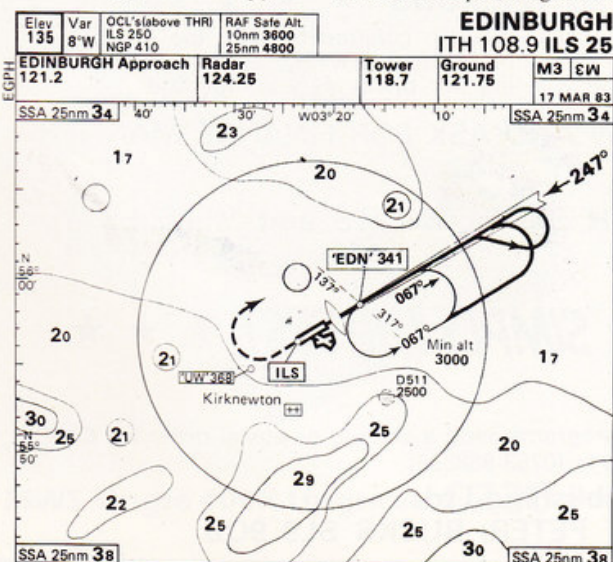
737 simulator had to be returned to Salamander as it was unloadable. A second copy proved to have the same fault, but a third gave no problems at all. Although Salamander were quick and efficient at providing replacements, the problem might have been avoided if they had followed the practice of some other software houses in providing a second copy of the program on the same tape.

Once the first part of the program has been loaded, several options are provided before the main part of the simulator is Chained in. These are: preset or user-defined airfield; start from take-off or mid-flight; engine noise volume (0-5); aircraft stall speed.

The last of these options is useful for the novice user, as it allows the plane to fly more slowly than in real life without falling out of the sky.

The first use of any flight simulator is a daunting experience. There are so many different instruments and controls that it seems impossible to work out what to do with them. The Salamander simulator does its best to ease this problem by thoroughly explaining the instrumentation in the manual and by choosing mnemonic keys for the major controls.

The screen shows the flight deck of the aeroplane, although no attempt is made at a model on original. Through the cockpit window the view is either of the runway and horizon (on take off and landing) or a 'radar' map of the area immediately surrounding the airport. Both views are simple, diagrammatic



representations and the runway in particular moves in a fairly jerky fashion as it travels up under the aircraft on approach.

There is a certain amount of flicker in the display as it is updated fairly slowly and the keyboard is scanned about every half second, so the command keys must be held down at least this long. All commands are acknowledged with a beep but it is easy, in moments of panic, to forget to wait for this confirmation, with unfortunate results for the crew and passengers!

The 137 simulator is a very lenient program and it really is quite hard to get the aeroplane to do anything untoward, so much so that Salamander provide a special function to cut all engines. Even this situation may be dealt with relatively simply however, and after an afternoon's preliminaries, trying out the various controls, it should be possible to take off, fly around a bit and make an attempt at a decent landing.

All the same, if you step too far out of line with a near-perfect flight path, you get flashing warnings and annoying noises. Should you go so far as to get into a really hairy situation, the screen judders so much that it's almost impossible to read the dials. This is, suppose, acceptable, since by then you're irrevocably on a collision path for the hard, hard ground.

One drawback to the program is that you only get enough fuel for about 25 minutes flying time. This means that if you foul-up a landing close to this limit, there's little chance of circling around and coming back for a second attempt.

At any time during a run of the program, a depression of

the 'Q' key will bring up a selection menu, allowing the plane to be repositioned at various points on and around the runway. The 'feel' of the simulator is good, supported well by as realistic a jet engine sound as you are likely to hear from a BBC micro.

It is possible to define an airstrip and to adjust windspeed and the position of navigation beacons to tailor the simulator to your specific requirements. Apart from this, however, there are not a lot of different things that can be done with the program. It would be interesting to be able to strike out across country heading for Heathrow or Bristol, or at least to be able to practise descents at other airports. The manual claims that the program fills just about all the available space not taken by the Mode 1 screen. Even so, to be truly competitive with other simulators now coming onto the market, this kind of facility ought to be seriously considered.

Verdict

As an aviator who tends towards the Buster Keaton school of flying rather than the Brian Trubshaw, the tolerance to error of the 737 simulator was very welcome. If only the program incorporated several airfields to practice on. As it is, the program is fine for 'circuits and bumps' but may, perhaps, pall once the pilot has mastered the controls.

Simon Williams

RATING

Lasting appeal

Playability

Use of machine

Overall value



CHOOSING A HOME MICRO



Choosing a home micro can be a daunting task to the newcomer, and with an ever increasing number of micros emerging on the market, even up-grading, say, from a ZX81 can be a risky and expensive exercise if the wrong decision is made. It is important to look at the real facts and specifications, and check exactly what you get for your money before choosing your micro-computer system.

THE PITFALLS

"DON'T LET THE ADD ONS ADD UP"

A number of large companies are offering packages that seem to be good value and low cost. These offers usually have a hidden sting inasmuch as the essential accessories such as connection leads, peripherals and software often carry very high cost premiums. e.g. software for low cost hardware usually costs between £29 and £49 for a ROM cartridge!!

CHECK THE QUALITY OF THE PRODUCT.

Raw materials are now an area where corners can be cut, and shoddy workmanship during 'building' can effect the 'up-time' of your unit. Areas to watch out for are unreliable edge connectors, corrosion and poor quality P.C.B.s. Low quality components and bad design will seriously effect the reliability of the end product, and can lead to false economy.

DON'T BUY A GAMES MACHINE

Unless you want just games and nothing else! With a games computer you are limited. Some computers, however, have the advantage of both games facility plus the whole world of computing to explore, as your interest and skills develop. A real computer system will allow you to expand your knowledge of the Hi-Technology world, and help earn its keep with its added uses in the field of education, communication and home business use.

SOFTWARE

Make sure the system you choose has a growing library of support software, to enable you to realize the full potential of your machine.

KEY POINTS TO LOOK FOR

● High Resolution Colour

In general most home computers have a poor graphics resolution (or detail). Check on the vertical and horizontal resolution in graphic mode and multiply the two numbers together. If the result is less than 35,000, then the graphics can hardly be considered high resolution. Without high resolution graphics displays such as those used in games tend to be "Chunky" in appearance.

● High Quality Sound

Some computers claim to provide a sound channel when in reality all that can be found inside the computer is a small buzzer controlled by electronic pulses. At the very least a sound facility should provide more than one channel and a raise channel as well (for gun shot effects in games for example). The best systems also provide envelope control of the sound channels to produce very sophisticated effects; very important for generating music. Also look for the ability to connect to external amplifiers.

● Keyboard

For accurate entry of programs and data into a computer it is important that the keyboard has a good tactile feel in operation. Coupled with acoustic feedback the user is fully aware when the computer has accepted his/her actions. Also of importance in a keyboard is layout. A standard computer keyboard layout will familiarise the user with the vast majority of computers used in the world of business and professional applications; very important if the purpose of purchasing a computer is educational.

● RAM

One of the most important features of a computer is the amount of RAM, or memory, included. In general the more powerful and exciting a computer program is the more RAM it requires. But take care, all computers are advertised quoting the total RAM used in the system. Computers use up a great deal of their own RAM for storing essential data and particularly in supporting the graphics display and the CPU. If it is less than 32K think again, is it enough?

● Computer Language

It is too difficult to program a computer in its own binary language so high level languages are used, the most popular being BASIC. However, there are a number of BASICs, some being very different from the rest. A de facto standard in the computer industry is Microsoft BASIC. Learn this one and you will be able to program in the majority of computer BASICs; such an important point if a home computer is to be used to educate your children to face the technology of the future.

● Expansion

As your interest and knowledge of computing grows, you will need a



Choosing the right system carefully will save you from throwing your money away. Check full specification, plus peripherals and software prices, before you buy. Preferably choose a Real computer system that can expand to meet your needs.

computer system that will grow with you; able to accommodate Printers, Disk-drives, Joysticks, Communications Modem, and Colour Monitor, as well as produce HI-FI sound effects.

● Software

The computer you choose should have a growing selection of utility

software to make the most of its capability. Remember, computing is here to stay. You can't learn to compute on a toy, or a device which does not behave like a real computer. In short, look out for a computer which offers all the points above, and you will be sure of getting the best value for money.

To find out which company offers you the right choice, with:-

- Good value, high specification, quality micros.
- A quality, 4 colour, plain paper printer/plotter.
- Communications Modem.
- Micro Disk Drives.
- Comprehensive and growing range of software

TURNOVER... →

The right choice for real computing

ORIC-1

Before making your final choice, check any other home micro in the same price bracket, against the incredible specification of the ORIC-1.

● Quality of build and materials		● Real computer keyboard layout and moving keys	
● Superb styling / Full colour display		● High Resolution colour graphics 240 x 200 pixels	
● Choice of 16K or 48K RAM		● Real computer language programming – Basic / Forth	
● Latest design technology and circuitry		● Teletext/Viewdata compatible graphics (28 rows x 40 characters)	
● Real sound – 8 octaves plus Hi-Fi output		● Cassette Port & R.G.B. output.	
● Centronics printer interface		● Fully supported and growing software library	
● Colour printer / Disk Drives		● A fully expandable system for home, education & small business use	
● Communications Modem		● Full range of peripherals to support your system...	

ORIC-1 Setting today's standard in Quality and Price.

ORIC-1 48K £139.95 inc. VAT ORIC-1 16K £99.95 inc. VAT

All ORIC computers purchased before 31st December 1983 come with a £40 voucher off the M.R.P. of the MCP 40 Colour Printer. **MCP 40 COLOUR PRINTER £169.95. OFFER PRICE £129.95**

TANSOFT ORIC Software

The fast growing success of ORIC-1 means that an incredible number of software titles are becoming available for your Oric. With many well known titles from independent software houses, plus exclusive ORIC SOFTWARE from TANSOFT, you can now drive your Oric towards its full potential. Below is a small selection from Tansoft's range, all of which offer superb value.

BUSINESS

ORIC BASE, ORIC CALC, AUTHOR.

MACHINE LANGUAGES

FORTH, ORIC MON.

COMPUTER GAMES

ZODIAC, HOUSE OF DEATH,
ORIC MUNCH, SUPER BREAKOUT,
ULTIMA ZONE, DEFENCE FORCE.

TOURING LANGUAGES

GERMAN, SPANISH, ITALIAN, FRENCH.

GENERAL INTEREST

ORIC CHESS, MULTIGAMES 1,
MULTIGAMES 2, ORIC CAD,
THE NOWOTNIK PUZZLE.

TANSOFT ORIC SOFTWARE available from your ORIC supplier and all good software dealers. For full list of further information contact:-

**NEWS FLASH
LATEST RELEASE
THE HOBBIT**



ORIC-1



The Growing System

ORIC 3" MICRO FLOPPY DISK DRIVE

Coming soon the incredible new 3" Oric Micro Drives. Small size, Compact, High precision disks with storage capabilities from 100K Bytes to in excess of 1 Megabyte unformatted. With their own built-in power supply, these easy to use units will add big system capability to your home micro.

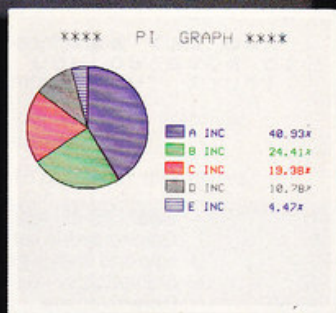


ORIC MCP 40 COLOUR PRINTER/PLOTTER

The Oric Colour Printer is quality engineered to provide 4 colour hard copy on plain paper, with superb graphics and text capability, printing either 40 columns or 80 columns. It prints in red, green, black and blue, onto a 4½" width standard paper roll. With a print speed of 12 characters a second, the MCP 40 comes with its own power supply and all necessary leads to connect straight into your Oric or to any standard Centronics interface.



This superb printer represents excellent value at just
£169.95 including VAT.



PCN ProgramCards

Something for the BBC and the Spectrum this week in ProgramCards, plus the continuation of programs from last week's issue.

For the BBC is a short utility for either model (A or B) from Steven McLean, of Liverpool. The routine can be used to search through any Basic program for a string of characters, specified before the search begins. It will then print the line numbers wherever matching strings are found. The routine can be used to find Procedure and Function names, remarks, print strings, data or numbers.

Before the routine is loaded, the main program should be already resident in RAM at the default page for the current filing system (&E00 for *TAPE or &1900 for *DISK). To run the utility, simply enter PAGE=TOP+512 <RETURN> then NEW <RETURN> and then CHAIN the utility.

If you intend to use the utility on a disk system, it is possible to set the PAGE value to &1400 and then CHAIN the utility into

the memory. The author suggests that a user-definable key can be set up to perform the above ie *KEYOPAGE=&1400:MRUN:M. This allows the program to be used frequently, once it has been loaded at &1400.

The program for the Spectrum, from Joseph Donnelly, is for all those Spectrum users who want to be a big wheeler dealer in the financial world.

The game is for two players and each is given a factory, distribution system, and some money. The game takes place over a number of days (in computer time), set at the beginning of the game, and continues until one of the players goes broke or the time is up.

The idea is to buy stock and transport it from your factory, by road, to the Ex Port. Once here it is transferred to a ship which you send across the sea to the In Port. Here the goods are sold, giving you a nice fat profit. As you can see from the picture below, the trucks, ship, river etc, are displayed on the screen and you can keep

track of their current location. This is all fine and quite easy until the dock workers go on strike, increasing your warehouse costs, or somebody waylays your drivers and steals half of the goods he was carrying.

These little snippets tend to set you back a bit and, of course, lose you money.

On the plus side, there is the occasional buyer who is prepared to pay over the odds for your goods, provided that they are at sea and on the way. If you can overcome all of these problems, then you should win the game.

If you have any programs, games or utilities sitting on the shelf at home, or that you have just written, why not send them in to ProgramCards? The more interesting, clever, well-programmed and original, the more we pay for the program. Send your program on either a cassette or disk, preferably with a listing, instructions and comments, to:

Programs Editor, Personal Computer News, Evelyn House, 62 Oxford Street, London W1A 2HG.

PCN ProgramCards

Shipment

Card 1 of 6

8338SH1/6

```

1 BORDER 5: PAPER 1: INK 4: C
L3
5 GO TO 9000
10 LET S=50
20 FOR F=0 TO 104: LET S=S-RND
: PLOT F,S: DRAW 0,-S: NEXT F
30 LET S=150: FOR F=0 TO 104:
LET S=S-RND: PLOT F,S: DRAW 0,17
S-S: NEXT F
40 FOR F=105 TO 232: PLOT F,S:
DRAW 0,175-S: NEXT F
50 LET S=S-40: FOR F=233 TO 25
S: LET S=S-RND: PLOT F,S: DRAW 0
,175-S: NEXT F
60 PRINT PAPER 4: INK 1: AT 12,
25: "EX Port": AT 20,2: "In Port"
100 REM SCREEN ROUTINE
100 PRINT INK 7: PAPER 2: AT 0,0
: "RED ": AT 1,0: " ": AT 2,0: "
110 PRINT INK 0: PAPER 3: AT 0,2
S: "CYAN": AT 1,20: " ": AT 2,20:
140 LET A$="You have      places
to move do you wish to move your
truck (Y/N)?"

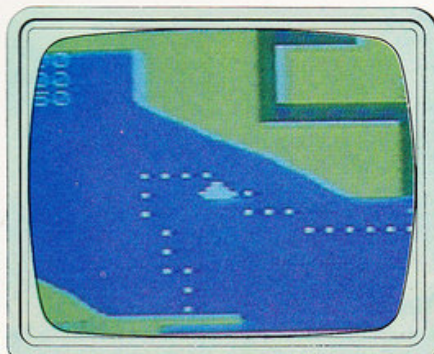
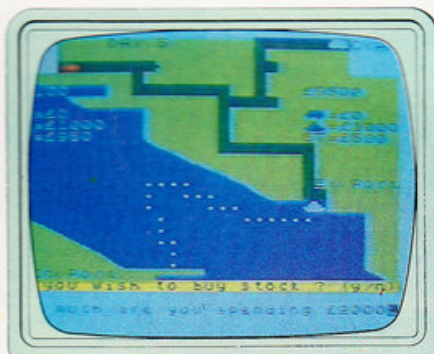
```

- | | |
|---------|---|
| 1 | Select border and screen colours, clear the screen. |
| 5 | Goto routine to set up user-defined graphics for truck and ship and then instructions, if wanted. |
| 10 | Set variable. |
| 20-50 | Draw river/sea. |
| 60 | Print in-port and ex-port. |
| 100-110 | Print the factories. |
| 140 | Set up a\$, places to move. |

ZX Spectrum Spectrum Basic

Application: Game

Author: Joseph Donnelly



HIGH QUALITY GREEN SCREEN VIDEO MONITORS

Designed for use with Professional and Personal Microcomputers where a high resolution display is required. Ideal for applications requiring 80 column mode or higher, high resolution graphics, etc.

CHECK THESE FEATURES:-

- ANTIGLARE SCREEN
- P31 GREEN FOR MINIMUM FATIGUE
- VIDEO RESPONSE 10Hz - 22MHz \pm 3db
- SUPERB RESOLUTION—UP TO 132 CHARS/LINE
- EXCELLENT GEOMETRY/LINEARITY
- HIGH STABILITY
- 230 VOLT 50Hz MAINS OPERATION
- COMPOSITE VIDEO 0.5/2.0V INPUT
- FLICKER FREE DISPLAY

£89



▲ 12" MODEL HM123

£87



▲ 9" MODEL HM910

ADD £5
Carriage/Postage

DEALER
ENQUIRIES
WELCOME

£85



▲ 9" MODEL HM911

THE LOWEST PRICE ANYWHERE

£349



FOR A PC WITH THESE
FEATURES... LOOK AT
THE SPEC. OF THE AMAZING
UNITRON 2200...

- Dual processors — 6502 and Z80
- 64K of RAM
- 24K ROM with softswitch control
- Selectable 80 or 40 column text display
- Detachable keyboard
- Apple® II-compatible
- CP/M® compatible
- High and low resolution graphics capabilities
- Two disk I/O for your disk drives
- Game paddles/cassette/video interfaces

Prices exclusive of VAT
Same day despatch. Access welcome.

CHILTERN ELECTRONICS

HIGH STREET, CHALFONT ST. GILES, BUCKS. HP8 4QH
TELEPHONE: 02407 71234 TELEX: 262284

ADD £9 Carriage/Insurance

PCNProgramCards

Shipment

Card 2 of 6

8338SH2/6

```

150 PRINT PAPER 0; AT 0,20; "
  AT 1,20; "
160 PRINT PAPER 0; AT 2,4; "
  AT 2,20; "
  AT 3,12; "
  AT 3
170 PRINT PAPER 0; AT 4,12; "
  AT 5,17; "
  AT 6,17;
180 PRINT PAPER 0; AT 7,17; "
  AT 8,17; "
  AT 9,17; "
190 PRINT PAPER 0; AT 10,24; "
  AT 11,24; "
  AT 12,24; "
  AT 13,
24;
199 REM *****
200 PRINT PAPER 1; INK 7; AT 12,
11; "
  AT 13,11; "
  AT 1
4,11;
210 PRINT PAPER 1; INK 7; AT 15,
12; "
  AT 16,12; "
  AT 17,12; "
  AT 18,13; "
  AT 19
13;
250 LET d$="0204020702100411041
404170617001709200002311241324"
255 LET e$="00200002400010200002
005100517091709200002311241324"
257 LET f$="1424152215191416131
41213141117121913"
260 LET i$="00010000010000000020
40100000014241000"
270 LET c$="00010000010000000002
60100000014241000"
275 DIM h$(36)
280 LET g$="Do you wish to buy
stock? (Y/N)"

```

```

300 LET i$="          There is so
me news for you....."
999 REM *****
1000 FOR i=1 TO 9
1005 IF VAL f$(1 TO 8)+VAL f$(33
TO 36)<=0 THEN GO TO 1320
1010 IF VAL c$(1 TO 8)+VAL c$(33
TO 36)<=0 THEN GO TO 1320
1015 PRINT PAPER 4; INK 0; AT 0,0
"DAY "
1020 FOR i=1 TO 2
1022 PRINT FLASH (i=1); INK 7; P
APER 2; AT 0,0; "RED "
  AT 1,0; "
  AT 2,0; "
1025 PRINT FLASH (i=2); INK 0; P
APER 5; AT 0,20; "CYAN"
  AT 1,20; "
  AT 2,20; "
1030 PRINT INVERSE 0; PAPER 1; I
NK 4; AT 4,0; "E"
  VAL f$(1 TO 8); "
  INVERSE 1; AT 4,24; "E"
  VAL c
$(1 TO 8); "
1040 PRINT INVERSE 0; PAPER 1; I
NK 4; AT 6,0; "AB=E"
  VAL f$(12 TO
15); "
  INVERSE 1; AT 6,24; "EF
=E"
  VAL c$(12 TO 15); "
1050 PRINT INVERSE 0; PAPER 1; I
NK 4; AT 7,0; "CD=E"
  VAL f$(24 TO
27); "
  INVERSE 1; AT 7,24; "CD
=E"
  VAL c$(24 TO 27); "
1060 PRINT INVERSE 0; PAPER 1; I
NK 4; AT 8,0; "ST=E"
  VAL f$(33 TO
36); "
  INVERSE 1; AT 8,24; "ST
=E"
  VAL c$(33 TO 36); "

```

150-190 Draw roads.
 200-210 Set colours for ship lanes.
 250 Define red's road data.
 255 Define cyan's road data.
 257 Ships route data.
 260-300 Player's data and strings.

1000 Loop counter 1 is the number of days for game.
 1005-1010 Check for end of game.
 1020-1025 t=1 for red player and t=2 for cyan player. Flash appropriate player.
 1030 Rub out cash balances.
 1040-1060 Rub out the amount of stock in lorries, ship and factories.

PCNProgramCards

Shipment

Card 3 of 6

8338SH3/6

```

1065 PRINT PAPER 1; AT 9,0; "
1070 PRINT PAPER 0; INK 2; AT VAL
f$(17 TO 18); VAL f$(19 TO 20); "
AB"
1075 PRINT PAPER 0; INK 5; AT VAL
c$(17 TO 18); VAL c$(19 TO 20); "
EF"
1080 PRINT PAPER 1; INK 2; AT VAL
f$(29 TO 30); VAL f$(31 TO 32); "
CD"
1085 PRINT PAPER 1; INK 5; AT VAL
c$(29 TO 30); VAL c$(31 TO 32); "
CD"
1100 PAUSE 10: PRINT PAPER 6; IN
K 0; AT 21,0; g$
1110 IF INKEY$="Y" THEN GO SUB 4
000: GO TO 4100
1115 IF INKEY$="N" THEN LET e=0:
GO SUB 4010: GO TO 4100
1120 GO TO 1110
1200 IF AND%=.7 THEN GO TO 1300
1210 LET x=1: FOR f=1 TO LEN i$:
PRINT INK 0; PAPER 6; AT 21,0; i$
(x TO f)
1220 IF f>=32 THEN LET x=x+1: BE
EP .05,20
1225 NEXT f
1230 RESTORE 9500+INT (AND%*8): R
EAD h$,h,i,j
1232 LET x=1: FOR f=1 TO LEN h$:
PRINT INK 0; PAPER 6; AT 21,0; h$
(x TO f)
1234 IF f>=32 THEN LET x=x+1: BE
EP .05,25
1236 NEXT f
1240 IF i=1 THEN LET f$(h TO i)=

```

```

STR$ (VAL f$(h TO i))
1245 IF i=2 THEN LET c$(h TO i)=
STR$ (VAL c$(h TO i))
1300 NEXT i
1310 NEXT i
1320 CLS: PRINT AT 3,10; "End o
f game."
1330 LET q=(VAL f$(1 TO 8)+VAL f
$(33 TO 36))-(VAL c$(1 TO 8)+VAL
c$(33 TO 36))
1340 IF q>0 THEN PRINT AT 10,0; "
RED win this time."
1345 IF q<0 THEN PRINT AT 10,0; "
CYAN win this time."
1350 IF q=0 THEN PRINT AT 10,0; "
A draw this time."
1360 PRINT AT 10,0; "Another game
(Y/N)"
1365 IF INKEY$="Y" THEN GO TO 92
00
1370 IF INKEY$="N" THEN STOP
1375 GO TO 1360
9999 REM *****
4000 PAUSE 10: INPUT "How much a
re you spending?";e
4010 IF i=1 THEN LET h$=f$
4015 IF i=2 THEN LET h$=c$
4020 IF e>VAL h$(1 TO 8) THEN LE
T e=VAL h$(1 TO 8)
4025 LET q=VAL h$(33 TO 36)+e: L
ET h$(33 TO 36)=STR$ q
4030 LET q=VAL h$(1 TO 8)-e: LET
h$(1 TO 8)=STR$ q
4032 IF VAL h$(12 TO 15)<0 THEN
GO TO 4090

```

1070 Update cash balances.
 1075-1085 Update the amount of stock in lorries, ship and factories.
 1100 Print more stock message.
 1200 Select random number for news flashes or next player's go.
 1210-1225 Scroll news flash message across bottom of screen.
 1230 Select random message.
 1232-1236 Scroll message across screen.
 1240-1245 Alter player's assets.

1300 Next player's go.
 1310 Next day.
 1320 Print end of game.
 1330-1350 Get final values and winner.
 1360 Prompt for another game.
 4000 Amount to spend.
 4010-4015 Get appropriate amount into h\$, the calculating string.
 4020-4030 Check money and stock levels.
 4032 Check lorry contents.

NewBrain

Buy from the NewBrain Specialists

The NewBrain is back!

NewBrain
EXPANDED NEWBRAINSYSTEMS PLEASE CALL FOR PRICES
Printers Epson FX80, RX80, RX80 F/T, Shinwa CP80, Juki etc. From £239 + VAT.
Recorder Sanyo DR 101 Data Recorder £39 + £5.85 VAT.

"The NewBrain Dissected" by John Braga. £8.50 + 50p p&p (UK)
Programme tape £9.95. Book & Tape £18.45 (post free in UK)
"Getting More from your NewBrain" by Andrew Pepper and Michelle Clark.
Available in December. Order now! £7.50 (post free in UK).
NEWBRAIN OWNERS CAN'T AFFORD TO MISS THESE USEFUL BOOKS!

NewBrain Software Selection

RUFAL (W) Super new adventure.
BRANZAP ASSEMBLER (W) An interactive assembler editor.
CHESS (G) Available once again. Limited stocks!
DARK KNIGHT (W) Graphics adventure game with many levels.
MONITOR (W) The memory manager. Examine, fill, alter, move, dump, save, etc.
CASHBOOK (C) Powerful search, analysis and reporting.
DISASSEMBLER (W) Unravel the secrets of the NewBrain's ROM.
DATABASE (G) Includes sort and search on any field.
NEWBAS (B) Powerful machine code assembler.
LIFE SEARCH (W) (Adventure) Can take two lifetimes to solve!
BRAINTEXT (W) An easy-to-use and very practical W/P.
STAR TREK (W) Ride the Galaxy of the Klingon menace.
BRAIN CHASE (W) Two new fast-action.
NEWBRAIN INVADERS (W) Arcade games.
BRAINWRITER (B) All the W/P features you've been waiting for!
EPROM version (Needs EPROM box).
DAYBOOK (C) Sales and purchases. Optional VAT.
9HOLE GOLF (W) Random holes. Fairways plus 3-D putting.
INVOICE AND CREDIT NOTE (C) Optional discounts and VAT analysis.

Software suppliers: B=Brainwave, G=Gemini, W=Watkiss Computers, C=Cornix-Micro, Gr=Grundy

Please write/phone for full lists of NewBrain hardware and software etc.

AUTHORS — DO YOU HAVE A PROGRAM WE MIGHT SELL?

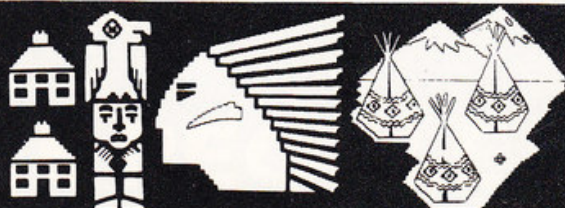
MAIL ORDER — Free delivery UK for orders over £5. Callers by prior appointment only, please. To obtain your NewBrain etc., ring us on Stevenage (0438) 812439 (Access welcome) or send cheque/PO/Access number to:

ANGELA ENTERPRISES

4 Ninnings Lane, Rabley Heath, Welwyn,
Herts AL6 9TD. Tel: Stevenage (0438) 812439



SPECTRUM & ZX81 EDUCATIONAL SOFTWARE



CALPAC LEARNING SERIES

Use our Computer Assisted Learning PACKS to help your children with their school work. The programs in the series use moving colour graphics and sound to make learning more enjoyable. Each pack contains four programs and is suitable for use with the 16K or 48K Spectrum. Program notes are supplied.

VOLUME 1 (from 6 years) **£9.50**
Tens and units addition and subtraction with detailed help facilities; powerful, easy to use drawing program; English comprehension applied to American Indians.

VOLUME 2 (from 7 years) **£9.50**
Roman history; spelling tester with easy entry of your own lists; flexible table-tester; homophones.

VOLUME 3 (from 9 years) **£9.50**
Nouns, verbs, adjectives and adverbs; tenses of verbs; biology of the flower; long division tutor.

Additional features of the CALPAC LEARNING SERIES include:

- Spelling checkers
- "Help" call up routine
- Easy insertion of subject material of your own choice into the programs.

CALPAC C10-LEVEL CHEMISTRY **£7.50**
Four clearly presented revision/tutorial programs. The subject matter has been carefully structured to cover the most important aspects of:

- Elements, compounds and mixtures.
- Structure, bonding and properties.
- Redox, electrolysis and the activity series.
- Acids, bases and salts.

48K Spectrum and 16K ZX81 versions of the cassette are available.

Please specify which you require.

Our software is available by direct mail from:

CALPAC COMPUTER SOFTWARE

108 Hermitage Woods Crescent, St Johns, WOKING, Surrey GU21 1UF
For further details please telephone: 048-67 2584

We have a demonstration cassette available for retailers or schools

DRAGON 32

MRC

Air combat and ground strike, "joystick" controlled sights cannon fire and bomb release. Full colour. Hi-res graphics, 3D and sound.

£6.50

Fruit

Compulsive, addictive, fruit machine. Using your skill with the holds, turn your £5 stake into £10 and beat the system. Hi-res graphics and sound. **£4.95**

Look and Learn

Educational picture recognition. Hi-res graphics, text and colour. Age 3-10yrs **£4.95**

Pontoon

Super Hi-res graphics, full colour definition and card display. Fascinating, absorbing. **£4.95**

Missile Command

City defence from attacking missiles, progressively difficult. Arcade type. Joystick. **£4.95**

Graphics Demonstrator

3D rotation, drawing with joystick, approx. 50 examples of Dragon's impressive graphics. **£4.95**

ORIC 1

Flight Simulator

With airspeed, radar, ground/vertical flight path indicators, artificial horizon and altimeter with continuous flight monitor on engine condition, stall speed etc., full colour, Hi-res graphics, 3D and sound. **£6.95**

Moonster

Defeat the guardians of Hyper to retrieve the life crystal. Mean zappo firing gremlins have orders to blast you on sight. Progressively difficult. Arcade type original. **£6.95**

Quark 3D Invaders

Superb update of original arcade game, pushes oric to its limits. Full colour and sound. **£6.95**

Super Fruit

Excellent graphics and definition fruit machine. Full colour and sound, holds etc. **£6.95**

Tango Foxtrot 01

Using your skill, locate the airstrip with the radar scanner, fly your aircraft through hazardous crosswinds and air pockets to land safely. Watch your fuel; watch your artificial horizon; be sure you are level on final approach. Full colour. Hi-res graphics, 3D and sound. **£6.50**



MRC

SPACE CRYSTAL

Space Crystal

Space trading adventure game. Fascinating 3D space travel on your voyage for the Illudium crystal. Black holes, hyper-drive, gamble planets and space pirates. Full colour and sound. **£6.95**

FOR

COMMODORE 64K DRAGON 32K
ORIC 48K AND SPECTRUM 48K

QUARK DATA P.O. BOX 61, Swindon, Wilts. Tel. (0793) 40661.

Please supply.....

Prices incl. p&p. UK only.....

Cheque for total amount enclosed.....

Name.....

Address.....



PCNProgramCards**City Defense****Card 2 of 5**

8338CD25

```

125 U=0:V=0:CURSETX,Y,3:CHAR43,0,1
130 MUSIC2,6,10,0:PLAY2,0,1,200
135 FORA=0TO9:CURSETA(A),0,3:DRAWC(A),20,1:NEXT
140 FORT=1TOR1:GOSUB150:NEXT
145 GOSUB250:GOTO300
150 K#=KEY#:I=X:J=Y
155 IFK#="" THEN200
160 IFK#="" THEN165ELSEM=ASC(K#)
165 IFM=8THENX=X-7:IFX=8THENX=225
170 IFM=9THENX=X+7:IFX=232THENX=15
175 IFM=10THENY=Y+5:IFY=155THENY=150
180 IFM=11THENY=Y-5:IFY=5THENY=10
185 IFMP=0THENCURSETI,J,3:CHAR43,0,2
190 MP=0:CURSETX,Y,3:CHAR43,0,2
195 RETURN
200 IFMI=0THENRETURN
205 MP=1:MI=MI-1
210 CURSETMI*6+45,180,0:CHAR109,0,0
215 IFMI=5THEN CURSET0,180,3:FILL8,1,12
220 Z=Z+1:E(Z)=X:F(Z)=Y
225 CURSETX,Y,3:CHAR43,0,1:RETURN
250 IFZ=0THENRETURN
255 FORA=1TOZ
260 FORB=1TO2:CURSET120,160,3:DRAWE(A)-118,F(A)-157,2:NEXTB
265 MUSIC1,3,7,0:PLAY1,1,2,600
270 FORC=1TO0STEP-1
275 FORD=1TO7:CIRCLED,C:NEXTD,C,A
280 CURSETX,Y,3:CHAR43,0,1:MP=0
285 Z=0:K#=KEY#:RETURN

```

125-135 Start attack.
 150-195 Get key from keyboard and act upon it.
 200-225 Routine for curset missile, line 215 sets a flashing attribute.
 250-285 Routine for firing a missile.

PCNProgramCards**City Defense****Card 3 of 5**

8338CD3/5

```

300 U=U+1:Q=U*20
305 IFU<6ANDRND(1)>.95THENGOSUB600:IFDH+TH>4THEN415
310 FORA=0TO9
315 IFD(A)=1THEN335
320 P=A(A)+U*C(A)
325 IFPOINT(P,Q)=0THEND(A)=1:V=V+1:GOTO335
330 CURSETP,Q,3:DRAWC(A),20,1
335 NEXT
340 IFV=10THEN400
345 IFU<7THEN140
350 FORA=0TO9
355 IFD(A)=1THEN370
360 CURSETA(A)+8*C(A),165,1:DH=DH+1
365 GOSUB700:WAIT10
370 NEXT
400 CURSET0,0,0:FILL160,1,0:CURSET0,0,0:FILL160,40,64
405 K=K+1:IFK=2THEN415
410 IFTH+DH<5THEN90
415 FORA=180TO187:CURSET12,A,0:DRAW200,0,0:NEXT
420 CLS:IFTH+DH>4THENPRINT"NO SURVIVALBONUS":GOTO445
425 PRINT:IFMI=0THEN440
430 SOUND1,234,0:FORA=1TOMI:PRINT"m":PLAY1,0,1,100:WAIT10:NEXT
435 PRINT" X ";25;"=" ";MI*25
440 PRINT"SURVIVALBONUS: 250";:SC=MI*25+250

```

300 Step attack counter, Y coordinate for attack position.
 305 Extra attack.
 3108335 Check for attacks stopped, display the next step of attack lines.
 340 Check number of attacks stopped.
 345 Check the number of attack steps.

350-370 Display hits on city.
 400 Clear screen above city.
 405 Check first or second attack.
 410 Start second.
 415 Clear missiles.
 420-470 Display the score and hits.


MOGUL

THE HOTWARE PEOPLE

METAMORPHOSIS

VIC 20 · COMMODORE 64

You have stumbled into the nest of the Cyglorx and find yourself fighting off the Robot Tanks!

£7.95

KONGO KONG

VIC 20 · COMMODORE 64

Climb ladders, avoid the barrels thrown by the Crazy Ape—rescue the Damsel.

£6.95

ZEUS

COMMODORE 64

Your Cone of Cold protects you as you become the Wizard fighting off the Thunderbolts of the angry god—Zeus.

£6.95

EARTHQUAKE

VIC 20 · COMMODORE 64

A great adventure, you are in a shopping centre during an earthquake. To save yourself you must first help the others!

£6.95

CREATORS REVENGE

COMMODORE 64

Penetrate the depths of Robot City and kill the Creator. Destroy the robots—but watch out for new robots as they hatch!

£7.95

SUPER TREK

VIC 20 · COMMODORE 64 · ORIC

Commanding the bridge of your Starship, you explore the Galaxy. Fend off the Klingon attacks with your Phasers.

£6.95

ANNIHILATOR

VIC 20 · COMMODORE 64

Defend your Planet against Invading Aliens. All machine code makes for fast and furious arcade action!

£5.99

PYRAMID

VIC 20 · COMMODORE 64

TI99/4A

A really tough adventure game as you try to ransack the Pyramid. However the builders have left clues everywhere.

£6.95

POLLYWOG

VIC 20

Help your Pollywog across danger to the safety of his home.

£6.95

ANNIHILATOR 2

COMMODORE 64

Another Great Game from the author of Annihilator and Metamorphosis—Mike Wacker.

£7.95

GREAT ADVENTURE PACK

VIC 20 · COMMODORE 64

Three Great Adventures in One Package. African Escape, Hospital Adventure, Bomb Threat. Great Action, Great Value, Great Fun.

£6.95

PLUS

Four Great Games for the Spectrum 48K

POTTY PLANTER · ADDER ATTACK · LAS VEGAS LADY · CRASH

All at **£5.50**

**AVAILABLE FROM ALL GOOD DEALERS
TRADE ENQUIRIES WELCOME**

MOGUL COMMUNICATIONS LIMITED · 90 REGENT STREET · LONDON W1R 5PT

Telephone 01-437 3156/7

PCNProgramCards**City Defense****Card 4 of 5**

8338CD4/5

```

445 PLAY1,0,1,250:WAIT400:CLS
450 PRINT"ROUND ";R:PRINT"SCORE: ";SC
455 PRINT"DIRECT HITS: ";DH:WAIT400
460 TS=TS+SC:TH=TH+DH:CLS
465 PRINT"TOTAL SCORE: ";TS
470 PRINT"TOTAL DIRECT HITS: ";TH
475 CURSET0,180,3:FILL8,1,8
480 WAIT400:IFTH<5THEN55
500 CURSET120,150,0:MUSIC2,3,5,0:PLAY2,2,2,10000
505 FORA=1TO40:CIRCLEA,1:NEXT
510 PLAY2,2,1,10000:FORA=40TO1STEP-1:CIRCLEA,0:NEXT
515 CURSET65,75,0:FILL8,1,12
520 IFTS>HSTHENHS=TS:N#="NEW HIGH SCORE":GOTO530
525 N#="GAME OVER"
530 CURSET75,75,0:GOSUB750
535 CURSET75,90,0:N#="ANOTHER TRY? Y/N":GOSUB750
540 GETA#:IFA#="Y"THEN30
545 IFA#<>"N"THEN540
550 TEXT:PRINTCHR$(6):END
600 ES=2:EX=INT(RND(1)*40+100):EY=0
605 CURSETEX,EY,3
610 IFES=1THENSOUND1,60,1:ES=2:GOTO620
615 ES=1:SOUND1,60,4:PLAY1,0,0,0
620 IFEX<XTHENDRAW-10,20,1:EX=EX-10:GOTO630

```

475	Clear flashing attributes for missiles.
480	Check for next attack round.
500-510	Display end explosion.
515-530	Display game over and high score.
535-545	New game or end prompt.
550	End.
600-650	Routine for extra attack.

PCNProgramCards**City Defense****Card 5 of 5**

8338CD5/5

```

625 DRAW10,20,1:EX=EX+10
630 EY=EY+20:IFEY=160THENCURSETEX,165,3:GOSUB700~DH=DH+1:RETURN
635 FORT=1TO12:GOSUB150:NEXT
640 GOSUB250
645 IFPOINT(EX,EY)=-1THEN605
650 RETURN
700 MUSIC2,5,6,0:FORB=2TO1STEP-1
705 PLAY2,2,B,1000:FORC=1TO10
710 CIRCLEC,B-1:NEXTC,B
715 RETURN
750 FORA=1TOLEN(N#)
755 CHARASC(MID$(N#,A,1)),0,1
760 CURMOV6,0,0:NEXTA:RETURN
1000 CLS:PAPER7:INK5:FORA=1TO2
1005 PLOT1,A,10:PLOT12,A,"CITY DEFENCE":NEXT
1010 PLOT1,5,"STOP ENEMY-ATTACK ON THE CITY."
1015 PLOT1,8,"YOU HAVE 25 MISSILES EACH ATTACKROUND."
1020 PLOT1,11,"USE CURSOR CONTROL KEYS FOR CURSOR-"
1025 PLOT1,13,"MOVEMENT AND CURSET WITH SPACEBAR."
1030 PLOT1,16,"AFTER 5 OR MORE DIRECT HITS ON THE"
1035 PLOT1,18,"CITY, YOU ARE FORCED TO SURRENDER."
1040 PLOT1,25,"PRESS ANY KEY TO START."
1045 GETA#:RETURN
2000 FORA=46912TO46959
2005 READRC:POKEA,RC:NEXT:RETURN
2010 DATA12,12,28,28,28,28,28,28,0,0,6,6,31,31,31,31,0,12,12,12,15,
15,15,15
2020 DATA0,0,0,0,0,0,60,60,63,63,63,63,63,63,0,0,8,8,8,8,28,8,20,0

```

700-715	Routine to display attack on city.
750-760	Routine for plotting characters in HIRES.
1000-1045	Instructions.
2000-2020	Redefine characters.

PCNProgramCards

Monitor 64

8338MO3/8

Card 3 of 8

Commodore 64/CMB Basic/Martin Lightfoot/cont'd

```

700 REM*****
701 REM   CONVERT DECIMAL TO HEX
702 REM*****
705 T=H:H$=""
710 H$=CHR$(FNHEX(T-INT(T/16)*16))+H$:T=INT(T/16)
715 IFT>0THEN710
720 RETURN
800 REM*****
801 REM EXECUTE MACHINE CODE PROGRAM
802 REM*****
805 IFMID$(CO$,2,1)<>" "THEN500
810 IFLEN(CO$)<>6THEN500
820 H$=RIGHT$(CO$,4):GOSUB600:IFH=-1THEN500
830 SYSH:GOTO200
1000 REM*****
1001 REM   DISPLAY MEMORY ON SCREEN
1002 REM*****
1005 IFLEN(CO$)<>11THEN500
1010 IFMID$(CO$,2,1)<>" "THEN500
1020 CO$=RIGHT$(CO$,9):H1$=""
1025 IFMID$(CO$,5,1)<>" "THEN500
1030 H1$=LEFT$(CO$,4)
1040 H2$=RIGHT$(CO$,4)
1110 H$=H1$:GOSUB600:IFH=-1THEN500

```

700-720 Convert the decimal number in H to a hex number in H\$.

800-830 Run machine code program starting at address contained in H.

1005 Check length of CO\$=11. If not then jump to line 500.

1010 Check the second character of CO\$ for space. If not then jump to line 500.

1020 Removes the first and second characters of CO\$. Checks if first character of CO\$ is a space, if not then jump to line 500.

1030-1040 Splits CO\$ into two.

PCNProgramCards

Monitor 64

8338MO4/8

Card 4 of 8

```

1120 A1=H
1130 H$=H2$:GOSUB600:IFH=-1THEN500
1140 A2=H
1150 IFA2<=A1THEN500
1155 PRINT:PRINT
1160 FORJ=A1TOA2STEP8
1170 H=J:GOSUB700:PRINT"J. "H$":I=0
1180 H=PEEK(J+I):GOSUB700
1185 IFLEN(H$)=1THENMH$="0"+H$
1190 PRINT" "H$:GETR$:IFR$="■"THENJ=A2:GOTO1210
1200 I=I+1:IFI<8THEN1180
1210 PRINT:NEXTJ
1220 GOTO200
2000 REM*****
2001 REM   MEMORY SAVE ROUTINE
2002 REM*****
2003 SS=0
2005 NA$="":IFMID$(CO$,2,1)<>CHR$(34)THEN500
2010 CO$=RIGHT$(CO$,LEN(CO$)-2)
2020 FORG=1TOLEN(CO$)
2030 IFMID$(CO$,G,1)=CHR$(34)THENF=G:G=LEN(CO$):
      GOTO2050
2040 NA$=NA$+MID$(CO$,G,1)
2050 NEXT

```

1150 Check to see if the second address is smaller than the first.

1160-1220 Display the required memory onto the screen, in rows of eight.

2000-2005 Checks to see if the second character of CO\$ is a quote.

2010 Knocks off the first and second characters of CO\$.

2020-2050 Removes the file name between quote marks and stores it in NA\$.

The Websters Sof

It takes the guesswork out of the business of selling software.

If you're a high street retailer then personal computer software is one of the biggest opportunities ever to come your way. The Websters Software Directory will help you take that opportunity and turn it into pound notes – quickly, simply and profitably.

A unique selling medium.

Nobody else has anything like it. Used at the point of sale, in conjunction with normal display methods, the Directory will turn your store into a recognised and authoritative software centre. Instantly, without fuss or bother, your customers will be able to browse



through all the best selling software titles for all the top selling brand name home computers.

Game players, computer buffs, school children, teachers, students and businessmen. Everybody wants to be able to find the software they're looking for quickly and easily. All will gravitate towards your store and your copy of the Websters Software Directory.

Software Directory



Maximum display value in the minimum space.

The first edition of the Directory contains 240 pages, each showing details of one software title. By the time the second update takes place in early 1984, the total will have risen to 400 pages. From then on, each copy of the Directory will be updated quarterly so that, at all times, in your store, consumers will be able to find all the information they need about personal computer software. There simply isn't a better or more effective way of showing the consumer what each program offers.

Shows what actually appears on the screen.

All this happens in your store, right at the point of sale. *Nowhere else can the consumer go and see two full colour action photographs of what the screen actually shows when the program is run.* The Directory is at the heart of every home computer owner's buying needs. An indispensable reference point, indispensable in your store.



Presents program information consistently.

At long last the home computer owner will have comprehensive and accurate information about each software title available in an easily understood way. The whole process of selecting from the huge range of programs currently available becomes easier and much more fun. The Directory answers everybody's questions and does everything possible to help the customer buy.

The Websters Software Directory is at the centre of a comprehensive personal computer software merchandising service. Our current stock list contains all the best selling titles from all the leading software houses. Programs are available for use on Sinclair, Commodore, BBC, Dragon, Texas Instruments, Atari, Acorn, Oric and Lynx microcomputers.

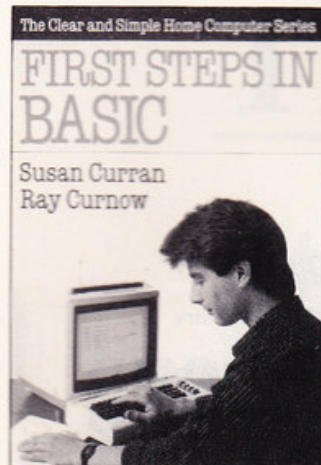
Websters

— SOFTWARE —

Please ask for further details or if you wish a representative to call.

Frances Cheyne, Websters Software Ltd.,
Langham Park, Catteshall Lane, Godalming,
Surrey, GU7 1NG. Telephone: Godalming (048
68) 4152.

Which book would your micro want you to buy? PCN's review page helps you choose.



'First steps in Basic' by Susan Curran and Ray Curnow, published by Windward at £4-95 (paperback, 192 pages).

This book is lucid, well laid out, and thoroughly useful. Since it starts in immediate mode, with the Print statement, it enables the beginner to experiment with the language and the computer without needing to know about more complicated matters such as programs and variables. These, sensibly, are not introduced until after the first chapter.

The book is machine independent, relying on a simplified form of Microsoft Basic to achieve this. Any adaptations that are needed (and they appear to be few and far between) are not difficult to implement. Sensible appendices on different Basics, and the language used here, facilitate this.

Progress is rapidly made to programs and variables. The latter are dealt with almost *too* thoroughly, but once the knowledge has been gained it is useful later on. The book subsequently moves on to loops, branching, editing, debugging, data and longer programs. The grounding given provides a basis from which to learn any programming language.

I think that it is a pity that flowcharts were used rather than structured diagrams, especially since the book advocates structured programming. The only structured diagram shown is used to illustrate structured programming ideas.

First Steps in Basic is an excellent book, whether you are just beginning to use your micro for programming or you are just about to buy one. Recommended.

PL

'Dynamic Games for your TI-99/4A' by Scott Vincent, published by Interface at £4.95 (paperback, 159 pages).

Well, well well; another book of type-them-in-yourself programs, this time for the TI-99/4A. The 30 programs in the book include the usual crop of golf, draughts, landers, and guessing games, though most of them have been retitled.

The book is laid out as a series of chapters, each one beginning with an introduction which sets the scenario for the following game. Next comes the instructions on how to play the game, ie which keys to press and which parts of the screen to look at. After this section you sometimes get notes on how the program operates. I say sometimes because, unfortunately, not all of the programs are documented in this way.

The games are generally of the interactive genre, that is they entail you chasing around the screen, or memory in the case of the adventures, zapping and dodging your various enemies and opponents.

At last we come to the listings. These look as though they have been printed on the ubiquitous dot-matrix printer. This suggests programs were first run on the TI and, once perfected, were printed out. Because of this there should be as few bugs as is humanly (and machinely) possible. The listings are legible and are generally short.

This is a worthwhile book if you have just obtained a TI-99/4A and are looking for a source of programs to get you started. But anyone who has had the machine for any length of time will probably have seen or written most of the programs.

KG



WordStarTM and CP/MTM Made Easy

John D. Lee

'Wordstar and CP/M Made Easy' by John D. Lee published by Wiley & Sons at £6.95 (paperback 223 pages)

Wordstar is the most popular word processor available on microcomputers. That it is mostly unavailable on home micros is a reflection that there is more money to be made from business users rather than home users. This, however, is changing.

MicroPro, the maker of Wordstar, have already produced three books about its word processor, but the best and most informative of these, the comprehensive User's Guide, is very difficult to understand and poorly indexed. The need for a well laid out and well indexed book was obvious.

This book succeeds, but at first it seems quite daunting, with 45 chapters and large contents and index sections. These are necessary, and the large numbers of short chapters actually makes for easy reading by allowing the reader to assimilate the information in small chunks.

Wordstar is not easy to use for beginners and is not really user-friendly, but this book is even if it is a little dry. The author has provided useful sections on disk and file maintenance, and on the loading and saving of files, even Wordstar and CP/M themselves.

It is unfortunate that the title makes a claim for CP/M since it is only described at the end of the book, and only really with reference to Wordstar.

The book provides a safe method of mastering Wordstar and is handy as a reference guide. Tear out (duplicate) pages of the instructions are available.

PL

'Introducing Dragon Machine Code' by Ian Sinclair published by Granada at £7-95 (paperback, 151 pages).

If you haven't used machine code on your Dragon before, then this is a helpful start to the (often tricky) subject. The only real worry is that, by the time you're really getting to grips with the 6809, the book is more a source of frustration and less one of enlightenment. However, once you've read this book, you'll be able to understand most of the available books on 6809 programming, and more importantly you'll be able to understand them with reference to your Dragon.

The sections of the book dealing with how to get into machine code at all, and on how to get the best from your Dragon, are very good. The will get you to the point of seeing what a machine code routine looks like, and towards getting them out of magazines and books and into your machine.

The very fact that the book becomes increasingly frustrating is a tribute to the way the author takes the reader, step by step, into machine code. By the time you've finished the book you will be eager to get into some of the more technical, and until you've read this less accessible books on the 6809 assembler.

However, this is the first book that I've seen about machine code which is very instructive on how to use it on the Dragon. Many machine code books are too 'head in the clouds' for home users.

A little more expensive than most computing books, but I think good value for money (still around the same price as a piece of software).

PL



SPECTRUM EXTENDED BASIC

—IMPROVE YOUR PROGRAMMING —EASE DE-BUGGING
—HELPS YOU ADD STRUCTURE TO YOUR PROGRAMS

The ten additional BASIC commands provided by Spectrum Extended Basic are considered an essential aid for most programming applications, so much so that many of these commands are standard features on other Basics.

The program is compact, occupying less than 5K memory, is user friendly—requiring only a two keyentry—and incorporates syntax checking.

The program commands are used and entered just like normal Basic keywords, the program operates bytrapping your usual keyboard input and testing for any of the ten additional commands.

The extra commands available are:

- AUTO auto line number, start and interval definable.
- CLOCK ON/OFF 12 hour clock, displayed on screen.
- DELETE Basic line/block delete.
- EXAMINE reads tape headers and displays information.
- FIND find specified string in Basic program.
- MEMORY displays memory status.
- RENUMBER full line renumber with GOSUBs and GOTOs
- SCROLL ON/OFF continuous scrolling.
- TRACE ON/OFF slows program execution, displays line and statement currently executed.
- VARIABLES displays variable names and contents.

48K Spectrum Extended Spectrum—£9.95

Also available at Boots, W.H. Smith and all good computer shops.

DELIVERY: UK—prices include VAT and postage & packing. Send SAE for Catalogue.

EUROPE—add 80p per program

ALL OTHER PLACES—for air mail add £2 for the first program and 50p for each subsequent program. Surface delivery add 80p per program.

CP software

Send Cheque, Postal Order or Access No. to:
CP SOFTWARE, Dept PCN1A
17 Orchard Lane, Prestwood,
Bucks HP16 0NN

Buy it with Access

CHALKSOFT

37, Willowslea Road, **EDUCATIONAL**
Worcester WR3 7QP **SOFTWARE**
Telephone: 0905 55192

Offer
closes
JAN 31
1984

Hey Dad! We use
that at school ...!

A good
idea for Xmas
I'll send off
today.

SPECIAL CHRISTMAS OFFER

Buy two
or more
and get
£1
off each.

Special thanks to:

- Good computer shops everywhere
- Access • Adtel ansaphones
- Webster and other imaginative software distributors
- Simon Stable's Real Time Tape Duplicating Company.

TITLE	XMAS PRICE	MACHINE	TICK HERE
PUNCMAN 1 & 2 Animated punctuation game. Can you help Punzman beat Nosh...? (7-12 years)	£9.25	BBC 'B'	
	£8.25	Spec 48K	
STORY A - SPANISH GOLD The first multichoice illustrated story book on screen. (6-11 years)	£7.95	BBC 'B'	
	£6.95	Spec 48K	
PIRATE Simply the best adventure game for young people (7 to adult) illustrated. Compulsive.	£9.25	BBC 'B'	
	£8.25	Spec 48K	
LETTERS Let your micro teach your child to write! Draws lower-case letters...	£11.25	BBC 'B'	
	£10.25	Spec 48K	
INKOSI Be an African King! Simulation. Can you look after the tribe and defeat the WITCH DOCTOR...?	£6.95	BBC 'B'	
	£5.95	Spec 48K	

Tick at least two. Remember, if you only buy one you pay the old price.
Prices include VAT and p&p.

Postcode

Take this coupon to your
local dealer or post direct.

Micro Post

* Delivery within 14
days or full refund.

TEXAS
TI-994A
£88.00
inc. VAT.



16k memory, full
typewriter keyboard,
colour and sound.

VIC 20
£89.50
inc. VAT.



U.K. Produced.
Massive software
range from only £1.99.

COMMODORE
64
£197.50
inc. VAT.



Massively powerful
best seller for games,
business and leisure
use.

To:- Micro Post,
P.O. Box 16,
Rugeley,
Staffs.

Best
Selling
Computers
delivered to
your door.

- * Discount Prices.
- * Free Securicor delivery.
- * ACCESS/CHEQUE
OR POSTAL ORDER.

ORIC 48K
£134.00
inc. VAT.



Full 48k, excellent
quality product, high
resolution graphics.

SHARP MZ 700
£247.00
inc. VAT.



Just launched
Japanese computer
with proven reliability
and power.

SEIKOSHA
GP100A/
GP100VC
PRINTERS.
£199.00
inc. VAT.

Dot matrix, tractor
feed.

Please send me:-
Item Price Total
£

I enclose my cheque/postal order for £.....
or debit my Access card

Signature

Name

Address

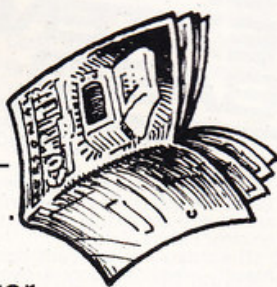
BLOCK CAPITALS PLEASE.

Your remittance should be made payable to:-
MICRO POST.

ONLY
£3.50

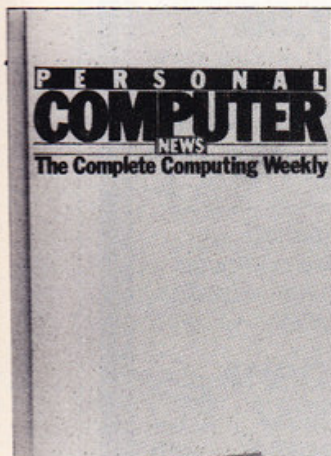
For sufferers of PCNitus THE PCN BINDER

Since March 1983, a mysterious malady
has afflicted thousands of people in Britain —
PCNitus. The symptoms are perplexing...
Those afflicted are found fighting their
way through piles of Personal Computer



News magazines
muttering strange things like 'can't find
the Electron Pro-Test' and 'The Spectrum
Micropaedia must be here somewhere...'
But a recent breakthrough has brought
instant relief to PCNitus sufferers.

The cure is called the *Personal
Computer News
binder*. It's red,
yellow and silver and holds four
months' copies completely flat,
even when full. You'll be able to
read them easily
and refer to
them quickly.



So if you recognise the symptoms above — take the cure now!

Just fill in the coupon at the bottom of the page and send it with payment (£3.50 inc postage, VAT and handling) to the address below.

BINDER ORDER CARD. Please rush me _____ PCN binder(s) at £3.50 each. I enclosed my cheque made payable to Personal Computer News. Please charge my Access/Visa/Diners/American Express card (delete where not applicable)

Account No. Name

Address Town Postal code

..... Signed

Send to Personal Computer News, Binders Department, 53/55 Frith Street, London W1A 2HG

DATABASICS

This six-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 (million 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 CHARACTERS columns x 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+T) 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, 5 1/4" 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	£40	Powertran/Cortex	£454	Osborne	£1,581	Country Computers C3000	£2,242	Britannia Baby	£2,657	Criter Series 1	£3,214	Altos 800/15	£5,663
Casio PB100	£50	Epson HX20	£472	APL Signet	£1,599	Kemtron K2000E	£2,242	Adler Alphatronic P3	£2,696	Samurai	£3,214	Durango F85	£5,744
TRS-80 PC4	£50	Tandy TRS-80 Model 100	£499	Basis 108	£1,610	Rair Black Box 320S	£2,242	Corona PC1	£2,697	Tiger	£3,214	Triton 4	£5,744
Aquarius	£50	Nascom 3	£549	Commodore 4016	£532	Sonyo MBC 2000	£2,242	Eagle II	£2,702	Torch	£3,214	Marin Chip M9900	£5,750
Laser 200	£70	Commodore 4016	£532	Research Machine 480Z	£560	Toshiba T-200	£2,242	Almarc 801	£2,708	Sord M223	£3,277	SW Tech Products S09	£5,807
Oric-1	£80	DAIPC	£584	ACT Apricot	£1,719	Merlin M2215	£2,242	DEC Rainbow 100	£2,714	Kontron RS180	£3,306	BASF 7100	£5,835
Sharp PC1251	£80	Apple II	£776	Microsolution Brit. Genius	£1,840	Cal PC	£2,294	ICL PC Model 10	£2,754	Kaypro 10	£3,340	Compustar	£5,857
Jupiter Ace	£90	Commodore 500	£799	Globe 101	£1,850	North Star Horizon	£2,294	Millbank SX10	£2,754	Columbia PC 1600-1	£3,392	Sord M243	£5,842
Casio FX702P	£99	Tandy Model 4	£861	Grundy 8200	£1,850	Sonyo MBC 1250	£2,294	Sirius I	£2,754	Digico Prince	£3,392	Sage IV	£5,962
Sinclair Spectrum	£130	HP 75C	£983	Genie II	£1,897	Casini C2	£2,294	Victor 9000	£2,754	OEM Orion	£3,392	Rair Business Computer	£6,037
Commodore VIC 20	£140	Sharp M280B	£900	Toshiba T-100	£1,900	Seed System I	£2,300	North Star Advantage	£2,766	Barcellos AMT 100	£3,450	Digital Microsystems 4	£6,210
Altair 400	£149	Franklin Ace	£914	Sord M23	£1,932	Sharp PC3201	£2,300	Apple III	£2,780	Kalamazoo 1050	£3,450	Superstar	£6,296
Sord M5	£150	Apple IIe	£972	Kaypro II	£1,949	HP 85	£2,360	Sonyo MBC 4050	£2,817	Digital Microsystems 3	£3,576	Racal 6000	£6,327
Altair 600XL	£160	Mupid 320 GB	£978	Krypton 800 range	£1,949	HP Series 100, 120	£2,360	Bonsai SM 4000	£2,842	Televideo TS 1602-C	£3,714	Eagle 1600	£6,497
Colour Genie	£168	Husky Hunter	£997	Kenilworth 83G	£1,953	Sord M23P	£2,362	Logica VTS Viesse	£2,863	Adds Multivision	£3,795	TI System 200-250	£6,695
Sharp PC1500	£174	Commodore 8032	£1,129	Transam Truscan	£1,983	IBM PC	£2,386	Decision-1 Computer O11	£2,869	Clenio Pronto	£3,795	Compucomp 675	£6,780
Dragon 32	£174	Commodore 710	£1,144	NCR Decision Mate V	£1,983	IBM PC	£2,386	DMF Fox	£2,875	Panasonic JD800M	£3,795	Wicat 150	£6,846
Texas CC40	£180	Microdecision	£1,144	Epson QX10	£1,995	IBM PC	£2,392	Eagle III	£2,950	Kemtron K3000	£3,795	Pascal Mod. Microengine	£6,969
Tandy TRS-80 colour	£180	Tulip 1	£1,150	IDS Datamachine	£1,995	Xerox 820 Model II	£2,415	Zenith ZF-120-22	£2,978	DEC PC 350	£3,852	Diablo 3000	£7,003
Mattel Intellivision	£190	Fujitsu FM8	£1,150	Tandy TRS-80 Model III	£1,999	Haywood 3000	£2,439	Monroe EC8800	£2,990	Cifer Club	£3,904	Onyx 5001 MU	£7,250
Electron	£199	Sonyo MBC 1000	£1,195	Caltext Micro	£2,012	LSM4	£2,472	Philips P3500	£3,000	Sage II	£4,019	Apple Lisa	£7,607
Camputers Lynx	£225	Pied Piper	£1,226	Minstel	£2,019	Canon CX-1	£2,500	Tanberg EC10	£3,000	IBM PCXT	£4,199	Sundance II	£7,653
Commodore 64	£229	Posifon 900	£1,259	Portico Miracle Portable	£2,059	Sirius 1	£2,525	Archives 1	£3,003	Haywood Hinet	£4,258	Haywood Hinet	£8,205
Sharp MZ700	£250	Cromemco C10	£1,350	LSIM3	£2,064	HP 87XM	£2,571	Cromemco System 1	£3,025	H-Mech H4500	£4,310	Altos 856-10	£9,631
New Brain A	£269	Commodore 8096	£1,374	Haywood 9000 Composite	£2,064	Ajile	£2,587	Wang Professional	£3,076	BMC OK 11F800, Model 20	£4,360	Micro Five 3000	£10,350
Genie II	£299	NEC PC 8001	£1,375	Posifon 9000	£2,147	Canon AS100	£2,599	Direct 1000	£3,093	ADS 42	£4,500	Sundance 16	£10,480
Altair 800	£300	Pascal 640	£1,437	Research Machines 380Z	£2,147	CP1100	£2,633	Hyperion	£3,105	Country Computers C1000	£4,543	Spectrum	£11,442
Microtran 65	£327	NEC PC8000	£1,454	Superbrain JR	£2,156	Sead System 19	£2,639	ITT 3030	£3,105	Country Computers C1000	£4,543	Ap. APL	As: Assembly
BBC Model B	£389	Signal 2	£1,483	Future Computers FX-20	£2,156	Enterprise 1000	£2,645	Monroe OC8810	£3,162	Fortune 32: 16 System 2	£5,204	Ap. APL	As: Assembly
Sharp MZ80A	£399	Magnum	£1,489	C/WP Cortex	£2,179	Fact 6520	£2,645	HP Series 200 Model 16A	£3,211	Zeus 4	£5,400	Co: Basic	Co: Pascal
Datasc Micro Controller	£431	HP86A	£1,495	Adler Alphatronic P2	£2,197	Olympia Boss Model A	£2,645						

ABBREVIATIONS

Ap: APL
As: Assembly
Ba: Basic
Co: Cobol
Cm: Comal
Fr: Fortran
Pa: Pascal

HARDWARE

ACT Apricot	£1,719	8086A	5	256K	768K	80×25	LCD	800×400	W	8	●	1	1	2	2	2×315K5¼F	MSDOS	Ba	●	A7	PCN issue 37	
Adds Multivision	£3,795	8085A	5	64K	256K	80×25	M	640×240	W	28	●	1	1	1	1	1×350K5¼F	CP/M2.2, Muon	Ba	●	A2	Multi user system	
Adler Alphatronic P2	£2,197	8085A	3	48K	64K	80×24	M		W	6	●	2	2	1	3	2×320K5¼F	CP/M	Ba	●	T1	£327 buys extra storage	
Adler Alphatronic P3	£2,696	8085A	3	64K		80×24	M		W	6	●	2	2	1	3	2×790K5¼F	CP/M		●	T1	16 bit option-promised	
Ajile	£2,599	8088	4	256K		80×25	M	640×250	W	10	●	1	1	2		2×320K5¼F	MS-DOS	BaAs	●	A9	PCN issue 13	
Almarc 801	£2,708	Z80	4	64K	512K	80×25	(M+)	●	W			2		11		2×800K5¼F	CP/M		●	A4	8-bit range goes to 20Mb	
Almarc 1601	£3,445	8086	8	128K	1Mb	80×25	(M+)	●	W			2		11		2×800K5¼F	CP/M86		●	A4	Pseudo 16-bits go to 20Mb	
Aquarius	£68	Z80A	4	4K	52K	40×24	TV	320×192	C					1	●		Cassette	Ba		M7	PCN issue 7	
Altos 800/15	£5,663	Z80	4	192K	208K	80×24	M		W	8	●	1				1×450K5¼F	MP/M		●	L1	Multi user business machine	
APL Signet	£1,610	Z80A	4	64K		80×25	Tv(M+)	●	*			2				2×188K5¼F	APL, CP/M	Ap	●	M1	*APL terminal recommended	
Apple II	£776	6502	1	48K	128K	40×24	Tv(M+)	256×192	W					8	●		CP/M, DOS 3.3, UCSD-P	Ba	●	A8	Plenty of software and extras	
Apple IIe	£972	6502		64K	128K	80×24	(M+)	256×192	W					1	8		DOS	Ba	●	A8	Updated Apple II	
Apple III	£2,780	6502	2	128K	256K	80×24	(M+)	●	W		●	1	1	4		1×140K5¼F	SOS, DOS		●	A8	Will emulate Apple II	
Apple Lisa	£9,775	68000	8	1Mb		120×30	M	792×360	W		●	2	1	3		2×860K5¼F	Lisa		●	A8	PCN issue 1	
Archives I	£3,003	Z80	4	64K		80×25	M	●	W	23	●	2	1	1	5	2×386K5¼F	CP/M			S1	Standard CP/M + graphics	
Atari 400	£150	6502B	1.79	16K		40×24	Tv	320×192	T	3				7	●		Cassette	Ba	●	A5	Games computer	
Atari 800	£300	6502	1.8	48K		40×24	Tv(M+)	●	W	3				7	4	●	Cassette	Ba	●	A5	Versatile, good graphics	
Atari 600XL	£160	6502C	1.79	16K	64K	40×24	(M+)	320×192	W	5				4	1	●	DOS 2	Ba	●	A5	Dos 3 available 1984	
Atari 800XL	£250	6502C	1.79	64K		40×24	(M+)	320×192	W	5				4	1	●	DOS 2	Ba	●	A5	256 colours, 128 at any one time	
Barcellos AMT 100	£3,450	Z80A	4	64K	256K	80×24	TvM		W	8	●	1	1	2	3	2×500K8F	CP/M	BaCo	●	B1	Up to four users	
BASF 7100	£5,805	Z80A	4	64K		80×24	M		W	26	●	1	1			3×163K5¼F	BOS	Ba	●	C1	Hard disk promised	
Basis 108	£1,683	6502	1	64K	126K	80×24	TvM	820×168	W	15	●	1	1	6	●		MOS	BaAs	●	A1	PCN issue 3	
BBC Micro Model B	£399	6502	2	32K		80×30	Tv(M+)	●	W	10	●	1		5	3	●		CP/M	Ba	●	E1	Built-in printer
BMC OKI if 800, Model 20	£4,360	Z80B	5	64K	256K	80×25	M	640×200	W	15	●	1			●	2×340K5¼F	CP/M	Ba	●	B2	CP/M business machine	
Bonsai SM 3000	£2,294	Z80	2	64K		80×24	M	80×24	W	14	●	1	1			2×350K5¼F			●	B2	Z80 for 8 bit software	
Bonsai SM 4000	£2,842	8088	5	128K	256K	80×24	M		W	14	●	1	1				CP/M, MP/M, MS-DOS	AsBaCo	●	B3	Cobol language included	
Britannia Baby	£2,657	8085	6.14	64K		80×25	Tv(M+)	80×25	W	11	●	2	1			2×500K5¼F	CP/M		●	B3	This is CP/M compatible	
British Micro Mini 803	£1,490	Z80A	4	64K		80×25	(M+)	512×256	W	17	●	1	1	1		2×400K5¼F	OS/M	Ba	●	B4	Also Z80B Processor	
CAL PC	£2,294	8088	5	128K	256K	80×25	TvM	256×512	W	●	2	1	1	5		2×400K5¼F	CP/M	Ba	●	C3	Apple II compatible	
C-Base 64A	£401	6502	1	64K	192K	40×24	Tv(M+)	256×192	W	51	●			8	●		CP/M, DOS 3.3, UCSD-P	Ba	●	W3	Range of software included	
Caltext Micro	£2,019	Z80A	4	64K	256K	80×24	TvM		W	36	●	1	1	3		2×400K5¼F	CP/M	Ba	●	C3	Also 128K with CP/M	
Computers Lynx	£225	Z80A	4	48K	192K	40×24	Tv(M+)	248×256	W		●	1	1	1	●		CP/M	Ba	●	C5	Choice of CP/M86 or MS-DOS	
Canon AS100	£2,633	8088	4	128K	512K	80×25	M	640×400	W	12	●		1	4		2×640K5¼F	MCX	BaAs	●	C4	Pascal, Fortran as extras	
Canon CX-1	£2,500	6809	4	128K	256K	80×24	M	80×25	W	15	●	3	1	1	2	2×320K5¼F	Cassette	Ba	●	C6	Pocket computer	
Casio FX 702P	£90	Cust.		2K		20×1	LCD		C					1	●		Cassette	Ba		C6	Business pocket computer	
Casio PB100	£50	Cust.		0.7K	1.7K	60×1	LCD		C		●			1	●		Cassette	Ba		C6	*Choose your own terminal	
Casu Mini C Mark 2	£2,300	Z80A	4	64K		*	(M+)	*	*			4	1	6		2×1Mb8F	CP/M		●	C7	Other models available	
Cifer Series 1	£3,214	Z80	4	128K	320K	132×32	TvM		W	40	●	3	1			2×800K5¼F	CP/M		●	C17	Optional 68000 processor	
Cifer Club	£3,904	Z80A	4	64K	256K	80×24	M	1024×300 opt	W	20	●	3	1			1×800K 5¼F	CP/M, MP/M opt, UNIX opt		●	C17	*Choice of terminal	
Clenlo Pronto	£3,795	Z80A	4	64K	1Mb	*	Tv(M+)	*	*			2	2	18		2×600K8F	CP/M	Ba	●	C8	Watch out for the weight	
Clenlo Table-Top 925	£3,105	Z80A	4	64K	128K	80×25	M		W	11	●	2	2			2×600K8F	CP/M		●	C8	An IBM lookalike	
Columbia PC1600-1	£3,392	8088	4.77	128K	1Mb	80×24	M	640×200	W	10	●	2	1	8		2×320K5¼F	CP/M, MS-DOS	Ba	●	I1	Very popular home micro	
Commodore VIC 20	£140	6502	1	5K	32K	22×23	Tv(M+)	176×158	W	8				3	1		Kernal	Ba	●	C9 <td>PCN issue 24</td>	PCN issue 24	
Commodore 64	£229	6510	1	64K		40×25	Tv(M+)	320×200	W	8				3	●		Kernal	Ba	●	C9 <td>The original PET</td>	The original PET	
Commodore 4016	£632	6502	1	16K	32K	40×25	Tv(M+)		W		●			1	3		Cassette, PETDOS	Ba	●	C9		
Commodore 700	£1,144	6509	2	128K	896K	80×25	TvM		W	10	●	1	1	2	1		Kernal	Ba	●	C9	PCN issue 5	

[illegible]

HARDWARE

ICL PC Model 10	£2,754	8085	3	64K	256K	80x24	Tv(M+)		W	11	●	2			8	2x700K5¼F	CP/M	Ba	●	I4	Bottom of range
ICL PC Model 15	£2,702	8085A	5	64K	512K	80x25	M	●	W	●	●	8				1x13.3Mb5¼H	CP/M, MP/M	Ba	●	I4	Suitable for small business
IDS Datamachine	£1,995	Z80	4	64K	1Mb		Tv(M+)					2			15	2x400K5¼F	CP/M	Ba	●	I8	*Depends on terminal
IO Tech Iona	£2,539	Z80	4	69K	960K	80x24	M	●	W	12	●	1	1		8	2x400K5¼F	CP/M	Ba	●	I5	Good colour versatility
Intellivision + micro adaptor	£189.90	CP1610	2.4	5K		20x12	Tv	●	C					1			Cassette	Ba		M7	Computer adaptor is £89.95
ITT 3030	£3,105	Z80A	4	64K	256K	80x24	Tv(M+)		W	8	●	1		1	1	2x280K5¼F	CP/M, BOS		●	I7	Top end business system
Jupiter Ace	£90	Z80	3.25	3K	51K	32x24	Tv(M+)		C	●	●				1			Fr		J1	Native Forth machine
Kalamazoo 1050	£3,450	8085	6	64K		80x24	Tv(M+)		W	10		1				2x250K5¼F	Kalamazoo		●	K3	Only Kabil language
Kaypro II	£1,949	Z80	4	64K		80x24	M		W		●	1	1			2x200K5¼F	CP/M	Ba	●	C15	PCN issue 35
Kaypro 10	£3,340	Z80A	4	64K		80x24	M		W		●	1			2	1x10Mb5¼H	CP/M	Ba	●	C15	PCN issue 35
Kemiton K2000E	£2,242	Z80	4	64K		80x24	(M+)		W		●	2	1		11	1x300K5¼F	CP/M		●	K4	Scientific Keyboard
Kemiton K3000	£3,795	Z80	4	64K	256K	80x24	(M+)		W		●	2			14	2x1Mb8F	CP/M, MP/M		●	K4	For scientific use
Kenilworth 83G	£1,953	Z80A	4	64K		80x25	TvM		W	10	●	1	1		5	2x350K5¼F	CP/M		●	K5	British portable
Kontron RSI 80	£3,306	Z80	4	64K	128K	80x25	M		W	16	●	2	1		8	2x303K5¼F	Kontron	Ba	●	K6	O/S CP/M based
Krypton 800 range	£1,949	Z80A	4	64K	256K	80x24	M		W	13	●	2	1		8	2x386K5¼F	CP/M		●	T8	Fully definable characters
Laser 200	£70	Z80A	3.6	4K	64K	32x16	TV	●	C			1		1				Ba		C14	Cheap colour computer
LSI M3	£2,064	Z80	2.5	64K		80x24	M		W	31	●	1	1			2x200K5¼F	CP/M		●	L3	Big, British and CP/M
LSI M4	£2,472	8088	5	128K	256K	80x24	M		W	31	●	2	1		1	2x400K5¼F	CP/M 86, CP/M80		●	L3	Z80 for 8-bit software
Logica VTS Vitesse	£2,863	8086	5	64K	256K	80x24	M	●	W	12	●	1	1		4	2x1Mb5¼F	CP/M, MS-DOS	Ba	●	L4	High-res colour graphics
Magnum	£1,489	Z80	4	64K		80x25	M		W		●	2				2x400K5¼F	CP/M		●	I6	Inexpensive CP/M machine
Marin Chip M9900	£5,750	9900	3	64K	1.6Mb	24x80	M		W	8	●	4			12	2x1.2Mb8F	MOS, MDEX	Ba	●	M2	Genuine 16-bit
Merlin M2215	£2,742	8085	5	64K		24x80	M		W	22	●	2		2		2x780K5¼F	CP/M	Ba	●	B7	Business computer
Micro Five 1000	£5,175	8088	8	128K	512K	25x80	TvM		W	20	●	10			2	2x1Mb5¼F + 2x8.3Mb5¼H	*		F2	*Choose your own O/S	
Micro Five 3000	£10,350	8086	5	128K	1Mb	25x80	TvM		W	20	●	5			3	1x10Mb8F	*		F2	*Choose your own O/S	
Microdecision	£1,144	Z80	4	64K		80x24	(M+)		*			2				1x200K5¼F	CP/M	Ba, Pilot	●	M9	*Terminal extra
Microsolution British Genius	£1,840	Z80	4	64K		80x24	TvM		W	21	●	1	1			2x160K5¼F	CP/M		●	M4	'Genius' by nature?
Microtan 65	£389	6502	1	8K	48K	25x64	(TvM+)		W		●	1	2				Tanbug	Ba	●	M8	PCN issue 26
Millbank SX10	£2,754	Z80A	4	65K	256K	80x25	M		W	10	●	2		1		2x350K5¼F	CP/M	As	●	M5	Scientific applications
Minstel	£2,059	Z80	4	64K	352K		(M+)	*				2	1			2x400K5¼F	CP/M opt		●	H4	Choose your terminal
Molecular M200	£5,462	Z80	4	64K	320K		(M+)		*			2		1	16	1x10Mb8H + 1x500K8F	CP/M	BaAs	●	G2	*Terminal required
Monroe EC8800	£2,990	Z80A	3	128K		40x24	M		W	32	●	3		3		1x320K5¼F	Monroe	BaPaPilot		F3	Only 40-character screen
Monroe OC8810	£3,162	Z80A	3	128K		80x24	M		W	32	●	3		2	1	1x320K5¼F	Monroe	BaPa	●	F3	Bigger model available
Mupid 320-GB	£978	Z80A	4	64K	128K	40x24	Tv(M+)	●	W	55	●	1	2	1	●		CP/M +	BaAs		P6	PCN issue 22
Nascom 2/3	£327	Z80A	4	2K	64K	16x48	Tv(M+)		W			1			4		NAS, SYS	BaAs	●	L5	Old reliable
NCR Decision Mate V	£1,983	Z80A	4	64K	512K	24x80	M	●	W	20	●				7	2x320K5¼F	CP/M 80	As	●	N3	PCN issue 8
NEC PC8000	£1,454	Z80	4	32K	64K	80x25	M	●	W	10	●	2	1			2x300K5¼F	CP/M, NEC, DOS	Ba	●	N1	Superb colour graphics
NEC PC8001	£1,375	Z80A	4	64K		80x24	M	●	W	10	●					2x144K5¼F	CP/M	Ba		N1	Price includes twin disk drive
New Brain A	£269	Z80A	4	32K	512K	80x30	Tv(M+)		C			2		1	●		Cassette	Ba		G3 <td>A lot of promise</td>	A lot of promise
North Star Advantage	£2,766	Z80	4	64K		80x24	M		W	15		1		6		2x360K5¼F	CP/M		●	T9	16-bit option
North Star Horizon	£2,294	Z80	4	64K	512K		*		*			2	1	1	9	2x360K5¼F	North Star DOS	Ba	●	T9	*Choose your own terminal
OEM Orion	£3,392	8086	8	128K	896K	80x25	TvM		W	13	●	11		6		2x500K5¼F	CP/M 86	BaCo	●	O5	*Full communications machine
Olivetti M20	£2,869	Z8000	3	160K	512K	80x25	M	●	W		●	1	1		5	2x320K5¼F	PCOS	Ba	●	B6	Real 16-bit
Olympia Boss Model A	£2,645	Z80A	4	64K		80x28	M	●	W	10	●	1		4		2x140K5¼F	CP/M		●	O1	Useful 28 lines on screen
Onyx 5001 MU	£7,607	Z80A	4	128K	256K	*			*			5	1			1x7Mb5¼H	CP/M	Ba	●	T2	*Terminal extra; other models
Oric 1	£80	6502A	1	16K	48K	40x28	Tv(M+)	●	C				1	1	●		Cassette	Ba		O2	4-colour printer opt

Osborne 1	£1,581	Z80	4	64K	104x24	M	104x24	W 10	1	1	2x185K5 1/4F	CP/M	Ba	O3	Portable, includes software
Panasonic JD 800M	£3,795	8085A	4	60K	80x24	M	80x24	W 21	3		2x250K8F	CP/M	Ba	P1	Larger model costs £5,002
Pasca 640	£1,437	Z80A	4	64K	80x24	M	80x24	W 21	1	1	2x250K8F	CP/M	W1	W1	Regular CP/M micro
Pascal Modular Microengine	£7,003	WD9000	2	128K	.	.	.	.	4	8	2x1.2Mb8F	UCSD-P	Pa	P2	*Terminal extra
Pied Piper	£1,226	Z80A	4	64K	80x24	Tv(M+)	80x24	W 36	1	1	1x780K5 1/4F	CP/M	S11	P2	PCN issue 4
Philips P3500	£3,000	Z80A	4	64K	320K	M	80x25	W 11	2	2	2x0.6Mb5 1/4F	Turbo-DOS	Co	P3	Fast O/S as standard
Portico Miracle Portable	£2,064	Z80A	4	128K	256K	M	80x25	W 10	2	1	2x400K5 1/4F	CP/M	P7	P7	PCN issue 28
Positron 900	£1,259	6809	1	64K	256K	(M+)	.	.	4	1		O/S 9	Ba	P4	*You choose your terminal
Positron 900	£2,134	6809	1	64K	256K	Tv(M+)	80x24	W 12	4	1		O/S 9	Ba	P4	Multi-user version
Powertran Cortex	£454	9995	12	64K	1Mb	Tv(M+)	40x24	W 12	1	1			BaAs	M2	Mainly sold as £340 kit
Quantum 2000	£2,587	Z80A	4	64K	192K	M	80x25	W 18	1	1	3x860K5 1/4F	CP/M		R1	Mono, low-res graphics
Rair Black Box Model 3/20S	£2,242	8085	5	64K	256K	(M+)	80x24	W 10	2	4	1x19Mb5 1/4H + 1x1Mb5 1/4F	CP/M	Ba	Q1	*VDU extra, many versions
Rair Business Computer	£8,037	8088	5	256K	1Mb	M	80x25	W 21	1	1		CP/M, PCDOS	Ba	R1	Hybrid 8/16 bit
Racal 6000	£6,327	Z80	5	64K	256K	M	80x26	W 21	1	1	1x600K8F	CP/M		R2	CPM languages available
Research Machines 380Z	£2,147	Z80A	4	32K	56K	Tv(M+)	40x24	W 4	2	1	2x144K5 1/4F	CP/M	Ba	R3	Widely used in schools
Research Machines Link 480Z	£650	Z80A	4	32K	256K	Tv(M+)	40x24	W 4	2	1		Cassette	Ba	R3	CP/Net version available
Sage II	£4,019	68000	8	128K	512K	(M+)	.	.	2	1	2x640K5 1/4F	UCSD-P System	BaAsPaFni	T10	*Terminal extra
Sage IV	£5,962	68000	8	128K	1Mb	(M+)	.	.	6	1	2x640K5F + 1x6MbH5 1/4	UCSD-P System	PaBaFni	T10	*Terminal own choice
Samurai	£2,754	8086	4.6	128K	768K	M	80x25	W 12	3	1	2x1.2Mb8F	MS DOS, CP/M 86		M6	High-res colour graphics
Sanyo MBC 1000	£1,195	Z80A	4	64K		M	80x25	W 17	1	1	1x320K5 1/4F	CP/M	Ba	L1	Standard CP/M model
Sanyo MBC 1250	£2,294	Z80	4	64K		M	80x40	W 17	1	1	2x640K5 1/4F	CP/M	Ba	L1	High-res graphics
Sanyo MBC 2000	£2,242	8085A	5	64K		M	80x24	W 24	2	1	2x328K5 1/4F	CP/M	Ba	L1	Big disk model costs £3,622
Sanyo MBC 4050	£2,817	8086	5	128K	512K	M	80x24	W 24	2	1	2x640K5 1/4F	CP/M 86	Ba	L1	Pseudo 16-bit
Seed System 1	£2,300	6800	2	32K	64K	M	80x24	W 3	2	2	2x160K5 1/4F	DOS 68 Flex	Ba	S3	Ageing business machine
Seed System 19	£2,600	6809	2	48K	1Mb	M	80x24	W 3	2	2	2x160K5 1/4F	OS-9		S3	Latest from Seed
Sharp M280A	£347	Z80	2	48K		M	40x25	W 5				Sharp Basic	Ba	S4	CP/M facility extra
Sharp M280B	£900	Z80A	4	64K		M	80x25	C 10				Sharp Basic	Ba	S4	Unusual keyboard
Sharp M2700	£250	Z80A	4	64K	68K	Tv(M+)	40x25	W 5	1	2		Sharp	Ba	S4	PCV issue 27
Sharp PC1251	£79.95	Cust.	.58	4.2K		LCD		C 18		1		Sharp Basic	Ba	S4	Pocket computer
Sharp PC1500	£169	Cust.	1.3	3.5K	11.5K	LCD	26x1	C 6	1	1		Cassette	Ba	S4	Optional 4-pen plotter
Sharp PC3201	£2,300	Z80A	2.6	64K	112K	M	80x25	W 10		5	2x500K5 1/4F	Sharp Basic	Ba	S4	Powerful Sharp Basic
Signet 10025	£1,599	Z80B	6	64K		M	80x24	W 10	2	1	2x200K5 1/4F	CP/M, Macros		S9	Choice of keyboards
Signet 2	£1,483	Z80	4	64K		(M+)	80x24	W 18	2	2	2x200K5 1/4F	CP/M		S9	Multi-user system
Signet ZX81	£40	Z80A		16K	16K	Tv	32x24	C		1		Cassette	Ba	S5	Sold a million
Sinclair Spectrum	£99	Z80A	3.5	16K	48K	Tv	32x24	C		1		Cassette	Ba	S5	PCN issue 14
Sirius I	£2,525	8088	5	128K	896K	M	80x25	W 7	2	1	2x600K5 1/4F	CP/M 86, MS/DOS	Ba	A7	IBM style
Sord M5	£150	Z80A	4	4K	16K	Tv(M+)	40x24	W 7	2	1		Cassette	Ba	S6	PCN issue 12
Sord M23	£1,932	Z80A	4	128K		M	80x25	W 14	2	1	2x330K5 1/4F	Sord O/S, SB80	BaPips	S6	CP/M compatible
Sord M23P	£2,369	Z80A	4	128K		M	80x25	W 14	2	1	2x290K3 1/2F	Sord O/S, SB80	BaPips	S6	Complete with suitcase
Sord M223	£3,277	Z80	4	64K		Tv(M+)	80x25	W 14	2	2	2x350K5 1/4F	Sord O/S, SB80	BaPips	S6	Standard business machine
Sord M243	£5,842	Z80	4	192K		M	80x25	W 15	4	1	2x1Mb8F	Sord O/S, SB80	BaPips	S6	Large and powerful
SWTP SO9	£5,750	6809	2	256K	1.2Mb	M	80x24	W 15	1	1	2x1.5Mb5 1/4F	Flex, Uniflex		S7	Top end SWTP
Spectrum	£11,442	68000	8	256K	4Mb	(M+)	.	.	4	16	2x720K5 1/4F	Mirage	Ap	M1	*As terminal
Sundance I	£6,969	Z80A	4	64K	256K	M	132x24	W 4	1	1	1x7Mb5 1/4H	CP/M	Ba	T2	Ordinary CP/M machine
Sundance II	£8,205	Z80A	4	128K	256K	M	132x24	W 4	1	1	1x7Mb5 1/4H	CP/M	Ba	T2	Middle-range Sundance
Sundance 16	£10,480	Z8001	6	256K	1Mb	M	80x24	W 5	1	1	1x14Mb5 1/4H	BOS		T2	Tape backup for hard disk
Superbrain JR	£2,127	Z80A	4	64K		M	80x24	W 2	2	1	2x160K5 1/4F	CP/M	Ba	I10	Bigger models available
Superstar	£6,296	Z80	4	64K		M	80x24	W 2	1	1	1x10Mb5 1/4H + 1x400K5 1/4F	CP/M 80	Ba	B7	Includes hard disk
Tandberg EC10	£3,000	8080A	2	64K		M	80x25	W 2	7		1x250K8F	CP/M, TOS	Ba	T3	Very early machine
Tandy TRS-80 Model II	£1,999	Z80A	4	64K	256K	M	80x24	W 2	2	1	1x500K8F	TRS-DOS	Ba	T4	Big business machine
Tandy TRS-80 Model III	£1,299	Z80A	2	48K		M	64x16	W 2	1	1	2x184K5 1/4F	TRS-DOS	Ba	T4	Standard TRS 80
Tandy TRS-80 Model 16	£4,199	68000	8	128K	512K	M	80x24	W 2	2	1	2x1.2Mb8F	TRS-DOS	BaAs	T4	True 16-bit
Tandy TRS-80 Colour Computer	£180	6809E	1	16K	32K	Tv	32x16	W 2	1			Cassette	Ba	T4	Related to Dragon 32
Tandy TRS-80 PC4	£50	Cust.	N/A	1/2K	1 1/2K	LCD	12x1	C 9		1		Cassette	Ba	T4	Low-cost pocket computer
Tandy Model 4	£861	Z80A	2	16K	128K	M	80x24	W 10	1	1	1x187K5 1/4F	TRS DOS	Ba	T4	Floppies versions available

HARDWARE

	£499	8085	2.4	8K	32K	40×8	LCD	240×62	W		1					●			Ba	T4	Software built in		
Tandy Model 100																							
Tandy TRS-80 PC2	£130	Cust.	1.3	2.6K	16K	26×1	LCD	156×7	C	6	●					●			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			●	C11	Recently upgraded	
Televideo TS-800 Series	£1,495	Z80A	4	64K		80×24	M	80×24	W	15	●	2		1						●	C11	Standard CP/M machine	
Televideo TS 1602-C	£1,323	8088	5	128K	256K	80×24	M	576×424	W	15	●	2		1			2×256K5¼F			●	C11	Graphics, but no colour	
Tiger	£3,214	Z80	4	62K	256K	80×24	M	●	512×512	W	10	●	1	1	3	2	●	2×1Mb5¼F			●	H5	PCN issue 36
TI Professional Computer	£2,386	8088	5	64K	256K	80×25	M		W	12	●	1					1×320K5¼F			●	T5	PCN issue 3	
Texas CC40	£180	Cust.		6K	18K	31×1	LCD	31×1	C	4						●			Ba	T5	Cartridge software available		
TI System 200-250	£6,695	9900	4	64K		80×24	M	80×24	W	12	●	1					1×5Mb5¼H			●	T5	Bigger version available	
TMK 332	£2,242	8085A	5	64K		80×24	M	190×96	W	22	●	2	1				2×320K5¼F		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		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		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		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			●	T7	S-100 machine	
Triton 4	£5,744	Z80A	4	64K	160K	80×24	M		W	8	●	1	1	3			2×1.2Mb8F			●	T11	Upgradable to Winchester disk	
Tulip 1	£1,150	8086	8	128K	896K	80×24	M	●	760×288	W	16	●	1	1	6	1	1×5.25K5¼F		Ba	●	N2	IBM PC software compatible	
Vector 4	£3,852	8088	5	128K	256K	80×24	M	●	640×312	W	15	●	1	1	1	2	2×630K5¼F		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		Ba	●	D8	Same as Sirius 1	
Wang Professional	£3,076	8086	8	128K	256K	80×25	M	800×300	W	16	●	1	1				2×360K5¼F		Ba	●	W4	8087 co-processor optional	
Wicat 150	£6,846	68000	8	256K	1.5Mb	80×25	M	400×300	W	20		2	1	1			2×616K5F		Ba	●	S10	Upgradable to 32 user system	
Wilkes YD8110	£4,025	8086	5	128K	896K	80×24	M	●	960×624	W	21	●	1		6		2×1.2Mb8F		Ba	●	W2	Standard CP/M machine	
Xerox 820 Model II	£2,415	Z80A	4	64K		80×24	M	1024×512	W		●	2	2	2			2×160K5¼F			●	R4	Powerful graphics	
Zenith ZF-120-22	£2,978	8088	5	128K	192K	80×25	M	640×225	W	18	●	2	1	1	5		2×320K5¼F			●	Z1	PCN issue 28	
Zeus 4	£5,400	Z80	4	64K	320K	80×25	(M+)	80×25	W	11	●	10					1×6Mb5¼H+1×250K5¼F		As	●	M5	Designed as multi-user	

DISTRIBUTORS

A1 Acorn Computers, Cambridge 245200 **A2** Adds (UK) Ltd, 01-949 1272 **A3** Ads Ltd, 01-947 4881 **A4** Almarc Data, Nottingham 52657 **A5** Atari International (UK), Slough 33344 **A7** ACT, 021-454 8585 **A8** Apple Computers, Hemel Hempstead 60244 **A9** Anderson Jacobson Ltd, Slough 25172

B1 Barcellos Ltd, Leicester 541574 **B2** Bonsai, 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 Merlin, 01-840 4567

C1 Computer Peripherals Ltd, 01-278 7837 **C2** Country Computers Ltd, Redditch 29826 **C3** Computer Ancillaries, Egham 36455 **C4** Canon (UK) Ltd, 01-680 7700 **C5** Computers Lynx, Cambridge 315063 **C6** Casio, 01-450 9131 **C7** Casu Electronics Ltd, Uxbridge 72511 **C8** Cleno Computing Systems, 01-670 4202 **C9** Commodore Business Machines, Slough 79292 **C10** Compucorp, 01-907 0198 **C11** Colt Computer Systems, 01-577 2686 **C12** Community Computers, Petersfield 87567 **C13** Comart, Huntingdon 215005 **C14** Computers For All, Basildon 418414 **C15** CK Computer, Plymouth 780311 **C16** Country Computers, Redditch 29826 **C17** Cifer, Molkham 706361 **C18** Comart, St. Neots 215005 **C19** Ceedata, 01-941 4869 **C20** CWP Computers, 01-928 9000

D1 Datalog, 061-941 2361 **D2** Dec Ltd, Basingstoke 59200 **D3** Digico, Letchworth 78172 **D4** Digital Microsystems, Reading 343885 **D5** Direct (UK), Warrington 14072 **D6** Dragon Data Ltd, Kenilworth 744700 **D7** Data General, 01-572 7455 **D8** DRG, Weston-super-Mare 415398 **D9** Data Applications, Cirencester 61828 **D10** DWV Electronics, 0203-668181

E1 Encotel Systems, 01-686 9687 **E2** Epson (UK), 01-902 8892 **E3** Equinox, 01-739 2387

F1 Facit Addo Ltd, Medway 401721 **F2** Five Technology, Litchfield 57701 **F3** FI Cord, 061-445 7716 **F4** Flight Electronics, Southampton 27721

G1 Gemini Micros, Amersham 28321 **G2** Gecas, 01-629 3758 **G3** Grundy Business Systems, 01-943 1901 **G4** Globe Business Machines, Weston-super-Mare 83522 **G5** Gulfstream, 040 26 4926

H1 Haywood Electronic Assoc Ltd, 01-428 0111 **H2** Hewlett Packard, Bracknell 63100 **H3** Hitech Microsystems, Oxford 726644 **H4** Hotel Microsystems, 01-328 8737 **H5** HH Electronics, 0954-81140

I1 Iacus Computer Systems, 01-485 5574 **I2** Interam Computer Systems, 01-675 5325 **I3** IBR Microcomputers, Reading 664111 **I4** ICL, Slough 31111 **I5** IO Technology, 01-248 4876 **I6** Irvine Business Systems Ltd, Irvine 75000 **I7** ITT Consumer Products, Basildon 304018 **I8** Interactive Data Systems, Milton Keynes 313997 **I9** IBM UK Product Sales Ltd, 01-578 4399 **I10** Interlec Data Systems, 01-840 1599

J1 Jupiter Cantab, Cambridge 313479

K1 Keen Computers, Nottingham 412777 **K2** KGB Micros, Slough 38581 **K3** Kalamazoo Business Systems, 021-475 2191 **K4** Kemtron Computers, St Albans 66222 **K5** Kenilworth Computers, Kenilworth 512127 **K6** Kontron Computers, 01-637 5171 **K7** Leicestershire Micro Systems, Leicester 551869

L1 Logitek, Standish 426644 **L2** Lowe Electronics, Maitock 4995 **L3** LSI Computers, Leicestershire Micro Systems, Leicester 551869

M1 Micro APPL Ltd, 01-834 2687 **M2** Microprocessor Engineering, Southampton 775482 **M3** Mediatech, 01-903 4372 **M4** Microsolution, Chipping Norton 3256 **M5** Milbank Computer, 01-891 4691 **M6** Micro Networks Ltd, 01-602 7405 **M7** Mattel, 01-930 0311 **M8** Microtanic Computer Systems, 01-693 1137 **M9** Mideltron, Derby 6811

N1 NEC 01-388 6100 **N2** Newport Technical Services, 0272-290651 **N3** NCR, 01-723 7070

O1 Olympia Boss Systems, 01-262 6788 **O2** Oric Products International, Ascot 27686 **O3** Osborne Computer, Milton Keynes 615274 **O4** Office International, Sunbury-on-Thames 85666 **O5** OEM, 01-407 3191

P1 Panasonic Business Equipment (UK), Slough 75841 **P2** Pronto Electronic Systems, 01-554 6222 **P3** Philips Business Systems, Colchester 575115 **P4** Positron Computer Ltd, Newton-le-Willows 29741 **P5** PHL, 021-745 3033 **P6** Poultier Compuvision Ltd, 0532-469611 **P7** Portico Technology, 01-735 8171

Q1 Quantum Computer Systems, Leeds 458877

R1 Rair Ltd, 01-836 6921 **R2** Racal, Reading 782158 **R3** Research Machines Ltd, Oxford 249866 **R4** Rank Xerox, Uxbridge 51137

S1 Salmon Electronics, Darlington 721368 **S2** Stirling Microsystems, 01-486 7671 **S3** Seed, Brownhills 378151 **S4** Sharp Electronics, 061-205 2333 **S5** Sinclair Research, Camberley 681666 **S6** Sord, 01-930 4214 **S7** SWTP, Peterborough 234433 **S8** Sirtel UK Ltd, Peterborough 236010 **S9** Shelton Instruments, 01-278 6272 **S10** Software Sciences Ltd, Farnborough 544321 **S11** Semi-tech Microelectronics, 01-390 6179

T1 Triumph Adler, 01-250 1717 **T2** Thames Systems, Thame 5471 **T3** Tandberg, Leeds 774844 **T4** Tandy Company, Walsall 648181 **T5** Texas Instruments, Bedford 67466 **T6** Torch Computers, Cambridge 841000 **T7** Transam Microsystems, 01-404 4554 **T8** Transtec, Bristol 277462 **T9** TRW Datacom International Ltd, Windsor 59183 **T10** TDI, Bristol 742796 **T11** Trivector Commerce, Biggleswade 82222

W1 Westrex Ltd, 01-578 0957 **W2** Wilkes Computers, Bristol 277399 **W3** Wolfcrow, 01-930 1991 **W4** Wang UK, 01-560 4151

Z1 Zenith Data Systems, Gloucester 29451

Vic-20 tape recorder, 16k RAM pack, super expander, motherboard, joystick, games, books, etc, still under makers guarantee, worth £280, sell £180. Tel: Clevedon 875258 (Peterson).

Texas TI99-4A, includes speech synthesiser, joystick, mini-memory, extended Basic, Munchman, Invaders, Parsec, Frogger and other games, £250 ono. Tel: 064 73 3392, Stephen Godfrey.

Texas TI994A, RS232 interface card, two RS232 interfaces and one centronics interface, requires pherical expansion box, £50. Tel: 06473 3392.

Osborne Portable, CPM, Wordstar, VisiCalc, also for approx 8 hours, still under guarantee, half price £695. Tel: 01-748 6238.

Lynx 48k, boxed, manual, demonstration cassette, leads, newsletters, £160, apply in writing please. Paul Davey, 13 Sudeley St, Brighton.

Newbrain Model A, complete, all leads, some software games and database, £175 ono; also Zenith 12in green monitor, £60. Tel: Hemel Hempstead 0442 833821 eves/weekends.

Ohio Scientific C2-8P, 48k RAM, 2 x 8in disks, 500k, Basic + OS-65U, Teletext 920 VDU with many facilities, £700 ono, may sell separately. Tel: Northwich (0606) 74767.

Atari 400 + 410 recorder, Basic Pro-joystick, technical reference notes, manuals, user mags, and games, as new; + ZX81, + manuals, £149. Tel: 01-427 6096.

Bargain! PET 32K new keyboard Pic-Chip ROM, cassette player, 50 games, word-processor, telephone file, database and more. All excellent condition, £250 ono the lot, with manuals. 01-992 8249.

Pink neighbour-anti-annoyance ear plugs free with aldy's Rotel RA1212 amplifier and RT824 tuner. Just £230. M.C. Myears, 25 Rona Rd, London, NW3.

Frog lovers unite. Buy aldy's Atari VCS with seventeen cartridges for £210 and gain an imitation frog. M.C. Myears, 25 Rona Rd, London, NW3.

Adapt roaming teletexts! Aldys' Radofin teletext adaptor (for any standard TV) with free adaption papers. Just £120. M.C. Myears, 25 Rona Rd, London, NW3.

Save the world from more outbreaks of aldy's ads — please buy my goods. (post paid. Offers considered.) M.C. Myears, 25 Rona Rd, London, NW3.

Swap BBC software, lots to choose from. Acorn Micro power, Bug Byte IJK plus lots of others. Tel: Grimsby 74584 after 6pm. Ask for Martin.

Oric-1 48K, including Forth, manuals, leads, and 'Oric owner' mags. Only £99. Tel: 0462 72412 (nr Hitchin) after 7pm.

Vic 20, cassette deck, 16k, super expander. £50 worth of software. Good condition. Sell for £180 ono. Buyer collects. Tel: Kimpton 833376.

Help! wife insists one computer must go. Sharp MZ80 £300/48K Oric £100. Tel: 0442-42887.

PCN Billboard

ZX81 16K for sale. With sound and over £65 worth of software including Pimania. Tel: John 01-472 7600 after 6pm. £85. or swap portable colour TV.

Mattel intellivision cartridges £10 each for sport cartridges, £11 for others. Tron Pitfall, Starstroke etc. Console plus two carts £45. Cash. Pudsey 561760.

Printer Epson FX80, (suitable BBC micro) 160 cps. Line tractor feed. Immaculate, complete with original packing/manual. Retail £450, accept £325. Tel: 01-472 3507.

Atari disk drive including software, cost £370, accept £199. Tel: 0786-3599.

Wanted Spectrum 16K or 48K. Cash waiting for sale. Atari joysticks for Texas TI99 plus Chess model. Tel: 0454-613831 (Bristol area).

Oric 16K new. Also £40 printer voucher, Ultra tape, Oric 1 book by Ian Sinclair. Worth £114, but unemployment forces quick sale hence £90. Tel: Lincoln 33464.

Hobbit drive with zero memory option for BBC. Utility to transfer from cassette. 8 data tapes games etc. £150 ono. Tel: Doncaster 841893 (Eves).

Atari software for swap or sell. 16/32k cassettes only. Tel: 03303-367.

BBC software for sale. Acornsoft, IJK, Quicksilver, DOC-soft, Micro power: all originals. £5 each or £40 the lot. (10). Tel: 01-836 2351 after 8pm at weekends.

Vic 20 + C2N, cassette unit + Arfon (7 slot) expansion + intro Basic (1) + super expander + Alien and Jelly Monsters cartridge games. All for £130. Tel: 0977-708742, Buyer collect.

Dragon 32, tape recorder, joysticks, light-pen, and software worth £41. (Pimania, Dragon Trek, Cpede, Quest, Defense) £180 ono or swap for CBM 64 + C2N cassette unit. Northampton (0604) 28319.

Vic 1515 printer spare ribbon, paper, dustcover, guaranteed till Jan '85. £150 for quick sale. Tel: 0268-770272 eves after 7 or weekends.

Vic-20 plus 16K, two cartridges, games worth over £100, physics revision pack, joystick and books. Bargain £100. Tel: 01-648 3621 (Morden).

Vic 20 6 months old. 2 joysticks, 16K RAM pack, £300 of software, 5 books excellent condition. Quick sale: £250. Tel: eves after 7.30. 01-881 1758.

Atari 400 + 410 recorder + Basic. Games: Zaxxon, Up, Up and Away + Star Raiders. Sell for £150 ono. Tel: Uxbridge 37085 10am-10pm.

MZ80K (48K RAM), built-in monitor and cassette. Pascal, Basic and games. A more professional, versatile and expandable machine in excellent condition. £165. Tel: 07373 50686.

Tandy TRS 80 MK1 level II with monitor plus £300 worth of software £150 ono. Tel: Brighton (0273) 699921 eves/w/e.

Intellivision plus ten games including Donkey Kong, Pitfall, Lock and Chase, Dungeons and Dragons etc. Excellent condition. Only £150 ono. Tel: Clevedon 872294.

ZX81 32K encased in Fuller keyboard, Motherboard, internal EPROM monitor, Assembler Forth Chess etc. Tapes, books, cost £200+. £80, Andy 0532-780954, (676449 eves).

Spectrum software to sell — most current titles: Lunar Jetman, Valhalla, Manic Miner, Zoom, Hobbit, Jetpac, Football Manager, etc. 50p each. Tel: Southampton 452786.

Acorn Colour Atom 8K ROM 5K RAM all leads 2 books introductory cassettes only £75 ono. 40 Northleigh Grove, Market Harborough, Leics. Tel: MH (0858) 65385.

Tandy TRS-80 Model 1 with green tube monitor plus hi-res graphics pack (brilliant graphics), some software manuals etc. Tel: Maldon 892219 (evenings).

BBC software for exchange, many titles, disc owners preferred but not essential. PROM based software also wanted. Tel: Reading (0734) 29058 eves/weekend.

Tandy 1 Genie 1 BBC disc drive S.S. only £75 inc PSU. Tel: S. Gill 01-485 6922 eves/weekend.

ITT 2020, single drive plus controller in original packaging. Wordprocessing games software and magazines. £500 ono or will split. Tel: Graham on 01-573 2727 eves.

Casio FX-700P pocket computer plus manual, program library etc. Brand new £35 ono. Write Antony Shepherd, Orchard Cott., Saville Hall Lane, Dodworth, Barnsley, Yorks.

Philips G7000 video game plus ten cartridges including Quest for the Rings, Munchkin, Cosmic Conflict, Satellite Attack, Gunfighter, Logic, Computer Programmer. Tel: 0642 566051. £150.

Atari printer Centronics 73912 £300, 850 interface £80. Word processor inc touch typing (disk/cass) £60. Management simulation (disk) £10. Suit all models. Tel: 01-958 5600.

Atari 400/800 ROM games as new. K-star patrol, Miner 2049er, Galaxian, Missile Command, Star Raiders, and Super Breakout only £15 each. Tel: 01-741 3361.

Atari 400/800 cassettes, Pharaoh's Curse £12, Sea Dragon £12, Preppie £7, Adventureland £7, Caverns of Mars, £5 Galactic Chase disk £3. Tel: Bristol 566369.

Newbrain AD built in display with w/p database and lots of games. Tech. manual, 12" green screen monitor £250. Tel: 01-249-9895 eve. only.

Oric 48K as new + cassette, software, mags £140. Mike. Tel: York 799416 after 7pm.

Astec 40 watt switched mode power supply for dual drive unit. + 12 volts, + 5 volts, with leads. Excellent condition, £45. Tel: 051-644-6568 (Merseyside).

48K ZX-Spectrum DK trunks keyboard over £300 software, only 3 months old including Manic Miner, Valhalla, Hobbit, Scrabble. £220 ono. Tel: 0375-678813.

ZX81 16K, Transformer, Leads, Brand new, £40 software, M.C. book, magazines, guarantee to 14-5-84. Ring Havant (Hants) 482700 after 5pm. Worth over £120, ask for Alex.

ZX81, + 16K, leads, books, transformer 7 games inc. (Frogger, Flight Simulation, Space Invaders) good condition. Blank tape. £65 ono. Jason White. Tel: 0272 655907, after 6pm.

48K Spectrum plus £145 software, 7 books 20+ magazines joystick interface. Cost £400, want £250. Tel: (0592) 752889 after 5pm, ask for Alex.

Sharp MZ80A computer 48K, one year old, £299. Tel: Corsham (Wilts) 0249-714589, (24hr).

Newbrain AD five months old, hardly used, plus extensive additional programming materials. Offers, ring Andy on 0532 (Leeds) 780954 day time 676449 evenings.

ZX81 Software: Forth, Vu-calc, Flight Simulator, adventures, ZX-gulp, Asteroids, Toolkit, Compiler, Galaxians, Assembler, etc. £30.00 ono. Martin McAuley, 238, Greenstead Rd., Colchester. Tel: (0206) 869188.

Monitor + 32K computer. PET 3000 series, large. Keyboard + cassette unit. Excellent condition, best offers over £300. Cambridge Area. Tel: Histon 4787.

Commodore 64 games, Horace, Dogfight, Sptemem, Matrix, AMC, Frogger, Cyclons, Monopole, MotorMania, HoverBover. £4.00 each. Tel: (Bracklesham Bay) 670 171 evenings. Ask for James.

48K Oric plus over £70 worth of software. Xenon, Centipede, Oricmunch, and others. The lot £135. Tel: Lee 01-952 6491.

Sinclair ZX81 32K Maplin keyboard + case. Lots of software. Including Aszmic I/C. Magazines, compatible cassette, etc. £100 ono. Tel: 0272 (Bristol) 566369.

Atari VCS cartridges, Missile Command £12, Indy 500 £15, Street Racer £6. All good condition, Tel: Bristol 0272 566369.

Printer, DPM-100, dot matrix, one month old, cost £280 sell £180 ono. W.H.Y? Atari Astro Chase and Chess £22 or swap Basildon (Essex) (0268) 284771.

National Panasonic music centre as new. £180 ono or swap for Micro. Swap Astrochase and Chess for any other Atari software. Basildon (Essex) (0268) 284771.

48K Lynx, unused with Sanyo cassette/recorder, much technical info. and all leads. Cost £260, only £190 ono. Tel: 0535-34384 eves.

Billboard Buy & Sell Form

To place your Billboard ad, fill in the form on the left, with one word per space, up to a maximum of 24 words. Send the completed form, together with a cheque or postal order for £1.50 made payable to VNU Business Publications, to: **Billboard, Personal Computer News, 62 Oxford Street, London W1A 2HG.** Note that we cannot guarantee that your ad appears in any specific issue, and that we cannot accept ads from commercial organisations of any sort.

Your name:

Address:

Telephone:

Professional Software for Spectrum and ZX81



SPECTRUM 48K

■ **Payroll:** Weekly, monthly, hourly. All tax codes, and pay levels. Guaranteed correct. £25.00 ■ **Statutory Sick Pay:** Better than programs costing 10 times as much on other machines. £40.25 ■ **Stock Control:** Over 1500 lines. Find, add, delete, in 2 seconds! Sinclair or full width plain paper printer (with interface) supported. £25.00 ■ **Spectrum Demo Tape:** Demonstration versions of payroll, stock control, SSP. On one tape. £3.95 ■ **Critical Path Analysis:** Enter network of over 500 activities. Program finds critical path. Durations and costs can be modified, and the calculation repeated. Full-width printer supported. £15.00

SPECTRUM 16K (usable on 48K)

■ **Mortgage:** See how repayment amount affects duration and total amount paid. While paying: see how much interest and how much capital you are paying. Month-by-month table printed. On the same tape. ■ **Loan:** Calculates true interest when paying instalments etc. £8.00 (both programs together)

Parallel Printer Interfaces:

■ **The Standard Interface:** Centronics interface to link your ZX Spectrum to many popular dot matrix and daisywheel printers. The package includes: interface, simple word processor, 3 sets (different) of printer software, cable, centronics plug, full instructions. The **LLIST** and **LPRINT** commands are supported. Many other features also. £45 inc. VAT. Post free. ■ **The Deluxe Interface:** Includes all the features of the standard package, and also has a 3.5 mm jack socket and special circuitry which allows the ZX Spectrum to **Save and Load**, without having to unplug or switch anything! £55 inc. VAT. Post Free. ■ **The Professional Interface:** Includes all the features of the deluxe package, but also allows the ZX Spectrum to be used as a very powerful peripheral processor for a bigger computer! Software is supplied which post-processes word processor output with straight right and left margins. £99 inc. VAT. Post Free.

Tape Loading Problems With Your Computer?

■ **Loading Aid:** Allows you to get tape playback level right first time. Helps with dropouts and to check tape quality too! Standard model £5.95. Deluxe model £7.95 ■ **The Microcomputer User's Book of Tape Recording:** Is a practical guide to help you get programs in and out of your computer. Written for the computer user - but several audio and computer professionals have found it useful! ISBN 0 946476 00 4. ONLY £3.15 incl. postage (£2.90 in shops - temporarily out of stock) ■ **Test and Alignment Cassette:** Tape loading problems are often due to a mis-aligned tape head. Align your tape head by ear with our tape - no instruments required! £4.90

ZX81 16K

■ **Beamscan:** Computers bending moment and shear force diagrams for a simply supported beam with 1.99 point, uniform and uniformly tapered loads. £25.00 ■ **Time Ledger:** For up to 17 employees. 200 clients. £15.00 ■ **Optimax:** A powerful linear optimisation program up to 75 variables <,=,>, constraints. £40.00 ■ **Payroll:** As above but only up to 30 employees. £25.00 ■ **Stock Control:** As above but 400 stock lines in 16K or 2000 lines in 64K. £25.00 ■ **Critical Path Analysis:** Up to 500 activities in 16K. Over 500 activities in 48K. £15.00 ■ **Budget:** Keeps track of expenses and compares with budget. 50 headings plus 12 months or 12 categories. £15.00 ■ **Financial Pack:** Contains three programs: Mortgage, Loan and VAT £8.00. All items are post free and include VAT. Programs are supplied with comprehensive manuals.

Remember - We at Hilderbay pride ourselves in the development of high quality professional software that is fully functional and with full support.

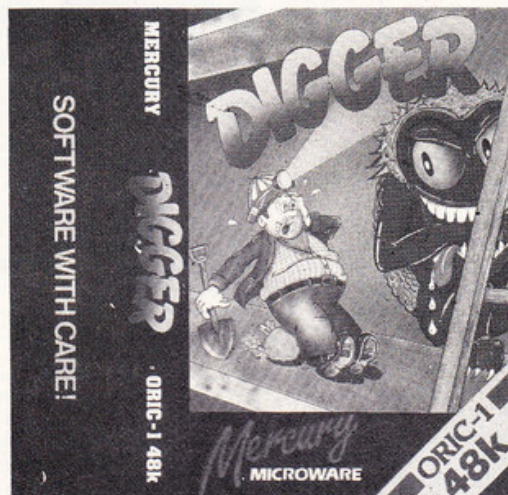
Contact us now for further information on these products and our full range of Apple II Software.

TRADE ENQUIRIES WELCOME ON ALL PRODUCTS

Hilderbay

Professional Software

Hilderbay Ltd Dept. PCN5 8-10 Parkway Regents Park London NW1 7AA
Telephone: 01-485 1059 Telex: 22870



A machine code all action super fast arcade game for the 48k Oric 1! Digger employs outstanding colour, sound and hi-resolution graphics to produce the frantic excitement you really need. Dodge grotesque creatures in a labyrinth of ladders and platforms, coax the creatures into holes you have dug, fill in this hole, fast, or they will leap out to claim their revenge. Carry precious gold bags down to the bank always racing the ever decreasing oxygen supply.

Great value at only £6.95 inc p & p.

Order direct from us:

Mercury

MICROWARE

1 DUXFORD WALK, MOSTON M10 9JN

Dealer enquiries very welcome

LYNX LYNX LYNX LYNX EVEREST — MORE THAN A GAME

Could you lead a fully equipped expedition through the Himalayas and conquer EVEREST. Every day a new challenge. Avalanches ... Snow blizzards ... Icefalls ... Abominable snowmen ... All this, and many more hazards will hamper your attempt to reach the summit. EVEREST is a tactical game requiring daring, skill and planning. Only the bravest will survive. Can you meet the challenge of EVEREST.

Cassette £7.95 inc. p.p.

NEW

BBC BBC BBC BBC BBC SPEED — TEXT EDITOR FOR BBC

SPEED is a full screen text editor with full auto scroll and instant edit response. SPEED will edit BASIC/ assembler programs, letters and documents, teletext graphics and text.

- ★ 40 or 80 character screen.
 - ★ Text width up to 250 characters.
 - ★ 29 edit commands with GLOBAL search and replace, insert/delete, move and copy.
 - ★ Print, word-count and case conversion UTILITIES.
- Cassette £13.95 inc. p.p.



Send cheque or P/O to:
MULTISOFT,
32 Redfield Hill,
Bristol BS15 6TQ.
Top royalties paid for quality
programs.
— Retail enquiries welcome —

MICROSHOP

Rates: £10 per single column cm. Minimum size 3 cm. Series discount available. **Mechanical Data:** Column width, 1 column 57mm. 2 colours 118mm. 3 columns 179mm. **Copy Dates:** 10 days prior to publication.

Contact: Christian McCarthy on 01-323 3211.

SOFTWARE

ELKAN ELECTRONICS **LOOK! LOOK!**

QUICK-SHOT deluxe self-centring joysticks — DRAGON/TANDY COLOR £14.95 (£1 p&p)

New! ELKAN TOP-SHOT self-centring joystick with three firing buttons £9.95 (+ £1 p&p)

For Dragon/Tandy Colour/Commodore 64/VIC-20/Atari/Texas Spectrum (with Interface 2) Buy a pair — p&p is free

NANOS "quick-reference" cards — easier to use than the manuals!

DRAGON32	£3.95
COMMODORE 64/VIC-20	£3.95
6502 PROCESSOR	£2.95

others, e.g. Apple, Tandy, Sinclair available.

DRAGON'S EYE on/off indicator £3.95

DRAGON'S TAIL joystick extender £2.95

Send cash, cheque, credit card no. to:

ELKAN ELECTRONICS, FREEPOST,
11 Bury New Road, Prestwich, Manchester
M25 6LZ. Tel. 061-798 7613
(s.a.e. for full lists/catalogue)

SPECTRUM 16/48K
ULTIMATE SOFTWARE: AMAZING PRICES

	RRP	OUR PRICE
JET PAK	5.50	£4.00
PSST	5.50	£4.00
COOKIE	5.50	£4.00
TRANZ AM	5.50	£4.00

Please add 50p to total for p&p.

Many other programs in stock for
BBC, ATARI, CBM 64, ZX81, VIC20, ETC.

Send cheque/PO or SAE for lists to
ACK DATA, 21 Salcombe Drive, Redhill, Nottingham, NG5 8JF. Tel. (0602) 262498 (after 6pm)

MICRO CHIP POSTER
40 x 50cm poster featuring Motorola MC68000 16-bit microprocessor chip in die form showing fine circuit details at a magnification of 150x.

SATELLITE POSTERS
41 x 60cm Landsat poster showing whole of UK
48 x 70cm Meteosat poster showing whole of earth

All posters in full colour available now at just £1.75 each or £4.50 for any three inc VAT. Add 55p P&P per order.

Send cheques/PO to:

Climax Computer Systems Ltd
17a Broad Street South Molton
Devon EX36 3AQ 07695 2314

15 41 ALIGNMENT SERVICE

Make sure your drive is at a peak performance with an update service, £20 + carriage.

Just out — 64 service ind/garage invoice prog. and 64 retail point/sale prog.

64 Specialist. SAE for software and hardware lists to Milton Keynes Music and Computers, 17 Bridge St, Leighton Buzzard, Bedfordshire. Tel: 05253 76622. Closed Thursdays.

Programs Wanted

We require quality programs for most micros. We pay cash fees, royalties and distribute in the UK, USA and Europe.

Phone: Basingstoke (0256) 25107
or write to:

DREAM SOFTWARE
P.O. Box 64, Basingstoke, Hants. RG21 2LB

(Please enclose return postage if you wish your cassette returned)

MORGAN CAMERA

S/H Computers in stock, 9/11/83. Big stuff inc. Sord M23 inc. Twin 8 inch disc drives and colour monitor £999. N.E.C. 8001 B.E. inc. double disc and high-RES Monitor £795 N.D.C. Personal C.P.M. based, double disk and monitor inc. Word Star, Super calc £695, big centronics printer £250, Acom Atom 12K, 8K £70. New 3brain A.D. £195. ZX Spectrum 48K £99, ZX81 and 16K £35. Vic 20 £65, Casio FX-702P £39, ITT 2020 £299. Vic disc drive £150. Pet printer £225. Centronics 739 £225. shuttle at £10. the caverns of Mars £15. Shamus £15. Star Raiders £10. Defender £15. Atari assembler editor £25. all prices inc. VAT. **Morgan Camera Co.** 160 Tottenham Court Road, W1. 01-388 2562.

POOLS PREDICTION

"POOLSWINNER"

The most sophisticated Pools Prediction Aid available. Gives probabilities of score draws, draws, homes or aways, based on two databases holding over 20,000 matches (included).

The databases are automatically updated as results are entered. This year's results are supplied with the package.

Can be used in simple mode, or with parameter adjustments to develop your own unique forecast method.

Fully documented, available now for Apple, Spectrum (48K), Dragon, ZX81 (16K), Commodore 64, BBC (B) (others — please enquire).

£15.00 (discs/tapes)

"POOLS DATA"

Complete record of all English Football League matches 1978-83. Team, scores and dates of 10,000 matches held in simple format, ready for your analysis. Starter analysis programs and full documentation included. Available for Apple, Spectrum, ZX81, BBC, Dragon, Commodore series.

5 years Data £15.00 2 years Data £7.50

SELEC SOFTWARE (PCN)



37 Councillor Lane,
Cheshire, Cheshire
061-428 7425



COMPUTER RETAILERS MICRODEALER UK IS THE UK's No. 1

SOFTWARE SPECIALIST DISTRIBUTOR

The Microdealer UK Software Portfolio contains a staggering 27 of the UK Top 30 best selling programs. Microdealer UK is open 7 days a week and sells advice, experience, knowledge and software. Remember, make Microdealer UK your first call for software.

RING:
305 0521
NOW!

LYNX

Instant machine code for the price of a game.

MODER-80 is the easy way to examine and modify memory using assembly language rather than hexadecimal. Just type your new instruction or data into any disassembled line and see it instantly updated on the screen! You can also insert or delete lines just as easily. Other advanced features include:

- All standard Z80 mnemonics plus DEFB, DEFH and DEFM.
- ASCII, binary, decimals, hexadecimal and current address allowed in expressions.
- Disassembled listings to screen, printer and tape.
- 100% machine code — you can run BASIC programs which CALL your code without affecting MODER-80.

A "must" for anyone interested in machine code on the Lync, beginner or not! Only £6.95 inclusive (mail order only) from:

SEVEN STARS PUBLISHING

Dept N, 15 Gloucester Avenue, London NW1 7AU



**48K SPECTRUM
USERS**

**SPECIALISTS IN
PROGRAMS FOR
SECONDARY
SCHOOL
SUBJECTS**

**WITH
TOP
THE
TO
GET
MICRO
SWOT**

For details and an order form write, enclosing a STAMPED ADDRESSED ENVELOPE to:

**MICRO-SWOT,
FREEPOST,
55 Nash Square,
BIRMINGHAM B42 2EX.**
(no stamp required)

PROGRAMMERS

We urgently require good quality software for the ZX Spectrum. For the right material we offer — improved market penetration — Expert presentation — Worldwide distribution — Total distribution in the U.K. and a high 25% Royalty.

SPARTAN SOFTWARE

9 Cotswold Terrace, Chipping Norton, Oxon.

Books

SPECTRUM — COMMODORE 64 — B.B.C. MICRO BOOKS

Popular Micro Books are Great Gift Ideas. They are gifts that offer excellent value for money, are instructional and enjoyable. Is there someone you care enough about to help them really get into their micro?

FOR THE NOVICE

The Working Spectrum Sunshine £5.95
The Working Commodore 64 Sunshine £5.95
Let your B.B.C. Micro Teach you to Program Interface £6.95

INTERMEDIATE

Spectrum Machine Code Made Easy Vol. 1 Interface £5.95
Using Commodore 64 (intermediate to serious) Duckworth £9.95
The B.B.C. Micro Revealed Interface £7.95

ADVANCED

Spectrum Machine Code Made Easy Vol. II Interface £5.95
Commodore 64 Machine Code Master Sunshine £6.95
Functional Forth for the B.B.C. B. Sunshine £5.95
P&P Free. Allow for cheque clearance and postage. All carry a no quibble, no nonsense guarantee. If dissatisfied return within 30 days and claim money back. Cheques, P.P.'s (Please print name and address) U.K. only P&P Free. Europe add £1.

JUST-ED

58 St. Mary's Road, Weybridge, Surrey KT13 9PZ

p.s. 100's of other titles. Send for free list state machine type.

Shops

Computerama

TORCH Z80 DISC PACK
inc £1,000 of software
ONLY £835 Incl. VAT

**ADVANCED USER GUIDE
FOR BBC**
ONLY £12.95 + £2 carr

**BBC * SPECTRUM * COMMODORE *
& ALL LEADING MICRO'S**

59 FOREGATE ST.
STAFFORD
41899

STOKE-ON-TRENT
MARKET SQUARE ARCADE
HANLEY.
268620

Situations Vacant

An opportunity for an enthusiast to become an office manager.

Must have flair, a good knowledge of W.P. and be able to relate to a sales force.

Write with C.V. and salary requirements.

**West End Office,
Hollybush Manor,
Potten End,
Hertfordshire.**

· VALUE · APPLE · VALUE ·

BASE UNITS



100%
APPLE
COMPATIBLE
£349.00
+£52.35 VAT

BASE 64A compatible with Apple cards and software. RAM based system control program. 64K on board memory, expandable to 192K. MINI-WRITER on board in RAM. 24K system memory. Tiny assembler with assembly and disassembly function. Upper and lower case characters. Function commands on keyboard. Numerical and cursor keypad. Can load 140K diskette program to 192K user RAM. Staggering value!

****Phone for part exchange quote on your existing personal computer****

MONITORS



£75.00 +£11.25 VAT

12" Green 18 Mhz monitor in elegant plastic case.

APPLE DRIVE ADD-ONS

DISK INTERFACE CPA 6

£47.90 +£7.19 VAT

To connect Apple or compatible drive

DISK DRIVE CPA 14

£176.00 +£26.25 VAT

Top quality Japanese slimline drive with cable.

APPLE CARD ADD-ONS

80 COLUMN CARD CPA 4

£57.50 +£8.62 VAT

80 characters by 24 lines with true decoders. 7 x 9 character resolution compatible with BASIC, PASCAL and CP/M. Modem compatible.

Z80 CARD CPA 3

£47.99 +£7.19 VAT

Adds a Z80 processor to your Apple. Under CP/M, you can add COBOL, FORTRAN or BASIC compiler and assembly language to your II plus and run CP/M packages such as Wordstar and business software.

128K RAM CARD CPA 20

£199.00 +£29.85 VAT

Enables user to load 142K program or use as a fast access disk.

16K RAM LANGUAGE CARD CPA1

£57.50 +£8.62 VAT

Expands the internal memory of your II to 64K and memory capacity available to Z80 card users from 44K to 56K. Available to load integer BASIC under DOS 3.3.

PAL CARD CPA 7

£79.00 +£11.85 VAT

Display your II plus colour text and graphics on your home television

PRINTER INTERFACE CARD CPA 9

£38.32 +£5.75 VAT

Parallel printer interface.

RS 232 CARD CPA 12

£57.50 +£8.62 VAT

Permits basic control of high speed printers and plotters. Programs easily with switch selectable preset for speed, line length, auto line feed and carriage return delay. Handles half duplex communications from 75 to 19200 baud. EIA RS 232 C or 20 mA current loop.

PRINTERS



£229.00 +£34.35 VAT

CP80 Matrix Printer. 80 cps, bidirectional logic seeking 80 column. Friction and adjustable tractor feed. Hi-res and block graphics. True descenders. Switchable italic print. Auto underline.

TURNKEY OFFER

Base 64 unit with monitor, two slim line disk drives and disk controller for

£749.00 +£112.35 VAT

Base 64 unit with monitor, two slim line disk drives and controller, Z80 card and 80 column card, CP 80 printer and controller

£1108.00 +£166.20 VAT

TO ORDER:

Access and Barclaycard accepted
Send exact amount including 15% VAT
plus £7.00 carriage and insurance,
quoting part numbers, to:

· WOLFCROWN ·

Alphasoft Limited · 101 Jermyn Street · London SW1Y 6EE · Telephone: 01-930 1991

BBC 32K

All operating systems

747 FLIGHT SIMULATOR

"THE BEST SIMULATION AROUND,
A MUST FOR ALL BUDDING PILOTS", PCN

from DOCTOR SOFT,
258 Coneygree Rd., Peterborough



Pilot written, instruments and 3D visual runway view (Heathrow, Gatwick). Banks and pitches with realistic motion. Now with full Instrument Landing System (ILS). Briefing program, charts, notes and flight plan. Fantastic!
ONLY £8.95 inc. VAT & P&P. Joystick control option in 4 program package.

* Available from
JOHN MENZIES AND ALL LEADING DEALERS
* Direct mail order
* Micronet 800 (Prestel)

DISC VERSION NOW AVAILABLE **£11.95**

GENEROUS ROYALTIES PAID FOR GOOD MATERIAL

3 DOUBLE ACTS FOR CHRISTMAS

- ☐ Spook, Spook (MUNCHER: 20 mazes, 3 skills, Hall of Fame/GHOST MINE: dig for gold, watch for ghosts & snake) £6.95
- ☐ Space, Space (WOOLPACK III: amazing colour graphics, 3 ships, 4 galaxies, aliens galore!/MISSION ALPHA: 3D & music) £7.95
- ☐ Spy, Spy (KREMLIN: escape from 3D maze in Kremlin/ BONDSKI: lethal action on ski slopes!) £6.95

GAMES DISC PACKAGE

- ☐ Muncher, Ghost Mine, Mission Alpha, Kremlin, BondsKI & Fireman (the building burns, the people jump, the helicopter bombs?!) £15.95
- ☐ EDUCATIONAL ☐ COLOUR-SHAPE MATCH (2-4 yr old) £5.95 cass. ☐ 747 SIMULATOR £8.95 ☐ DISC VERSION £11.95
- ☐ WORD PERFECT (Friendly & versatile full facility 40/80 column word processor. £7.95, + £2.95 Disc version)
- ☐ TALKING TABLES TEACHER (Speaks when speech ROM fitted, teaches multiplication with games & questions) £6.95 (cassette)
- ☐ FAMILY DISC PACKAGE: Tables Teacher, Colour Shape Match, Harmony, Home Office & Word Perfect £15.95

ROYALTIES... DOC PAYS THE BEST FOR THE BEST!!

DOCTOR SOFT

ADVANCED SOFTWARE

All prices include VAT & P&P Cheque or PO to:
"Doctor Soft", 258 Coneygree Road, Peterborough PE2 8LR

NAME _____

ADDRESS _____

PCN10/11



MASSIVE DISCOUNTS

(UP TO 60% !!)

ON SOFTWARE FOR ATARI, BBC, COMMODORE 64, DRAGON, SPECTRUM & VIC20

Send s.a.e. for free leaflet or call in at one of our shops now!

Maplin Electronic Supplies Ltd.

All mail to P.O. Box 3,
Rayleigh, Essex SS6 8LR.
Tel: (0702) 552911

Shops at: 159-161 King Street, Hammersmith, London W6. Tel: 01-748-0926.
8 Oxford Road, Manchester. Tel: 061-236-0281.
Lynton Square, Perry Barr, Birmingham. Tel: 021-356-7292.
282-284 London Road, Westcliff-on-Sea, Essex. Tel: 0702 554000.
46-48 Bevois Valley Road, Southampton. Tel: 0703 25831
All shops closed all day Monday.

TURBO CHARGE YOUR ZX 81!

with our ZX 81 — FORTH ROM

with multi-tasking

Replaces your basic ROM to give you a totally new system. The unique screen editor allows you to edit programmes while other programmes are executing. Runs more than ten tasks at once. Schedule tasks to run from 50 times per second to once a year. Ideal for control purposes. Uses all ASCII characters and restores the keyboard to normal operation. It contains a real-time clock and a large number of 32-bit words. Supports the ZX printer. Allows machine code definitions and needs at least 2K of memory. Supports 16K, 32K, and 64K Ram-Pack. Three times faster than fig-FORTH, but fig compatible. Available as a "fit yourself EPROM", with an extensive manual for £25 x VAT. Some ready-Converted ZX81's available. Floating point extension. ROM — out soon!

Coming Soon!

FORTH-I/O Cartridge for Spectrum £59 + VAT. Ask for details

AND THE OLD FAVOURITES:

Nas-FORTH NASCOM £25 + VAT
Pet-FORTH for Pet from £25 + VAT

DAVID HUSBAND

2 Gorleston Road
BRANKSOME
Poole BH12 1NW
Tel: 0202-764724

GAMES MACHINE

AVAILABLE AT ALL SPECTRUM SHOPS, HMV, SELFRIDGES, JOHN MENZIES, LEISURE ZONE AND ALL GOOD COMPUTER SHOPS.



£7.95

THE FABULOUS WANDA AND THE SECRET OF LIFE THE UNIVERSE AND EVERYTHING for COMMODORE 64

An adult fantasy game with Arcade Action

You are travelling far from home looking for good times around the Universe, when you are intercepted by the evil Brutus of the Federation. Brutus forces you to go and seek the Secret of Life, the Universe and Everything - known only to the Fabulous Wanda, a hostess in the Spaced-Out Inn in Highville on the planet COPUS. You are teleported down to Highville where the Customs man demands money for Teleport Tax. There is a video game in the Terminal with 3 credits left. Now you are on your own and you must decide how to proceed to Highville Mainstreet to find the various establishments to enter and

OGLES for BBC/B

Designed with people of all ages in mind this programme provides an aid to learn and match colours as well as being very entertaining. Not only have colours to be matched in sequence but co-ordination skills can be developed by moving the correct coloured OGLE to match a pattern displayed on the screen. Interest and amusement are provided by you as Gordon having to control your pet dog Flash by guiding him to collect the matching OGLE, carry it back and to drop it at the correct position. There are two levels of play.

An easy level for the younger person. A professional level for the older person with play against the clock and Hall of Fame.

OGLE COMPETITIONS ARE FUN! £8.95

BARRELDROP! for 48K SPECTRUM

Poor Gordon! His drainpipes are blocked again and the only way to clear them is to drop barrels down them. Gordon stands on the top of his roof with 5 barrels. When the game starts he'll roll one down the roof. Press **SPACE** to drop it through the roof accurately into the centre of a drainpipe and you'll score the number of points in the pipe, which will start to flash, and Gordon will get the barrel back for another go. The barrel will be lost if the drop is inaccurate, or into a pipe already filled, but - Flash the dog is on hand! If you know you're going to lose the barrel and you can see Flash peeping out from the bottom-right corner, press **D** and Flash will save it! Once you clean all 5 pipes, you will get a bonus, but there's a surprise in store before you get the next set of pipes to fill £5.95

SUPERSNAILS for 16K or 48K SPECTRUM

Snails specially imported from West Africa are being kept in Dr. Van Winklehoff's laboratory for genetic experiments. The Doctor has turned them into a super-breed of snail who now leave behind a trail of super glue that will trap any snail touching it. Two of the snails, continually moving and controlled by the players, escape from their pens into the laboratory. Unfortunately, only one of the snails can escape from here into the outside world without raising the alarm. You must therefore trap your opponent and then try to escape through the small door which will then appear.

Features:-
• Fast Action - 100% Machine Code
• Nine levels of difficulty
• Keyboard or Joystick Control

STAND 109
NORTHERN COMPUTER FAIR
NOVEMBER 24-25

£7.95



EGBERT

for COMMODORE 64

A fast Arcade Action Game for all the family to play.

Written in 100% Machine Code for super-fast action!

Egbert works on the production line at 'LEYSPEACE'. It was a comfortable life until the invasion of the TEBBITES from the planet TOR. Egbert's union has been exterminated and the Tebbites have left their deadly Pets running wild in the workplace. As if that wasn't enough, the evil invaders have forced Egbert to take care of an Egg - damaging the Egg will have fatal consequences for poor Egbert. Egbert is now on piecework - can he earn a decent wage? Can he even survive? **WARNING!** You may get an ulcer by playing this game.

SIX LEVELS OF SKILL. ANYBODY WHO CAN DO LEVEL 6 SHOULD WRITE AND LET US KNOW!

ARITHMETIC FUN-TIME for TI99

Elementary addition, subtraction, multiplication and division exercises providing valuable practice and drill for young children who are developing their basic mathematical skills.

Uses colour graphics and sounds to give a good presentation with the sums appearing in large letters on a blackboard. The Computer plays back sums which the child has difficulty with showing the child the correct solutions. Uses the basic TI99 console. £5.95

Games Machine Ltd., Business & Technology Centre, Bessemer Drive, Stevenage, Herts. SG1 2DX.
Telephone: (0438) 316561.

Please add 50p to cover post and packing.

I enclose a cheque P.O. payable to GAMES MACHINE LTD., for £

or debit my Access/Barclaycard account no.

Signature

NAME

ADDRESS



	QTY.	£
WANDA		
BARRELDROP		
EGBERT		
SUPERSNAILS		
OGLES		
ARITHMETIC		
TOTAL		

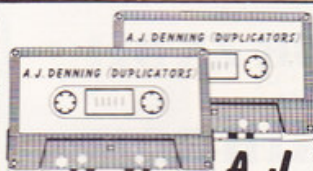
SEND TO:-

GAMES MACHINE LTD.,
FREEPOST,
STEVENAGE,
HERTS SG1 2TH.

DEALERS AND DISTRIBUTORS REQUIRED. GAMES AND EDUCATIONAL PROGRAMMES WANTED FOR ANY HOME COMPUTERS.

MICROSHOP

Accessories



A.J. DENNING (DUPLICATORS)

**QUALITY CONTROLLED CASSETTE DUPLICATING
QUALITY & SERVICE AT COMPETITIVE RATES**

QUALITY — Constant Stringent Checks Made Throughout Production.
SERVICE — Despatched Normally Within 10 Days From Receipt Of Master.
PRICE — C10 From 28p Including Case. C15 From 31p Including Case.
CONTACT US NOW FOR YOUR PERSONAL QUOTATION

A. J. DENNING (DUPLICATORS)

19 The Crescent, Henleaze, Bristol BS9 4RW

Tel: (0272) 623267

DELTA 14 HANDSETS FOR THE BBC

Used for years by DATABASE owners these high specification handsets have 14 pushbuttons to take the strain off of your keyboard. The DELTA 14 comes in two parts. One handset will plug into the A/d to give analogue spring return joystick plus three button functions. The second part is the DELTA 14B/1 adaptor box which connects the 15 way "D" to the user port. This gives 12 buttons on a 4x3 matrix. The eighth line selects a second joystick which can be plugged into the adaptor box.

New, available now — Program to convert keyboard-played games to run on the joystick and handset buttons.
DELTA 14B JOYSTICK HANDSET FOR BBC £12.95
DELTA 14B/1 ADAPTOR BOX AND CABLE £13.95
CONVERSION PROGRAM CASSETTE £5.95
CONVERSION PROGRAM DISK £8.95



DIRECT FROM OUR FACTORY



IN KIT FORM: kit contains 1 switched joystick assembly, 2 moulded case halves, fire button, 1.5m5 core + screen cable, fixing screws. £4.50 per KIT
READY BUILT with 9 way "D" socket — suit Atari or Vic20 £5.95 each
SPECTRUM PROGRAMMABLE INTERFACE — to enable above joystick to work on the SPECTRUM. Will convert any keys to joystick directions. Complete with program tape £24.00
"D" connectors 9-way female plug or 15-way male plug complete with hoods £1.75
Din plug 5-way 240 deg 50p
AERIAL SPLITTER SWITCHES £2.50
(Saves unplugging T.V. aerial to connect computer)

Cheque or PO with order. Prices quoted INCLUDE VAT. 1st Class Post. 7 day money back
VOLTMACE LTD., PARK DRIVE, BALDOCK, HERTS.
Callers welcome Monday to Friday. Telephone: (0462) 894410

HARDWARE

Calling All New Brain owners CENTRONICS printer interface £49.95

Would you like to print out what appears on your screen? Then you will need our unique **GRAPHICS** routines. For most common printers, please specify on ordering. £6

SPACE FIRE, a space invader type game for all the family. Un-matched at £4

TYPEPRO LIMITED
30 Campkin Rd, Cambridge CB4 2NG
Tel: Day 0487 842083 Eve. 0223 322394

MICROPAGE ROM box £29.95

Up to 4/ 8K EPROMS may be paged into the NewBrain's spare memory slot. This allows up to four programs to be selected from a menu without reducing the 32K RAM. As a service we will blow your 8K program for you. Write for details enclosing SAE.

JOYSTICK and demo program £19.95

By arrangement with Anthony Ashpitel

THE TYPING MASTER

is now available for the NewBrain. Suitable for a beginner or just to improve your speed to over 30wpm. £15

Check your mortgage, loans and savings with "MORTGAGE". Only £5. **MATHS PLOTTER** allows several functions to be plotted onto the same screen, $y=f(x)$ & parametric forms £5. **MEMOPAD** word processing with wordwrap find, justify, etc. great value at £10

Join the **NewBrain USERS GROUP**. Our first Newsletter is out in December. Got a problem, get help from our staff. Know a trick, why not share it with fellow NewBrain owners, there are over 16000 of us out there. Subscriptions £5 per annum (6 Newsletters & special special).

GFG Microsystems,
36 Armitage Way, Cambridge CB4 2UE
Tel: (0223) 315120

All prices include VAT, P&P.

COMPUTER CONSUMABLES

QUALITY DISKS AT COMPETITIVE PRICES

Machine	Price per box 10
Commodore Pet	From £20.00
Tandy	From £20.00
Osborne I	£20.00
Apple II	£20.00
Apple III	£21.00
Olivetti M20	£25.00
IBM P.C.	Single sided £21.00
	Double sided £25.00
Sirius	Single sided £24.00
	Double sided £33.00

Prices are exclusive of V.A.T. Postage & Packaging included in price.

01-691 7120

COMPUTER CARRYING CASE

Suitable for Spectrum, Oric, Lynx, Sord, Vic 20, Commodore 64, or computers of similar size. The hard case is finished in black with twin lockable fasteners and carrying handle.

Separate pockets hold computer/manual, leads, power pack, cassette player and five cassettes. Folds flat for storage.

£13.95 inc VAT +

Post and packing £2

Dust covers also available for any computer, printer etc. Dealer enquiries welcome.

SHERBORNE DESIGNS

Victory House, 8A The Rank,
North Bradley, Trowbridge, Wilts.
Tel: 02214 4425

Cassettes

BLANK CASSETTES!

TOP QUALITY PROFESSIONAL BRAND
COMPUTER/AUDIO CASSETTES
AT BUDGET PRICES

Packed in boxes of 10 cassettes
Complete with labels, inlay cards
and library cases.

Prices include VAT post & packing

LENGTH	BOX PRICE (10)	QTY	Amount
5 mins	\$4.85		
10 mins	\$4.90		
12 mins	\$4.95		
15 mins	\$5.00		
30 mins	\$5.20		
60 mins	\$5.80		
90 mins	\$7.50		

Cheque/Postal Order enclosed for £

NAME

ADDRESS

PROFESSIONAL MAGNETICS LTD

Cassette House, 329 Hunslet Rd, Leeds

LS10 1NJ

Tel: (0532) 706066

TRADE ENQUIRIES WELCOME

DRAGON/ATOM/ORIC-1 ADD LOW-COST I/O POWER WITH A VIA BOARD

Drive extra I/O devices, from LEDs & switches to extra peripherals. Link 2 micros for data/program transfer, spool listings to a second micro to print/save etc. (see TEV-LINK below).

HARDWARE: 6522 VIA provides 16 I/O lines + control, serial port 2 timers, interrupt register, I/O voltage & interrupt lines taken to 26-way IDC plug for easy connection to peripherals etc. Connectors available for Dragon, Atom. The Board may be interfaced to most other 6502/6809 micros, and may be shared between m/c's by changing the plug-in connector.

SOFTWARE: TEV-LINK package provides 2-machine parallel link (2 Boards needed) overall speed about 8K DATA bytes-second with error checking.

A PRINT SPOOLER is included (only 1 Board needed) connect printer port to VIA board on receiving micro and use normal LIST/PRINT etc.

Assembled board + Atom connector £16.50

Assembled board + Dragon connector £18.75

Assembled board only — for your interface £14.00

Atom connector £4.00, Dragon connector £6.00

OTHER SOFTWARE:

CAVE QUEST: Underground quest for the ring of power. Dragon/Atom/Oric cassette £2.30

TEVROG'S KINGDOM: A real-time quest for magic powers (and survival): Oric £5.75

Other software and hardware available soon.

T.M.L. DATABASE

A flexible general purpose data filing and retrieval program with an auto-reminder feature for birthdays, appointments, etc. 100% machine code program.

MAIL ORDER ONLY.

SEND FOR LISTS/DETAILS

All prices fully inclusive of VAT, P/P etc.
Teward Microtech Ltd, (Dept PCN)
403 Dallow Road, Luton, LU1 1UL.
Tel. (0582) 418906

LOOK — COMPUTER STATIONERY

SMALL OR LARGE QUANTITIES AVAILABLE

Continuous listing paper: — music rule or plain. 500, 1000, 2000 sheet.
Continuous labels: — large range of sizes in packages of 500-5000, larger quantities available.

Continuous envelopes. Cleaning kits

Store your work safely in one of our printout binders.

Catalogue on request. Speedy service.

HCL COMPUTER SUPPLIES

19 GREENLANDS ROAD, KEMSING,

SEVENOAKS, KENT.

TEL: OTFORD (09592) 2918

THE No 1 IN MAIL ORDER

MICROSHOP

CALL

CHRISTIAN MCCARTHY

ON

01-636 6890

Programme Converters

Calling all ATARI and COMMODORE 64 OWNERS!

Enthusiastic (and good!) owners of Atari and Commodore 64 machines wanted to do program conversions for forthcoming publications. Please ring:

Jane Green
PCW Books
01-323 3211 x329

Software

EMPIRE

from
SHARDS
software

...there is no
hiding
place...



The ultimate strategy game for the Dragon 32. Destroy the evil Dragon Empire before it conquers the world. For one player (no joystick). Includes 7 world maps and 8 levels of difficulty. With 100% hi-res. Only £6.95 at Boots and all good stockists or send cheque/PO to SHARDS SOFTWARE, 189 Eton Rd, Ilford, Essex IG1 2UQ.

Microshop Classified

● **Spectrum.** See your graphics or characters scanned and produced 8 times larger on screen. Clever 12 line entry. Send £1 only to Shaw Bros., 22 Trinity Lane, York YO1 1EL.

● **Manic Miner.** Use the keyboard to select (and play) any screen. Send £1.50 to Microman, 16 Chippendale Rise, Bradford BD8 0NB.

● **Disk Binders — £3.50 each.** Complete with pockets to hold ten 5¼in floppy diskettes. Price includes VAT & postage. Cheques or PO's to Grid Enterprises, 174 Astonville Street, London SW18 5AG.

Magicwond Light Pen — Ideal Christmas Gift for the BBC(B) owner. Complete with microswitch, user-guide, software. £22.50 C.W.O. — Magicwond, Dept N1, 3 Queensbridge Park, Isleworth, Middlesex TW7 7LY.

If an advertisement
is wrong we're here
to put it right.

If you see an advertisement in the press,
in print, on posters or in the cinema
which you find unacceptable, write to us
at the address below.

The Advertising ✓
Standards Authority

ASA Ltd, Dept 3
Brook House, Torrington Place,
London WC1E 7HN

Programmers

ocean

URGENTLY REQUIRE GAMES PROGRAMS

Ocean Publishing Limited, publishers for a major software house,
urgently require machine code game programs for home micros.

**ZX SPECTRUM, COMMODORE 64, ORIC,
DRAGON, VIC-20 and ACORN ELECTRON**

Our national dealer network ensures maximum sales. Should your
program be accepted we will pay top royalties or buy your copyright.

Write in confidence to the

SOFTWARE DEVELOPMENT MANAGER

Ocean Publishing Limited, Ralli Buildings, Stanley Street, Manchester M3 5FD.
OR TELEPHONE: 061-832 7049

Services

Dear reader, my name is Simon Stable. I specialise in direct data
duplicating for the following cassette-based micros: BBCA/B, ZX Spectrum,
Electron, Lynx, Oric 1 and Dragon 32. Disc copying for BBC 40/80 track. Dot
matrix printed labels to order/blanks. Blank cassettes.

FAST **0869 252831** **COMPETITIVE**
TURNAROUND **PRICES**

I'm proud to be sole duplicator for Chalksoft Educational Programs whose
new mail order address is: Freeport O.F., Chalksoft Ltd, 37 Willowdale
Road, Northwick, Worcester. Yours Sincerely, Simon Stable.

For further information about real-time cassette copying write or phone
FREEPOST, 46 WEST END, LAUNTON, OXON OX60 812

Interdisk
LIVELY PROGRAMMERS
Wanted by established record
company

Please write to:
PO Box 99,
249-251 KENSAL ROAD,
LONDON W10 5DB
or Phone 01-969 9414

CBS behind the green door

RAMpack wobble fans will be pleased to hear of the appearance of 'The Shaky Game', which is not only given away free with cassettes of the Bop Won't Stop by Shakin' Stevens.

The game runs on the 48K Spectrum, although the album itself will only work on standard hi-fi equipment. Your goal is to drive Mr Stevens to his 'ole house' — fans will notice the allusion to this seminal Stevens work — while avoiding 'clusters of lethal vampire bats.'

CBS reliably informs us that this is the first time a pop star, shaking or otherwise, has been crammed inside a 48K Spectrum.



All shook up on a Spectrum.

Acorn calling

Supporters of Acorn's campaign to free women from drudgery and stick them behind micro keyboards instead will be gratified by the latest developments. At Compec, besides showing off the cocktails program — so handy for those long afternoons by the tumble dryer — Acorn had implemented the next stage in its neo-liberationist campaign.

The current stage in the battle to interest 'the gels' in micros seems to involve plastering them up in green and white Acorn jumpsuits, and paying them to dish out leaflets.

Funny thing, liberation.

SANTAX ERRORS

Tempting bug

In our review of *Baron* from temptation Software (Issue 36) we stated there was a bug in a 'Yes/No' answer routine. However, Temptation tells us that this is in fact a feature of the program's error trapping.

NEXT WEEK

Hardware *Is the Dragon 64 twice as nice?*

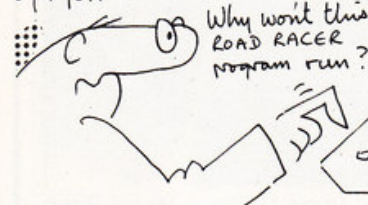
Awards *Nominate your favourite system, peripheral or program in the 1984 British Micro Awards*

Buyer's Guide *A 16-page special to guide you through the hardware maze.*

Win a rifle Games *Ten Stack rifles and games are the prizes. An Oric round-up plus reviews of games on the Spectrum, BBC and Atari.*

PAL2000

by Mollusc.



PCN DATALINES

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

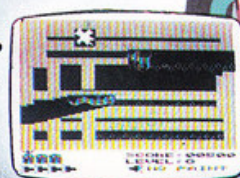
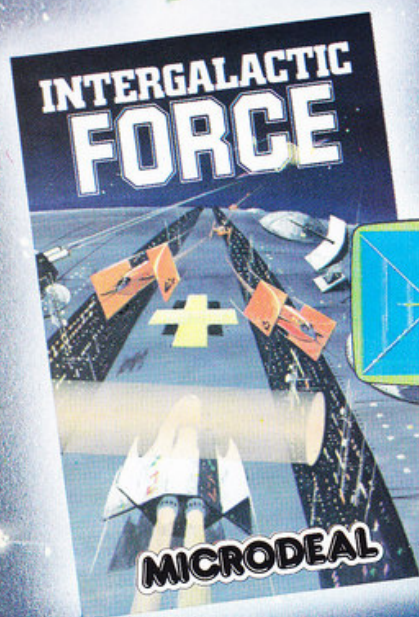
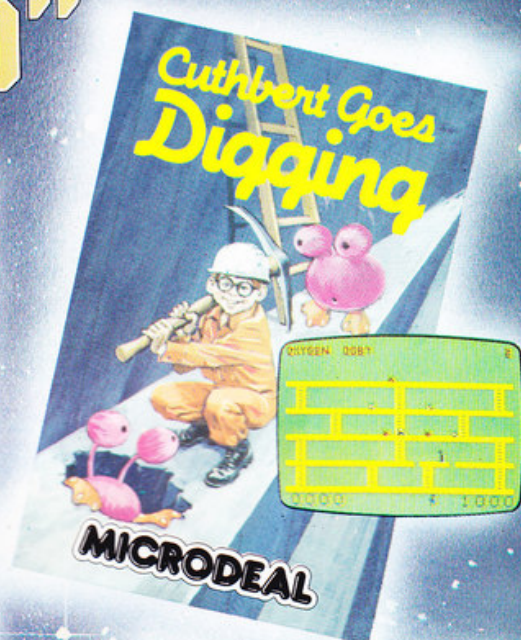
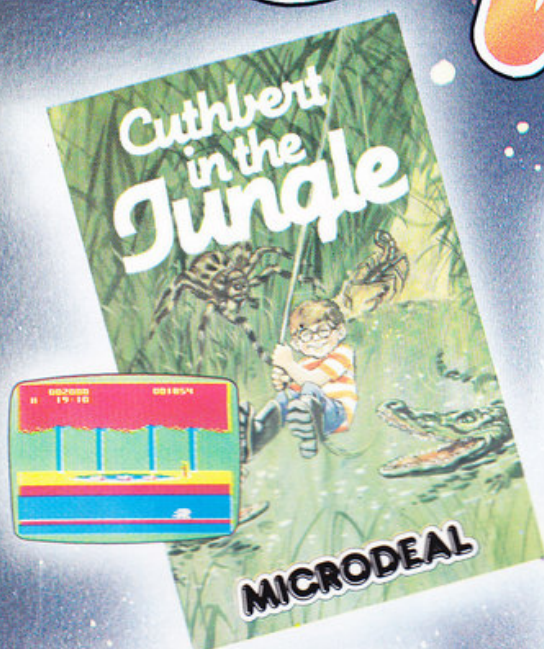
Event	Dates	Venue	Organisers
Northern Computer Fair	November 24-26	Belle Vue, Manchester	Reed Exhibitions, 01-643 8040
BBC Micro User Show	December 9-11	Westminster Exhibition Centre	Database Publications, 061-456-8383
Your Computer Christmas Fair	December 15-18	Wembley Conference Centre	Reed Exhibitions, 01-643 8040
Which Computer? Show	January 17-20	NEC, Birmingham	Clapp & Poliak Europe Ltd., 01-747 3131
Northern Home Entertainment Show	January 19-22	Excelsior Hotel, Manchester Airport	Stamley Wire Advertising Ltd., 01-253 6637
Acorn Education Exhibition	January 25-27	Central Hall, Westminster	Computer Marketplace (Exhibitions) Ltd, 01-930 1612
Communications & Computer Systems Fair — CABLES	February 2-4	Pontin's, Prestatyn, Wales	Pontin's Ltd., 07456 2267
LET '84	February 13-15	Heathrow Penta Hotel	Anthony Farrar, 0923 774262
International Home Computers, Video Games & Software Exhibition	February 13-15	Heathrow Penta	Wheatland Journals Ltd., 0923 774262
Information Technology & Office Automation Exhibition and Conference	February 21-24	Barbican Centre, London EC1	B.E.D. Exhibitions Ltd., 01-647 1001
OEM Only Conference	March 7	Hilton Hotel, London W1	Tom Lewis, 01-994 6477
Computer Trade Show	March 13-15	Wembley Conference Centre, Middlesex	Reed Exhibitions, 01-643 8040
Essex Apple Village	March 25-28	Festival Hall, Basildon, Essex	Database Publications, 061-456 8383

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Computer Indonesia	Nov 22-25	Jakarta	Overseas Exhibition Services Ltd., 01-486 1951
Computer Dealers Exhibition	November 28-Dec 2	Las Vegas, USA	Interface Group Conference & Exposition Management, 160 Speen St., Framingham, MA 01701, USA
Personal Business Computer Show	February 29-March 3	Hong Kong	Overseas Exhibition Services Ltd., 01-486 1951

WHEN IT COMES TO DRAGON 32 Software

"WE'VE GOT
IT TAPED"



MICRODEAL

41 Truro Road, St. Austell, Cornwall PL25 5JE. Tel: 0726 3456

All cassettes £8 each

Selected titles available from larger branches of Boots, John Menzies, Spectrum, Computers for All and all good computer shops.

BUG-BYTE SOFTWARE



OVER 175
DIFFERENT SCREENS



THE DAWN OF A NEW ERA IN GRAPHIC ADVENTURES



EAT YOUR
HEART OUT
BILBO!

Versions available now
for Commodore 64,
Electron and
BBC Model B.

Twin Kingdom Valley is a breakthrough in adventure programs, a highly complex journey through over 175 different locations to test your ingenuity to the limit, using simple English commands. In your High Street now

Price **£9.50**

Bug-Byte Limited

Mulberry House,
Canning Place, Liverpool.
Dealers contact Matthew
Thomas on 051-709 7071.
Registered Dealers can order
direct from CBS Distribution
on 01-960 2155.