PERSONAL
COMPUTER NEWS
NOW EVERY THURSDAY
THE COMPLETE COMPUTING WEEKLY
JUNE 16–22 1983 Vol 1 No 15
35p

COMX EXCLUSIVE
Can this £120 Hong Kong computer compete?
Pro-Test, page 46

EXCLUSIVE
APPLES WITH EARS
Teach your computer to obey voice commands

GENIE GRAPHICS
Unbottle your Genie's colour capabilities

SOFTWARE: EPSON, COMMODORE
Pro-Tests of new packages for the HX20 and 64

ACE ACTION
We play arcade games on the Jupiter Ace

SPECTRUM MICROPAEDIA, PART 2
Build your complete library of microcomputing

Your No 1 computing weekly
35p ONLY

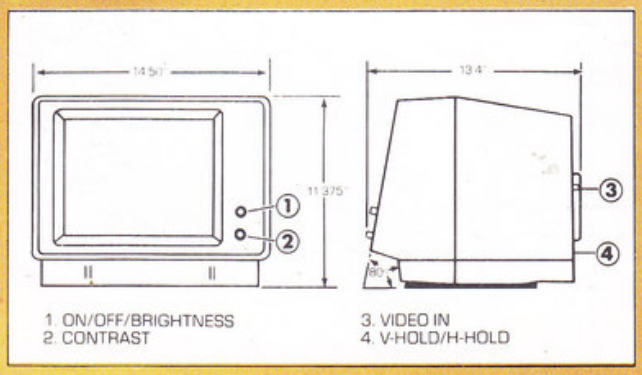
AMDEK BY Roland DG

The clear choice for text and high resolution graphics!

Everything about the Amdek 12" Video-300 monitor is designed for easy reading and operation. It's compatible with practically every computer or word processing system including the popular Apple & IBM computers.

Video-300 Fact Sheet

ITEM	SPECIFICATIONS
CTR	12" diag. 90° deflection angle
CTR	Etched non-glare, green or amber
Signal	Composite video input
Input Signal	1·0 Vp-p, sync negative
Input Impedance	75 ohms
Scan Frequencies	Horizontal: 15.75 KHz. Vertical: 50/60 Hz
Display Size	210 (W) x 158 (H) mm
Deflection Linearity	Horizontal: 10% Max. (refer to EIA ball chart and dot pattern). Vertical: 8%
Video Response	18 MHz (±3dB)
Resolution	Centre: 900 lines. Corners: 800 lines
Power Source	120/220 V Convertible 50/60 Hz
Controls	See diagram (focus, sub-brightness, H-size V-linearity and +B adjustment are on PCB)



Roland (UK) Ltd Great West Trading Estate, 983 Great West Rd., Brentford, Middx TW8 9DN
Telephone: 01-568 4578 Telex: 934470

MENU
June 16-June 22, 1983 Volume 1 No 15

PCN SPECIAL OFFER
Save £1 on your favourite Spectrum games cassette!
See page 10

Micropaedia Spectrum: Part 2

Microdrive revolution, Building a bigger system, Around the keyboard, Organic Spectrum and Hatching a colour plot.

REGULARS

Monitor 2
Coleco's Adam breakthrough, *page 2*; something old, something new at the Commodore show, *page 3*; French software springboard, *page 4*; pros and cons for IBM PC, *page 5*; Nomad takes on Husky, *page 8*.

Random Access 12

Microwaves 16

Routine Inquiries 18

Gameplay
Jupiter Ace 50
The Ace speed is challenged with a mixed hand of new games
Apple 51
Richard King is the test pilot in Cleared for Landing
Dragon 32 54
Uncultured vultures; alien space-ships in 3D

ProgramCards
BBC Model B 55
Recapture the disk workspace
Commodore 64 57
A 24-hour clock using eight coloured sprites
Atari 400/800 61
Pirate Island adventure starts
Colour Genie/Dragon 65
Mastermind for micros; Breakout in low-res

Clubnet 66
WICPug plugs into Micronet

Readout 71
An IBM bumper bundle

Databasics 73
Latest hardware prices

Billboard 79

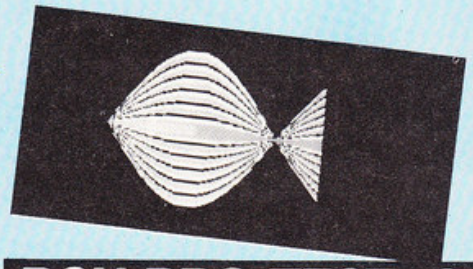
Quit/Datelines 88

Cover photograph by Naru

PCN SPECIALS

NewBrain Basic: Part 2 — 23

The printer connection . . . and into the graphics area, with David Janda.



Genie Scene — 25

Nigel Cross picks out some fascinating patterns in the Colour Genie's 'surprising' graphics.

PCN PRO-TEST: SOFTWARE

Sysres 64 — 30

A programmer's aid package which boosts the Commodore's Basic with a further 50 commands. Pete Gerrard rates it.

Address Manager — 32

Your Spectrum as an address book.

Epson Filing — 35

Records on the run. How does the MST Database work as a portable filing system for the HX-20? Henry Velleman is our roving reporter.

PCN PRO-TEST: PERIPHERALS

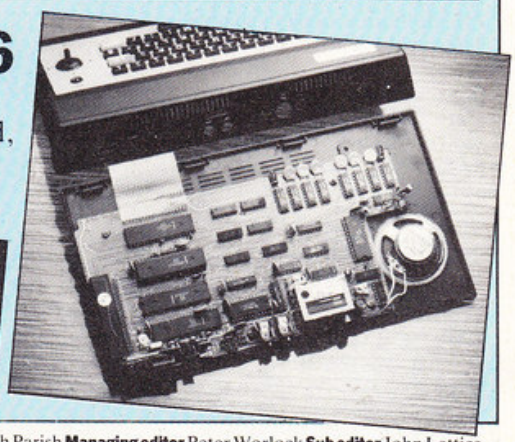
Apple II Speak — 36

HAL is here — in the guise of VIM. Nigel Cross lends the Voice Input Module an ear.

PCN PRO-TEST: HARDWARE

Comx 35 — 46

Max Phillips meets the Comx 35 micro: 32K RAM, colour, sound, good keyboard, joystick, ten bundled programs and a good Basic — all for a miserly £120.



CHARACTER SET **EDITORIAL: Editor** Cyndy Miles **Deputy editor** Geof Wheelwright **Production editor** Keith Parish **Managing editor** Peter Worlock **Sub editor** John Lettice **News editor** David Guest **News writers** Ralph Bancroft, Wendie Pearson **Software editor** Shirley Fawcett **Systems editor** Max Phillips **Hardware editor** Richard King **Peripherals editor** Ian Scales **Listings editor** Sandra Grandison **Editor's assistant** Harriet Arnold **Art director** Jim Dansie **Art editor** David Robinson **Assistant art editor** Floyd Sayers **Art assistant** Dolores Fairman **Publisher** Fiona Collier **Publishing manager** Mark Eisen **Publishing assistant** Jane Green **ADVERTISING: Advertisement director** John Cade **Advertisement manager** Nic Jones **Assistant advertisement manager** Sue Hunter **Sales executives** Robert Stallibrass, Matthew Parrott, Bettina Williams, Ian Whorley, Sarah Barron, Roxanna Johnston, Christian McCarthy **Production manager** Eva Wroblewska **Advertisement assistant** Jenny Dunne **Subscription enquiries** Simon Maggs **Subscription address** 53 Frith Street London W1A 2HG 01-439 4242 **Editorial address** 62 Oxford Street London W1A 2HG 01-636 6890 **Advertising address** 62 Oxford Street London W1A 2HG 01-323 3211 **Published by** VNU Business Publications, Evelyn House, 62 Oxford Street London W1A 2HG © VNU 1983. No material may be reproduced in whole or in part without written consent from the copyright holders. 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

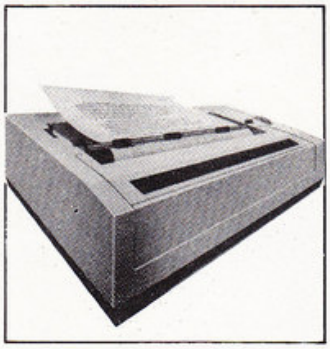
Coleco Adamant

CP/M compatibility and a built-in daisywheel printer included with your micro for under £300?

Sounds crazy, but that's what Coleco Industries unleashed on the world last week in Chicago. Coleco's Adam computer will sell for $600 in the US — including a built-in daisywheel printer, a high-speed magnetic tape storage facility, CP/M compatibility, full-travel qwerty keyboard, 80K RAM and compatibility with all the Coleco games machine software.

The machine's Z80A processor allows the use of CP/M business operating system with what Coleco calls an optional '500K mass-memory' drive for storage. Conventional storage with a magnetic cassette tape drive comes as standard with the price of the Adam — and each cassette will store about 25K.

Coleco claims the cassette drives will run much faster than ordinary cassette storage devices and hold twice as much information as wafer-tape drives. A second tape drive will be offered for $125.



The daisywheel printer, not the least of the surprises in Coleco's Adam.

Perhaps the biggest news for UK computer users is that Coleco will also sell a cut-down version of the Adam to act as the plug-in computer console for the ColecoVision video game system (*Pre-tested in PCN, issue 2*). The computer console will include the tape drive, printer and full-travel keyboard, but will use the Z80A processor and the cartridge slot of the games machine.

It's expected to sell for between £100 and £200 ($400 in the US) and will be released in the UK this autumn.

A spokesman for Ideal Toys, which sells the ColecoVision machine in this country, said the computer console will be available before the stand-alone computer.

He added that Ideal expects to build up a big base of ColecoVision games machine users and that many should be interested in buying the Adam add-on unit.

. . . But Atari counters

The cheapest computer in Atari's new XL range (*reported last week in PCN's View From America*) will be sold with a special $465 package that includes a letter-quality printer, text editing program and a data-storage attachment.

The package will be offered for Atari's 600XL, which sells for $150 in the US with 16K (expandable to 64K). It will put the 600XL in direct competition with Coleco's new Adam computer, which will sell for $600 with a built-in daisywheel printer and tape drive.

Atari claims its printer is twice as fast as Coleco's. The announcement of this printer/software package for the 600XL comes on the heels of Atari's release of four new computers last week, all destined to replace the ageing Atari 400 and 800.

A spokesman for Atari UK declined to name a UK release date for the XL series.

Arise, Sir Clive . . .

Clive Sinclair, the leading force in the British micro revolution, has been rewarded with a knighthood.

Sir Clive started in the electronics business in the Sixties with an assemble-it-yourself hi-fi kit. A pocket calculator, digital watch and pocket TV followed — all of them world firsts, none of them outstanding commercial successes.

When the ZX80 made its appearance from the newly-formed Sinclair Research it represented a quantum leap in terms of cost and performance. Massive sales of the micro led to further refinements and the launch of the second version of the machine, the ZX81.

Under challenge from the Americans and the Japanese, Sinclair Research went on to develop the ZX Spectrum as a colour computer that would sell for around £100.

Not everything in the Sinclair firmament shines bright. Sinclair users are still waiting for their low-cost microfloppy drives, and difficulties in developing the flat screen TV (not helped by recent labour disputes at Timex) could let the Japanese in first.

Sir Clive's contribution to the micro industry is not restricted to technological innovation. He has also encouraged some of the best brains in the country and a number of companies, including Acorn, Jupiter Cantab and Torch, can trace their origins to Sinclair.

His latest project reflects his prominent membership of MENSA and abiding interest in stimulating creative ideas. Called Metalab, it will be a technological think-tank committed to opening up new fields ranging from battery technology to robotics.

Now the Beeb gets BOOTed

Look out for price-cuts on the BBC Micro in mid-July as the Boots chain puts the system on its shelves for the first time.

The BBC will be going into Boots' top 30 branches, including Nottingham, Manchester, Newcastle and Leeds. Boots will not say whether there will be introductory bargains on offer but a spokesman said: 'We are always looking to be competitive,' and the Boots chain's pricing has been aggressive over the last two months.

Sirius distributor ACT is getting in on the retail act as well.

It plans to set up a national chain of computer department stores called Computerworld, and the first of them has now opened in Bristol.

ACT is offering its dealers a franchise-style arrangement. It will provide finance as long as the dealer sells mainly ACT products, which will soon include ACT's own micro, the Apricot.

Eventually it expects to have between 100 and 150 stores around the country.

Its target is to have 20 to 30 open by the end of the year.

Micro Marketing

Complaints have reached *PCN* concerning a former advertiser, Micro Marketing, previously located in Fulham, London SW6.

Anyone wishing to contact the company should write to director Giles Hacking, c/o C G Hacking, C G Hacking & Sons Ltd, 50 Borough High Street, London SE1. Tel: (01)-407 6451.

Micro Marketing is no longer at its Fulham address.

ON THE BEEB — Storage for your BBC has probably shrunk as far as it can with Advanced Memory Services' release of Hitachi 3in drives. The double-sided floppies hold 200K, and a single drive will cost you £225 — the dual drive version is £399. In either case you get cables, manuals, utilities and EPROM controller with the drive. The Hitachi drives join a growing list of floppy disk units that will run on the BBC Micro. Acorn itself, Mitsubishi, Siemens and Torch all produce storage devices for the BBC, but Control Data's disks still represent the most bytes per pound. Advanced Memory Services is on Warrington (0925) 62682.

Hobbit caps Acorn

One of the biggest holes in the BBC Micro's performance is about to be partially plugged — but not by Acorn.

Ikon Computers, producer of the Hobbit storage system, is designing a 'sideways ROM' to enable you to transfer machine code programs from cassette to the Hobbit. But without a sound knowledge of 6502 machine code and the workings of the BBC you won't have much chance of getting machine code programs to run once you've put them on to disk from a cassette.

If you add a disk drive and interface (DFS) to your BBC it's natural to want to transfer cassette-based programs to disk. With programs written in Basic there is normally no problem, but machine code software is a different kettle of fish.

Acorn's attitude is unsympathetic.

'Acornsoft software is not designed to be saved on to disk,' a spokesman said. It says you must buy the program on disk in the first place, and it won't offer a trade-in on cassette software. Nor will it consider attaching a relocator to its tape software for users who want to save it to disk.

Saving software is actually no problem — you load it from the tape into the lower end of memory above the DFS and then save it to disk. But when you try to load it from disk and run it, the machine code loads into the RAM above the DFS and is therefore unlocated. Switching back to the tape filing system does not move everything down into its original starting position, and therefore the program will not run properly.

Ikon's solution is a piece of hardware designed to keep the Hobbit filing system out of the BBC's RAM, thus side-stepping the problem.

It should be available later in the year.

Acorn's lack of sympathy is based not on a cynical desire to sell more disks but on the question of software copyright protection. You buy the right to use the software, not the software itself.

64 carries the day

You could hardly move for new products at the Commodore Show in west London last week.

Some of them won't actually be on sale for three months and some were supposed to have been rolling into the stores by now, but Commodore managed to build a centre of interest around them even before you got round to looking at the other 60 exhibitors' wares.

And there was some flag-waving as well, with UK-designed and written software being destined for users throughout the world.

The portable Commodore 64 and the Teacher's Pet were two of the machines that immediately caught the eye; one that didn't was the Commodore 500, for the simple reason that it wasn't there. The 500 and 700 were recently thought to be on the verge of either being dropped or re-launched (*PCN, issue 14*) but the word now is that stocks of both are on their way to dealers.

The 1701 14in colour monitor for

Star debutante — the portable 64.

the Vic 20 and Commodore 64 performed some classy graphics, the 1520 four-colour printer/plotter also brought a splash of colour to the show, and the 8250SK disk drive may look unspectacular but it will give you 3Mb for £1,295.

But the SX64 Portable 64, weighing in at about 25lbs, was probably the star of the show. As portables go it has a style all its own, and some felt it wouldn't be out of place in a garage performing wheel-balancing tests. But its spec could justify the anticipation it has created: you get 64K of RAM as standard, a built-in 5in colour monitor, and optional single or dual integral disk drives. It will run any 64 software.

The serial interface will let you hook it up to monitors, printers and others. Prices start at £650 and larger storage models will cost up to £995 when it becomes available in the autumn.

September is the due date for the Teacher's Pet, or as Commodore prefers to call it the Educational 64. This system has the technical spec of the 64, the programming language Logo, and a colour monitor in a Pet housing. Commodore feels that more schoolchildren should benefit from contact with micros — specifically with Commodore micros — and this system at around £400 with software such as Data Limited's Talking Books will lead its charge into the classroom.

Commodore's 500 and 700 were originally launched in the spring and the 700 was Pro-Tested in *PCN* issue 4. It now runs CP/M, so some progress has been made while the rest of the world wondered what had happened to it. At the show the demo of CP/M had some teething troubles but if Commodore says it runs presumably we can take its word for it.

All the software on the Commodore stands was written in this country and it will be sold around the world. The new pieces on show included business applications such as Future Finance, a financial planning system, and Easy Stock, a control routine, and serious games with such promising titles as Lobster Catcher and Face Ache.

It also had programming tools to demonstrate, including Simon's Basic to whet your appetite for the day when this becomes available in cartridge form for the 64.

If the crop of new products overwhelmed you there were plenty of familiar sights around the Cunard Hotel in Hammersmith, the scene of this year's show. The entire lower floor was given over to Vic 20 and 64 demonstrations. There was also an arcade area where you could acquaint yourself with the latest games, and Vicsoft was there in strength. Despite its mixed feelings about software on cartridges (*PCN, Issue 14*), it had no fewer than 17 ROM-based games making their debut.

Commodore demonstrated new printers for users of its business and

The 700 Series . . . but no sign of the 500.

Teacher's Pet classroom contender.

No design award for the 1701.

home computer systems with the usual attractive Commodore price-tags.

The 6400P is a 40cps daisywheel printer which is on sale now for £1,195. It will take a range of print wheels to give you a choice of character styles.

The 4023 and 1526 are both dot matrix units, for the Commodore business range and for the 64/Vic 20 respectively. They will both print standard alphanumeric characters or Commodore's graphics symbols.

The 4023 costs £450 and the 1526 £345; both are in the stores now.

CP/M for Commodore systems was also represented on a Commodore 64, equipped with a Z80 cartridge.

A wealth of new products, but the Vic 20 keeps its faithful following.

VIEW FROM PARIS

Franc talk in foreign software

From Alan Simpson

It is hardly surprising that the French are getting restless about the invasion of English — or rather American — speaking microelectronic companies and services. The French balance of micro-trade is distinctly one-sided with exports accounting for only five per cent of world micro business and imports representing an equally unhealthy position.

France takes much delight in establishing Five Year Plans but is now discovering to its technological and social cost that in micro matters, even five months could be too long a planning time.

With a sidelong glance at Ken Baker, 1983 has been nominated 'Computer Year' in France and the authorities are actively promoting Paris as 'The World Capital of Data Processing'. To back up this somewhat pretentious claim, the First International Software Package Fair, organised by SICOB and Convention Informatique, has just taken place at The Palais des Congres in Paris.

The software — or 'progiciel' as the French prefer — being shown at the exhibition represented some of the best, plus some of the not so best, packages available in the UK and the US. Increasingly, the small local business user is now being served with French language versions of standard software packages. International vendors have been investing considerable time and funds in developing products which are not only user friendly but are also local language versions of best selling software packages.

The word made French

MicroPro in fact is marketing its top word processing packages, WordStar, MailMerge, SpellStar and SuperSort in 11 working languages.

Closer to home, Intelligence (UK) announced a French version of its management planning package MicroModeller. According to managing director Ashley Ward, as the products go to non-specialists company users, it has become essential to provide a local language version.

MicroModeller, which is being distributed internationally by Cresta Marketing, has now sold over 6,000 copies — 5,000 in the UK and 1,000 in Australia and Canada, and the company is hoping for a similar response in Europe. Its expectations could well be realised. In France especially, business micro users tend to have more powerful machines than their counterparts in the UK and US, a factor which assists the Intelligence (UK) marketing drive.

Cresta Marketing is also involved in distributing the Supergraf graphics package, from Georgetown Computer Systems, which was featured in *PCN*, 29th April 1983. The package was attracting considerable attention, as was the associated Victor/Sirius system. Another Cresta International marketing product was Format-80, the Apple word-processing package from Elite Software.

Patrick Whelan, marketing director of Cresta, has been establishing offices in London, Paris, Munich, Geneva, and New York. He is firmly convinced that the current international market for software is highly confusing with far too many suppliers trying to offload their products in unfamiliar environments.

'There are too many machine types, languages, operating systems, and formats competing for business. Europe is being overwhelmed with English language software which has been configured for commercial English and US users,' he says. By liaising closely with users and dealers Cresta will source and adapt standard software packages to meet the needs of specific localities.

Also being introduced to an international market for the first time were the Sound Training Word Processing and CP/M teaching packs from Head-Line Communication of Hereford. However, translations are apparently still in the development stage.

Home computing systems and electronic games were notably absent from the Paris exhibition. But for the small business user, a visit to 'Mini Sicob' could well have been a justifiable business expense.

To the aid of Commodore

An impressive batch of programming aids for the Commodore 64 and 8000 machines has been released by Calco Software.

The packages, at £100 for the 64 and £295 for the larger machines, look pricey but in tests they suggest that you'll get your money's worth. A screen generator, report generator, Basic programming aids and other utilities are brought together in a very 'friendly' package.

The screen generator was previously available in a cartridge for the Vic (called Screen Master). It lets you develop screen management functions in Basic. Screen masks for acquisition of data can be stored in memory and on disks, for rapid recall.

Windows can be declared, with full scrolling capabilities, and commands exist for drawing lines and clearing and reversing areas on the screen. Keyed Access Filing is catered for, with records of up to 256 bytes. The Indexed Sequential Access Method is used for data retrieval, giving access to records by complete or partial key, using sequential searches. If the index is lost, a utility generates it again. Data can be compressed, to save disk space.

A report generator package makes it simple to design and record a printing mask, into which data is put for filing by the editor program.

A range of Basic programming aids extends Basic by If . . . Then . . . Else, Print Using, Hardcopy, Call, Fetch, and other commands.

Multiple precision arithmetic is provided as well as computed GOSUB and GOTO.

Altogether no less than 85 new commands are added to the 100 in Basic.

Contact Calco on 01-546 7256.

Monarch vs Megaframe

UK début — Dynabyte's Monarch

Two micros from the heavyweight division made their UK débuts last week.

In the blue corner, sporting 1 Mb of RAM, multiple processors and a 50Mb hard disk was Convergent Technologies' Megaframe. The only guide to its form is strictly from the US — prices start at $17,546.

In the red corner from Dynabyte was the Monarch, starting at around £12,000 with an 8086, a Z80, BOS, Oasis 8, MP/M 11 and MP/M-86.

Both contenders plan further systems that may bring them within the range of those of us who don't have major businesses to run — Dynabyte is looking at a 32-bit processor, possibly an NS16032, and Convergent Technologies plans a portable machine.

de Bono lateral linking micro

A quiet and cautious crowd that managed to find its way to the right bits of the Barbican struggled to get to grips with micro networking and multi-micro systems at last week's Office Automation Show.

Apple was there, with the show's biggest crowd on tiptoe to get an eyeball at Lisa, hooked up to give a demonstration of Applenet. But Wang had also hopped aboard the networking gravy train, with its 16-bit Professional micros hooked up to the Wang VS minicomputer.

Something different came from a new company, de Bono Multi/Processor Computing — yes indeed, run by a brother of the famous lateral thinking de Bono. Its Home PC is going to sell from £695 for a micro with both 6502 and Z80 processors on board, and it runs Apple DOS, CP/M and CP/M+.

There's a business version, the Executive, with twin floppy disks and a 27 Mb Winchester thrown in for £2,395.

And the de Bono Business System is the company's hope to sell its db^2 database management system — a piece of software that's designed to be used by networks of micros, irrespective of what microprocessor they are based on.

Hewlett-Packard cleaned up the prizes for the gimmickiest stand, with the tale of two HP-120 desktop micros keeping tabs on the British team in the Americas Cup sailing races. An *American* company, computing for a *British* team in an *American* race . . .?

IBM bumper bundle

Autumn should be a good season for PC owners. IBM has announced a bumper selection of add-ons for the unstoppable PC, anticipated for September.

Take your pick from an IBM colour display (£520), a full Bisync communications adaptor for playing at 3270 communications and suchlike (£230) or one of those wonderful 8087 maths co-processors for £214 *(PCN, issue 14)*.

Software doesn't get overlooked either. Basic primer is an on-line tutor for IBM Basic. At £53, it has the distinction of being available this month. There's an APL interpreter (£165) which will use the 8087 to provide fantastic mathematical power with the minimum of cryptic symbols.

Systems stuff will include a 'professional Editor', (£113) with macro capability and text formatting, so we'll all be able to get rid of EDLIN.

There's runtime support for UCSD p-System version 4.3 (£41) to allow access to p-System applications written in UCSD-Pascal, Fortran 77 or Basic.

FileCommand (£31) appears to be a welcome utility. It provides an on-screen directory and menu of commands, giving an easy way to keep house and run programs. FileCommand is supplied to work with either the current version 1 of PC-DOS or version 2 when it becomes available.

Last, don't forget this is a personal computer. New games releases will include Strategy games — draughts, Elusion, Reversi and a surprise package, Battleships! It isn't clear what Elusion will turn out to be. It's played on a 25 or 36 square board and the object is to be the player to make the last move. Strategy games will cost £31.

At the same price is the intriguing '101 Monochrome mazes'. This allegedly attractive game offers '101 unique mazes filled with black pools. . . '.

Presumably you have to make your way from your B&B accommodation to the tower while being chased by the trams.

...but XT late

Not even the mighty IBM is immune to the micro industry's most common disease — its Personal Computer XT is going to be a month or two late.

First deliveries of the hard-disk PC were due this month, but because the Americans are buying more than IBM can build only a trickle will arrive.

The corporation's official statement says: 'Because of exceptionally high demand it is unlikely that IBM will be able to meet all immediate European dealer requirements. We shall do everything we can to reduce delivery delays.'

Exactly how long you will have to wait if you have ordered an XT is a matter of speculation. IBM has already increased its productive capacity in the US 'several times' in the last five months, but even if it starts building XTs at Greenock its preparations could occupy several months.

Unfortunately, the US maker of the IBM-compatible Compaq still has no plans to bring its system to the UK before the end of the year.

IBM Greenock — gearing up for PC production.

Meanwhile, you may console yourself with the thought that even one of the world's largest corporations has attacks of human frailty occasionally.

Less consolatory is the thought that people who ordered IBM's System 38 minicomputer counted the waiting time in years rather than months.

P-System pep talks by TDI

Supporters of the UCSD p-System operating software will soon find that the feeling is mutual — the UK distributor of the p-System is offering a hardware-like support contract with it.

TDI, which sells the p-System on a range of machines including the IBM PC, Sage, Sirius, and Apple, has set up a hot-line maintenance service to give p-System users the kind of response to problems that is more common in the hardware world.

Not that the p-System is particularly accident-prone, TDI is at pains to emphasise. 'People have problems with operating systems,' a spokeswoman said. 'They find that they can't do this or that and they phone up to ask about it. Frequently it isn't the software that's at fault but their understanding of it.'

TDI's new Customer Support Services section is intended to deal with problems as quickly as possible.

Its aim is to keep the customer satisfied, and with the price of software rising as a proportion of a system's cost it is a logical step.

Other software suppliers could well follow suit.

But software expertise doesn't come cheap. For the first three months you get the support free, and for the rest of the year you pay £50. From then on it will cost £100 a year, about 25 per cent of the original cost of the p-System. Hardware maintenance contracts usually average out around 10 to 15 per cent.

PCN Charts

PCN Charts follows the rise and fall of the UK's best-selling micros. This fortnightly top-of-the-shops list tells you what's selling best over the counter; it does not take account of mail order and does not count deposit-only orders. This week's figures show the number of machines sold in the two-week period ending one week before publication date (in this case June 16), so these charts tell the story in high streets between May 27 and June 9.

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

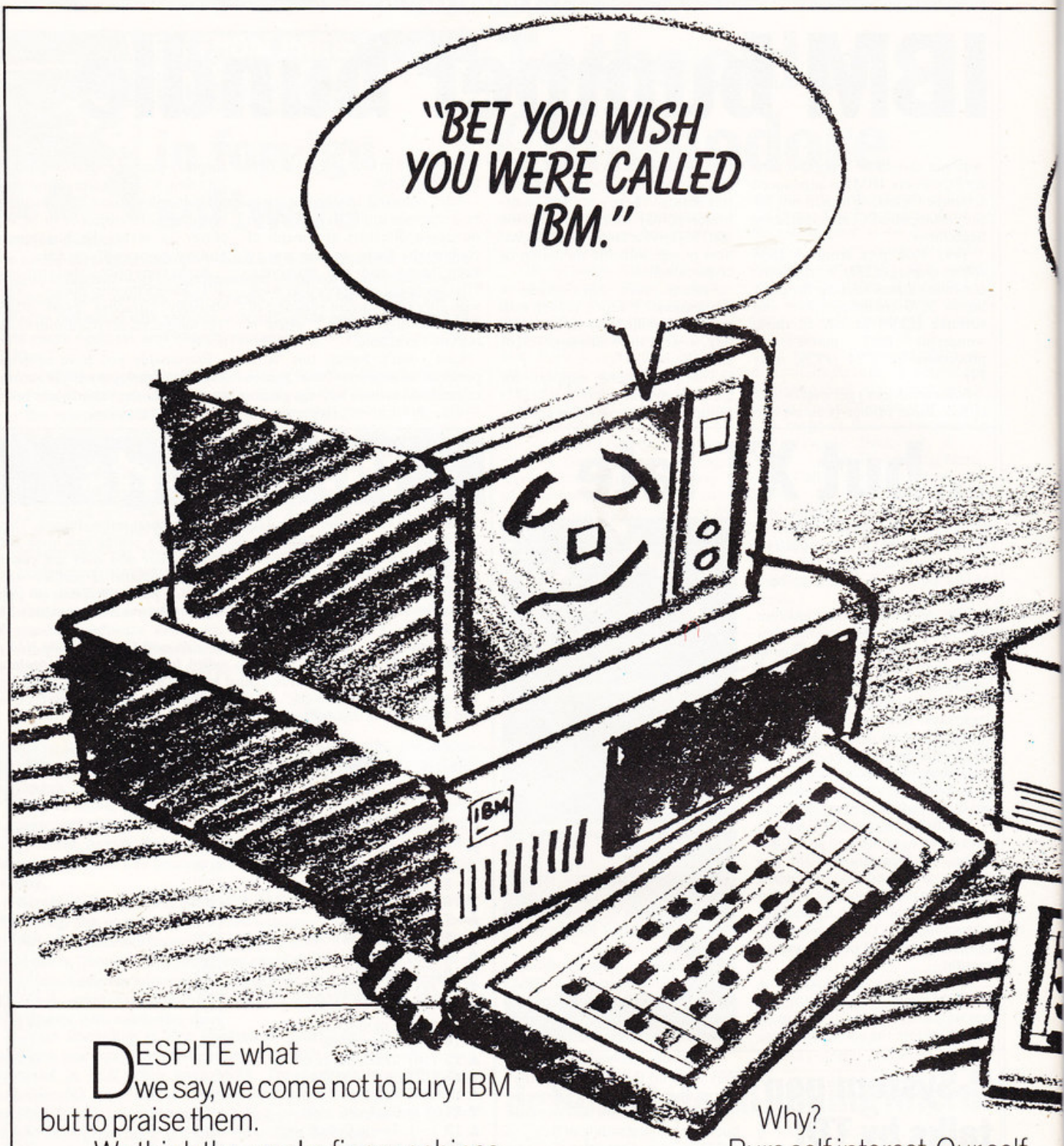
Top Twenty up to £1,000

		MODEL	PRICE	DISTRIBUTOR
► 1	(1)	Sinclair Spectrum	£99	(SI)
► 2	(2)	BBC Model B	£399	(AC)
► 3	(3)	Sinclair ZX81	£40	(SI)
▲ 4	(6)	Atari 400	£150	(AT)
▼ 5	(4)	Oric 1	£100	(OR)
▼ 6	(5)	Dragon 32	£200	(DR)
▲ 7	(9)	Vic 20	£170	(CO)
▲ 8	(10)	Atari 800	£300	(AT)
▲ 9	(13)	Texas TI 99	£150	(TE)
▼ 10	(7)	Lynx 48	£225	(CA)
▼ 11	(8)	Newbrain A	£228	(GR)
▼ 12	(11)	Epson HX20	£472	(EP)
▲ 13	(14)	Colour Genie	£224	(LO)
▲ 14	(18)	Jupiter Ace	£90	(JU)
▲ 15	(16)	Commodore 64	£345	(CO)
▼ 16	(12)	Sharpe MZ80 A	£549	(SH)
▲ 17	(19)	Apple II E	£969	(AP)
▼ 18	(17)	Sharp PC 1500	£170	(SH)
▲ 19	(—)	Tandy Colour	£240	(TA)
▲ 20	(—)	Sord M5	£218	(SO)

Top Ten over £1,000

► 1	(1)	Osborne 1	£1,581	(OS)
► 2	(2)	Sirius 1	£2,754	(ACT)
▲ 3	(4)	IBM PC	£2,392	(IBM)
▼ 4	(3)	Apple III	£2,780	(AP)
▲ 5	(8)	HP 86A	£1,541	(HP)
▼ 6	(5)	Commodore 8032	£1,129	(CO)
▲ 7	(9)	Sanyo MBC 1000	£1,195	(SA)
▲ 8	(10)	DEC Rainbow	£2,714	(DEC)
▲ 9	(—)	Televideo TS 800	£1,495	(CCS)
▼ 10	(7)	Superbrain II	£2,070	(IC)

AC Acorn Computers. **ACT** — ACT Sirius. **AP** — Apple Computers. **AT** — Atari International. **CA** — Camputers. **CCS** — Colt Computer Systems. **CO** — Commodore. **DEC** — Digital **DR** — Dragon Data. **EP** — Epson. **GR** — Grundy Business. **HP** — Hewlett-Packard. **IBM** — IBM. **IC** — Icarus Computers. **JU** — Jupiter Cantab. **LO** — Lowe Electronics. **LL** — Lucas Logic. **OL** — Olivetti. **OR** — Oric. **OS** — Osborne Computers Corporation. **SA** — Sanyo. **SH** — Sharp. **SI** — Sinclair. **SO** — Sord. **TA** — Tandy. **TE** — Texas Instruments.



DESPITE what we say, we come not to bury IBM but to praise them.

We think they make fine machines.

And they're probably the most well-known computer manufacturer you've ever heard of.

So rather than just ask you to compare our CAL personal computer with just anyone's personal computer, we'd like you to compare it with IBM's. (Plus the new DEC machine and the Sirius too, if you like).

Why?

Pure self interest. Our self interest and your self interest.

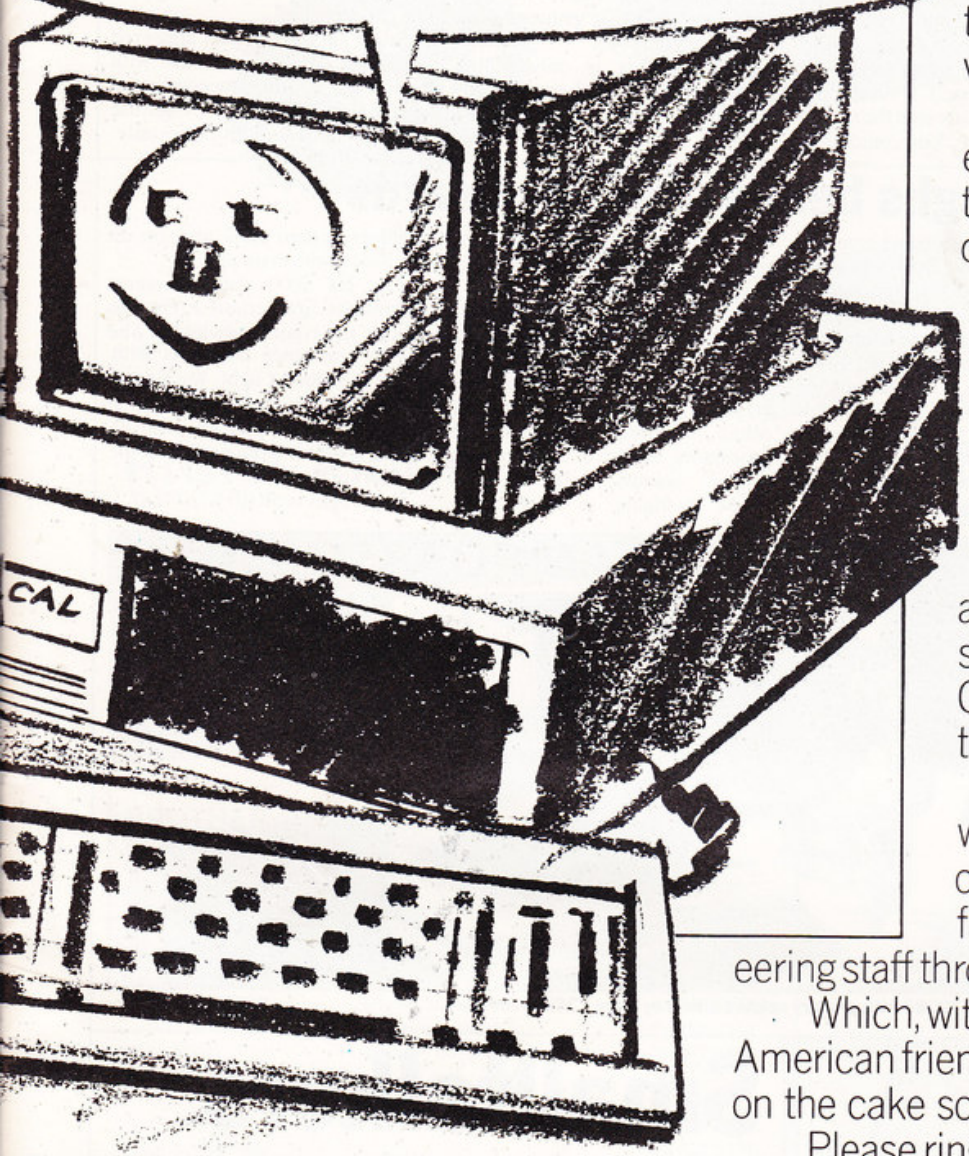
To begin with, price is a big plus for the CAL personal computer. In general, we work out about 33% less expensive.

But price is only a small part of the story.

The CAL personal computer can take 8 bit and 16 bit software.

The keyboard is identical to the

"BET YOU WISH YOU WERE BRITISH, ALMOST 33% LESS EXPENSIVE, HAD 8 AND 16 BIT PROCESSORS WITH FULL MULTI-USER CAPABILITY."



IBM PC. Very easy to use. A detached 71 key unit.

When it comes to languages the CAL PC features Basic, Cobol, Fortran, Pascal and Multi User Microcobol.

The CAL gives you two 400K floppy discs as standard. Plus an inbuilt 5MB, 10MB, 15MB or 20MB hard disc.

The CAL PC has RS 232, Centronics or the option of RS 422 ports.

For operating systems the CAL can have CP/M,* CP/M 86,* MS-DOS* and BOS.*

Using the BOS* system, CAL's personal computer can operate as a multi-terminal system with remote visual display units.

Depending on your experience so far, some of this will sound impressive, or some of it will sound like gobbledygook.

In either instance we'll be only too happy to tell you more.

The CAL PC is the latest product to emerge from Computer Ancillaries: a British company that's successfully produced the CALtext word processor and the Durango computer range.

As a British company, we offer a fully established on-site service and support facility from our own engineering staff throughout the UK and Eire.

Which, with all due respect to our American friends, tends to put the icing on the cake so far as you're concerned.

Please ring or write now for further information.

*CP/M is a trademark of Digital Research Inc. *CP/M86 is a trademark of Digital Research Inc. *MS-DOS is a trademark of Microsoft *BOS is a trademark of MPSL

PCN/16/6

☐ Please send me further information on the CAL PC.

☐ I am a dealer and would like more details. My current main line product is

Name _____ Position _____

Company _____

Address _____

_____ Tel. No. _____

Computer Ancillaries Limited
64 High Street, Egham, Surrey TW20 9EY.
Tel: (0784) 36455.

Rival for Husky

A go-anywhere portable with the promising name of Nomad has been launched for those of you needing a micro in a tough environment.

Made by Immediate Business Systems (IBS), Milton Keynes, it will compete with the Husky, made by DVW Electronics of Coventry. This portable sells at £3,445 for the 144K version and £2,051 for the 32K.

Nomad, however, offers a whacking 256K of memory for £3,600. David Viewing, managing director of DVW, said his company planned an upgrade of the Husky later this year, but would not elaborate.

Describing the Husky, he said: 'It's designed so that anyone can use it, in any situation or environment.'

It has a better screen display — four lines of 32 characters, as opposed to Nomad's two lines of 40 characters, and is for inexperienced users.

For the Nomad you would need to use the MBasic 80 Programming language to write programs.

David Thomsett, marketing manager of IBS, stressed the robust nature of Nomad: 'You could drop it in a bucket of water and it would still work.'

Nomad comes in a 64K version for £2,570, but a price for the 128K version is still to be decided. It weighs less than 3lbs, and is the size of a large book, measuring 10.7in wide, 7.5in deep and 2in thick. It runs off a Z80 processor and uses rechargeable batteries.

Its portability is enhanced by bubble memory.

The company is only selling direct at present and can be contacted in Milton Keynes on 0908 568192.

Dual bases

Two new database packages for Commodore users are now in the shops.

Superbase from Precision Software is a £517 database management system for the Commodore 700 Series, and this version will interface with Superscript 11, a word processor which includes a spelling checker and calculator.

The version for the Commodore 64, costing £115, will interface with Easyscript and Easyspell, the Commodore word processor and spelling checker.

Super Office has also appeared this week. It is a database with integrated word processor and spelling checker at £127.50 for use on the Commodore 700 Series only.

Snakes and ladders

The Johnny-come-latelies in the PC business are about to sweep aside some of its pioneers, and it looks like a triumph for business over the home user.

A report from market research company Intelligent Electronics Europe forecasts that IBM, DEC, Hewlett-Packard and Olivetti will take large market shares away from companies such as Apple, Tandy, Commodore and Osborne this year.

Figures are based on the West European market, and Victor, maker of the Sirius, is the only new computer company expected to increase its share.

Apple's present share of 18 per cent is expected to fall to 11 per cent within the year, with Commodore crashing to 9 from 17 per cent. Olivetti meanwhile is expected to jump from 4.5 to 8, and Sirius from 3 to 6 per cent.

Tandy's market share should fall from 12 to 9, and IBM should breeze in with 13 per cent, knocking all its main competitors for six.

The West European market will quadruple to $3,600m by 1988.

Burroughs bends over backwards

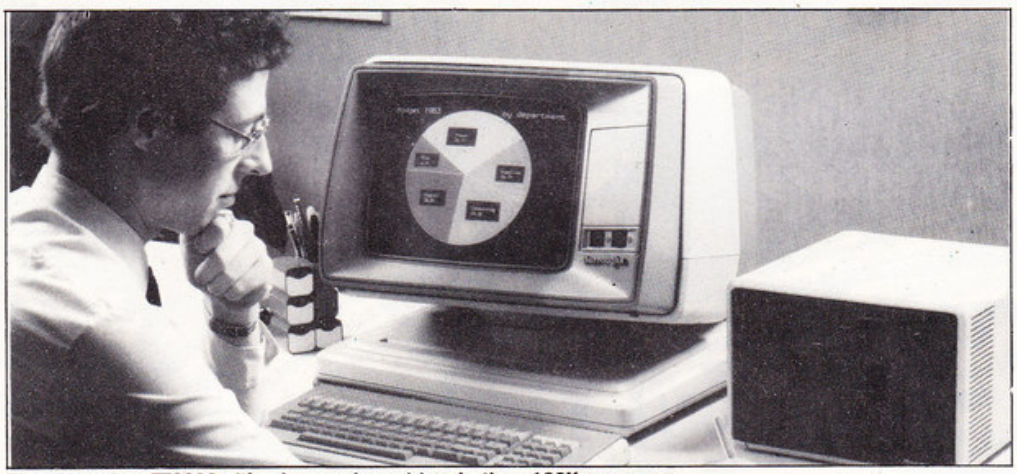
Your entry into personal computing if you work for a Burroughs user could be the ET 2000, launched by the US manufacturer last week. But you'll have to persuade somebody to part with a tidy sum to get one.

The ET (Ergonomic Terminal) 2000 is an 8086, MSDOS system with 256K of RAM — prices start at £3,500. You get a choice of disk drives — either the IBM-compatible 160K floppies or the dual 800K variety. The 2000 supports four drives, giving it a maximum on-line capacity of 3.2Mb.

Burroughs is starting off with two models, the 2100 monochrome machine and the 2200 with eight colours. It has also introduced a graphics processor which, for the colour machine, includes three processors to drive each of the primary colours, with 128K of RAM available to each. The graphics system slots underneath the base of the main unit.

The ET 2000 also represents Burroughs' first serious attempt to placate the ergonomics lobby. The CRT's luminance conforms with levels of ambient light, the screen swivels and tilts, and the detachable keyboard has sculpted keys with all manner of attention paid to the comfort of the user.

Burroughs is on (01)-750 1287.



The eight-colour ET2200 with primary colours driven by three 128K processors.

TAPE TRAVEL — Portability is a matter or opinion when systems weighing 28lbs or more are sold with handles on them. But for the handheld systems the problem is not so much weight as the equipment that you have to carry around with them. This is where Olympus hopes to make an impression with its microcassette recorder, the Pearlcorder C100, which costs about £55. It uses the kind of cassettes executives dictate into — they run for 15 minutes a side, which should be enough for most programs. It weighs just 10oz with batteries, and its phase reverse control makes it usable on most micros. Olympus is on (01)-253 2772.

Smalltalkers

Smalltalk, the mouse-driven operating environment that inspired the Lisa and VisiOn, has been launched on the Basis 200 series. It costs £454.

The Basis is a German-built Z80-based micro that can be expanded to a 16-bit system using plug-in processor cards which offer a choice of 68000, Z8000 or 8086 chips. The machine is distributed in this country by BCD Systems, which has sold the micro mainly to universities and technical institutions.

According to BCD's sales director Douglas Shankland, you would need a minimum of 1Mb of RAM to run Smalltalk. 'This can be done by plugging in four 256K RAM cards. We hope soon to be able to offer a RAM card with 1Mb on it,' he said.

The company is also re-launching the Basis 108, a twin-processor system that runs CP/M Plus and is compatible with Apple II hardware and software.

It features 6502 and Z80 processors and comes with a minimum of 128K of RAM. It has been available in this country in small numbers but BCD Systems is now setting up a dealer network to sell it retail. It will sell for £1,708 without disks. A twin disk system will cost £2,582.

BCD Systems is on (0892) 45266.

■ Apple systems get their fair share of Smalltalk implementations — Asolo of Basingstoke also has one.

THE BROTHERS BROTHER

WP PRINTER

HR15

RIGHT PRICE — **UNDER £550 RETAIL**

RIGHT PERFORMANCE — **13 CPS, CARTRIDGE DAISY WHEEL & RIBBON, 2 COLOUR PRINTING, PROPORTIONAL SPACING, GRAPHICS ETC.**

RIGHT OPTIONS — **SINGLE SHEET FEED, TRACTORS SERIAL/PARALLEL INTERFACES**

BROTHER DEALERS:

London WC2	Digitus Ltd.	01 379 6968
London WC1	Bonsai Ltd.	01 580 0902
London EC1	City Computer Centre	01 588 5537
London South	The Lyndon Co.	01 788 1234
London South East	Bennett Electronics	01 692 4941
London South West	Twickenham Computer Centre	01 892 7896
London West	Interlex Ltd.	01 943 0968
London North	Lion House Retail	01 580 7383
North Middx	Davinchi Computers	01 952 0526
Wildings Office Equipment Group:		
Ilford		01 514 1525
Holborn WC1		01 405 8052
Moorgate EC2		01 628 0501
Buckinghamshire	Christie Computers	0494 775999
Buckinghamshire	Fraser Associates	0280 816087
Berkshire	Computer 100	0734 584545
Oxfordshire	4B Microcomputers	0295 67551
Thames Valley	Bits and Bytes	06285 26535
South East	Amplicon Micro Systems Ltd	0273 608331
East Anglia	Anglia Computer Centre	0603 667031
Essex	Essex Computer Centre	0245 358702
South	Brian Bass Ltd.	02514 23900
Kent/East Sussex	Crown Business Centre Ltd.	0323 20496
Hampshire	Basingstoke Computer Centre	0256 52203
Avon	Data Link Ltd.	0272 213427
South West	Southern Computer Systems and Services	0803 212957
South Wales	Penny Computer Systems	04465 4539
North Wales	Technologic Ltd.	0978 263618
South Midlands	Daventry Computer Centre	03272 78058
East Midlands	Leicester Typewriters	0533 24848
Birmingham	Q-Com Systems	021 622 7165
North Midlands	Skytronics Ltd.	0602 781742
Manchester	Doxiver Ltd.	061 962 9418
Merseyside & North Lancs	Agri-Plan Computer Systems	0774 733714
South Yorks	Intac Ltd.	0709 547179
West Yorks	Leeds Computer Centre	0532 458877
North East	Microcomputing Ltd.	0632 476018
Scotland East	Computer Services Scotland	0592 773710
Scotland West	Sculthorps Ltd.	06285 26535

UK DISTRIBUTOR

THAME SYSTEMS LTD.

TELEPHONE: 084 421 5471
TELEX: 837508
THAME PARK INDUSTRIAL ESTATE
THAME, OXON OX9 3RS

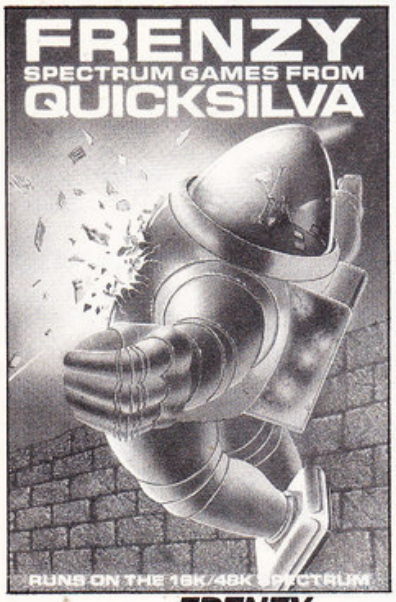
COMPUTER NETWORKS – Ungermann-Bass
MICROCOMPUTERS – Rair, Onyx, Zilog
GRAPHICS SYSTEMS – Terak
DISK PRODUCTS – Adaptec, Archive, Heurikon, NEC, Quantum, SMS
PERIPHERALS – Axiom, Brother, Hazeltine, NEC, Toshiba

SAVE £1

PCN SPECIAL OFFER

SAVE MONEY ON SPECTRUM GAMES

Here's your chance to save £1 on one of five top Spectrum games from ***John Menzies.***



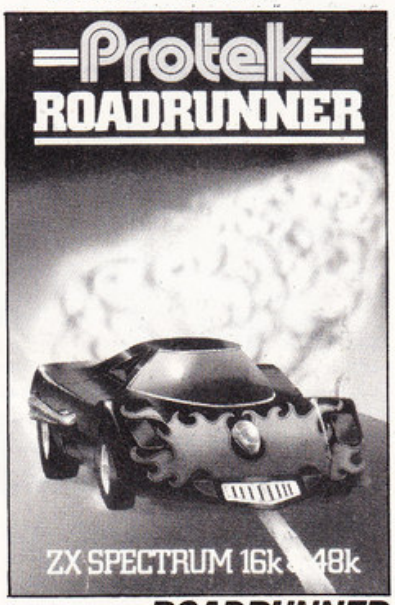
FRENZY
from Quicksilva
~~£4.95~~ **£3.95**

ASTRO BLASTER
from Quicksilva
~~£4.95~~ **£3.95**

3D DESERT PATROL
from Computer Rentals
~~£4.95~~ **£3.95**

Just cut out and keep the coupon below together with those in the next three issues. When you've collected all four take them to a branch of John Menzies with a computer department and claim your £1 off any one of the top five cassettes pictured here. That's all you have to do! But remember, don't delay. This offer closes on July 30, 1983.

THE BLACK HOLE
from Quest
~~£5.49~~ **£4.49**



ROADRUNNER
from Protek
~~£5.95~~ **£4.95**

To get PCN every week, send off the subscription card in this week's issue. Don't miss this offer because your newsagent has sold out!

John Menzies

This *PCN* special offer is available only at John Menzies stores with a computer department. No part value will be accepted, and the coupons cannot be used for discount on other lines.

Offer closes on July 30, 1983

PCN SPECIAL OFFER

SPECIAL OFFER

Instant Technology (INTEC)

10 REGENT STREET, SUTTON-IN-ASHFIELD, NOTTS NG17 2EH. 0623 554416

COLOUR T/V's

£89.95! Including door-to-door delivery (mainland UK)

These are used televisions, carrying a full 90-day, parts and labour warranty.

PLUS!

14 DAY MONEY BACK GUARANTEE IF FOR ANY REASON YOU ARE NOT SATISFIED. SIMPLY RETURN TO US FOR YOUR MONEY BACK.

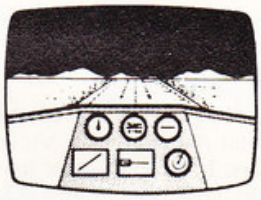
We reserve the right to substitute models and size, subject to availability.

Offer closes on the 30th September, 1983. Any orders received on or before that date will be despatched at the special offer price.

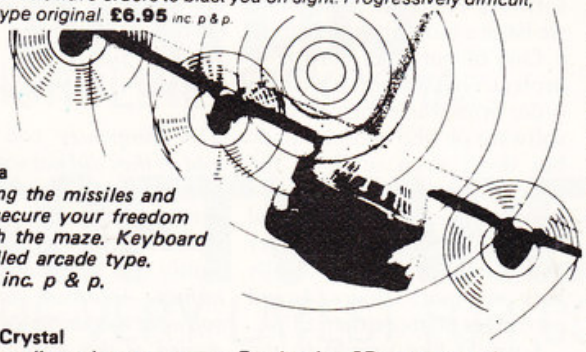
Make your cheque or postal order payable to "INTEC". Alternatively you may order through our unique scheme. Simply phone your order and promise to pay by cash or cheque on delivery.
All orders will be processed the same day and delivered within 5 working days. In most cases the next day. Phone any convenient time seven days a week.

NEW! 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** *inc. p & p.*



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** *inc. p & p.*



Amazea
Avoiding the missiles and skulls, secure your freedom through the maze. Keyboard controlled arcade type.
£4.95 *inc. p & p.*

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** *inc. p & p.*

Romany Oracle
Your own private gypsy, this programme uses exactly the established method of card fortune telling and gives present and future readings from interpretation of the cards and combinations of them. **£6.95** *inc. p & p.*

Original programmes required, cash or percentage terms.

DRAGON 32 Cassettes

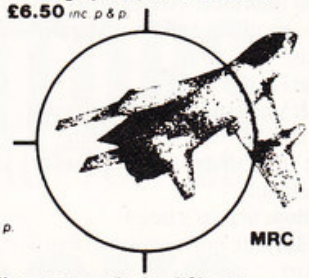
MRC
Air combat and ground strike, "joystick" controlled sights cannon fire and bomb release. Full colour, Hi-res graphics, 3D and sound.
£6.50 *inc. p & p.*

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** *inc. p & p.*

Look and Learn
Educational picture recognition. Hi-res graphics, text and colour. Age 3–10yrs. **£4.95** *inc. p & p.*

Pontoon
Super Hi-res graphics, full colour definition and card display. Fascinating, absorbing. **£4.95** *inc. p & p.*

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 *inc. p & p.*



MRC

Missile Command
City defense from attacking missiles, progressively difficult. Arcade type. **£4.95** *inc. p & p.*

Graphics Demonstrator
3D rotation, drawing with joystick, approx. 50 examples of Dragon's impressive graphics. **£4.95** *inc. p & p.*

QUARK DATA P.O. BOX 61, Swindon, Wilts. Tel. (0793) 40661.
Please supply . . . . . .
. . . . . .
. . . . . .
Cheque for total amount enclosed . . . . . .
Name . . . . . .
Address . . . . . .
. . . . . .

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

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.

Jargon for the jaded

I am writing to express sympathy with Mr Furness in his confusion over the meaning of the many abbreviated terms that make up computer and programming jargon (*PCN, Random Access, issue 13*).

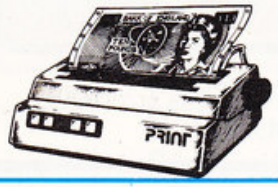
Until the advent of the more enlightened computer mags such as *PCN*, which endeavours to explain such matters, I could only guess at the meaning of many terms and have ended up with an alternative glossary which may be of interest.

Some examples are listed below.

Centronics: American method of making money from electronics.
CMOS: Second son of Amos.
ASCII: Son of Arthur.
Serial interface: Adaptor to enable good reception of Crossroads.
Poke: (censored).
Pixel: Very small creature living at the bottom of the garden.
Bus: Noise made by the Sinclair Spectrum.
RAMtop: Sheep's head.
RS232: Inferior version of Ford Escort.
Z80: Japanese motorbike.
LLIST: Name of Welsh composer.
16K: 8K if you're lucky.
48K: 16K Oric.
Baud: State of person after too much computer jargon.
Baud rate: Time it takes to achieve above state.
Floppy disk: Hard disk left in the sun.
Twin floppies: (censored).
Flip-flop: Action of twin floppies.
Basic: Complicated.
CP/M: Confuses People Most.

I'm sure *PCN* readers will add to this list.
John Reynolds,
North Anston, Sheffield.

PCN £10 Star Letter



Soft seduction

It is becoming increasingly apparent that games software is not being bought for the fact that it is good or enjoyable but because it has a pretty front inlay.

I bought two cassettes. One was poor but with a lovely picture on the front and the other was an excellent flicker-free game with sound and colour with a poor drawing on the front inlay.

Is it to be that only artists will be able to sell software in the future? I know a lot of people agree with me. So with your reviews print more pictures of the games.
Robert Newton,
Littlehampton, W Sussex.

We print full tests of the software so you're not wrongly influenced by the packaging. We do show pictures of what's on the screen rather than an artistic and possibly unrealistic interpretation of it. Like books, you can't judge the package by its cover, good or bad — Ed.

All aboard the Qwerty

Jan Allan's comments, *PCN, issue 12*, rather hit the nail on the head regarding the qwerty keyboards. What, really, is the advantage of more 'ergonomic' (and I use the word very loosely) keyboards that allow typists to exceed all known records on the qwerty arrangement when such speed is seldom required or even desirable?

My own speed is that of copy typing which is, arguably, the most difficult at which to attain high speeds (no looking down at the keyboard . . . see?), however my own tested speed at a VDU terminal exceeds 100 words per minute. Do we really want to go so very much faster? I think not.

The keyboard should follow the standard qwerty layout that is known internationally and by millions of keyboard operators throughout the world.

Apart from the standard layout, any idiosyncrasies of the main equipment should be catered for by specialist keys.

Whilst on my soapbox, I would like to say a few words to all those 'my machine is the best' microcomputer enthusiasts. Yes my friends, your machine is the best, as far as you are concerned. But what about the rest of us?

My previous micro was a Sharp MZ80K. I still feel that it is one of the most flexible systems around. However, being a typist I just could not get on with the keyboard. So I sold it.

When looking for my next micro I thought long and hard about what I really wanted to do and eventually bought an Osborne-1, no colour, limited graphics, a ridiculously small screen, but everything else that I wanted. When I do want to use colour, graphics, sound, joysticks etc. I merely take out my ZX Spectrum.

So you see, I have two machines which are 'the best around', but remember that 'best' is from my viewpoint just as your version of 'best' would be from yours.

So please, can we just stop padding out the letters pages with all this correspondence and lets see something else?
D A Thompson
Dartford, Kent

No padding intended (or needed), but due to popular demand, the 'mine's best' series has been discontinued — Ed.

Software satisfaction from a library

I am writing to tell you about the National Association of Video Owners. It has existed for four months now. We offer members use of software library, software exchange service and we issue a monthly newsletter.

One of our chief aims is to protect Vic20 owners from mail order firms who either sell poor software or who accept money but don't even send on the goods. One of our goals is also to encourage a downward trend in software prices. We consider that cassettes should ideally cost no more than £4 and cartridges no more than £15.

I would like to add to the software libraries debate. The majority of people who join our club do so to use our library. Even if software houses do protect their software by locking programs so that home users cannot copy them, libraries will still proliferate.

There are several reasons for this. One is that many users buy software from shops without testing them, with the result that many customers are dissatisfied. Since shops refuse to exchange software the user is stuck with a tape which is of no use to anyone.

Having sent out questionnaires to my members asking them about software, I can tell you that 70 per cent of them get fed up with a game after two weeks. It therefore makes great sense to join a software library.
S N Tomanek,
Silverdale,
Nottingham

Disk disappointment with my BBC

I have just bought a disk system for my BBC and am disappointed to find that most of my commercial tapes — the long ones that I really need the disk system for — could not be saved as the companies that market them (mainly Acornsoft, Bug Byte and Program Power) have made it extremely difficult to break in to the programs in question.

They do not, as they could, offer an optional service which would allow people to return their copies of the programs on tape and for the company to return them on a disk for a small fee.

I am also disappointed in the lack of commercially available software (apart from adventures) on disk. Surely these big companies can record their programs on disk — they do have turnovers of many billions of pounds, and there are quite a few of us disk system users out here.
Alistair Lindsay,
Frodsham, Warrington

The companies you mention told us they did not want people to copy their software (even for personal use) and would not offer a copying service because it would cost too much time and money. Acornsoft said that its software was designed not to be copied as this would break its copyright. Bug Byte said it tries to make its software as copy-proof as possible, while Program Power said it did not put dongles into its programs to make them uncopiable. You should, with effort, be able to work out how to copy a program onto disk. But the company's not going to tell you how! — Ed.

PHONE
0533
532991

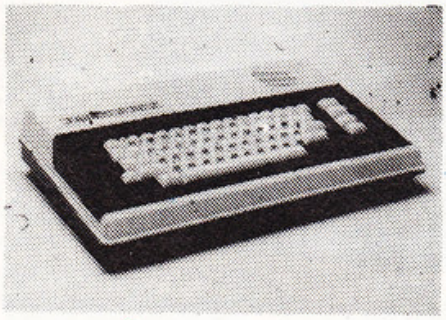
OPEN
MON-FRI
9.30-5.30

ARCADE COMPUTERS

37 & 38
Second Floor
The Silver Arcade
Leicester
★ Computing Specialists ★
We are stockists of the fabulous . . .

COLOUR GENIE!

THIS EXCEPTIONAL MICRO FOR
£194



★ SEND FOR FREE COLOUR BROCHURE ★

— ALSO —

ORIC-1 48k £169.95

PRINTERS
MICROLINE, SIEKOSHA

MONITORS
PRINCE, CROFTON, etc

SOFTWARE & BOOKS
THE VERY LATEST FOR COLOUR GENIE, ORIC 24,
BBC, VIC20, VIC64, SPECTRUM, DRAGON32

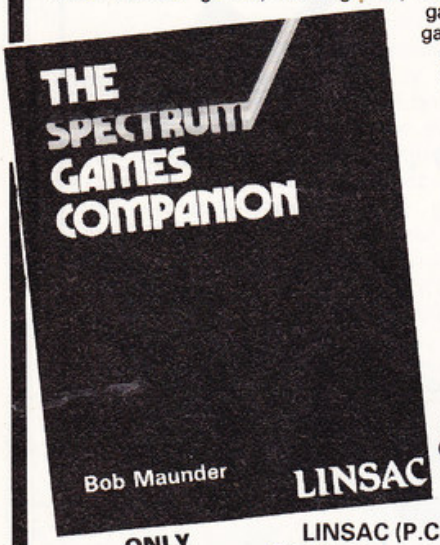
MAIL ORDER-
WE MAIL ORDER - *FAST!*
PHONE FOR DETAILS.

Linsac's ZX Companion series has received excellent press reviews:

"Far and away the best" — *Your Computer*

Thoughtfully written, detailed and illustrated with meaningful programs ... outstandingly useful" — *EZUG*

'The Spectrum Games Companion' is the latest addition to the series and is aimed at the games player and programmer alike. Twenty-one games designed specifically for the ZX Spectrum are included, with clear instructions on entry and play. Each program is explained fully with complete details on how it is designed and written. Introductory chapters show how to set up and use the Spectrum and how to create your own games. Later sections cover number games, word games, board games, simulation games, dice games, card games and grid games. If you want to enjoy your ZX Spectrum and learn its secrets at the same time then this is the book for you!



Bob Maunder is co-author of 'The ZX80 Companion' and author of 'The ZX81 Companion'. He is a Senior Lecturer in Computer Science at Teesside Polytechnic, holds an MSc degree in Computer Science, and is a Member of the British Computer Society.

The Spectrum Games Companion is available from good book shops, or send £5.95 to:

LINSAC (P.C.N.) 68 Barker Road, Middlesbrough, Cleveland TS5 5ES

ONLY £5.95

Postage is free within the U.K. — add £1 for Europe or £2.50 outside Europe.

ISBN 0 907211 02 X

REPRINT SERVICE

If you are interested in a particular article or advertisement in Personal Computer News, you might like to take advantage of our special Reprint Service. Let our high quality reprints provide an attractive and impressive addition to your portfolio of promotional material.

For further details and a quotation, give us a call today.

Ring

Robert Buggs

on

01-636 6890

PERSONAL COMPUTER NEWS

MAKE YOUR SPECTRUM WORK FOR YOU!

Connect to professional printers with this Centronics interface.

£39.95 inc.VAT

ZX Lprint interface will enable your Spectrum computer (16 or 48K) to print on any dot matrix or daisywheel printer with 'Centronics' input (e.g. Seikosha, all Epsons, Star, Shinwa, Oki Microline and many others). Just plug ZX Lprint in and LPRINT and LLIST commands will work. And because NO additional software is needed all of your RAM is free to take professional word processing programmes such as Tasword 2.
High resolution screen dump can be done on many printers using optional 'COPY' software.

- ●WORD PROCESSING
- ●HIGH RESOLUTION GRAPHICS PRINTING
- ●SPREAD SHEET PRINTOUT
- ●ADDRESS LABELS AND ENVELOPES
- ●CORRESPONDENCE ●PROGRAM LISTINGS

EUROELECTRONICS

26 Clarence Square, Cheltenham, Glos, GL50 2JP

ORDER: To EUROELECTRONICS, 26 Clarence Square, Cheltenham, Glos. GL50 2JP Tel: (0242) 582009

From: Name: _____

Address: _____

_____

This order is for: (Quantity)

ZX LPRINT interface at £39.95 _____

Interconnecting Cable at £11.95 _____

COPY software at £5.00 _____

Please specify make of your printer _____

_____

Cheques/PO payable to EUROELECTRONICS please. Amount £ _____ Please add £1.45 p&p.

BACK ISSUES SERVICE

FILL THE GAPS IN YOUR PCN COLLECTION

Issue 1, March 11-18.
Pro-Tests: Apple's Lisa, Texet TX8000; Spectrum speech synthesiser, Apple printer, Commodore network; 3D on Spectrum, graphs package for Apple and IBM, BBC graphics system.
Features: computer chess, Occam parallel processing language, Victor/Sirius function keys.
ProgramCards: Towers of Bramah (Pascal), Biorhythm (Apple II), Roman Year (Apple II), Shape Utility (Apple II).
Gameplay: Darts, Soccer (Atari); Castle of Riddles (BBC Model B); Pimania (Spectrum); Flight Simulator (IBM PC).
Databasics: micros and peripherals.

Issue 2, March 18-25.
Pro-Tests: Toshiba T100, Casio PB100, ZX81/Basicare, Vic speech synthesiser, Spectrum spreadsheet, IBM graphics, BBC word processing.
Features: Colecovision, micro backgammon, nursery computing.
Gameplay: Ultima II (Apple), Trader (ZX81), Starquest (Vic 20), Hungry Horace (Spectrum).
ProgramCards: String editor (Spectrum), Analogue Clock (BBC Model B), Chart generator (Spectrum), String extract/replace.
Databasics: full software listings.

Issue 3, March 25-April 1.
Pro-Tests: TI Professional, Apple speech synthesiser, Facit 410 printer, IBM keyboards, Petspeed compiler, Sirius toolkit, Dragoncalc.
Features: Atom upgrade, Lynx programming, Apple music.
Gameplay: Mangrove (Vic 20), Mutant Herd (Vic 20), Compendium (Dragon), Patience (Spectrum), Noughts and Crosses (Dragon), Great Britain Ltd (Spectrum), Ulysses (IBM PC).
ProgramCards: Magnify (Spectrum), Spider (Vic 20), Firing Range (BBC).
Databasics: micros.
Micropaedia: Anatomy of the BBC, part 3.

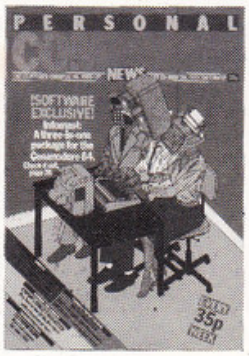
Issue 4, April 1-8.
Pro-Tests: Pied Piper Communicator, Olympia ESW3000 printer, Namal Supertalker, Commodore Calcresult, Spectrum Pascal, Cashbook (BBC).
Gameplay: Dark Crystal (Apple II), St George (Dragon), Wizard War (Dragon).
ProgramCards: Fruit Machine (C64), Tunesmith (Oric), Array Editor.
Databasics: peripherals.
Clubnet: Clubs and user groups.
Micropaedia: Go Forth, part 1.

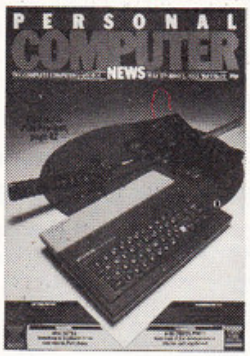
Issue 5, April 8-15.
Pro-Tests: Commodore 700, Ikon Hobbit, 1-2-3 (IBM), ZX81 machine code.
Features: speech packs, monitors.
Gameplay: Grand Prix (Dragon), Derby Day (Spectrum), Deadline (Apple).
ProgramCards: Wacky Racers (Oric), Fruit Machine (C64), Parse Integer.
Databasics: Software.
Clubnet: full list of user groups.
Micropaedia: Go Forth, part 2.

Issue 6, April 15-22.
Pro-Tests: Tycom Microframe, IBM PC, Scorpio Disks, Dragon sound module, ZX81 graphics, Bottom Line Strategist (CP/M), PaperClip word processor.
Features: IBM PC DOS, BBC word processing, PC-1251.
Gameplay: Mined Out (Spectrum), Transylvanian Tower (Spectrum), Lunar Leeper (Apple II), Evolution (Apple II).
ProgramCards: Wacky Racers (Oric), Mortgage Comparison (Sharp MZ80K), Computer Set Up (BBC), Day of Week.
Databasics: micros.
Micropaedia: Graphics, part 1.

Issue 7, April 22-29.
Pro-Tests: Mattel Aquarius, Epson FX80, Olivetti JP101, Lisp on Spectrum, Vic 20 assembler, Supergraf on Victor/Sirius.
Features: Dealer support, Atari graphics.
Gameplay: Krakit (ZX81), Cruising On Broadway (Spectrum), Kaktus (Vic 20), Fantastic Voyage (ZX81).
ProgramCards: CBM controls, Computer Set Up (BBC), Wacky Racers (Oric), Julian Dates.
Databasics: Peripherals.
Micropaedia: Graphics part 2.

Issue 8, April 29-May 6.
Pro-Tests: Atari Home Files Manager, Kobra's Vic Stat for the Vic 20, Hestacrest's Accounts for the Spectrum; Epson RX80 printer, NCR's Decision Mate V, Future Computer's FX20.
Features: Micronet, Compact programming on the TI99/4A.
Gameplay: Harvester (Vic 20), Strategic Command (Dragon 32), A first Book of Micro Rhymes (BBC), Telling the Time/Money (Spectrum).
ProgramCards: Program Indexer (BBC B), CBM Database cards 1-4, Sort/Extract.
Databasics: software.





Issue 9, May 6-13.
Pro-Tests: Structured Basic on the Apple, Pixel Power on the Vic 20; Star DP510 printer, Dams and Interpod interfaces for Commodore 64; Micro-Professor.
Features: BBC function keys, Atari word-processing part 1.
Gameplay: Dungeons of Intrigue (Oric), The Castle (Oric), Starship Command (BBC B), Dragon Trek, Nowotnik Puzzle (Spectrum).
ProgramCards: Lower case (Dragon 32), CBM database cards 5-6, Monster (Spectrum), Wildcard Search (MBasic).
Databasics: hardware.
Micropaedia: Graphics, part 4.

Issue 10, May 13-20.
Pro-Tests: Infomast on Commodore 64, Dragon Mace; MC202 and CMU800 music synthesisers (Apple), Prism directly coupled modem; Epson QX10.
Features: ZX81 graphics part 1; Atari word-processing part 2.
Gameplay: Rescue (Spectrum), Dictator (Spectrum), Roman Empire (Spectrum), Choplifter (Vic 20), Skyhawk (Vic 20).
ProgramCards: Union Jack (Lynx), Escape (Spectrum), CBM Database cards 7-9, Evaluate (MBasic), Formula (BBC B).
Databasics: peripherals.
Micropaedia: Graphics, part 5.

Issue 11, May 20-26.
Pro-Tests: BBC Vufile, PFS:File for IBM, Apple Pascal; printer comparison, Pickard Joystick Controller for ZX81 and Spectrum; C9E Computer Board.
Features: ZX81 graphics part 2, Basic on the Sharp MZ80K.
Gameplay: Motor Mania (Commodore 64), Oric Flight, BBC Music Synthesiser, Music Maker (Spectrum), Embassy Assault (Spectrum), Tobor (Spectrum).
ProgramCards: Homeward Bound (ZX81), Connect Four (Dragon 32), CBM Database, cards 10 — end.
Micropaedia: Keyboards.

Issue 12, May 27-June 2.
Pro-Tests: Spectrum word processor, PFS:Report on IBM, File Handling for Colour Genie; CTI CP80 type I printer, TG Trackball; Sord M5.
Features: Epson Basic, Oric sound part 1, Tandy Colour graphics.
Gameplay: Mad Martha (Spectrum), Frenzy (Spectrum), Headbanger (Spectrum), Oric roundup.
ProgramCards: Election Barchart (Commodore 64), Memory Utility (BBC B), Munch (Spectrum).
Databasics: Hardware.
Clubnet: clubs (Cambridge Microcomputer Club special).
Micropaedia: Disk Drives, part 1.

Issue 13, June 3-9.
Pro-Tests: Telewriter for Dragon 32, Abersoft Forth for Spectrum, GPS graphics processing system for Apple II+; joysticks, rulers; Ajile.
Features: Dragon meets Tandy, Oric music part 2, transferring Basic for Colour Genie and Genie 1.
Gameplay: Everest Ascent (Spectrum), Colour Genie roundup, Micro Maze (Jupiter Ace), Qix (Atari).
ProgramCards: Cupid (Oric), Alien (Dragon 32), Time Bomb (Atari).
Databasics: peripherals.
Micropaedia: Disk Drives, part 2.

HOW TO GET THEM

All available back copies of PCN can be ordered from our new Back Issues Service, using the coupon printed here.

For a guide to the subjects covered by Micropaedia every week, see our Micropaedia list above.

Send your orders to: Personal Computer News Back Issues Service, 53-55 Frith Street, London W1A 2HG.

To make sure of getting all your copies in future, why not fill in the tear-out subscription card in this issue.

ORDER FORM

Any one issue is 75p, additional copies 55p, post & packing inclusive. Overseas readers please add £1 per copy airmail postage. Please allow up to 21 days delivery.

Name ..... Telephone (day).....

Street .....

Town ..... Post Code.....

Please send me ..... issues of PCN, issue nos .....

I enclose my cheque/PO made payable to Personal Computer News *or* please debit my credit card: Visa/Access/Amex/Diners

Card no ..... Signature .....

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

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

Alternate characters banished from Basic

Many Oric owners seem to have had problems with large programs overwriting their alternate character set. In *Microwaves, PCN issue 12*, S W Lucas suggested frequent use of X=FRE("") to force garbage collection to avoid the problem.

A simpler and more common trick is just to set HIMEM to #97FF at the start of your programs. This puts the alternate character set just off-limits to Basic.

Many thanks to all those who pointed this out.

Disable Spectrum's BREAK Key

One of the most sought-after routines for the Spectrum is a method of disabling the BREAK key. Even though Sinclair announced it was possible to do this at the Spectrum launch, the manuals don't mention any technique.

You can do this with POKE 23613,PEEK 23730-5 to disable BREAK and POKE 23613,PEEK 23730-3 to re-enable it. If you're sure that RAMtop is in its usual place (32599 on a 16K machine and 65367 on the 48K model), you can change these POKEs to 82 and 84 respectively.

The POKE works by altering the low byte of ERR-SP, the address to which the stack is reset when an error occurs. Normally this points to a routine that terminates execution of the program, but the POKE forces it to point to a routine that continues execution.

Unfortunately, there are drawbacks to using this method . . . probably the reason Sinclair doesn't document it. It will only work 99 per cent of the time. You should really set 23614 also. You must ensure that normal error-trapping is restored before the program ends to avoid the machine resetting itself.

The POKE traps all errors except 'Nonsense in Basic'. You can pick up the error from location 23610. For example, if you divide by 0, you could check for the error with IF PEEK 23610=5 THEN . . . If you do this, POKE 23610,255 beforehand so that any previous errors are cleared. And notice that if an error occurs, the Spectrum will skip any more multistatement statements on that line.

Other dangers are a machine crash if a numeric input is answered with STOP or an undefined variable is used in an INPUT. So it's best to use INKEY$ and INPUT LINE for all your input and check any strings before using VAL$.

If anyone knows any other side effects, please write.

Robert Baker,
London SW9

Oric line restored

If you try 'Dropping Aliens' in your Oric manual, you'll find it gives you an OUT OF DATA ERROR at line 1020. All that's missing is the line 1045 RESTORE.

Nigel Grace,
Wendover, Bucks

Listings compatibility on upgraded Vics

Once you've expanded your Vic 20 with an 8K or 16K RAMpack, you may have problems using listings designed for the unexpanded machines, or Vic with 3K expansion.

To avoid this, enter the following before typing in or LOADing the program: POKE 44,32:POKE 256*32,0: POKE 36866, 150: POKE 648,30: NEW. Press RETURN then hold down the RUN/STOP key and press RESTORE.

If you're entering a listing, ignore any instructions that POKE any locations from 51 to 56. If you're loading the program from tape, ignore any random characters that appear on the screen as it loads.

A Mardlin,
Aylesbury, Bucks

Dragon/Tandy screen reverse-out

The following machine code routine (*below*) can be used to reverse the graphics screen on the Dragon. It should also work on the Tandy Color Computer.

As listed, the program inverses the first four pages of hi-res but this can be easily changed. Bytes 2 and 3 are the start address and 13 and 14, the end address of the area to be inversed.

You could combine this routine with Darren Eteo's Dragon scroll routines in *Microwaves, issue 12*. Incidentally, Mr Eteo's routines can be converted to scroll left and right by POKEing the eight byte in 'down scroll' and the sixth byte in 'up scroll' with 1.

A Edgson,
East Barnet, Herts

```
10 CLEAR 200,32699
20 DATA 142,6,0,134,255,168,132,167,132,
   48,1,140,30,0,38,243,126,180,140,246,57
30 FOR A=1 TO 21
40 READ B
50 POKE A+32699,B
60 NEXT A
70 REM DEMO SECTION
80 PMODE 3,1:SCREEN 1,1:PCLS
90 CIRCLE(50,50),40:PAINT (50,50),7,8
100 COLOR 6,7
110 LINE (100,100)-(200,150),PSET,BF
120 FOR A=1 TO 40
130 EXEC 32700
140 NEXT A
150 IF INKEY$="" THEN 150
160 END
```

Keep Dragon in the picture

It's often handy to be able to recall Dragon graphics from tape. You can do this using the CSAVEM and CLOADM and addresses gleaned from the following tables of hi-res pages.

Page	Hex Address
1	600-BFF
2	C00-11FF
3	1200-17FF
4	1800-1DFF
5	1E00-23FF
6	2400-29FF
7	2A00-2FFF
8	3000-35FF

PMODE	number of pages used
0	1
1,2	2
3,4	4

Assuming, you're starting with page 1, some examples would be CSAVEM "NAME",&H600,&HBBF,&H600 for PMODE 0; CSAVEM "NAME", &H600, &H11FF, &H600 for PMODE 1 or 2, and CSAVEM "NAME", &H600, &H1dFF, &H600 for PMODEs 3 and 4. To get your graphics back use CLOADM.

D G Rendle,
Hythe,
Southampton

Codifying the Ace cursor

Many Ace users will want to use the cursor and editing keys in their own programs. The Ace manual does not list the relevant codes for use with INKEY: All are accessed using the caps shift:

Key	Function	Code
1	Delete line	10
2	Caps lock	2
3	None	51
4	Inverse video	8
5	Cursor left	1
6	Cursor up	7
7	Cursor down	9
8	Cursor right	3
9	Graphics	4
0	Delete	5

The short routine demonstrates the use of these codes by moving an asterisk around using the arrow keys.

Ralph Lorenz,
Henley-in-Arden, Warwickshire

```
0 VARIABLE X 0 VARIABLE Y
: POINT   X @ Y @ AT 42 EMIT ;
: VERT    INKEY 7 = IF X @ 1- X ! THEN
          INKEY 9 = IF X @ 1+ X ! THEN ;
: HORIZ   INKEY 1 = IF Y @ 1- Y ! THEN
          INKEY 3 = IF Y @ 1+ Y ! THEN ;
: TEST    BEGIN 1000 0 DO LOOP X @ Y @
          AT SPACE VERT HORIZ POINT
          0 UNTIL ;

(enter TEST to run the demonstration)
```

The BBC Microcomputer Specialists

GUILDFORD COMPUTER CENTRE offers a complete range of Computers for Home, Business and Educational applications.

Large stock of additional equipment available includes:- Printers, Hard/Floppy Disc drives, Monitors etc., for most makes.

An extensive range of Business software (Accounts, Stock, Payroll, Word Processing etc.).

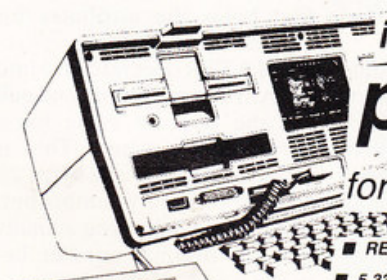
Drop in for a frank discussion and expert advice on your requirements or arrange a demonstration. We give a full and expert backup to ALL our sales.

Stockists of:- BBC/Acorn, Torch, Oric, Olivetti, Hitachi, TRS-80, Commodore, Dragon, Sharp, Sirius, Osborne, IBM, Newbrain, Epson, Seikosha, Cumana, etc.

commodore · olivetti · ACORN COMPUTER · HITACHI · TRS-80

GUILDFORD COMPUTER C·E·N·T·R·E

1 The Quadrant, Bridge Street,
Guildford, Surrey. GU1 4SG
Telephone (0483) 578848



introducing

plus16™

for the Osborne 1™

FROM £395!

- REAL 16-bit POWER.
- 5.33MHz 8088 CO-PROCESSOR.
- 64k RAM UPGRADEABLE TO 128k.
- CP/M-86 OPERATING SYSTEM RUNS A WIDE RANGE OF SOFTWARE.
- 8-bit OPERATION NOT AFFECTED.
- ASSEMBLED & TESTED.
- FITTING SERVICE AVAILABLE.

plus16 for the OSBORNE 1 with single or double density disk drives includes all necessary connectors, mounting hardware and full installation and operating instructions. Requires CP/M-86 operating system (sold separately)

SoftWare Publishers MILCOTE COTTAGE, KING'S RIDE, ASCOT, BERKSHIRE

Please send me:		Total
____ *plus16* co-processor boards with 64k RAM	£395.00	____
____ *plus16* co-processor boards with 128k RAM	£450.00	____
____ *plus16* 64k RAM upgrade kits only	£60.00	____
____ *CP/M-86* (on single-density 5¼" disk)	£95.00	____
____ *CP/M-86* Manuals (Digital Research)	£35.00	____

All prices are inclusive — *I enclose cheque for:* £ ____

☐ More *plus16* details please ☐ Tell me how I can become a *plus16* dealer

☐ Send me details of *plus16* fitting service

Name: ____ Daytime phone number: ____

Address: ____

OSBORNE 1 is a registered trademark of Osborne Computer Corporation
CP/M-86 is a registered trademark of Digital Research, Inc.

ZX SPECTRUM & ZX81 EDUCATIONAL SOFTWARE

Spectrum Junior Education **£5.50**

Use your Spectrum to help your children with their school work. This cassette contains eight attractive, easy-to-use programs for the 7 to 11 age group.

Topics include English comprehension, spellings, homophones, junior science, maths and history.

★ Entering your own questions and answers allows you to adapt two of these programs for exercises in any subject area.

★ Moving colour graphics and sound are extensively used to improve motivation.

★ Use the "draw" program to produce pictures, maps and diagrams.

Suitable for the 16K or 48K Spectrum. Program notes are supplied.

O-Level Chemistry (C1) **£5.50**

This cassette contains 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.

Professional Computer Assisted Learning materials from:

CALPAC COMPUTER SOFTWARE
108 Hermitage Woods Crescent, St Johns, Woking, Surrey GU21 1UF.

SPECTRUM JUNIOR EDUCATION J2 AVAILABLE AT THE LONDON COMPUTER FAIR EARLS COURT

ROUTINE INQUIRIES

Lost in a maze of bits and bytes, trapped in a forest of errors, or bugged by Basic? Whatever your problem, access our HELP function . . . better known as Max Phillips.

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

Soft snags and harder keys

Q I am trying to buy a home computer. I've narrowed my choice down to two — the 48K Spectrum and the 48K Oric. It seems that there is little software available for the Oric and there are problems with LOADing what is available. Is this still the case? The only thing I have against the Spectrum is its keyboard.
P Toogood,
London E12

A Like most new machines, the Oric has had a bad time with software. It is starting to appear now, but not in the quantity or quality that you can get for the Spectrum.

The fuss over LOADing problems seems to be nothing to do with the Oric itself — but to be a problem with early cassettes from Oric suppliers — it should have gone away by now.

In its current state, the Oric is a machine for experienced hobbyists rather than first timers. Besides a software shortage, it has ROM problems and a superficial manual. But it does appear to offer a better hardware spec. Great if you like that sort of thing.

The Spectrum is still the unrivalled first time computer, especially now it's a giveaway £130. The keyboard is objectionable, but have you tried it with its key-beep switched on? Show off: try POKE 23609, 100 in your local W H Smith. POKE is typed by pressing the O key. If the keyboard turns out to be a real problem, you could buy a full travel add-on and still come inside the Oric's price.

But think carefully about this. You still have to muck about with one-touch keywords if you're using Sinclair Basic.

Alternative entries

Q I own a 48K Spectrum and I am very pleased with it. The only problem is its keyboard. I know there are lots of add-on keyboards, but I want one with a proper spacebar, and where I don't have to use the keywords. Is this an impossible thing to ask?
Dieter Lott,
Bonn, West Germany

A The current batch of Spectrum keyboards have, at long last, got space bars. The Delux keyboard from Kayde Electronics on Great Yarmouth (0493) 55253 costs £45. Fuller Designs (71 Dale St, Liverpool 2) is about to launch its FDS keyboard for £39.95 plus £2.50 for post and packing.

Unfortunately, it's harder to beat the keyword system. Sinclair Basic expects keywords . . . it can't handle people typing them out character by character. So, unless someone has a big go at the Basic, you're stuck with it.

I can't see why you want to eliminate the keywords. They're not difficult to learn and you don't need them if you are writing machine code programs or word-processing . . . presumably the reasons why you want a better keyboard in the first place.

Lost in the translation

Q Recently, I purchased a Lynx, well aware of the software shortage. Is it possible to purchase cassettes for other micros and read them into the Lynx? I am prepared to modify them if I could get them into the Lynx.
Andy Scarisbrick,
Worsley, Manchester

A I've no doubt that it would be possible to read other machines' cassettes on the Lynx. But it would require a neat bit of programming to do it and, as far as I know, nobody has bothered.

It wouldn't be worth the trouble. Lynx Basic is so different from other Basics that the conversion job would be a major task. Like all programming, you'd be much better off working it all out on paper before going near the keyboard.

So if you feel like doing your own conversions, have a go with magazines and books of listings. The older the better, as you'll find simpler programs and fewer machine-dependent routines. Besides books for mainframe Basics, look at books for the PET and Tandy TRS80 model 1.

Once you've got the basics of the program converted, you can go through and add Lynx specific stuff such as sound and graphics. Apart from the hard work, you've got instant and cheap software.

Epson: a racing certainty

Q Are Epson's FX80 and RX80 as good as they say? Besides the price, what is the main difference between the two?
Arvinder S Maini,
Wembley, Middlesex

A These machines are certainly good. Most of Epson's products are. But they're not dramatically so . . . there's a surprising fuss surrounding their launch. I didn't think people cared about printers — but it looks as though the end of the MX80 has deprived the micro world of its much loved workhorse.

Like you, I have trouble telling the new beasts apart. Perhaps Epson should adopt more memorable names like the Banana from Gorilla (or vice-versa) that's available in America, and change the case colours.

For the record, the FX80 is the more expensive one at £440. Its main advantage is its faster 160 cps print speed. Remember, the F stands for faster. The RX80 is the more homely machine at around £300 and looking reassuringly like an MX80.

If you want more info, see *PCN*'s Pro-tests (*PCN* issue 7, *PCN* issue 8) for full reviews of the FX80 and RX80 respectively. If you're looking for a cheap printer, there are now hundreds of cheap alternatives.

Take a PEEK at Spectrum

Q Could you tell me where I can get a complete list of PEEK and POKE addresses for the 16K Spectrum? Could you explain the ATTR function as it is not explained in the manual?
Ian Linwood,
Dinwoodie, Lockerbie

A Not in the manual? Most things are in that manual. Try the index . . . ATTR is explained in several episodes from page 112, 116, 164 and 219. But if you couldn't understand it, let's try another way.

You'll know that each character square on the Spectrum's screen can have a PAPER colour and an INK colour. In addition it can be BRIGHT or FLASHing. These effects or properties are called attributes.

The Spectrum gets its display from two areas of memory. The Display file (locations 16384 to 22528) holds any graphics and the shapes of the characters on the screen. The memory from 22528 to 23296 (the Attributes file) holds the attributes for each character position.

All ATTR does is to dive into the Attributes memory and pull out the relevant value for a particular character. This is stored in memory as a byte . . . an eight-bit binary number but, being Basic, what you actually get is a decimal number between 0 and 255.

So ATTR lets you find out if a character at a particular position on the screen is flashing, bright and what colour it is. You could do a similar thing with PEEK but ATTR just simplifies the job.

Once you've got your ATTR value, you need to decode it to look for particular attributes. Figure 1 shows a sample ATTR value in binary. The first three bits from the right are the INK colour, the next the paper colour, and bit 6 is a one if the 20▶

```
  10 REM attribute demo
  20 CLS
  40 PRINT AT 10,12; INK 1;"PERS
ONAL";AT  12,8; INK 2;"C O M P U
 T E R";AT 14,14; INK 3;"NEWS"
  50 FOR R=10 TO 15
  60 FOR C=8 TO 22
  70 LET A=ATTR (R,C)
  80 LET A=A+1: IF A>255 THEN LE
T A=0
  90 POKE 22528+R*32+C,A
 100 NEXT C: NEXT R: GO TO 50
```

ZX attributed — see *Take a PEEK at Spectrum*

WANTED! PROGRAMMERS WITH IDEAS!

Artic Computing, the makers of Gobbleman, Galaxians, Ship of Doom, Combat Zone, Voice Chess and many other bestselling home computer games are looking for programmers with bright ideas!

Have you got the game of the decade locked away inside your head?

Could you invent another Pac.Man? Or the 1980's answer to Space Invaders?

If you can devise new games and write them into workable programs for a wide range of home computers then you could be the person we're looking for.

£££££s for Programs!

Artic will purchase your new programs as well as guarantee high royalties on all subsequent sales. If the game you devise is even moderately successful this could mean considerable earnings for you.

Unlimited technical support!

If we think your ideas have potential we will provide you with full technical support — all the hardware you need, assistance with program development and advice on how to create even more popular programmes.

All negotiations in strictest confidence. Please write to Managing Director.

Artic Computing Limited,
396 James Reckitt Avenue,
Hull, North Humberside,
HU8 0JA.

◀18

character is BRIGHT, bit 7 is a one if it's FLASHing.

You can chop up the decimal number to extract the information you need. For example suppose A = ATTR(row, column). If A is greater than 128, the character at row, column is flashing. Other tests can be derived for other information.

ATTR in itself might not seem that useful. But it's worth understanding since having a separate display and attribute memory allows you to do some fancy effects with the minimum of trouble.

Suppose you use POKE to set particular attributes prior to PRINTing and PLOTting a character. You can have colour changes all set up ready for you to whizz a spaceship across the screen. Or you could alter the colours of existing text. The demo program on page 18 should be of interest. Line 70 reads back the attribute for the current character. After messing it around, the value is POKEd back where it came from.

As for a complete list of PEEKs and POKEs on the Spectrum, I've never seen one. You should do your own. Collect all the bits and pieces in the manual, in magazines and books. Try your local club and so on.

PEEK and POKE are just simple tools. It's what people do with them that turns them into useful PEEKs and POKEs. So although there's a whole pile of standard and useful ones you can find, there will always be new ones being invented. Start collecting now . . .

Evolution of the Oric

Q I've got quite an early Oric and there are some surprising differences between it and a later model bought by a friend. I get a lot of corrupted LOADs at the 2400 baud rate and the screen flickers whenever sound is used. I've read that early Orics had EPROMs rather than ROMs and I don't know if this will be exchanged for a new ROM or not. Can you advise me?

On one occasion, a corrupted LOAD produced a listing with two words I didn't know existed in Oric Basic . . . INVERSE and NORMAL. INVERSE is also mentioned in the Oric brochure but it's not in the Oric manual.

How do you use these commands?

M Platts,
Malmesbury, Wilts

A It's hard to know where to start with this one. Early Orics do seem to have suffered from production problems, blamed on everything from power supply, modulator to the ROMs. If you can't live with faults like bad loading and a flicking picture then I'd have a got at exchanging your Oric.

Try and insist on an exchange for a new machine. This is okay if you're convinced that the faults make the machine faulty but it's likely to be quicker than sending your Oric away for repair.

You're right that early Orics are fitted with EPROMs and not ROMs. In itself this isn't a bad thing. It's just suggestive of preliminary versions of the software. Everybody else does this and switches to ROMs as soon as they're convinced the software is ready and working.

As regards a new version of the ROM (or EPROM), Oric says it has plans to do a new version. There are no details as to when or how they will be available.

INVERSE and NORMAL are harmless oddities in the ROMs. They are in the Basic's command table but appear to have been patched out. As far as I know, they are not usable.

It's easy to see how they got into your listing. A Basic program is saved in a 'tokenised' form. Each keyword is replaced with a particular number, PRINT might be 1, IF might be 2 and so on. This makes programs more compact and quicker to execute.

INVERSE and NORMAL are in the command table. So a corrupted listing might accidentally have their tokens in it. So out they pop when you LIST the program. It's only when you try to execute these instructions that the Oric finds a locked door with the message SYNTAX ERROR written on it.

If you want a quick look at the command table yourself, this short program dumps it to the screen.

```
10 CLS
20 I=49386
30 PRINT CHR$(PEEK(I));
40 IF PEEK(I)>128 THEN
   PRINT
50 I=I+1:IF I<50123 THEN
   30
60 END
```

Getting answers on the screen

Q Can you recommend a cheap but good VDU? Can you use a VDU made for a particular computer with another machine?

J Trotter,
Edinburgh

A Let's be careful about words here. VDU stands for Visual Display Unit. Many people use it to mean just a display screen . . . either a TV or monitor. Not so long ago, a VDU was a terminal to a computer . . . it had a screen and a keyboard.

If you mean just a monitor, then there are lots of units I could recommend. You gets what you pays for. If you're after a bottom end monchrome monitor then anything from the Zenith 121 upwards will do the job. If you are buying a monitor, do get it from a nearby dealer where you can see it working and get it fixed or adjusted if it ever needs it.

The signals used to drive monitors conform to various standards. It's just a question of matching signals and plugs to use one monitor off one computer with another machine.

There are only a couple of snags you might meet. Some monitors for particular computers have fixed leads with odd plugs. The monitor may take its power from the computer through these leads — it's unlikely that you'll be able to use this on other machines.

And you may find that some imported American and Japanese machines come with foreign standard monitors and won't use anything else.

Beating the Oric go-slow

Q I have written a game for the Oric and want to change it to machine code when a compiler comes out. Would I then be able to market it? If I did, would I have to pay royalties to the author of the compiler? Do you know of any compilers that will become available?

James Eibisch,
Cheltenham, Gloucestershire

A Basic compilers for 6502 machines are expensive and complex programs. You can get compilers for machines such as the Pet and Apple but they are very much disk-based products. So don't expect such a serious tool to be available for the Oric for a long while.

What you can expect are 'mock' compilers that will translate a tiny subset of Basic into machine code. Think carefully about buying one of these . . . you'll have to re-write programs in Oric Basic to get them to compile.

Reality aside, suppose you had a Basic compiler on the Oric and were selling a compiled program. Royalty payments or whatever depend solely on the company that produces the compiler. It's a matter of some debate. You've bought a tool . . . why should you have to keep paying the company whenever you use it?

So where does this leave you? With a slow Basic program. If you need speed (or flexibility) then you can't avoid learning either assembly language or possibly Forth. Don't worry. It's not that hard.

Dawning of the micro micro

Q I've got a silly question. Where did you get the little model computer that was pictured next to the Aquarius on the cover of issue 7? I know it's a silly question but I did think it was a cute model.

S Sham,
Enfield, Middlesex

A Oh dear . . . silly answer time. I suspect the fact that the model's CPU appears upside down fooled you. It's actually a model of a DEC professional with a built in digital clock. It was given away at the launch of DEC's micros in January.

I suspect DEC had the models made because it's still difficult to get hold of the real thing. It can't have been a ploy to get their name around the place because most of the models I've seen don't keep good time. A trait reflected by the deliveries of the machines themselves.

I was lucky enough to be given a working (but slow) specimen . . . I'm sure it's around my desk somewhere.

But don't be embarrassed about asking. I think it's one of the nicest freebies I've ever been given. There's only one thing I'd like more than a working example. A working specimen of the genuine article.

PASCAL FOR THE ZX SPECTRUM

Hisoft are pleased to announce the availability of Hisoft Pascal 4 for the 48K ZX SPECTRUM.

No longer do you have to put up with the slow execution speed of BASIC programs; Hisoft Pascal 4 produces programs that run between 40 and 100 (yes 100!) times faster than the equivalent programs written in ZX SPECTRUM BASIC. For example, a program to sort a 100 element array of numbers into ascending order takes 60 seconds in BASIC, while HP4 produces a program which does the same thing in 0.6 seconds!

NOW you and your children can learn to program in an efficient and structured way by using Pascal, the favoured language in schools and universities.

NOW you can write games programs etc. which run as fast as you need them to without having to resort to assembler or machine code.

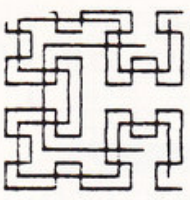
NOW you can use a language which requires minimal re-learning when you move from your SPECTRUM to another computer; Hisoft Pascal 4 has all the essential features of Standard Pascal as detailed in the Pascal User Manual and Report — by Kathleen Jensen and Niklaus Wirth, the man who designed Pascal.

Hisoft Pascal 4 is a professional piece of software designed by a team who have been writing Pascal compilers for many years — you will find it to be powerful, flexible and very easy to use.

To top it all, we are offering the package (which includes a 60 page manual), for a limited time, to 48K ZX SPECTRUM users at an INCREDIBLE price of: **ONLY £25 INCLUSIVE.**

We also have a powerful assembler, disassembler and debugger package called DEVPAC. This includes a fast assembler that allows conditional assembly and has many assembler commands, a labelling disassembler and a debugger which is very easy to use and has single step facility. The entire package comes with a forty page manual giving full details of the system and DEVPAC costs only £12.50 inclusive.

Write for more details TODAY to:



HISOFT
60 Hallam Moor
Liden SWINDON
SN3 6LS

Tel. (0793) 26616 (Answering machine)

IF OUR ADVERT DOES NOT CONVINCE YOU THE FREE PRINTOUT SAMPLE WILL.

SHINWA-CTI CP80

FULL FEATURED 80 COLUMN MATRIX PRINTER

PROBABLY THE BEST PRINTER AVAILABLE IN THE WORLD BELOW £300!!

COMPATIBLE CENTRONICS INTERFACE AND INDUSTRY STANDARD CONTROL CODES MAKES THE CP 80 IDEAL FOR:—

BBC, DRAGON, ORIC, APPLE, NEWBRAIN, SIRIUS and many more.

OPTIONAL RS232 INTERFACES AVAILABLE BOTH UNBUFFERED AND BUFFERED

Made in Japan

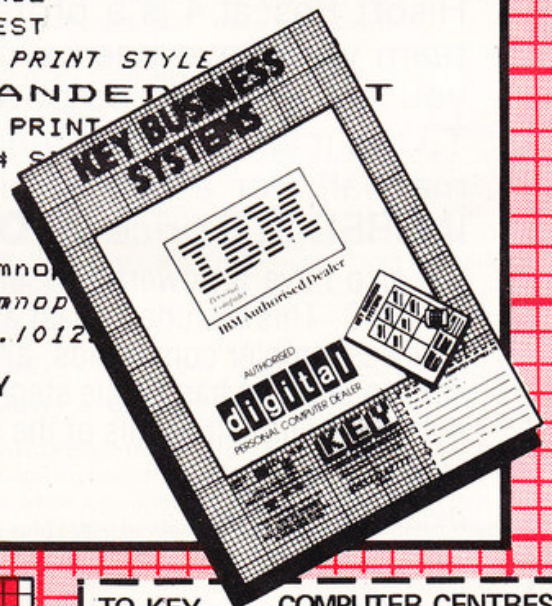
EX STOCK £289 + VAT FREE 24HR DELIVERY!

FULL ONE YEAR WARRANTY

SPECIFICATIONS

+ 80 COLUMN
+ FRICTION AND ADJUSTABLE TRACTOR FEED
+ BIDIRECTIONAL LOGIC SEEKING
+ HI-RES GRAPHICS AND BLOCK GRAPHICS
+ SUB AND SUPERSCRIPTS
+ 9 X 9 DOT MATRIX - TRUE DESCENDERS
+ CONDENSED PRINT
+ EMPHASISED PRINT
+ GRAPHICS SET -
+ AUTO UNDERLINING
+ VERTICAL AND HORIZONTAL TABS
+ BACKSPACE
+ SELF TEST
+ ITALIC PRINT STYLE
+ EXPANDED
+ DOUBLE PRINT
+ £ AND #

@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmno
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>? !"#$%&'()*+,-./012



NO DELAY! - TELEPHONE YOUR CREDIT CARD No. TODAY AND YOU CAN START PRINTING TOMORROW

- AND IF YOUR NOT SATISFIED RETURN WITHIN 14 DAYS FOR A FULL REFUND.

HAMPTON COURT — KEY — WALTON

OPEN 6 DAYS A WEEK
MON - SAT 9am to 7pm (6pm SAT)

Buy it with Access

BARCLAYCARD VISA

PRICES QUOTED EX-VAT AT 15%
H.P. FACILITIES ARRANGED
CAN BE DELIVERED WITHIN 24 HOURS FROM STOCK

KEY COMPUTER CENTRES LTD

Enterprise House 44 Terrace Road,
Walton-on-Thames, Surrey KT12 2SD

Telephone: Walton-on-Thames
(09322) 42777
(4 lines)

TO KEY COMPUTER CENTRES LTD.

Please send me FREE print out samples and literature.

Name .....

.....

Address .....

.....

.....

.....Post Code.....

David Janda makes designs on the Newbrain — with the aid of screen and printer.

Graphics in print

The Newbrain is designed for expansion. Disk drives, printer, communications modem and ROM cartridges have all been promised, and with their addition the Newbrain should form the core of a powerful system.

Grundy will be releasing a printer for the machine in the near future, but meanwhile you can connect various printers to the machine provided you have the right interface.

The Newbrain interface will be of the RS232C/V24 type, with a device number of 8. So once you have the printer set up, entering OPEN #8,8,"b" enables the printer. Here b stands for the baud rate. If your printer operates at 300 baud, enter OPEN #8,8,"300".

Grundy's machine will operate at 9600 baud, and as this is the default value, OPEN #8,8 will be sufficient for 9600.

To list or print, all that is needed is the stream number. You'll be able to list all or part of a program by entering the stream number after the LIST thus: LIST #8 or LIST #8,10-100.

It won't be possible to use TAB with the printer as TAB will act as the comma separator with zone widths of eight characters. At first this may seem like a letdown, but the print formatting characters are available and spaces can be printed. To see this, look at the following program which prints the number n, COS n, SIN n and TAN n, formatted!

```
10 PRINT "Align next page to printhead
   and press N/L"
20 INPUT (" ") Z$
30 OPEN #8,8
40 FOR a=1 TO 100
50 PRINT #8,a [3] ;"        ";
60 PRINT
   #8,COS(a)  [1.4]  ;"        ";
70 PRINT #8,SIN(a)  [1.4]  ;"        ";
80 PRINT
   #8,TAN(a)  [2.4]  ;"        "
90 IF a/20=INT(a/20) THEN PUT #8,12
100 NEXT a
110 CLOSE #8
120 PRINT "Printout complete"
130 END.
```

Lines 30 and 110 open and close the printer stream, while line 90 calculates whether 20 lines have been printed. If this is the case, a form feed is performed, and 20 lines are printed per sheet.

Graphics

The Newbrain has a comprehensive graphics package as standard, with 19 graphics commands in all. The functions range from placing a graphics cursor on a particular area of the screen to drawing axes. Our table lists the machine's graphics commands.

All the commands are preceded by PLOT, and it is possible to have more than one graphics command per line, for example:

```
PLOT RANGE (200, 100), CENTRE
   (100, 50)
```

The graphics command PEN allows the user to find out where on the screen the PEN is. This is handy because you cannot draw outside a previously defined graphics area. PEN is used to evaluate where the next pixel is to be drawn, and if it is outside the graphics area, an error trapping routine can be set up. This is very good for debugging graphical programs.

Look at the following program from the Newbrain beginner's guide. This sets up a narrow (hence 'w') area at the lower end of the screen and draws a cross-hair:

```
5 CLOSE 1
10 OPEN 0,0, "100"
20 OPEN 1,11, "n160"
30 PLOT BACKGROUND (1), WIPE
40 PLOT RANGE (200,100)
50 PLOT CENTRE (0,0)
60 PLOT PLACE (0,50), MOVE (200,50)
70 PLOT PLACE (100,100), MOVE
   (100,0)
80 END
```

Line 5 closes any streams that were open, 10 reserves some memory and line 20 OPENs a narrow screen 160 high.

Reserving areas of memory to do graphics work is a headache. To define a work area for graphics, a stream has to be opened, and sometimes this can be very complicated.

OPEN #,11,"W200" opens a stream — number 1, for device 11. A wide screen 200 graphic lines high has been selected.

Character set

The Newbrain has four character sets. This does mean that every character is different in each set — the difference is usually in the latter half. Each character set can be obtained by entering control codes directly on the screen, or by a program statement (PUT).

Not all the characters are printed, as the first 31 are control codes, and these can be used for tasks like positioning the cursor. The following program prints every printable character in all the sets:

```
10 LET a=0
20 FOR c=1 TO 8
30 READ a
40 PUT 23,a
50 FOR p=0 TO 255
60 PRINT CHR$(p);
70 NEXT p
80 NEXT c
90 DATA 65,66,67,68,72,73,74,75
100 END
```

Overall, the Newbrain is a good machine. Its processor is used throughout the micro world and it has a 'normal' Basic. The only real disappointment is that, for a compiled Basic, the machine runs slow. But the compiler is designed for saving memory rather than for speed.

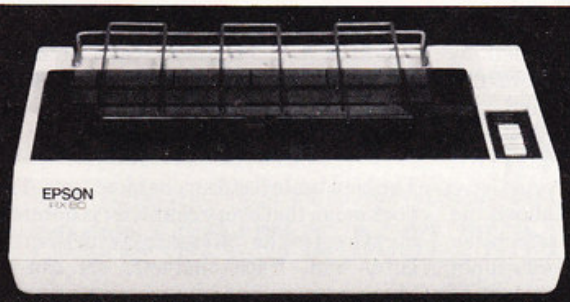
When its peripherals become available in the near future, it could well become a micro worth watching.

TABLE OF GRAPHIC COMMANDS

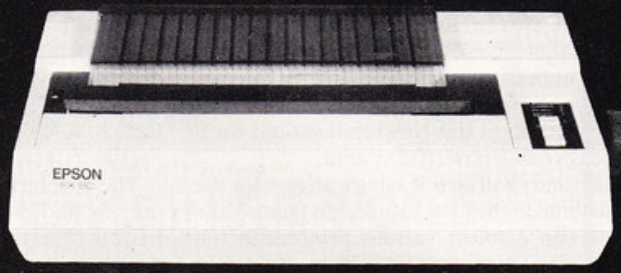
MOVE(x,y)	Moves pen to x,y. Draws as it goes.
MOVEBY(d)	Moves the pen distance d.
DRAW(x,y,c)	Draws line to x,y. Colour c.
DRAWBY(d,c)	Draws line to d.
ARC(d,o)	Used to draw circles.
PLACE(x,y)	Move pen to x,y. No drawing.
TURN(o)	Turn pen angle o.
TURNBY(o)	Turn increase by o.
RADIANS	Angles output in rads.
DEGREES	Angles output in deg.
BACKGROUND (b)	Sets background to colour b.
WIPE	Clears screen.
DOT(x,y,c)	Plot single dot.
AXES(a,b)	Draws axes crossing at current pen position.
COLOUR(c)	Sets the pen colour.
FILL	Colours the area pointed to by pen.
RANGE(a,b)	Sets the coordinate scale.
CENTRE(a,b)	Sets the origin of the coordinates.

CPS – THE PRINTER SPECIALISTS

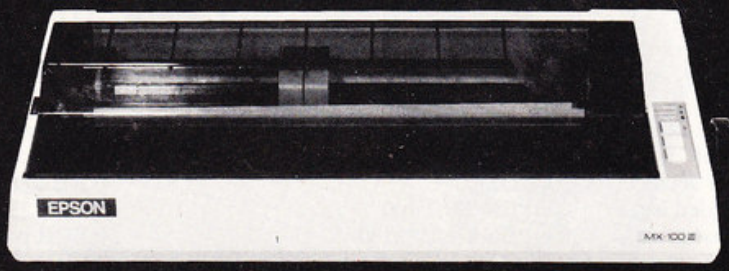
SPECIAL OFFERS ON LOW COST PRINTERS



EPSON RX80
100 cps
Dot Matrix Parallel Interface
RS 232 & IEEE Option
£270



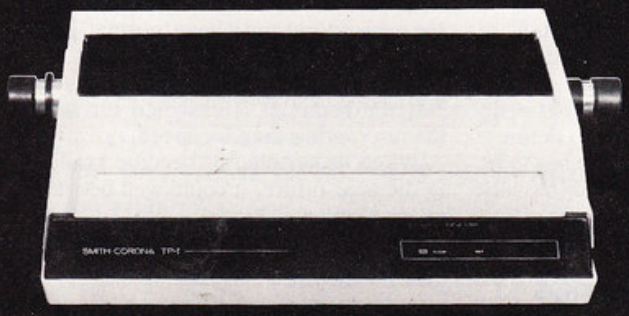
EPSON FX80
160 cps
Dot Matrix Parallel Interface
RS 232 & IEEE Option
£375



EPSON MX100
100 cps
Dot Matrix Parallel Interface
RS 232 & IEEE Option
£430

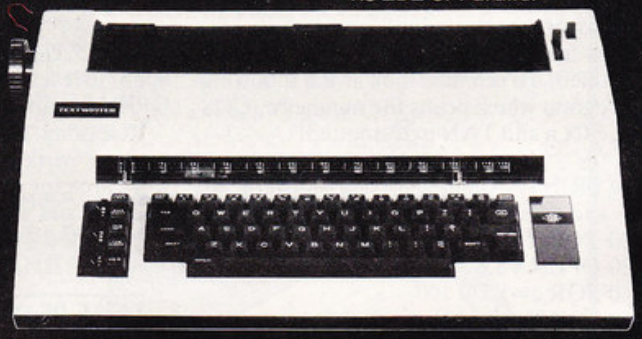
£395

SMITH CORONA TP1
Daisywheel Printer
RS 232 or Parallel



£355

TEXTWRITER
Daisywheel Typewriter/Printer
RS 232 or Parallel



NEW!

- Now available, Parallel Interfaces for you to run your VIC20, Commodore 64 or Spectrum on the famous Epson Printers **£25.00**
- Microperf Continuous Stationery on 100 gram Bonded Paper. Needs to be seen to be believed **£35.00** per 1000 sheets
- RS 232 to Parallel Converter or Parallel to RS 232 Converter **£89.00**
- Tractor Feed for Smith Corona **£99.00**

All items are excluding VAT & delivery. Normally all items are ex-stock

CPS **Computer Peripheral Supplies**
Unit 20 Stadium Way, Battle Farm Trading Est.
Reading RG3 6BX Tel: 0734 418383

Please send me further details

Name

Company

Address

Tel No

Open Sesame? Nigel Cross gives Colour Genie owners magic words they've been looking for.

The Genie's graphics in the picture

The Colour Genie is claimed by both the manufacturer and distributor to be a machine capable of 'amazing' graphics facilities. Depending upon your interpretation of the word, this may or may not be the case.

My understanding of it is that it claims to have 'surprising' graphics — this certainly seems to be the case.

Basically, the machine has two graphics modes. One is low resolution with text on a 24 lines by 40 character display. The other is high resolution, with no text, giving access to 160 points in the X direction and 96 points in the Y direction. For those unfamiliar with X, Y designations they refer to horizontal and vertical axes. These two modes are mutually exclusive in both direct and program modes.

Low resolution is the normally available and displayed text screen and is referenced within programs by the LGR command. However, should you use the high resolution screen and your program terminates, you will find the system automatically returns to the low resolution screen. Assuming that you really want to see what is on the high resolution screen then the CTRL and MOD SEL keys must be depressed. To return to low resolution press BREAK.

Low resolution allows the use of the full ASCII code range (0 to 255), selectable by the CHAR n function for one of four active character sets. The full pre-defined character set is shown in the illustration on this page.

User defined characters can be created using an 8 by 8 matrix, and are then POKEd into memory. This is similar to many other machines previously described in issues of *PCN*, and is well explained in the manual, so I shall skip this technique.

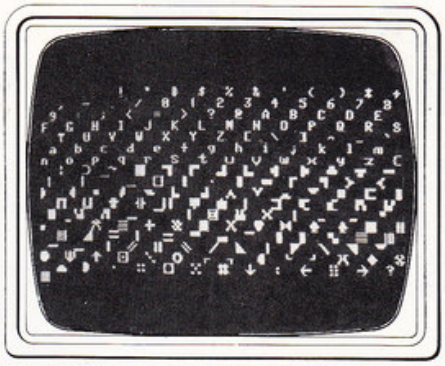
Colour

Within this mode eight colours are available referenced by the COLOUR n command, where 'n' refers to the following: 1 — white, 2 — green, 3 — red, 4 — yellow, 5 — orange, 6 — blue, 7 — cyan, 8 — magenta.

Black is, however, the only available background colour in this mode. By deft programming and careful character design it is possible to produce very effective animated graphics.

However, to turn to the high resolution mode, things become somewhat more complex and decidedly 'amazing'. Access to this mode is by the FGR command within your program, or as previously stated through the keyboard. FGR is supposed to represent Full GRaphics, but on a system such as this with only four character colours and two background colours, I feel that in this day and age it is something of a misnomer.

Starting in the background, BGRD gives an insipid pink and NBGRD returns to black — powerful! In this mode the four foreground colours are selected by the



A display of all pre-defined characters available through access to ASCII codes 0-255.

FCOLOUR n command where 'n' is: 1 — black, 2 — cyan, 3 — orange, 4 — green. The Basic manual suggests that 2 and 3 are blue and red — wrong! Clearing the screen in this mode is accomplished by the FCLS command to the currently set background colour.

However, should you want different background colours then a facility does exist to colour the background with the FILL n command. Here 'n' is the same as above, but do make sure that your foreground colours are not the same as the selected background or they will disappear.

Displays

Simple drawing of pictures or patterns is accomplished by either of two commands. The first is the PLOT X1, Y1 TO X2, Y2 ..... TO Xn, Yn command which allows a line to be drawn from point 1 to 2 to ... n in the current foreground colour. There is an associated command NPLOT ... to draw lines in the current background colour.

The second major command is CIRCLE X,Y,R where X,Y is the centre of the circle to be drawn and R is its radius. The radius can exceed the parameters of the available screen and still function without errors, a technique demonstrated in the first program in lines 20 to 50.

Unfortunately, the same does not apply to plotted lines, thus these should be restricted to the available screen area, as in lines 60 to 100 of the same program.

The second program example shows the capability of generating, rotating and reducing regular geometric shapes. The original intention of this program was to demonstrate the use of another command, the PAINT X,Y,C,B function. This command is supposed to fill a closed shape with a solid colour C, up to a selected border colour B, by defining a point within the shape, X,Y.

But this procedure proved so erratic that the function was omitted. If you would like to try it, then enter the following line in the program and watch the result.

65 PAINT X,Y, (5 – M),M

This should have produced solid rotating squares, but the display turned out to be that of slabs of colour to the right of the pattern with the occasional solid square — not quite the desired result.

I can only assume that this is due to lines of different colours falling within the boundaries of the selected shape to be filled.

Even attempts to PAINT circles with solid colours produced many erroneous displays and on occasions 'hung' the system altogether leaving the power-off as the only exit. Not the world's most efficient technique!

As a way round this problem, the third example shows a somewhat long-winded technique for PAINTing solid colours to produce a multi-hued fish design.

There are four more commands available for use in the high resolution mode pertinent to the creation and display of complex shapes. The shapes concerned have to be created by the long-winded procedure of analysing the shape and colour combinations of the desired result and POKEing the binary colour and movement values into the high end of memory such that it can be displayed afterwards.

This technique can only store one shape at a time and is so time-consuming that you should only attempt it as a last resort. Be that as it may, the commands associated with this are SCALE n — for selecting size of displayed shape; SHAPE X,Y — displays shape at X,Y; NSHAPE — undraws the shape; XSHAPE — inverts the colour of the shape drawn.

All in all, I would expect most users of this system to create their graphics using the low resolution mode as, in my opinion, high resolution has so many drawbacks and limitations that only the single-minded and dedicated have the patience, and probably skill, to make the high resolution system work well.

27 ►

BUY THE BEST

TWILLSTAR COMPUTERS

IN STOCK

BBC

BBC MOD A 299.00
BBC MOD B 399.00

DISK DRIVES
ONLY £195.00
Disk Interfaces
Business Software
Education Software
Entertainment Software

ORIC-1
THE REAL COMPUTER
SYSTEM 48K ONLY £155.00
INC VAT

BBC Software from:
Acorn Soft, Gemini, Bugbyte, IJK, Superior Software, Program Power, MP Software

Dragon 32 ONLY £195.00 INC VAT

NEW
EPSON FX80 ONLY £395 + VAT
EPSON MX100 ONLY £395 + VAT
SEIKOSHA GP 100A £185.00 + VAT
SEIKOSHA GP 250X £230.00 + VAT
CP80 £299.00 + VAT

NEW SPECIAL OFFER
Now connect a Daisywheel Typewriter/Printer to your BBC SILVER-REED EX44 ONLY £395.00 + VAT (inc. serial or parallel interface)

commodore COMPUTERS

Printer Cables, Leads, Disks, Stationery, Cassettes, Ribbons, Dust Covers and Wide Range of Software for all Computers.

COLOUR MONITORS
14" Microvitek £250.00
GREEN MONITOR
Zenith £95.00 inc VAT

COMPUTER BOOKS & ELECTRONIC MAGAZINES
SOFTWARE, HARDWARE SUPPORT/SERVICES/RENTALS

CALL IN FOR FURTHER DETAILS

TWILLSTAR COMPUTERS LTD
17 REGINA ROAD, SOUTHALL, MIDDX
TEL: 574 5271 (24 hours)
OPEN 10am-8pm SIX DAYS A WEEK

OSBORNE

BEAT THE PRICE RISE

DOUBLE DENSITY	£995
80 COLUMN D.D.	£1195
EPSON FX80	£365
DAISYWHEEL from	£425
MONITOR	£89

(Prices + VAT & Delivery)

DISCOUNTS ON 2 OR MORE

WE SPECIALISE IN OSBORNE AND WE ARE AUTHORISED MAIN DEALERS

Fraser Associates Ltd.
1 Bristle Hill Buckingham Bucks MK18 1EZ
Tel. Buckingham (0280) 816087

PHONE 0533 532991

OPEN MON-FRI 9.30-5.30

ARCADE COMPUTERS

37 & 38
Second Floor
The Silver Arcade
Leicester
★ Computing Specialists ★
We are stockists of the fabulous . . .

COLOUR GENIE!

THIS EXCEPTIONAL MICRO FOR £194

★ SEND FOR FREE COLOUR BROCHURE ★

— ALSO —

ORIC-1 48k £169.95

PRINTERS
MICROLINE, SIEKOSHA

MONITORS
PRINCE, CROFTON, etc

SOFTWARE & BOOKS

THE VERY LATEST FOR COLOUR GENIE, ORIC 24, BBC, VIC20, VIC64, SPECTRUM, DRAGON32

MAIL ORDER- WE MAIL ORDER - *FAST!* PHONE FOR DETAILS.

FOR BBC MICROCOMPUTER

Software

FORTH ROM and documentation ..... £34.72 + VAT
Manual (for newcomers to FORTH) £6.75

Hardware and Accessories

TORCH drives and operating system £780.00 + VAT
Printers, drives etc ..... Please 'phone for quote

FOR EPSON HX20

Software

FORTH ROM + documentation ..... £34.72 + VAT
(Manual available shortly)

Hardware and Accessories

EXPANSION UNIT, VDU Interface etc
..... Please 'phone for quote

COMING SOON FOR BBC MICRO

FORTH FLOATING POINT EXTENSION (ROM)
COMPUTER AIDED LEARNING PACKAGE

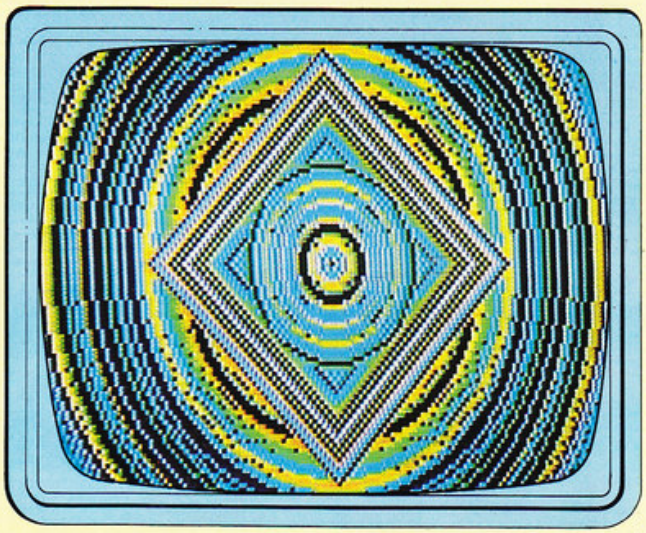
OTHER MACHINES:
Dragon 32, Colour Genie, Apple, SWTPc

H.C.C.S. Associates

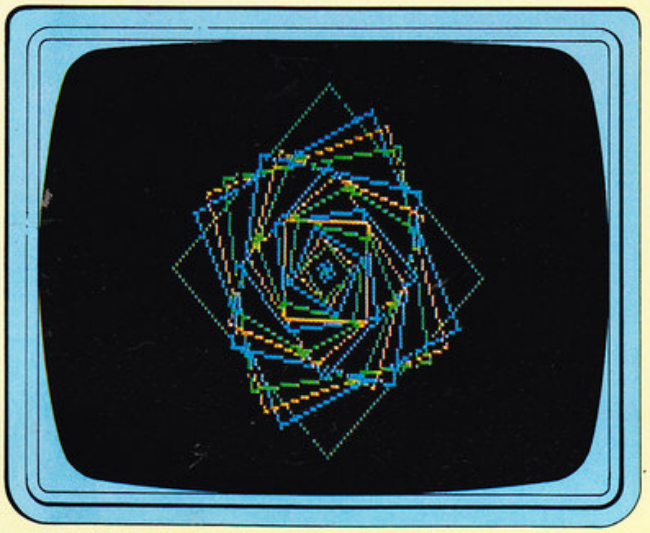
533 Durham Road, Low Fell
Gateshead, Tyne and Wear NE9 5EY
Tel: (0632) 821924

◀ 25

```
10 FGR: FCLS
15 X = 80: Y = 48
20 FOR R = 1 TO 100
30 FCOLOUR (RND(4))
35 CIRCLE X,Y,R
40 A$ = INKEY$: IF A$ = " " THEN INPUT A$
50 NEXT R
60 FOR R = 1 TO 47
70 FCOLOUR (RND(4))
80 GOSUB 200
90 PLOT AX,AY TO BX,BY TO CX,CY TO DX,DY TO AX,AY
95 A$ = INKEY$: IF A$ = " " THEN INPUT A$
100 NEXT R
110 GOTO 20
120 REM END OF MAIN PROGRAM LOOP
200 AX = X:      AY = Y - R
210 BX = X + R:  BY = Y
220 CX = X:      CY = Y + R
230 DX = X - R:  DY = Y
240 RETURN
```



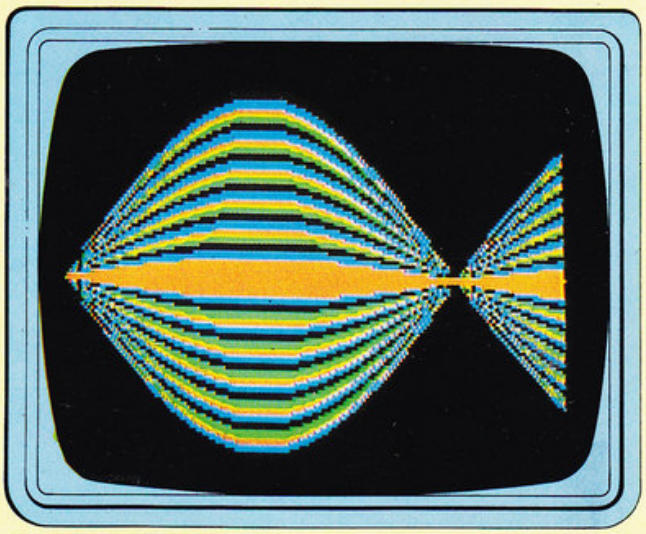
The short program on the left produces a display of partially random colours, as seen in the 'wallpaper' pattern above. The program creates a whole range of pseudo-colours, using a line-overlap technique. It is possible to run the program over and again without repeating patterns, despite the fact that only four colours — black, cyan, orange and green — are used.



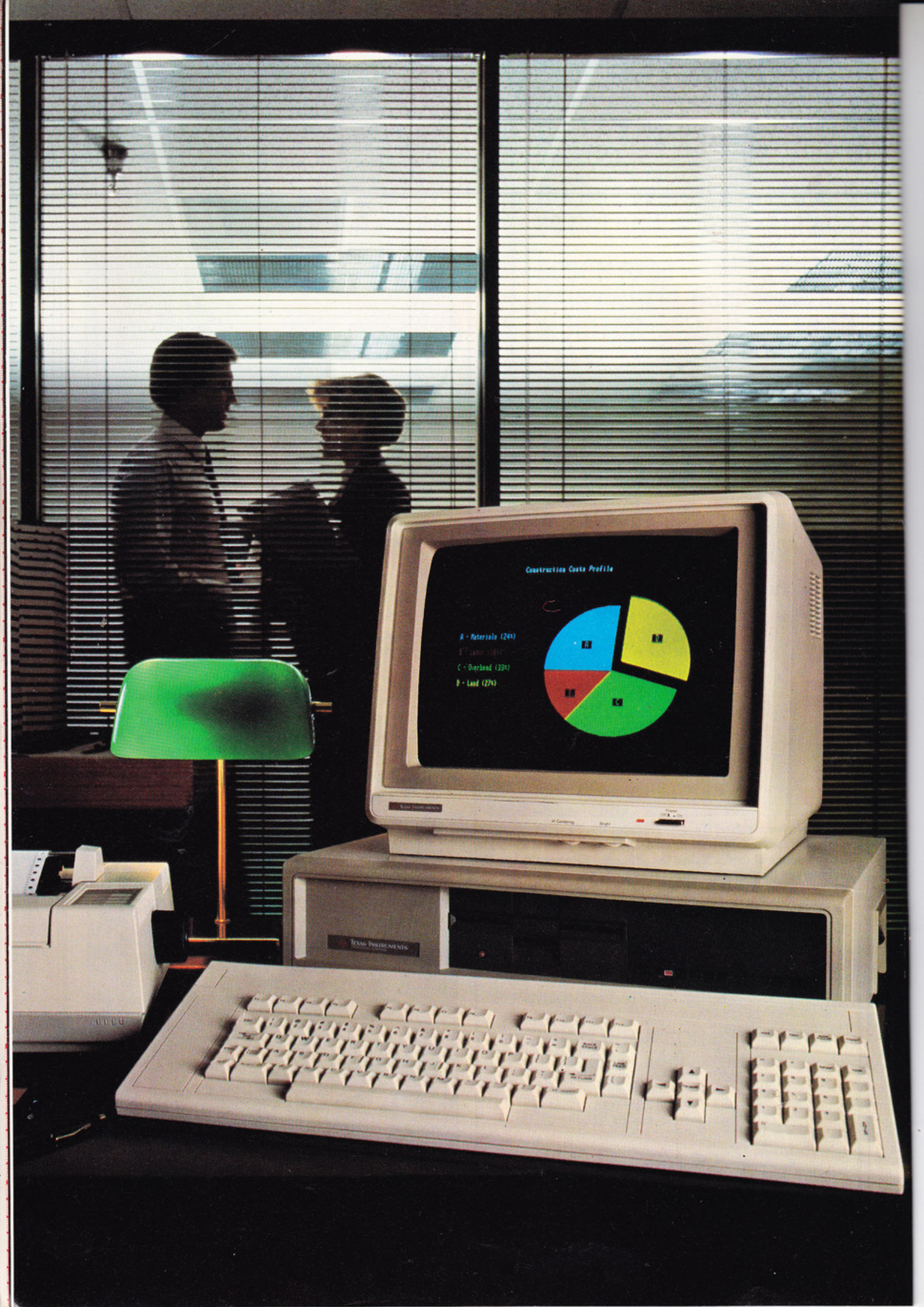
The pattern you see above is easy to produce using the short program on the right. It uses variable adjustment of regular geometric shape to give the impression of depth. Notice the difference between the way this program and the first program use colour.

```
10 FGR: FCLS
20 X = 80: Y = 48: R = 47
25 M = 4
30 FOR TH = 0 TO 3.770 STEP 0.1571
40 GOSUB 200
50 FCOLOUR M
60 PLOT AX,AY TO BX,BY TO CX,CY TO DX,DY TO AX,AY
70 M = M + 1: IF M = 5 THEN M = 1
80 R = R - 2: A$ = INKEY$: IF A$ = " " THEN INPUT A$
90 NEXT TH
100 GOTO 20
110 REM END OF MAIN PROGRAM LOOP
200 AX = X + R * SIN(TH): AY = Y - R * COS(TH)
210 BX = X + R * COS(TH): BY = Y + R * SIN(TH)
220 CX = X - R * SIN(TH): CY = Y + R * COS(TH)
230 DX = X - R * COS(TH): DY = Y - R * SIN(TH)
240 RETURN
```

```
10 FGR: FCLS
20 Y = 48
30 R = 47
40 M = 2
50 FCOLOUR M
60 FOR X = 0 TO 159
70 DY = R * SIN(X/40)
80 PLOT X,Y - DY TO X,Y + DY
90 A$ = INKEY$: IF A$ = " " THEN INPUT A$
100 NEXT X
110 M = M + 1: IF M = 5 THEN M = 1
120 R = R - 2
130 IF R <> 1 THEN GOTO 50
140 INPUT A$
150 GOTO 10
```



Simplicity itself — this program uses large areas of solid colour together with trigonometric functions to create . . . a fission reaction?


Construction Costs Profile
A - Materials (24%)
C - Overhead (33%)
D - Land (27%)

The new TI Professional Computer. If you want the business edge, it's the answer.

Today's business manager is faced with a world of questions, often tough. Questions about productivity. Cost control. And the bottom line.

To help you come up with sharper answers and alternatives, to give *you* the business edge, we introduce the new Texas Instruments Professional Computer. The one with the power, the expandibility, the easiest-to-use keyboard, extremely high resolution graphics, and a broad array of software.

All the leading operating systems and programming languages are available. You can use many popular application programs from the best software suppliers to help you create spread-sheets, do word processing, construct graphics, communicate with other data bases or create your own.

All of which lets you control assets, manage your time, and make projections for tomorrow's performance – today.

And for a clear "hard copy" printout of information, you can rely on the new 850 Series printers, made by Texas Instruments especially for the new TI Professional Computer.

The TI Professional Computer helps you make better business decisions based on better information. With the performance and reliability you expect from TI.

In short, it's the answer.

For full information phone 0234 223000 or write to Texas Instruments, Manton Lane, Bedford MK41 7PA.

TEXAS INSTRUMENTS

Creating useful products and services for you.

SPECIFICATIONS

System Unit
16-bit, 8088 microprocessor
64K byte RAM, expandable to 256K bytes
4K byte graphics display memory
5-slot expansion bus

Keyboard
Specially designed low profile
Popular typewriter layout
97 keys, including 12 function keys
Separate numeric keypad and cursor control clusters
Tactile response, for quick positive entry
Upper- and lower-case letters

Display Units
12-inch monochrome (green phosphor) or 13-inch full-colour, 25 lines x 80 columns
High resolution, 720 x 300 pixels

Mass Storage
Built-in 320K byte diskette standard
Additional internal storage of 320K byte diskette, or 5 or 10 Mbyte Winchester disks optional

Communications Options
TTY, 3780
3270 SNA stand-alone
3270 BSC and SNA cluster

Operating Systems
MS™-DOS, Digital Research™ CP/M-86®, and Concurrent CP/M-86,™ UCSD p-System™

Languages
BASIC, COBOL, FORTRAN, Pascal

Applications Software
Over 100 programs available from the most popular software vendors such as Microsoft, Ashton-Tate, Micro-Pro, IUS, Sorcim, MPSL, Lifeboat and others

Printers
150-cps TI 850 Series for most applications

FOOTNOTES: MS-DOS is a trademark of Microsoft Corporation. CP/M-86 and Concurrent CP/M-86 are trademarks of Digital Research Inc. UCSD p-system is a trademark of the Regents of the University of California.

Sysres gives a micro about 50 extra commands. Pete Gerrard uses it to boss around his 64.

The Commodore at your command

Sysres is a programmer's aid package for the Commodore 64, and adds a very valuable 50 or so commands to the existing Basic built into the machine. As it is aimed at programmers, it is competing directly with a similar package called Power 64.

Both sets of programs are designed to enhance the computing capabilities of your machine, and the comparison table at the end of this review will give you some idea of which one would suit you best. I tested the package on a Commodore 64 with a 1541 disk drive.

Kieren Phelps

Features

There are around three dozen commands to soup-up the 64's own text editor and help you edit both text and basic files easily. They work in much the same way as the standard Basic commands, but insist on being the first command on any line. They allow you to DELETE a range of lines, define a KEY as a special function, MERGE a file from disk into your program or RENUMBER a program.

There are also 11 DOS support commands which allow you to format diskettes, duplicate and validate them; copy, scratch or rename files and list files and the directory. These commands cannot be used from within a Basic program in the normal way, but this does not detract from their overall usefulness.

Sysres operates by taking out a chunk of memory from the 64, but as it sits below the area normally used for RAM this is of little concern to the user. All you'll lose is 256 bytes, and this is hardly a major disaster.

Presentation

There is only one program disk, which comes in an attractive binding, together with a user registration card, for use in the event of your disk malfunctioning.

The usual sort of security devices are missing, but instead you are given a rather peculiar master disk, which allows you to create up to three copies of what they refer to as a 'boot disk'. You get three to cover the occasional error on your part, and to prevent you from giving too many away.

The manual tells 64 owners with a single disk drive to get someone with a double disk drive to make copies for them, as making copies on a single drive is tedious and prone to error.

As well as giving this sound advice, the manual does its job well, describing each command in detail (with a useful index), and giving examples of it in use. But there are annoying discrepancies which detract from the overall appeal of the product. Commodore 64 owners are presented with just half a dozen pages which are different from the original Commodore Pet version. The other 100 or so pages have a number of references to the Pet which do not apply to the 64. And not all the differences are trivial.

Getting started

There are no security devices to install; you simply insert the master disk into the drive, and away you go. But be prepared to be driven to the limit of your patience while the computer slowly and painfully makes the boot disk from your original master.

On using the package for the first time, you are required to make at least one boot disk before proceeding. This is tedious if you just want to start playing around with it straight away, and downright aggravating if you don't happen to have any blank disks to hand.

Beyond that, the manual and the instruction file on the master disk are all you'll need to begin driving the system. It's that easy to use.

In use

There have been utility programs available for computer users for a number of years, and such commands as AUTO (for line numbering), RENUMBER (for line re-numbering) and DUMP (for dumping out the contents of active variables) have become required statements for this kind of utility.

Sysres has all the standard commands you'd look for — old favourites like FIND and CHANGE, which search through your program and replace all occurrences of a given set of characters with another set, as well as some powerful additions to existing Basic commands.

The most useful, and the most apparent, is the ability to scroll a Basic program listing bi-directionally. Move the cursor to the top of the screen and the program listing will continue to decrement until you reach the start of the listing. Similarly, moving to the bottom of the screen scrolls the listing in the other direction.

A number of existing commands — such as RUN, which now ignores all screen garbage — have been upgraded but all of them are fairly common. Besides these facilities Sysres has a few aces up its sleeve. You can view sequential files on the screen with a three keystroke sequence, or do the same with relative files. You can also dump the contents of the screen to the printer.

You can define any key to be a whole sequence of other keystrokes, or even make a key into a whole program subroutine. Almost as an afterthought, Sysres gives you an internal monitor for your Commodore 64, with the same bi-directional scrolling facilities, even in assembly language.

32 ▶

Here comes the HERMIT 21

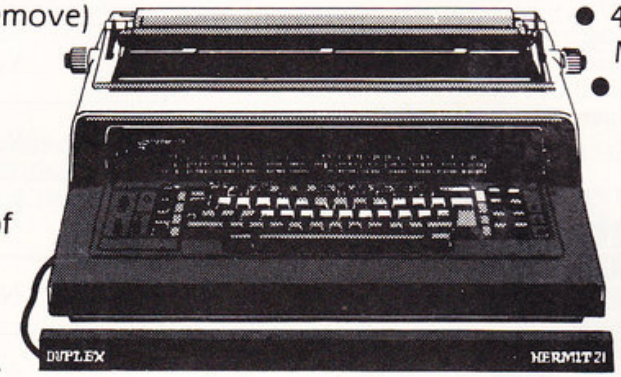
HERMES INTELLIGENT TYPEWRITER

INTERFACES FOR THE HERMES TOPTRONIC 21 TYPEWRITER

HERMIT KSR

UP TO 45 cps

- Plug on unit. (30 seconds or less to fit or remove)
- 2000 Char. Print Buffer
- RS232C Specification (TX & RX)
- Three modes of operation (normal/ set up/Ksr)
- 'WHITE-SPACE-SKIP' to increase print throughput up to 45 cps
- Printer Pause/Resume Key
- True KSR (Keyboard/send/receive) mode
- Keyboard 'SET-UP' mode to change operating parameters (non-volatile)
- Xon/Xoff, DSR/DTR, ETX/ACK handshaking protocols



HERMIT MSR

- All KSR features and
- 4000 Char. Working Memory
- Simple to use TEXT-EDITOR
- Five modes of operation. (Normal/telex/letter/ set up/Ksr)
- Battery-backup & Power-Fail-Safe. (Protects memory contents)
- Allows HERMIT series products to be interconnected
- Special FORM-FILLING facility using multiple 'stop-codes'
- Allocate up to 100 special phrases, (paras or whole letters)
- Standard 21 features retained at all times

HERMIT 21 ADD-ONS

- HERMIT-TI: tape cassette interface unit
- HERMIT-CD: cassette deck
- HERMIT-TF: tractor feed unit
- HERMIT-PO: telex paper tape punch unit
- HERMIT-PR: telex paper tape punch reader unit
- HERMIT-AI: APPLE II RS232C converter card
- HERMIT-EI: PET microcomputer IEEE to RS232C convertor unit

ALL* PRODUCTS AVAILABLE FROM:– DUPLEX COMMUNICATIONS LTD on 0455 209131 OR DUPLEX COMMUNICATIONS (SOUTH) LTD on 0277 841011 *Ask for Dept PCN

DUPLEX Communications

The Interface People

Dealer Enquiries Welcome

Midlands/North—2 Leire Lane, Dunton Bassett, Nr. Lutterworth, Leicestershire LE17 5JP. Tel: 0455 209131
South—52 High Street, Stock, Essex CM4 9BW. Tel: 0277 841011

◀30

Reliability

I made a number of attempts to crash the program. Pressing RUN/STOP twice on the initial screen display plunged it into terrible chaos.

Apart from that, the program seems uncrashable.

Verdict

I consider Sysres to be the best package of its kind currently available for the 64. It is also the cheapest. As well as adding more commands than its rivals, the ones it has are particularly useful. You'll get so used to scrolling program listings merrily up and down the screen that you'll never want to be without the package again.

Apart from a couple of mistakes in the manual, the documentation is more than adequate, and certainly any experienced (or even not-so-experienced) programmer will find this a delight to use.

RATING

Name Sysres 64 **Application** Programmer's aid **System** Commodore 64 **Price** £59 **Publisher** Solidus IC (UK), Wandle Road, Beddington, Croydon 01-688 5164 **Format** Diskette **Language** Machine code **Other versions** Commodore Pet series, Apple **Outlets** Mail order.

	ORIGINAL TOOLKIT	POWER 64	SYSRES
Machines	**All Pets**	**Pets/64s**	**Pets, 64s, Apples**
Number of commands	9	15	50+
Disk commands	1	1	11
Monitor commands	No	Yes	Yes
Screen dump	No	No	Yes
Scroll listings	No	Yes	Yes
List files from disk	No	Yes	Yes
Ability to add commands	No	Yes	No
DOS support	No	No	Yes
Price	£29	£69	£59

The number of commands given applies to the command in its most basic form. Most have a number of variants on the original form. We've tried to give a balanced comparison between Power 64 and Sysres. The original Toolkit utility chip? It just goes to show how times change . . .

ZX compresses addresses

Address Manager is primarily for home use, allowing you to keep your address book on cassette and use your Spectrum to find and update addresses.

Features

The program is menu-driven, the menu coming up on the screen when you load the tape and after you have finished each operation. The options available are Locate Entry, Add Entry, Amend Entry, Delete Entry, Select Entries, Display Entries, Print Entries, and Maintain File.

The Select Entries option is a multiple indexing facility. When you enter a name and address into a file you can specify three index keys, of three characters each, and you can ask the program to search for combinations of index keys and print out the entries that match.

As well as the program there is a simple file of names and addresses on the tape, which you can use to learn the controls and editing methods.

Presentation

Address Manager comes in a colourfully printed box which contains the program cassette and instruction leaflet, and there is space provided in the box for you to keep your address file tape.

The leaflet is nicely printed, with explanations and examples of the program's features, and illustrations to show the screen layout for all of the menu options.

In use

Address Manager is generally quite easy to use, allowing you to select options and move around the different fields of an entry by pressing the cursor control keys.

There are, however, some features that are a little more complicated and confusing than they need to be. The editor, which you use when entering or altering names and addresses, can work in several different modes, where you have different ways of getting upper and lower case letters, or numbers and cursor movement.

As you will probably use the editor only occasionally, having all these different modes is more likely to be confusing than helpful.

I was unable to crash the program, even when it was loading, saving, and printing, and the program performed correctly, doing everything exactly as described in the instructions.

The only problem I had was with the tape, which has the program on both sides, but one side would not load correctly. Faulty tapes may not be common, but it is important, and if anything goes wrong with the tape you will not be able to get at your address file until you can get another copy.

Verdict

Address Manager is a well-designed program, and the multiple indexing facility is a sufficient advantage to compensate for the extra trouble involved in loading a tape instead of using an old-fashioned address book.

RATING

Name Address Manager **Application** Computerised address book **System** ZX Spectrum **Price** £8.95 **Publisher** OCP, PO Box 99, Oxford **Format** Cassette **Language** Machine code.

OSBORNE

BUSINESS PACKAGES

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

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

SPECIAL OFFER **£1,599** (plus VAT)

⋆**Card Sort** — this program will sort your cardbox files on any field of a card **£49.95**

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

NAME .....

ADDRESS .....

.....

TEL: .....

PCN15

GEM SYSTEMS LTD
(DEPT MCS)
2 CRAWFORD ROAD, HATFIELD,
HERTS AL10 0PG
TEL: (07072) 66148

MICROSPHERE

MICROSPHERE COMPUTER SERVICES LTD
72 ROSEBERY ROAD · LONDON N10 2LA
TELEPHONE 01-883 9411

EVOLUTION (48K Spectrum)
Can you trace the course of evolution from the primordial soup to man, keeping a balanced world and surviving the odd disaster as you go ?
Should be easy. . . after all it's been done before!
Only **£6.95**

OMNICALC (48k Spectrum)
The best Spectrum spreadsheet you can buy. Written in machine code to be faster, to give you more space for data, and to allow more features to be included, it is guaranteed uncrashable.

"If more programs shared the quality of OMNICALC, then we might see more Spectrums in offices." Home Computing Weekly 3/5/83

"It is ideal for someone who has just found the spreadsheet concept, but it is also a very powerful tool for anyone who has used one previously."
Sinclair User June 1983
Complete with comprehensive manual **£9.95**

ZX-SIDEPRINT (Spectrum & ZX81 versions)
Use ZX-Sideprint to print sideways, giving you 80/132 etc. characters per line.
(State version reqd) **£4.95**

CREVASSE & HOTFOOT (any Spectrum)
Can you make it across the ice-cap whilst chasms open and close all around? Or, help the rabbit get to fields full of carrots – but remember! the plumper the rabbit, the greater the danger.
2 original games for only **£4.95**

NEW! **THE TRAIN GAME** (any Spectrum) **NEW!**
First there were model railways, then there were computers. Now Microsphere gives you both in one.
Featuring passenger, goods & express trains; tunnels; viaducts; points; stations; turntable bonus games; collisions; derailments; irate passengers; and everything else you expect from a major railway!
Two track layouts on each cassette. Superb value for money.
Only **£5.95**

IT'S NEW

It's Frustrating!

BREAKAWAY

A game with a motif of "Rescue the Damsel", with high resolution graphics and escalating skill levels. In particular the game teaches keyboard layout since highest scores are achieved by pressing indicated keys as quickly as possible.

A game for all the family to play on the ZX Spectrum

ONLY £5.95

from your nearest good software stockists or direct from Procom Software

PROCOM
309 High Road,
Loughton, Essex.

★ **DEALER ENQUIRIES WELCOME**

BBC Microcomputer System

OFFICIAL BBC MICROCOMPUTER DEALER

BBC Microcomputer System

This is the best microcomputer currently on the market. 32K of RAM, 32K ROM, 8 modes of operation, full colour, full size keyboard, internal expansions — in short "a personal computer capable of expanding into a small business computer."

BBC Microcomputer Mod B	£348 + VAT	**£399.00**
BBC Mod B + Disk Interface	£409 + VAT	**£469.00**
BBC 100K Disk Drive	£230 + VAT	**£264.00**
BBC 800K Dual Disk Drive	£699 + VAT	**£803.85**
Torch Light Pen for BBC Micro	£65 + VAT	**£74.75**
Torch 800K Dual Disk Drive + Z80 Processor and 64K RAM, CPN Operating System supplied complete with Disk Interface Kit	£799 + VAT	**£918.85**
BBC Games Paddles	£11 + VAT	**£12.65**
Parallel Printer Cable	£10 + VAT	**£11.50**

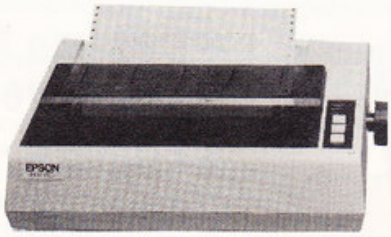
100% BBC COMPATIBLE MITSUBISHI SLIMLINE DISK DRIVES

Double sided, double density, 80 TRKs, supplied in a specially designed case for the BBC microcomputer complete with cables, utilities disc and user guide.

Single 400K Drive	£239 + VAT	**£274.85**
Dual 800K Drives	£449 + VAT	**£516.35**
Single 400K switchable 40/80 tracks	£249 + VAT	**£286.85**

We stock a large selection of Software for BBC. Please send S.A.E.

EPSON FOR RELIABILITY



EPSON FX80: 80 column, 160 CPS, normal, italic and elite characters, 256 user definable characters, superscript, subscript, 11 × 9 matrix, bidirectional logic seeking, hi-res bit image printing (960 × 8 dots/line), friction and pinfeed, 9 international character sets, Centronic parallel interface.

FX80 PRICE ..... £379 + VAT = **£435.85**

EPSON RX80: 80 column, 100 CPS, normal, italic and elite characters, 11 international character sets, hi-res bit image printing, bi-directional logic seeking, 4" to 10" adjustable pin feed, Centronic parallel interface.

RX80 PRICE ..... £259 + VAT = **£297.85**

MX-100 136 column, 10 CPS, friction and tractor feed, up to 15" adjustable carriage, hi-res bit image printing, true descenders, Centronic parallel interface.

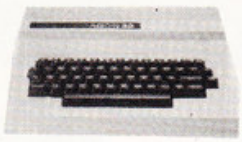
MX-100 PRICE ..... £419 + VAT = **£481.85**

RS232 Interface for all above Printers ..... £55 + VAT = **£63.25**

GUARANTEED LOWEST PRICES

We guarantee that our prices are the lowest on the market. If you can find any item advertised and in stock at less than our price we will match that price.

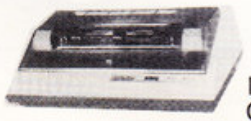
DRAGON 32



A powerful computer specially designed for the family and small business use. It has 32K RAM, 16K Microsoft extended colour basic, high resolution colour graphics, 9 colours 256 × 192, Centronic parallel printer interface, professional keyboard and five octaves of sound.

DRAGON 32 with Cass Lead . £165 + VAT = **£189.75**
DRAGON JOYSTICKS (Pair) . £17.35 + VAT = **£19.95**
PRINTER CABLE ..... £10 + VAT = **£11.50**
A large range of Software is available on cassettes. Please send S.A.E. for details.

SEIKOSHA DOT MATRIX PRINTERS WITH HIGH-RES GRAPHICS



AP-100A: 80 column, 30 CPS. Dot addressable hi-res graphics, 10" wide adjustable tractor feed, 7 × 5 print matrix. Centronic parallel interface.

AP100A PRICE ..... £169 + VAT = **£194.35**
FRICTION FEED ADAPTOR ..... £25 + VAT = **£28.75**

GP-250X: 80 Column, 50 CPS, tractor feed 10" wide fully adjustable, true descenders, 64 user definable characters, double height and/or double width printing, 8 × 5 print matrix, Centronic parallel and RS232 (serial) interface both included.

GP-250X PRICE ..... £229 + VAT = **£263.35**

TORCH Z80 DISC PACK FOR BBC MICRO

This includes DUAL (800K) disc drives, 64K RAM, Z80 2nd processor CP/M compatible operating system (CPN). This enables you to use a range of standard business Software and other programming languages such as PASCAL, C, BCPL, FORTRAN, LISP and COBOL. (Please note — these languages are not included in the price).

SPECIAL OFFER: Torch Z80 Disk Pack + Disk Interface Kit for BBC Micro ..... £799 + VAT = **£918.85**
Torch Z80 Disc Pack ..... £780 + VAT = **£897.00**
Torch Light Pen for BBC ..... £65 + VAT = **£74.75**

NEW LOW PRICES STAR DP

The most cost effective quality matrix printers to be launched this year. DP510 and DP515 features include friction and tractor feed and roll holders as standard. 100 CPS print speed bi-directional logic seeking 9 × 9 matrix gives true descenders. 2.3K buffer as standard. Hi-res bit image plus block graphics, sub and super script, italic printing, auto underlining, vertical and horizontal tabulation, left and right margins set, skip over perforation, back space and self test.

STAR DP510 10" Carriage 80 Columns
SPECIAL PRICE ..... £269 + VAT = **£309.35**
STAR DP515 15" Carriage 136 Columns
SPECIAL PRICE ..... £369 + VAT = **£424.35**
RS232 INTERFACE FOR ABOVE ..... £50 + VAT = **£57.50**

NEW ARRIVALS

- Shinwa CP80 Printer, Centronic Parallel Interface code compatible with Epson MX80. Price £269 + VAT **£309.35**
- Juki Daisy Wheel Printer with Centronic Parallel Interface. Price ..... £369 + VAT = **£424.35**
- **Four Colour Printer**
  Centronic Parallel Interface, supplied with ten pens.
  Price ..... £130.40 + VAT = £149.95

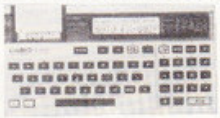
PLEASE PHONE FOR FURTHER DETAILS ON THESE ITEMS

COMPLETE WORD PROCESSOR FOR ONLY £1,099 + VAT

This package consists of BBC Microcomputer, View Processor, 400K Disk Drive, High Resolution Green Monitor, Daisy Wheel Printer and all the necessary cables and documentation.

OUR SPECIAL PACKAGE DEAL
PRICE ..... £1099 + VAT = **£1263.85**

CASIO POCKET COMPUTERS



CASIO FX-802P: Pocket computer with scientific function and built-in mini computer, uses BASIC language. 1568 program steps. QWERTY keyboard, 12 char. display.
FX802P ..... £ .

CASIO FX-700: Pocket computer with scientific functions, BASIC language, 1568 program steps, QWERTY keyboard, 12 char. display.
FX700P ..... £ .

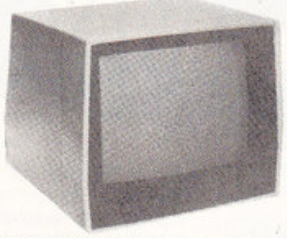
CASIO PB-100: Pocket computer, BASIC language, 544 program steps (expandable 1568 steps). QWERTY keyboard, 12 char. display.
PB-100 ..... £34.74 + VAT = **£39.95**

FA-3 Cassette Adapter for FX700 & PB100
FA-3 Price ..... £17.35 + VAT = **£19.95**

FP-12 Printer for FX700 and PB100
FP-12 Price ..... £

FX-602P Scientific calculator with 512 program steps and 88 memories. Price ..... £39 + VAT = **£44.85**

PROFESSIONAL MONITORS



GREEN MONITORS 12" green screen monitors with composite and sync. input. Suitable for most computers.
18 MHZ Bandwidth High Resolution . £89 + VAT = **£102.35**
15 MHZ Bandwidth Normal Resolution £69 + VAT = **£79.35**

COLOUR MONITORS MICROVITEC RGB input monitor, normal resolution. As used with BBC computer. Metal cabinet.
Cub Microvitec ..... £239 + VAT = **£274.83**

SANYO RGB monitors in plastic cabinets.
SCM14N — normal resolution 400 Dots ..... £239 + VAT = **£274.83**
SCM14M — medium resolution 600 Dots ..... £339 + VAT = **£389.85**
SCM14H — High resolution 800 Dots ..... £479 + VAT = **£550.85**

TEXAS INSTRUMENTS TI 99/4A

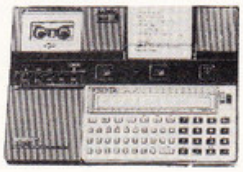
This microcomputer is based on TMS9900 16 bit microprocessor. It includes 16K RAM, 16 colour high resolution graphic (192 × 256). The screen display is 32 characters, 24 lines TI-BASIC. Full size keyboard. For Software there are about 1000 Programs to choose from. There are a lot of peripherals available e.g. Disk Drives, Disk Interface, Speech Synthesizer, Extra RAM. Additional Languages (PASCAL, TI-LOGO, ASSEMBLER).

TI Home Computer & Cass Lead		**£130.40 + VAT = £149.95**
Peripheral Expansion System	£126.04 + VAT	**£144.95**
Disk Controller Card	**£130.40 + VAT**	**= £149.95**
Single Disk Drive	£173.87 + VAT	**= £199.95**
Speech Synthesizer	£36.48 + VAT	**= £41.95**

FREE! If you buy TI home computer before 2nd July 83 TEXAS INSTRUMENTS will supply FREE one pair of Joysticks, connect four game and beginners basic tutor cassettes. If you buy 6 software modules before 2nd July 83 TEXAS INSTRUMENTS will supply FREE speech synthesizer.

We are official dealers for BBC Microcomputer System/Acorn Computers, Texas Instruments Home Computers, Y.E. Data Business Computers and Torch Computers.

SHARP PC-1251 COMPUTER WITH PRINTER AND MICRO CASSETTE £146.95 + VAT



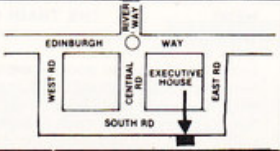
New pocket computer with 24K Bytes System ROM, 4K RAM, BASIC LANGUAGE, 24 character liquid crystal display, QWERTY keyboard + numeric pad + user defined keys. 24 column Thermal printer, Microcassette recorder for data storage, battery charger and demonstration cassette supplied in an attractive case.
PC-1251 + CE-125 ..... £146.95 + VAT = **£169.00**

Akhter Instruments Ltd.

EXECUTIVE HOUSE, SOUTH RD, TEMPLEFIELDS, HARLOW, ESSEX, CM20 2BZ. UK.
TEL: HARLOW (0279) 443521 OR 413639
TELEX 995801 REF — A18

ORDERING INFORMATION:
All orders which accompany a cheque, cash or postal orders are *CARRIAGE FREE* (UK only). Please make cheques and postal orders payable to "AKHTER INSTRUMENTS". A carriage charge of 3% of invoice total is applicable to BARCLAYCARD and ACCESS orders. We accept official orders from Government and Educational establishments. We accept VAT FREE EXPORT orders, please phone or write to check shipping cost.

OPENING HOURS: MON-FRI 9am-5.30pm, SAT 10 am-2pm.
We welcome callers, no parking problems.



Henry Velleman checks out an underarm filing system for the Epson HX-20 portable micro.

Rambling records

Ever wished you could carry a filing system around with you? The MST Database program is an attempt, although on a less ambitious scale, to do just that on Epson's HX/20.

Features

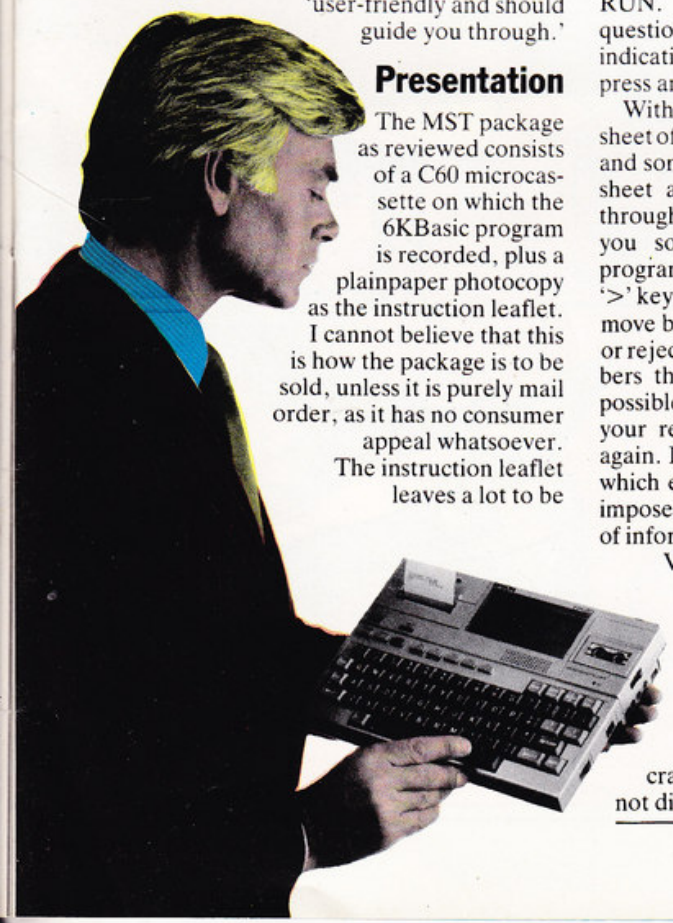
The Epson HX-20 is a very portable, battery powered microcomputer complete with a built-in 24-column dot matrix printer and 20-column by 4-line LCD display. As standard it costs £402 with 16K RAM.

The MST Database costs £25 and provides all the basic facilities necessary to build and maintain a simple filing system on the HX-20.

At the above prices (not much more than a good quality filing cabinet) you won't find all the facilities which are to be found on the latest office micros with sophisticated packages such as dBase II. However, in addition to the essential facilities of add, amend, delete and list records, the MST program has flexible search, sort and total routines which can be used on any field — something uncommon on many of the expensive packages and machines.

The instruction leaflet with MST Database claims that the package is 'designed to replace any reasonably sized card index system'. This is a meaningless comment as no indication is given as to the actual capacity of the system.

Unfortunately I found that the instruction leaflet was definitely the weak link of the system, leaving too many points to be discovered by trial and error, and relying heavily on the fact that the program is 'user-friendly and should guide you through.'



Presentation

The MST package as reviewed consists of a C60 microcassette on which the 6KBasic program is recorded, plus a plainpaper photocopy as the instruction leaflet. I cannot believe that this is how the package is to be sold, unless it is purely mail order, as it has no consumer appeal whatsoever. The instruction leaflet leaves a lot to be desired. It would be greatly improved by an introduction to the concepts and planning of a computerised database and examples would make it so much easier to plan the transfer of your existing system onto the computer.

Worse, you are given no guide as to the number of records you are likely to be able to fit on the system and there is no hint that the maximum field length is only 18 characters. By experimentation I found that a database of records consisting of four alphanumeric fields totalling 60 characters plus one numeric field gave 54 records on a 16K machine or 234 records with 32K RAM.

Records may contain up to nine fields, so if you use the maximum field size, your record has a limit of 152 characters and this produces 113 records on the 32K machine.

You would be wise to experiment with different file configurations before finally committing yourself by entering a lot of data.

The paragraph on 'Getting Started' gives terse instructions on loading the program into the computer, referring you to the Epson manual for the tricky bit of clearing the memory and setting the time and date.

Unfortunately Epson has rather hidden this information in its manual and it would be easy to search for hours for this essential piece of advice (page 4.1.2).

In use

The seasoned user will be familiar with the next hurdle; the program does not do what the leaflet says it will do when you type RUN. Instead of asking a series of questions, a title page is displayed with no indication of how to proceed. Fortunately, press any key and away the program goes.

With the instruction leaflet is a loose sheet of sample printouts of the main menu and some of the other options. Using this sheet as a guide to the excellent 'step through' facility which the program has, you soon become at home with the program. To step through simply press the '>' key to progress forward, the '<' key to move backwards and the '@' key to accept or reject any option. The program remembers the path you have taken and it is possible to move back several steps, alter your response, and then move forward again. I found this a very powerful facility which easily makes up for the restriction imposed by the small screen on the amount of information displayed at any one time.

Very strangely the program will not allow lower case characters even though the HX-20 has a full upper and lower case set on both the display and the printer. The input is otherwise well controlled, and the program ignores irrelevant keys so it is difficult to crash the system. The BREAK key is not disabled, but this is unlikely to cause a problem unless pressed during a sort.

When adding data the program steps you through field by field, prompting for the appropriate input and restricting you to the maximum field length set.

There is also a search facility you can use to find a record you wish to amend or delete. The search is powerful but slow, allowing searching on any of the fields and displaying all records where a possible match exists. Searching for 'TOM' will match with not only TOM but also TOMATO, ATOM, etc if they exist in the searched field. Matches can be displayed on the screen or the printer.

The sort facility also works on any of the fields which means that you do not need to worry too much about having a key or master field restricting the layout of your database.

The sort can be into either numeric or alphabetic order. The instruction leaflet warns you to be prepared for a lengthy delay if you have a lot of records and it is a pity that the HX-20's built-in sound is not used to signal the completion of lengthy processes such as sorting or searching.

Reliability

The program performed reliably and should not crash under normal use but there is too little emphasis in the instructions on the importance of backing-up your database to tape in case of catastrophe.

Also, the data saving routine does not allow a name to be given to the tape file. This can make it very difficult to find the right tape.

The only major problem you are likely to experience is if more than one database is planned for the same HX-20. This is due to a hardware design oversight in that there is no way of clearing memory without totally resetting the machine. You then have to reset the system time and date, reload the program from the microcassette, followed by the data also from cassette.

Verdict

The MST Database is a very fair package for the price and should provide a ready replacement for most reasonably compact manual filing systems providing that the data will fit into a maximum of nine fields with up to 18 characters each.

I feel that with a revamped user manual the package would be excellent value for money, but it may be worth looking at Epson's own database program, Card Index, which sells for £25 on cassette.

RATING

Features	
Documentation	
Performance	
Usability	
Reliability	
Overall Value	

Name MST Database **Application** Database **System** Epson HX-20 **Price** £25 **Publisher** MST Consultants **Format** Cassette **Language** Basic **Outlets** Mail order

Nigel Cross talks to his micro, courtesy of VIM from Voice Machine Communications.

An Apple with ears on

About 15 years ago Stanley Kubrick and Arthur C Clarke combined their talents to produce a classic science fiction film. The product, *2001 — A Space Odyssey*, was hailed as a major step forward in the realistic portrayal of the future.

One of the most memorable features of the film was the voice activated and responsive computer HAL — a science fiction writer's invention. It's worth pointing out that when that film was released there were no microcomputers — and even if there were they would have cost an arm and a leg. But today we have a glut of small and powerful machines, with ever-increasing capabilities at low cost.

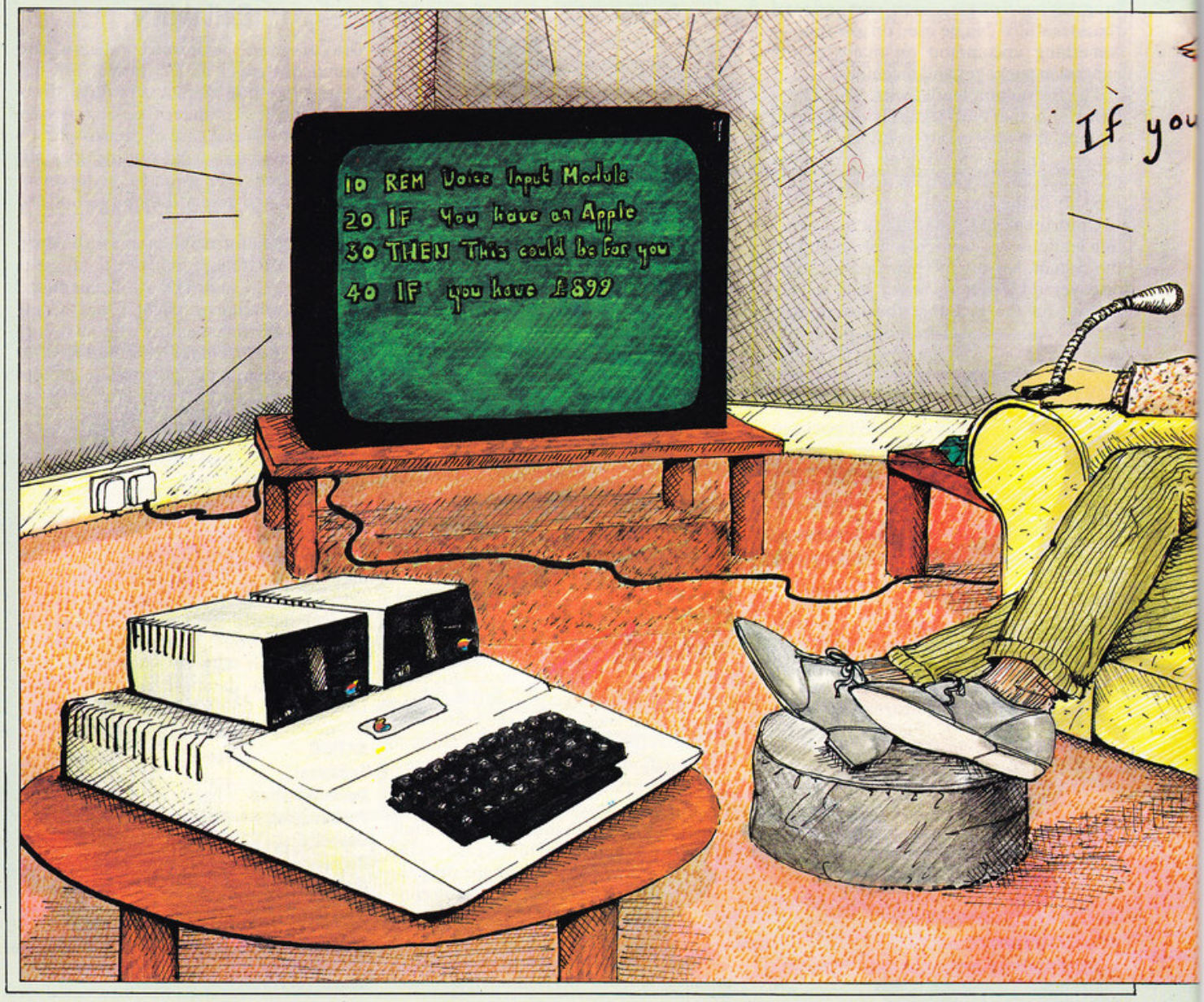
Among those capabilities are a whole range of voice output units (or speech chips). They vary in efficiency and cost, but until now there has been no voice input facility outside the research laboratory environment. VIM (Voice Input Module), from Voice Machine Communications of California, has changed all that. At relatively low cost you can talk to your computer and your micro can respond accordingly.

Presentation

The system *PCN* reviewed is the VIM-2 for the Apple II range of computers. It consists of one large PCB (VMC 2020C), Shure noise-cancelling goose-neck microphone, foot-operated switch, disk-based software and a comprehensive user manual.

The PCB is somewhat longer than the normal I/O board often seen in Apples, as it contains its own processor (68B03), 4K EPROM and 8K RAM plus keyboard interface. Due to its length the top leading edge is cut away so that the board can fit under the sloping part of the Apple keyboard.

The manual claims that the installation of the board is a simple ten-minute job that can be done with a Phillips screwdriver. The instructions for installation are as idiot-proof as possible without being too 'down-market' for the average Apple user. But they must be read thoroughly before taking the plunge. Once you're acquainted with the instructions and illustrations, all you have to do is arm yourself with your trusty tool and dismantle the Apple.



Linda Parry

Instead of the normal technique of just lifting off the cover and putting the PCB into one of the available I/O slots, this board requires the whole of the upper part of the Apple to be disconnected from the baseplate. The next part is the most tricky and potentially dangerous operation. What you have to do is remove the keyboard connector from the mother-

At relatively low cost you can talk to your computer

board and plug it into the VIM board, while plugging a matching connector into the now vacant keyboard socket. Extreme caution is required to do this.

The keyboard connector is one of those dreadful long-pinned devices, and it's far too easy to bend the legs trying to remove it from its tight-fitting socket. I did this, but managed to retrieve the situation. The UK distributors, CGD, Ltd, told me it will be including a chip-puller in the versions that it supplies to alleviate this problem. Once you've got this far it's easy to put the PCB into any available I/O slot (the softare uses slot 4 as its default value, but this can be adjusted to your requirements).

All you need to do then is put the machine back together again, connect the foot-operated switch to the board and plug the microphone into the switch. You are now in a position to use the system, but it has probably taken about 30 minutes and left you suffering from terminal apoplexy!

In use

Use of the system is simplicity itself. Put the supplied software disk into the drive and turn on the Apple. Hey Presto! The Voice Utility Program (VUP) is loaded and allows you to perform all the necessary actions through menu-driven selections. But before continuing with the operation of the system it would be best to fill in a bit of background and put VIM into perspective.

At about the time *2001* hit the world's cinemas, Ron Runge (now of VMC) was working on the problems of optical recognition of shapes and patterns by computer. To do this he analysed various eyes of the animal kingdom and produced a simplistic model eye which interfaced directly to a computer. This was capable of recognition of simple shapes — triangles, squares and circles — but beyond this, technology and the complexity of the problem left him no alternative but to abandon this line of research.

Not wishing to waste all his experience gained in pattern recognition techniques, he turned to the problems of speech. Again he took the empirical route, analysing various types of ear until he produced a computer compatible model guinea-pig ear with which to further his research. But even this simpler line of research posed many problems.

For example, if you were to go into any high street hi-fi shop and just look at amplifiers, you'd find a whole range of equipment covering a wide spread of performance. The cheaper units typically have an active low distortion range covering frequencies from 20Hz to 15kHz, whereas the top quality units spread from 5Hz to 20kHz. This means that for the expensive amplifiers the reproductive capability allows for a greater band-width response within the human limits of audio frequencies.

Similarly, sounds uttered by the human larynx (voice box) tend to be within the wider band-width, giving more distinctive and unique timbre of each word or phrase spoken by the individual. However, if you used a cheap amplifier to reproduce the spoken word then it is possible for you to lose the distinctive qualities of each individual's speech pattern by not having the full range available for amplification. This therefore highlights the first part of the problem in speech pattern recognition — that of the wide range of frequencies to be sampled for distinctive response.

The second — and greater — problem is that human speech tends to be an amalgam of many different frequencies generated simultaneously. This means that any device designed to analyse human speech patterns must be capable of not only covering the frequency range, but also sampling many frequencies at the same time. There is also the problem of repetition. It is seldom possible for individuals to reproduce the same word or phrase exactly, so any sampling technique must also have the capability of being able to average the frequencies used in any single utterance. These changes in frequency generation are usually caused by small variations in volume, stress and health plus other factors too numerous to document here.

The problems so far mentioned pale into insignificance when compared to the fact that words and phrases are not just one sound but a concentrated string of sounds. The sounds that make up our words have been the subject of many years of research and investigation by speech therapists, primarily to teach deaf people how to communicate with those of us who hear normally.

It has been found that there are 64 discrete sound units that make up all of our words, and this refers only to English language. For other languages there are other aspects — gutterals, for example — to be taken into consideration. The individual sound units are collectively referred to as phonemes (a Greek derived word meaning sound units).

It was first thought that phoneme recognition would be the solution to the problems, but again the infinitely variable human body managed to put the mockers on this line of investigation.

The drawback to the use of phonemes for speech pattern recognition is that each

Sounds that make up words have been subject to years of research

phoneme as uttered by any person can still be a variable. This variation is usually caused by the fact that although in normal speech each phoneme is used, in many words they vary in reproduction according to the length of time taken to utter one, or to apply inflexion, stress, accent, etc.

Runge's answer to these seemingly insurmountable problems was to treat all speech in one way. The technique he employed was to sample speech input at specific points in time over a number of discrete frequencies. He used an audio frequency spectrum analyser for this.

41▶

ZX MICROFAIR
7th ZX Microfair
Alexandra Palace
4 June, 1983

FOX ELECTRONICS

Presents Products:

NEW! LOWER PRICE

ZX MICROFAIR
7th ZX Microfair
Alexandra Palace
4 June, 1983

For the Spectrum, The VIC-20, The Jupiter Ace and the ZX-81

FREE
Kaleidoscope. programme + by special arrangements + with Fountain Computers free instruction for improving your Spectrum display with each purchase normally £1.

SPECTRUM UPGRADE ONLY £22.50
+ 70p p+p

SEND NOW TO UPGRADE YOUR SPECTRUM
FROM 16K TO 48K, SIMPLE INSERTION
NO SOLDERING REQUIRED
FULL INSTRUCTIONS SUPPLIED
(ISSUE TWO MACHINES ONLY)

Also available for both the
SPECTRUM or ZX81

The FD42 Keyboard. A keyboard to house your Spectrum/ZX81 PCB and give you a full typewriter type keyboard, no soldering or electronic knowledge required to fit. Only

£29.95
INCLUSIVE

ZX81

THE BEST
AVAILABLE EXPANDABLE
RAM PACK
AT THESE NEW LOW
PRICES

16K
£19.50
(+ 45p P&P)

32K
£34.00
(+ 45p P&P)

The **ZX-PANDA.** A 16K RAM pack expandable at any time to 32K by simple plug-in insertion of a £14.50 module.
The ZX-PANDA, a specially converted unit, designed to eliminate wobble and memory loss. Housed in a very attractive case and now at very attractive prices!

AND FOR THE **ZX81**
Another replacement keyboard, this one with a calculator type feel. Peel off backing and press to fit at only
£10.00

VIC20

More memory for your VIC20

Vixen RAM Cartridge for the VIC20

Switchable between 16K or 8K + 3K.
Gives you the option of full 16K RAM or 8K and 3K RAM in one package. When added to a Standard VIC20 gives 16384 bytes of extra memory in memory blocks 1 and 2 or 3092 bytes of extra memory into the 3K memory block AND 8192 bytes of extra memory switchable between memory blocks 1 and 3.

Fully compatible with available motherboards/modules.
Simply plugs into the rear expansion port of computer.
No re-addressing of existing BASIC programs needed.

Only £39.95

Tandem

Expandable Expansion System for the VIC20
Gives 4 expansion slots for VIC20 cartridges.
Custom-designed case. Plugs directly into computer. Further expanded by using TANDEM System!
ROM socket for expansion.
No extra power supply needed.
Only £30.00

JUPITER ACE

Pacer

The Uniquely expandable 16K RAM pack

New

Similar concept to ZX-PANDA but for the incredible Jupiter Ace.
Attractive, solidly built 16K RAM pack with the facility of expanding to 32K by plug-in module.
For more power to faster FORTH . . . you need a PACER!

16K Expandable RAM **£29.95**
16K Expansion Module..... **£14.50**

SEND SAE FOR FULL CATALOGUE

ALL OUR PRODUCTS ARE IN STOCK
AND USUALLY DESPATCHED WITHIN 10-14 DAYS

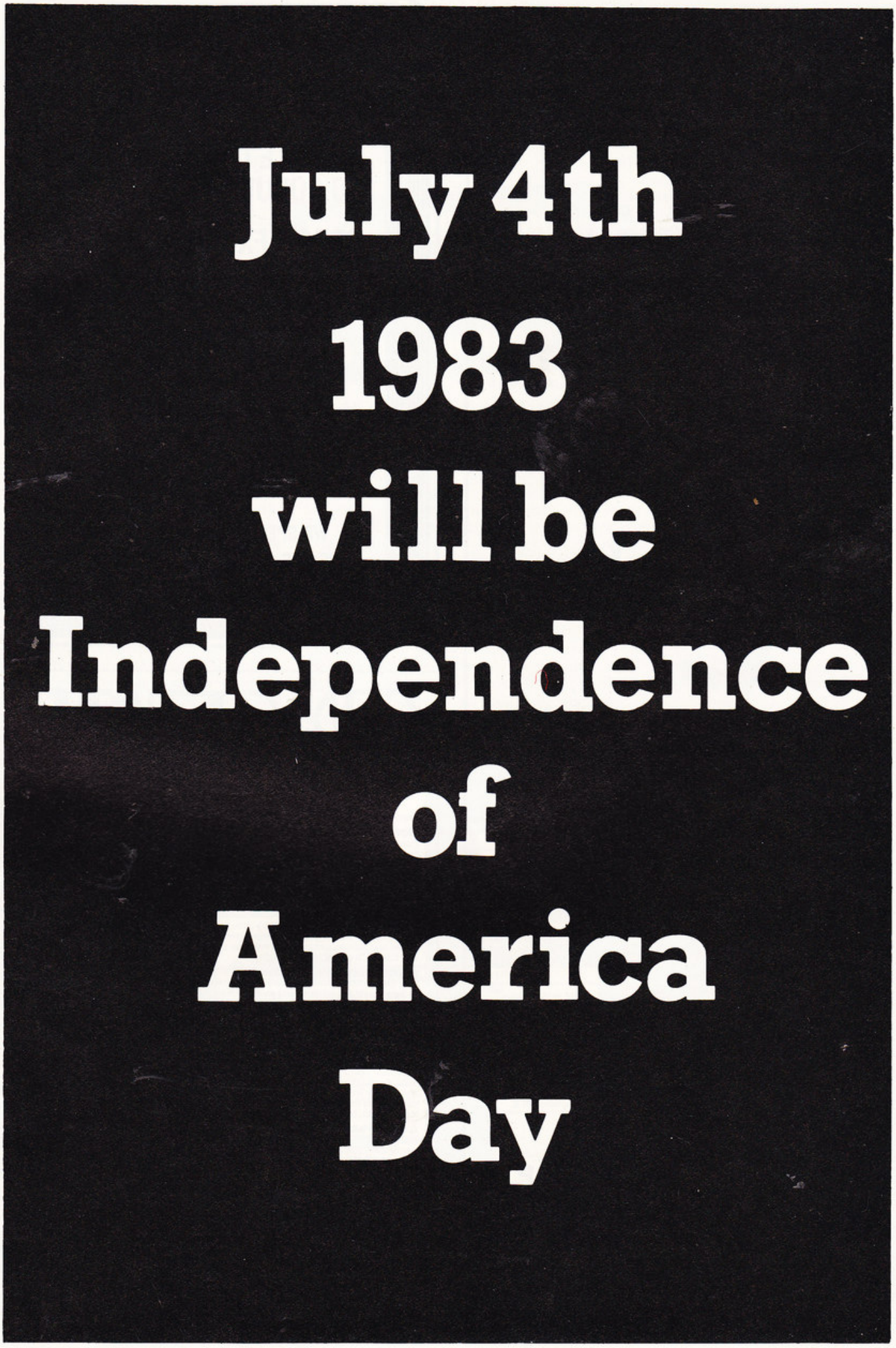
ITEM	TOTAL
SPECTRUM UPGRADE at **£23.99** inc	
SPECTRUM KEYBOARD at **£29.95** inc	
VIXEN RAM CARTRIDGE at **£39.95** inc	
TANDEM EXPANSION at **£30.00** inc	
ZX-PANDA 16K at **£19.95** inc	
ZX-PANDA 32K at **£34.45** inc	
ZX-PANDA EXP (MOD) at **£14.50** inc	
JUPITER ACE PACER 16K at **£29.95**inc	
JUPITER ACE PACER 16K MODULE at **£14.50** inc	

Please send me the above item/s. I enclose my remittance for £.....

SEND NOW TO

FOX ELECTRONICS

141 ABBEY ROAD *CALLERS WELCOME*
BASINGSTOKE, HANTS. TEL: 0256 20671


July 4th
1983
will be
Independence
of
America
Day

BBC SPECIALISTS

A NEW STAR IS BORN

FROM THE LARGEST RETAILER IN THE UK OF STAR PRINTERS COMES THE:

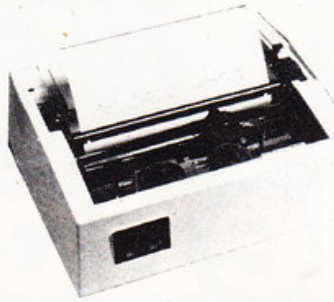
NEW STAR DP 510/515

EX STOCK

One Year Warranty, True Descenders 9x9 Matrix, 100 CPS Bidirectional & Logic seeking, 5,6,8.5,10,12,17 cpi 40,48,68,80,96,136 cpl, Italics, Emphasized, Double strike, Super & Sub Scripts, Hi-Resolution & Block Graphics
Continuous Underline, Backspace, Vertical & Horizontal Tabs Friction, Tractor Feed or Paper Roll (Roll holder standard) 2.4K Buffer Standard
Centronics Interface Standard RS232 — £55 extra, ex VAT
DP 510 Accepts 10 Inch Paper
DP 515 Accepts 15 Inch Paper

DP 510 £280.00 + £42.00 VAT = £322.00
DP 515 £399.00 + £59.85 VAT = £458.85

PACKAGE PRICE for BBC MICRO/DRAGON/ORIC
STAR DP 510 + Cable + Delivery & VAT £345.00
STAR DP 515 + Cable + Delivery & VAT £483.00



SPECIAL

NEW LOW PRICE ON STAR DP8480

EX STOCK

DP 8480 £208.70 + £31.30 = £240.00

RS232 Interface as standard
7 Needle Head 7x9 Character Matrix
80 cps Bidirectional & Logic Seeking
5,6,8.5,10,12,17 cpi 40,48,68,80,96,136 cpl
Block Graphics or Optional Hi-Res Graphics
Friction & Tractor Feed accepts up to 10 inch Paper

Hi-res Graphics option for DP8480	£15/£20
BBC Package (Star DP8480 + Hi-res option + Cable + Delivery & VAT)	£260.00
Printer Cables	
BBC to 36 Way Centronics Type Connector	£17.50
Dragon to 36 Way Centronics Type Connector	£17.50
Oric to 36 Way Centronics Type Connector	£17.50
Torch to 36 Way Centronics Type Connector	£20.00
BBC to 25 Way D Type (For use with RS423)	£9.50
BBC to 40 Way Edge Connector (Centronics 737/739)	£20.00
Full A>B Upgrade Kit	£60.00
Ram Upgrade Kit	£23.00

Disk Drives From £200.00

Including Case, Cables, Utilities Disk & VAT — Delivery £4.00
Blank C15/C30 Cassettes Ten for £4.50 ANY MIX
Send SAE for Full Price List of: –
Books : Software : Leads (Cassette, Monitor, Data & Specials) : Upgrade Kits & Components

Postage 50p per order or as stated
24 hr Securicor Delivery for Printers/Disk Drives £8.00

C.J.E. Microcomputers

NEW SHOP NOW OPEN

Dept (PCN), 78 Brighton Road
Worthing, West Sussex BN11 2EN
Tel: (0903) 213900

OSBORNE

BEAT THE PRICE RISE

DOUBLE DENSITY	£995
80 COLUMN D.D.	£1195
EPSON FX80	£365
DAISYWHEEL from	£425
MONITOR	£89

(Prices + VAT & Delivery)

DISCOUNTS ON 2 OR MORE

WE SPECIALISE IN OSBORNE AND WE ARE AUTHORISED MAIN DEALERS

Fraser Associates Ltd.
1 Bristle Hill Buckingham Bucks MK18 1EZ
Tel. Buckingham (0280) 816087

GEM SOFTWARE

for LYNX, DRAGON, SPECTRUM & ZX81 Software.

MONSTER MINE *by W. E. MacGowan* (LYNX & DRAGON) £7.95
Escape from the mine with as much money as you can, but don't get closed in or caught by the prowling monsters. An addictive machine code game, with superb graphics and save facility. (SPECTRUM & ZX81) £4.95

SULTAN'S MAZE *by Christopher Hunt* (LYNX & DRAGON) £7.95
Enter the 3D Maze in search of the Sultan's jewels, but beware, your strength may run out, or, you may come face to face with the Mad Guardian. A multi-difficulty game with fantastic graphics and sound.

CHARACTER GENERATOR *by John Line* (DRAGON) £9.95
A program for the programmer, allowing creation and saving of character sets/shape tables and subsequent inclusion into user's basic program. Demonstration program and full ASCII character set included.

GEMPACK IV *by W. E. MacGowan* (DRAGON & LYNX) £7.95
Two great machine code games, with full colour graphics.
In **Sea Harrier** you must land your plane on the aircraft carrier, after dispersing the clouds with chemical bombs, but don't hit the ship!
In **Sub Chase** you must depth charge the wolf pack without being sunk. Both with 4 levels of play from easy to kamikaze!

CHATEAU *by Pete Allen* (DRAGON) £7.95
A new type adventure, in which you must wander the Count's old mansion in search of treasure! Of course, when the Count died and hid his treasure, he also left lots of unpleasant surprises for those brave enough to try and seek out his riches!! Come face to face with Ghouls and Ghosts, Vampires and Trolls; do you run or fight? Will the mysterious Travel Agent suddenly appear and whisk you away to far off places? Where can you find the key or the lamp? Is the clock booby-trapped? Will you die a cold and lonely death, or will you win through to claim the fantastic treasures of The Chateau??

GAMES PACK III *by Christopher Hunt* (LYNX) £7.95
REVERSI Pit your wits against the Lynx with this easy to learn, yet extremely demanding board game. Five skill levels, from novice to grand master. **SNAKE** Guide the snake to the food, but watch out, he will grow and must not eat the wall or himself. **PONTOON** An excellent implementation of a favourite card game in full colour with sound. Lynx is a mean Banker.

GOLF *by Pete Allen* (LYNX & DRAGON) £7.95
An excellent Basic program, giving you an 18 hole course, with handicaps and choice of clubs. A golfing weakness must be specified. Amazing full colour graphics and sound!!

All titles available mail order or Access. All cassettes despatched by return of post.

GEM SOFTWARE
UNIT D, THE MALTINGS, SAWBRIDGEWORTH, HERTS.
Telephone: (0279) 723567

TRADE ENQUIRIES WELCOME — PLEASE RING FOR DEALER PACK.

These sample selection points, in fact, turn out to be at periods of five milliseconds (1/200th of a second). Unfortunately, the frequencies used for the discrete sampling are unavailable to us, but it is assumed that they would be selected according to a normal distribution graph — bell-shaped — as used in statistical analysis. The majority would be grouped about the mid-frequency range of human speech, and less at the band width extremities.

Although this method of sampling covers the whole range of normal speech, there is yet another problem — word or phrase completion, and plosives. Plosives are the result of the complete closure of the oral passage followed by the sudden release of breath or utterance. Examples of these are the sounds produced by 'B', 'D', 'P', 'K', 'T' and the hard 'G'. In these cases there is a silence during the build up of the power required to force the sound out of the larynx. Obviously, this silence has to be allowed for in the sampling technique and not cause the analyser to assume that it is the end of an utterance.

The method employed to distinguish between plosives and termination is the simple task of allowing a 32 sample wait during comparative silences. If the silence continues past this selective wait then termination is assumed and comparison with a stored vocabularly is instigated.

This historical and technical background should show you the enormous amount of effort required to produce an efficient recognition unit. The fact that this unit is available for such small machines as are around at the moment, and is relatively cheap, demonstrates the single-minded dedication of Ron Runge to improvements in the human/computer interface, and he should be given a hearty pat on the back.

But to return to the operation of VIM, we got as far as loading the VUP, a menu-driven utility program. This program allows the facilities of BUILDing and EDITing, TRAINing the VOCABULARY, RECOGNISEing the VOCABULARY, IDLEING AVIM (Apple Voice Input Module) and QUITing the VOICE UTILITY. Within these menu selections are further sub-menus to allow the operator to deal with all the requirments of voice input, storage of vocabularies, loading of vocabularies, loading and saving of voice patterns etc.

Playing Blackjack by talking to your computer is an experience

In operation, VIM proved to be a robust product with stable, easy-to-use software. The user manual leads you very simply through a series of exercises to familiarise you with the operation of the system. These use a set of pre-defined vocabularies for interface to standard Apple software such as Visicalc, Wordstar, Apple Pie and Basic plus a vocabulary for a Blackjack game (also supplied on disk). Playing Blackjack by talking to your computer is an experience all of its own — but, unfortunately, our resident card-sharp managed to lose all his money by chewing on a Callard and Bowser and trying to talk to the machine, which managed to misinterpret his instructions. Mind you, even I couldn't manage to understand him!

By studying the manual in depth you'll find many tips on getting the best results. *eg* use longish discrete words or phrases, avoid possible homonyms (bear, bare etc). I followed the advice in the manual, and found that the manufacturer's claims of high accuracy were valid.

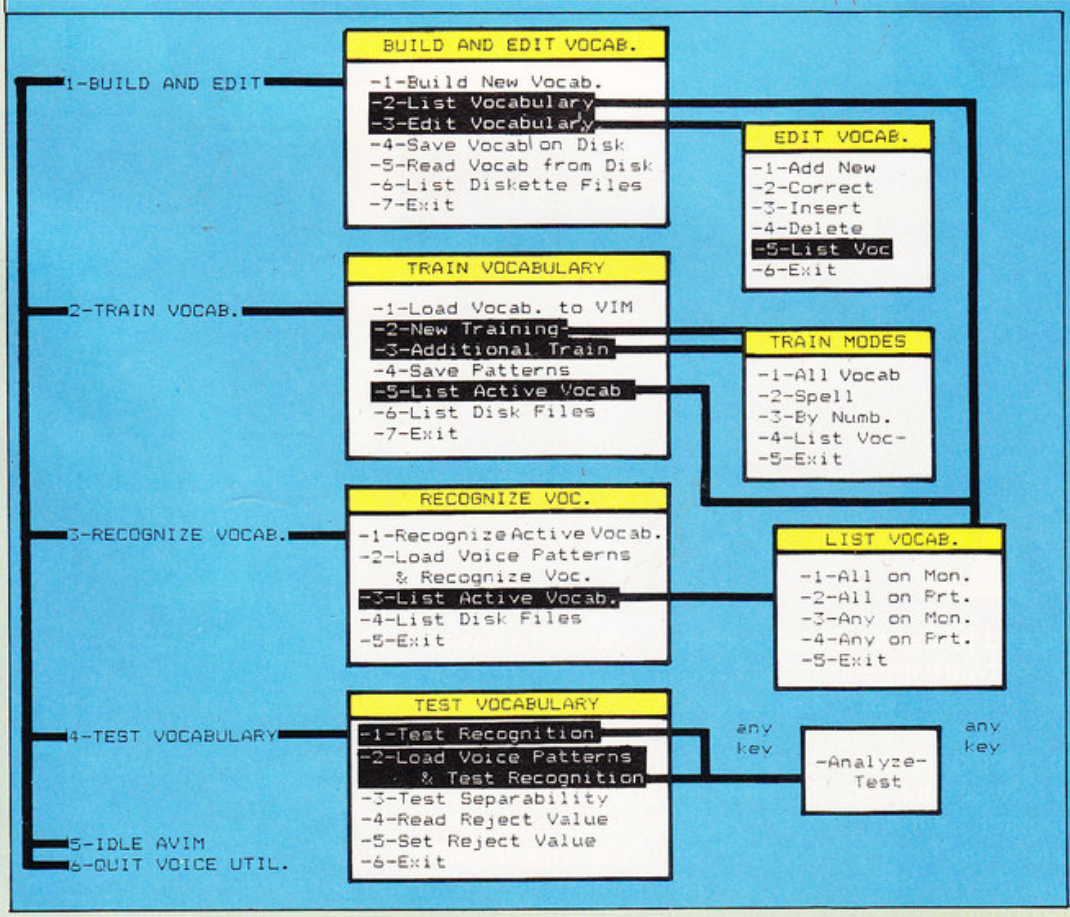
In fact, as a bit of a joke, we even tried to interface a BBC Model B microcomputer fitted with the Kenneth Kendall voice chip (see *PCN issue 4* for a review of this) to the Apple through VIM. *It worked!* Is this the first demonstration of non-bit oriented inter-computer communication? Could it catch on? We wait to hear!

Verdict

All in all I have got to admit that this system is most impressive. The manufacturer also mentions a whole range of extra options available for VIM. These include head-worn close-talking microphones, a programmer's reference manual and a cordless microphone system.

Thank you Ron Runge and CGD for giving me the opportunity to enjoy myself so much with such a professional and forward-thinking product. My only hope is that it is put to use correctly.

Item VIM (Voice Input Module) **Computer** Apple II **Price** £899 inc VAT **Contact** CGD Ltd, (01) 878 4072.



Learning to listen

These are the four slabs of menu you encounter when using the system. The idea is to choose commands which are both easy to remember and distinguishable for the machine.

Once you've saved the vocabulary you train the system to recognise the way you're likely to say the words.

The program clears the screen and prompts you, one word at a time, to say each word. It 'remembers' the way you say the words and then works its way through the list twice more. In this way it has a good sample of your pronounciation of the word — every time you say it, you say it slightly differently.

You then save the vocabulary to disk and tell the program to recognise the vocabulary. The program turns the VIM on and drops you into Basic, where you can load the program you wish to control with the system.

The AVIM program has options for testing your vocabulary for separability — to make sure that no two words will sound too much alike to the system.

We felt it was time we stopped telling you about ourselves and said a few words about the massive commitment which over 100 software organisations have made to the ACT Sirius 1.
On these pages are just a few of more than 400 packages now available for the Sirius 1, Britain's best-selling 16-bit personal computer.

The packages range from traditional accounts programs to sophisticated computer-aided design systems and there is a whole host of software for specific industries and professions.

If you're looking for a computer solution to match your business requirements, then 'phone one of the numbers above, before you look any further. They're all convinced that the ACT Sirius 1 is the best machine of its kind in the country – and they have the software that will make it work for you. And if you don't see what you want, just clip the coupon for details of more than 400 products designed for the ACT Sirius 1.

Please send me
the Registered Product Brochure,
listing over 400 Hardware and
Software products for the ACT Sirius 1.

Name _____

Position _____

Company _____

Address _____

_____

_____

Telephone _____

ACT sirius 1

ACT (Sirius) Ltd. FREEPOST, Birmingham B63 1BR, or call **021-501 2284**

NO TWO-BIT COMPUTER.

You're looking at the new true 16-bit MBC4050 microcomputer from Sanyo. Just one of a new range of machines designed to make your life easier.

With features like the 8086CPU, 128 KBytes RAM expandable up to 384 KBytes, twin 5¼" slim type double sided double density double track 640 KBytes per drive mini floppy disk drives giving more than 1.2 MBytes storage capacity, the CP/M-86 operating system, interfaces for Centronics – compatible printers and RS-232C communications port, you can see that the MBC4050 is something of a star performer.

As with all Sanyo products, the attention to detail will make the MBC4050 an even more attractive proposition. Thoughtful features like a built-in palm rest on the detachable keyboard, coiled cable and tilt display option for flexibility and ease of operation, and the versatility of 15 programmable function keys.

For further information regarding the many new bits in the Sanyo Computers range for 1983, contact our distributors, Logitek, at Logitek House, Bradley Lane, Standish, Greater Manchester or telephone them on 0257 426644.

Alternatively, clip the coupon below and return it to Sanyo. We'll send you information on any of our business machines, all designed to mind your business more efficiently.

SEE SANYO, THEN DECIDE

SANYO

Please provide me with further information on the Sanyo 1983 Business Machines Range. I am particularly interested in (please tick):–
☐ Microcomputers ☐ Calculators ☐ Telephone Answering Machines
☐ Electronic Cash Registers ☐ Dictating and Transcribing Machines

Name _____
Company _____
Address _____
Position _____ Tel (Day) _____

Return to Marketing Dept., Sanyo Marubeni (UK) Ltd., 8 Greycaine Road, WATFORD, Herts. or Tel Watford 46363.

PCN2

JABBERWOCKY give you the chance to become a secret agent! Can you reach London with the secret plans before the KGB reach you?
This adventure game with Arcade Action features single key commands for fast, real-time excitement! Written entirely in machine code for the 48K Spectrum!

WILL YOUR AIRLINER REACH IT DESTINATION?

CAN YOU OUT-SHOOT THE ENEMY?

WILL YOU EVEN FIND THE GUN?

WHO IS MRS. BORGIA?

WANTED — MACHINE CODE PROGRAMS — EXCELLENT ROYALTIES PAID

JABBERWOCKY SOFTWARE
610 WASHWOOD HEATH ROAD, BIRMINGHAM B8 2HG.

Access or Barclaycard Orders Ring

021 326 6394

I inclose cheque/P.O. payable to **Jabberwocky** total £..... or debit my Acccess/Barclaycard

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Signature .....

Name .....

Address .....

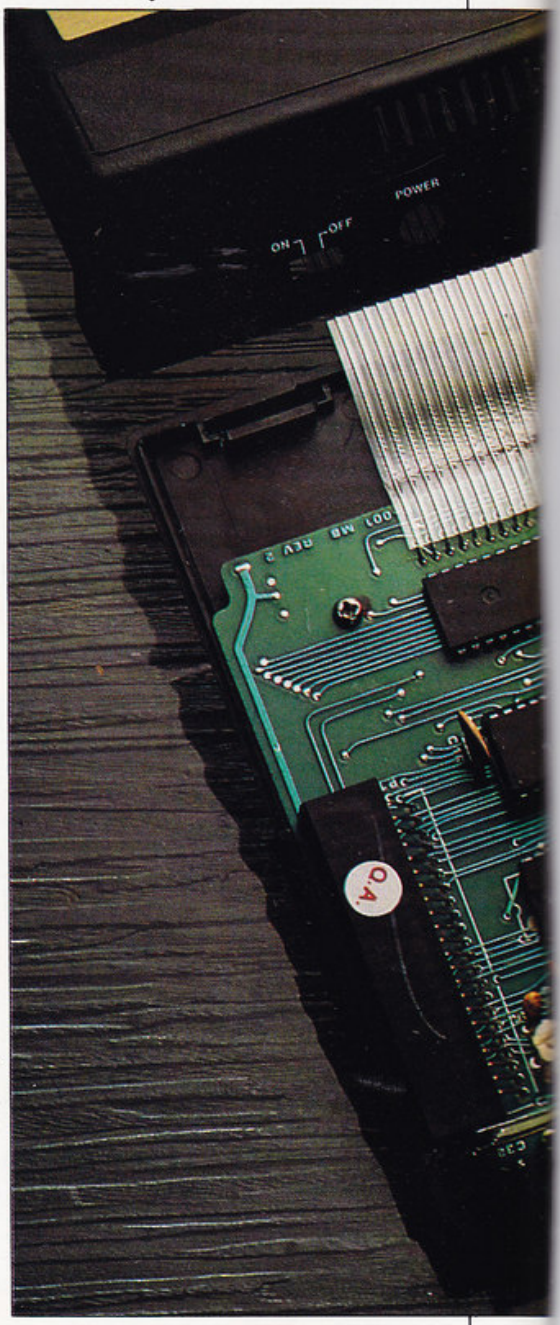
.....

Send to **Jabberwocky Software 610 Wash Wood Heath Road Birmingham B8 2HG**

JABBERWOCKY

Max Phillips falls for the Comx 35 — a full-featured colour micro for a miserly £120.

Beauty from the Orient



You don't launch a £120 home computer anymore unless you know exactly what you're doing. Fortunately, the Hong Kong-based Comx World Operations seems to have the market sussed. Its existing companies who should watch out.

The Comx 35 is a conservative little computer. It's beautifully built, well designed and it offers 32K Ram, colour graphics, sound, a usable keyboard, a joystick, ten bundled programs and a good Basic. For a miserly £120.

Presentation

The review machine was one of the first in the country. Its packaging is going through a cosmetic redesign. But functionally, its compact and strong enough. The Comx has a very consumer goodie feel to it, ideal for today's computer.

You find everything you need in the box. One pretty computer, TV lead, cassette leads, manual, freebie cassette and a plug/power pack. It really is child's play to get started.

Documentation

Documentation is the customary spiral bound Basic tutorial. It looks less glossy than some of its rivals . . . it's off a daisywheel with a single spot colour and a handful of diagrams. But who needs fatuous filler cartoons anyway?

Manuals are about communicating information and the Comx book is hard to beat. It's in English, it's thorough, accurate, well organised and not the slightest bit patronising. There's plenty of examples and programs and tables where you need them. In short, as an example of its genre it's spot on.

But, and it's a megabut, there's one omission — gut level technical information. The Comx is based on the antediluvian 1802, a wierd, wonderful but little known environment. A complete 'Comx 35 peeled' guide is essential.

Memory maps, I/O ports, entry points, schematics, ROM listings, CPU architecture. Every bit, byte and jumper should be documented. The Comx 35 will fail miserably unless UK and American companies can produce software and add ons for it. It needs the support that make Sinclair and Apple tops.

Comx says it will consider handing out technical information. It has a choice of confessing all or comitting suicide.

Construction

For £120, it's quite a shock. The Comx is well styled (a definite selling point) and well made. The main unit has a moving keyboard and built in four-way joystick and there's also a welcome on/off switch at the back.

Prising the Comx open involves just two screws and a small fight with its snap-on top. Inside, it's a beautifully made and laid out board, all posh connectors and apparently kludgeless.

The big surprise is the 1802 processor. This takes its name from the year it was last seen in a commercial product. Normally, nobody could care less what processor was in a machine. As long as it was a 6502, Z80, 6809, 8080 . . .

The 1802 is a CMOS 8-bit chip, equipped with a neat instruction set and piles of 16-bit registers. Last well known products to use it were the Elf, Cosmac VIP and Quest. Well . . . they were well known once.

No matter how good a design the 1802 is (the Dodo was a good design), its rareness is a fault. How many 1802 programmers are there left? How quickly will software houses train their latest ten-year-old folk heroes to program it? Having an 1802 introduces a dangerous unadoptability among software houses and add on firms.

Following the 1802 overture, there's a set of three RCA support chips . . . the 1869, 1870 and 1871. The rest of the computer seems to be a bank of 32K RAM and a second block, presumably video RAM, of 3K. Hence the 35K in Comx 35.

Keyboard

Super selling point, especially in photographs, is the Comx's 55 key keyboard. This is similar to the Oric's in feel but a little crammed. All decoding seems to be done in software so you can do what you like with it.

The layout is QWERTY at heart but the rest is original thinking. Punctuation marks are all moved round and DEL has ended up bottom left. But it's perfectly usable . . . most Basic characters don't require shifting, so tots should find it a delight.

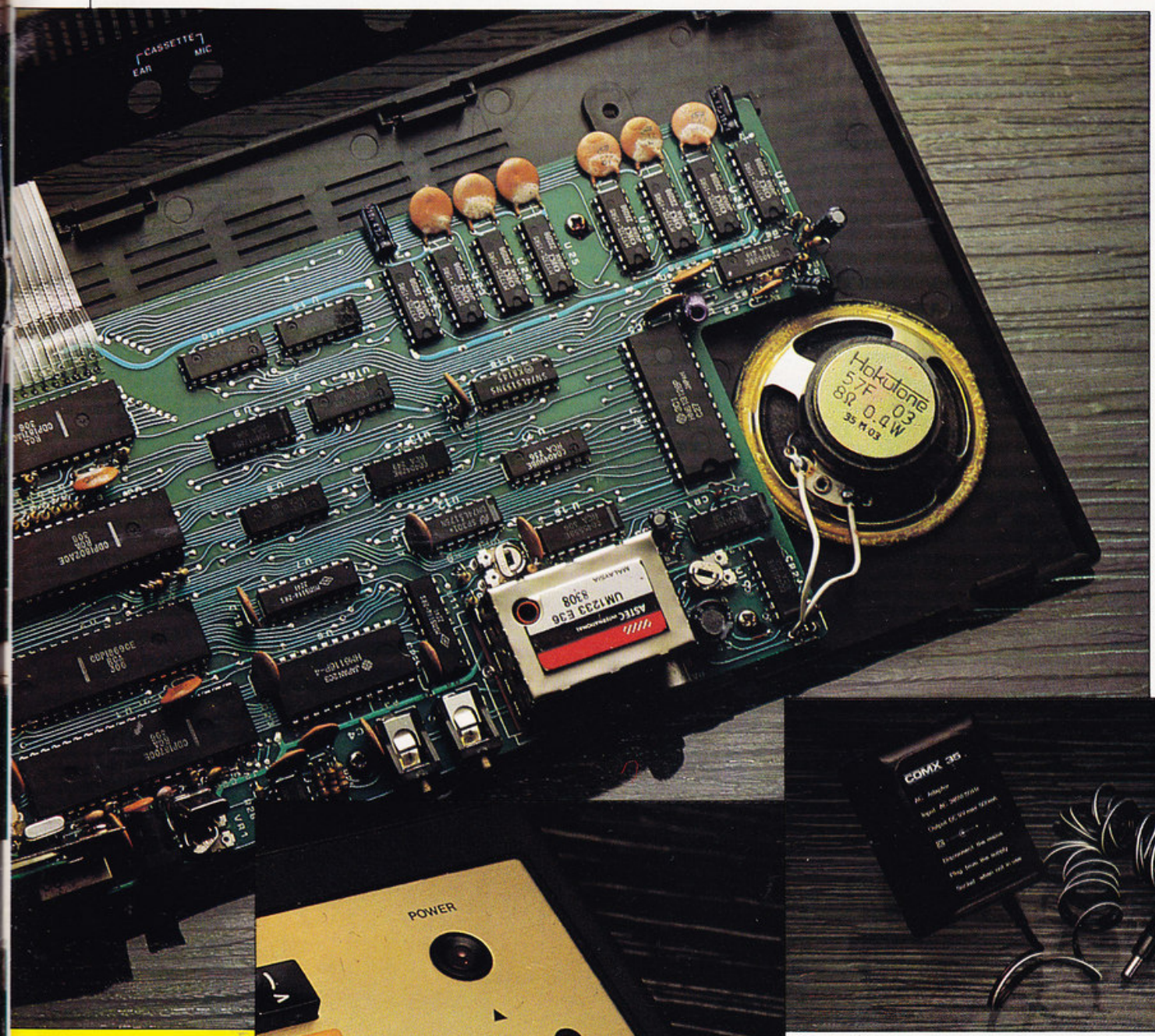
There's a reset key, labelled RT, carefully positioned right next to the 1. Sensibly, Comx has locked it. You must hold down the space bar and hit reset at the same time to actually reset the machine.

But not to make a glaring failure of including a sensible reset, the RT button is destructive. Hit it and it blows away all your programs and data. The ESCape key interrupts Basic programs . . . most of the time. I managed to hang myself several times.

But the real genius in the keyboard is the little joystick. Think about a built in joystick. Commercial programs can use it without having to worry about half their market not having bought one. Everyone knows there is a joystick and how it works.

It's a simple but sturdy device, and it's a little strange. All it does is generate key presses (136-139 for up, right, down and left). So you can read it with the KEY function in Basic.

It's an auto-repeat joystick (what am I saying?) so you can work it like a normal joystick but most of the time, the action is to flick it once with the tip of the finger rather than bend it Atari style with the fist and forearm.



Top: The Comx lid snaps off after removing two screws. Inside is a neat and well made board. The larger chips are the 1802 and display generator, user RAM is in the upper right with the video RAM to the left of the silver modulator.
Right: The built in joystick provides for up, down, left and right
Far right: The Comx has a separate power supply cum plug. There's an on/off switch on the computer

Screen

The Comx plugs straight into a TV. There will be American NTSC versions but there's no monitor output which may be fine for a home computer but it can be difficult to develop on.

Unless, of course, the picture is as good as the Comx's. It produces a stable 40×24 eight-colour display, with clear characters and bright colours. The review machine had some form of loose connection that caused the display to go pop on several occasions. Nothing that a smart tap on the table didn't cure!

The Comx is, at a cursory glance, a sort of colour ZX81. There a 40×24 line display with 128 different characters. Lower case isn't standard . . . it's replaced by more of the bizarre shapes and signs that inhabit the rest of the set.

But the entire set is redefinable using the gloriously easy SHAPE command. So you could put lower case in if you wanted it. This is the full extent of Comx graphics as far as the Basic system goes. No pixel graphics, no bit mapped high resolution.

You could do a 64×90-odd bit-mappedfudge but it's hardly hi res graphics and it wouldn't fill the screen. You could define yourself a set of pixel characters . . . 80×48 wouldn't be difficult. Don't let it put you off. PET owners never let it stop them. And they didn't have colour.

But Comx colour is cryptic to say the least. It goes something like this. The 128 characters (normally white) repeat with codes 128 to 255 in a second colour (normally cyan). At a simple level, Comx Basic puts your typing up in the first colour and its responses in the second. Coupled with a pink cursor, it's a surprisingly helpful use of colour.

You can set the background colour to any of the eight available with SCREEN. And you can select the two character colours from a palette of 12 choices using

48▶

The Comx 35, the home colour computer at a take away price. There's 35K Ram, colour and sound for £120. Top: The Comx manual . . . spot on for its genre

◀47

COLOR. There's also a CTONE command that brightens text against the background by fiddling with luminances.

Sounds like there's only four colours on screen at once (background, two text and cursor). The rest of the colour involves the actual character definitions themselves. Comx characters are on a crammed 6×8 matrix. The high two bits of any of the eight bytes in the definition select from four colour pairs to be used like cyan and white in the default set.

So, in reality, you've got access to multicoloured characters, with each line of six dots being a combination of two colours. That's a similar colour resolution to the Oric.

What does this make Comx graphics besides a considerable strain on the mind? Good enough. You can use the definable characters to produce fast, multicoloured arcade style displays, particularly if you can program the 1802.

The Comx misses out on normal graphics. There's no PLOT command, no CIRCLE, PAINT, LINE and so on. The best you've got is CPOS(Y,X) to position the cursor for PRINT. But it doesn't really need them. Commercial programmers, at least, can do great things with multicoloured character graphics.

A last word on graphics. COLOR has the audacity to reset all your character definitions. So any thoughts of cycling quickly through the colour palette like the BBC's VDU 19 should be careful thoughts.

The Comx 35 has sound. Plenty of it. It comes through the built-in, innocent

looking speaker but can be so loud that an external on/off/volume control would be a real blessing.

Not that it's fancy sound. There's a single note channel, opened at any of eight octaves with MUSIC or TONE, and a Gaussian white noise thingy controlled with NOISE. There's also a VOLUME command but it's helpless against the others.

The great thing about the sound is that it's simple. You can do explosions, phasers, invaders and so on with the minimum of parameters and the maximum effect (usually deafness).

The sound is all done in software. On most machines your program would have to stop to do a really juicy effect. But the timed interrupts in Comx Basic, using TIME and TIMOUT, lessen the problem. The demo programs included with the Comx make the point that sound is often neglected. In the loudest possible way.

Storage

The Comx plugs into an ordinary cassette recorder using its supplied EAR and MIC cables. Comx at least isn't babbling incoherently about microdrives but says it hopes to have disk drives this year.

There is a command DOS in the Basic which comes back with the reassuring error code 62. A 62 turns out to be 'ROM or ROM card not installed'. Bingo!

The cassette itself actually works well. You get a quiet replay through the built in Public Address system. It sounds like it's around 300 baud and there's long leaders and short blocks.

It worked fine. There are no named files and programs are saved with PSAVE and PLOAD. Apart from the playback, you've got no indication of how things are progressing.

The only other discernable bit of COS is DLOAD and DSAVE which load and save Basic's data tables. Simple and effective as it goes.

Expansion

Well, there's room for it. There's a single expansion socket, for you-name-its. Comx is planning a printer, disk drives and so on this year. But it's a shame there isn't a plain ordinary Centronics printer socket on the back. It would make a usable teeny word processor. And where are the pin outs for the socket?

Basic

Comx Basic is very impressive. 1802 Basics aren't easy to come by and Comx had to write its own (fear!). It bears the dreaded Version 1.00 label but seems to be a tremendous success. Perhaps Comx has cornered the world market in 1802 programmers.

Comx Basic feels like an 8K Basic like Microsoft's or Sinclair's. It's got its share of fabulous goodies and disastrous deficiencies. But it's not the same mess as some other home grown Basics.

Good bits first? Try and believe some of this. A RUN+ statement that converts literal GOTO destinations into absolute addresses. It produces a marked increase in speed in an already reasonably fast Basic.

TIME starts an internal interrupt timer. When it reaches zero, the Basic GOSUBs to the routine specified by TIMOUT (line number). Try that in your event-driven IBM Basic.

Timed interrupts let you do amazing tricks, like playing tunes under program control continuously with a game under way at the same time.

There's FORMAT and FIXED for printing numbers. FVAL evaluates an expression in a string. CHR$ will take a list of ASCII codes instead of just one. EXIT even let's you change your mind about FOR/NEXT loops. Yuk.

There are fewer bad bits. Strings are limited to 127 characters and string arrays to 255 elements. There's no ON . . . GOTO and ON . . . GOSUB. So you're stuck with GOTO 100*20−4.7+NT . . . etcetera. AND, OR, XOR and NOT are byte sized, bitwise operators. They can't be used as operators in IF statements.

For debugging, there's TRACE and RENUMBER. Editing is an old fashioned serial line editor invoked by EDIT. You position the cursor under the point you want to change and type, I,D or C for insert, delete or change, followed by the new characters. Control S then implements the change.

This pedestrian antique is workable as well as laughable. Perhaps Comx's 1802 development system runs on a serial terminal. A throwaway touch is Control R which retypes the last command. It's great to see another micro with this 5 minutes' worth of programming that puts years on user's lives.

And sin of sins, the Basic doesn't have any error messages. There's a total of 73 different error codes, thankfully listed on page 133 onwards. There's only one reason to forgive this . . . this list offers an insight into future developments. Files not opened for I/O. Unacceptable character in BINARY number. Even WORD not in LIBRARY. The mind boggles.

Comx Basic is one of the best 1802 Basics around. 1802 jokes aside, it's a great home computer Basic, perfectly adequate for most jobs. It commands over 30K of usable memory, allowing newcomers a good stab at learning programming.

Included with every Comx is a cassette of ten programs. The review machine came with a preliminary but mostly working copy. There's five games and five more 'serious' programs.

If this is a sample of the software you can expect, you need not worry about independent suppliers.

Verdict

The Comx 35 is a great little machine for £120. Everyone knows that prices go down and performance goes up. The Comx is just right in many ways but not dramatically so.

Competition has to be the unstoppable and so-far unrivalled ZX Spectrum. It costs a mere extra £10 to go to the 48K wonder machine. The Comx's little advantages . . . keyboard, quality display, solid construction . . . will have to work hard to detract from the Spectrum market for cheap quality software.

It's wait-and-see time for the Comx. It has to get add-ons, software, technical information to make it. When the flies start falling, Comx will be well placed. It should be able to play chase-the-price-tag with Sinclair itself . . . a game few others dare to risk.

You've also got to wait for the arrival of the Comx. Don't buy it mail order until you've seen dealers' windows full of them. Few computers ever go from review to end users in a matter of weeks. Initial shipments should already be here. Let's hope that the Comx doesn't do a disappearing Texet.

The Comx 35 is a fun little machine and it offers great value for money. It's aimed at the first-time buyer who starts off with games and goes on to programming and it hits that target spot on. All Comx has to do is deliver it and any number of British and American companies will have to think hard.

In short, like it or not, the Comx 35 is a winner.

COLOURS SET BY COLOR(X)

	Colour 1	Colour 2
1	Black	Green
2	Red	Yellow
3	Blue	Cyan
4	Magenta	White
5	Black	Blue
6	Red	Magenta
7	Green	Cyan
8	Yellow	White
9	Black	Red
10	Blue	Magenta
11	Green	Yellow
12	Cyan	White

Colour combination 12 is the default value.

SPECIFICATION
Price £120
Processor 1802
Ram 32K
Text screen 40×24
Graphics screen 40×24, 8 colours
Keyboard 55 key moving keyboard with joystick
Storage Cassette tape
Interfaces Expansion port
Language Basic
Distributor Asley Computers, Unit 133, Hartlebury Trading Estate, Hartlebury, Worcs, DY10 7JB.
Software supplied Demo tape of ten programs

Now that software for the Ace has gone Forth and multiplied, Max Phillips tries his hand.

Playing the Ace

Speed is not one of the qualities of the 'fastest microcomputer in the universe'. It's taken ages for software and RAMpacks to emerge for the eccentric Jupiter Ace.

But now they're here, the claim that Forth makes for fast, value-for-money programs is easily tested. And you'd be surprised what can be done.

GOBBLEDEGOOK

To start the Pacman rolling, there's Gobbledegook from old Jupiter itself. It runs on a 19K Ace and comes with the minimum of paperwork. Sparse cassettes with slightly smutty covers characterise Ace software.

Congratulations to the brain that thought of the name Gobbledegook; it's the best imitation Pacman name in the business. It's a shame it's a touch too long for the Ace's filing system and the program actually goes by the name of Gobblegook.

But it's a fun program and it plays well. Everything's there . . . you eat the pills, and the gooks chase you. Eat a power pill and the gooks shrivel a bit.

My only quibble is that it isn't easy to spot the change from a violent gook to a shrivelled one.

Gobbledegook gooks move randomly—they don't have the comin'-to-get-you mentality of most Pacmen. You can select between two chase algorithms using Logic A or Logic B. So it's a different game from the one you're used to.

Program luxuries include an ingenious automatic score ladder and provision for two players to take turns and compete. There's screenful after screenful of pills, but there are no proper progressive playing levels. So apart from eating your friends into the ground, Gobbledegook won't provide eternal fun.

HOPPER

Hopper is, of course, Frogger. Discount Software's version for the 19K Ace should be famous for its cassette cover. A heroic attempt to reproduce the unfortunate frog has come out looking like a demented four-legged acorn with measles. Well worth the money.

It is a bit of a disappointment to find that the joyous object does not turn up in the program itself. Still, there's plenty of graphics and music to make up for it.

The game is rather simple. You've got to cross a wide motorway, divided by two streams of traffic. This is much easier to deal with than versions where the directions of traffic are mixed together.

Your controls are simply left and right arrow to move left and right and up arrow to hop forward.

Hopper isn't too hard to master, but there are a few rough edges. There's no play-again option, and the frog can frequently be persuaded to fly over the backs of lorries. Fun for the minutes it lasts.

FROGGER

Frogger take two came from Remsoft, the Brighton-based software house that's also the Jupiter Ace user group and vice-versa.

Remsoft's 19K Frogger has a busy road with alternating traffic followed by a fast-moving river for you to cross. There's plenty of noise but it lacks the odd trimming — a high-score feature, for example.

The controls are 0 for right, 1 for left and 9 for forward. You can't move left or right once you're past the road.

It doesn't take long to be notching up free frogs like they grew on trees. But miss on the road and you turn into a small heap of frog. The same splat also appears if you drown.

If you can't get off a log quick enough, you are swept away off the left of the screen. But curiously, the frog wraps round to reappear on a new log at the right of the screen. You can hop it to safety only to discover that it turns into a splat the moment it reaches home.

Frogger is nicely programmed and reasonable fun. But more work wouldn't go amiss.

OTHELLO

Othello is more than a touch fashionable at the moment. Jupiter Cantab's 19K version is competently done and has the advantage that it plays a reasonable speed.

Ace Othello will play against you or act as a board for two human players. There's a welcome user interface, far ahead of the nasty old co-ordinates, commas and returns that ruin most Basic versions.

You pick your move by positioning a * cursor over the relevant square, using the four arrow keys. Once you've decided where you want to go, you press 0 to place your counter.

The display presents a neat board with slightly square pieces. But it updates quickly and pieces are turned over with reassuring speed.

Positioning the * involves a series of musical tones. Great fun . . . it's as interesting to play tunes on the cursor as it is to play Othello.

If you can't go, you can press 1 to skip your go. Unfortunately, you can do this at any time during the game, allowing for some sophisticated cheating.

But the proof of the pudding is in the beating. And Ace Othello managed to lose several times.

GREEDY GOBBLER

Time to hang up my RAMpack and go back to the days of the 3K RAM. Greedy Gobbler comes with Blowing up the World, and is one of a vast number of tapes designed to keep people amused while they save up for the RAMpack.

The cassette is produced by Jupiter, and offers an amazing fun-per-byte-penny ratio. Program one is a complete but rather tiny Pacman. It's controlled by a sensible cross-shaped key cluster and makes more noise than you'd have thought possible on an Ace.

You are randomly followed by four baddies plus a dead one in the middle that never seems to move until you walk near it. Eat a power pill and they turn into edible top hats for seven seconds.

Greedy Gobbler is great fun — even addictive.

Program two raises the odd political issue. You are a satellite that flies over a map of the world. The idea is to completely erase everything within a count of 3,000 by dropping bombs. You just sit there and press 1-8 depending on the distance at which you want the bomb to explode.

It could be a sedate pastime for retired megalomaniacs. The world puts up very little resistance . . . kind of satisfying.

Now if the world fired back at you and your satellite got lower and lower you'd have a competitive game. It's called Bomber! But Blowing up the World is an earth-shattering experience with a charm all its own.

FISH AND FLUTTERER

I tried another 3K tape to see if Jupiter could do it again, and Fish has much the same qualities. You control a beautifully animated fish in a strong right-to-left current.

The only object is to eat as much of the strange-looking food and debris as possible without getting swept off the screen. There's a counter of how many things you've eaten and that's it.

Flutterer is another non-competitive game. A strangely menacing fly wobbles its way down the screen while you fire your inexhaustible supply of jerky rockets at it. Hit a flutterer and you score one point. That's the sum total of its 3K wonder.

Jupiter Cantab Cheshunt Building, Bateman St, Cambridge, CB2 1LZ (0223) 313479 — Gobbledegook £7.95, Othello £7.95, Greedy Gobbler & Blowing up the World £5.95, Fish & Flutterer £5.95. **Remsoft** 18 George St, Brighton (0273) 602354 — Frogger £6.50.

FLIGHT SIMULATOR

APPLE

Skyline computing

Name Cleared for Landing **System** Apple II, 48K, DOS3.3 **Price** £49 **Publisher** Programmers Software, Arkansas **Format** Diskette, **Language** Machine Code/Basic **Outlets** Beattie-Edwards Aviation, 20 Normanhurst Close, Three Bridges, Crawley, Sussex, (0293) 20565.

IFR Simulator from Programmers Software is a hi-res simulation of flying an aircraft on instruments. It has been around in various guises for some years, but this is the latest and most sophisticated version.

It's aimed (according to the manual) at those who want to understand the workings of aircraft instruments and navigation, not at training real pilots.

Quite why anyone would choose to learn about such a rarefied subject without at least wanting to become a pilot, though, I can't imagine.

Don't think that this is an alternative to the classic flight-simulator, A2-3D1 from Sublogic, though. It isn't the same thing at all.

Objectives

IFR Simulator is intended to train you in the complexities of blind-flying. For this purpose the 'basic six' instruments must be available. These are altimeter, airspeed indicator, artificial horizon, turn and bank indicators and rate of climb or descent indicator.

Also included is a set of radio-navigation instruments, namely two OMNIs and an automatic direction finder. These are the real reason for the program, and it is intended to train you in their correct use.

Training is done by 'flying' a series of problems, which range from simple to very difficult. The task is to orientate yourself by using the OMNI and ADF, then to fly to a given position. If this is done successfully it is assumed that you could have made a successful landing from that point.

Whenever your altitude drops below a minimum, the session is over, and a plot of your flight-path is shown, since you have effectively landed. Naturally, doing so anywhere but on the runway is a crash, but the program doesn't take any notice if you do.

First impressions

The documentation would be good if it were better organised. It has all the information required, but it's in such a mess that it's not a lot of use.

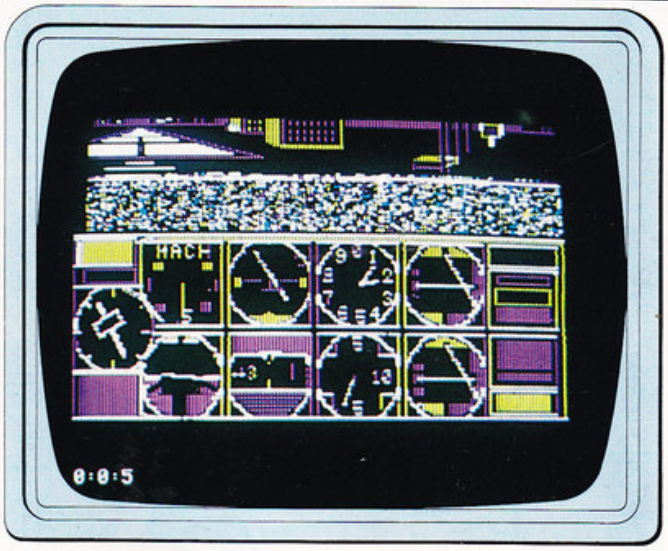
The manual is OK if you know a bit about instrument or radio-flying, but rather confusing otherwise.

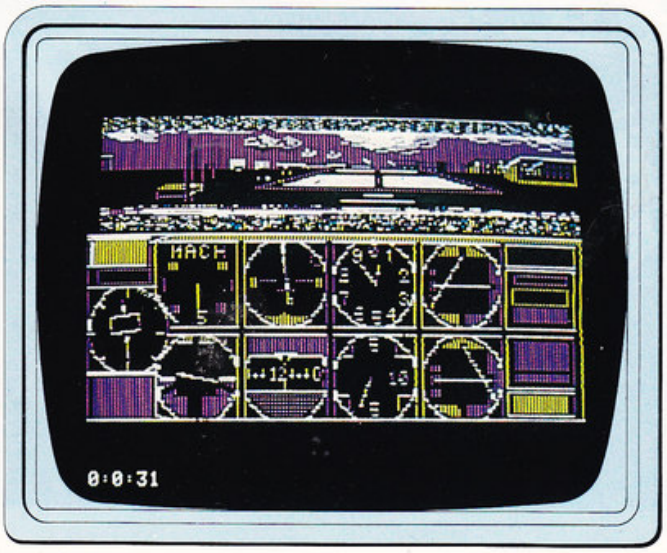
Getting into the pilot's seat is a matter of menu-driven teleportation. You boot the disk and are presented with a menu of problems. Selecting one of them immediately transports you to the starting position.

The problem is shown on the bottom of the screen in the typical terse, cryptic style of the airways. For example:

LR NDB RWY 4. Direct to NDB
344 Out Procedure trn.
164 inbound to runway
FAF is bottom OMNI

From there on in, you're on your own. Happy landings . . . mind you, it isn't easy.





In play

The actual flight characteristics of the plane are noticeably different from the Sublogic simulator. It seems much less jumpy but rather less stable, and if left unattended in level flight, has a habit of wandering without any noticeable tendency to correct.

The speed of response is quite adequate, because most of the real work is done in machine code.

The use of the Apple's facilities is excellent. The instruments, both conventional and electronic, are beautiful, and their response is uncannily accurate. But my main criticism is against the 'out-the-window' view. This is a picture of an airport runway, stretching away into the distance, with several large buildings on either side.

When the plane turns, the view scrolls sideways. It's beautifully done, but utterly pointless since it doesn't respond as a real horizon.

The main trick when you're flying this thing is not to worry about the apparent lack of response from the OMNIs, as you barrel along waiting for something to happen.

As long as you're flying *towards* the beacon, not away from it, the OMNI will suddenly swing over as you cross the beam. Only then do you get some idea of where you are.

The joystick or paddles are used to fly the plane, P adds 3 per cent more power each time it is pressed, L subtracts the same amount.

The only other valid Keypress is ESCAPE, which gives an X-Y plot of your course so far.

The authors don't approve of doing this, so for some time after looking at the plot, the compass is dead. Pendantry.

To build new problems, you need to use the Seed program, which contains the actual flying problem. Installing a new flying exercise consists of making some minor changes to the Basic code. This, the authors suggest, is not something you would want to do yourself, so they advise you to send them the details of your approach-problem together with $100, and they'll do it for you.

I bet they will, but I can't figure out why they didn't put all the relevant details into a file, and add a little file-manager to take care of it.

Verdict

After making a thorough mess of the first few problems, I began to get the hang of it, and apart from the irritating display, found it quite fun.

It isn't strictly a game . . . it's a real simulation, and as such is instructive. Certainly there is nothing like it on the market.

Overall, I would say that my feelings were of modified rapture. It's a good solid program which is interesting and different.

Richard King

RATING

Lasting appeal	👾👾👾
Playability	👾👾👾👾
Use of machine	👾👾👾👾👾
Value for money	👾👾👾

Virgin Games

A name to PLAY with

GOLF (Spectrum 16K & 48K)
CHAMPIONSHIP GOLF IN YOUR OWN HOME by David Thomson **VGA 1004**

MISSION MERCURY (VIC 20 UNEXP)
LAND YOUR CRAFT AND RESCUE THE SCIENTISTS . . . BUT BEWARE THE ASTEROID BIRDS by Steve Lee **VGA 3001**

YOMP (Spectrum 16K & 48K) **COMMAND THE PARAS AND TAKE ON THE IMPOSSIBLE** by T. Murray & R. Poole **VGA 1001**

STARFIRE (Spectrum 48K) **RID THE GALAXY OF THE XTARDAN BATTLE CRUISERS – A GAME OF STRATEGY AND SKILL** by Martyn Davies **VGA 1002**

SHEEPWALK (Spectrum 48K) **A SHEEPDOG TRIAL IN YOUR LIVING ROOM! IT'S A ONE-MAN SHEEPDOG TRIAL** by Gregory Trezise **VGA 1003**

SPACE ADVENTURE (BBC B) **A GRAPHIC ADVENTURE SET ON A SEEMINGLY ABANDONED SHIP DRIFTING THROUGH SPACE** by R. Thomas & A. Thomas **VGA 2003**

BUG BOMB (BBC B) **A SKIN-TINGLING NEW ARCADE GAME** by Simon Birrell **VGA 2001**

LANDFALL (BBC B) **AN EXCITING AND REALISTIC SPACE SHIP LANDING SIMULATOR** by Gregory Trezise **VGA 2002**

VIRGIN GAMES GANG

- **With each title you buy before the end of August you get:–**
- 1. An offer of **One Year's Free Membership** of **The Virgin Games Gang.**
- 2. **Free Entry** into **The Virgin Games Gang draw** on September 6th.
- **First Prize – £500 of computer hardware or software** of your choice
- **Second Prize – £100 of computer hardware or software** of your choice
- and **150 runner-up prizes** of **Virgin Games T-shirts or posters.**
- 3. A **Specially mixed** piece of **music by Steve Hillage** – to **play** while you **play.**

- If your local retailer is not yet stocking **Virgin Games** – tell him he should be – but, however, you can order direct from **"I've got no good local retailer" dept, Virgin Games Ltd, 61-63 Portobello Road, London W11.** enclose a cheque or postal order for **£7.95** for **each title** you want and don't forget to put your name and address – people do you know!
- **Allow up to 28 days for delivery before complaining.**
- **Don't forget,** if you want to make some money to buy some games from us or do whatever else you get up to and you have written an original games program, with good graphics for any of the popular home computers other than the ZX81, **send a cassette version to us – it could make you rich.**

£7.95

R.R.P.

Computer FUN . . . available NOW!

DRAGON ACTION

DRAGON 32

Vindictive vultures

Name Vultures **System** Dragon 32, joystick **Price** £6.95 **Publisher** J Morrison (Micros), 0532-480987 **Format** Cassette **Language** Machine code **Other versions** None **Outlets** Mail order and some dealers

Just when you thought you'd killed your last invader, and you'd never want to see another row of aliens, galaxians, or anything else lined up at the top of your screen, someone comes along with a new variation and you're addicted once more — or I was, at least.

Objectives

In this single-player game you're being attacked by vultures who are attempting to drop — well, use your imagination about that. The joystick helps you keep down your cleaning bill, and the only aim is to wipe out the waves of increasingly fast-moving vultures as you head for that high-score that's recorded at the top of the screen.

This early review copy came without a cassette insert, though J Morrison's packaging has never been of the most professional. This does tend to detract a little from the programs, which are usually very good.

In play

The program is auto-run, and offers you slow, medium and fast speeds. The blue and yellow vultures line up at the top before peeling off individually to zig-zag down the screen in what is initially at least a reasonably slow and predictable manner. But that doesn't last long, and while you only have to contend with the birds one at a time, a nasty trick is that on reaching the bottom they come back up (obviously eating that seed that makes birds bounce with health) in a faster more erratic manner.

They flap about till you can pick them off, a flying vulture netting you 200 points while one still in the holding pattern earns you half that amount. There are no mother vultures gliding randomly across the top, but once you've managed to wipe out the flying birds a row of eggs will hatch out one at a time to present you with — yes, super-vultures, which move even faster.

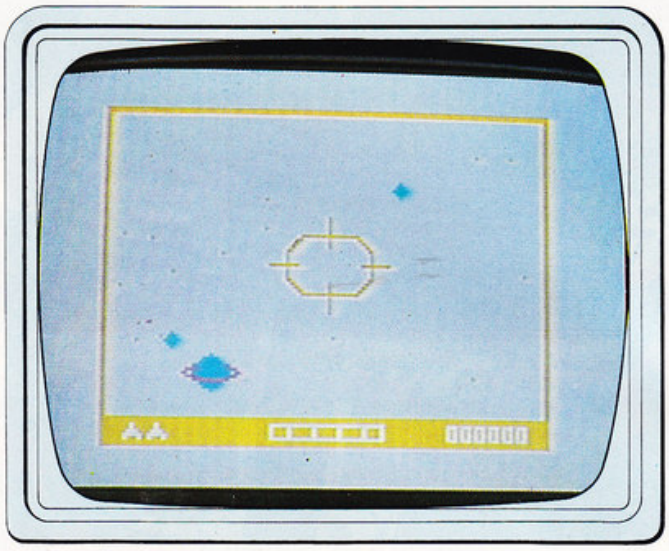
As with Galaxians, the best technique is to glide under the birds and shoot them as they move, being careful to keep out of corners, though when they do eventually get you, one way or another, and you lose one of you three lives, you'll be subjected to a burst of derisory chirruping . . . or whatever noise vultures make.

Verdict

Vultures is an amusing and addictive variation on an old favourite. It is reasonably priced, and as it is written in machine code, is fast. It should provide a messy challenge to most people. **Mike Gerrard**

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	



DRAGON 32

Violence in 3D

Name Star Jammer **System** Dragon 32, joystick **Price** £7.95 **Publisher** Salamander Software, 0273-771942 **Format** Cassette **Language** Basic **Other versions** None **Outlets** Boots, Spectrum and mail order (+ 50p)

Three-dimensional games just don't seem to have caught on as well as some others. Most people apparently prefer to see their targets moving down or across the screen, rather than hurtling towards them in increasing size as they do in this new battle game from Salamander.

Objectives

The aim of the game is to stop the alien ships from a distant galaxy reaching the colonised planets of your own federation . . . or to put it another way, zapping and high-scoring.

Star Jammer is the name of your ship. The game itself comes in Salamander's usual sturdy plastic wallet, complete with instruction leaflet, though this is scarcely needed as the game is as easy as falling off the proverbial log. My copy LOADed first time every time.

In play

Your sights are fixed in the centre of the high-resolution screen. Stars and space debris float towards and around you. From time to time you'll see a green or purple object in the distance. By using the joystick you must steer this into your sights and blast it with your cannon ('the very latest type', it says, so Salamander obviously spares no expense.)

As the alien ships approach, they turn into one of several varieties, from the common 50-point 'H'-wing to the infrequent 1,000-point Commander, but they all have to suffer the same fate as you head for the targets of 10,000 and 50,000 points and your reward of an extra life. I'll have to take that on trust, I'm afraid, as my entries in the high-score top ten at the end are strictly between me and my Dragon.

Occasionally you'll approach a Stargate, and be drawn through the whirlpool-like phenomenon into the next quadrant of the galaxy, while having your energy replenished at the same time.

You have three lives, and if the enemy ship gets close enough to fill the screen you're going to lose one of them. Sound was a little disappointing, with unexciting little shrills and bleeps, and only a siren when your ship is wiped out.

The game is pleasing on the eye in colour, but it is set against a pale rather than the usual black background, so I wouldn't recommend it to those with just a black-and-white set. They'd find it tricky to pick out the aliens.

Verdict

This isn't a game to set the world alight, and it lacks the simple 'Clear the screen' challenge of most games, but it is reasonably fast for Basic, and requires a fair amount of dexterity with the joystick. It shouldn't disappoint buyers. **Mike Gerrard**

RATING

Lasting appeal	
Playability	
Use of machine	
Overall value	

PCN ProgramCards

What a load of goodies we've got for you this week! Eleven annotated ProgramCards for your ever-increasing library of programs. You are keeping these, aren't you?

This week

For those of you with disk-based BBC machines we have a good routine to recapture the lost disk work area (3584-6400) in memory for use by large programs. This procedure was sent to us by C R Tanner of Ickenham, Hillingdon, and can be used in your own program loading utilities.

Following hard on the heels of the Colour Genie articles in this and last week's issues we have a small *Mastermind*-type program.

John Tompkins of Leicester sent us his Micro-mind game. It shows how simply this type of game can be programmed, yet still be effective and entertaining.

Allan Tennent of Glasgow was pressurised by his younger brother to write some games on his new Dragon 32 machine. One of the fruits of this persuasiveness is this version of the perennial Breakout game which uses the machine's low-resolution mode to give better speed — he has not yet mastered the art of machine code programming to use high resolution with any reasonable speed. This may not be the best example of the game, but as an early attempt at inter-active games programming it was deemed worthy of inclusion.

How many of you with machines capable of sprite graphics have managed to fathom the intricacies of using them? Well, Andy Holmes of Coventry thinks he has got it right with his interesting version of a 24-hour clock using the sprite graphics facility of his Commodore 64.

Will it prompt others of you to show us your sprite techniques? We hope so!

Adventure games addicts will no doubt be pleased to see Pirate Island by 14-year-old Philip Green of St Helens, Lancashire, starting this week. His game is not complex but demonstrates the ideas behind adventure games programming in an easy-to-follow way. It is for the Atari 400/800 range of machines but with little effort can be converted to a whole host of other computers.

Are any more of you working on adventures? If so, then let us know when you have them completed so that others may learn how to develop their own games.

A RUN for our money

Gives us a RUN for our money.

Contributions should be sent on disk or cassette, with a plain paper listing and brief notes to:

Programs Editor, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

All disks and cassettes will be returned, at our expense, after consideration or publication.

PCN ProgramCards

Mover

Card 1 of 1

8315M

A fully documented procedure to allow recapture of the disk workspace (3584-6400)

```
  10REM THE USER MUST LOAD ALL PARTS OF THE PROGRAM FROM DISC BEFORE
  20REM THE PROCEDURE IS USED AS IT WILL TURN THE DISC OFF WITH *TAPE.THIS
  30REM PROCEDURE IS DESIGNED TO BE USED IN THE USERS OWN 'DISK INDEX PROGRAM'
  40REM WHICH SHOULD FOLLOW THE FOLLOWING FORMAT
  50REM
  60REM 1.LIST ALL PROGRAMS ON THE DISC AND ALLOW ONE TO BE SELECTED.
  70REM 2.*LOAD ALL PARTS OF THE PROGRAM INTO MEMORY BETWEEN &1900 AND &7000
  80REM 3.CALL THE PROCEDURE TO MOVE THE PROGRAM DOWN IN MEMORY TO ITS CORRECT
POSITION AND THEN RUN IT.
  90REM
 100REM TO USE THE PROCEDURE YOU MUST PASS IT SOME INFORMATION
 110REM
 120REM PROCMOVE(LENGTH,START ADDRESS,RELOCATE ADDRESS,PAGE OR CALL ADDRESS
 130REM ------------------------------------------------------------------
 140REM ,INSTRUCTIONS)
 150REM ---------------
 160REM
 170REM WHERE THE INSTRUCTIONS ARE..
 180REM
 190REM B=RELOCATE PROGRAM AND THEN SET PAGE VALUE AND RUN
 200REM M=RELOCATE AND CALL RUN ADDRESS
 210REM R=ONLY RELOCATE PROGRAM THEN ENDPROC
 220REM E=ONLY SET PAGE VALUE AND RUN PROGRAM
 230REM
 240DEFPROCMOVE(C%,A%,B%,D%,A$)
 250?&70=C%MOD256:?&71=C%DIV256
 260?&72=A%MOD256:?&73=A%DIV256
 270?&74=B%MOD256:?&75=B%DIV256
 280IFA$="B"THENPROCM:PROCBAS
 290IFA$="M"THENPROCM:CALL&D%
 300IFA$="R"THENPROCM
 310IFA$="E"THENPROCBAS ELSE ENDPROC
 320DEFPROCBAS *FX21,0
 330RESTORE450:FORA=1TO8:READY%:A%=138
 340X%=0:D=USR(&FFF4):NEXT:PAGE=D%:END
 350DEFPROCM:P%=TOP+&20:FORP=0TO2STEP2
 360[OPTP:.ST LDA£140:LDX£0:LDY£0
 370JSR&FFF4:CLC:LDA&70:ADC&72:STA&70
 380LDA&71:ADC&73:STA&71:CLC
 390LDA&73:SBC&75:STA&76:.L1 LDA&72
 400STA&74:CLC:LDA&73:SBC&76:STA&75
 410LDY£0:CLC:LDA(&72),Y:STA(&74),Y:CLC
 420LDA&72:ADC£1:STA&72:LDA&73:ADC£0
 430STA&73:CMP&71:BNEL1:LDA&72:CMP&70
 440BNEL1:RTS:]NEXT:CALLST:ENDPROC
 450DATA79,76,68,13,82,85,78,13
```

BBC Model B
BBC Basic and assembler

Application: utility
Author: C R Tanner

Where £ occurs, replace with (shift-3)

240	Start of procedure
250-270	Set absolute program values
280-310	Analyse instruction and act accordingly
320-340	Procedure to set PAGE values etc, and terminate
350-440	Procedure to perform relocation function using embedded assembler code
450	Data statements for use in 330-340

QUESTION

WHERE CAN I BUY

NEWBRAIN 'A' 32K	FOR	**£268.00**
NEWBRAIN 'AD' 32K	FOR	**£298.00**
SINCLAIR ZX81 1K	FOR	**£48.00**
SINCLAIR SPECTRUM 16K	FOR	**£99.00**
SINCLAIR SPECTRUM 48K	FOR	**£129.00**
ORIC-I 48K	FOR	**£168.00**
SINCLAIR ZX PRINTER	FOR	**£39.00**
SINCLAIR ZX81 RAM PACK	FOR	**£28.50**
SEIKOSHA GP-250X PRINTER	FOR	**£260.00**
SEIKOSHA GP-100A PRINTER	FOR	**£215.00**
BMC BM12E GREEN MONITOR	FOR	**£100.00**
SANYO SCM12H GREEN MONITOR	FOR	**£100.00**
SANYO SCM12N GREEN MONITOR	FOR	**£85.00**

CARRIAGE: 1 item £4.00, 2 items £3.50 each, 3 items £3.00 each, 4 or more FREE

ANSWER:-

MICROCELL COMPUTER SYSTEMS

New Brain

APPOINTED STOCKIST

FOR ACCESS PHONE ORDERS, PLEASE RING (0532) 681366

MICROCELL COMPUTER SYSTEMS, P.O. BOX MT12, LEEDS 17, YORKSHIRE

NAME _____

ADDRESS _____

_____

_____

SIGNED _____

FOR OUR COMPLETE PRICE LIST

PLEASE TICK ☐ PLEASE DEBIT MY ACCESS NO ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

PLEASE SEND ME

TOTAL £	
+ CARRIAGE £	
TOTAL ENCLOSED £	

PCNProgramCards

Sprite Clock Card 1 of 5

8315SC1/5

A novel 24-hour clock using eight coloured sprites. Runs in 6K. Refer to ProgramCard 8307CC for explanation of Commodore Control code symbols.

Commodore 64
Commodore Basic

Application: general interest
Author: Andy Holmes

```
5 PRINT"□"
10 REM  ******************************
20 REM **                            **
30 REM *      A 24 - HOUR CLOCK       *
40 REM *    USING COLOURED SPRITES    *
50 REM *                              *
70 REM **                            **
80 REM  ******************************
90 REM
100 REM  JUST ENTER THE TIME OF DAY IN
110 REM    24 HOUR MODE. IF YOU HAVE
120 REM TYPED IN AN OUT OF RANGE NUMBER
130 REM  THEN THE PROGRAM WILL RESPOND
140 REM BY MAKING YOU RETYPE THE ENTRY.
150 REM
160 REM   ONCE YOU HAVE TYPED IN THE
170 REM  PROGRAM YOU MAY WANT TO TAKE
180 REM    OUT THE <REM> STATEMENTS.
190 REM THESE ARE ONLY HERE TO EXPLAIN
200 REM WHAT THE PROGRAM IS DOING, AND
210 REM  IF THEY ARE REMOVED WILL NOT
220 REM AFFECT ANY JUMPS IN THE PROGRAM
230 REM
300 REM"◆◆          VARIABLES          ◆◆
310 SP=53248:PO=2040:CH=192
320 REM"◆◆        RESERVE MEMORY       ◆◆
330 POKE52,48:POKE56,48
340 REM"◆◆      SPRITE DATA INPUT      ◆◆
350 FORI=12288TO12990:READA
360 POKEI,A:NEXT
370 REM"◆◆      SET SCREEN COLOUR      ◆◆
380 POKESP+32,0:POKESP+33,0
390 REM"◆◆ COLOUR SPRITES 0 & 1 BLUE ◆◆
400 POKESP+39,14:POKESP+40,14
```

300-400 Initialise program variables, load character data, set sprite colours

PCNProgramCards

Sprite Clock Card 2 of 5

8315SC2/5

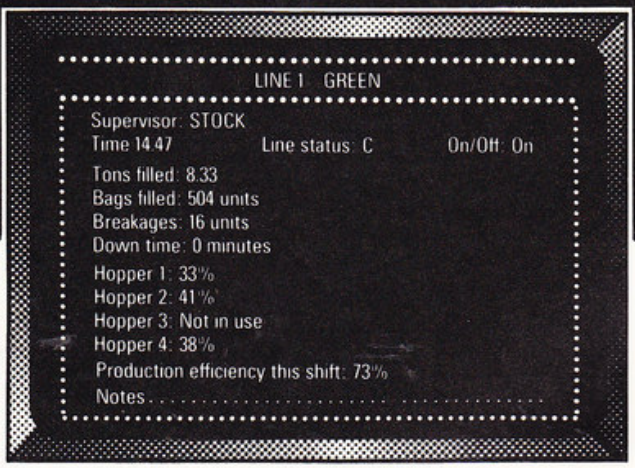
```
410 REM"◆◆ COLOUR SPRITES 3 & 4 RED  ◆◆
415 POKESP+42,2:POKESP+43,2
420 REM"◆◆ COLOUR SPRITES 2 & 5 YEL'W◆◆
430 POKESP+41,7:POKESP+44,7
432 REM"◆◆ COLOUR SPRITES 6 & 7 GREEN◆◆
435 POKESP+45,5:POKESP+46,5
440 REM"◆◆     TURN OFF ALL SPRITES   ◆◆
450 POKESP+21,0
460 REM"◆◆      DOUBLE SPRITE SIZE    ◆◆
470 POKESP+23,255:POKESP+29,255
480 REM"◆◆  SET SPRITE Y COORDINATES ◆◆
490 FORI=1TO15STEP2
500 POKESP+I,125:NEXT
510 REM"◆◆ SET MSB FOR SPRITES 6 & 7 ◆◆
520 POKESP+16,192
530 REM"◆◆  SET SPRITE X COORDINATES ◆◆
540 POKESP,17:POKESP+2,60:POKESP+4,97
550 POKESP+6,136:POKESP+8,179
560 POKESP+10,218:POKESP+12,3
570 POKESP+14,46
580 REM"◆◆  SET ALL SPRITE POINTERS  ◆◆
590 FORI=0TO7
600 POKEPO+I,192:NEXT
610 REM"◆◆ SET SPRITE POINTERS 2 & 4 ◆◆
620 POKEPO+2,202:POKEPO+5,202
630 REM"◆◆       REAL TIME INPUT      ◆◆
640 PRINT"□□┌──────────────────────────────────┐";
650 PRINT"│□   REAL-TIME , 24 HOUR SPRITE CLOCK   □│";
660 PRINT"│□                                    □│";
670 PRINT"└──────────────────────────────────┘"
680 PRINT"□□□□□□□□     PLEASE ENTER THE CORRECT TIME"
690 INPUT"□□□□□□□□□□     HERE >>>  ▚          ████████████";TM$
700 IFLEN(TM$)>6THEN690
710 IFLEN(TM$)<6THEN690
720 IFVAL(LEFT$(TM$,2))>24THEN690
730 IFVAL(MID$(TM$,3,2))>59THEN690
740 IFVAL(RIGHT$(TM$,2))>59THEN690
750 TI$=TM$
760 PRINT"□□□□□□□                                    "
770 PRINT"□□□□□□□□□                                    "
```

410-435 Final part of sprite colour set up

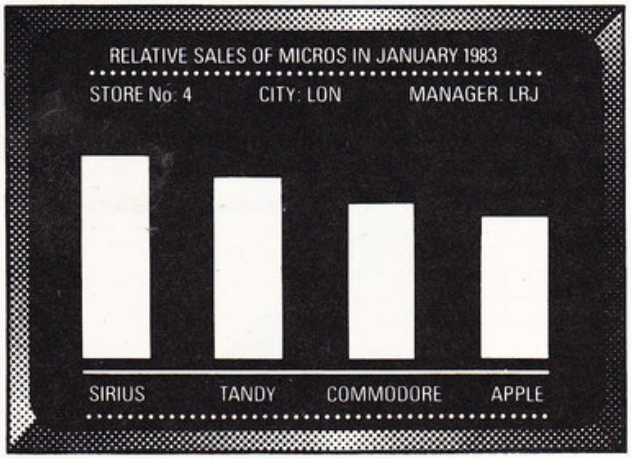
440-620 Initialise all sprite data

630-770 Time input routine. Time *must* be entered as full six digits (HHMMSS) in 24-hour form

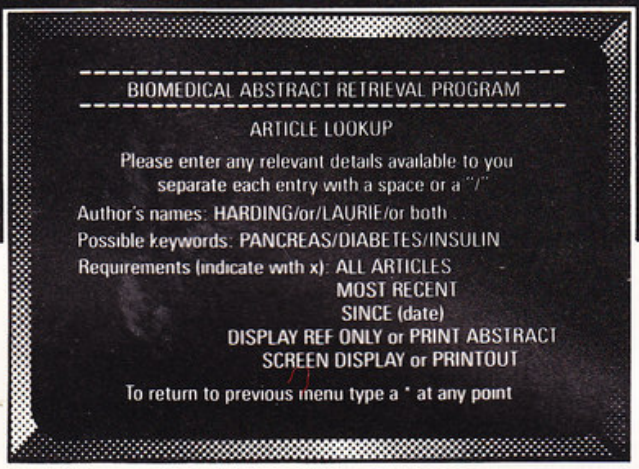
Hundreds of problems. One solution.



Controlling the production of tomato grow bags may sound simple enough, but co-ordinating *all* the different aspects on a brand-new production line was not without its headaches. When the production manager turned to the company's new micro for an answer, it was **THE LAST ONE** which made it possible to create a system in hours rather than months. **TLO** then went on to produce over *one hundred* individual solutions for this company in a period of less than a year.



A simple, moving, graphic display was needed by a major computer retailer to demonstrate how a new product line could maintain compatibility with some of his earlier machines. Half an hour's work with **THE LAST ONE** and he had a program displaying bar-charts, graphs and printouts. Little more than an hour later the same program was up and running on three other makes of micro. When asked what made the four machines compatible, he laid the credit squarely with **THE LAST ONE** – "some manufacturers would be hard put to even use the same mains plug – **TLO** at least gets them all speaking the same language."



The biochemistry department of a major Scottish university had a need for a filing system which could store details of abstracts of biochemical articles and which would allow retrieval of relevant material through entry of key words alone. A massive database had to be implemented on an Apple II computer and retrieval times needed to be measured in seconds not hours. **TLO** did it and the solution has since been widely published for use on other machines.

Using a computer to solve a complex problem is not always as easy as it sounds.

One solution that has helped solve hundreds of problems in installations throughout the world is THE LAST ONE (TLO).

A glance through the three examples on this page will give you some idea just how versatile TLO is.

TLO runs on the Apple II and IIe, Commodore 4032 and 8032/96, TRS-80 Model II (TRSDOS or CP/M), most CP/M, CP/M 86 and MS-DOS machines including the IBM PC (PC-DOS) and Sirius.

Try out TLO for £50 + VAT

A limited demonstration version of TLO is now available for just £57.50 including full documentation, VAT, postage and packing. This is fully refundable against purchase of the full version.

Find out what TLO can do for you by sending today for a free information pack. It could be the solution to hundreds of *your* problems.

THE LAST ONE™

D.J. 'Al' Systems Ltd., Dept D. Station Road, Ilminster, Somerset, TA19 9BQ. Telephone: Ilminster (04605) 4117.

Nominated 'SOFTWARE PRODUCT OF THE YEAR 1982', and selected as finalist in Recognition of Information Technology Achievement Awards (RITA)

PCNProgramCards

Sprite Clock Card 3 of 5

8315SC3/5

```
780 REM"◆◆   CLOCK UPDATE ROUTINE    ◆◆
785 POKESP+21,255
790 FORI=1TO6:T=VAL(MID$(TI$,I,1))
800 IFI=1THENPOKEPO+0,CH+T:REM SPRITE 0
810 IFI=2THENPOKEPO+1,CH+T:REM SPRITE 1
820 IFI=3THENPOKEPO+3,CH+T:REM SPRITE 3
830 IFI=4THENPOKEPO+4,CH+T:REM SPRITE 4
840 IFI=5THENPOKEPO+6,CH+T:REM SPRITE 6
850 IFI=6THENPOKEPO+7,CH+T:REM SPRITE 7
860 NEXT:GOTO790
1000 REM"◆◆   DATA FOR CHARACTER 0   ◆◆
1010 DATA7,255,224,14,15,240,12,7
1020 DATA240,8,3,240,8,3,240,8
1030 DATA3,240,8,3,240,8,3,240
1040 DATA8,3,240,8,3,240,8,3
1050 DATA240,8,3,240,8,3,240,8
1060 DATA3,240,8,3,240,8,3,240
1070 DATA8,3,240,8,3,240,12,7
1080 DATA240,14,15,240,7,255,224,0
1090 REM
1100 REM"◆◆   DATA FOR CHARACTER 1   ◆◆
1110 DATA0,254,0,0,127,0,0,63
1120 DATA0,0,63,0,0,63,0,0
1130 DATA63,0,0,63,0,0,63,0
1140 DATA0,63,0,0,63,0,0,63
1150 DATA0,0,63,0,0,63,0,0
1160 DATA63,0,0,63,0,0,63,0
1170 DATA0,63,0,0,63,0,0,63
1180 DATA0,0,63,0,0,30,0,0
1190 REM
1200 REM"◆◆   DATA FOR CHARACTER 2   ◆◆
1210 DATA7,255,224,14,15,240,12,7
1220 DATA240,8,3,240,8,3,240,0
1230 DATA3,240,0,3,240,0,3,240
1240 DATA0,3,240,0,3,240,0,7
1250 DATA240,0,15,240,7,255,224,14
1260 DATA0,0,12,0,0,8,0,0
1270 DATA8,1,224,8,3,240,12,7
1280 DATA240,14,15,240,7,255,224,0
1290 REM
```

780-860 Routine to perform correct clock display

1000-1290 Data statements for digit display format. Characters 0,1,2

PCNProgramCards

Sprite Clock Card 4 of 5

8315SC4/5

```
1300 REM"◆◆   DATA FOR CHARACTER 3   ◆◆
1310 DATA7,255,224,14,15,240,12,7
1320 DATA240,8,3,240,0,3,240,0
1330 DATA3,240,0,7,240,0,15,240
1340 DATA1,255,240,0,15,240,0,7
1350 DATA240,0,3,240,0,3,240,0
1360 DATA3,240,0,3,240,8,3,240
1370 DATA8,3,240,8,3,240,12,7
1380 DATA240,15,15,240,7,255,224,0
1390 REM
1400 REM"◆◆   DATA FOR CHARACTER 4   ◆◆
1410 DATA7,255,224,14,15,240,12,7
1420 DATA240,8,3,240,8,3,240,8
1430 DATA3,240,8,3,240,8,3,240
1440 DATA8,3,240,8,3,240,8,3
1450 DATA240,8,3,240,12,7,240,14
1460 DATA15,240,7,255,252,0,15,240
1470 DATA0,7,240,0,3,240,0,3
1480 DATA240,0,3,240,0,1,224,0
1490 REM
1500 REM"◆◆   DATA FOR CHARACTER 5   ◆◆
1510 DATA7,255,224,14,7,240,12,3
1520 DATA240,8,3,240,8,1,224,8
1530 DATA0,0,12,0,0,14,0,0
1540 DATA7,255,224,0,15,240,0,7
1550 DATA240,0,3,240,0,3,240,0
1560 DATA3,240,0,3,240,0,3,240
1570 DATA8,3,240,8,3,240,12,7
1580 DATA240,14,15,240,7,255,224,0
1590 REM
1600 REM"◆◆   DATA FOR CHARACTER 6   ◆◆
1610 DATA7,255,224,14,7,240,12,3
1620 DATA240,8,3,240,8,1,224,8
1630 DATA0,0,12,0,0,14,0,0
1640 DATA15,255,224,14,15,240,12,7
1650 DATA240,8,3,240,8,3,240,8
1660 DATA3,240,8,3,240,8,3,240
1670 DATA8,3,240,8,3,240,12,7
1680 DATA240,14,15,240,7,255,224,0
1690 REM
```

Data statements for digit display format. Characters 3,4,5 and 6

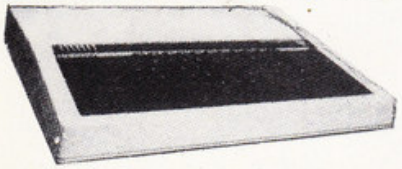
COM-TEC COMPUTER SYSTEMS

6-8 EASTGATE, BARNSLEY, SOUTH YORKSHIRE S70 2EP.
Telephone (0226) 46972 + 200782

TRADE AND DEALER ENQUIRIES INVITED — DISCOUNTS AVAILABLE ON BULK ORDERS. CALLERS WELCOME AT OUR EASTGATE SHOWROOMS.

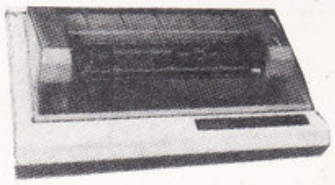
VAT: PLEASE ADD VAT AT 15% TO THE TOTAL ORDER COST INCLUDING CARRIAGE. CHEQUES AND POSTAL ORDERS SHOULD BE MADE OUT TO COM-TEC.

COMPUTERS



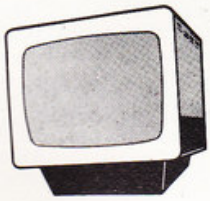
BBC model 'B'	£346.96 + £3 carr.
BBC model 'B' with disc interface	£407.83 + £3 carr.
BBC disc interface kit	£95 + 50p carr.
BBC model A to B upgrade kit	£69 + 50p carr.
BBC Joysticks	£11.30 + 50p carr.
Dragon 32	£175 + £3 carr.
Oric 48K	£139 + £3 carr.
Spectrum 48K	£129 + £1 carr.
Atari 400	£130 + £3 carr.
Atari 800	£260 + £3 carr.
Vic 20 special pack	£121.70 + £3 carr.

PRINTERS



Seikosha GP100A	£175 + £5 carr.
Seikosha GP250	£220 + £5 carr.
Seikosha 700A Colour Printer, 7 colours, 30 shades	£40 + £5 corr.
Epson FX80	£390 + £5 carr.
Epson RX80	£270 + £5 carr.
Epson MX100 FT3	£425 + £5 carr.
Parallel Printer Cable	£13.50 + 50p carr.

MONITORS



Microvitec 1431 14" RGB £235 + £5 carr.

Microvitec 2031 20" RGB £319 + £5 carr.

14" Colour television/ RGB monitor £259 + £5 carr.

FUNCTIONS PERFECTLY IN EITHER ROLE

DISC DRIVES

TEAC slimline 40 track S/S single drive 100K	£179 + £2 carr.
TEAC 40 track S/S twin drive 200K	£355 + £3 carr.
TEAC 80 track S/S single drive 200K	£250 + £2 carr.
TEAC 80 track S/S twin drive 200K	£475 + £3 carr.
TEAC 80 track D/S single drive 400K	£325 + £2 carr.
TEAC 80 track D/S twin drive 800K	£590 + £3 carr.
Dragon disc drive by Delta, 1 single drive 100K	£260 + £2 carr.
Dragon disc drive by Delta, 2 single drive 200K	£300 + £2 carr.

STAR BLAST

NEW SPACE SHOOTOUT GAME WRITTEN IN-HOUSE. GREAT GAME, GREAT FUN. **ONLY £6.99** BBC ONLY

CASSETTE RECORDER WITH MOTOR CONTROL

ALBA CASSETTE RECORDER, MAINS/BATTERY OPERATED, FREE LEAD WITH EACH RECORDER, STATE 5 OR 7 PIN DIN TO 3 JACKS. **PRICE £21.75 + £3 carr.**

EPROM PROGRAMMER

ATPL EPROM PROGRAMMER **ONLY £120 + £3 carr.**

SOFTWARE

Extensive range of games, educational and business software from all the market leaders.

GEMINI MARKETING LIMITED

Salamander Software

SS IJK

PSION

A & F

ACORNSOFT

BUG-BYTE SOFTWARE

PROGRAMPOWER

BUSINESS EXCLUSIVE FOR BBC, DRAGON AND ORIC USERS BUSINESS

COM-SOFT INTEGRATED BUSINESS SYSTEMS ON DISC

DISC MODULES AVAILABLE:		CASSETTE MODULES AVAILABLE AS STAND ALONE SYSTEMS ONLY:	
Sales	£45		
Purchases	£45	Sales	£20
Stock Control	£45	Purchases	£20
Payroll	£45	Stock Control	£20
Invoice Generator	£20	Payroll	£20
(Included in sales module)		Invoice Generator	£15
Nominal Ledger	£45	Nominal Ledger	£20
Word Processor	£45	Word Processor	£20
Database	£20	Database	£15

THE DISC MODULES CAN ALL BE USED AS STAND ALONE SYSTEMS. THE SALES, PURCHASES, STOCK CONTROL AND NOMINAL LEDGER MODULES CAN NOW BE USED AS A COMPLETELY INTEGRATED BUSINESS SYSTEM. E.G. ENABLES STOCK RECORDS TO BE UPDATED SIMPLY BY ENTERING SALES AND PURCHASE INVOICES.

COM-TEC COMPUTER SYSTEMS

AUTHORISED BBC + ACORN DEALER WITH FULL WORKSHOP FACILITIES AND TECHNICAL BACKUP.

PCNProgramCards

Sprite Clock Card 5 of 5

8315SC5/5

```
1700 REM"◆◆   DATA FOR CHARACTER 7   ◆◆
1710 DATA7,255,224,14,15,240,12,7
1720 DATA240,8,3,240,8,3,240,8
1730 DATA3,240,0,3,240,0,3,240
1740 DATA0,3,240,0,7,240,0,15
1750 DATA224,0,31,192,0,63,128,0
1760 DATA127,0,0,254,0,1,252,0
1770 DATA3,248,0,7,240,0,15,224
1780 DATA0,31,192,0,31,128,0,0
1790 REM
1800 REM"◆◆   DATA FOR CHARACTER 8   ◆◆
1810 DATA7,255,224,15,240,112,15,224
1820 DATA48,15,192,16,15,192,16,15
1830 DATA192,16,15,192,16,15,224,16
1840 DATA15,240,48,6,60,96,12,15
1850 DATA240,8,7,240,8,3,240,8
1860 DATA3,240,8,3,240,8,3,240
1870 DATA8,3,240,8,3,240,12,7
1880 DATA240,14,15,240,7,255,224,0
1890 REM
1900 REM"◆◆   DATA FOR CHARACTER 9   ◆◆
1910 DATA7,255,224,14,15,240,12,7
1920 DATA240,8,3,240,8,3,240,8
1930 DATA3,240,8,3,240,8,3,240
1940 DATA8,3,240,8,3,240,12,7
1950 DATA240,14,15,240,7,255,240,0
1960 DATA15,240,0,7,240,0,3,240
1970 DATA8,3,240,8,3,240,12,7
1980 DATA240,14,15,240,7,255,224,0
1990 REM
2000 REM"◆◆   DATA FOR CHARACTER 10  ◆◆
2010 DATA0,0,0,0,0,0,0,62
2020 DATA0,0,127,0,0,127,0,0
2030 DATA127,0,0,127,0,0,62,0
2040 DATA0,0,0,0,0,0,0,62
2050 DATA0,0,127,0,0,127,0,0
2060 DATA127,0,0,127,0,0,62,0
2070 DATA0,0,0,0,0,0,0,0
2080 DATA0,0,0,0,0,0,0,0
```

Data statements for digit display format. Characters 7,8,9 and 10

PCNProgramCards

Pirate Island Card 1 of 9

8315PI1/9

An easy to follow adventure. This can be easily modified to run on many machines.
"?" is heavily used throughout the program for PRINT.

```
1 DIM Y$(12)
5 PRINT "}"
10 PRINT "***************"
20 PRINT "* PIRATE ISLAND*"
50 PRINT "*              *"
60 PRINT "***************"
70 FOR I=1 TO 1000:NEXT I:? "}"
80 ? "In this adventure,your task is to find and restore all treasures by choosi
ng numbers from 1-4."
81 ?
82 ? "Each room has a choice of 1-4 things that you can do."
83 ?
84 ? "But in some rooms you may see a sign saying please type in order."
85 ?
86 ? "So when you see this sign type the  numbers in order,to help you understan
d what is going on."
87 PRINT
90 ? "GOOD LUCK"
95 FOR I=1 TO 7000:NEXT I:? "}"
100 ? "You are in a large room,to the north is a corridor."
105 PRINT
110 ? "VISIBLE ITEMS:warm glowing fire,rug,large sleeping cat."
115 PRINT
120 ? "WHAT DO YOU WANT TO DO ???"
130 ? "1.WAKE CAT"
140 ? "2.LIFT RUG"
150 ? "3.GO FIRE"
160 ? "4.LOOK FIRE"
161 ?
165 ? "PLEASE  TYPE IN ORDER"
167 ?
170 ? "TYPE IN NUMBER REQUIRED";:INPUT A
180 IF A=1 THEN ? "}":GOTO 230
190 IF A=2 THEN ? "}":GOTO 240
200 IF A=3 THEN ? "}":GOTO 340
210 IF A=4 THEN ? "}":GOTO 360
220 GOTO 130
```

Atari 400/800
Atari Basic

Application: game
Author: Philip Green

1	Assign array for occasional input
5	Clear screen. "}" is the printed version of "clear screen" symbol (ESC, CTRL and CLEAR or ESC, SHIFT and CLEAR)
70	Pause
80-90	Opening instructions
95	Pause
100	Start of adventure! Location
105-167	Prompts
170-220	Response and action

SELL, EXCHANGE or BUY SOFTWARE

the
COMPUTERHOUSE
WAY

By becoming a member of COMPUTERHOUSE and entering your unwanted software on the COMPUTERHOUSE lists (which are circulated to all members) you get the opportunity to sell or buy software at 80% of its original cost. Alternatively as a member you can simply exchange at no extra cost to yourself other than postage.

MEMBERSHIP ONLY £12.95 per annum

For further details of membership and other benefits send large SAE to:

COMPUTERHOUSE (Dept PCN)
Freepost
ILFORD, ESSEX IG1 2BR

NAME _____

ADDRESS _____

_____

_____

VIC TAPE BACKUP

NEW

VIC TAPE BACKUP is a new and unique machine-code program which can provide security backup copies of most VIC-20 programs currently available.

- will backup most types of program, in BASIC or machine-code
- Detailed instructions provided
- Very easy to use, with audio-visual prompting system
- No risk to original tapes
- Works with all memory configurations
- Allowance for load errors
- Written by Raeto West, noted exponent of PET/CBM/VIC programming

Price £7.95 (includes VAT, post and packing — no extras)
Send orders with Cheque/PO crossed 'a/c payee' made out to Level Software Ltd to the distributors:
LEVEL SOFTWARE LTD, P.O. BOX 55, SHIRLEY, SOLIHULL B90 4SL.
TEL: 021-643 6729.

This program is sold strictly on condition that purchasers use it only to take security backup copies of tapes which they own, for their own use.
I have read and understood the conditions and agree to abide by them.

..... Signature

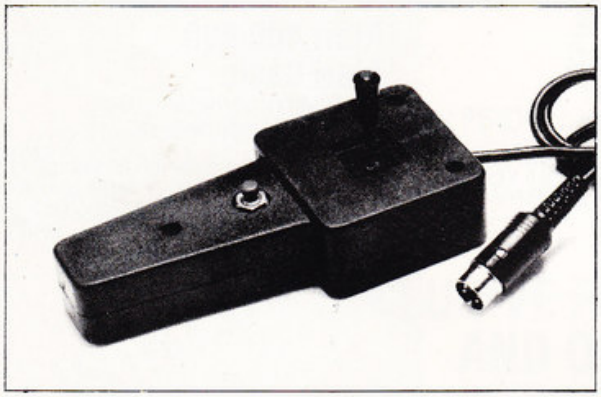
NAME: .....

ADDRESS: .....

PCN 16/6/83

From the people who really know.....

JOYSTICKS



NOW AVAILABLE

Joysticks for:
Dragon
BBC
Tandy
Vic
Atari
ZX81
Spectrum etc.

Self centring microswitch joysticks in the same case as our popular pot types. Available with a variety of plugs to suit most popular micros, and interfaces (shortly) for, Spectrum and ZX 81, these light action precise mechanism give rapid, ultra reliable control of all your favourite games.

Ask at your local dealer or distributor, or in the event of any difficulty contact us direct.

Features: Compact size, precise action, long life, and competitive prices. Made in England by Flight Link, specialist manufacturers of joysticks for nearly 20 years.

UK and export enquiries invited

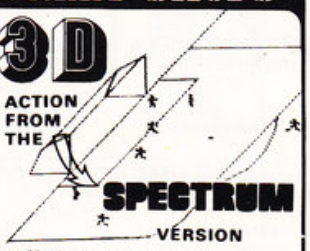
FLIGHT LINK CONTROL LTD
UNIT 12, THE MALTINGS, TURK STREET, ALTON, HANTS.
Telephone: Alton (0420) 87241 Telex: 858623 Telbur

NOW IN YOUR HIGH STREET SHOPS

FOOTBALL MANAGER 3D

by Addictive Games

for **SPECTRUM 48K AND ZX81 16K**



ACTION FROM THE SPECTRUM VERSION

This superb game is **now available** from branches of
W.H. SMITH * and BOOTS.

Manage your own team in this exciting game of skill which vividly captures the drama and excitement of real football.

FEATURES INCLUDE:
★ 4 DIVISIONS ★ F.A. CUP ★ PROMOTION & RELEGATION ★ ★ TRANSFER MARKET ★ TEAM SELECTION ★ ★ SAVE GAME FACILITY ★★★ *AND MUCH MORE!* ★★★

WHAT THE PRESS SAY ABOUT IT:—

IF YOU have always wanted to manage a football team, FOOTBALL MANAGER, from Addictive Games, is for you — The game is ideal for a football fanatic but the most interesting thing for us was the 3-D graphics used to create the goalmouth action — the game is a winner.
SINCLAIR USER FEBRUARY 1983

Although I'm no great football fan, I really enjoyed playing this game — excellent use is made of colour and user-defined graphics. The game is very logically put together, so that the development of strategy and tactics has a real effect. For example, one of my teams got through to the fourth round of the F.A. Cup where it was beaten by a second division side. This upset morale and meant that our promotion bid failed. Perhaps I should have given up the F.A. Cup run and held some good players back — the possibilities are endless. Brian Clough had better watch out!
*** SPECTRUM VERSION ONLY. ZX COMPUTING FEB/MARCH 1983**

ALSO AVAILABLE FROM THE FOLLOWING SHOPS
BUFFER MICRO SHOP (London)
MICROWARE (Leicester)
ANIROG COMPUTERS (Horley, Surrey)
SUCCESS SERVICES (Walsall)
THE COMPUTER SHOP (Newcastle)
DRAGON BYTE (Leeds)
AND OTHER GOOD COMPUTER SHOPS

PRICES
FOR THE SPECTRUM 48K £6.95, ZX81 16K £5.95
3D GRAPHICS ONLY IN SPECTRUM VERSION
To Order send Cheque P.O. payable to ADDICTIVE GAMES, Dept PCN, P.O. Box 278, Connburrow, Milton Keynes MK14 7NE
PLEASE STATE COMPUTER

PCNProgramCards

Pirate Island Card 2 of 9

8315PI2/9

```
230 ? "CAT AWAKES AND VANISHES"
231 PRINT
235 GOTO 140
240 ? "THE RUG VANISHES TO REVEAL A GOLDEN KEY"
245 PRINT
250 ? "1.TAKE KEY"
260 ? "2.GO FIRE"
270 ? "3.LOOK FIRE"
271 ?
272 ? "PLEASE TYPE IN ORDER";:INPUT B
280 IF B=1 THEN ? ")":GOTO 320
290 IF B=2 THEN ? ")":GOTO 340
300 IF B=3 THEN ? ")":GOTO 360
310 GOTO 250
320 ? "YOU ARE NOW CARRYING THE GOLDEN KEY"
325 PRINT
330 GOTO 260
340 ? "YOU ARE NOW AT THE FIRE.YOU MANAGE TO SEE A SILVER SWORD IN IT"
345 PRINT
350 GOTO 270
360 ? "YOU SEE NOTHING SPECIAL,EXCEPT AN OLD MAP"
365 PRINT
370 PRINT "1.TAKE MAP"
380 PRINT "2.TAKE SWORD"
390 PRINT "3.GO NORTH"
395 ?
397 ? "PLEASE TYPE IN ORDER";:INPUT C
400 IF C=1 THEN ? ")":GOTO 440
410 IF C=2 THEN ? ")":GOTO 460
420 IF C=3 THEN ? ")":GOTO 480 .
430 GOTO 370
440 PRINT "YOU NOW HOLD THE MAP , LEAVE THIS ROOM,YOU MAY NEED IT AGAIN SOMETIME
."
445 PRINT
450 GOTO 380
460 ? "YOU NOW HOLD THE SILVER SWORD,IN SOME CASES A SWORD IS GOOD,IN OTHERS MAY
 BE NOT."
465 PRINT
470 GOTO 390
480 ? "You are in a long corridor:VISIBLE ITEMS large door with sign saying NO E
NTRY"
485 PRINT
490 ? "1.GO EAST"
```

230-235	Action to response
240-310	Action to response
320-330	Action to response
340-350	Action to response
360-430	Action to response
440-450	Action to response
460-470	Action to response
480	New location
485-550	Action to response

PCNProgramCards

Pirate Island Card 3 of 9

8315PI3/9

```
500 ? "2.GO WEST"
510 ? "3.OPEN DOOR";:INPUT D
520 IF D=3 THEN ? ")":GOTO 560
530 IF D=1 THEN ? ")":GOTO 600
540 IF D=2 THEN ? ")":GOTO 620
550 GOTO 490
560 ? "YOU MAY HAVE OPENED THE DOOR,BUT SOMETHING HAS FALLEN FROM THE CEILING AN
D YOU ARE DEAD"
567 PRINT
570 ? "HIT Y FOR ANOTHER TURN";:INPUT Y$
580 IF Y$="Y" THEN 5
585 GOTO 570
600 ? "SORRY IT'S A DEAD END"
605 PRINT
610 GOTO 490
620 ? "You are in a small box room:VISIBLE ITEMS bottles of rum,weird looking bo
x"
625 PRINT
630 ? "1.TAKE RUM"
640 ? "2.GO BOX"
645 ?
647 ? "PLEASE TYPE IN ORDER";:INPUT E
650 IF E=1 THEN ? ")":GOTO 670
660 IF E=2 THEN ? ")":GOTO 700
670 PRINT "YOU NOW HAVE THE RUM TO TRADE"
680 PRINT
690 GOTO 640
695 PRINT
700 ? "YOU HAVE ENTERED THE BOX,AND THE FLOOR HAS GIVEN WAY"
705 FOR I=1 TO 50:NEXT I
706 PRINT
707 ? "YOU ARE FALLING THROUGH MID AIR"
710 FOR I=1 TO 1000:NEXT I:? ")"
715 PRINT
720 ? "       S P L A S H       "
725 PRINT
730 ? "BOY! YOU WERE LUCKY! YOU HAVE LANDED RIGHT IN THE SEA"
731 ?
740 ? "You are in the sea:VISIBLE ITEMS sandy beach ahead of you in the distance
."
745 PRINT
```

560-585	Oh dear! Try again?
600-610	Ah well!
620	Location
625-660	Prompts and response
670-690	Action to response
695-731	Argh! . . . You've fallen in the water!
740-745	New location

Continued next week

'WORK STATION'

from: **£39·95**

DE-LUXE VDU/OPERATORS CHAIR FULLY ADJUSTABLE SEAT, FULLY ADJUSTABLE SPRUNG BACK AND UPHOLSTERED IN RICH BEIGE TWEED. 'COFFEE' FRAME, TWIN WHEEL CASTORS OPTIONAL. SUPPLIED K.D., ASSEMBLED IN SECONDS.
Video 1: Seat height 410/560mm on glides.
Video 2: Seat height 450/600mm on castors.

from: **£29·95**

PROFESSIONAL WORK STATION WITH 'COFFEE' FRAME, TEAK MELAMINE WORKTOP AND COURTESY PANEL AND CASTORS. FITS ALL LEADING MICROS.
Model A: 610mm deep, 1010mm wide, 695mm high
Model B: As above + 305mm × 1010mm upstand
} Supplied K.D. Assembled in minutes.

VERY SPECIAL DEALER SCHEME AVAILABLE!

To: 'WORK STATION', FREEPOST, PROSPECT MILL, HINDLE STREET, DARWEN, LANCS.

Please send me:

- ☐ **Model A** @ £39.95 + £4.95 p&p
- ☐ **Model B** @ £49.95 + £4.95 p&p
- ☐ **Video 1** @ £29.95 + £3.95 p&p
- ☐ **Video 2** @ £32.95 + £3.95 p&p

Please allow 14 days for delivery

I enclose cheque/postal order payable to: 'WORK STATION' for £_____

Or: please charge my Access account no.

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

NAME:_____

ADDRESS:_____

_____ POSTCODE:_____

SIGNATURE:_____

Caling all one-fniger ed tyspits!

Is it time you learned how to type properly?

Just imagine...after 24 hours of practice you could be keying at 40 words per minute with 95% accuracy.

All thanks to your efforts and a very clever new program called Touch 'n' Go.

This programme takes you through 60 lessons to keyboard fitness. Right away you produce words and sentences with ten fingers. You compete with the computer to improve your speed and accuracy.

Caxton

And you go on with this Space Invader- like tutor to improve your skill and become equally proficient on the numeric keypad.

Simply Touch 'n' Go faster!

Formats: CP/M*, MSDOS* PCDOS*

*Registered trademarks Digital Research, Microsoft, IBM.

MicroComputer Printout
"Three simple instructions... get you started"

What Micro?
"You need only 24 hours and £25 to banish keyboard lag forever"

Become a keyboard virtuoso in just 24 hours

Micro Decision
"Very user friendly and will teach you to master both letters and numbers"

£29.90 INC. VAT + P&P

Send today for this valuable program for yourself, your office and your family. PLEASE PRINT

Caxton Software Ltd
10/14 Bedford St. London WC2E 9HE
Telephone 01-379 6502 Telex 27950 Ref 398

Name:

Address:

Computer format:

Payment by Cheque/Postal Order/Credit Card
VAT Invoice required ☐
Access/Barclaycard

PCN

PCN ProgramCards

Micro-mind Card 1 of 1

8315MM

A very simple version of the classic Mastermind game.

```
5 COUNT = 0
10 CLS
20 A = RND(4)
30 B = RND(4)
40 C = RND(4)
50 D = RND(4)
60 PRINT     "------------MICRO MIND------------"
70 PRINT
80 PRINT "CHOOSE FOUR NUMBERS BETWEEN 1 & 4"
90 PRINT "BEWARE NUMBERS CAN BE DUPLICATED"
100 PRINT "IF YOU ARE CORRECT + WILL APPEAR"
110 PRINT "IF YOU ARE WRONG X WILL APPEAR"
120 COUNT = COUNT + 1
130 INPUT E: INPUT F: INPUT G: INPUT H
140 IF E <> A THEN PRINT "X": T = -1
150 IF F <> B THEN PRINT "X": T = -1
160 IF G <> C THEN PRINT "X": T = -1
170 IF H <> D THEN PRINT "X": T = -1
180 IF E = A THEN PRINT "+": T = 1
190 IF F = B THEN PRINT "+": T = T + 1
200 IF G = C THEN PRINT "+": T = T + 1
210 IF H = D THEN PRINT "+": T = T + 1
220 IF T = 4 THEN GOTO 250
230 IF COUNT = 10 THEN GOTO 300
240 GOTO 80
250 PRINT "WELL DONE! YOU WIN!": GOTO 310
300 PRINT "!!YOU LOSE!!"
310 PRINT "THE NUMBERS WERE"
320 PRINT A: PRINT B: PRINT C: PRINT D
330 PRINT "ANOTHER GAME?"
340 INPUT A$
350 IF A$ = "Y" THEN GOTO 5
360 END
```

Colour Genie
Colour Genie Basic

Application: game
Author: John Tompkins

5	Initialise limit of attempts
10	Clear screen
20-50	Generate numbers
60-110	Instructions NB: replace "+" with "●" (Graphic A) in line 110
120	Increment attempt count
130	Inputs for each number
140-170	Wrong
180-210	Correct. NB: replace "+" as line 110
220	Clever dick! All correct
230	Only 10 attempts
240	Next attempt
250	Yippee!
300	Gloom and despondency
310-320	Just to let you know
330-350	Again? Y = Yes
360	Any other response ends program

PCN ProgramCards

Brickbat Card 1 of 1

8315B

A short implementation of a Breakout-type game using the low resolution mode.

```
10 REM SET UP WALL
20 CLEAR
30 CLS: FOR I = 1056 TO 1151: POKE I,175: NEXT
40 REM PLACE BAT
50 BP = 1517: IX = RND(2): IY = -1: IF IX = 2 THEN IX = -1
60 REM PLACE BALL
70 POKE BP, 159: POKE BP+1, 159: POKE BP+2, 159
80 PX = RND(29)+1: PY = 15: IF PEEK(32*PY+PX+1023) <> 96 THEN 80
90 POKE 32*PY+PX+1023,79
100 REM CHECK POSITION AHEAD. IF CLEAR MOVE BALL
110 NX = PX+IX: NY = PY+IY: IF NX < 1 OR NX > 31 THEN IX = IX*-1: GOTO 110
120 IF NY > 15 THEN 290
130 IF NY < 0 THEN IY = IY*-1: NY = PY+IY
140 IF PEEK(32*NY+NX+1023) <> 96 THEN 320 ELSE 170
150 IY = IY*-1: NY = PY+IY: IF PEEK(32*NY+NX+1023) = 96 THEN 170
160 IX = IX*-1: NX = PX+IX
170 POKE 32*PY+PX+1023, 96: POKE 32*NY+NX+1023, 79: PX = NX: PY = NY
180 REM MOVE BAT
190  A$ = INKEY$: IF A$ = CHR$(8) OR A$ = CHR$(9) OR A$ = CHR$(32) THEN P$
= A$
200 IF P$ = CHR$(32) THEN 270
210 IF P$ = CHR$(9) THEN 250
220 IF  BP  >  1505  THEN  POKE BP, 96: POKE BP+1, 96: POKE BP+2, 96: BP =
BP-2: GOTO 270
230 IF BP > 1504 THEN POKE BP, 96: POKE BP+1, 96: POKE BP+2, 96: BP = BP-1
240 GOTO 270
250 IF BP < 1532 THEN POKE  BP,  96:  POKE  BP+1,  96: POKE BP+2, 96: BP =
BP+2: GOTO 270
260 IF BP < 1533 THEN POKE BP, 96: POKE BP+1, 96: POKE BP+2, 96: BP = BP+1
270 POKE BP, 159: POKE BP+1, 159: POKE BP+2, 159
280 GOTO 110
290 IF T = 2 THEN PRINT "SCORE = "; SC: INPUT "ANOTHER GAME "; B$: IF B$ =
"YES" THEN 20 ELSE END
300 POKE BP, 96: POKE BP+1, 96: POKE BP+2, 96
310 POKE PY*32+PX+1023, 96: T = T+1: GOTO 50
320 REM IF POSITION AHEAD IS PART OF WALL THEN DELETE IT
330  IF  PEEK(NY*32+NX+1023) = 175 THEN POKE NY*32+NX+1023, 96: SC = SC+1:
SOUND 150,1
340 SOUND 200,1
350 GOTO 150
```

Dragon 32
Dragon Basic

Application: game
Author: Allan Tennent

20	Initialise variables
30	Clear screen then set up wall
50	Set bat in start position. Select movement vectors
70	Draw bat
80-90	Ball position
110-170	Check ball movement allowed and action
190-280	Move bat according to left/right arrows or halt movement with space bar, then round again
290	Balls all used (3). Show score and prompt for another game
300-310	Lost ball
330	Bonk. Take brick from wall
340	Beep
350	Continue to play

Clubnet keeps you in touch with the microcosm of personal computer enthusiasts throughout the UK. It is divided into two sections — clubs and user groups.

We publish a list of these two groups on alternate weeks. This week it is the turn of user groups, which are listed alphabetically by machine and special interest.

Each issue will also focus on the activities of an individual club or group with a fly-on-the-wall report. This week we feature the Watford ICPUG.

If your association has something special on the agenda or if you've just started a new one, contact us at *Clubnet, Personal Computer News*, VNU, 62 Oxford Street, London W1A 2HS.

The user group listing is based on that of the Amateur Computer Club.

WICPUG plugs into Micronet

It was a full house at the Watford Independent Commodore Products Users Group meeting which offered tips on getting hooked up to Micronet 800.

It's not unusual for WICPUG to have some of the big names from the Commodore headquarters in Slough drop in. And on this night John Collins from the company's technical department stepped in to bring members news from the Commodore front, until the Micronet presenter made his appearance.

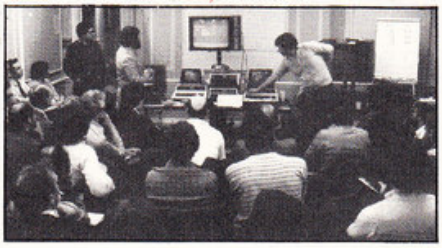
Mr Collins talked about a modem for the 64 machine (See *PCN issue 14*) and other products in the pipeline.

WICPUG has been going for a couple of years now, and from the start it had a bias towards professional users rather than games players. Stephen Rabagtiati, one of the founder members of the club, said: 'Normally we have a guest speaker.

'We sometimes get visits from major software houses, and when we get the chance we like to look at other micros to see what they have got to offer. Some of our members meet privately and quite a few of them have written software for the main ICPUG library.'

At this gathering more than 50 people poured into a room of the Institute of Grocery Distribution, in Letchmore Heath, where meetings are normally held.

Rod Eva (left), David Babski, Micronet's Editor (centre) and Stephen Rabagtiati demonstrate Micronet on Commodore machines.



Members gather to see demonstrations on hardware, software and add-ons.

Mr Rabagtiati and Rod Eva, chairman of WICPUG, have formed their own company called Y2 Computing. They wrote the Prestel software for the Commodore Pet machines and have recently written the package to be used with the Commodore 64 Prestel interface.

Micronet's editor David Babski eventually arrived and showed a Kenny Everett video on Micronet, and followed it with a talk on connecting the system through an acoustic modem. After some teething problems in setting it up, members watched the system running — and the evening was rounded off with questions from the floor.

Sandra Grandison

Name WICPUG **Venue** Institute of Grocery Distribution, Grange Lane, Letchmore Heath, Watford **Meetings** Second Monday of the month **Contact** Stephen Rabagtiati, 01-7797141.

USER GROUPS

Acorn

Coventry Acorn Atom User Group. Subs: £4. No meetings but quarterly newsletter. Contact Peter Frost, 18 Frankwell Drive, Coventry, 0203 613156.

Kent Medway Acorn User Group. Meets at St John Fisher School on last Monday of month at 7pm. Session at 9pm Thursday at the Fox and Hound, Chatham. Contact Clem Rutler, c/o St John's Fisher School, Ordance Street, Chatham, Kent, 0634 42811 (day), 0634 373459 (eve).

Manchester Acorn User Group. Meets at AMC, Crescent Road, Crupsall, Manchester 8 on Tuesday except school holidays, fees: £1. Contact John Ashurst, 192 Vendure Close, Failsworth, Manchester, 061-681 4962.

Apple

Bristol Apple Users and Dabblers. Meets at 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, once a month. Newsletter. Contact Ewa Dabkowski, c/o Datalink, 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, 0272 213427.

Buckinghamshire Apple User Group. Contact Steve Profitt, The Granary, Hill Farm Road, Marlow Bottom, Buckinghamshire, 062 84 73074.

Croydon Apple User Group. Meets at Sidda House, 350 Lower Addiscombe Road, Croydon, on second Monday of month. Subs: £5, £10 commercial members. Contact Paul Vernon, 60 Flawkhurst Way, West Wickham, Kent, 01-777 5478.

Hertfordshire British Apple Systems User Group. Meets at Old School, Branch Road, Park Street, St Albans, Hertfordshire, on first Tuesday and third Sunday each month. Tuesday and third Sunday each month. Annual subs: £12.50, joining fee: £2.50. Publishes magazine. Contact John Sharp, 09273 75093.

London Apple Music Synthesis Group. Contact Dr Davis Ellis, 22 Lennox Gardens, London SW1.

Milton Keynes Microcomputer User Group. Meets every Tuesday, 7.30pm. Contact Brian Pain, Sir Frank Markham School, Woughton Centre, Chaffron Way, Milton Keynes.

Atari

Birmingham User Group. Meets at the Malaga Grill, Matador Public House, Bull Ring shopping centre, Birmingham, on second and fourth Thursday every month at 7.30pm. Subs: £5. Meetings: 25p members, 50p non-members. Contact Mike Aston, 42 Short Street, Wednesbury, West Midlands.

Carshalton Atari User Club. Contact Paul Deegan on 01-642 5232.

Hull Atari Users Local Group. Proposed new user group. Contact Harvey Kong Til, 546 Holderness Road, Hull HU9 3ES. Hull 7911094.

London Silica Atari 400/800 User Club. New club, library planned, newsletter. Contact Richard Hawes on 01-301 1111.

Norwich Atari User Group. Proposed new club. Contact Ken Ward, 45 Coleburn Road, Lakenham, Norwich, Norfolk.

Preston Atari Computer Enthusiasts. Meets at KSC Club, Merrion House, Beach Grove, Ashton, Preston, on third Thursday of month at 7.30pm. Subs: £5. Contact Roger Taylor, 0253 738192.

Atom

Liverpool BBC and Atom User Group. Meets at Old Swan Technical College, Room C33 on first Wednesday of month at 7.30pm and at Birkenhead Technical College on third Thursday of month at 7.30pm. Contact Nick Kelly, 051-525 2934 (evenings).

BBC

Laserbug is an international user group for the BBC micro. Produce monthly magazine. Subs: £12 for one year, £6 for six months. Contact Paul Barbour, 10 Dawley Ride, Colnbrook, Slough, Berks. 02812 30614.

Beebug. Ten magazines with programs. Discount deals, library and query service. Contact Sheridan Williams or David Graham at PO Box 50, St Albans, Hertfordshire AL1 2AR.

Bournemouth BBC User Group. Meets at Lansdowne Computer Centre, 5 Holdenhurst Road, Bournemouth on first and fourth Wednesday of month at 7.30pm. Contact Norman Carey on 0202 749612.

Brent/Barnet User Group. Meets on last Sunday of month. Subs £3. Newsletter. Contact Joseph Fox, 4 Harman Close, London NW2 2EA.

North London BBC Micro Users Group. Meets at The Prince of Wales, 37 Fortune Green Road, on Tuesdays at 7pm. Wide range of skills and expertise. Contact Dr Leo McLaughlin, Department of Chemistry, Westfield College, University of London, Kidderpore Avenue, London NW3 7ST, 01-435 0109.

Preston Area BBC Micro User Group. Meets at Boatmans Arms, Marsh Lane, Preston, on last Thursday of month. Subs: £5. Contact Duncan Coulter, Membership Secretary, 8 Briar Grove, Ingol, Preston, Lancashire, 0772 725793.

Witham BBC Micro User Group meets at comprehensive school, Witham on second Thursday each moth at 7.30pm. Contact Dave Watts after 7pm, 0245 358127.

Comal

London Comal User Group. Meets at Polytechnic of North London, Holloway, second Wednesday of month, term time. Subs: £7.50. Contact John Collins, 75 74111.

Commodore ICPUG

Barnsley. Subs: £7.50. Contact Bob Wool, 13 Ward Green, Barnsley, South Yorkshire, 0226 85084.

Blackpool. Meets at Arnold School, Blackpool, on third Thursday of month. Contact David Jarrett, 197 Victoria Road, Thornton Cleveleys, Blackpool FY5 3ST.

Canterbury SE. Meets at The Physics Lab, Canterbury University, on first Tuesday and Wednesday of month. Subs: £7 adults, £3.50 juniors. Contact R Moseley, Rosemount, Romney Hill, Maidstone, 0622 37643.

Carrickfergus. Contact David Bolton, 19 Carrickburn Road, Carrickfergus, Antrim BT38 7ND, 09603 63788.

Cheltenham. Meets at The Cheltenham Ladies College on last Thursday of month at 7.30. Contact Alison Schofield, 78 Hesters Way Road, Cheltenham, Gloucester, 0242 580789.

Clwyd. Contact John Poole, 6 Ridgway Close, Connah's Quay, Clwyd CH5 4LZ.

Corby. Contact Peter Ashby, 215 Wincohn Way, Corby, Northamptonshire, 05363 4442.

Coventry. Meets at Stoke Park School and County College at 7pm on fourth Wednesday of month except July, August, December. Subs: £2.50. Contact Will Light, 22 Ivybridge Road, Stvyechale, Coventry. Warwickshire.

Derby. Meets at Derby Professional Colour every other Tuesday at 7pm. Contact Robert Watts, 03322 72569.

Durham. North-East Pet and ICPUG. Meets at Lawson School, Burnley at 7pm second and third Mondays of month. Contact Jim Cocallis, 20 Worcester Road, Newton Hall Estate, Durham.

Essex. No meetings, software library. Contact Simon Kniveton, 097 086 303.

Hainault. Meets at Grange Remedial Centre, Woodman Path, Hainault. Contact Carol Taylor, 101 Courtlands Avenue, Cranbrook, Ilford, Essex.

Glasgow. Contact Dr Jim MacBrayne, 27 Daidmyre Crescent, Newton Mearns, Glasgow, 041-639 5696.

Gloucester and Bristol Area. Meets at 23 Sheppard Leaze, Wotton-under-Edge, Gloucester, on last Friday of month.

Hampshire. Meets at 70 Reading Road, Farnborough, on third Wednesday of month. Contact Ron Geere, 109 York Road, Farnborough, Hants, 0252 542921.

Hertfordshire North. Meets at Provident Mutual Assurance, Purwell Lane, Hitchin, on last Wednesday of month. Contact B Grainger, 73 Minehead Way, Stevenage, Herts SG1 2HS, 0438 727925.

Kilmarnock. Meets at Symington Primary School on first and third Thursdays of month at 7pm. Software library. Contact John Smith, 19 Brewlands Road, Symington, Kilmarnock KA1 5RW, 0563 830407.

Liverpool. Meets at The Merchant Taylor School for Boys, Crosby, on second Thursday of month at 7pm. Software exchange. Contact Tony Bond, 27 Ince Road, Liverpool L23 4UE, 051-924 1505.
London. Contact Alan Birks, 135 Queen Alexandra Mansions, Judd Street, London WC1, 01-430 8025.
London North. Contact Barry Miles, Department of Business Studies, North London Polytechnic, Holloway Road, London N7, 01-607 2789.
Norfolk. Contact Peter Petts, Bramley Hale, Wretton, King's Lynn, Norfolk PE33 9QS, 0366 500692.
Northumberland. Proposed new club. Contact Graham Saunders, 22 Front Street, Guide Post, Northumberland.
Slough. Meets at Slough College on second Thursday of month at 7.30pm, visitors — 65p adults, 40p students. Contact Brian Jones, 53 Beechwood Avenue, Woodley, Reading RG5 3DF, 0734 661494.
South-East. Regional Group. Meets at Charles Darwin School, Jail 'Lane, Biggin Hill, Kent, on third and fourth Thursday of month at 7.30pm. Subs: £7.50. Free library, discount service, courses and newsletter. Contact Jack Cohen, 30 Brancaster Road, Newbury Park, Ilford, Essex, 01-597 1229.
South Midlands. Meets at 12 York Street, Stourport-on-Severn on last Thursday of month. Help available with business programming problems. Contact M J Merriman at above address.
Staffordshire. Annual subs: £6.50. Group newsletter. Contact at 57 Clough Hall Road, Kidsgrove, Stoke-on-Trent.
Teddington. Contact G Squibb, 108 Teddington Park Road, Teddington, Middlesex, 01-977 2346.
Watford. Meets on second Monday of month. Contact Stephen Rabagtiati, c/o Institute of Grocery Dist. Grange Lane, Letchmore Heath, Watford, Herts, 01-779 7141.

Commodore Pet

Blackpool. West Lancashire Pet Users Club. Meets at Arnold School, Blackpool on the third Thursday of month. Contact D Jowett, 197 Victoria Road, East Thornton, Blackpool FY5 35T.
Southern Users of Pets Association. Contact Howard Pilgrim, 42 Compton Road, Brighton BN1 5AN.
Pet User Group Crawley. Contact Richard Dyer, 33 Parham Road, Ilfield, Crawley.
Pet Users Education Group. Produces newsletter. Contact Dr Chris Smith, Department of Physiology, Queen Elizabeth College, Camden Hill Road, London W8 7AH.
UK Pet Users Club. Annual subs: £10, newsletter. Contact 360 Euston Road, London NW1 3BL.
Pet Users Group. Meets at Polytechnic of North London, Eden Grove, Room 320. On alternate Tuesdays, 6pm. Meets at Barry Miles on 01-607 2789.
Pet User Club. Contact Margaret Gulliford, 818 Leigh Road, Slough Industrial Estate, 0753 74111.
Independent Pet Users Group. Contact 57 Clough Hall Road, Kielsgrove, Stoke-on-Trent, Staffordshire.

Commodore Vic

Burnley. Proposed club. Contact John Ingham, 72 Ardwick Street, Burnley, Lancashire.
London. Vic Users Group. Meets on alternate Tuesdays at 6.30pm at Polytechnic of North London, Community Centre. Contact Robin Bardbeer.
Norfolk. Proposed club. Contact J Blair, 7 Beach Road, Cromer, Norfolk, 0263 512849.

Compucolour

Caversham. Compucolour Users Group UK. Meets at Community Centre, Caversham Park Village twice a year. Subs £15. Contacts with USA, Australia and Canada. Newsletter, program library. Contact Peter Hiner, 11 Pennycroft, Harpenden, Hertfordshire, 05827 64872.

CP/M

Irish CP/M Users Group. Subs: £5, meets monthly in Dublin area. Newsletter. Contact Doug Notley, Gardner House, Ballsbridge, Dublin 4, Dublin 686411.
UK CP/M Users Group. Subs: £7. Software library, newsletter, help service. Contact Lesley Spicer, 11 Sun Street, London EC2M 2QD, 01-247 0691.

COSMAC

COSMAC Users Group. Contact James Cunningham, 7 Harrowden Court, Harrowden Road, Luton, Bedfordshire, 0582 423934.

Digital Equipment

Digital Equipment Users Society. Program library. Contact The Secretary, PO Box 53, Reading, Berkshire, 0734 387725.

Dragon

Brixham Dragon Owners Club meets at Computer Systems (Torbay), Pump Street, Brixham, every Saturday at 2.30pm. Contact Ian Chipperfield, 22 Brookdale Court, Brixham, Devon, Brixham 59224.

Education

Birmingham. Education ZX80/81 User Group. Subs: £2.50. Contact Eric Deeson, Highgate School, Balsall Heath Road, Highgate, Birmingham B12 9DS.
Birmingham. MUSE. Subs: £10, student £6.50. National body for co-ordinating activity in schools, colleges. Contact Lorraine Boyce, MUSE Information Office, Westhill College, Weoley Park Road, Birmingham, 021-471 3723.
Dublin. Computer Education Society of Ireland. Subs: £3. Contact Dairmuid McCarthy, 7 St Kevins Park, Kilmacud, Blackrock, Co. Dublin.
Middlesex. Educational Users Group. Offshoot of national TRS-80 Users Group. Contact Dave Fletcher, Head Teach, Beaconsfield First and Middle School, Beaconsfield Road, Southall, Middlesex.
Worcestershire. Mini and Microcomputer Users in Education. National organisation. Contact R Trigger, 48 Chadcote Way, Catshill, Bromsgrove, Worcestershire B61 0JT.

Forth

Forth Users Group. Produces newsletters and covers a variety of machines. Subs £7.50. Contact David Husband, 2 Gorleston Road, Branksome, Poole, Dorset BH12 1NW, 0202 764724.
Forth Interest Group UK. Meets at Room 408, South Bank Polytechnic on the first Thursday of month. Subs: £7. Newsletter. Contact K Goldie-Morrison, 15 St Albans Mansion, Kensington Court Place, London W8 5QH, 01-937 3231.

Forum

Forum 80 Users Group. Contact Frederick Brown, 421 Endike Lane, Hull HU6 8AG.

FX-500-P

FX-500-P Users Association. Contact Max Francis, 38 Grymsdyke, Great Missenden, Buckinghamshire HP16 0LP.

Genealogists

Society of Genealogists Computer Interest Group. Subs: £3. Newsletter. Contact Anthony Camp, 01-373 7054.

Intel MDS

UK Intel MDS Users Group. Newsletter. Contact Lewis Hard, c/o S.P.A.C.E., The Old Coach House, Court Row, Upton-on-Severn, Worcester WR8 0NS.

Ithaca Audio S100

Ithaca Audio S100 Users Group. Software exchange, discount. Contact Dave Weaver, 41 Dore Avenue, North Hykenham, Lincoln LN6 8LN.

Jupiter Ace

Jupiter Ace Users Group. Subs: £7. Newsletter, add-ons. Contact John Noyce, Remsoft, 18 George Street, Brighton BN2 1RH.

Mattel

Mattel Intellivision TV Game Group. Proposed group to organise games, competitions. Contact Warrington 62215 after 4pm.

Medical

Durham. Primary Health Care Group. Contact Dr Alastair Malcolm, British Computer Society, Cheveley Park Medical Centre, Belmont, Durham, 0385 64282.
London. Medical Micro Users Group. Newsletter. Contact Medicom, 1-2 Hanover Street, London W1.
Middlesex. TRS-80 Medical and Laboratory Users. Newsletter. Contact Dr Robinson, The Residency, Northwick Park Hospital, Harrow, Middlesex.

Nascom

Berkshire. Nascom Thames Valley User Group. Meets at Frogmore Hotel, Windsor, on Thursday forthnightly, 8pm. Newsletter. Contact Mike Rothery, 37 Eaton Wick Road, Eton Wick, Windsor, Berkshire, Windsor 56106.
Birmingham Nascom User Group. Meets at Davenports Social Club, Granville Street, Birmingham on the last Thursday of month, 8pm. Contact Martin Sidebotham, 021-744 3093.
International Nascom Microcomputer Club. Subs: £5. Newsletter, program library. Contact 80 Oakfield Corner, Sycamore Road, Amersham, Buckinghamshire HP6 5EQ.
Merseyside Nascom User Group. Meets at Mona Hotel, St James Street, Liverpool, on the first Wednesday of month, 7.30pm. Contact Mr T Searle, 051-526 5256.

Newbrain

Wakefield Independent Newbrain User Group. Contact Anthony Hodge, 15 St John's Court, Wakefield WF1 2RY.

Ohio

Ohio Scientific User Group. . Subs: £5. Newsletter. Contact Tom Graves, 19a West End, Street, Somerset, 0458 45359.

Oric

Oric Owners Group. Subs: £10. Communicates through bi-monthly newsletter. Contact Paul Kaufman, 3 Club Mews, Ely, Cambridgeshire.

Osborne

British Osborne Owners Group. Subs: £18. Newsletter. Contact J Anglesea, Flat 19, Rowan House, Mitton Road, Handsworth, Birmingham B20 2JR.

OSI

OSI UK User Group. Contact Richard Elen, 12 Bennerley Road, London SW11 6DS.

Pascal

Pascal User Group. Subs: £9. Contact Nick Hughes, PO Box 52, Pinner, Middlesex HA5 3FE.

PDP

Buckinghamshire. PDP8 User Group. Newsletter. Contact Nigel Dunn, 21 Campion Road, Widmer End, High Wycombe, Buckinghamshire, 0494 714483.
Hertfordshire. PDP11 User Group. . Information service only. Contact Pete Harris, 119 Carpenter Way, Potters Bar, Hertfordshire EN6 5QB, 0707 52091.

Pilot

UK Pilot User Group. Contact Alec Wood, Wirral Grammar School for Boys, Cross Lane, Bebington, Wirral, Merseyside LG3 3AQ.

Prestel

ACC National Prestel Committee. Administrates Club Spot 800 (hobbyists on Prestel). Contact secretary, Rupert Steele, St John's College, Oxford OX1 3JP.

Research Machines

Birmingham. Research Machines 380Z. Contact Peter Smith, Birmingham Educational Computing Centre, Camp Hill Teachers Centre, Stratford Road, Birmingham B11 1AR.
Leamington Spa. West Midland RML User Group. Contact Spencer Instone, c/o 59 Avenue Road, Leamington Spa.
Newcastle. NERML 380Z User Group. Meets monthly at Micro-Electriconics Education Centre of the Polytechnic Coach Lane Campus. Subs: £5. Contact Mr Hatfield or Mr Reed, Computer Unit, Northumberland Building, Newcastle Polytechnic. 0632 326002.
Oxford. Research Machines National User Group. Contact RML, Mill Street, Osney, Oxford OX2 0BW, 0865 249866.
Oxford. Research Machines Ltd National User Group. Contact M D Fisher, PO Box 75, Oxford OX4 1EY.

Sharp MZ80

Aberdeen. International Sharp Users Group. Subs: £3. Newsletter. Contact Graham Knight, c/o Knights Computers, 108 Rossemount Place, Aberdeen, 0224 630526.
Essex. Sharp MZ80K User Group. Contact Joe Street, 16 Elmhurst Drive, Hornchurch, Essex RM11 1PE.
Leeds. Sharp PC1211 Users' Club. Subs: £5. Newsletter. Contact Jonathan Dakeyne, 281 Lidgett Lane, Leeds LS17 3AQ.
Somerset. Sharp MZ80 Users Club. Contact Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset BA21 4AE.

Sinclair

Brighton. ZX Users Group. Contact J Ireland-Hill Jnr, 145 Godwin Road, Hove, Brighton.
Aylesbury. Sinclair ZX Computer Club. General monthly meeting, newsletter. Equipment for hire, specialist meetings, library. Contact secretary, Ken Knight, 0296 5181.
Colchester. Sinclair User Group. Meets forthnightly. Contact Richard Lawn, 102 Prettygate Road, Colchester, Essex.
Cardiff. ZX Club. Meets on last Sunday of month, 2pm. Subs: £5. Telephone service, software library. Contact Mike Hayes, 54 Oakley Place, Grangetown, Cardiff, 0222 371732.
Edinburgh. ZX. Meets at Claremont Hotel, Claremont Crescent, Edinburgh on second and fourth Wednesdays every month, 7.30pm. Subs: £5 adults. £3 juniors, students, OAP and unemployed. Newsletter. Contact John Palmer, 56 Meadowfield Drive, Edinburgh, 031-661 3183.
Glasgow ZX80/81 User Group. Contact Ian Watt, 10 Greenwood Road, Clarkston, Glasgow, 041-638 1241.
Liverpool. ZX Computer Club. Meets at ZX Computer Centre, 17 Sweeting Street, Liverpool, on Wednesday, 6.30pm. Contact Keith Archer, 051-260 4950.
London. National ZX User Club. Monthly magazine 'Interface'. Contact Tim Hartnell, Interface, 44-48 Earls Court, London W8.
London. Sinclair User Group. Meets at Polytechnic of North London, Room 2-5 Tower Block. Monday, 6.30pm. Contact Irving Brand, Polytechnic of North London, Holloway Road, London.
ZX Spectrum Club. Proposed new club for teenagers. Contact D Beattie, 63 Kingsley Crescent, Sawley, Long Eaton, Nottingham NG10 3DA.
Staffordshire. ZX80 National Software Association. Subs: £6. Newsletter, software available on cassette. Contact 15 Woodlands Road, Wombourne, Staffordshire WV5 0JZ.
Suffolk. ZX Amateur Radio User Group. Newsletter. Contact Paul Newsman, 3 Red House Lane, Leiston, Suffolk. SAE essential. No telehone enquiries.
Surrey. Guildford ZX81/80 Users Group. Meets Fridays, club magazine. Contact A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, 0483 62035.
Surrey. ZX80/81 User Club. Newsletter. Contact David Bigden, PO Box 159,

68 ►

◀ 67

Kingston-upon-Thames, Surrey KT2 5UQ.
West Sussex. Hassocks ZX Micro User Club. Contact Paul King, 25 Fir Tree Way, Hassocks, West Sussex.

Sirius
Sirius User Group. Newsletter, program library. Contact Ray D'Arcy, Sirius User Club, The Microsystems Centre, Enterprise House, 7-71 Gordon Street, Luton. 0582 412215.

68XX
68XX Special Interest Group. Contact Tim Turner, 63 Millais Road, London E11 4HB, 01-558 3681.

Software
London. Software Group. Meets at Polytechnic of North London, Room 2-3 Tower block Thursday, 6pm. Contact Mike Duck at Polytechnic of North London, Holloway, London N7.
Oxford. Program of the Month Club. Discount programs, newsletter. Contact Mr Durrant, 55 St Thomas Street, Oxford OX1 1JG, 0855 250333.

Sorcerer
Liverpool European Sorcerer Club. Monthly meetings. Subs: £7.50, newsletter. Contact Colin Marle, 32 Watchyard Avenue, Formby, near Liverpool L37 3JU, 070 48 72137.
Surrey. Exidy Sorcerer User Group. Newsletter, program exhange. Contact Andy Marshall, 44 Arthurs Bridge Road, Woking, Surrey GU21 4NT.

Spreadsheet
International Electronic Spreadsheet Users Group. Newsletter. Contact UK Alpha House, 7th Floor, Rowlandsway, Manchester M22 5RG.

Tangerine
Avon. Tangerine Users Group. Hardware/software suppliers for Oric 1 and Microtan. Monthly newsletter. Contact Bob Green, 1 Marlborough Drive, Worle, Avon, 093421315.
Bristol. Tangerine Homebrew. Contact A Coales, 35 Mogg Street, St Werburghs, Bristol BS2 9UB.

Texas Instruments
Leeds. TI99/44 User Group. Meets at 30 Gipton Wood Road, Leeds 8, Mondays 7pm. Subs: £6. Contact I Youlden, 0532 401408.
Manchester. TI User Group. Proposed new club. Contact T Grimshaw, 21 Allingham Street, Longsight, Manchester.
Manchester TI9900 User Group. Software, data libraries. Contact Chris Cadogan, Department of Computer Science, University of Manchester M13 9PL.

Triton
Triton User Group. Subs: £4. Newsletter, software exchange. Contact Nigel Stride, Transam Ltd, 12 Chapel Street, London NW1, 01-402 8137.

TRS-80
Birmingham. National TRS-80 User Group. Meets at Adam & Eve Pub, 1st Floor, Bradford Street, Birmingham on last Friday of month. Subs: £2.50. Newsletter, software library. Contact Michael Gibbons, 1 New Street, Castle Bromwich, Birmingham B38 9AP, 021-747 2260.
Chelmsford. TRS-80 User Group. Contact Michael Dean, 22 Roughtons, Galleywood, Chelmsford, Essex.
Durham. North East TRS-80 User Group. Meets at Information Technology Centre, Gateshead on the third Wednesday of month, 7pm. Subs: £5. Newsletter. Contact J Dunn, 8 Ettrich Terrace, North Gateshead, County Durham.
Edinburgh. Scottish TRS-80 and Genie User Group. Meets at Mansion House Hotel, Milton Road, second Thursdays of month, 7.30pm. Contact Dick Mackie, 3 Warrender Park Crescent, Edinburgh EH9 1DX, 031-229 6032.
Isle of Wight. TRS-80 User Club. Meets at London Hotel, Ryde on last Friday of month, 7.30pm. Contact Sean Coulson, 0903 614589.
Kent. TRS-80 User Group. Contact Alan Reid, 22 Woodeys Road, Rainham, Kent, 0634 367012.
Bolton. Northwest TRS-80 User Group. Meets at Barton Aero Club, Barton Aerodrome, Irlam, near Manchester on last Wednesday of month, 8pm Subs: £8. Sub-group meets at Crown Hotel, Blackfriars Street, on first and third Monday of month. Newsletter, software library. Contact Melvin Franklin, 40 Cowlees, Westhoughton, Bolton, Lancashire.
Liverpool. UK DOSPLUS User Group. Contact Peter Tootill, 101 Swanside Road, Liverpool L14 7NL.
Liverpool. Merseyside TRS-80/Video Genie User Group. Meets second Thursday of month. 7.15pm. Contact Peter Toothill, 101 Swanside Road, Liverpool L14 7NL. 051-220 9733.
London, SW. TRS-80 User Group. Contact Ron Everitt on 01-394 2123.
Merseyside. TRS-80 User Group. Subs: £5. Software library, newsletter. Contact N Rushton, 123 Roughwood Drive, Northwood, Kirby, Merseyside.
Milton Keynes. National TRS-80 and Genie User Group. Fee £7 for six months, newsletter. Contact Brian Pain, 24 Oxford Street, Stony Stratford, Milton Keynes.
London. TRS-80 Genie Group. Meets at Central Common Room, The Residency, Northwick Park Hospital on first Sunday of month. Contact Dr Nick Robinson, Central Room, The Residency, Northwick Park Hospital.
Northants. TRS-80 Users Group. Meets at Welwyn Park Community Centre on alternate Thursday at 7pm. Subs: £12, Saturday workshop. Contact Neil Griffiths, 0858 65718.
Nottingham. East Midlands TRS-80 Users Group. Newsletter. Contact Mike Costello, 15 Langbank Avenue, Rise Park, Nottingham NG5 5BU, 0602 751753.

Colour Genie
National Colour Genie User Group. Subs: £10. Products monthly newsletter, has software library and prepares national workshops. Contact Marc Leduc, 46 Highbury Avenue, Nottinghamshire NG6 9DB.

UCSD
Hants. UCSD System Users Society. Contact John Ash, Dicoll Data Systems Ltd, Bond Close, Kingsland Estate, Basingstoke, Hants RG2 0QB.
Oxford. UCSD Pascal UK Users Group. Contact Malcolm Harper, Oxford University Computing Laboratory Programming Research Group, 45 Banbury Road, Oxford OX2 6PE.

CUA
CUA User Group. Contact Adrian Waters, 9 Moss Lane, Romford, Essex.

6502
Bedfordshire. 6502 User Group. Contact Walter Wallenborn, 21 Argyll Avenue, Luton, Bedfordshire LU3 1EG, 0582 26927.
Hants. 6502 Users Club (Southern Region). Contact Steve Cole, 70 Sydney Road, Gosport, Hants.

Remember

Let us know about your micro club or user group so we can be sure the information printed here is up to date. Drop a card to Sandra Grandison, Listings Editor, at *Personal Computer News*, 62 Oxford Street, London W1A 2HG, or give her a call on 01-636 6890.

INSTANT IMAGE TRANSFER TO ZX SPECTRUM
RD DIGITAL TRACER £55.50

The high resolution colour graphics of the ZX Spectrum permit accurate presentation of complex or irregular images – maps, technical drawings, even personalities. But entering individual co-ordinates for unusual shapes can be tedious and time-consuming.

The RD DIGITAL TRACER cuts out tedious plotting. It provides instant transfer from original to diplay file – for screen display, ZX printer printout, or retention on cassette.

The RD DIGITAL TRACER is supplied with tracing sheet, software cassette and full instructions on use. Latest software includes fast colour fill, audible keystroke acknowledgement, fast PAPER colour change and fast LOAD from saved display file.

This is an invaluable tool for engineers, architects and other technicians, and for educational use in the presentation of lectures, and in computer training and application. Designed for the ZX Spectrum, the RD DIGITAL TRACER as supplied is compatible with ZX 81, although high resolution colour graphics are not available on this machine.

The RD DIGITAL TRACER is available from computer shops or direct from RD Laboratories. The direct, UK only, price of £55.50 includes VAT (Postage and Packing free). Send a cheque (payable to RD Laboratories Ltd.) with order for delivery within 28 days, or ask your local dealer for details.

Please send me .....RD DIGITAL TRACERS at £55.50 each (including P&P and VAT). I enclose cheque for £ ..... payable to RD Laboratories Ltd.

Name .....

Address .....

.....

.....

Send to: Dept. YCB, RD Laboratories Ltd., 20 Court Road Estate, Cwmbran, Gwent NP44 3AS

RD Laboratories also supply the RD 8100 SYSTEM for economic automatic measurement, test and control. The modular-based RD 8100 SYSTEM is already used widely in many applications – from scientific experimentation to small-scale energy management systems. Please send stamp and address for brochure.

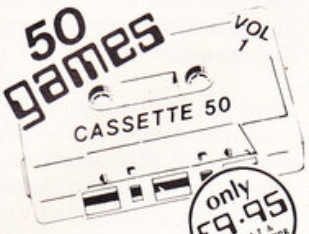
R D Laboratories Ltd

20 Court Road Estate Cwmbran Gwent NP44 3AS
(06333) 74333

DON'T MISS THIS INCREDIBLE OFFER!

50 GAMES £9·95!

CASSETTE 50 FOR YOUR MICRO



GALACTIC ATTACK
SPACE MISSION
LUNAR LANDER
PLASMA BOLT
STARTREK
RADAR LANDING
ATTACKER
GALACTIC DOGFIGHT
ZION ATTACK
IVASIVE ACTION
OXO
BOGGLES
PONTOON
SKI JUMP
HANGMAN
OLD BONES
THIN ICE
MAZE EATER
ORBITTER
MOTORWAY
FORCE FIELD
NIM
TUNNEL ESCAPE
BARREL JUMP
CANNONBALL BATTLE
OVERTAKE
SETTING TARGET
SMASH THE WINDOWS
SPACE SHIP
JET FLIGHT
PHASER
INTRUDER
INFERNO
GHOSTS
SUBMARINES
ROCKET LAUNCH
PLANETS
BLACK HOLE
DYNAMITE
DO YOUR SUMS
DERBY DASH
SPACE SEARCH
UNIVERSE
RATS
TANKER
PARACHUTE
JETMOBILE
HIGH RISE
THE FORCE
EXCHANGE

CASCADE SOFTWARE

NOW AVAILABLE FOR

sinclair SPECTRUM
ZX81
LYNX
DRAGON
ATARI

apple
VIC 20
ORIC-1
BBC A/B

ORDER NOW

DIRECT MAIL ORDER FORM

CASCADE SOFTWARE
CASCADES HOUSE
BARGAN'S LANE
LLANDOGO
GWENT
S.WALES NP54PA

SUPPLY CASSETTE 50 FOR _____ COMPUTER
I enclose cheque/P.O.
Name _____
Address _____

MAIL ORDER ONLY PCN 10/6

from COMPUTER CONCEPTS

Wordwise for the BBC Microcomputer Model B

The word processor for the BBC micro

TIMES ED. SUPPLEMENT oct '82
ACORN USER feb'83
BEEBUG dec/jan'83

Wordwise

The word processor for the BBC machine. This ROM based word processor simply plugs into one of the empty sockets inside. Supplied with full spiral bound manual and cassette containing an example document and free typing tutor program.
Now available from stock. Quantity Discounts
£39.00 + £1.50 p&p + VAT

Cash or royalties — we pay the best rates around for any good BBC micro software.

Professional B.B.C. software for the home
COMPUTER CONCEPTS

Dept PCN 15

Buy it with Access

BARCLAYCARD VISA

16 Wayside, Chipperfield, Herts, WD4 9JJ. tel (09277) 69727

SELL, EXCHANGE or BUY SOFTWARE

the COMPUTERHOUSE WAY

By becoming a member of COMPUTERHOUSE and entering your unwanted software on the COMPUTERHOUSE lists (which are circulated to all members) you get the opportunity to sell or buy software at 80% of its original cost. Alternatively as a member you can simply exchange at no extra cost to yourself other than postage.

MEMBERSHIP ONLY £12.95 per annum

For further details of membership and other benefits send large SAE to:

COMPUTERHOUSE (Dept PCN)
Freepost
ILFORD, ESSEX IG1 2BR

NAME _____

ADDRESS _____

_____

_____

'IBM Basic for Business and Home' by Robert Funkhouser, published by Reston and distributed by Prentice-Hall (0442 58531) at £12.70 (paperback, 204 pages).

This is a remarkable book. Long after Mr Funkhouser's contribution to IBM Basic has been forgotten his bold assault on the English language will live on.

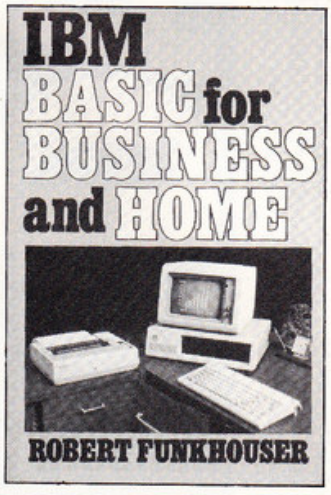
His preface gives the game away — this book may appear to be about IBM Basic but its primary purpose is to demonstrate that we are all mistaken in believing that we can use language to communicate. 'Using a computer,' he asserts, 'is not difficult. It is not difficult, that is, once you know how to use it.'

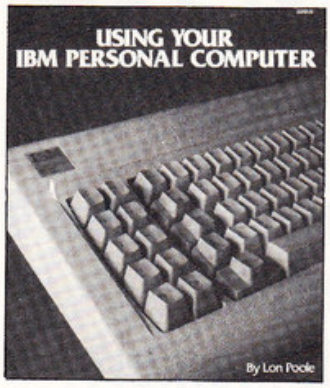
Even a skilled Logical Positivist would have difficulty sorting that out, but Mr Funkhouser has made his point and he goes on to show that language, when handled with the care of a man wearing asbestos gauntlets, can indeed be used to convey information.

'Input,' he says later, 'is data . . . Data that is input to a program is often referred to as "input data".' What could be clearer? Armed with a solid understanding of input data you can look forward to complete mastery of your IBM PC.

It may be unfair to concentrate on Mr Funkhouser's eccentric style, but we are not quibbling about minutiae such as split infinitives (although he can dish those out as well). A book that addresses you as though you were two years old is likely to be more irritating than useful.

As to content, Mr Funkhouser aims to give a comprehensive treatment. From the rationale of computing to the intricacies of DOS he doesn't overlook very much. He concentrates on business programming and his reassuring comment 'No prior computer experience is needed' is possibly the understatement of the year. **DG**





'Using Your IBM Personal Computer' by Lon Poole, published by Prentice-Hall (0442 58531) at £14.40 (paperback, 326 pages).

Presentation is just as important as content in computer manuals. It improves readability and comprehension. Having an eye for these things, my heart sank when I first picked up this book. I could tell without reading it that it was written and printed in America.

I don't want to appear xenophobic but I find Americanese (both language and presentation) jarring on the mind and eye. However, if you can put up with words like 'colour' being spelt 'color' you may well be rewarded.

Lon Poole is no newcomer to this kind of book. Previous efforts have included *Apple II User's Guide and your Atari Computer*. The result is a well-polished approach to the subject that takes the reader in stages through the anatomy of the machine.

Part 1 deals with the essentials of how to use the PC. Setting up the system and working with the operating system are well covered. Part 2 dives into the complexities of how to program in Basic and is as comprehensive as you would expect from a book with more than 300 pages.

Appendixes — sorry, appendices — cover easy reference guides to Basic commands, PC DOS commands, error messages and keyboard codes. Inside the back cover you'll find a glossy tear-out card for use as a quick-reference guide.

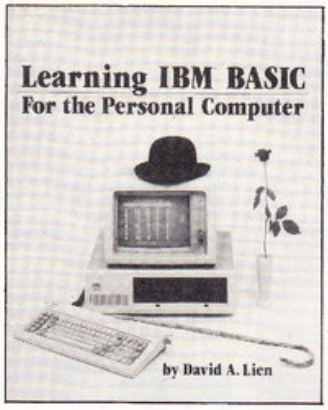
The text is supplemented with charts, diagrams and program listings of good legibility and clarity — which is more than can be said of the photographs. **RB**

'Learning IBM Basic for the Personal Computer' by David A Lien, published by CompuSoft at US$19.95 + $2.50 p&p surface mail (paperback 425 pages). CompuSoft Publishing, PO Box 19669-I2, San Diego, CA 92119.

Do you have an IBM PC about the house? Do you yearn to get to know it better? Ache to learn Basic? Do you enjoy reading American? Do you grin at cute cartoons of rabbits illustrating multiplication? Do you believe learning should be Fun, Fun, Fun?

Here's the book for you. It's a hefty paperback and entire pages are given up to cartoons or three- or four-line exercises — in the interests of user-cuddliness, one presumes.

Dr Lien, the man behind more than a million technical book sales and proud author of such classics as the Epson MX Printer Manuals, proclaims his latest opus as 'Light and non-threatening, since we have no insecurities to pass along'.



Your journey starts gently enough, with instructions about switching on, which way up to insert the system disk, and how to enter the date, list the directory and format a disk.

Then it's down to Basic, and plenty of hands-on exercises spelt out in minute detail, right down to 'Remember to use the ↑ key to get parentheses.' There's a chapter for each new concept, from relational operators and FOR-NEXT loops to PEEK and POKE, flowcharting and debugging. And most chapters have their own exercises to sweat over.

There are plenty of appendices, full of ASCII codes and error messages and IBM-reserved words. And a stack of ready-to-type-in sample programs.

It's all there, and all explained with exemplary clarity. But a few British business persons might find its jokey style beneath their corporate dignities. **SF**

'IBM Personal Computer—An Introduction to Programming and Applications' by Larry Joel Goldstein and Martin Goldstein, published by Prentice-Hall (0442 58531) at £13.55 (book only), £30.97 with disk (paperback and disk 310 pages).

The Goldsteins have done it properly this time.

In their last book for the Apple II *(PCN April 15)* they spent too much time playing with numbers and little maths problems. But in their new book for the IBM PC there's a good mix of explanations about Basic for the novice, enough programs to keep most hobbyists happy and a meaty section on applications.

Because the IBM PC is seen more as a business machine in the UK, punters could be excused for expecting the book to concentrate on business applications. In the US, however, the PC is seen as a little more down-market, and the book reflects this in its coverage.

There's a discussion on computer graphics, word processing and business simulation, but also a section on computer games, programming for scientists and tips on using colour.

The chapters on applications are made all the more vivid by the inclusion of many short demonstration programs and exercises. For example, in the word-processing chapter a rudimentary 32-line program gives the first-time user an idea of what world processors can accomplish. Similarly, a bar chart program is included on the graphics sections and a program demonstrating the operation of a dry-cleaning business is listed in the business simulations chapter.

An extra is the 5½in floppy disk containing many of the programs listed. **GW**

32K Rampack For Your Vic 20

Special Offer

Choose any of the following Gemini software cassettes requiring 32K memory.

1. **Database**
2. **Stock Control**
3. **Mailing List**
4. **Invoice Statements**
5. **Home Accounts**
6. **Commercial Accounts**

And add a 32K Rampack by Plus 80

(Recommended Retail Price £69.95 for both)

SPECIAL PRICE £59.99 (Inclusive)

Send to: **PLUS 80, 31-33 LOWER ROAD, HARROW, HA2 ODE.**

SOFTWARE 1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐
32K RAMPACK ON ITS OWN **£49.99** ☐
16K RAMPACK ON ITS OWN **£37.99** ☐

INDIVIDUAL SOFTWARE
PACKAGES **£19.95** 1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐ 6. ☐

Name ..... Address.....

..... Tel. No:.....

(Please tick appropriate boxes)

Allow 10-14 days delivery. Generous Dealer Discounts

DATABASICS

This five-page guide lists as many of the micros on the market for under £12,000 as possible. In Databasics you'll find all the specifications for the machines, add-ons and software necessary to make your buying decisions.

PCN keeps you up to date in three-week cycles, starting with hardware, then peripherals and finally software.

PRICE Specifications listed for each machine indicate what you get for the basic price quoted, which includes VAT.

PROCESSOR TYPE a microprocessor is the heart of the computer. The Z80 and 6502 are popular 8-bit chips. The 8088 and 68000 are common 16-bit chips. If a machine has an 8-bit and a 16-bit processor we have listed the 16-bit only. Cust. means custom-built.

SPEED IN MHz Speed of the clock used to drive the microprocessor, measured in MegaHertz (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 × lines The number of characters that can be displayed across the screen and the number of lines down.

METHOD (at extra cost) This indicates the way the computer displays information. **M** on its own means that a monitor is included in the basic price. **Tv** indicates that you can plug the computer into a television set (**M+**) indicates that the monitor costs extra. **LCD** = Liquid crystal display.

COLOUR CAPABILITY tells you whether the machine can give colour at the basic price quoted.

MAX DOT RESOLUTION gives the maximum number of points across the screen by the number of points down the screen that are available for graphics.

KEYBOARD This tells you the type of keyboard that comes with the machine. **W** = word processing, **C** = calculator and **T** = touch-sensitive.

No OF FUNCTION KEYS refers to the number of keys that can be used for different jobs by different programs.

NUMERIC PAD indicates whether the machine has a separate calculator-style group of number keys to enter data quickly.

INTERFACES BUILT-IN shows the number of standard connections built into the machine.

CASSETTE FACILITY gives a yes or no as to whether or not the machine can use a cassette to store data.

CAPACITY PER DISK AND DISK SIZE tells you how many disk drives come with the machine, and the amount of data in kilobytes (K) or megabytes (Mb) that can be stored on each drive. There are two sizes for disks, 5¼" or 8", and they can be floppy **(F)** or hard **(H)**.

OPERATING SYSTEM gives the program that looks after the general running of a computer.

LANGUAGES INC is a column which lists the programming languages that come with the machine at the basic price.

OTHER LANGUAGES AVAILABLE indicates whether or not other programming languages are available for the machine.

DISTRIBUTOR To find which company distributes the machine refer to the distributor table from the code listed in this column. The table is at the end of the listings, and gives the distributor's name and telephone number.

All details given are the latest available. We ask distributors to let us know as soon as machine specifications change so Databasics can be kept right up to date. This guide has been meticulously researched and the information collected from individual distributors listed.

PRICE GUIDE

Sinclair ZX81	£40
TRS-80 PC4	£50
Sharp PC1251	£80
Jupiter Ace	£90
Casio FX702P	£90
Sinclair Spectrum	£99
Tandy TRS-80 Pocket 2	£130
Atari 400	£150
TI-99/4A	£150
Commodore VIC 20	£170
Sharp PC1500	£170
Acorn Atom	£174
Colour Genie	£194
Dragon 32	£200
Sord M5	£218
Camputers Lynx	£225
Tandy TRS-80 Colour	£240
New Brain A	£269
Multitech MPS II	£269
BBC Micro Model A	£299
Genie II	£299
Atari 800	£300
Nascom 2	£327
Genie I	£330
Commodore 64	£345
BBC Micro Model B	£399
Datac Micro Controller	£431
Cortex	£454
Epson HX20	£472
Nascom 3	£549
Sharp MZ80A	£549
Commodore 4016	£632
Research Machine 480Z	£650
DAI PC	£684
Apple II	£776
Commodore 500	£799
HP 75C	£883
Sharp MZ80B	£900
Commodore 8032	£1,129
Commodore 710	£1,144
Microdecision	£1,144
Fujitsu FM8	£1,150
Sanyo MBC 1000	£1,195
Positron 900	£1,259
Tandy TRS-80 Model III	£1,299
Commodore 8096	£1,374
Pasca 640	£1,437
NEC PC8000	£1,454
Irvine Business Systems	£1,489
Televideo TS-800 Series	£1,495
HP 86A	£1,541
Osborne I	£1,581
Signet 10025	£1,599
APL Signet	£1,610
Zenith Z89-81	£1,668
Basis 108	£1,683
Commodore Spr. Pet 9000	£1,719
Gemini Galaxy 2	£1,719
British Micro Mini 803	£1,720
Microsolution Brit. Genius	£1,840
Genie III	£1,897
Toshiba T-100	£1,900
Sord M23	£1,932
Transtec BC2	£1,949
Kenilworth 83G	£1,953
Transam Truscan	£1,983
IDS Datamachine	£1,995
Tandy TRS-80 Model III	£1,999
Kenilworth 83N	£2,012
Caltext Micro	£2,019
LSIM3	£2,064
Haywood 9000 Composite	£2,064
Hawk Model 110	£2,070
Positron 9000	£2,134
Research Machines 380Z	£2,147
Superbrain JR	£2,150
Future Computers FX-20	£2,156
Comart Communicator	£2,180
Adler Alphatronic P2	£2,197
Kemitron K2000E	£2,242
Rair Black Box 320S	£2,242
Sanyo MBC 2000	£2,242
Toshiba T-200	£2,242
TMK 332	£2,242
Bonsai SM 3000	£2,294
CAL PC	£2,294
North Star Horizon	£2,294
Sanyo MBC 1250	£2,294
Casu Mini C2	£2,300
Seed System I	£2,300
Sharp PC3201	£2,300
HP 85	£2,360
HP Series 100, 120	£2,362
Sord M23P	£2,369
TI Prof. Computer	£2,386
IBM PC	£2,392
Xerox 820 Model II	£2,415
Haywood 3000	£2,439
LSM4	£2,472
Canon CX-1	£2,500
Adler Alphatronic P2U	£2,524
IO Tech Iona	£2,539
HP 87XM	£2,571
Quantum 2000	£2,587
Seed System 19	£2,600
Enterprise 1000	£2,645
Facit 6520	£2,645
Olympia Boss Model A	£2,645
Britannia Baby	£2,657
Adler Alphatronic P3	£2,696
Eagle II	£2,702
Almarc 801	£2,708
DEC Rainbow 100	£2,714
ICL PC Model 10	£2,754
Millbank SX10	£2,754
Olivetti M20D	£2,754
Sirius I	£2,754
Victor 9000	£2,754
North Star Advantage	£2,766
Apple III	£2,780
Sanyo MBC 4050	£2,817
Bonsai SM 4000	£2,842
Logica VTS Vitesse	£2,863
Decision-1 Computer O11	£2,869
Eagle III	£2,950
Zenith Z89-81	£2,978
Monroe EC 8800	£2,990
Philips P3500	£3,000
Tanberg EC10	£3,000
Archives 1	£3,003
Cromemco System 1	£3,025
DECPC 325	£3,080
Direct 1000	£3,093
Equator	£3,099
Clenio Table-Tops 925	£3,105
ITT 3030	£3,105
Monroe OC 8810	£3,162
HP Series 200 Model 16A	£3,211
Samurai	£3,214
Torch	£3,214
Sord M223	£3,277
Kontron RS180	£3,306
Columbia PC 1600-1	£3,392
Digico Prince	£3,392
Barcellos AMT 100	£3,450
Kalamazoo 1050	£3,450
Cromemco System 2	£3,560
Digital Microsystems 3	£3,576
Decision-1 Computer 012	£3,674
Televideo TS 1602-C	£3,714
Adds Multivision	£3,795
Clenio Pronto	£3,795
Panasonic JD800M	£3,795
Kemitron K3000	£3,795
DEC PC 350	£3,850
Vector 4	£3,852
Sage II	£4,019
Eagle IV	£4,190
C-1010	£4,197
Tandy TRS-80 Model 16	£4,199
Hytech H4500	£4,310
BMC OK 11 F800, Model 20	£4,360
ADS 42	£4,500
Televideo TS-80ZH	£4,533
Corvus Concept	£4,887
ICL PC Model 31	£4,939
Cromemco System 3	£5,170
Micro Five 1000	£5,175
Fortune 32:16 System 2	£5,204
Zeus 4	£5,400
Hawk Model 2110	£5,405
Molecular M200	£5,462
Altos 800/15	£5,663
Durango F85	£5,744
Marin Chip M9900	£5,750
SW Tech. Products S0/9	£5,750
BASF 7100	£5,805
Sord M243	£5,842
Archives IV	£5,905
ICL PC Model 32	£6,037
Rair Business Computer	£6,037
Digital Microsystems 4	£6,210
Superstar	£6,296
Racal 6000	£6,327
Eagle 1600	£6,497
TI System 200-250	£6,695
Compucorp 675	£6,780
Sundance I	£6,969
Pascal Mod. Microengine	£7,003
Diablo 3000	£7,250
Onyx 5001 MU	£7,607
Sundance II	£8,205
Haywood Hinet	£9,550
Altos 856-10	£9,631
Micro Five 3000	£10,350
Sundance 16	£10,480
Spectrum	£11,442

ABBREVIATIONS

Ap: APL
As: Assembly
Ba: Basic
Co: Cobol
Cm: Comal
Fr: Forth
Fn: Fortran
Pa: Pascal

HARDWARE

Make and model	Price inc VAT	Processor type	Speed in MHz	Standard RAM	Max RAM — normally at extra cost	Display			Graphics	Keyboard			Interfaces built-in					Storage		Operating system	Languages inc	Other languages available	Distributor	Comments
						Max characters columns × lines	Method (at extra cost)	Colour capability	Max dot resolution	Type of keyboard	No. of function keys	Numeric pad	No. of RS232	No. of Centronics	No. of IEEE 488	No. of others	No. of expansion slots	Cassette facility	Capacity per disk and disk size					
Acorn Atom	£174	6502	1	2K	40K	32×16	Tv(M+)	●	256×192	W							1	●		Cassette	BaAs	●	A1	Hobbyist micro
Adds Multivision	£3,795	8085A	5	64K	256K	80×25	M		640×240	W	28		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			1	3		2×160K5¼F	CP/M	Ba	●	T1	Good software choice
Adler Alphatronic P2U	£2,524	8085A	3	64K		80×24	M			W	6	●	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			1	3		2×790K5¼F	CP/M		●	T1	16 bit option-promised
ADS 42	£4,500	8085A	4	32K		40×8	M		40×8	W		●	3				3	●	1×82K5¼F	Holland Automation	Ba		A3	Intelligent cash register
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
Altos 800/15	£5,663	Z80	4	192K	208K	80×24	M			W	8	●		1					1×450K5¼F	MP/M		●	L1	Multi user business machine
Altos 856-10	£9,631	8086	10	512K	1Mb	80×24	M			W	16	●	6						2×500K5¼F	Xenix	Xenix	●	L1	The 16-bit version
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 III	£2,780	6502	2	128K	256K	80×24	(M+)	●	560×192	W		●	1				4		1×140K5¼F	SOS, DOS		●	A8	Will emulate Apple II
Archives I	£3,003	Z80	4	64K		80×25	M	●	240×100	W	23	●	2	1		1	5		2×386K5¼F	CP/M		●	S1	Standard CP/M + graphics
Archives IV	£5,905	Z80	4	512K		80×25	M	●	240×100	W	23	●	1			1	3		1×10Mb5¼H+1×7445¼F	CP/M, MP/M		●	S1	Hard disk version
Atari 400	£150	6502B	1.79	16K		40×24	Tv	●	320×192	T	3					7		●		Cassette	Ba	●	A5	Games computer, Basic extra
Atari 800	£300	6502	1.8	48K		40×24	Tv(M+)	●	320×192	W	3					7	4	●		Cassette	Ba	●	A5	Versatile, good graphics
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 disc promised
Basis 108	£1,683	6502	1	64K	126K	80×24	TvM	●	820×168	W	15	●	1	1			6	●				●	C12	Apple bus, Z80, 80 columns
BBC Micro Model A	£299	6502	1.8	16K	32K	40×30	Tv(M+)	●	320×256	W	10					1		●		MOS	BaAs	●	A1	Upgradable to Model B
BBC Micro Model B	£399	6502	2	32K		80×30	Tv(M+)	●	640×256	W	10			1		5	3	●		MOS	BaAs	●	A1	Versatile and expandable
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	●	E1	Built-in printer
Bonsai SM 3000	£2,294	Z80	2	64K		80×24	M		80×24	W	14	●	1	1					2×350K5¼F	CP/M		●	B2	CP/M business machine
Bonsai SM 4000	£2,842	8088	5	128K	256K	80×24	M			W	14	●	1	1						CP/M, MP/M, MS-DOS		●	B2	Z80 for 8 bit software
Britannia Baby	£2,657	8085	6.14	64K		80×25	Tv(M+)		80×25	W	11	●	2	1					2×500K5¼F	CP/M	AsBaCo	●	B3	Cobol language included
British Micro Mimi 803	£1,720	Z80A	4	64K		80×25	(M+)		512×256	W	17	●	1	1		1			2×400K5¼F	OS/M		●	B4	This is CP/M compatible
C-1010	£4,197	6502	1	64K	128K	80×24	TvM		256×192	W	12	●	1	1		1	8	●	1×1405¼F+1×10MbH	CP/M, DOS, UCSD-P	Ba	●	C2	Apple II compatible
CAL PC	£2,294	8088	5	128K	256K	80×25	TvM	●	256×512	W		●	2	1		1	5		2×400K5¼F	CP/M	Ba	●	C3	Also Z80B Processor
Caltext Micro	£2,019	Z80A	4	64K	256K	80×24	TvM			W	36	●	1	1			3		2×400K5¼F	CP/M		●	C3	Range of software included
Camputers Lynx	£225	Z80A	4	48K	192K	40×24	Tv(M+)	●	248×256	W			1	1				●		Cassette	Ba	●	C5	Unusual — promise of CP/M
Canon CX-1	£2,500	6809	4	128K	256K	80×24	M		80×25	W	15	●	3	1	1		2		2×320K5¼F	MCX	BaAs	●	C4	Pascal, Fortran as extras
Casio FX 702P	£90	Cust.		2K		20×1	LCD			C								●		Cassette	Ba		C6	Pocket computer
Casu Mini C2	£2,300	Z80A	4	64K		*	(M+)		*	*			4	1			6		2×1Mb8F			●	C7	*Choose your own terminal
Clenlo Pronto	£3,795	Z80A	4	64K	1Mb	*	Tv(M+)		*	*			2	2			18		2×600K8F	CP/M	Ba	●	C8	*Choice of terminal
Clenlo Table-Top 925	£3,105	Z80A	4	64K	128K	80×25	M			W	11	●	2	2					2×600K8F	CP/M		●	C8	Watch out for the weight
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	An IBM lookalike
Commodore VIC 20	£170	6502	1	5K	32K	22×23	Tv(M+)	●	176×158	W	8					3	1	●		Kernal	Ba	●	C9	Very popular home micro
Commodore 64	£345	6510	1	64K		40×25	Tv(M+)	●	320×200	W	8					3		●		Kernal	Ba	●	C9	Good value for money
Commodore 500	£799	6509	1	128K	896K	40×25	Tv(M+)	●	320×200	W	10	●	1		1	3	1	●		Kernal	Ba	●	C9	Available by summer?
Commodore 4016	£632	6502	1	16K	32K	40×25	TvM			W		●			1	1	3	●		Cassette, PETDOS	Ba	●	C9	The original PET
Commodore 710	£1,144	6509	2	128K	896K	80×25	TvM			W	10	●	1		1	2	1	●		Kernal	Ba	●	C9	Might be a long wait
Commodore 8032	£1,129	6502	1	32K	96K	80×25	TvM			W		●			1	1		●		Cassette, PETDOS	Ba	●	C9	The 80-column PET
Commodore 8096	£1,374	6502	1	96K		80×25	TvM			W		●			1	1		●		Cassette, PETDOS	Ba	●	C9	Fully expanded PET
Commodore Super Pet 9000	£1,719	6502	2	96K		80×25	TvM			W		●	1		1	1	2	●		Cassette, PETDOS	Ba	●	C9	Top of the range
Compucorp 675	£6,780	Z80	4	64K	256K	80×20	M			W	20	●	1				4		2×655K5¼F	Compucorp		●	C10	Unusual O/S

Comart Communicator CP100	£2,180	Z80	4	64K	512K	80×24	M			W		●	2	1			10		2×390K5¼F	CP/M		●	C13	Business CP/M micro
Cortex	£454	9995	12	64K	1Mb	40×24	Tv(M+)	●	256×192	W	12	●	1					●			BaAs		M2	Mainly sold as £340 kit
Corvus Concept	£4,887	68000	8	256K	1Mb	120×60	M		720×560	W	10	●	2			1	4			Merlin	Pa	●	K1	A4 shaped screen
Cromemco System 1	£3,025	Z80	4	64K		80×24	(M+)	●	450×735	W	20	●	1				8		2×390K5¼F	CDOS, Crom		●	C13	Designed for business
Cromemco System 2	£3,560	Z80	4	64K		80×25	(M+)			W	20	●	1				21		2×390K5¼F	CDOS, Crom		●	C13	Large business machine
Cromemco System 3	£5,170	Z80	4	64K		80×25	(M+)			W	20	●					21		2×1.2Mb8F	CDOS, Crom		●	C13	Top end Cromec
DAI PC	£684	8080	2	48K		60×24	Tv(M+)	●	255×335	W			1					●		Cassette	Ba		D9	Optional maths chip
Datac Micro Controller	£431	Z80	2	16K		40×24	Tv(M+)		80×60	W			1			1	1	●			Ba	●	D1	Mainly used in labs
DEC Rainbow 100	£2,714	8088	N/A	64K	192K	132×24	M	●	960×240	W	20	●	2				3		2×400K5¼F	CP/M		●	D2	Competitor for IBM PC
DEC PC 325	£3,080	PDP11/23	N/A	256K		132×24	M	●	960×240	W	20	●	2				1		2×400K5¼F	P/OS		●	D2	Mini in micro clothing
DEC PC 350	£3,850	PDP11/23	N/A	256K		132×24	M	●	960×240	W	20	●	2				4		2×400K5¼F	P/OS		●	D2	Mini in micro clothing
Decision-1 Computer MDC-011	£2,869	Z80A	4	64K	192K		(M+)*			*			3	1		1			2×400K5¼F	CP/M	Ba	●	I2	*Buy your own terminal
Decision-1 Computer MDC-012	£3,674	Z80A	4	64K	192K		(M+)*			*			3	1		1			1×400K5¼F+1×5Mb5¼H	CP/M	Ba	●	I2	*You choose the terminal
Diablo 3000	£7,250	8085	3	32K	64K	80×24	M			W	8	●	1				4		2×1.8Mb8F	DACL	Ba	●	B5	Unusual O/S
Digico Prince	£3,392	Z80A	4	64K		80×25	M			W	50	●	2				7		2×400K5¼F	CP/M		●	D3	Unusual keyboard
Digital Microsystems DMS-3	£3,576	Z80A	4	64K			(M+)*			*			3			1			2×512K8F	CP/M		●	D4	*Choice of terminal
Digital Microsystems DMS-4	£6,210	Z80A	4	128K	½Mb		(M+)*			*			4						2×512K8F	MP/M		●	D4	*Depends on terminal chosen
Direct 1000	£3,093	Z80	4	64K		80×25	M		132×28	W			2						2×300K5¼F	CP/M		●	D5	Standard CP/M machine
Dragon 32	£200	6809E	1	32K	64K	32×16	Tv(M+)	●	256×192	W				1		4	1	●		Cassette	Ba		D6	Tandy colour lookalike
Durango F85	£5,744	8085A	5	64K	196K	80×64	Tv(M+)			W		●	4			1	12		2×1Mb5¼F	Star Basic	BaCo	●	C3	Built in printer
Eagle II	£2,702	Z80A	4	64K		80×24	M		80×24	W		●	2	1		1			2×500K5¼F	CP/M	Ba	●	M3	Includes WP/SS software
Eagle III	£2,950	Z80A	4	64K		80×24	M		80×24	W		●	1						2×1Mb5¼F	CP/M	Ba	●	M3	Includes WP/SS software
Eagle IV	£4,190	Z80A	4	64K		80×24	M			W		●	2	1		1			1×1Mb5¼F+1×12.5Mb5¼H	CP/M	Ba	●	M3	Includes WP/SS software
Eagle 1600	£6,497	8086	8	128K	512K	80×25	M	●	720×352	W	24	●	2	1		1	8		1×1Mb5¼F+1×12.5Mb5¼H	MS-DOS, CP/M 86		●	M3	High speed IBM copy
Enterprise 1000	£2,645	*	8	64K			M			W	10	●	2			2			2×358K5¼F	Enterprise		●	D7	Micro Nova 16-bit
Epson HX20	£472	6301	1	16K	32K	20×4	LCD		120×32	W	13	●	2				2	●		Cassette	Ba		E2	Powerful portable
Equator	£6,842	Z80A	4	64K	448K	80×24	M		255×560	W	14	●	7	1		1	8		1×5Mb5¼F+1×750K5¼F	CP/M, MP/M, Turbo DOS		●	E3	Two bigger models available
Facit 6520	£2,645	Z80	4	64K	128K	80×24	M		80×24	W	8	●	2						2×320K5¼F	CP/M, Facit DOS	Ba	●	F1	Concurrent printing
Fortune 32:16 System 2	£5,204	68000	6	256K	1Mb	80×24	M	●	1024×1024	W	16	●	1				20		2×800K5¼F	Unix		●	I3	Genuine 16-bit
Fujitsu FM8	£1,150	6809	1	64K		80×25	(M+)	●	640×200	W	10	●	1	1		4	1	●		Flex	Ba		S2	Good for business graphics
Future Computers FX-20	£2,156	8088	8	128K	1Mb	80×25	M		800×400	W	20	●	2			2			2×800K5¼F	CP/M 86, MS-DOS		●	E1	Still on a promise
Genie I	£330	Z80	1.7	16K	48K	64×16	Tv(M+)		128×48	W			1	1			1	●		Cassette	Ba	●	L2	Compatible with TRS 80/I
Genie II	£299	Z80	1.7	16K	48K	64×16	Tv(M+)		128×48	W	4	●	1				1	●		Cassette	Ba	●	L2	Speeded-up Genie I
Genie III	£1,897	Z80A	3.2	64K		80×24	M		160×72	W	8	●	1	1		1	3		2×700K5¼F	New DOS	Ba	●	L2	CP/M costs extra
Colour Genie	£194	Z80	2.2	16K	32K	40×24	Tv(M+)	●	160×96	W	8		1	1		2	1	●		Cassette	Ba		L2	Home games machine
Gemini Galaxy 2	£1,719	Z80	4	64K	512K	80×25	M		160×75	W	10	●	1	1		1	5	●	2×400K5¼F	CP/M		●	G1	Low cost British system
Hawk Model 110	£2,070	Z80A	4	64K	256K	*	(M+)*	●	*	*			2	1			3		2×390K5¼F	CP/M, MP/M2		●	L6	*Choose your terminal
Hawk Model 2110	£5,405	Z80A	4	64K	256K	*	(M+)*	●	*	*			2	1			3		1×390K5¼F+1×21MbH	CP/M, MP/M2		●	L6	*Choose your terminal
Haywood 9000 Composite	£2,064	Z80A	4	64K	192K	80×25	M		64×255	W	34	●	2				8		2×320K5¼F	CP/M	As	●	H1	Designed for network
Haywood Hinet	£10,982	Z80	4	64K	128K	80×24	M			W	34	●	3	1		1			1×11Mb8H	CP/M		●	H1	Large network machine
HP 75C	£883	Cust.	N/A	16K	24K	32×1	(M+)			C						1	4	●	1.3K card reader	HP	Ba		H2	Calculator/computer
HP 85	£2,360	Cust.	N/A	16K	32K	32×20	M		255×191	W	8	●	1			4	4	●		Cassette	Ba	●	H2	Engineers' machine
HP 86A	£1,541	Cust.	N/A	64K	512K	80×24	M		544×240	W			1	1		2	4			HP	Ba	●	H2	CP/M optional
HP 87XM	£2,571	Cust.	N/A	128K	640K	80×24	M		544×240	W	14	●	1	1	1	3	4			HP DOS	Ba	●	H2	Special technical uses
HP Series 100, 120	£2,362	Z80A	3.68	64K		80×24	M		80×24	W	8	●	2			1				CP/M	Ba	●	H2	Top end HP business system
HP Series 200 Model 16A	£3,212	68000	8	128K	750K	80×25	M			W	5		1		1		2			HP		●	H2	Genuine 16-bit
Hytech H4500	£4,310	Z80	4	64K	208K	80×25	M		80×25	W	26	●	1				3		2×403K5¼F	CP/M	Ba	●	H3	Standard CP/M micro
IBM PC	£2,392	8088	4.7	64K	576K	80×25	(M+)	●	640×200	W	10	●		1			5		1×360K5¼F	MS-DOS	Ba	●	I9	Slow but reliable
ICL PC Model 10	£2,754	8085	3	64K	256K	80×24	Tv(M+)			W	11	●	2				8		2×700K5¼F	CP/M	Ba	●	I4	Repackaged Rair Black Box
ICL PC Model 31	£4,939	8085	3	128K	256K	80×24	(M+)		80×24	W	11	●	4				8		1×250K5¼F+1×5MbH	CP/M, MP/M	Ba	●	I4	Multi user Black box
ICL PC Model 32	£6,037	8085	3	256K		80×24	(M+)		80×24	W	11	●	8				8		1×250K5¼F+1×5MbH	CP/M, MP/M	Ba	●	I4	Top of ICL range
IDS Datamachine	£1,995	Z80	4	64K	1Mb	*	Tv(M+)		*				2				15		2×400K5¼F	CP/M	Ba	●	I8	*Depends on terminal
IO Tech Iona	£2,539	Z80	4	69K	960K	80×24	M	●	160×75	W	12	●	1	1			8	●	2×400K5¼F	CP/M		●	I5	Good colour versatility
Irvine Business Systems	£1,489	Z80	4	64K		80×25	M			W		●	2						2×400K5¼F	CP/M		●	I6	Inexpensive CP/M machine
ITT 3030	£3,105	Z80A	4	64K	256K	80×24	Tv(M+)		80×24	W	8	●	1			1	1		2×280K5¼F	CP/M, BOS		●	I7	Top end business system

HARDWARE

Make and model	Price inc VAT	Processor type	Speed in MHz	Standard RAM	Max RAM — normally at extra cost	Display: Max characters columns × lines	Display: Method (at extra cost)	Display: Colour capability	Graphics: Max dot resolution	Keyboard: Type of keyboard	Keyboard: No. of function keys	Keyboard: Numeric pad	Interfaces built-in: No. of RS232	Interfaces built-in: No. of Centronics	Interfaces built-in: No. of IEEE 488	Interfaces built-in: No. of others	Interfaces built-in: No. of expansion slots	Storage: Cassette facility	Storage: Capacity per disk and disk size	Operating system	Languages inc	Other languages available	Distributor	Comments
Jupiter Ace	£90	Z80	3.25	3K	51K	32×24	Tv(M+)		64×46	C		●					1	●			Fr		J1	Native Forth machine
Kalamazoo 1050	£3,450	8085	6	64K		80×24	Tv(M+)		80×24	W	10		1						2×250K5¼F	Kalamazoo		●	K3	Only Kabol language
Kemitron K2000E	£2,242	Z80	4	64K		80×24	(M+)		80×24	W			2	1			11		1×300K5¼F	CP/M		●	K4	Scientific Keyboard
Kemitron K3000	£3,795	Z80	4	64K	256K	80×24	(M+)		80×24	W		●	2				14		2×1Mb8F	CP/M, MP/M		●	K4	For scientific use
Kenilworth 83G	£1,953	Z80A	4	64K		80×25	TvM		160×75	W	10	●	1	1			5		2×350K5¼F	CP/M		●	K5	British portable
Kenilworth 83N	£2,012	Z80	4	64K		80×25	TvM		160×75	W	10	●	1	1			5		2×350K5¼F	CP/M	Ba	●	K5	Includes Basic
Kontron RSI 80	£3,306	Z80	4	64K	128K	80×25	M		256×512	W	16	●	2	1			8		2×303K5¼F	Kontron	Ba	●	K6	O/S CP/M based
LSI M3	£2,064	Z80	2.5	64K		80×24	M		80×24	W	31	●	1	1					2×200K5¼F	CP/M		●	L3	Big, British and CP/M
LSI M4	£2,472	8088	5	128K	256K	80×24	M		160×72	W	31	●	2	1			1		2×400K5¼F	CP/M 86, CP/M80		●	L3	Z80 for 8-bit software
Logica VTS Vitesse	£2,863	8086	5	64K	256K	80×24	M	●	640×288	W	12	●	1	1			4		2×1Mb5¼F	CP/M, MS-DOS	Ba	●	L4	High-res colour graphics
Marin Chip M9900	£5,750	9900	3	64K	1.6Mb	24×80	M		24×80	W	8	●	4				12		2×1.2Mb8F	MOS, MDEX	Ba	●	M2	Genuine 16-bit
Micro Five 1000	£5,175	8088	8	128K	512K	25×80	TvM		512×512	W	20	●	10				2		2×1Mb5¼F+2×6.3Mb5¼H	*		●	F2	*Choose your own O/S
Micro Five 3000	£10,350	8086	5	128K	1Mb	25×80	TvM		512×512	W	20	●	5				3	●	1×10Mb8F	*		●	F2	*Choose your own O/S
Microdecision	£1,144	Z80	4	64K		80×24	(M+)			*			2						1×200K5¼F	CP/M	Ba,Pilot	●	I2	*Terminal extra
Microsolution British Genius	£1,840	Z80	4	64K		80×24	TvM		80×24	W	21	●	1	1					2×160K5¼F	CP/M		●	M4	'Genius' by nature?
Millbank SX10	£2,754	Z80A	4	65K	256K	80×25	M		80×25	W	10	●	2			1			2×350K5¼F	CP/M	As	●	M5	Scientific applications
Molecular M200	£5,462	Z80	4	64K	320K		(M+)*			*			2			1	16		1×10Mb8H+1×500K8F	CP/M	BaAs	●	G2	*Terminal required
Monroe EC8800	£2,990	Z80A	3	128K		40×24	M		240×240	W	32	●	3			3			1×320K5¼F	Monroe	BaPaPilot	●	F3	Only 40-character screen
Monroe OC8810	£3,162	Z80A	3	128K		80×24	M		80×24	W	32	●	3			2	1		1×320K5¼F	Monroe	BaPa	●	F3	Bigger model available
Multitech MPFII	£269	6502	1.2	64K		40×24	Tv(M+)	●	280×192	C				1		1	1	●		Cassette	Ba	●	S8	Apple soft compatible
Nascom 2	£327	Z80A	4	2K	64K	16×48	Tv(M+)		48×96	W			1				4	●		NAS, SYS	BaAs	●	L5	Old reliable
Nascom 3	£549	Z80	4	48K		16×48	Tv(M+)		48×96	W			1				4	●		NAS, SYS	BaAs	●	L5	Fully expanded Nascom
NEC PC8000	£1,454	Z80	4	32K	64K	80×25	M	●	160×100	W	10	●	2	1					2×300K5¼F	CP/M, NEC, DOS	Ba	●	N1	Superb colour graphics
New Brain A	£269	Z80A	4	32K	512K	80×30	Tv(M+)		640×220	C			2				1	●		Cassette	Ba		G3	A lot of promise
North Star Advantage	£2,766	Z80	4	64K		80×24	M		640×240	W	15		1				6		2×360K5¼F	CP/M		●	T9	16-bit option
North Star Horizon	£2,294	Z80	4	64K	512K		*		*	*			2	1		1	9		2×360K5¼F	North Star DOS	Ba	●	T9	*Choose your own terminal
Olivetti M20D	£2,754	Z8000	3	160K	512K	80×25	M	●	512×256	W		●	1	1			5		2×320K5¼F	PCOS	Ba	●	B6	Real 16-bitter
Olympia Boss Model A	£2,645	Z80A	4	64K		80×28	M	●	80×28	W	10	●	1				4		2×140K5¼F	CP/M		●	O1	Useful 28 lines on screen
Onyx 5001 MU	£7,607	Z80A	4	128K	256K	*			*	*			5	1				●	1×7Mb5¼H	CP/M	Ba	●	T2	*Terminal extra; other models
Oric 1	£169	6502A	1	48K		40×28	Tv(M+)	●	240×200	C				1		1		●		Cassette	Ba		O2	16K promised
Osborne 1	£1,581	Z80	4	64K		52×24	M		128×32	W	10	●	1		1				2×185K5¼F	CP/M	Ba	●	O3	Portable, includes software
Panasonic JD 800M	£3,795	8085A	4	60K		80×24	M		80×24	W	21	●	3						2×250K8F	CP/M	Ba	●	P1	Larger model costs £5,002
Pasca 640	£1,437	Z80A	4	64K		80×24	M			W		●	1	1					2×250K8F	CP/M		●	W1	Regular CP/M micro
Pascal Modular Microengine	£7,003	WD9000	2	128K		*	*		*	*			4				8		2×1.2Mb8F	UCSD-P	Pa	●	P2	*Terminal extra
Philips P3500	£3,000	Z80A	4	64K	320K	80×25	M			W	11	●	2						2×0.6Mb5¼F	Turbo-DOS	Co	●	P3	Fast O/S as standard
Positron 900	£1,259	6809	1	64K	256K	*	(M+)		*	*			4		1		3			O/S 9	Ba	●	P4	*You choose your terminal
Positron 9000	£2,134	6809	1	64K	256K	80×24	TvM	●	480×240	W	12	●	4		1		3			O/S 9	Ba	●	P4	Multi user version
Quantum 2000	£2,587	Z80A	4	64K	192K	80×25	M		160×75	W	18	●	1	1			5	●	3×860K5¼F	CP/M		●	Q1	Mono, low-res graphics
Rair Black Box Model 3/20S	£2,242	8085	5	64K	512K	80×24	(M+)			*			2				8		2×1Mb5¼F	CP/M	Ba	●	R1	*VDU extra; many versions
Rair Business Computer	£6,037	8088	5	256K	1Mb	80×25	M	●		W	10	●	2			4	8		1×19Mb5¼H+1×1Mb5¼F	CP/M, PCDOS	Ba	●	R1	Hybrid 8/16 bit
Racal 6000	£6,327	Z80	5	64K	256K	80×26	M		80×26	W	21	●	1	1					1×600K8F	CP/M		●	R2	CP/M languages available
Research Machines 380Z	£2,147	Z80A	4	32K	56K	40×24	Tv(M+)			W			1	1			4	●	2×144K5¼F	CP/M	Ba	●	R3	Widely used in schools
Research Machines Link 480Z	£650	Z80A	4	32K	256K	40×24	Tv(M+)			W	4		2	1		1	2	●		Cassette	Ba		R3	CP/Net version available
Sage II	£4,019	68000	8	128K	512K	*	(M+)		*	*			2	1	1				2×640K5¼F	UCSD-P System	BaAsPaFn	●	T10	*Terminal extra
Samurai	£3,214	8086	4.6	128K	768K	80×25	M	●	720×400	W		●	3	1			3		2×1.2Mb8F	MS DOS, CP/M 86		●	M6	High-res colour graphics

Sanyo MBC 1000	£1,195	Z80A	4	64K		80×25	M	80×25	W	17	●	1	1				1×320K5¼F	CP/M	Ba	●	L1	Standard CP/M model
Sanyo MBC 1250	£2,294	Z80	4	64K		80×40	M	640×400	W		●	1	1				2×640K5¼F	CP/M	Ba	●	L1	High-res graphics
Sanyo MBC 2000	£2,242	8085A	5	64K		80×24	M	80×24	W	24	●	2	1			2	2×328K5¼F	CP/M	Ba		L1	Big disc model costs £3,622
Sanyo MBC 4050	£2,817	8086	5	128K	512K	80×24	M	80×24	W			1	1				2×640K5¼F	CP/M 86	Ba	●	L1	Pseudo 16-bit
Seed System 1	£2,300	6800	2	32K	64K	80×24	M	80×24	W	3	●	2				8	2×160K5¼F	DOS 68 Flex	Ba	●	S3	Ageing business machine
Seed System 19	£2,600	6809	2	48K	1Mb	80×24	M		W	3	●	2				8	2×160K5¼F	OS-9		●	S3	Latest from Seed
Sharp MZ80A	£549	Z80	2	48K		40×25	M	80×50	W		●							Sharp Basic	Ba	●	S4	CP/M facility extra
Sharp MZ80B	£900	Z80A	4	64K		80×25	M	320×200	C	10	●							Sharp Basic	Ba	●	S4	Unusual keyboard
Sharp PC1251	£79.95	Cust.	.58	4.2K			LCD	24×1	C	18	●					1	●	Sharp Basic	Ba		S4	Pocket computer
Sharp PC1500	£170	Cust.	1.3	3.5K	11.5K	26×1	LCD	156×7	C	6	●	1	1			2	●	Cassette	Ba		S4	Optional 4-pen plotter
Sharp PC3201	£2,300	Z80A	2.6	64K	112K	80×25	M	160×50	W	10	●					5		Sharp Basic	Ba	●	S4	Powerful Sharp Basic
Signet 10025	£1,599	Z80B	6	64K		80×24	M	512×512	W		●	2	1			1		CP/M, Macros		●	A6	Choice of keyboards
Sinclair ZX81	£40	Z80A	3.5	1K	16K	32×24	Tv	64×44	C							1	●	Cassette	Ba		S5	Sold a million
Sinclair Spectrum	£99	Z80A	3.5	16K	48K	32×24	Tv	256×192	C							1	●	Cassette	Ba	●	S5	Very popular home micro
Sirius I	£2,754	8088	5	128K	896K	80×25	M	800×400	W	7	●	2		1		4		2×600K5¼F	CP/M 86, MS/DOS	Ba	●	A7	IBM style
Sord M5	£218	Z80A	4	4K	16K	40×24	Tv(M+)	256×196	C				1		2		●	Cassette	Ba		S6	Japanese home computer
Sord M23	£1,932	Z80A	4	128K		80×25	M		W	14	●	2	1		2	3		2×330K5¼F	Sord O/S, SB80	BaPips	●	S6	CP/M compatible
Sord M23P	£2,369	Z80A	4	128K		80×25	Tv(M+)	640×200	W	14	●	2	1		2	2		2×290K3½F	Sord O/S, SB80	BaPips	●	S6	Complete with suitcase
Sord M223	£3,277	Z80	4	64K		80×25	M		W		●	2			4			2×350K5¼F	Sord O/S, SB80	BaPips	●	S6	Standard business machine
Sord M243	£5,842	Z80	4	192K		80×25	M	640×400	W	15	●	4	1		4			2×1Mb8F	Sord O/S, SB80	BaPips	●	S6	Large and powerful
SW Technical Products SO/9	£5,750	6809	2	256K	1.2Mb	80×24	M		W	15	●	1	1					2×1.5Mb5¼F	Flex, Uniflex		●	S7	Top end SWTP
Spectrum	£11,442	68000	8	256K	4Mb	*	(M+)		*			4				16		2×720K5¼F	Mirage	Ap	●	M1	*As terminal
Sundance I	£6,969	Z80A	4	64K	256K	132×24	M		W	4	●	1	1				●	1×7Mb5¼H	CP/M	Ba	●	T2	Ordinary CP/M machine
Sundance II	£8,205	Z80A	4	128K	256K	132×24	M		W	4	●	1	1				●	1×7Mb5¼H	CP/M	Ba	●	T2	Middle-range Sundance
Sundance 16	£10,480	Z8001	6	256K	1Mb	80×24	M		W		●	5	1				●	1×14Mb5¼H	BOS		●	T2	Tape backup for hard disc
Superbrain JR	£2,150	Z80	4	64K		80×24	M	560×240	W		●	2				1		2×160K5¼F	CP/M	Ba	●	I10	Bigger models available

infomatics
MICRO BULLETIN

BE UP-TO-DATE WITH ALL THE VITAL NEWS IN THE MICRO COMPUTER INDUSTRY.

In our fast-moving business the right piece of news can often put you ahead of your competition ... alter your plans ... even the very strategy of your business ... but only if it reaches you in time.

The Infomatics group of publications is launching a new weekly newsletter to cater specifically for people in the micro computer industry. Published every Monday, the Infomatics Micro Bulletin will be packed with information about what is happening on the micro front – both hardware and software. Produced by the same publisher as Personal Computer World and MicroDecision, the micro newsletter will carry up-to-date information on what is happening in the US and Japan, as well as news from the UK.

We'll be talking about new products coming along from the Japanese and American manufacturers and spotting those who want representation in the UK and Europe. And we'll be reporting on those companies abroad which want to market British systems and software.

The information will be aimed at people in the business – software houses, dealers and manufacturers – rather than hobbyists and users. It will therefore be essential reading for those who want to stay up-to-date with events and pick up the best deals first.

Annual subscription to the Micro Bulletin is £85, and will include an automatic subscription to Infomatics magazine.

So send off now for this week's FREE issue of the Micro Bulletin and for details on how to subscribe.

FREEPOST NO STAMP NEEDED

To: Infomatics Micro Bulletin,
VNU Business Publications B.V.,
FREEPOST 38, London W1E 6QZ
Yes, please send me my free issue of Infomatics Micro Bulletin.

Name _____

Company _____

Position _____

Address _____

_____

Postcode _____

Telephone _____

HARDWARE

Make and model	Price inc VAT	Processor type	Speed in MHz	Standard RAM	Max RAM — normally at extra cost	Display: Max characters columns × lines	Display: Method (at extra cost)	Display: Colour capability	Graphics: Max dot resolution	Keyboard: Type of keyboard	Keyboard: No. of function keys	Keyboard: Numeric pad	Interfaces built-in: No. of RS232	No. of Centronics	No. of IEEE 488	No. of others	No. of expansion slots	Storage: Cassette facility	Storage: Capacity per disk and disk size	Operating system	Languages inc	Other languages available	Distributor	Comments
Superstar	£6,296	Z80	4	64K		80×24	Tv(M+)		80×24				1	1			8		1×10Mb5¼H+1×400K5¼F	CP/M 80	Ba	●	B7	Includes hard disk
Tandberg EC10	£3,000	8080A	2	64K		80×25	M			W		●	7						1×250K8F	CP/M, TOS	Ba	●	T3	Very early machine
Tandy TRS-80 Model II	£1,999	Z80A	4	64K	256K	80×24	M		80×24	W	2	●	2	1					1×500K8F	TRS-DOS	Ba	●	T4	Big business machine
Tandy TRS-80 Model III	£1,299	Z80A	2	48K		64×16	M		128×48	W		●	1	1		1		●	2×184K5¼F	TRS-DOS	Ba	●	T4	Latest TRS80
Tandy TRS-80 Model 16	£4,199	68000	8	128K	512K	80×24	M			W	2	●	2	1					2×1.2Mb8F	TRS-DOS	BaAs		T4	True 16-bit
Tandy TRS-80 Colour Computer	£240	6809E	1	16K	32K	32×16	Tv	●	256×192	W			1					●		Cassette	Ba	●	T4	Very popular
Tandy TRS-80 PC4	£50	Cust.	N/A	½K	1½K	12×1	LCD		12×1	C	9	●				1	1			Cassette	Ba		T4	Low-cost pocket computer
Tandy TRS-80 Pocket Computer 2	£130	Cust.	1.3	2.6K	16K	26×1	LCD		156×7	C	6	●						●		Cassette	Ba		T4	Plotter available
Televideo TS-80ZH	£4,533	Z80	4	64K		80×24	M		80×24	W	15	●	2			1			1×256K5¼F+1×7Mb5¼H	CP/M		●	C11	Recently upgraded
Televideo TS-800 Series	£1,495	Z80A	4	64K		80×24	M		80×24	W	15	●	2			1				CP/M		●	C11	Standard CP/M machine
Televideo TS 1602-C	£3,714	8088	5	128K	256K	80×24	M		576×424	W	15	●	2			1			2×256K5¼F	CP/M-86		●	C11	Graphics, but no colour
TI Professional Computer	£2,386	8088	5	64K	256K	80×25	M			W	12	●		1					1×320K5¼F			●	T5	Choice of operating systems
Texas Instruments TI-99/4A	£150	9900	3.5	16K	52K	32×24	Tv(M+)	●	256×192	W						2		●		DOS	Ba	●	T5	This has sprite graphics
TI System 200-250	£6,695	9900	4	64K		80×24	M		80×24	W	12	●	1						1×5Mb5¼H	UCSD-P, PX10		●	T5	Bigger version available
TMK 332	£2,242	8085A	5	64K		80×24	M		190×96	W	22	●	2	1					2×320K5¼F	CP/M	Ba	●	P5	*6502 I/O processor
Torch	£3,214	Z80*	4/2	96K		80×30	TvM	●	640×256	W	15	●	1	1		4		●	2×400K5¼F	CPN	Ba	●	T6	CP/M compatible
Toshiba T-100	£1,900	Z80A	4	64K	96K	80×25	TvM	●	640×200	W	8	●	1	1	1		2		2×256K5¼F	CP/M	Ba	●	O4	Pro test March 18
Toshiba T-200	£2,242	8085	2.6	64K		80×24	M		80×24	W	15	●	1		1				2×256K5¼F	CP/M	Ba	●	O4	Standard CP/M machine
Transam Truscan	£1,983	Z80A	4	64K		80×24	TvM		640×288	W		●	2	1		1	5		2×190K5¼F	CP/M		●	T7	S-100 machine
Transtec BC2	£1,949	Z80A	4	64K	256K	80×24	M		80×24	W	13	●	2	1			8		2×386K5¼F	CP/M		●	T8	Fully definable characters
Vector 4	£3,852	8088	5	128K	256K	80×24	M	●	640×312	W	15	●	1	1		1	2		2×630K5¼F	CP/M, CP/M 86	Ba	●	A4	8-bit and pseudo 16-bit
Victor 9000	£2,754	8088	5	128K	896K	80×25	M		800×400	W	7	●	2	1			4		2×600K5¼F	CP/M 86, MS-DOS	Ba	●	D8	Same as Sirius 1
Wilkes YD8110	£4,025	8086	5	128K	896K	80×24	M	●	960×624	W	21	●		1			6		2×1.2Mb8F	CP/M 86	Ba	●	W2	Standard CP/M machine
Xerox 820 Model II	£2,415	Z80A	4	64K		80×24	M		1024×512	W		●	2	2			2		2×160K5¼F	CP/M		●	R4	Powerful graphics
Zenith 120-22	£2,978	8088	5	128K	192K	80×25	M		640×225	W	18	●	2	1	1	1	5		2×320K5¼F	CP/M, MS-DOS, Z Basic		●	Z1	Graphics includes turtle
Zenith Z89-81	£1,668	Z80	2.5	48K	64K	80×24	M			W		●	2	1					1×100K5¼F	CP/M	Ba	●	Z1	Elderly CP/M machine
Zeus 4	£5,400	Z80	4	64K	320K	80×25	(M+)		80×25	W	11	●	10						1×6Mb5¼H+1×250K5¼F	CP/M, Muse	As	●	M5	Designed as multi-user

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 **A6** Anglotech Computers, Slough 74201 **A7** ACT, 021-454 8585 **A8** Apple Computers, Hemel Hempstead 60244
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
C1 Computer Pheripherals Ltd, 01-278 7837 **C2** Country Computers Ltd, Redditch 29826 **C3** Computer Ancillaries, Egham 36455 **C4** Canon (UK) Ltd, 01-680 7700 **C5** Camputers Lynx, Cambridge 315063 **C6** Casio, 01-405 9131 **C7** Casu Electronics Ltd, Uxbridge 72511 **C8** Clenlo 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
D1 Datac, 061-941 2361 **D2** Dec Ltd, Basingstoke 59200 **D3** Digico, Letchworth 78172 **D4** Digital Microsystems, Reading 343885 **D5** Direct (UK), Warrington 814072 **D6** Dragon Data Ltd, Kenfig Hill 744700 **D7** Data General, 01-572 7455 **D8** DRG, Weston-Super-Mare 415398 **D9** Data Applications, Cirencester 61828
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, Lichfield 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
H1 Haywood Electronic Asoc Ltd, 01-428 0111 **H2** Hewlett Packard, Bracknell 63100 **H3** Hytech Microsystems, Oxford 726644
I1 Icarus 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 3040 **I8** Interactive Data Systems, Milton Keynes 313997 **I9** IBM UK Product Sales Ltd, 01-578 4399 **I10** Intertec 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** Kemitron, Chester 21817 **K5** Kenilworth Computers, Kenilworth 512127 **K6** Kontron Computers, St Albans 66222
L1 Logitek, Standish 426644 **L2** Lowe Electronics, Matlock 4995 **L3** LSI Computers Ltd, Woking 23411 **L4** Logica VTS, 01-637 5171 **L5** Lucas Logic, Kenilworth 59412 **L6** Leicester Micro Systems, Leicester 551869
M1 Micro APL Ltd, 01-834 2687 **M2** Microprocessor Engineering, Southampton 775482 **M3** Mediatech, 01-903 4372 **M4** Microsolution, Chipping Norton 3256 **M5** Millbank Computer, 01-891 4691 **M6** Micro Networks Ltd, 01-602 7405
N1 NEC 01-388 6100
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
P1 Panasonic Business Equipment (UK), Slough 75841 **P2** Pronto Electronic Systems, 01-554 6222 **P3** Phillips Business Systems, Colchester 575115 **P4** Positron Computer Ltd, Newton-le-Willows 29741 **P5** PHL, 021-745 3033
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
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, 01-405 5240 **T8** Transtec, Bristol 277462 **T9** TRW Datacorn International Ltd, Windsor 59183 **T10** TDI, Bristol 242796
W1 Westrex Ltd, 01-578 0957 **W2** Wilkes Computers, Bristol 277399
Z1 Zenith Data Systems, Gloucester 29451

PCN Billboard

Vic-20, plus cassette joystick, machine code monitor, 3K RAM+Programmers Aid cart, chess cart, super lander cart Programmers reference and, Vic Revealed, £70 software. Tel Skelmersdale 25652. £190 ono.

Atari program recorder, brand new, boxed + 10 games, worth £300, Preppie Shamus Zaxxon, Airstrike Darts & more. Bargain at £110, call Tel 01-203 4545.

Apple II 48K Europlus, complete with instruction manuals, TV modulator, leads and software. Excellent condition. For quick sale £375 ono. Tel. 021-430 3759.

Othello and pontoon for Texas T199/4A (16K) or Sharp MZ-80K. £5 for both. Stephen Godfrey, 73 Southwood road, Hayling Island, Hampshire, PO11 9PT.

Atari 400/800; EMI Submarine Commander cartridge only £20. Tel Elgin (0343) 44695.

Mattel Intellivision cartridges £12 each or will sell 13 for £130. titles include Night Stalker, Star Strike, Space Hawk. Tel Larbert (0324) 562051 weekdays after 5 pm or anytime weekends.

Newbrain writer text editing program. Files loaded/saved on tape. Menu driven print options. Cassette, manual £9.50. Also cash budget £6.95. P Murray, Astley House, Elmhurst, Lichfield, Staffs.

Atari VCS + 4 cartridges Space Invaders, Asteroids, Combat, Olympics. Joysticks, paddles etc. New condition, still Boxed, £95. Tel Southend on Sea 546277.

ZX81, perfect condition, tape with over 35 programs including machine code Maze Chase Pinball Bomb run, etc, plus mags £30, small Sanyo radio cassette recorder suitable for above DIM 9½×5×2⅓in. VGC £28 Tel 594 2281.

Korg MS10 synthesizer, excellent condition, with manual. £175 ono. Tel Glasgow 423 5765 after 6 o'clock, ask for Gerry or Shuggy.

Pet 2001 keypad type with expandment to 32K, will separate, best offer secures, also Aculab 735P and addressable 1EEE to parallel port decoder interface for IBM typewriter. Tel 01-950 4209.

Apple II 48K Evroplus, complete with manuals, TV modulator, leads and software., Excellent condition, bargain at £375 or offers. Tel 021 430 3759.

Atari 400 16K, cassette recorder, Basic, joystick, games software, manuals £200. Tel Clacton 430277 evenings.

Wanted ZX printer willl pay £30 to £40 also wanted workable pools program for 16K or 48K Spectrum. Tel N/Shields 0632 580199 anytime.

Atari VCS with 7 cartridges including Space invaders Casino and Break-out. Will accept £120 ono. Tel 01-310 9880.

ZX81 16K plus work station cassette recorder, books, many games on tapes, including 3D Monster Maze, Startrek, Defender, worth £130. Sell £50. Tel 0634 401174 Medway, Kent.

Sinclair 16K RAM for ZX81. £20. Frank Dunn, 32 Gateacre Park Drive, Woolton, Liverpool. L25 1PA. Tel: 01-051 722 7915.

ZX81 Memotech 16K, £23 worth of software and £9 worth of books, worth £130 will sell for £100. Tel Amlwch 831783.

VIC20 wanted in exchange for my two 40ch FM CB rigs and aerials, powerpak homebase or mobile, cost over £270. Tel Reading Whitley, (0734) 867670 (after 4pm) ask for Mark.

Jupiter Ace for sale £60. ZX81 plus 16K RAM pack and six games cassettes, £50. Tel Chesterfield 70730 after 6pm.

Gamestapes for 16K-ZX81 100% machine code Leapfrog £5.95, Scavenger 15 sheets, 4 Mazes 2/6 chasers fruit all characters fully animated, not Pacman £5.95. 19 Denmark Drive, Sedbury, Chepstow.

Wanted BBC/B, must be in good condition. Tel (0427 84) 294 (evenings).

Commodore 8K2001, integral green screen monitor and cassette, software includes Microchess, Backgammon, Dodgems and Invaders. Full set of TIS manuals, real bargain at £190. Anstruther (Fife) 311181 evenings.

ZX81 + Memotech 16K expandable RAM pack and Filesixty keyboard, all with leads etc, two game tapes, £8 worth of magazines etc. £66 ono. Tel Bursledon 2073.

Speech synthesizer, works with any computer, leads, manual in cabinet, perfect condition one month old, unlimited vocabulary built in PSU £60. Tel 0652 648074.

ZX81 games for sale, including Pacman, Breakout, Astroids and Basic compiler, £2.25 each, also for sale brand new Sinclair 16K RAM packs £24 ono each. Tel E. Horsley 2864 for more details.

ZX81 plus 16K RAM plus manuals, software, also 14in portable mains B/W television ideal starter pack £85. Tel Andover 0264 65136.

The overwhelming response to PCN's Billboard service is causing delay in publication of some advertisements. To solve this growing backlog and to cover some of the publication costs we are now charging £1.50 for each ad. Every form received at PCN's offices, 62 Oxford Street, London W1A 2HG, must be accompanied by a postal order or cheque for £1.50 made payable to VNU Business Publications.

Spectrum software, mint condition. Kopykat machine code program copier £4, machine code test tool £7, tape header reader £2, Meteoroids £3. Nigel Barker, 61 Ardeen Road, Doncaster DN2 5ER.

Apple II professional software unwanted prize on one disk £10 for Taxman, Frogger, Space Panic, Flywars, Serpentine, Cannonball Blitz, Choplister, s.a.e. to JRC Stevens, Elmfield, Harrow-on-the Hill, Middx.

Newbrain Model A, green monitor, special compatible cassette recorder, six months old, £50 worth of software, guide handbook, power pack, £325. Tel 01-866 9148 evenings, 01-995 1400 ext 303 days. Godber, Pinner, Middx.

VIC 20 software, swop/sell Star Battle cartridge, Panic, Amok cassettes, issues Vol 1,16 to Vol 2,5 V + G G. Offers, I Carpenter, 43 Craddocks Close, Bradwell Milton Keynes.

Atari Video computer games with cartridges, Space Invaders, Casino and Combat £85. 14 Derby Avenue, Skegness, 0754 5579 office hours 0754 5557 after 6pm.

48K TRS80, lowercase, VDU Edtasm + tiny Pascal, excellent 280 development (34K source/code, macros, symbolic debug, in-memory assemble), £175, will split, nearly complete PCW, PC offers. Tel 0202 576681.

VIC 20 16K RAM, 20 cartridges including Choplifter, Adventures, Mutant Herd and Super Expander, some cassettes, joystick, books, all excellent condition, £300 ono. Tel (0632) 899602 afternoons only.

Sharp MZ80K, 48K, complete with manual, reference books, Chess game, good condition, bought £400, sell £200. Write to Tony S, 9 Thorncliffe Road, Summertown Oxford, for further details.

ZX81 + 16K RAM + games, can buy separate ZX81 + 16K RAM £60 +, 7 months' guarantee games inc Krazy Kong Football manager etc total value £35 asking £15. Tel Dews 0924 451912.

Cortex 16 bit colour computer 64K as featured in ETI magazine, cost £450 + but buying house hence £375 ono. Tel Guildford (0483) 31949.

Atari Video game system, with six cartridges, Missile Command, Maze Graze, Combat, Dodge 'em Space Invaders, Cosmic Ark, worth £250, will accept £150. Tel Freddie on 01-624 2074.

Atari VCS extra paddles and 23 cartridges (including Parker and Activision). Invaders Chess Backgammon, Superman, Starmaster etc, over £650 to buy today bargain £275 ono. Southend (0702) 352505.

For BBC Acornsoft Planetoid and book called 30 + programs for the BBC, £12 ono for them both, will separate. Tel 061-428 9707 after 5pm, ask for Dave.

Oric 1 48K used twice, full manual, cassette lead, software, boxed £150, also cassette recorder. Tel 01-892 9787.

Atari 400 plus Atari tape recorder and Basic cartridge and Basic manuals plus Star Raiders, Energy Czar and more including joysticks £200. 1A Prince Arthur Road, London NU3 6AY.

Astro Wars hand held arcade game good condition with box and instructions £12 ono or will swop for 16K Spectrum games, collect if possible. Tel John 01-205 6453 evenings and weekends only.

ZX Spectrum, perfect condition, with books and magazines, software £80 ono. Tel St Albans 31737.

Colour Genie 16K + cassette recorder + £30 of software, four months old, hardly used, £180 ono. Tel Darwen 72275 after 6pm.

Wanted ZX81 power pack, must be in good condition. Tel Freeland 882057 evenings only.

For sale, ZX81 16K with manual and leads plus software, excellent condition only three months old all worth £95, will sell for £60. Tel 021-502 4471.

ZX81 16K + Filesixty keyboard+10 games tapes, worth £180, only £90. Please Tel Cambridge 315443 after 8pm, or Cambridge 244538 after 3pm.

Video Genie 48K + VU meter and cassette+excellent editor assembler, Toolkit and Galaxy Invaders software (worth £50), original packing, leads and manuals, good condition, must sell £250 ono. Will deliver reasonable distance. Tel Rick 0625 27965 (Macclesfield).

VIC20 Vic cassette deck 3K, super expander, Avenger cartridge, new style joystick. Vic revealed, other books and software, games and utilities, £185 ono. Tel s/s Rob 0632 552921 after five.

VIC20 accessories, CBM 16K RAM cartridge, Avenger, Sargon II Chess, joystick. Introduction to Basic Pts I and II, Innovative computing book, over £160 new, one month's use, £100 ono. Tel Rainford (074488) 2325, after 6pm, ask for Alan.

Sinclair built ZX81 + JRS 16K RAM, 6 month guarantee remains, £20 worth of magazines+software, accept £70. Tel York (0904) 52368 (after 6pm).

Philips G7000 video games machine, excellent condition £80 ono, computer cartridge, Munchkin, Air Sea Battle, Laser Attack and Space Monster. Tel Jason, Swansea 895416, 5-9pm.

Nascom-1, NAS-SYS-1, 48K RAM, Basic, P10, Supermum with 5A-PSU, Cottis Blandford cassette interface, programs, magazines (Inmc, Micropower), £270 cassette recorder, works at 5000 baud with above, £30. Jackson,. Tel Stevenage 66355.

Games (Sc1 f1 or brain teasers) for Vic 20. Tel Steve Christian on 051-733 1586 for list of titles (after 6.30pm).

Commodore 64 plus C2N cassette software, joystick, magazines £340 ono. Tel 01-251 3769 after 5.30pm.

For Sale or will swop 120CH am-fm CB with 2 aerials and transformer worth £190 for Spectrum 16-48K or Dragon. Will sell for £130, all boxed. Tel: 0207 502128 weekdays only.

BBC Model B wanted with software and books willing to pay up to £325 in Lancashire area. Tel Poulton Le Fylde (0253) 883929 aftr 4pm.

BBC compatible 160K disk drive £175, write Harshad Patel, 76 Fairlands Avenue, Thornton Heath, Croydon CR4 6HE.

Attention Atari owners, cartridges for sale, Phoenix £20, Pacman £20, Yar's Revenge £20, Raiders/Ark £22; Haunted House £20, Super Breakout £20, Planet Patrol £18. Most unopened. Tel 0723 73538.

Atari VCS, joysticks, paddles+Invaders cartridges, hardly used, will sell for only £75, contact Max. Tel Bristol (0272) 28672 after 5pm.

Atari shooping list generator, nineteen commodity groups, totalling over 350 items, menu driven, file update facility, requires 32K, disk drive, £7.50. Lees, 1 Loudoun Place, Castle Donington, Derby.

Wanted ZX81 good condition under £60. Tel Atherton 876903 after 5pm weekdays, or anytime weekends.

Sharp MZ80-P5 printer as new £210, Sharp MZ80B FDOS, Pascal and Double Precision £50. J Parish, 2 Collyers Close, Hurworth, Darlington, Co Durham DL2 2ES letters only please.

VIC 20 with Elementary manual and three games cartridges, Chess, Avenger, and Jelly Monsters, normal 3K memory, shop price £210, will ask £180 ono. Tel 01-607 4398 evenings and weekends.

VIC 20 Jelly Monsters £10, Boss 8K £5, Haywards Heath 542485 ask for Paul (after 5pm).

Acorn Atom 12K RAM, 18K ROM with disc pack (96K storage), ROMS include Workpack, Atomcalc and Toolbox, much software, printer interface all for £299. Tel (Penn Bucks) 3355, printer available.

Atari video console with joysticks etc plus Combat cartridge, £45 only, Missile Command £10, Asteroids £10, War Lords £15, Haunted House £6. Tel: 01-686 9423 Croydon.

Sharp MZ80K £399. Excellent condition with Basic, Pascal, machine language and systems program (Assembly) plus many games inc. Star Trek. Tel: (0742) 681144 (evenings only).

Apple II Goodies clearout! Grappler and interface, £69, Epson type II interface, £75. Z80 card with CP/M, £149, Magic Window word processor, £59. Frank. Tel: 01-207 3411 (evenings).

Nascom 1 8K ROM Basic, 48K RAM, Eprom board, Cottis Blandford cassette interface, cased with combined VDU. Offers around £160. Elwyn. Tel: Ruabon 821863 (day).

Pet CBM Voluntary community project for unemployed wishes to buy at reasonable cost. Prepared to collect. Tel: 0742 25569, (10am-4pm).

80►

PCN Billboard

Sharp MZ80K £350. With high resolution graphics board, 48K RAM, books and software including Sharp Software Technique and Zen Editor, Assembler, Debugger. Jasbir, 5 Redmead Road, Hayes, Middx.

Will swop my brand new, hardly used ZX Spectrum with lots of software, for Vic 20 (preferably with cassette recorder). Also, 16K ZX81 complete with professional keyboard and case, £80 ono. Tel: Mansfield (0623) 29380.

Vic Revealed, £6, Introduction to Basic Part 1 £9, Rabbit Base £9, Rabbit Writer £12, Vicat £5, available separately, all £35, cost £60 +. McKenzie, 13 Grasvenor Avenue, Barnet, Herts.

TI 99/4A stand alone 32K memory expansion unit (does not require peripheral expansion system). Tel: 01-206 0796 (evenings or weekends).

Spectrum 48K, 1 month old, boxed, as new, includes over £40 software: Penetrator, Spectre, Galaxians, Meteoroids, Horace, Spookyman, + many more, £110. Contact B. Doyle, 19 Church Road, Urmston, Manchester. Tel: 061-747 6533 (after 6pm).

Olympus OM10 F1.8 lens, for swop with 40 or 80 track disk drive for BBC computer, want to view it running. Graham, 10 Leadhall Road, Harrogate. Can travel.

30 hour Basic £2.75 or swop software BBC, also teleprinter with Nascom interfacing, details and software printout £20 or offers. Could deliver north or midlands. Tel: Harrogate 872045.

Newbrain AD, Beginners' Guide and tape, technical notes, all immaculate, offers around £270. Tel: Worthing 207201 (anytime).

Wanted new condition home computer, swop for over £120 of fantasy and family games, with software + books, not ZX81. Cannot collect. Tel: Richard after 5pm 051-733 0090 Liverpool.

Wanted 48K Oric and software, swop for over £120 fantasy, family games or combination with cash, must sell. Call Richard. Tel: 051-733 0090 after 5pm. Quick sale, buyer collects, Liverpool.

ZX81 software: Startrek, Defenda, Asteroids, Scramble, Invaders, ZX-Gulp, 3D Monster, 3D Defender, Advent-A, Mazogs, Pilot, Chess, Bugbyte 6, ICL 5, ZXDB, Z-aid, Backgammon, Flight. All for £40. £2.50 each. Tel: Preston 27316.

ZX81 16K manual, cassette recorder, software, ie Flight Simulator adventure tapes etc, in excellent condition, three months old. Tel: 21829 after 6.30pm, £80 for the lot.

Wanted Sharp PC1251 pocket computer with or without CE125 cassette drive printer. B. C. Green, 15 Clifton Gardens, London, N15.

16K ZX81 leads, manual, Filesixty keyboard and software, as new, also hand-held Invaders, game-watch. Bargain at £100, worth over £125. Tel: Downpatrick, Northern Ireland 3359, request David.

Swop a set of Spectrum manuals + tape dump of ROM for Ace manual + tape dump ROM. Since hardware is similar it is possible to transfer files. P. Crawley, Bedstone College, Bucknell, Salop. SY7 0BG.

Microtan 65 Fig-Forth in Eprom 8K RAM Tanex Xbug Assembler, upper/lower case, graphics in mini system rack, Cherry keyboard, £150 ono. Tel: 021-445 5439.

Wanted BBC Model B, offering Honda 250 Superdream immaculate condition, new K181 tyres fitted, top box, fairing, little used bike, over 70mpg. Tel: Vic. 061-366 5645.

For sale, Dragon 32 including joysticks, 2 books, manual, with Ghost Attack cartridge, Donkey Kong, Computer-voice cassette, leads, 2 months old, £180. Tel: Wakefield 365237.

Sirius 1 computer with Z80 card and 2.4 meg disk storage, as new, £2,400, with software MBasic etc, total 192K RAM. Tel; Newcastle upon Tyne 573905 (after 6pm).

Vic 20 + 16K RAM + £100 software inc. 2 games cartridges + 5 cassettes + compiler + Programmers' Reference Guide, £155, will sell separately. Tel: 061-790 5874.

BBC adventures to swop, Arrow of Death, Time Machine, Golden Baton and Dragon Quest, will swop for similar good condition originals. Tel: Saltford 3202 after 5pm, ask for Steve.

Spectrum 48K plus £40-worth software, £100. Sinclair printer with paper, £40. ZX81 with 16K and software, £40 ono. All little used. Write, 97 Windfield, Leatherhead, Surrey.

Philips G7000 computer game plus 8 cartridges, including Munchkins, Freedom Fighters, Computer Programmer, over £200 in value, 5 months old, £125. Tel: (North Humberside) 0405 69699.

Commodore 64 wanted cassettes and cartridges, also two joysticks wanted. Call Nigel, Needham Market, Suffolk 721926 (day); Stowmarket, Suffolk 613739 (evenings).

Spectrum Jackpot (48K) as new, swop for Spectrum games or sell for £4, game features gamble, hold, nudge facilities. Tel: Kwong Lee 0272 558321 (evenings only).

Sharp MZ-80K bought for business but never used, several game tapes included, private sale, price £325. Tel: Lincoln 722292.

Acorn Atom 16K ROM, 12K RAM, monitor utility floating point ROM 6522 V.I.A. printer socket, manuals PSU and lots of software worth £60, must sell! £200 ono. Tel: Dave, (0788) 812940 (evenings only).

VIC 20 + cassette. Introduction to Basic Part 1, Super Expander, motherboard, printerface (connects Sinclair printer to Vic 20), joystick, games, books, all under 7 months old, £195 including postage. Tel: 0283 35415.

Software for ZX81 16K, includes 3D Monster Maze, Tomb of Dracula, Chess, Invaders and Black Crystal, over £45 worth, selling for £30. Tel: 061-790 3561, will post.

Commodore 64, manual, graphics, Sprite Editor cassette, must sell, getting married. £300. A. McMillan, 3 Bramley Place, Trent Vale, Stoke on Trent, ST4 6NG.

ZX81 1K, hardly used, all leads and manual, boxed, only £25. Tel: 01-467 8220. Steve.

ZX80, ZX81, books, magazines and software including Sinc. interface and Sinclair User for sale, offers or details. G. D. Potter, 7 Oxford Road, Birstall, West Yorkshire WF17 9JR.

BBC Model B development aids. Linker allows subroutine libraries to be link-edited generating complete programs, supplied with useful text-editor, tape-based, £4.50 both. Tel: Basildon (0268) 280970 after 8pm, weekends, Chris.

Vic 20, tape deck, introduction to Basic Part 1, games book, lots of cassette games, joystick, dust cover, five months old, fully boxed, £150. Tel: Johnstone 26463.

Acorn Atom 12K ROM 12K RAM, 2 utility ROMs, PSU, leads, books, £150 of software, £175. Tel: Reigate 40465 (after 4pm).

Spectrum character generator, all usual features plus mirror flip, inverse rotate, left/right, up and down, scroll and restore characters £2. M Morley, 132 Croydon Road, Reigate, Surrey, RH2 0NQ.

Vic 20 C2N recorder, plus 16K RAM, lots of software including Simplicall, 5 months old, £225 ono. Tel: Heysham, Lancs (0524) 51293.

ZX81 16K, little used, £60, ALF 9-voice Apple music card with music software, £60 Tel: (089 272) 3579.

Acorn Atom 12K ROM 64K RAM, ROM extension board, A+F, Procyon, P.P. utility ROMs, 5V 3AMP PSU. All leads, manuals etc, books + magazine articles + some software. £250 ono. Tel: 0332 769740 (evenings).

Wanted for Sharp MZ80K interface unit MZ801/0, printer MZ80P3, floppy disk MZ80FD. Tel: London or Surrey 01-408 2121 or 025 125 2004.

Spectrum arcade games tape, Defender, Frogger, Pac-man, Invaders, Scramble Lander, £7.50. Tape header, decoder + disassember tape, £5. Marc, 37 Seafield Drive, Wallasey, Merseyside.

Jupiter Ace, £60. ZX81 and 16K RAM plus games, £50. Tel: Chesterfield 70730 (after 6pm).

Wanted microcomputer in exchange for complete outfit for printing and developing including colour enlarger 35mm camera and electronic timer and converter etc, Coray, 3 Penang House, Prusom Street, Wapping, London E1 9RF.

ZX81 games for sale, includes Tomb of Dracula, 3D Monster Maze, and many others, plus 16K RAMpack £10 and £2 per game. Tel: 01-446 5154 (after 4pm).

Will swop, Yamaha 250cc, 1981, US custom motorbike, immaculate, only 1,000 miles, as new, for a BBC Model B microcomputer with some software. Tel: Tony Refail, (0443) 671227.

Mattel electronics TV computer game plus voice synthesis and 8 cartridges. Swop for micro or £250 ono cash. Tel: Mike 051-933 8387 (after 6pm or at weekends).

Apple II Europlus, 64K, disk drive, RAM card, TV modulator, Mountain hardware music system — best around, £1,000 ono. ALF 9-voice Apple music card, £60. Tel: (089 272) 3579.

Sharp PC1211 pocket computer complete with CE-122 printer and cassette interface, £60. Tel: Len Merkel, 01-524 1925 (daytime), Chelmsford 329541 (evenings).

TV computer game (Mattel), 8 cartridges plus Voice Module, £250 ono, will separate or exchange BBC Micro, Tube, disk drive, printer plus other offers considered. Tel: Mike 051-933 8387 (after 6pm or at weekends).

Swop Atari 800 plus 410 recorder, joysticks, books, programs etc, only five months old, for BBC computer Tel: Eastbourne (0323) 641719 (evenings).

ZX 81 + 64K + £60 of software + Kayde Graphics ROM + P55 Qsave + Briefcase, worth £250, sell for £125 ono, also Spectrum software for sale/swop. Tel: 01-567 3305 (between 5-6pm weekends only).

Atari 400 32K including Basic and manuals, £200 ono. Tel: Radlett 7206 (after 6pm).

Atari 400/800 Submarine Commander cartridge for exchange in another 16K cassette or cartridge. Tel: Iver 654785.

Intellivision system with Soccer cartridge for sale, unopened and unused, unwanted prize worth £100, yours for £60, will split postage costs if necessary. Tel: 051-648 3446.

Vic 20 software, half price eg. Amok £3.50, Arcadia £2.75, etc. Sae for list. K. Hulston, 14 Bispham Avenue, North Reddish, Stockport, Cheshire SK5 6NT.

BBC model B with 1.2 ROM, complete with original packaging and final user guide, also with lots of Acornsoft software, £365 ono. Tel: Canterbury 750600 (evenings and weekends).

Commodore 64 Sprite Creation Aid, create, print, save, load, invert, full instructions and comprehensive advanced sprite handling techniques explained, professional graphics, bargain, £5.50. NSP, 4 Beachville St. Sunderland SR4 7NA.

Wanted ZX Spectrum (£110 or less). A Rochefort (Syntax), MSM's College, Spinkhill, Sheffield S31 9YL (answer guaranteed if stamp or SAE).

Commodore 64 with cassette unit and Programmers Reference Manual, as new, £340 delivered or £330 collected. Tel: (0754) 2372 or (0754) 3400 (after 6pm).

Video Genie 16K, integral cassette recorder, very good condition, some software (including superb Checker King, Adventure) genuine bargain, £125 ono for quick sale. Tel: (Edgware) 01-952 4558 (evenings).

Chess Challenger Ten Computer with smart carrying case, absolutely immaculate condition. Bargain at only £75 ono. Also many Atari VCS cartridges for sale. Details, Tel: 01-952 4558 (evenings).

Ireland Wanted Sinclair ZX81, good home offered for model in perfect condition by unemployed intellectual seeking further experience, also required add-ons suitable. Details to B. Finlay, Corofin, Co. Clare.

Pet 2001 8K integral cassette, manual, dust cover, good condition. £125 ono. Tel: Brookwood 5832.

ZX Spectrum 48K RAM, perfect condition, £90. ZX printer + 4 rolls paper, £35. Hisoft Spectrum Pascal compiler, £15. Various other cassettes, the lot together for £115. Tel: Alistair, (Croydon) 01-654 2210 (after 5.30pm).

Swop HM5000 advanced power controller for 16k ZX Spectrum controller worth over £150 and only four months old. Tel: 01-741 7853.

Philips G7000 video game complete with eight cartridges, £50. Tel: Len Merkel 01-524 1925 Ext 31 (day), Chelmsford 329541 (evenings).

Intellivision games console + seven cartridges. Total price new £250, will sell for £190 ono. Also Sharp PC-1200 pocket computer + printer interface, new £150, will sell for £90 ono. Tel: 0204 709703.

Atari VCS, under guarantee, six cartridges including Star Raiders, Pac-man, £150 or exchange for Dragon 32. Tel: Leeds (0532) 691737.

ZX81 + 16K RAM + Fuller keyboard + repeat key + book, tapes, manual etc, good condition, worth £130+, accept £90. Tel: St Boswells (0835) 22711 (after 5pm).

Vic 20 C2N cassette recorder, Super Expander cartridge, introduction to Basic Part 1, joystick, plus extras, still under guarantee, original boxes, £200 ono. Tel: 01-594 0622.

Microline 80 printer RS232 interface, 1½ years old, offers over £150. Tel: 0565 830277 (North Cheshire).

Jupiter Ace software, 16K Star Trek, Mission Simulation based on the classic game. Send £5 to M. McGeary, 67 Barker Road, Linthorpe, Middlesbrough TS5 5EW.

Jelly Monsters £10, plus other Vic 20 software, must sell, upgrading to Vic 64. Sae for details, Kevin Hulston, 14 Bispham Avenue, North Reddish, Stockport, Cheshire SK5 6NT.

Pimania addicts! For a comprehensive map of The Land of PI, send £1 plus an Sae to: James Mortleman, 41 High View Road, South Woodford, London E18 2HL.

ZX81 16K + Filesixty keyboard + manual and leads + book and 5 games, including 3D Monster Maze, Space Raiders and fantasy games, £75. Tel: 061-794 9975 (Manchester).

Atari VCS plus cartridges Star Raiders, Pitfall, Atlantis, Defender and Raiders of the Lost Ark, complete with joysticks,

paddles, good condition, £95. Tel: (0493) 58897 (daytime).

Tandy Colour Computer, 32K upgrade by Tandy. Extended Microsoft Basic, joysticks, manuals, Chess ROMpac, Quasar Commander ROMpack. Some Chromasette magazine cassettes, £250. Tel: 01-674 2125 (Streatham), (evenings and weekends).

Atari video computer game plus joysticks, paddles, Combat and Defender cartridges, £50. Tel: Bristol 735240.

Rowtron Home Entertainments Centre, four months old, hardly used, instructions and three cartridges, Space Invaders, Monster Munchers, Pinball, colour and sound, cost £77, selling £50 ono. Tel: 01-302 3876.

ZX81 16K Memopack, converted Atari joystick. Software includes books, tapes and magazines. Similar system would cost over £100. Leads, manual and PSU included, £75. Tel: 041-634 2425 (after 6pm), buyer collects.

Black Crystal adventure and monopoly-type game for 48K Spectrum for sale, £5 each, was £7 each, or will exchange for other games tapes. Mr K. Burton, 6 Westbourne Terrace, Barnsley, Yorks.

Pet 4016, cover, cassette deck with Soundbox, Toolkit, Superchip, Visible, Music Monitor, 6502 Assembler, 130 games etc on tape, 6 books. £475 ono. Tel: 0344 54211, Ext 29 (office).

Jupiter Ace complete with leads, manual and power supply. £70 for quick sale. Tel: 0760 61598.

Swop Intellivision cartridge Star Strike and Skiing for Tron, Subhunt, Utopia, Space Hawk or any other Intellivision cartridge. Tel: Bournemouth (0202) 24036 (after 5pm).

Atari VCS, 20 cartridges, new joysticks and 40 channel CB with power pack and aerial. Exchange for Atari 800 48K computer with cassette deck. Tel: 041-946 9110.

Dragon 32 for sale, excellent condition, 15 game tapes, joysticks, manual, colour graphics, book, £150. Martin Stoney, 68 Lambourne Road, Chigwell Row, Essex. Tel: 01-500 2386.

Sharp MZ80K 48K, superb condition, hardly used, just under one year old, some manuals and games, only £275 ono. I. J. Herd, 131 Greystones Road, Sheffield S11 7BS.

ZX81 16K, £100 worth games, books etc, total value £165, will accept £85 ono. Tel: (Southend) 0702 617608.

Wanted second-hand disk drive for Vic 20. Must be £120 or less, also second-hand cheap printer for Vic20. Write with details to Henry, 24 Tradaree Court, Shannon, Co, Clare, Eire.

TRS80 16K LII lower case with TRS80 16K expansion interface, both for £225. Tel: Len Merkel 01-524 1925 Ext 31 (daytime), Chelmsford 329541 (evenings).

Dragon 32 as new + joysticks + over £150 worth of software, including Arcade games, Chess, Assembler, Forth + manual, + books on machine code. Cost £370+. Want £230. Tel: 01-651 3483 (after 6pm).

Wanted Texas computer with recorder and leads, willing to swop Atari VCS, four tapes, Combat, Video Olympics, Space Invaders, Defender. Swopper collects. Tel: South Elmsall 47630.

Gamestape 1. 4 games for the 16K Jupiter Ace. Send £3 to M Caple, 24 Llanon Road, Llanishen, Cardiff CF4 5AG.

BBC Model A 32K with 6522 VIA, leads, recorder, B/W TV, cost £400, sell at £300, only 6 months old. Tel: Newport 0633 65863 for Gerald.

Wanted — can you copy 2/3 times year a IMS 5000 DS/DD floppy onto 5in or 8in format? Offers to Peter Winnington, Les 3 Chasseurs, 1411 Orzens Vaud, Switzerland.

DRAGON 32, joysticks, Berserk cartridge, 6 games cassettes (including Donkey-king, Phantom Slayer). Tandy Color Computer, books (3), magazines, Rainbow (3), Coco News (3), games book, + more programs. Worth £310+ only £240. Tel: Leeds (0532) 622004.

Sharp MZ80K. 48K excellent condition, Basic, Forth, many games, utilities, Accounts etc. User club mags, books, dust cover, £300 only. Will deliver within 100 miles. Tel: Holywell 711400.

Commodore Pet 2001 8K. Integral cassette and monitor. Toolkit, Soundbox and manuals. Software includes over 50 programs, plus Teach Yourself Pet Basic, £200 ono. Tel: 01-427 9104.

Do you write Vic20 games? I'd like a penfriend between 12-15 or I'd like to swap your Vic20 games. Tel: Flimwell 424, East Sussex.

Atari games: Preppie, Ghost Hunter, Baja Buggies, Shamus, Caverns of Mars, £12 each. Ghost Encounters, Galactic Chase, £10 each. Cartridges, Space Invaders, Star Raiders, £12 each. Tel: 031-229 6794.

Software for Apple 2, Applewriter 2, Visi-Calc, D.O.S. Toolkit, Tasc Compiler and more, plus over 30 games. John. Tel: 0626 862455.

ZX81 + 16K expandable RAM, all leads, manuals + console, same software. (8 months' guarantee), still boxed. Tel: Bitton (027588) 6038 after 5pm. All £75 ono.

Mattel Intellivision + seven cartridges, £190 ono. Cartridges titles: Deadly Discs, Bowling, Tank Battle, Auto Racing, Star Strike, Tennis, (soc free). Will sell all together, not separate. Tel: Bolton (0204) 709703.

Sinclair built 16K ZX81, still boxed, fitted Atari joystick, Philips B/W television, many popular games, cassettes, PSU, manual, magazines, etc. Cost over £200, bargain at £130. Tel: 0420 22291 (eves).

Acorn Atom 12K RAM 12K ROM plus Utilikit 4K Eprom, leads, manuals plus £60+ of software £150 ono. Tel: 061-624 5224.

Sinclair ZX81, leads, manuals, 16K RAMpack, £25 worth of software including Scramble, Asteroids, Invaders — excellent condition, under guarantee, bargain at £35. Tel: Manchester 865 4089 after 6pm.

Pet cassette player wanted. Contact Warren Newman, 3 Thalia Close, Greenwich SE10 9NA. Would consider also Basic 4 software.

Atari VCS, good condition, 6 cartridges: Asteroids, Pac-man, Slot Racers, Tennis, Night Driver, Combat. Cost £225, sell for £115. Tel: 01-656 1321.

Sinclair ZX81 32K RAM Memopak plus 3D Monster Maze, Asteroids, Invaders. Breakout tapes, all in excellent condition for quick sale, £60 ono. Tel: Farnworth 78417. Mark Haslingdon, after 5pm.

TRS80 L11 16K with VDU and tape drive and over £60 of various programes etc. Perfect working order, however, slight scratches on paintwork hence price £200. Tel: (021) 360 2043.

ZX81, 1K + all leads and manual, £25 ono. For quick sale. Tel: Chelford 861445.

Pet 4016 with cassette deck and manuals, lots of software, £400 ono. Tel, after 5.30pm week days 01-223 1613.

Commodore 64, unwanted competition prize — Commodore 64, tape unit, software and Programmers' Reference Guide, mint condition. £350 ono, for quick sale. Tel: 01-747 0990 after 6pm.

16K RAM for ZX81 plus tapes and a push button keyboard and some magazines and literature. All this for £35. Stephen Upstell, 10 Chiltlee Close, Liphook, Hants GU30 7BP. Tel: Liphook 723058.

BBC Acornsoft games, Monsters, Planetoid, Rocket Raid and Castle of Riddles in original packing, £20 or swap for others, not Meteors or Snapper. Tel: Bob, Rochdale 40486.

Video Genie EG3003 16K complete with leads and manuals plus over £130 software, £220 ono. Tel: Colchester (0206) 230421 after 7pm or weekends.

Vic 20 £80; 7 slot Arfon expansion £80; 16K £40; 8K £20; Super Expander £20; N/C Cart £20; Programmers' Aid £20; 6 cartridge games £12.50 each; 16 cassette games £3-£5 each; Basic Part 7 £8; Vic Revealed £5; Programmers' Guide £5; joystick £10. Tel: 01-573 8935. Hayes Middlesex, after 6pm.

Aculab floppy tape drive for TRS80, no expansion interface needed, £60. Tel: Len Merkel 01-524 1925, Ext 31 (daytime). Chelmsford 329541 (eves).

TI 99/4A stand alone 32K memory expansion unit (does not require peripheral expansion system). Tel: 01-206 0796, evenings or weekends.

ZX81 plus 16K, flexible ribbon, cassette recorder and 12in TV, also 13 games tapes worth £65. Learning lab and books. Total cost £250, complete set £150. Tel: Bracknell 52354.

Commodore 64 software. Tape 1: home banking system; tape 2: Startrek, Mars, Race Chase; tape 3: Biorhythm, Pontoon, Wraptrap. £6.50 each. Tel: 0325-480298 after 5pm.

Wanted Vic 1540/1 disc drive for CBM 64. Tel: 0232 711580.

Sharp MZ-80K 48K cassette unit in need of attention. Games (inc Cribbage, Space Invaders), machine code several Basics etc, £200 for quick sale. Tel: Ely 720381 (evenings and weekends).

Vic20 plus dust cover cassette unit and Super Expander cartridge. All in very good condition, offers around £170. Tel: Wellingborough 665380, evenings only.

Sharp PC1211 with cassette interface and printer. All manuals, perfect condition, £80. Tel: 01-668 8541.

Philips G7000, three months old with two videopacs, cost £100, offers around £70. Tel: 021-745 3363.

ZX81 16K RAM for sale, £30+ of games, 3D Defender, Monster Maze, Catacombs, Scramble, Invaders, Galaxians, sell for £100, original RAM pack, good condition. Tel: 01-427 4923 bargain.

Atari VCS, new joysticks, paddles, Combat, Defender, Asteroids, Star Raiders, Space Invaders, £119. Tel: Louth 0507 604142.

Spectrum 48K boxed, also Kempston joystick and interface includes Timegate, £130. Tel: Cromer 761296 after 6pm.

Atari VCS plus cartridges, Starmaster, Defender, Missile Command, Combat, Raiders of the Lost Ark. Eight months warranty remaining. £130 ono. Tel: 01-731 0435 after 6pm.

Two Atari VCS cartridges for sale, Defender and Video Checkers, £15 or £25 for both or swop for Pacman or Berzerk. Tel: Kinver (near Stourbridge) 872559 after 5pm.

TRS 80 word processor, tape driven inc. text save and editing plus other features. Only £12.50, sent by return. C. Smith, 4 Commercial Road, Lowestoft, Suffolk NR32 2TD. Money Back Guarantee.

Commodore 64 games. Othello, Backgammon, Pontoon, Draughts, Startrek, Synth, machine code sidescroll, all cass. from £2.95 to £5. Tel: 01-748 8178 after 4.30pm weekdays, any time weekends. Also much Vic20 software.

Taito Space Invader cocktail table, as seen in pubs and clubs, with all keys, good condition, give away price at only £175. Tel: Crawley (0293) 547348.

Oric software. Bug-Bytes, The Castle and Tansoft Chess. Both mint condition, cost £18, accept £13. Tel: Rugeley 6677.

Wanted ZX81 bits cheap or swop, ie 32K Dynamic RAM card. Chris Warwick, 44 Wellington Road, Birmingham B20 2SB.

ZX81 Forth language tape wanted or keyboard. I'm prepared to pay £5-£10 for either. Tel: 01-504 0823 ask for Paul.

Sharp PC1500, powerful pocket computer, perfect condition, expandable, cost £170, selling for £125 or swop for Spectrum or similar. Tel: Salford (061) 792 3968, ask for Stefan.

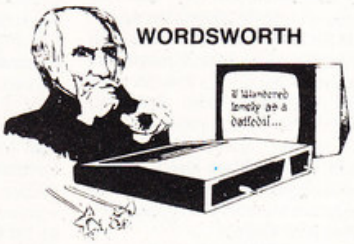
READERS' BUY & SELL FORM

Billboard is *PCN*'s micro marketplace. Whether you are buying, selling, or swopping secondhand goods, just fill in the form up to a maximum of 24 words, including your name, address or full telephone number and send it with a cheque or postal order for £1.50 payable to VNU Business Publications, to **Billboard, Personal Computer News, 62 Oxford Street, London W1A 2HG.** But remember, this service is not for commercial advertisements; we will not include ads from companies large or small, or from anyone carrying on a profit-making business. Also, we cannot guarantee to place ads in specific issues — it's first come, first served. No reprints either unless you send in another form. Please write clearly putting only one word in each box.

MICROSHOP

Rates: £10 per single column cm. Minimum size 3 cm. Series discount available. **Mechanical Data:** Column width, 1 column 57mm. 2 columns 118mm. 3 columns 179mm. **Copy Dates:** 10 days prior to publication.
Contact: Ian Whorley on 01-323 3211.

Software



BEFORE YOU BUY

A BBC WORD-PROCESSOR

ASK YOUR DEALER THESE QUESTIONS:

* Will it print a 100K document at one command?
* Will it personalise a standard letter to 999 club members at one command?
* While it is doing that, can I type up the minutes of the last meeting and save them on tape?
* Can I see all the time how my print-out will look, using an ordinary television set?
* Can it use the upside-down italics feature of my Obscuro Printer (without my having to buy an extra tape for £10)?
* Can I embed printer codes at any position within a text line?
* Will it align my 8-decimal-place figures, and add them up automatically for me?
* Can I lock the keyboard in case the cat goes to sleep on it?
* Can I search and replace, centralise text, count words, etc?
* Does it work with all BBC operating systems, using cassettes?

IF ALL THE ANSWERS ARE YES,
AND IT COSTS LESS THAN £20,
BUY IT.

IT MUST BE WORDSWORTH!

ALSO AVAILABLE DIRECT, PRICE £17.25, FROM

IAN COPESTAKE (W1)

23 Connaught Crescent, Brookwood, WOKING, Surrey, GU24 0AN
Telephone 048 67 Brookwood 4755

Printing service available. Disc versions supplied to special order.

HANDWRITING

Christopher Jarman's 'Basic Modern Hand' computerised! Two suites each consisting of five programmes and each suite (BBC 'B'), costing £9.95. "LETTERS" draws lower case letters grouped in families; "CAPITALS" draws upper and numerals. Interactive, full colour, and sound (which can be turned off!). SPECTRUM versions available shortly. . . These AND MORE (SAE for details) from:

chalksoft Ltd.
Dept PCN6, Lowmoor Cottage, Tonedale, Wellington, Somerset TA21 0AT, telephone 082-347 7117
TRADE AND EXPORT ENQUIRIES WELCOME

BBC CHARACTER GENERATOR

Menu driven facilities include reflect, invert and 3 rotates. Display is on grid for multi-character pictures. Full load and save etc.

£9.95 P&P FREE
CHEQUES TO
VISCOUNT SERVICES LTD
2A Boulton Road, Southsea, Hants.
NO FUSS GUARANTEE **0705-833633**

MICROBYTE SOFTWARE
FOR 16K COLOUR GENIE

GALACTIC ATTACK

AN ARCADE SPACE GAME
(ALL MACHINE CODE)
JOYSTICK CONTROL OPTIONAL

£7.95 INCL P&P
MICROBYTE SOFTWARE, DEPT PCN
18 HILGROVE ROAD, NEWQUAY, CORNWALL TR7 2QZ

Small School Software

Study Packages are designed to a high specification by experienced specialist teachers for use both at home and in school. Based on the well-established techniques of individualised learning schemes, the Packages consist of a suite of objective matched programs using to the full the capabilities of the BBC-B Micro, supported by software documentation, course notes, exercise materials, Revision program and Post Test.

Package Titles include:
The Theorem of Pythagoras**First Steps in Algebra*****
*****Mental Arithmetic Tests*****
all priced at **£6.95** inc

But send for a full description and List of Titles enclosing a s.a.e., to:–
SMALL SCHOOL SOFTWARE, 41 Sinah Lane, Hayling Island, PO11 0HJ.

---

64 BUSINESS USERS

Hardware including super CP80 printers and lots of good software in stock. e.g. Calc Result, Accounts Packages, Visawrite and Spell, Codewriter, Assembler, Monitor, Programming Utilities and WAIT FOR IT — CENTRONICS INTERFACES.

THE COMPUTER CENTRE
17 Bridge Street, Leighton Buzzard, Beds.
Tel (0525 376622 & 382504)

A SINCLAIR SOFTWARE/HARDWARE SPECIALIST CONVENIENTLY SITUATED NEAR M1 AND M62 MOTORWAYS.

PHILIP COPLEY HI-FI LTD
6 WESTLEY STREET, OSSETT, WEST YORKSHIRE
TEL: 0924 272545
HOURS OF BUSINESS: TUE-SAT 10.30-5.30
OPEN BY APPOINTMENT UNTIL 8P.M.

BANNED . . .

QUALITY PROGRAMS WANTED

. . . all 'Arcade Action' Games from our lists. We specialise solely in adventure, simulation and business games from many independent suppliers. Full lists: (state computer).

SAGASOFT,
148 Barrack Road, Christchurch, Dorset, (0202) 486 207

LYNX OWNERS

NILUG, The National Independent Lynx User Group has now been formed.

Subscriptions £9 per year. Send cheque payable to Nilug, to:

NILUG
53, Kingswood Avenue, Sanderstead, South Croydon, CR2 9DQ.

The first newsletter is now available.

MICROSHOP

Software

DRAGON SOFTWARE

ALIEN ODDESSY Parts I & II £9.95
AMAZING £5.95
BOPSWIZZLE £5.95
GOLDEN APPLES £8.45
PLANETARY TRADER £5.95
MINI GAMES £5.95
STOCK-MARKET £5.95
SURPRISE £8.45
SCANNER 13 ..... £8.45

Write to:

BAMBY SOFTWARE
LEVERBURGH,
ISLE OF HARRIS PA83 3TX
or 'phone 085-982-313 or 239
Between 9am-9pm.

NEW SPECTRUM AND ORIC GAMES

ORIC 1
1. BETABOMB — Get your man through the door — when its open — before the intelligent bombs get him..... £4.95
SPECTRUM 16K
2. EARLY BIRD — Can the early bird catch the worm? Superb graphics and ten levels of play.
CHOMPER — How much can you eat before being caught? Two games on one tape..... £5.95
SPECTRUM 48K
3. WHIST — Best game of whist yet, full graphics, and you can't cheat £5.95
4. PONTOON — All features of this classic card game £4.95

Full range of software for ZX81, Spectrum and Oric. Send sae for details. Make cheques etc. payable to B.A.J. Services, Unit Office, Pier Road Industrial Estate, Gillingham, Kent ME7 1RS.

BBC 32K FAROS

! NEW ! 3D SPACE GAME ! NEW !
FULL COLOUR/SOUND. HIGH SCORE TABLE

£5 INC
CHEQUES PO's to:

ARTIFICIAL MEANS
28 CONISTON RD.
COVENTRY. CV5 6GW.

Clubs

ORIC-1 OWNERS.

Tangerine created Oric-1 now TUG creates the rest. An independent users group with a solid reputation for progressive system support. Monthly newsletters, meetings, software, hardware, reviews, advice and lots more. We have a proven record of performance on our system. Join TUG. You'll like us, we do! Send £1.00 + S.A.E. (A4) for sample newsletter and details. **Tangerine Users Group, 1 Marlborough Drive, Worle, Avon BS22 0DQ.**

To Let

SURPLUS PREMISES TO LET ANGEL ISLINGTON N.1

IDEAL FOR STUDIO, COMPUTER/SOFTWARE OR OFFICES. ATTRACTIVE RENT/LEASE.

01-359 2465

WANTED PERSONAL COMPUTERS
all models bought for cash
Morgan Camera Company
160 Tottenham Court Road,
London W1 Tel: 01-388 2562

HUNDREDS OF SECOND-HAND TAPES ON OFFER

GAMES AND EDUCATIONAL FOR THE:

Vic 20, Spectrum, ZX81, Dragon 32 and others. We stock top quality tapes as used by the best software companies at incredibly low prices.

10 × C10 £5.00 **10 × C12 £5.50** **10 × C15 £6.00**
EACH ORDER HAS A 50P P&P CHARGE

We also stock various second-hand add-ons. (e.g. joysticks and rampaks).
Please send SAE for details of above or telephone between 9am and 5pm — 0691 652626.

HEATH MICROWARE

4 GATEACRE AVENUE, OSWESTRY, SHROPSHIRE

ORIC 1

CREATE HIGH SPEED PROGRAMS WITH EDITOR: ASSEMBLER: DISASSEMBLER: instant, direct, powerful machine code is available at your fingertips with this composite program. Auto address and disassembly of code with control key back and forth scrolling for input and editing. direct assembly and error message support similar to programming in basic.

Cursor controlled Editor, with direct change, insert and delete with automatic expansion and/or closure of text. Decimal or Hex input or numerics with toggel decimal-hex display of address and operands. Mixed code, data, string inputs up to 255 characters. Relocate code function.

Full 6502 code plus labels with autobranch calculation. Pseudo-ops: ORG, START, END, DEL, EQU, DEFB, DEFW, DEFS, DEFS.

Optional high speed hex-display as per a monitor or full disassembly with address, hex code, label, mnemonic, operand and symbols table, output to screen or printer.

Complete with Instruction Manual £15

MICROPLOT
19 The Earls Croft, Cheylesmore, Coventry CV3 5ES.
PHONE: 0203 503038

Software for PET SHARP TEXAS

All programs listed can be written in German or Danish text (except for Pet).

TEXAS
Martian Lander
Alien War
Lunar Lander
Special Noughts and Crosses
Basic Tutorial/Electronics Digital Techniques
Musical Composition, Morse Code Test
Speech (if required) on most programs using Speech Editor

PET/SHARP
Typing Test
Morse Code Test
Plus Plus!!

EDUCATIONAL
Basic Tutorial (5 parts total approx 70k)
Electronics Tutorial (as above) Morse Code Test, Typing Test

GAMES
Pet/Sharp Jigsaw Puzzle
Variety of Space Games ie Knots & Crosses (in large graphics) 4 games being played simultaneously
Three-Card Brag, Code Breaker, Viking Castle

UTILITIES
Biorhythms
6502 Dis-Assembler in Basic, Dis-Assembler to Screen or Printer (Pet only)

We are on Prestel Mailbox (Enterprise 268559565)
Tele ordering details in catalogue.
Most programs £5.00 post paid.

AQUARIUS SOFTWARE

10 Kenneth Road, Basildon, Essex SS13 2AT.
Telephone (0268) 559565 (24 hours)
Prestel mailbox. 0268559565
All programs £4.00 post paid

MULTILOAD NETWORK

Loads 4 or 6 Computers simultaneously from a single cassette recorder. Ideal for schools. Simple and robust.

ZX81, Spectrum & Jupiter Ace — £7.98
BBC, Oric, Dragon — £12.20
Send SAE for brochure

NETWORK COMPUTER SYSTEMS
39 Bampton Road, Luton, Beds.
(0582) 508616

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: Oric 6522A version should be out soon. 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: 'TEVLINK' 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
Cable: Printer port to VIA (state m/c)	£7.00
TEVLINK Board to Board cable	£4.50
TEVLINK's ware: Dragon/Atom cassette	£7.75
Blank cassettes (cased): 10 × C10 for	£5.75

OTHER SOFTWARE:

CAVE QUEST. Undergrand quest for the ring of power. Dragon/Atom/Oric cassette	£2.30
LASER INVADERS: Dragon joystick game	£2.30
TEVROG'S KINGDOM: A real-time quest for magic powers (and survival): Oric	£5.75

Other software and hardware available soon.
WANTED!! Good software (games & serious) for royalties or outright purchase. Send for details.
MAIL ORDER ONLY.
SEND FOR LISTS/DETAILS
All prices fully inclusive of VAT, P/P etc.

Tevward Microtech Ltd, (Dept PCN)
403 Dallow Road, Luton, LU1 1UL.
Tel. (0582) 418906

THE BEST ALL ACTION GAMES AVAILABLE FOR YOUR VERY SPECIAL VIC 20

BASIC VIC

Crazy Kog	£6.00
Escape M.C.P.	£5.50
Paratruper	£5.50
The Catch	£5.50
Paracuda	£5.50
Race Fun	£5.50
Anti-Matter Splatter	£5.50

VIC + 8K

Critters	£5.50
Cyclons	£5.50

FOR YOUR C.B.M. 64

Star Track	£7.00
Frogger	£7.00
Cyclons	£5.50
Panic	£7.00
Centrotods	£5.50
Escape M.C.P.	£5.50
Pakacuda	£5.50
Annihilator	£5.50

Lots of new software arriving soon for your Vic 20, CBM 64, Atari, Dragon and Spectrum computers. Bytewell only stocks the best tried and tested software for your computer. Not the cheapest but the best. All Commodore, Atari and Dragon Cartridges available at discount prices. Oric software available soon (all new games). Joysticks for the Vic, CBM64 and Atari £6.95 (plus 50p.pp.) ☐

SPECIAL SPRING OFFER
The Fabulous Vic 20 colour and sound computer only £120 (inc. vat) (p.p. £5). ☐
Send £1 for full colour catalogue and hardware and software for Vic 20, CBM 64, Atari, Dragon and Spectrum computers. ☐

How to order the above: Just tick the titles you require. Fill in your name and address and send advert (or order on plain paper) with your cheque or postal order:- **Bytewell, 203, Court Road, Barry, S. Glam. CF6 7EW.**

Name .....

Address .....

Overseas Orders:- You may remit by sterling money order (available from your bank) or your own US$ cheque. Please add 65p postage etc.

MICROSHOP

Accessories

OUT NOW

THE NEW DELTA 14 HANDSET 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 4×3 matrix. The eighth line selects a second joystick which can be plugged into the adaptor box.

DELTA 14B JOYSTICK HANDSET FOR BBC £10.95
DELTA 14B/1 ADAPTOR BOX AND CABLE £13.95

Still Available **JOYSTICKS from £4.50 each**
DIRECT FROM OUR FACTORY

IN KIT FORM: kit contains 1 switched joystick assembly, 2 moulded case halves, fire button, 1.5 metres 5 core + screen cable, fixing screws **£4.50 per KIT**
READY BUILT with 9 way "D" socket — suit Atari or Vic 20 ..... **£5.95 each**
FEW ONLY with potentiometers and 5 way din socket to suit Dragon **£5.00 each**

CONNECTORS
"D" connectors 9 way female plug or 15 way male plug complete with hoods **£1.75**
Din plug 5 way 240 deg **50p**
9 way female plug moulded to 1 metre of 9 core lead **£2.50**
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, immediate despatch — 7 day money back guarantee.

VOLTMACE LTD., PARK DRIVE, BALDOCK, HERTS.
Callers welcome Monday to Friday. **Telephone: (0462) 894410**

SHORT-LENGTH COMPUTER/AUDIO TAPES

If you have searched without success for high quality low cost short-length tapes then sit back and relax.

Premium Grade Agfa R.F.W. Cassettes Manufacturers of high quality blank cassettes suitable for programming. For example, with a minimum order of 25, you can purchase 25 cassettes of 2½ minutes each side for only £10.00 plus postage & packing of £1.95p. Fill in the coupon and post with your remittance to: **R.F.W. Recording Supplies, Green Acres, Northlands, Sibsey Nr. Boston, Lincolnshire PE22 OUA.**
Tel: 0205 750 595

All prices are inclusive of VAT at 15%

Please send me high-quality audio tapes in the quantity indicated *(tick where applicable)*

25 cassettes
(including £1.95 p&p)

☐ 2½ mins £11.95
☐ 5 mins £12.20
☐ 6 mins £12.45
☐ 7½ mins £12.60
☐ 10 mins £13.20
☐ 12½ mins £13.95

50 cassettes
(including £2.49 p&p)

☐ 2½ mins £22.75
☐ 5 mins £22.95
☐ 6 mins £23.49
☐ 7½ mins £23.99
☐ 10 mins £24.99
☐ 12½ mins £26.49

100 cassettes
(including £3.50 p&p)

☐ 2½ mins £43.50
☐ 5 mins £44.50
☐ 6 mins £45.50
☐ 7½ mins £46.50
☐ 10 mins £48.50
☐ 12½ mins £53.50

Including inlay card & side-labels.

Total Remittance £ _____
NAME _____
ADDRESS _____
_____
_____
I enclose my cheque/PO _____
Please make cheque/PO payable R.F.W.

MICROWAY COMPUTER CENTRE
39 HIGH STREET, RAINHAM, KENT
TEL: 0634 376702
(SPECTRUM CENTRE DEALER)
Open six days 9am-5.30pm. Late night Thursday 6.30pm
BBC ● Spectrum ● Dragon ● Oric ● Plus many more ● Hardware and software
SPECIAL OFFER
48K SPECTRUM NOW ONLY £119
(while stocks last)
Range of printers, disk drives, accessories and books also available
Business hardware and software including the new HH TIGER also available.

NO HIDDEN EXTRAS — YOU PAY THE PRICE YOU SEE

VERBATIM DATALIFE FLOPPIES

MD 525-01 SSSD-SSDD TWIN PACK £5.36
10 PACK £21.25
MD 577-01 SSDD 77/80 TRACK TWIN PACK £7.28
10 PACK £30.41
MD 550-01 DSDD TWIN PACK £7.32
10 PACK £30.61
PAPER-PACK (250 sheets 9.5×11) £4.02
LABEL PACK (250 labels fits 9.5 tractor) £5.32 DISC-BOX (Stores 50 floppes) £21.21
MX80 RIBBON £4.23
VERBATIM 5.25 Cleaning kit £8.23

REMEMBER VAT AND CARRIAGE ARE INCLUDED
YOU PAY THE PRICE YOU SEE!

COMPAC LTD
COMMERCE HOUSE, STUART STREET,
LUTON, BEDFORDSHIRE LU1 5AU
Tel. 0582 452580

PRINTERS FOR SHARPS

Most dot matrix and daisy wheel printers available for MZ80K & MZ80A.
Our package includes printer, cable, interface and software. Centronics for RS232, automatic conversion of Sharp codes to standard ASCII. All printer control codes can be used with BASIC. Other boards available include EPROM memory storage and programmers, ADC's etc.

Details from:–

PETERSON ELECTRONICS LTD
Academy Street
Forfar
Angus DD8 2HA
Telephone: Forfar (0307) 62591

GRAPHICS

- **The New Intelligent Graphics card**
- **Serial or parallel operation**
- **38 commands**
- **512 x 256 (131,072 pixels)**
- **85 x 25 text**
- **Prices from £55 inc.**

send SAE for comprehensive details

COMPUTER AIDS
33 Bearsden Cr., Hinckley, Leics LE10 0SQ

Programming the
PET/CBM
By Raeto West

The Reference Encyclopedia for Commodore PET and CBM Users
Comprehensive teaching and reference book on programming Commodore's 2000, 3000, 4000 and 8000 microcomputers and peripherals.

Many programs, charts and diagrams. 17 chapters, appendices, and index. iv + 504 page large-format paperback. ISBN 0 9507650 0 7. Price in UK and Europe £14.90 each (includes post and packing). Five or more £12.90 each. 48 hour order turnaround guaranteed.

From dealers and booksellers or direct:
Trade Manager, Edward Arnold (Publishers) Ltd, Woodlands Park Avenue, MAIDENHEAD, Berks SL3 3LX.
Tel: (062882) 3104

"A masterpiece" — *Creative Computing*
"Essential" — *Educational Computing*
"Excellent" — *Jim Strasma*
"Comprehensive & Accurate" — *Jim Butterfield*

Send orders and make cheques payable to:
Trade Manager, Edward Arnold (Publishers) Ltd, Woodlands Park Avenue, MAIDENHEAD, Berks SL3 3LX.

Send ..... copy/ies Programming the PET/CBM at £14.90
I enclose cheque/PO for £ .....
NAME .....
ADDRESS .....
.....

MICROSHOP

Hardware

KAYPRO II

THE BIG SCREEN PORTABLE AVAILABLE NOW!

And here's why Kaypro II outsells Osborne in the USA.

- Clear 9 inch, 80×24 screen
- CP/M Z80, 64K RAM
- Twin 200K disk drives
- Numeric keypad, cursor control keys
- Rugged ergonomic specification.
- **Free Software included:** Perfect Writer, Perfect Speller, Perfect Calc, Perfect Filer, Word Plus, Profit Plan, M Basic, O Basic, S Basic + Compiler, and several games.

SPECIAL PRICE OFFER

Just £1695, or £1859 with special ECSL half-price Epson RX-80 printer offer (exc. VAT)

EXE COMPUTER SERVICES LIMITED
Norwich Union House, Bedford Street, EXETER, Devon EX1 1LG.
Tel: Exeter (0392) 217417

OSBORNE 1

BEST PRICES FOR NEW LATEST OSBORNE — PHONE US!

Purchased for 3 month project: **DOUBLE DENSITY — £810**
SINGLE DENSITY — £660

- ★ Original packaging with manual
- ★ 3 month warranty
- ★ Free software (worth £700) CP/M, C Basic, M Basic, Super Calc + Wordstar with mailmerge.

NEW PRINTERS to go with your Osborne 1:

DAISY WHEEL: Praxis 35 Bytewriter, with internal interface. (off line it's an electronic typewriter) ..... **from £395**
EPSON FX 80: 160 C.P.S. Tractor and friction feed ..... **from £395**
EPSON RX 80: 100 C.P.S. Tractor feed only ..... **from £265**

For any other printers: *Please 'phone for quotation.*
Prices exclusive of V.A.T. And delivery.

CONTACT: TRICIA CARROLL 0252 516766

DLA COMPUTER SERVICES LTD
105 Mytchett Road, Mytchett, Camberley, Surrey.
Tel: (Farnborough) 0252 516766.

DLA are official dealers and authorised service agents for Osborne Computer Corp. (U.K.) Ltd.

WEST DEVON ELECTRONICS

DRAGON 32 — £169.90
INC VAT — FREE P&P

15 Station Road, Horrabridge, Devon
Tel: Yelverton (0822) 853434

HOME COMPUTER CENTRE

ATARI 400 16K	£148.00	SPECTRUM 16K	£98.00
ATARI 800 48K	£298.00	SPECTRUM 48K	£128.00
SINCLAIR ZX81	£44.00	DRAGON 32K	£174.00
ORIC-1 48K	£168.00	COMMODORE 64	£342.00
BBC 'B' 32K	£398.00	VIC 20 PACK	£135.00

Plus printers, cassette recorders, RAM packs, accessories etc., etc. Extensive software stocks.

Open 6 days a week.
Mail order – phone **Northwood 20664,** free lists & prices.
Access, Barclaycard, American Express.

SCREENS MICROCOMPUTERS
6 MAIN AVENUE, MOOR PARK, NORTHWOOD, MIDDLESEX

Services

My name is Simon Stable. I specialise in direct data duplicating for the following cassette-based micros: BBC AB, ZX Spectrum, Oric and Dragon. Disc copying for BBC.
My prices are very competitive with a fast turnaround.
Dot matrix printed labels to order or blanks (tractor).

"BLANK CASSETTES" **08692 2831/3986** "COMPETITIVE RATES"

For further information about real-time cassette copying

● write or 'phone ●

46 WEST END, LAUNTON, OXON. OX6 0DG.

HOBBYIST LIMITED

Open 6 days 10am-7pm. Wednesday and Saturdays 5.30pm.

Authorised Apple Service Centre.

Apple IIe, Epson HX20 Portable Computer and Epson RX80, FX80 Printers all now in stock. Also wide range of supporting peripherals and books.

3 The Broadway, Manor Hall Road, Southwick, Brighton BN4 4ND
Tel: 0273 593345

PERSONAL COMPUTERS GAMES COMPUTERS

LARGE STOCKS OF

BBC, DRAGON AND SPECTRUM

We also carry an extensive range of software, games, monitors, printers and drives.

"BASICS"
DECTRADE LTD
39-41 TRUST BOULEVARD
WEST BRIDGFORD, NOTTINGHAM
TEL: 0602 819713 TELEX: 377678 NETWRK

SPECIAL INTRODUCTORY OFFER FOR THE LATEST + BEST OSBORNE YET!

- ★ 80 Column screen
- ★ Double Density
- ★ Green phosphor screen

SPECIAL PRICE £1,195

Quantity discount on application. Normal retail price £1,495. MONITORS: 12 inch monitors for the Osborne, details supplied on request.

CONTACT TRICIA CARROLL. Tel. 0252 516766

DLA COMPUTER SERVICES LTD
105 Mytchett Road, Mytchett, Camberley, Surrey.
Tel. (Farnborough) 0252 516766.

DLA are official dealers and authorised service agents for Osborne Computer Corp (UK) Ltd.

Insurance

INSURE YOUR COMPUTER

Impact damage, Fire, Theft & Transit Insurance for your Computer Equipment:

£1 to £1,500 cover	£8.00 pa £10 (excess)
£1,500 to £2,500	£16.00 pa £15 (excess)
£2,500 to £8,000	£16.00 pa £25 (excess)
£10,000	£20.00 pa £25 (excess)

Ask for details

KGJ Insurance Brokers
6 Hagley Road, Stourbridge, West Midlands DY8 1QG
Tel (03843) 5333/2545

Accessories

Speed up the action with

PICKARD JOYSTICK CONTROLLER

Allows use of any keys, not just cursors — no special programming — does not affect other add-ons — special price until the end of June.

Price: £18.95 + £1.50 p&p.
Spectrum ZX81 compatible

Success Services
154 High Street, Bloxwich, Walsall, West Mids, WS3 3JT
Tel: (0922) 402403

BBC B 32K

From Creative Interface Designs at a fraction of the cost of comparable systems. The CID digitiser system is a tool for the creative artist, CAD, education, or just plain fun. The system includes digitiser hardware and a sophisticated software package. All graphics modes are supported. Easy to use, full instructions included. Full colour and colour shading. Palette and probe position displayed.

Some of the many facilities include trace-draw, automatic geometric routines, dynamic rotation, triangles, boxes, circles, polygon, liners, etc, etc.

£45+15% VAT
Free musical tablet program included.

I TWO
1 Abbots Place, London NW6.
624 5404

MICROSHOP

Software

STOCK LEDGER SPECTRUM

Before you buy an Apple or a Pet to record your stock movements, try our Stock Ledger. Our program means that you can now run sophisticated stock accounts on your Spectrum. Packed with features, the program provides full audit trail and comprehensive printer output. It has the speed, the capacity and the facilities to solve your stock record problems.

"On a large computer system a file of this nature would cost between £150-£700"
Wholesalers report.

48K Stock Ledger: £14.95
complete with manual

Kemp Ltd
43 MUSWELL HILL, LONDON N10

SPECTRUM MICRO-DOCTOR

Easy to use diagnostic program for 16K/48K machines on cassette for only £6.95.

MICRO-DOCTOR brings you the type of self checking program usually associated with expensive main frame computers. These machines constantly perform self diagnostic tests to ensure that errors do not degrade important data. If your micro does develop an obvious fault then you do not need

MICRO-DOCTOR, but often faults, at least in the early phase, are not obvious and may be generating errors which are a hazard to normal operations.

MICRO-DOCTOR will ferret out these errors giving you warning that your computer needs servicing. Alternatively

MICRO-DOCTOR will give you the assurance that your machine is sound. Tests **CPU, ROM, RAM,** printer, speaker, in fact all machine hardware and circuits. Gives easy to understand error messages. Performs these tests in an autoloop up to 999 times. Special features include halt when screen is full of error messages, so no need to machine watch, audio que on halt, definable upper **RAM** limit for test, toggle start/stop for test equip. Use, loads in two locations.

All cassettes fully guaranteed, send cheque/P.O. for fast delivery.

Dealer enquiries welcome. See us on Micronet 800.

J K GOSDEN SOFTWARE,
13 ASHTEAD COMMON,
ASHTEAD, SURREY, KT21 2ED

VIC 20 STARTER PACK £139.99

SPECIAL OFFER: INTRODUCTION TO BASIC PART II £12.50

MASTERMIND — ROBERT CARRIER MENU PLANNER:

EDUCATIONAL	GAMES
'O' LEVEL: History	Pharaoh's Tomb
Physics	Grid Runner
Maths	Abductor
English Language	Trax
Biology, etc	Castlemath
	Tiny Tot 7
	Krazy Kong
	Junior Math
	Gortex
	Microchips, etc

from £4.99

COMMODORE 64 £345

Phone Doug on (0767) 316702

NOLANSCO ELECTRONICS

FRENCH HOLIDAYS or Exams in View?

This program helps you to learn and revise French through vocabulary quizzes. Accents are catered for. Starting from 800 words (included) build up your vocabulary on tape! Price £6.50 plus 50p p&p from J. Hargreaves, Updown , Pewley Way, Guildford, Surrey GU1 3PY

VOCABULARY PROGRAM for the BBC Micro (32K)

LYNX SOFTWARE

AVAILABLE NOW.

CASSETTE FILE HANDLER

Turn your Lynx into a powerful computer. No memory expansion needed. Place all your valuable data into cassette file. You just append the system to your own basic program and your program can call any of the eight procedures to enable it to do all the following:— Declare file-space, define record, load file from cassette, save file to cassette, write record to file, read records from file, clear work area, over write all files with new files.

The whole system occupies only 2K of memory and enables you to do all the things you wanted to do with your Lynx computer, e.g. telephone directory recipe storage, mail list, games data.

SOFTWARE ON CASSETTE WITH USER MANUAL INCLUDES HOME BUDGET SYSTEMS.

£16, cheque or postal order includes P&P.

RAD SYSTEMS
17 Devonshire Hill Lane, London N17 8LJ.

Courses

CHESTER COMPUTER SCHOOL

Modular training courses for office personnel: Managers
Technicians
Professionals of all kinds

Introduction to micros:
CP/M
Spreadsheets
Word Processing
Networks
Management Information Systems
Program Generators
and much more

One, two and three day courses. Three week executive courses include group project and practical work experience.

All students receive course certificates. Fees from £20 per day. Details and application forms from:

The Principal
Chester Computer School
7 Stanley Place
Chester
Tel: 0244 318959

WILL YOU TEACH COMPUTING?

BEAUMONT SUMMER CAMPS
would like you to teach computing to 6-16 year olds at one of many fine locations this summer. So if you know Basic and can manage a small team of tutors contact:

David Walker,
73 Upper Richmond Rd,
London SW15, 01-870 9866.

MENTOR COMPUTING

BBC Basic 1 day tutorials in East Anglia

Structured programming: an introduction.
Saving memory.
Syntax error. What to do next.
Teletext mode: avoid the problems.
Fee including lunch and refreshments £25.

Write for dates and details to

Mentor Computing
121 Newland Street Witham, Essex.

To Advertise Call Ian Whorley

PERSONAL COMPUTER NEWS

01-323 3211

JOIN THE EXPANDING WORLD OF MICRO-BUSINESS

THE COMPANY

TDI Limited is the leading specialist UCSD p-System software house in Europe, and sole UK importer of the SAGE micro. Rapid growth in the company business has created a number of exciting new vacancies in their Bristol office.

THE POSITIONS

Senior & Junior Systems Programmers are needed to port the p-System to new hardware. We are looking for a solid knowledge of the p-System, UCSD Pascal, and at least two Assembler languages, plus ability to work in a small highly motivated team.
Contact: Chris Lee, Systems Manager.

Customer Support staff are required to provide telephone and sales support, and training services. Good experience of the p-System, and an ability to get on with people are essential.
Contact: Mike Taraniuk, Customer Services Manager.

Software Salespersons are needed to follow up the enormous demand for both the p-System itself, and p-System based applications packages. The ideal applicant will have some knowledge of the p-System, applications software, and/or previous sales experience.
Contact: John Page, Software Products Manager.

THE REWARDS

TDI provides high quality benefits to its staff, and salaries to match abilities and experience.

TDI Limited,
29 Alma Vale Road,
Bristol BS8 2HL
Tel: 0272-742796

SALES EXECUTIVES

AREA MANAGER — £20K +

To sell portable micro terminals with market leaders. Based Reading. Age 25-35 with 5 years proven sales in micros/minis. **£10K salary, car – on target £21½K.**

SALES EXECUTIVES-MICROS

To sell Corvus, Sirius and IBM PC to end users. Based London SW covering Greater London areas urgently needed. **Salary £9K + guarantee, car – on target £20K.**

SALES EXECUTIVE-MICRO/MINI

Based South Herts to sell range of micro and minis priced £30K-£100K. Territory London and north Home Counties. **High salary and commission to £21K.**

SALES EXECUTIVES-MICROS

Croydon distributor needs micro sales executives to sell in south London postal districts to end users. **Good salary, car – to £18K.**

SALES AND MARKETING DIRECTOR

Based north London to set up and manage dealer network for established company marketing internationally known micro. **High basic salary. Very high expected earnings.**

Plus many other good sales vacancies
Telephone for details

SDS CONSULTANTS
Computer Personnel Consultants
After 8.00pm and weekends: 0444 458804

150 Regent Street,
London W1R 5FA
Tel: 01-439 6288

GAMES — UTILITIES — EDUCATIONAL — ACCESSORIES — HARDWARE — SERVICES

ADVERTISERS

PCN is now offering a NEW service
to advertisers

MICROSHOP CLASSIFIED

For only £10 you can advertise your program or service in the No. 1 SELLING WEEKLY

MICROSHOP CLASSIFIED ADVERTISEMENT FORM

For your classified ad in P.C.N., fill in this form putting one word in each box allowing a maximum of 30 words. Write in block capitals and don't forget to include your name and address, or telephone number. Underline any words required in bold type. All ads must be accompanied by a flat fee of £10. Make cheques or POs payable to *Personal Computer News*. We cannot guarantee to print an ad in any specific issue. Send form to:-

MICROSHOP CLASSIFIED PCN,
62 Oxford Street, London W1A 2HG

Please find enclosed my cheque/PO for £10 for the following ad.

Microshop Classified

● **Wanted:** young micro enthusiast, willing to take a risk, and run a tiny microshop and mail order business in Ealing area for share of profits. Phone 01-847 0734 any evening.

● **Computer Stationery** your home user pack, 200 sheets 11 x 9½". Plain paper micro sprocket perforator only £3.99 P&P (inc). Cheques/postal orders/enquiries Micro Supplies, Bridlington House, Bridlington Avenue, Hull, N. Humbs 0482 28811.

● **Cycle Planner:** computes important dates of female menstrual cycle. GROWTH TRACKER: guide to childhood development and illnesses. Unique programs on one cassette, 48K Spectrum. Cheque/P.O., £7.25. Medidata, P.O. Box 26, NW9 9BW.

● **IBM PC 64K,** dual 320K floppy, green monitor, 240V supply. As new £19.90 plus VAT. Telephone 0799 23142 (evenings).

● **BBC** disk drives, 5¼' CDC, Tandon single sided 40TRK, £149 inclu VAT P&P. Cheques, P.O., Vishal Computers Ltd, P.O. Box 238, Thornton Heath, Surrey CR4 6YD.

● **Osborne One.** For sale. Beige case. All software with backup and manuals, £700. Olympia ESW KRO RS232, £375. Sanyo green screen monitor, £75. Nottingham (0602) 585544.

● **Ace Utilities** (19K), superb Hex monitor, key bleep program — does not affect normal running, M/C CMOVE and FILL, £5. Colin Dooley, 37 The Avenue, Stockton, Cleveland TS19 7EP. Tel: 0642 583336.

● **Epson HX20.** Six games on micro or audio cassette. Turn your computer into an expensive executive toy, £7.95 inclusive. Specify which cassette required. D. J. Thwaites, 54 Wilkie Avenue, Burnley, Lancs. BB11 3QE.

Ratified

We'd like to say that after our story about the company I/O Devices and its chinchillas two weeks ago we sent out an ace reporter with instructions not to come back until the chinchillas were immortalised on film.

But no. Besides, not everybody would recognise a chinchilla but most of you would know a rat when you see one. You'd see through our deception in seconds.

So what is this cuddly little fellow doing with a floppy disk drive? It is posing, no doubt for £60 an hour, for ITL Kathmill which has just produced the RAT 305S drive.

ITL Kathmill claims 'shirt pocket media portability' for its drive, and that's all very well but where does the rat go? Up your trouser-leg to fight it out with the ferrets?

Thumble

Burroughs' descent into the PC world has been marked by all sorts of features intended to make life easier for anybody using its new ET2200 (*see report page 8*). These it refers to as ergonomics — swivelling screen, sculpted keys etc.

But one feature seems exclusive to Burroughs. Its hardware requires no tools to install. Presenting this remarkable breakthrough Burroughs' Geoff Druitt draws attention to the cabling. Even the plug needs no tools to apply — it is fitted with 'thumb screws'.

Burroughs should find another name for them before it makes ergonomics disreputable.

SYNTAX ERRORS

Still game . . .

You may have been confused, after reading Max Phillips' enthusiastic review of Ah Diddums in Issue 14, to find that the package rated nothing for Lasting Appeal. Its Playability, Use of machine, and Overall value all had their ratings in green space invaders, but Lasting Appeal had none. This was a case of 'many a slip', because Max swears that after a week of solid playing he hadn't tired of the program. It should have scored four for lasting appeal. Sorry, Imagine.

Spectrum specs

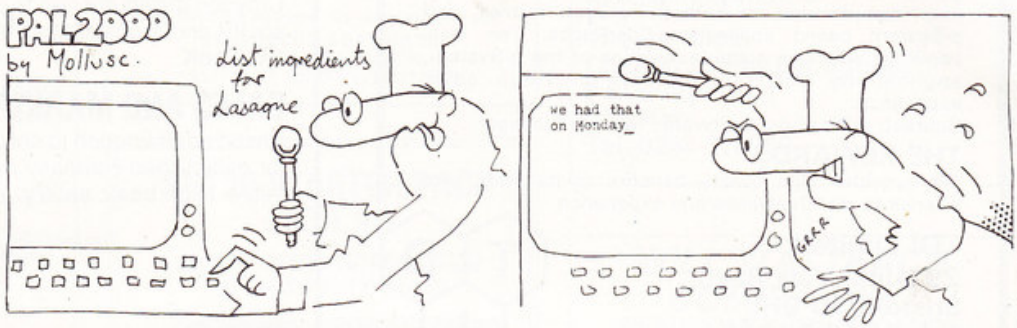
In last week's Micropaedia, we got a little lost Inside the Spectrum (pages 108 and 109). Thus, we could be forgiven (please!) for saying that the 16K RAM was a combination of 2K chips in rows of eight — actually it's a simple 1 × 16 configuration. Similarly, the 32K RAM is not eight 4K chips, but a 1 × 32 arrangement.

You might have noticed a mistake in the section on basic control statements. The article on page 110 refers to 'IF condition THEN action 1 ELSE action 2'.

As everyone knows, there is no ELSE condition in Spectrum Basic (*blush, blush*).

SUM total

The Mattel Pro-Test (*Issue 8, April 29*) grumbled about Finplan's ROMpack spreadsheet program, because it lacked some essential functions. But it doesn't. SUM, AVG MIN and MAX are available in this program. It's just that we got the machine so early (thanks, Mattel!) that it came without final documentation.



PCN DATELINES

PCN Datelines keeps you in touch with up-coming events. Make sure you enter them in your diary.

Organisers who would like details of coming events included in PCN Datelines should send the information at least one month before the event. Write to PCN Datelines, Personal Computer News, 62 Oxford Street, London W1A 2HG.

UK EVENTS

Event	Dates	Venue	Organisers
Computer Fair	June 16-19	Earls Court, London	Roy Bratt, Reed Exhibitions, 01-643 8040
Computer Open Day Exhibition	June 16	Holiday Inn, London	Tony Kaminiski, Couchmead Communications, 01-778 1101
Fylde Computer Show	June 17-19	Winter Gardens, Blackpool	Northern Exhibitions, 0706 877687
Compec North '83	June 21-23	Belle Vue, Manchester	Roy Bratt, Reed Exhibitions, 01-643 8040
Leeds Software Fair	June 21	John Taylor Teacher's Centre, Leeds	Graham Creighton 0532 782181
BBC Micro User Show	June 24-26	Renold Building, UMIST Manchester	Database Publications, 061-456 8500
Dexpo Europe '83	June 29-July 1	West Centre Hotel, London	Expo Consul Inc, 01-948 3111
Malvern Microcomputer Fair	July 2	Winter Gardens, Malvern, Worcestershire	Personal Computer Fairs, Worcester 22659
Micro Trade '83	July 6-8	Barbican Centre, London	Timothy Collins, Montbuild Ltd, 01-486 1951
IBM Users Conference & Exhibition	July 12-14	Wembley Conference Centre	Online Conferences Ltd, 09274 28211
Acorn User Exhibition	August 25-28	Cunard International Hotel, London	Computer Marketplace Ltd, 01-930 1612

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
Mini Computer Show for Office, Home, Hobby	June 23-26	Exhibition Hall, Cologne	German Chamber of Industry and Commerce, 01-930 7251
International Micro Computer Exhibition	Aug 2-5	Kuala Lumpur, Malaysia	Conference & Exhibition Management Services SDN BHD, 9-A Jalan SS24/8 Taman Megah, Petaling Jaya, Selangor
National Computer Business & Office Systems	Aug 16-19	Auckland, New Zealand	Trade & Industrial Exhibitions, 12 Heather Street, Parnell, PO Box 9682, Auckland
Australian Computer Exhibition	Sep 13-16	Melbourne, Australia	Riddell Exhibition Promotions PTY Ltd, 166 Albert Road, South Melbourne, Vic 3205
International Peripheral Equipment & Software Exposition	Sep 13-15	Moscone Centre, Anaheim, USA	Cahners Exposition Group SA, 0483 38085

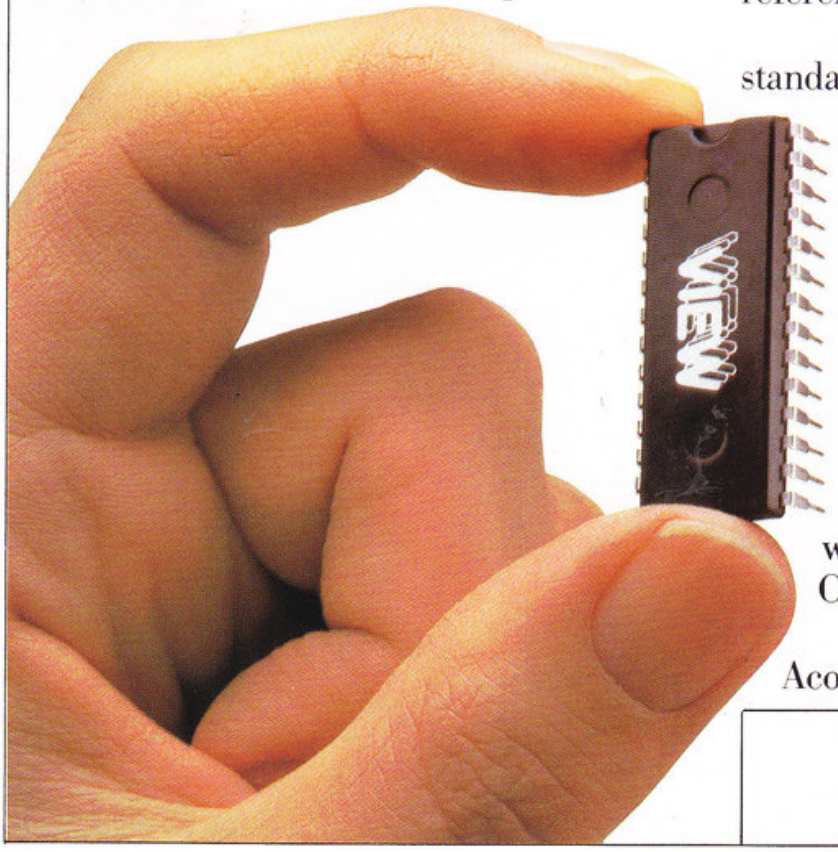
A two-minute operation turns your BBC Micro into the heart of a word processor.

VIEW is a software program from Acornsoft (the software division of Acorn Computers Ltd., who designed and built the BBC Micro) that enables you to use your BBC Micro, together with a printer, as a fully operational word processor.

View is supplied as a Rom chip that can easily be fitted to your BBC Micro by your local dealer, in a painless two-minute operation.

Then, once installed, you only have to switch on and View is operating immediately. (You can easily switch back to normal computing with a single command.)

Also included in the View package are two special books: 'Into View,' that takes you by easy stages through all the word processing commands and explains the many ways in which View can help you, and the 'View Guide', which provides a quick reference to all View facilities.



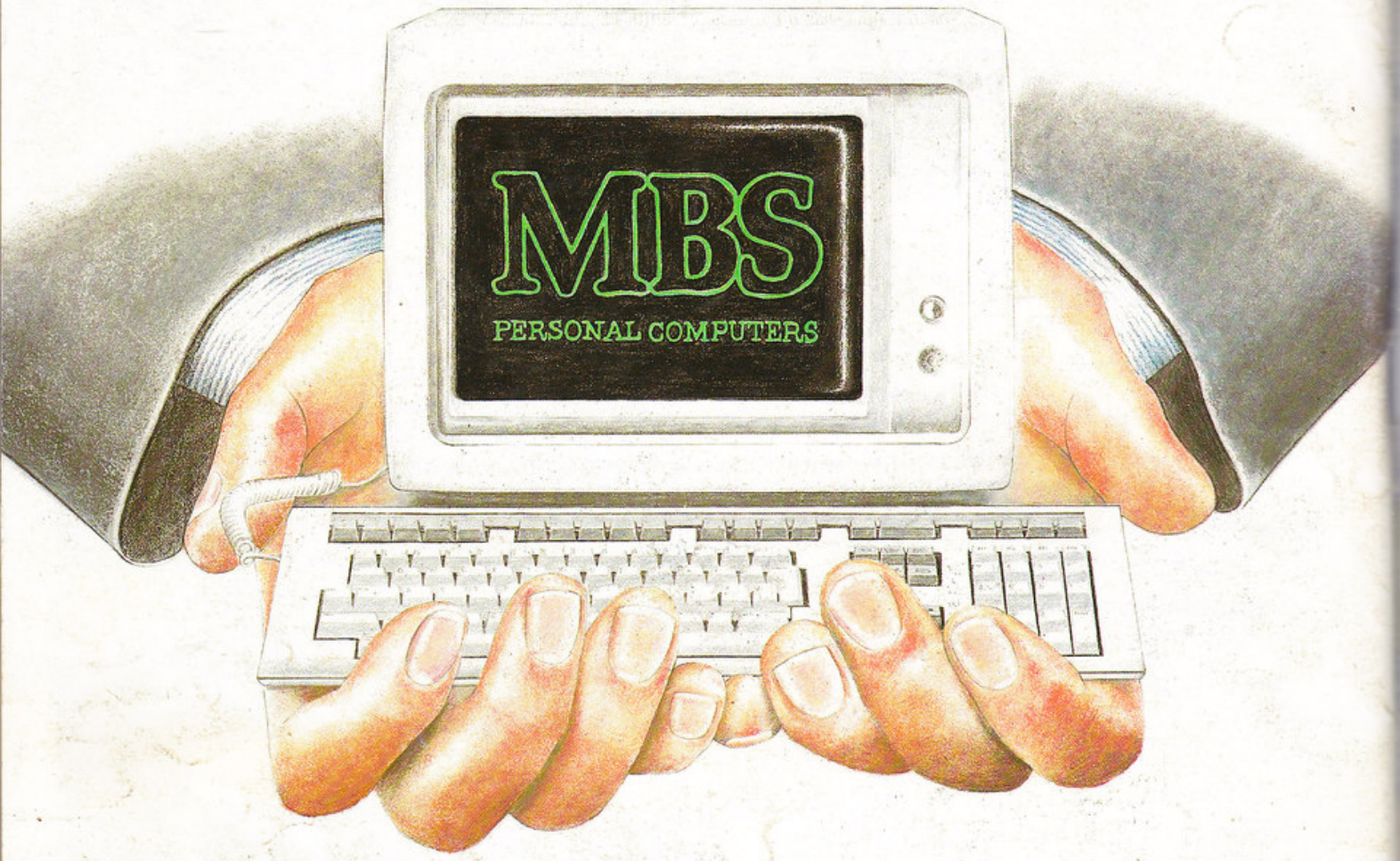
You'll find that View is, by any standards, a thoroughly professional system, yet still surprisingly simple for the beginner to master.

The 'Spark-Jet Printer' shown in the photograph is the ideal choice of printer for your word processing application. Extremely quiet, it offers high resolution graphics from monitor or T.V. screen and is available now from dealers.

If you'd like more information, write to Acornsoft, 4a Market Hill, Cambridge CB2 3NJ.

Or, for details of your local Acornsoft dealer, phone 01-200 0200.

ACORNSOFT



Before you buy a personal computer, try it first by renting from us.

You probably know just how much the right personal computer could help you in your business or profession.

But how do you decide on the right machine without making expensive mistakes?

We have a very simple solution.

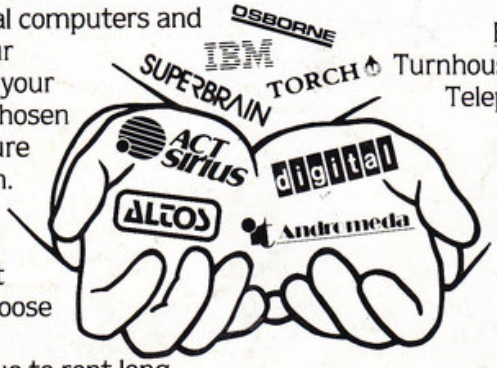
See the very best personal computers and software in action at one of our demonstration centres. Make your selection and then rent your chosen system from us until you're sure you've made the right decision.

When you are ready, simply convert to a purchase agreement. If the system isn't right for you, we'll help you choose a more suitable one.

Naturally, you can continue to rent long term... which may be financially advantageous to you. Alternatively, we can arrange leasing or, of course, direct purchase at the outset.

However you purchase, you'll have a good deal with MBS. And you can rely on unbiased, expert guidance from the computer professionals at our centres.

Call in today.



Nationwide MBS personal computer centres:

London St. Mary Abchurch House
123 Cannon Street London EC4N 5AX
Telephone 01-621 1122

Bristol 14-16 Baldwin Street Bristol BS1 1SR
Telephone 0272 277243

Edinburgh Old Terminal Building
Turnhouse Airport Edinburgh EH12 0AL
Telephone 031-333 1000 Ext. 3144/5

Eton 119/120 High Street Eton
Windsor Berkshire SL4 6AN
Telephone 07535 68171

Warrington The Genesis Centre
Garrett Field
Birchwood Science Park
Warrington WA3 7BH
Telephone 0925 822261

Wirksworth Blind Lane Wirksworth
Derbyshire DE4 4EZ
Telephone 062 982-3120

MBS

MBS Personal Computers Ltd
119/120 High Street Eton Windsor Berkshire SL4 6AN