PERSONAL COMPUTER NEWS

THE COMPLETE COMPUTING WEEKLY · WEEK ENDING MARCH 25th · 35p

HARDWARE

HEAVY METAL

Full Pro-Test of Toshiba's tough T100

SOFTWARE

EASY AS PIE?

New IBM package plots the colour of your money

PERIPHERALS

TOWER OF POWER

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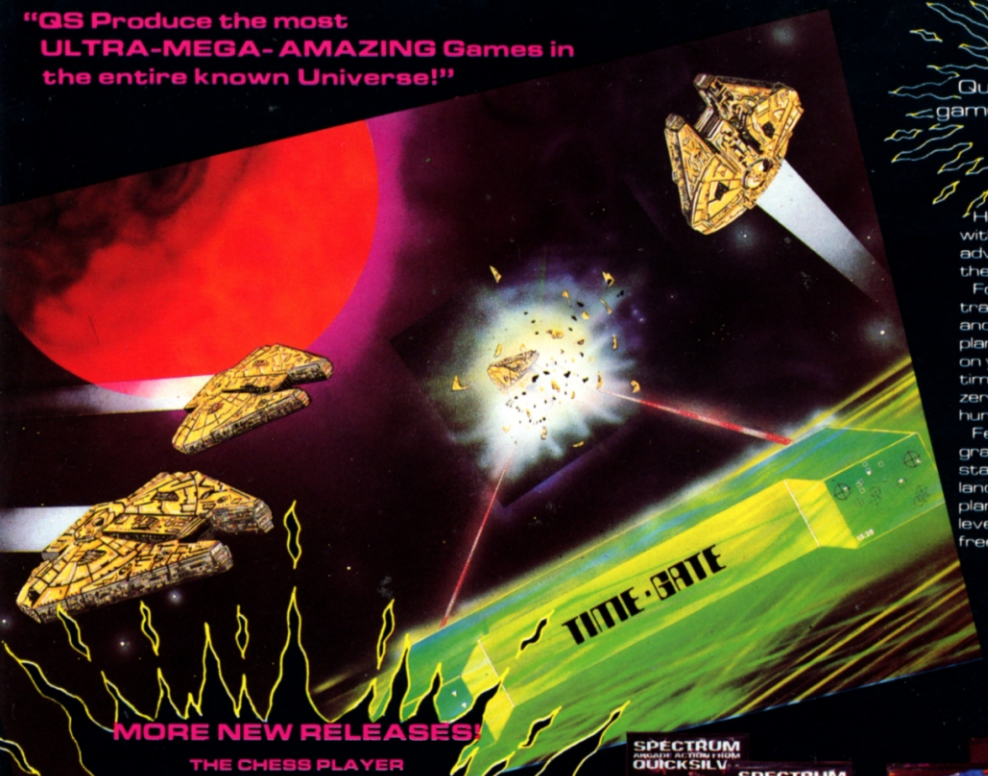

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"...very good." "...addictive game..." [C & V.G.]

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VISA

Pull-out supplement
Micropaedia Part 2
Looking deep into the BBC — word processing, colour graphics and all the add-ons you're likely to need

CHARACTER SET

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Psion Vs CP 31

Tales of woe and bad luck as a brace of Spectrum programs brings the backgammon blues.

Nursery End 32

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Free reader's advertisements — swop, sell or buy.

Dragon Data hatches a successor to 32

By David Guest

A new Dragon is about to emerge from the Welsh valleys, and if it doesn't breathe fire it should at least be colourful.

Dragon Data is intent on keeping you in the dark for the time being but managing director Fred Clark isn't denying that the new system will be a 16-bit machine running MS-DOS. It is also likely to have twin disk drives, and a colour monitor will be available.

'We don't have a release date at the moment,' said Mr Clark. 'We will talk about the system when we have it up and running.'

The heart of the new machine is likely to be an 8086 processor, and the colour screen is expected to be a 14in model which will be supplied by Microvitec.

On the question of price Dragon Data is particularly evasive. Asked if £1,200 sounded reasonable Mr Clark said: 'For £1,200 it won't have a colour screen and two disk drives.'

Dragon 32: the forerunner to a bigger, better version?

Vic packages with your LPs

You should soon be able to buy educational software for your Vic-20 through your local record shop. Commodore-approved software house Ivan Berg has arranged to make its educational software available off the shelf.

The first products to be sold through these outlets are Ivan Berg's GCE/CSE revision programs together with its BBC Mastermind, Quizmaster, Vic Road User and Robert Carrier Menu Planner packages. They cost £9.90.

'Our view is that this is where the future of software will be,' says the company's managing director Ivan Berg.

'It will go the same way as records and tapes.'

For details of your nearest stockist, Ivan Berg Software is on 01-328 3341.

Numbers on the IBM

The new super-spreadsheet program for the IBM PC has made it across the Atlantic.

Called 1-2-3 it is produced by Lotus Software and is available from Personal Computers in London for £400.

In addition to handling 'what if' type questions the program can translate spreadsheet information into a graphical representation and generate reports. By using a second monitor it is possible to display the spreadsheet and graphs simultaneously.

'It is what Visicalc should have been,' says Stuart Lakey, director of Personal Computers. 'A particularly impressive feature is the help screens.

'If you run into difficulty you just hit the "help" button and up comes a help screen directly related to the routine you are working on.'

Although designed to run on the IBM PC and Compaq portable lookalike, it is thought that Lotus is working on versions to run on other MS-DOS machines.

So far it can only be bought through Personal Computers which has the product in stock. Tel: 01-377 1200.

Startech boldly goes for Commodore's US software

You can now get elusive Commodore software for the Vic-20 and 64 in the UK.

Startech, a Liverpool-based software house and one of the UK's biggest importers of US software, has set up a separate division specialising in programs for the Vic-20 and Commodore 64.

A large shipment of Commodore 64 games cassettes is expected from the US this week, and will retail for around £15 a game.

Vic-20 cartridge games are already dribbling in from the US — 16 are available, for between £23.95 and £27.

Business software for this model will arrive this week. ViCalc, a small spreadsheet program, is £10.95 while the ViCat database sells for £17.95.

Games for the Commodore 64 are Adventure Packs 1 and 2, which are multilevel "dungeon and dragon" type games.

All are available direct from Startech which can be reached on 051-727 7267.

Tiny Word at low cost for the Newbrain

Newbrain users now have another word processing package for their machine.

Launched by Kuma, Tiny Word will be available from Newbrain stockists including Lasky's Curry's and more than 100 smaller high street outlets this week, at £24.50.

The package has screen editing and 16 editor commands.

The newcomer joins packages from Brainwave Software at £25 and Elstree Computer Centre at £40.25 for the Newbrain.

IBM's new plans: all Peanut and Popcorn?

You can expect two new personal computers from IBM before the end of the year.

The multinational may have been slow to get into the personal computer business but it is making up for lost time. The XT joined the PC last week, and IBM is expected to launch machines on either side of this pair to offer you a range of hardware.

For anybody who regards almost £3,000 as a pretty penny for a PC, the smaller of the new systems should be a pleasant surprise. It is expected to sell in the US for less than $1,000 — and one US source puts the price as low as $600.

Members of the dedicted band known as 'IBM watchers' are predicting that this micro-PC, code-named Peanut, will be strictly for home uses. It will be, they say, a more economically packaged version of the original PC with a small keyboard and less memory, and should appear in October.

At the other end of the scale the larger machine will be a multi-user, multi-tasking system. It may be based on a higher performance processor than the 8088. Known as PC-2, or Popcorn, it is expected later than its tiny cousin.

Nor do IBM's plans end with the PC line. The good old 3278 terminal could become a micro in its own right with the provision of add-ons.

IBM had no comments.

BBC's big one — System Five dual drive, major file server for Econet.

Count to ten to use Econet

By Geof Wheelwright

Unless you have ten machines or more, you can forget about running Acorn's Econet local area networking system on your BBC micros.

It will cost you more to run five BBCs on the Econet system sharing one dual disk drive than if you equipped each machine with its own disk drive.

Acorn spokesman Lawrence Hardwick claims that the system was never supposed to be cost effective for small configurations.

'I wholly expect that anyone using Econet will realistically have ten stations or more,' said Mr Hardwick.

The limited effectiveness of Econet is largely due to its design. As it currently stands, you must tie up at least two machines in the network — at a cost of about £900 — simply to run the file server and printer server programs.

The Econet system will cost about £50 per machine to hook up. Then you must buy the terminators, clock and cable to link the system together and a file server program to run the system. By the time all that is purchased for four machines, you would have spent £750.

Acorn says it hopes to adapt the printer servers to run on the same machine that handles the file server, so that only one machine need be tied up.

The System Five major file server system can also be used with Econet, but it costs more than twice the price of the dual disk drive system.

ACT's portable: Apricot comes to fruition

After the Apple from the US and the Peach from Japan, the UK Apricot is on its way.

The Apricot, from ACT, is built around an 8086 chip with an 8089 input/output processor and an optional 8087 maths processor. It will have two 3½in floppy disk drives and a 9in screen.

The system will run MS/DOS version 2.0, as on IBM's XT.

ACT, with its background in bureau services and software production, will supply some applications and communications software. Like any self-respecting Apricot, it will be portable.

Fresh Apricots should be on the shelves of your local store from June. What they'll cost has not yet been determined, but an ACT spokesman promised that it would be less than the £2,750 of the Sirius, which ACT also markets.

This is ACT's first venture in micro design and production. It brought in hardware expertise from electronic engineers QED to round off the package.

It will aim to be producing 2,000 systems a month by the end of the year at a new factory in Scotland.

ACT has developed the Apricot independently of Victor Technologies, the US manufacturer of the Sirius. It claims that Apricot will not compete with Sirius while at the same time Victor may build the Apricot under licence in the US.

ACT managing director Roger Foster is reported to have described the development as a 'bold step'.

It is also a logical step for ACT. From its origins as a computer bureau it has developed into a supplier of most computer products.

Anything disk can do Ikon do too

Help is on the way for BBC users whose budgets won't stretch to disk drives but feel their style is cramped (and temper frayed) by tedious and unreliable cassette storage.

Apparently non-tedious and reliable storage is on the way in the form of the Hobbit — a 60K per side tape system from Ikon Computer Products.

The Hobbit reads and writes at 750 bytes per second and its winding mechanisms are completely controlled by the computer.

The device is claimed to require no special interface and is compatible with all versions of the BBC operating system.

The system supports BBC commands and brings a few of its own on an EPROM which is plugged into one of the spare sockets on the BBC.

• *Personal Computer News* will soon be featuring a Pro Test of the Hobbit.

Make your Torch into a BBC for £25

For the princely sum of £25 you can plug a ROM chip into your Torch to use programs and files designed for an Acorn BBC micro.

The ROM should enable you to load and store BBC programs on the Torch, and it will put BBC files at your disposal. In effect it runs the disk filing systems of both machines in parallel.

As a result, Torch says, its users will be given a wider choice. And features of the BBC machine, particularly its file handling, will be performed more efficiently.

'We are getting Acorn's disk filing system on a royalty basis and putting hooks into it,' said Torch's Ray Anderson. So both 40- and 80-track disks can be handled, although the restrictions of the BBC filing system apply — 31 files per disk or 31 files per surface.

But running under CP/M offsets some of the limitations where efficiency is concerned, Torch claims.

The Torch system is basically an elaborately packaged BBC micro, so correspondences between the two are hardly surprising. But Torch, with CPN, the CP/M look-alike, has moved in a different direction.

PCN THREEBIES OFFER

Welcome to week two of the PCN Threebies Offer. Already our publisher is worrying.

So many of you have saved your PCN Threebies Offer coupon from issue one, that it looks as if he is going to have to give away thousands of crisp, green, one pound notes.

Keep up the good work. You now have two coupons, so you are two thirds of the way there.

Just to remind you, all you have to do is collect the PCN Threebies Offer coupons from issues one, two and three of *Personal Computer News*, and we will send you £1.00 absolutely free. Remember though, absolutely no photocopies and only one claim per household.

Make sure you get next week's issue of *PCN*, to get coupon number three, and to find out how to claim.

No replies can be accepted from anyone who has any connection with the publishing, printing or distribution of this magazine.

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VIEW FROM JAPAN

Japanese prepare for the invasion

You can expect a lot more Japanese machines in the shops this year.

It's no secret that the Japanese have been busy selling personal computers at home for some time. Last year alone sales doubled to 650,000.

But it may not be quite so well known that there are at least 70 firms already competing for the spoils of Japan's crowded domestic market.

It is largely because of this heated domestic competition that some 20 Japanese manufacturers are even now preparing to take their machines abroad.

That should be good for the average user. Japan's forays into the UK to date have not revealed that country's best machines.

In true Oriental fashion most companies have made only cautious moves in your direction. They tested the market first by selling their displays, disk drives and printers under Western names through agreements with Western companies.

Even those companies that have released machines in the UK have generally sent their older, poorer-performance machines out first.

Now the companies are planning to send the machines that have been selling big in Japan to this country. So you can expect to see the PC 8800 Series that Nippon Electric (NEC) introduced last year, as well as the PC 9800 Series that it introduced this year. Fujitsu's new Micro 16 and the Sanyo MBC 200 Series also ought to be making their way to your shores soon.

Brother will be going to the Hanover Fair in April to launch a range of low cost printers that should be available in the UK in August or September.

At the bottom end of the range will be the EP-22, a dot-matrix printer that can also be used as a portable typewriter. It features a 16-character, one-line display and comes with 2K memory and either a serial or Centronics interface. It will be priced at around £175.

For around the same price, Brother will be offering the HR5, a bi-directional printer with a 9×9 dot matrix printhead. In addition the company will be bringing out a daisywheel printer, the HR15, that will be competitively priced at under £500.

That could result in a round of major price cuts, not to mention machines that offer better performance at lower prices. It could also make a trip to your local computer shop a dizzying experience for the novice buyer.

The impending invasion could also be a boon for software suppliers. The Japanese are weak at producing software and even now many companies are looking to UK and European specialists for help.

Epson, for one, is openly seeking European software houses, and hiring Europeans, to help write software and support its machines.

Double vision on the oriental screen

ese are different. There has to be
o account for their startling national

ıtry at the moment might suggest it's
ched the X-1PC colour TV, which
levision signals to let you write and
TV.

tching Coronation Street through a
demic question at the moment; the
-1s that Sharp can barely keep pace,
0,000 a month.

arance in the UK towards the end of

From George Faas

Jupiter's new machine leaves Ace users cold

Jupiter Cantab is working on a new machine — which may explain why users are still waiting for add-ons for the Jupiter Ace.

Jupiter is believed to have a prototype working based on the Z80 chip with high resolution colour graphics, 48K of memory, Prestel compatibility with an 80-column mode and a built-in modem.

But news of a new machine does not excite users of the Ace who have been waiting since October for their expansion boards.

'It's a sore point,' said John Noyce who runs the Jupiter Ace Users Group.

'Jupiter has been promising all sorts of things. In particular we would like to see the printer board,' he said.

Jupiter maintains that the add-ons will be out soon.

'The printer board will be available in a month or two,' said Jupiter Cantab founder Steven Vickers. The 16K and 48K RAM packs should be out in the next two weeks.'

But Mr Vickers was cagey about details of the new machine. 'There are no new models that we are announcing that we are working on,' he said. 'But that's not to say that we are not working on a new model.'

'If you look at the market it is not unreasonable to think that there is a gap in the market for a Spectrum-like successor to the Ace,' he added.

It is unlikely that the new machine will be released for at least six months.

'Throw away your manual' with Torch Operating Guide

MPI Software wants to come between you and your beloved Torch operating system.

Last week PCN got an exclusive unveiling of the Operating-Guide, a package designed to let you access operating system commands without having to memorise them or keep your manual constantly at hand.

In simple English (which is what this program purports to give you) the program translates CP/N (the Torch's operating system) commands and allows you to access them easily.

The Operating Guide was originally written as a guide to help people running programs in CP/M, and has now been rejigged to help on the Torch.

The program was written by Decision Systems. The company claims it will make the user manual obsolete for CP/M and CP/N users.

Every time you need to use CP/N utility, the menu-driven program takes you through the stages of the operation and lists all the available file management options.

The system also has a feature that tells you when you need to back-up the main Operating Guide program so it doesn't go down.

There is no manual for the Operating Guide as all the instructions are menu-driven and it will sell for about £45. MPI can be reached at 01-591 6511.

Easy access to the Torch's operating system — thanks to MPI Software

Spectrum Microdrives: late, later, latest

By Ian Scales

The Sinclair Microdrive, first announced in April 1982 as an imminent storage peripheral for the ZX Spectrum, is still not in sight. That, as everyone with a calendar knows, makes it nearly a year late.

Sinclair is still determined to remain mysterious about the drive. The company claims that premature release of technical details will jeopardise the product's advantage over its rivals. So, management refuses to make any promises about a release date.

This is despite the fact that the Microdrive design has been frozen and the company claims it is simply waiting for shipments of custom chips so production can get under way.

The latest information from Sinclair is that design improvements are said to have marginally bettered the access time of 3.5 seconds previously claimed.

The Microdrive interface will cost £30 while each drive will now cost £40. Up to eight drives can be chained together — each with a capacity of slightly more than 100K.

Those of you who bought the Spectrum by mail order when it was first announced will be offered the drives first.

Sinclair says this will serve as part-compensation to those who had to wait long periods for Spectrum deliveries. Of course it also enables the company to determine the eventual take-up rate.

Home-grown is no cheaper

It isn't just American micros that cost more in the UK. Our own products often sport higher price tags in the UK.

Apparently it's not the trip across the Atlantic that hikes up the price. Timex, the US company that acquired the US rights to the ZX81 and Spectrum, is presently allowing its version of the ZX81 to be discounted by retailers to as little as $53 (£36).

A lower price for the US version of the Spectrum is also considered likely because of the pricing of competing 'low end' brands from Commodore and Texas Instruments.

MEM/DOS: Le Crunch for Apple?

Apple users with a taste for the exotic can now sample a French operating system.

Guernsey software house Dynatech Microsoftware has introduced MEM/DOS to the UK. This £299 package sells at a rate of 400 copies a month across the Channel.

Dynatech claims that this is because the French version has a number of advantages over Apple DOS. MEM/DOS comes in the form of a card that slots into the back of your system. Since it uses screens or masks to take over input and output functions, Dynatech claims it enables you to program 20 times faster than is possible with the normal system.

MEM/DOS for the Apple

It makes a split screen possible; it frees memory by residing on a card; and it regards disk space as one continuous area.

MEM/DOS offers the choice of 40 or 80 columns on the screen.

For multi-user operations a communications interface card will be needed, costing £299.

Summer scramble over 2.0

Expect a rash of upgrades this summer as micro makers start to include version 2.0 of the MS-DOS operating system in their machines.

The new version will give you support for fixed disk operations, extended screen and keyboard controls, batch-type operations, and other features designed to make your life easier.

Microsoft, the US producer of MS-DOS, has already supplied version 2.0 to its existing customers — a list which includes DEC, Wang, Hitachi, NEC, Victor and others. The new version made its debut last week in the launch of IBM's PC XT.

In detail, the additional features of version 2.0 are: general support for fixed disks including back-up and restore commands; it can be started from diskette or fixed disk; tree structured directories, a file recovery utility and a batch command language are included; multiple disk input/output buffers; room for the addition of user-installed device drivers; optional verify after write; piping, where the output from one program becomes the input to another; redirected I/O; and a background file print utility.

A Microsoft spokesman said: 'You can't buy it direct, it will come on the machine you buy and it is up to the manufacturer to provide support.'

PCN Charts

You're right . . . gremlins got into the system last week and rendered PCN Charts at best intriguing, more likely incomprehensible. But here they are again — with full explanation.

PCN Charts follow 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. The figures show the number of machines sold in a two-week period ending two weeks before publication date (in this case March 18), so today's tells the story in high streets between February 18 and March 4.

The machine prices quoted are for the no-frills models and include VAT. Information for the PCN Charts has been culled from retailers throughout the country and compiled by MRIB, London. They will be updated every alternate week . . . so watch for the ups and downs in next week's PCN!

Top Twenty up to £1,000

1	BBC Model B	£399	(AC)
2	Sinclair ZX81	£50	(SI)
3	Newbrain AD	£299	(GR)
4	Commodore Vic-20	£170	(CO)
5	Acorn Atom	£174	(AC)
6	Apple II	£776	(AP)
7	Sinclair Spectrum 16K	£125	(SI)
8	Atari 800	£400	(AT)
9	Atari 400	£160	(AT)
10	Commodore 64	£345	(CO)
11	Dragon 32	£200	(DR)
12	Jupiter Ace	£90	(JU)
13	Texas TI99	£150	(TE)
14	Colour Genie	£224	(LO)
15	Oric 1	£100	(OR)
16	Sharp MZ80A	£549	(SH)
17	Commodore 500	£799	(CO)
18	Tandy TRS (C/C)	£240	(TA)
19	Epson HX20	£472	(EP)
20	Commodore 4016	£632	(CO)

Top Ten over £1,000

1	Sirius 1	£2,754	(ACT)
2	Olivetti M20	£2,754	(OL)
3	Apple III	£2,780	(AP)
4	Osborne 1	£1,581	(OS)
5	HP 86A	£1,541	(HP)
6	Commodore 710	£1,475	(CO)
7	Xerox 820	£2,415	(RX)
8	Superbrain II	£2,185	(IC)
9	Micro-Mimi 802	£1,720	(BM)
10	Sanyo MBC 1000	£1,195	(SA)

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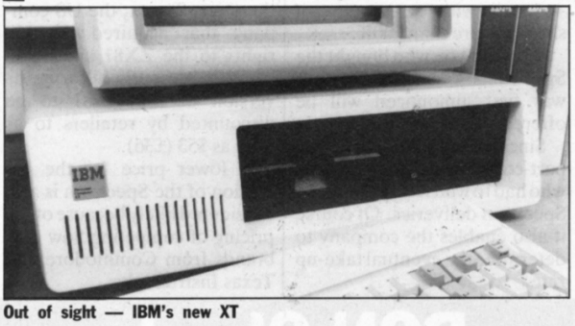
IBM's £5,000 personal micro



Out of sight — IBM's new XT

As a personal computer the IBM PC is rapidly disappearing over the horizon.

The new, improved XT version launched last week *(PCN, March 18)* is virtually a member of the business system class — a machine that sets you back almost £5,000 isn't something that you'll buy out of the petty cash.

But there is more to the XT than meets the eye. The XT has brought DOS version 2.0 along with it. The operating system doesn't have the menu facility that everybody had been expecting but there are tree-structured directories, a batch command language, piping and other attractions.

The Basic 80 interpreter is still the same old 8-bit oriented relic but with support for about 21Mb on the system it seems churlish to dwell on the Basic.

From the point of view of storage, the XT is in a different class from the original PC. User memory starts at 128K, up from 64K on the PC, and it can be expanded to 640K.

On-line storage can include two 5¼in fixed disks giving 10 Mb each, plus a new 360K floppy.

IBM is offering expansion units, one for PC owners to boost their storage and one for XT owners to double it. The PC expansion unit has the 10 Mb drive, a disk drive adaptor, and a ROM replacement kit to support fixed disks. It costs £2,172.

The XT expansion kit costs £1,978 and contains a 10MB disk drive and eight expansion slots for optional plug adaptors.

The disk drives have a 90 millisecond average access time and can shunt data out at five megabits a second.

The XT and expansion units are expected to be in the shops in early June. The minimum system, with 128K for you to play with and a 10MB disk, will cost £4,858 plus VAT. A larger system, with 256K user memory and a second fixed disk, will cost £7,126.

Prolog for the small machine

Language buffs with a CP/M machine can now experiment with fifth generation language Prolog.

Oxford software house Expert Systems has brought out a full implementation of the language that will run on any CP/M machine with 64K. It costs £335.

A compiler version to run on 68000 machines will be available later in the year.

Prolog differs from traditional languages in the way programs are written.

'Prolog is a language based on logic', explained Alex Goodhall, managing director of Expert Systems. 'Rather than listing the steps a computer has to go through to solve a problem a Prolog program uses a series of logical statements to describe the problem. The language then enables the computer to sort out how to solve it,' he said.

PC price bonus from IBM

There is a bonus in the launch of the IBM Personal Computer XT. From now on the original PC will cost you less.

IBM cut the price of its system units and disk drives by a modest six per cent.

The reduction on some peripherals, however, was much greater. A system unit with a 160K diskette drive comes down from £1,394 to £1,311; with the 320K drive the reduction is from £1,537 to £1,461.

The 160K drive's price falls from £264 to £180, and the larger drive from £407 to £330.

The price reduction in the US was closer to 15 per cent.

Portable Commodore

Commodore is preparing for a full-scale attack on the UK portables market.

The new SX-100 range consists of three portables, one with black and white display and two with colour. Details are still a bit sketchy, but it looks as if they could be aimed directly at the popular Osborne 1.

Weighing in at 22lb apiece, the machines offer 64K, built in 5in monitor and floppy disk drives holding 170-340K, depending on the model.

The colour version looks like better value for money than others on the market. The UK prices have not been set, but in the US they will range from $995 for a black and white display with single disk drive, to $1,495 for a colour display with double disk drives.

The bad news is that the launch date in the UK is still uncertain, but we could be in for a sneak preview in May.

TEXT MATCH — IS Pipeline enables you to insert graphs into reports, put addresses into form letters and make multiple copies. It is compatible with the Apple or any Centronics interface and is expandable from 8 to 128K from £139. From Pete and Pam Computers, 01-769 1022.

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Put your idle Epson to work

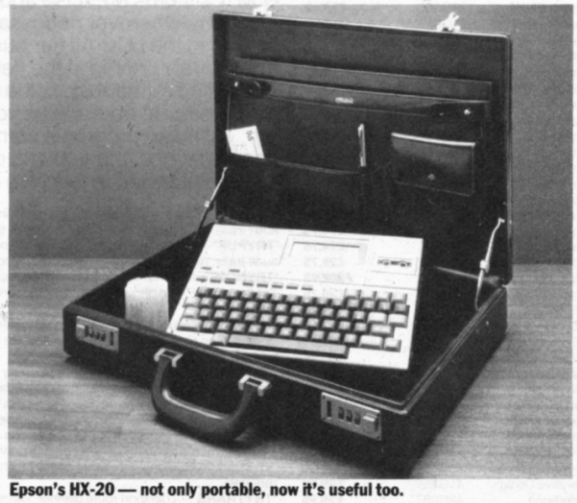
Relief is in sight for all of you Epson HX-20 owners who bought the 'portable computer that slips into a briefcase' only to find that there was no software to run on it.

Epson UK has launched a suite of packages that form a personal office system for the machine.

Already available on micro-cassette or plug-in ROM card are a diary that works with the micro's built-in clock, a mailing list, and a card index program that can be used as an address book or telephone directory.

Also available is a program called D.I.Y., a program generator that allows you to tailor the HX-20 to your own applications. By answering a series of questions you can write data capture/handling routines without learning Basic.

Sold under the Eponsoft label, the diary and card index programs cost £29.70 and the mailing list and D.I.Y. programs sell for £34.50. All four programs can also be bought as ROM cards for £86.25 each, and are available from Epson dealers.



Epson's HX-20 — not only portable, now it's useful too.

On its way, but not available yet, is Correspondent, a program that allows you to write and format documents. It can be linked with the mailing list and can also be used with an external printer.

Meanwhile Kuma, the Maidenhead software house, has brought out a 'home budget' package priced at £19.95.

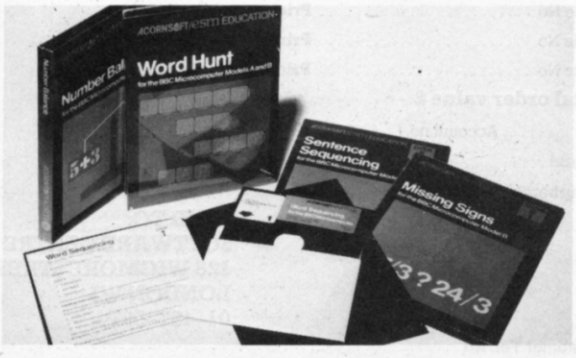
Why Sinclair recalled those power packs

The mystery of the faulty Spectrum power packs has been solved. It seems the faulty batch contained a printed circuit board inside the transformer. A pair of tracks were so close together there was a danger that a harsh spike down the line could cause a bridge between them.

This would have made the low-voltage connection between the pack and the Spectrum 'live' with mains power. If someone happened to be holding the bare end-plug at the same time as a spike arrived down the line a humid environment could have been enough to bridge the circuits and cause a dangerous electric shock.

The fault was discovered by an engineer at one of Sinclair's repair centres and the company is going to reassess its quality control.

The Sinclair operation involves subcontracting all the manufacturing to other companies. According to Sinclair, the manufacturer concerned had successfully filled similar orders before and the Spectrum units were checked only to make sure they worked properly. 'We won't be making the same assumption again,' said a spokesman.



MICRO TEACHER — Five new educational packs for BBC micros are now available from Acornsoft. Word Sequencing, Sentence Sequencing, Missing Signs, Word Hunt and Number Balance retail for £15.35 or £11.90, for disk or cassette, available direct from Acornsoft head office.

A network around the Globe

If you have been tempted by the Globe business micro you should now be able to find a dealer near you who stocks it.

Globe has upped the number of dealers to 30 and is well on the way to its target of 40 dealers nationwide.

The Globe's main claim to fame is that it uses British components throughout (with the exception of the disk drives). It also sells as a complete package — hardware plus software for £2,128.

The result is a system with 64K memory, dual disks holding a total of one megabyte, a CP/M operating system and Wordstar, Mailstar and Plannercalc software packages.

Top end of the range is a system featuring 2.4 megabytes of storage in 8in disks and costing £3,680.

Globe can be contacted on 0934-835222.

Go-faster Forth on BBC and Spectrum

Forth fans should now be able to run this super-fast language on their Sinclair Spectrums, and BBC owners who already have Forth up and running can get a toolkit package to extend the language's capabilities.

Artic Computing, suppliers of a Forth package for the ZX81, this week launched a Forth implementation for the Spectrum.

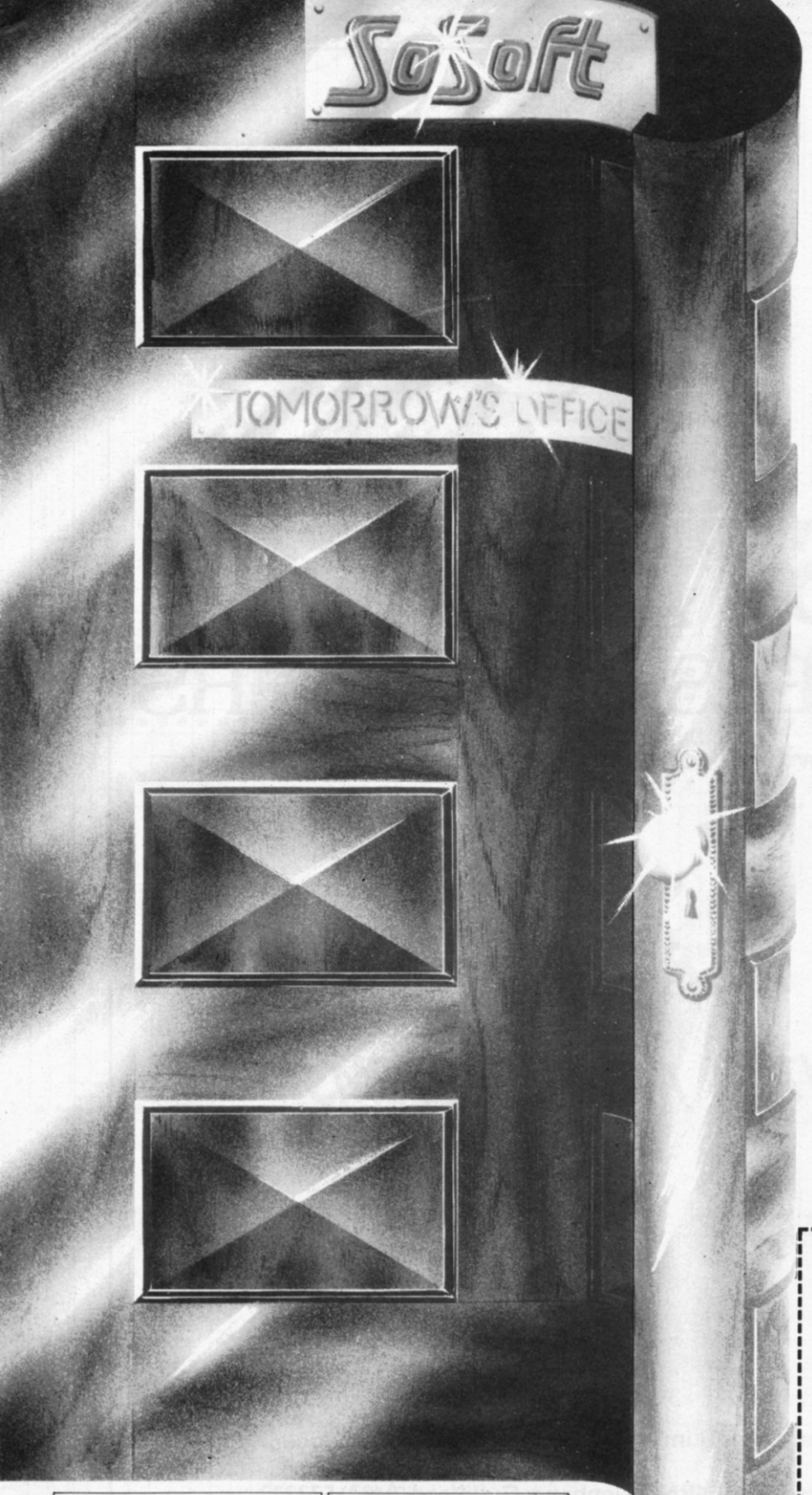
Selling at £14.95 it has 'all the Forth features except disk handling,' the company claims.

The Forth Toolkit for the BBC machine comes from Level 9 Computing a company that released a Forth package for the micro a few months ago.

The toolkit, which costs £10, gives the user extra facilities such as turtle graphics, a 6502 assembler, a decompiler of Forth words and the ability to work with games joysticks and printers.

Artic Computing can be reached on 0482-75284 and Level 9 on 0494-26871.

Shop around before buying. Mike Hampson, at 7 Hereford Drive, Clitheroe, Lancs, is advertising Spectrum Forth on cassette for only £5.95.



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Prospero conjures a Z80 Fortran package

The debate raging over the merits of Basic and newer languages such as Pascal and Forth might lead you to think that the mainframe language Fortran is headed for the scrapheap.

But Prospero, the London software house, doesn't share that view. It has just released a Fortran compiler for Z80-based micros. The £250 package runs on any CP/M machine with a minimum 56K memory and two 100K drives.

The compiler generates native Z80 code directly and conforms fully to the America National Standards Institute Fortran 66 standard rather than the more recent Fortran 77 standard.

'We have chosen the older version because there is such a large amount of software available for it,' said Mike Oakes, a director of Prospero.

The package includes the compiler, a disk-to-disk editor, the run-time library, a library management utility and a program to configure a working copy of the software to suit variations, such as different disk capacities.

It has been designed to work with the native code Pascal compiler produced by the same company and as a result it is possible to write programs mixing the two languages.

Prospero says execution speed and accuracy are second to none among 8-bit languages.

Multi-user Archives for £10,000

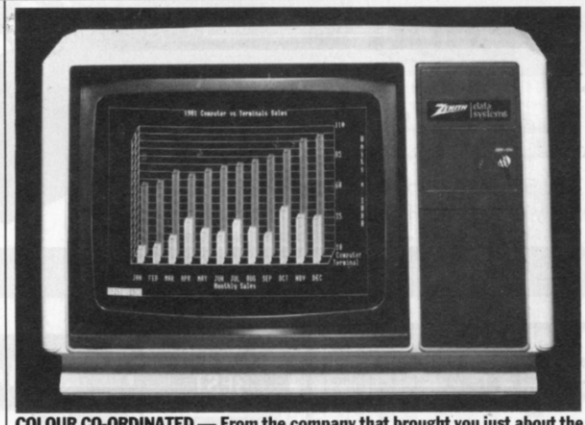
Coming upstream from Salmon Electronics is a multi-user, multiprocessor micro system.

With the Archives IV, Salmon says, you will be able to set up a system for five users at less than £10,000.

The company freely admits that the Archives IV is no technological triumph. 'There is nothing very new in it,' a spokesman said. 'But everything is tried and tested and it works.'

With Z80 processors, an S100 bus, and MP/M, the system's elements do have a familiar look.

Salmon, the UK distributor for US Archives machines since 1981, can be contacted on Darlington 0325 721368.



COLOUR CO-ORDINATED — From the company that brought you just about the cheapest monochrome monitor on the market comes the Zenith ZVM 121-EV colour monitor. This has a 13in screen and will run with most computers with RGB output. It will cost you £506 from Zenith Data Systems on 0452-29451.

Six pack from Oric

The first software for the Oric will be hitting the shops by the end of this month.

Oric itself has produced six packages including a £17.50 version of Forth, Chess for £9.99 and Oric Base for £9.95. They will be available from Dixons, Lasky's, WH Smith, Micro-C, Spectrum and other dealers.

Bug-Byte Software will also be releasing an adventure game, The Castle, for £8 early in April.

As for the machine itself: Oric says it's coming.

Music and mayhem on your Beeb

Four new games are on the way for BBC users.

Bug-Byte, the Liverpool-based software house, will be slipping the new packages onto the market in two weeks.

For £7.50 each you will be able to play Galaxy Wars, City Defence or Space Invaders. For those with a musical ear there is the Music Synthesiser at £9.50.

Mr Baden says these new packages will be available from Bug-Byte's 220 dealers and, in the future, from WH Smith and Boots.

Independent puts another card into the Apple pack

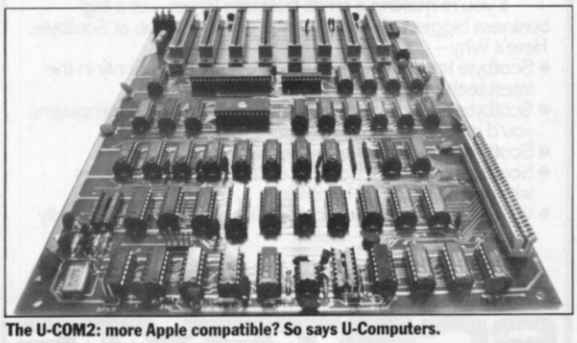
A Manchester company has come up with an offbeat upgrade for adventurous owners of the Apple II.

U-Computers, a manufacturer of add-on cards for Apple II, has developed a new mothercard for the Apple bus.

The company claims its U-COM2 board offers greater compatibility with the Apple II than Apple's own card, the Super IIe.

Dr Bill Unsworth, managing director of U-Computers, says: 'The Super IIe does not have Slot 0, the U-COM2 does.' The significance of that is that many programs relocate the disk operating system into a 16K card, giving the user more free memory.

Dr Unsworth says the presence of Slot 0 means U-COM2 can make that relocation while the Super IIe can't.



The U-COM2: more Apple compatible? So says U-Computers.

The U-COM2 costs £249 in fully-tested board form. A power supply is available for £71 and a special 40-column display board costs £39.

Apple Computers did not wish to comment on U-Computers, which is located at Winstanley Industrial Estate, Long Lane, Warrington, Cheshire. Tel. 0925 54117/8.

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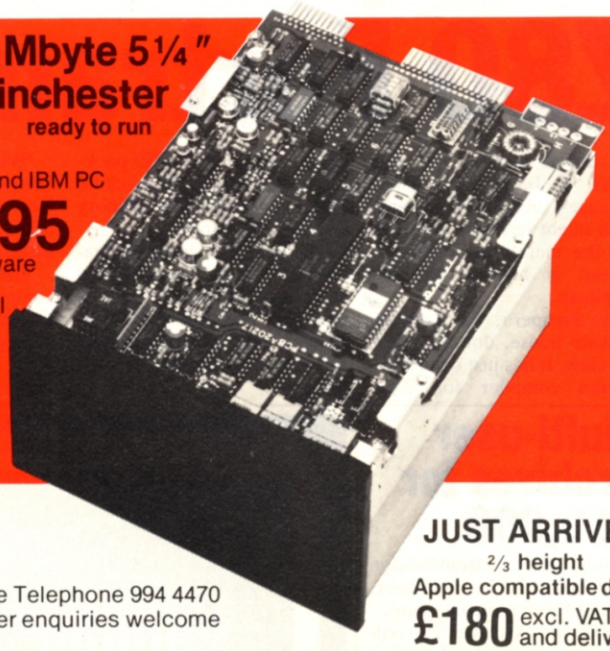

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Out of order?

Some time in early December (I forget the exact date) I sent off the order form for the Oric culled from one of the microcomputer magazines. Sure enough, the Oric failed to materialise inside the obligatory time-frame.

Why is it that the mail-order computer companies can continue to get away with this sort of activity?

Friends have experienced similar delivery problems with Sinclair some time ago and in spite of the hue and cry raised at the time nothing seems to have changed. Why is nothing done?

Duncan Snelling
Putney, SW15.

Clear away the copyright clouds

I am a complete layman in legal matters, but I feel I should comment on the current controversy concerning software copyright.

The copyright laws have not been clarified by the courts, and I assert that it is has yet to be shown that copyright applies to computer software and hardware, except where the software is in documentary form. Therefore, as the law stands at present, no copyright exists in computer tapes or ROMs in whatever form they are manufactured.

I was at one time completely sympathetic with the copyright concept, when it applied only to lterary and musical works, and when the proceeds of royalties benefited the authors.

I began to lose my sympathy when the recording companies formed an organisation which extorted additional fees, principally for the benefit of the recording companies, from the legitimate owners of their products when the products were used outside the circle of the owner's immediate family and friends.

At present the manufacturers of audio and video tapes are also making obscene noises, and the latest band to join the merry throng is the publishers of computer program tapes.

If one takes a cool look at the situation, every one of these latter-day Shylocks has already been adequately reimbursed for his labours; if he has not, he has only himself to blame.

I, like most people, have spent my life working for an employer. During my employment I introduced many innovations, some of which for all I know are still in use to this day. I received no financial reward for any of them, other than my normal salary; neither did I expect one.

When copyright genuinely exists, it is automatically conferred by publication, and no song and dance is necessary. If they want to make an issue of the matter, let them take it to court and get the law clarified.

Short of using 'bully boy' tactics, I agree that all are perfectly entitled to take whatever steps they think fit to prevent their material being copied, and most already do so with a considerable degree of success. If they don't like the existing law, they must take steps to get it altered, or else change their product, and produce material which is indisputably copyright, ie listings only.

R J Parsons
Whitton, Middx.

Why are the prices so high?

It seems to me that someone ought to expose UK computer prices.

How many unsuspecting customers are aware that in the US personal computers cost roughly half what they do here?

I am at a loss to understand why this should be so. I would greatly appreciate some sort of explanation of this state of affairs, but in fact, I find it hard to believe that there is one.

Mona Cundick,
Dagenham, Essex

Chess champ challenged

An article on chess by David Levy was quite a coup for your first issue, and congratulations are due.

But it was disappointing to see Levy subscribing (albeit in his last paragraph) to the tedious and often repeated view that mechanical chess players will one day surpass humans.

Perhaps it would be charitable to say that this is the type of conclusion to an article that rolls most readily out of the typewriter and spares the author further thought. Perhaps Levy genuinely believes in the irresistible march of technology.

Either way it hardly matters. Aside from the practical and philosophical objections to the idea of superhuman chess champions, consider the purpose of programming machines to play chess. Surely it isn't simply the mountaineer's syndrome ('because it's there') that is responsible for all the time and effort that has gone into chess programs.

If chess programs have any importance in the context of artificial intelligence — teaching machines to give the appearance of thinking — isn't their technical ability vis-à-vis humans largely irrelevant?

And if they do become the greatest players in the world, and men give the game up because of a sense of inferiority, can you imagine anything more sterile than a game of chess between two machines?

Andrew Gallagher,
Staines

Micros make meetings

Some people do talk rubbish — even if half the blame goes to others for printing it (*Micro hermits, PCN March 18*).

Roy Church talks of 'societal impact' and suggests that people already behave in an anti-social manner.

What does he mean? I've met a lot of fellow enthusiasts since I bought my Vic and now know neighbours I'd never talked to before.

Such comments can come only from someone who is already missing out — in this case missing out on micros.

Andy Moise,
Mitcham.

Micronet's call costs

Firstly, I would like to congratulate you on a first class magazine. If the standard remains as high as the sister magazine *Personal Computer World*, I shall eagerly await the arrival of it each week.

I would like to make one comment on your article on the new Micronet 800 network. You mention that unlike the Prestel system, most of the pages are free and you only have to pay for the cost of a local call.

This is not correct. You pay for a Computer Connect charge (currently 5p a minute), between the hours of 8am and 6pm weekdays and 8am and 1pm on Saturdays.

All other times are free, ie Sundays and public holidays, the only charge being the cost of a local call.

Bob Hallett
Enfield, Middx.

Roots of the square

When R J Parsons of Whitton, Middlesex (*PCN, March 18*) said he'd be dubbed 'square' because of his views about computer games, he's absolutely right.

A stuffed shirt more like. What is slightly odd is that he doesn't seem to think games are a matter of skill.

Surely it's better to spend hours calculating complex mathematics to land a spaceship on the moon, or exercise memory and strategy in an adventure game, rather than to doze off watching Crossroads or some mind-dulling TV quiz special.

I'm glad Mr Parsons will be glad to be called square. If this is his attitude he obviously gets very little fun elsewhere.

W Bisiker,
Guildford.

Forget Frankenstein

I think David Levy missed a vital pont in Chess Programs (*PCN March 18*).

By saying 'one day the computer will be the master, and man the powerless slave' is nonsense.

The computer will always (Hal apart) be the slave since man will always remain the creator.

J Budge,
Exeter.

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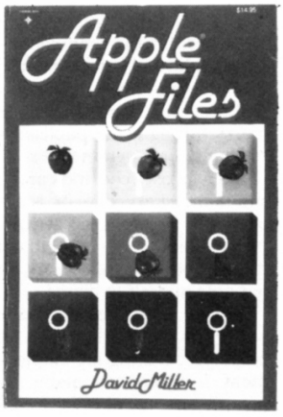


'Apple Files' by David Miller, published by Prentice-Hall at £11.95 (paperback, 414 pages)

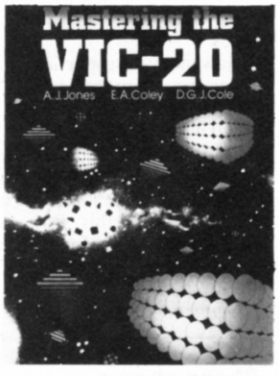
Of all the major skills needed for effective data-processing, disk filing techniques are the most difficult to acquire.

The oddities of Apple DOS don't make it any easier, so this book looked as though it might be a welcome offering to the novice.

It's much more than the title suggests, being a complete tutorial on writing data-handling programs in Applesoft Basic rather than on disk-files alone.

It contains complete listings of several suites of programs, some of which look comprehensive. Each chapter introduces new concepts in Basic, with a question-and-answer section to check progress. But in the attempt to lead the novice gently, the author uses some quite apalling programming techniques.

The book, no doubt, contains useful information but the poor technique obscures it. **RK**



'Mastering the Vic-20' by A J Jones, E A Coley & D G J Cole, published by Ellis Horwood, £5.95 (paperback, 178 pages).

This is the best book I've seen for the Vic-20.

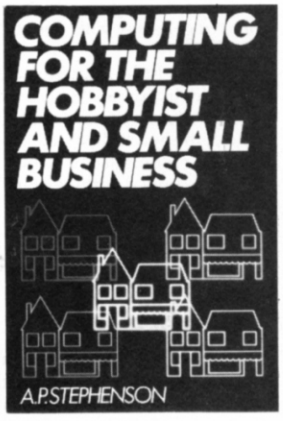
It's not only readable and understandable, but instructive and fun; and worth the price for the example programs alone.

Among these are a music synthesiser and hi-resolution graphics drawing program, plus a machine-code dump-to-printer routine.

But the authors offer much more than examples. Starting with an introduction to the more obscure bits of Basic and a plea for structured programming, *Mastering the Vic-20* moves through sound, user-defined graphics, peripherals — including the Vic printer — and useful sections on file-handling on cassette and disk.

The second part of the book gives an overview of the system architecture and introduces machine-code programming.

It should be on the bookshelves of all Vic owners. **PW**



'Computing for the Hobbyist and Small Business', by A P Stephenson, published by Granada at £6.95 (paperback, 200 pages).

Computing for the Hobbyist and Small Business is among the latest in the wave of books for newcomers to computing. But what makes this one different is that it breaks the usual structure and sets out to group hobbyists and small business buyers together and concentrate on their needs.

The book's introduction sets the gentle style. By the time you finish it you've been given a good idea of what kind of micro system you need.

One particularly useful feature is the stock control example program which has extensive explanatory notes.

But there are obvious shortfalls, notably the index which is so brief it limits the book's use for reference. However, all in all, it is a good introduction to the business of micros. **JL**

PCN Paperchase

It's week two . . . the chase is on. You should have the answer to the first part of PCN Paperchase by now — so you must be well on the way to winning one of the four BBCs we're giving away — each worth £399.

You'll remember that last week we asked you to unravel the first five lines of a muddled program and come up with a unique number. An errant programmer had written a 30-liner on separate pieces of paper. But he failed to number it before a gust blew it into a heap on the floor.

The first part should not have caused you any problems. This week's will be a little tougher — if only because we want you to decipher the next ten lines of the program.

When you've sorted the MID$ from the PRINTS, you'll get a three-word phrase which (and here's the clue) is more relevant to foresters than to market gardeners.

Once you've cracked it, keep the answer in mind. You'll need it to complete the final part next week, and send your solution to us. Don't send part answers — wait until you have solved next week's problem. Then waste no time in claiming your chance to win a BBC. Once again . . . good luck!

```
P$ = P$ + MID$(A$,28,1): P$ = P$ + MID$(A$,6,1)
P$ = P$ + MID$(A$,14,1): P$ = P$ + MID$(A$,7,1)
P$ = P$ + MID$(A$,11,1): P$ = P$ + MID$(A$,9,1)
P$ = MID$(A$,5,1): P$ = P$ + MID$(A$,12,2)
A$ = "ABCDEFGHIJKLMNOPQRSTUVWXYZ -1234567890"
P$ = P$ + MID$(A$,1,1): P$ = P$ + MID$(A$,3,1)
P$ = P$ + MID$(A$,27,1): P$ = P$ + MID$(A$,23,1)
PRINT "PHRASE = ": P$
P$ = P$ + MID$(A$,15,1): P$ = P$ + MID$(A$,18,1)
P$ = P$ + MID$(A$,20,1): P$ = P$ + MID$(A$,19,1)
```

You don't have to use a computer to solve this — just common sense and logic. The program is written in BBC Basic, so with only minor adjustments (such as a comma instead of a semi-colon) it will run on any machine using Basic.

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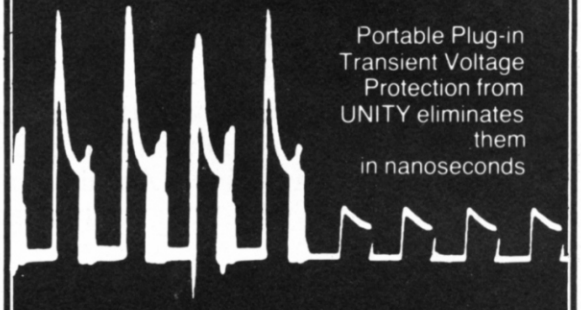

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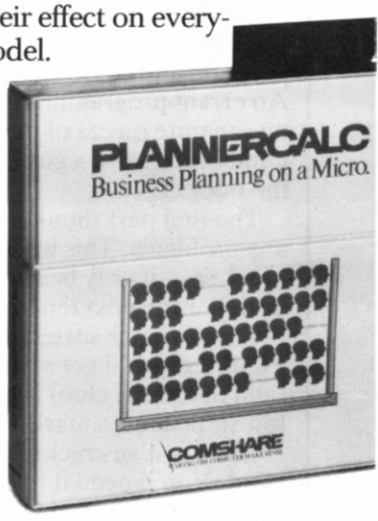

It comes with the best manual on the market and it's suitable for most micros with a ™CP/M 2.2 operating system, 64K of memory, giving at least 900 cells, minimum screen width of 80 characters and 2 floppy disc drives.

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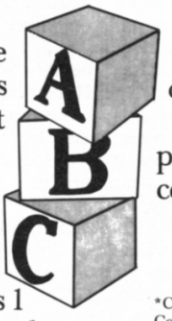

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Strong silent type

An article I read described Pascal as being 'strongly typed'. Can you explain what this means? The writer seemed to feel that this is not a good thing.
Simon Drew,
Mitcham.

Data typing is an important part of programming as well as an issue in the structured programming debate that hasn't yet been aired.

All information is of one sort or another. The type of a piece of data is simply the set to which it belongs. So the type of a datum such as '34' might be 'whole number' or 'real number' or 'age'. A letter like 'z' might be of type 'letter' or type 'character' and so on. A variable of a particular type can only take on values from that particular set.

Pascal, being a very formal language, is full of data types. As well as the more obvious integer, real and character types, it has a Boolean type. A Boolean variable can only be true or false. So if you write 'VAR verdict: Boolean', you declare a variable which could only hold one of two values — true or false.

Pascal lets you add newer and ever more complex types at will. Some of the famous examples are 'TYPE day = (Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday)' or 'TYPE sex = (male, female)'. A variable such as 'VAR Sexjohn: sex' can only have the values 'male' and 'female'.

You can go on building bigger and better types using array and record structures. And you can use parts of existing types, such as 'TYPE weekday = Monday . . . Friday'.

Languages vary in the amount of typing available. Pascal is strongly typed. Basic has at most the real, integer (*eg*, A%) and string types (*eg*, A$). BCPL has only the one type, a 16 to 32 bit word. You can do what you like with it.

Assembly language has no types at all unless you count the 'byte' as being a primitive type. It's up to you to implement whatever types and structures you need out of this basic unit.

You've probably already spotted the advantages of strong typing. It makes programs easier to read and debug. It ensures that, like the shaped slots in a child's toy, nothing ever goes where it shouldn't. So 'TODAY: = MALE' isn't allowed. Strong typing can allow some compilers to generate very efficient code.

But it can be very restrictive. There is no reason why you shouldn't be able to write 'TODAY: = YESTERDAY + 1'. If you have a 'TYPE colour = (red, green, blue)', why can't you later say 'WHITE: = red + green + blue'? In Basic red T RED = 1: LET GREEN = 2: LET BLUE = 4' followed by 'LET WHITE = RED + GREEN + BLUE' is not only just as clear but it also works.

A compiler which permits strong typing and implements full checking of variables can easily end up with an over-sized run-time library.

Systems programmers tend to avoid typing, applications programmers tend to use it.

Catty questions

I have a question over which I have lost much sleep. I have a cat and my husband has a microcomputer. The computer sits near a sunny window in my husband's study and the cat has taken to lying on the keyboard. Is the cat in any danger?
Judith Orr,
London NW1.

No, not unless your husband is a fast typist. Keyboards tend to be safe to touch and I doubt whether the cat's eyesight will be impaired through staring at the screen all day. Cats rarely do anything that strikes them as uncomfortable.

I'm more worried about the computer. Cat fur and pawprints will not improve the reliability of floppy disks.

Neither, for that matter, is leaving disks near a sunny window a sensible practice. Move the computer and leave the cat where it is.

Epson ducking the issue

Among the many ads in computer magazines is one that seems odd. It is the one for the Epson HX-20, and it shows the machine perched on a water-spotted table over a bath. I'm no expert on care of micros but it must be bad for a machine to be in such damp conditions.

Am I right or should I not worry about computing in a sauna.

L Paddon,
Exeter.

The HX20 is far more delicate than your average rubber duck. It is strongly built and has an optional sturdy plastic case for posing when there's no bath handy. So you could reasonably take it with you on a building site or milk round. But like most other computers, it won't take kindly to heat, damp, violence or silly adverts.

If you do need a computer that can be used in hostile environments (such as saunas) ring DVW Electronics (0203 668181) about the Husky. This is a serious weather-proof battery portable, though it lacks the moving keyboard, and the till-roll printer.

ZX81 — can colour climb aboard?

I understand that I can use colour with my ZX81, but with such a low-priced micro, is it really worth adding £40 or £50 of equipment? Are the results worth the price?

Would I do better to invest instead in a more sophisticated machine?

M Belgrave,
Ilford, Essex.

You can do anything you like with a ZX81 and add-ons. Colour hasn't really caught on, because its difficult to get good results at a reasonable price. Haven Hardware withdrew its £40 colour board because of unstable results.

But there's no reason why you shouldn't spend £40 or more on a ZX81. For a start, you really need a proper keyboard and a 16K RAM pack if you're going to get the best out of it.

The trouble is that it's difficult to get software support even for some of the most popular add-ons.

That's fine if you write your own programs, or if the company making the hardware puts out programs. But even if you had a colour board you'd have trouble finding programs that used it.

With this in mind you might do better to save up for a more sophisticated machine. Think about a Spectrum or an Oric — both have colour, sound and so on as standard, so all the better programs on the market will take advantage of this.

Keyboard questions

Is it possible to buy a different keyboard for the Spectrum? I want one that feels more like a typewriter. Does any company make a suitable one that wouldn't need an electronics whizz kid to fit it?

S Douglas,
London EC1.

You've discovered why there is a huge market for replacement Spectrum keyboards. You can get typewriter keyboards complete with cases from several suppliers, such as Data-Assette (01-258 0409) and DK'tronics (0493 602453) for about £45.

You only need a few minutes, some care and some commonsense to fit them. The keyboards don't have a proper space bar, but if you're already used to having Space under your right hand this should be no trouble.

Dancing display blots out burnout

When I leave my Atari on for more than about ten minutes the display on the television changes colour.

Does this mean my graphics are unstable?

Arthur Ward,
London N1.

No, the Atari does this deliberately. If you don't touch the keyboard for a while, a timer starts alternating the colours on the screen. This is to prevent an image being permanently 'burnt' into the screen of the monitor or TV. Touching a key will restore the screen and reset the timer.

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Apple joystick out of control

Beware the reverse joystick blues.

I had just come home from playing games on a friend's Apple and had used my joystick while we were playing. When I got home I put the joystick back in my machine and sat down to write a letter using my wordprocessing program — Super Text — and found that my keyboard wouldn't control the keys properly.

I turned the machine off in frustration and forgot about it for a while. When I turned the machine on the next day I loaded a games program and tried to play it; this time the joystick wouldn't move.

I soon realised I had put my joystick in backwards, thereby causing the wordprocessor and the game to work improperly.

So if you think your keyboard is packing up or worse, check the position of your joystick first.

E G Mardsen
Chipping Camden

How I define BBC characters

No matter how much fun user defined characters are on the BBC, it's always awkward to type in rows of VDU commands to create them. I always use the procedure below to define my characters.

Each character is defined by a string of eight hex bytes held in a DATA statement. Hex is used because it's easier to enter and check and you don't have to do any decimal conversions. The program decodes each string and defines characters from 224 onwards, though you could easily change this.

N Beech
London N16

```
>LIST
 1000 DEFPROC_DEFCHARS
 1010 LOCAL SA,A$,I
 1020 SA=224
 1030 READ A$:IF LEN(A$)<>16 THEN ENDPROC
 1040 VDU 23,SA:FOR I=1 TO 16 STEP 2:VDU EVAL("&"+MID$(A$,I,2)):NEXT I:SA=SA+1:G
OTO 1030
 1050 REM Some sample character definitions
 1060 DATA "55AA55AA55AA55AA","0102040810111214","18FF18FF1818FF18","END"
```

Protect your Lynx graphics

I used to think my Lynx was slow, but if you use the PROTECT command, you can write quite quick graphics in Basic. PROTECT disables certain colours. So if you PROTECT MAGENTA, the Lynx doesn't update its memory for red or blue colours. It can print only in green but it does do it a lot faster.

You should be able to make any animated game use this feature. I set up a background, PROTECT it and then have any moving objects in one of the unprotected colours.

One useful command I discovered by accident is TEXT. This protects everything but green. It's useful not only for speeding up programs but it makes LISTing and editing a lot quicker as well. The Lynx has a few other surprises. There is an STR command, even if it isn't mentioned in the manual. Anyone else discovered any secrets?

G Carter
London W1

Snooper stopper

A lot of security systems are fairly complicated to implement, and the problem is that no matter how good it is, it can almost always be cracked.

But if you're protecting, say, club data or files for a small business, you may need only to delay snoopers rather than stop them completely.

Say your filing system involves the program giving you a number of options, and asks you to INPUT one of those options. You need only make a small alteration to the program listing for the *correct* answer (as far as your software is concerned) to be a codeword rather than an actual named option.

An easily remembered coding system would be for you to INPUT the name of the program at this point rather than what the computer is ostensibly asking for.

You would then be asked again for an INPUT, and this time you would put in the right answer.

Y T Hall,
Southend, Essex

Numbers trap on the Jupiter Ace

The Forth language used on the Jupiter Ace is powerful, but it holds a trap for beginners. It is possible to accidentally redefine ordinary numbers to become something else.

Programs are written in Forth by defining new commands and building them into programs. Each command is defined by typing a colon (:) followed by the name of the command and then the instructions which make up the command.

Once the command has been defined its name has to be keyed in and it will be performed.

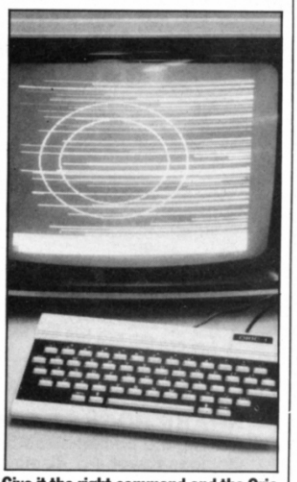
The trap is that new users may accidentally leave out the name that was meant to be given to the command. If this happens the first instruction which should have followed the name will itself become the name of a new command.

This means that if, for example, the first instruction is the number 2, it could accidentally be redefined to be equal to the number 3. The Ace would then think that 2+2=6.

It is not easy to spot when this has happened. The best way is to keep a careful check on the list of new words by using the VLIST command. Being careful when defining new commands also helps.

L Roberts,
Holland-on-Sea, Essex.

Curing the Oric's oval



Give it the right command and the Oric thinks it's in America — and its ovals become true circles.

When I got my Oric I was upset to find that the CIRCLE command actually draws ovals, not circles.

But after a few hours of trial and error I've found a way round the problem.

I just key in FILL 1,1,29 and the whole picture on the television screen stretches upwards.

This makes the ovals drawn by the CIRCLE command into real circles.

I think this works because part of the Oric is designed so it can be converted to work with American TV sets as well as British ones.

This is because American televisions use a different system from ours and so need a different signal. Giving the right command makes the Oric think it is in America.

For some reason the mixture of American and British television signals makes the picture stretch. Can anyone explain why this should happen?

Furthermore, this system does not always have the desired effect.

It works with my television (a Grundig) but it made the picture on my friend's TV go crazy. By adjusting the vertical hold control on the back of her TV we got a normal picture again.

If you switch into the TEXT mode the picture will go back to normal.

It can also be made to do this by keying in the command FILL 1,1,31. The commands can be part of a computer program.

Peggy Keenan,
Eastbourne, Sussex.

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COLECO EXCLUSIVE

A plug-in keyboard would zap-up the new Coleco Vision games unit, says Geof Wheelwright

Qwerty versus Donkey Kong

Don't write off the ColecoVision video games system just because you want a programmable computer. That may have been the rule in the past, but this machine will sport a plug-in keyboard — one day.

At £130 the Coleco machine is a computer in video game clothing. CBS Electronics and Ideal Toys are due to launch it in June.

The vital clue is on the front of the machine — hiding just below the game cartridge socket is an innocent-looking expansion interface. This is where you can plug in a computer keyboard.

There's no estimated price on the keyboard yet, but Ideal spokesman Richard Ault promises it will cost less than the games unit itself.

Electronics companies used to wean you onto the harder stuff — real home computers — by getting you to buy a games machine first. But now even the games machine companies are realising that more and more people are ready for the hard stuff, and can't get it fast enough.

ColecoVision was released in North America last year, aimed at the Mattel and Atari video games market. But CBS and Ideal realise that it just isn't on to bring out a non-programmable machine in the UK.

Despite this reasoning the keyboard will not be available for the ColecoVision launch. This means it will not be possible to access the machine's computer capabilities immediately. The machine tested played games wonderfully and featured sophisticated high-resolution graphics. But when struck with the programmer's natural itch to create, I could do nothing with it.

Mr Ault concedes that the success or failure of the machine in this country will depend on the arrival of the keyboard. He vows that it will be on sale by autumn.

He seems to shudder at the mention of Mattel's long-standing — and unfulfilled — promise to supply a computer keyboard for the Intellivision games machine and swears Ideal will not 'do a Mattel'.

But the ColecoVision promotional material currently available seems to make the same kind of vague keyboard promises that characterised Mattel's no-show.

One example of this is that, although the other plug-ins for the Coleco are well-documented, there is not even a mock-up of the computer keyboard in company promotional brochures.

So until that keyboard turns up you'll have to be content with £20 CBS Electronic games cartridges.

The game supplied with our machine was Donkey Kong, a licensed version of the popular arcade game of the same name. CBS Electronics has the market cornered on this cartridge, and sells the same game for both the Mattel Intellivision system and the Atari VCS. Coleco's version of the game seems better than the ones implemented on Atari and Mattel machines.

Even without a keyboard the Coleco Vision can be credited with a good deal of ingenuity in design. Like any good computer, it's adaptable and expandable — even using it as a games machine.

But software availability is the key to success, and Coleco's designers have developed a highly versatile expansion module interface on the front of the machine. Plug-in modules allow the machine to play all the games cartridges currently available for both Atari and Intellivision machines.

You will also be able to plug in the computer keyboard and a 'Turbo Drive' module to the interface. The turbo drive module wasn't available for our test, but looks like good fun. You plug the joystick into it to serve as a gearshift, and use the wheel and foot-pedal provided to drive down the on-screen highway generated by the computer.

We thought the hand-controllers were a nice compromise between the limiting Atari joystick and the rather pedestrian Intellivision keypad. The controllers consist of an eight-directional disc on a stick — a sort of upside-down joystick — at the top, two independently controlled fire buttons at the side, and a 12-key numeric pad which can handle the overlays needed for Intellivision games.

As a pure games machine, it's unlikely you will find anything in the £130 price-range to touch the Coleco machine's quality graphics and playability. And if you want something that can turn into a computer when you're tired of either buying or playing games, keep the Coleco in mind.

We wouldn't advise buying the Coleco machine on the assumption that you'll soon be able to use it as a computer, but you *can* draw that conclusion if Coleco meets its summer deadline for release of the keyboard in the US.

When you take the lid off, this games machine looks far more like the computer it really is. The big processing chip near the front is a Z80A and the front interface connects to peripherals — including the soon-to-be-released computer keyboard.

Ko-Kon Chung

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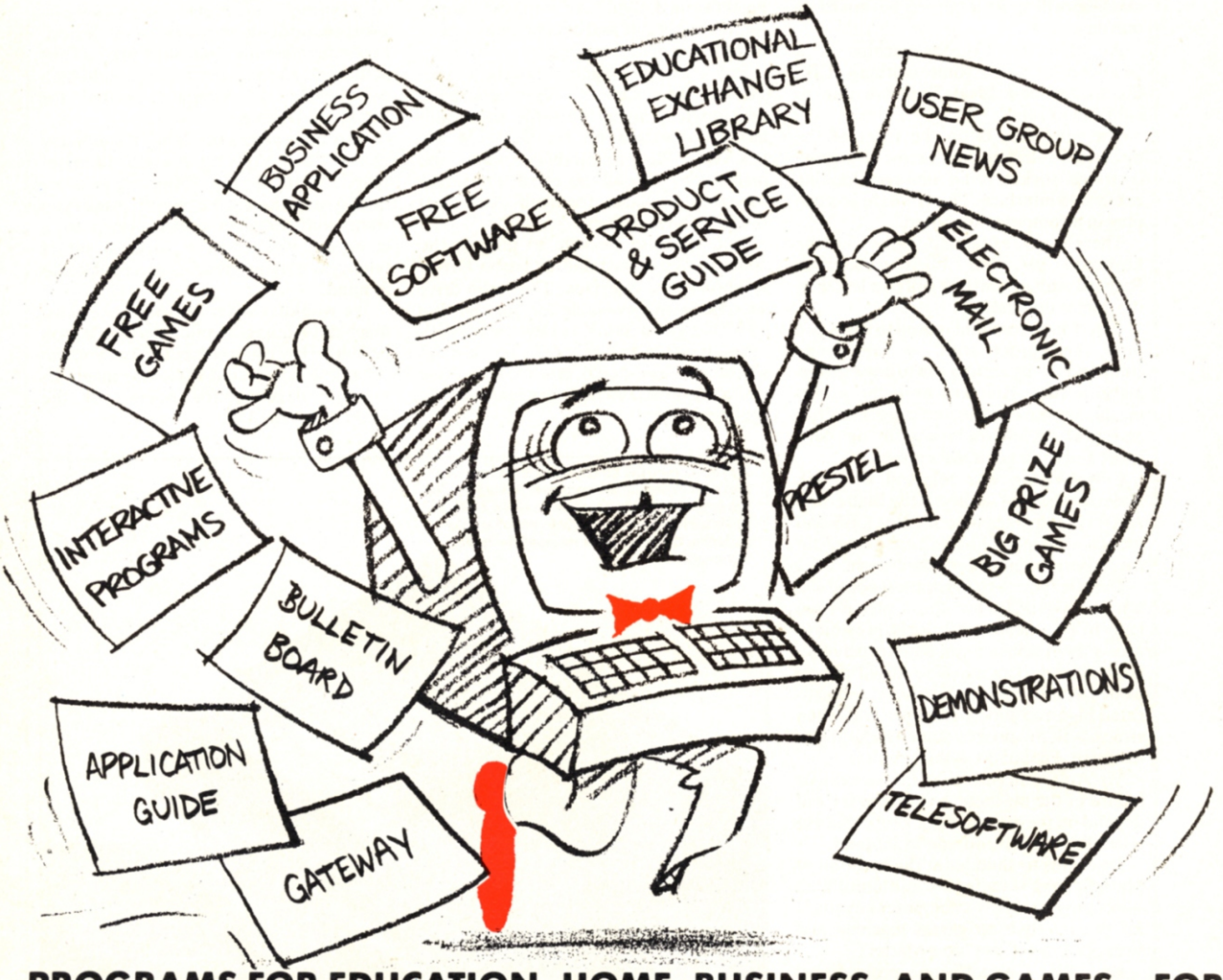

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'Lucky' Geof Wheelwright loses his reputation on the gaming board to a brace of programs

Backgammon blues

Backgammon is a far cry from the usual run of zap and splat games for the Sinclair Spectrum.

But now two versions of the age-old Lebanese game are available on cassette. The first, from CP Software, has been out for some time and the second, from Psion Software, is due to be released in two weeks. I compared the CP game with an exclusive pre-release copy of Psion's implementation.

The CP game is a fairly straightforward, no-frills presentation, but Psion's features three-dimensional dice, friendly chat, and strategically placed bells and whistles.

Psion's game

It started ominously; I knew I was in trouble when the game took five minutes to LOAD. Then I was asked which level of play I wanted — there are four — and whether I wanted to roll my own dice.

Being a bit of a coward I chose level one, the easiest, and trusted the computer with the dice. I plugged on in the hope that I could thrash the Psion program at its own game.

I hoped in vain — every time I made a play to take one of the program's stones it would quickly protect them. Even when I offered a stone in sacrifice, in order to get the Psion game to leave one of its stones unprotected, it wasn't interested.

By playing this conservative game, the Psion program was soon bearing off, while I struggled to get the last of my men off the bar and into my inner table. I was practically gammoned, and the Psion program won easily.

I was glad I hadn't put any money on the game.

I went on to greater things, losing spectacularly to level three. I'd accepted the doubling of stakes, secure in the knowledge that the Spectrum has no pocket-searching peripheral.

My excuse is that I was dazzled by the Psion program's graphics and was therefore incapable of thinking straight. The game starts by drawing a nice black and white backgammon board with blue and red stones, then the dice come rolling out — in simulated 3-D.

CP's version

I had no such excuse for losing to the CP Software program. CP backgammon is more of a rough and tumble affair, playing aggressively and expecting you to put up a fight.

I did manage to capture some of the game's stones — but it managed to take twice as many of mine.

There were no nice graphics to distract me this time. The screen display is utilitarian, employing a red and yellow board with black and white stones. The dice don't move, and are 'thrown' by means of the spots changing when you hit Enter.

The animation that moves your stones is also inferior on CP's implementation. Unlike the Psion game, where you actually see the stones moving from place to place on screen, the CP version just flashes the piece that's about to move. It then magically teleports it to its new position where it reappears about four seconds later (a full second slower than the Psion game).

One redeeming quality of CP's otherwise lacklustre program is its on-screen documentation of moves. Every time you make a move a code representation is shown on screen (*eg* it shows *f-4* when you move the stone at position *f* four points closer to your inner table).

CP also scores a few brownie points for on-screen documentation before the game, and there are several paragraphs explaining the workings of backgammon before the dice are thrown. It's a shame that thoroughness of documentation did not carry over to the information on the cassette sleeve.

The paper documentation amounts to a brief summary of how to LOAD a program, and then a précis of the International Backgammon Association's rules for the game. There are more instructions on the back of the cassette sleeve, but again they concentrate on how to play backgammon rather than on how to unlock the secrets of CP's version.

Only about one-third of the Psion documentation discusses how to play backgammon — the rest highlights all the bells and whistles that make its game unique.

Verdict

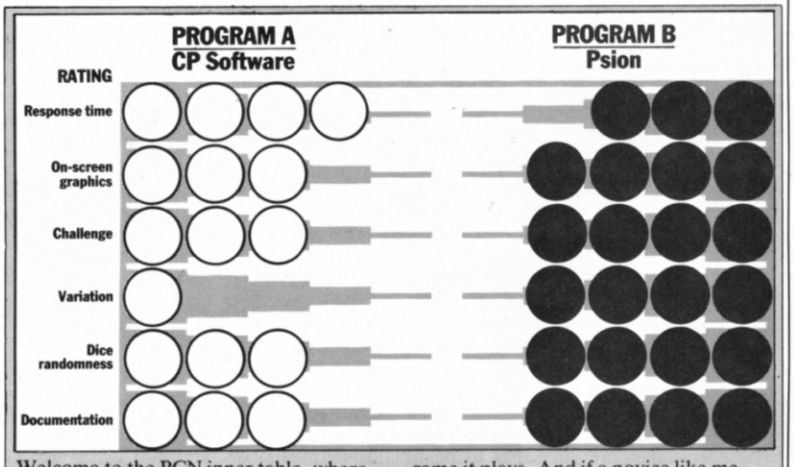
Psion's game also gives new meaning to the phrase 'user-friendly'. It offers you hints on what moves to make if you get stuck, although I have a suspicion the machine is cheating.

If you want a game that puts up a good fight, and caters more for the backgammon novice than the aspiring champion, CP's version might be the one.

But if you want a backgammon program that takes you from an easy level to a very difficult one, all the while offering hints and invitations to gamble, you should opt for the Psion game.

This does seem to come closer to the spirit of most backgammon games I've seen played.

Both games cost £5.95, so your choice depends on your playing philosophy.



Welcome to the PCN inner table, where we test two competing Backgammon games for the Spectrum.

The Psion game's response time seems quicker than it actually is, because the stones move across the screen — but it was still a full second faster than the CP's teleport-style moves.

Moving stones and tumbling dice also give Psion a higher rating for graphics — it doesn't alter the game, but I was getting more for my money.

Psion's Challenge rating is also higher, because of the conservative game it plays. And if a novice like me can take stones from the CP game without too much trouble, then a more advanced player should be able to beat it. CP also scored low because it has only one level of play, while Psion has four. The fifth test was purely subjective, but I felt that the CP dice were less random than Psion's — somehow, CP always seemed to get the moves it needed to steal my stones — who me, paranoid?

I've covered documentation in the text, but it's worth saying that CP could have given more information about what's special about their program. **GW**

What kind of micro toys are kids laying their hands on these days? Deenagh Brook reports

Catching the Toy Town bus

End users are getting younger and younger. Not only do we have children of eight and upwards who are mastering the mysteries of Basic at school on their BBCs and Apples, but even the toddlers are beginning to wriggle in on the act.

There are two ways to help foster young enthusiasm. The first involves embracing a new philosophy in teaching children about computers, while the second makes use of popular micros to introduce the tots to computing.

The premise behind the first is that children between the ages of three and eight are too young to appreciate or learn anything from 'adult' computers such as the Sinclair ZX81 or the Apple.

Instead, you are encouraged to buy any one of a number of new computers being designed specially for nursery school age. These machines are supposed to be to computer age kids what cloth books and flash-cards were to the generations before them.

For some time computerised games such as the Little Professor and Big Track have been available. These have been a great success and smaller children are rapidly taking for granted these sophisticated games.

And indeed, these toys have helped considerably in teaching young children the mechanics of data entry and communication with an electronic toy. For example, with Big Track you make a tank-like vehicle move exactly where you want by giving it logical, step-by-step instructions, pressing the appropriate direction indicators followed by a number which represents the distance to be travelled.

Talking computer

The latest amusement for the three-to-nine age group is a talking computer produced by a company called Electroplay. The machine looks like a quality toy, durable and tough, about 12in square, with a carrying handle to make it portable for a small child.

But although it looks like and has the appeal of a toy, it is in fact a sophisticated computer and is designed specially for small children.

The heart of the design is a touch-sensitive pad which takes a large selection of overlays. These vary from the simple display of numbers and fishes, to one with a jumble of words. All are very brightly coloured and clearly marked. Each has an ON and GO button and some have an extra game facility.

After pressing ON the child is welcomed by a female voice, and vocal instructions and encouragements follow.

At first the voice seems difficult to hear, but after a while the 'voice on a chip' really does become soothing and much clearer as the ear adjusts to the pitch.

In ON mode, when the child touches one of the objects (numbers or words) the computer responds with the spoken name of the object. In GO mode, the voice asks you to touch a particular image or word.

If the answer is correct the machine responds with 'Yes, that's right,' with an encouraging lift to the voice at the end. If, on the other hand, the answer is wrong, the voice is not discouraging. It merely points out the mistake and patiently asks the child to try again.

In the game mode, the child has to perform a task, often at speed, but the computer adapts itself to the speed of response and announces the marks at the end.

Progress

In the maths programs, the system monitors progress during five turns, and if four out of five sums are correct the complexity is increased. However, if the child makes several mistakes, the prob-

Stuart Briers

lems become easier so the child's interest is retained.

As you would expect, the Talking Computer also has a talking clock.

It works on the same principle as the other programs. The child can place the hours and minute hands and learn from the voice what time it is, and then have a little rest with encourgaging remarks thrown in.

The Talking Computer comes with 21 different programs. It is expandable too, with a slot for a program cartridge incorporated into the machine.

Electroplay is working on language cartridges and more programs on sentence construction.

All in all, this computer for small children is impressive and well thought out and certainly encourages children (and some adults too) to be less fearful of computers.

Another vocal computerised toy, also produced by Electroplay is called Pass Me. It looks rather like a space ship with six coloured arms, each with a number at the end. You would be forgiven for thinking it is just another version of that old favourite, Simon. But it isn't.

Pass Me is described as a sociable game. There are seven games in it, with six levels of skill in each. These test memory and reaction.

It can even trick you by calling out numbers different from those printed on the arms, and you are supposed to grab the correct arm.

This time the voice is male and quite commanding, which all adds to the confusion. Pass Me tests different aspects of memory and learning from those games which rely on visual aids alone.

Useful work

But there is a body of opinion which believes that giving children computer toys trivialises the subject and postpones the time when they learn to do useful work on a real micro.

The second way to help children into the computing field means starting them with something as simple as learning the alphabet on a computer's qwerty keyboard.

Once they know the letters, and how to spell their names, the youngsters can get started on simple programming.

For example:

```
10 PRINT "MY NAME IS CHRIS"
20 GOTO10
```

would print the name down the screen and teach the child, in two very simple lines, quite a lot about programming.

There is much in computer languages that is so logical and straightforward that it might be a shame not to introduce the child to it at an early age.

By using a real computer you could teach the child a lot about computing without limiting yourself to the program cartridges produced by the toy manufacturers.

Maths on a micro

For example, teaching maths on a micro involves the child in both arithmetic and programming. The sum 2*3/6 would not produce the expected result unless the child remembered to use the proper PRINT 2*3/6.

The flexibility of the computer also offers facilities to keep the child's interest with sound, graphics, attractive screen layouts, and to personalise programs with the use of names and familiar places.

If you are a particularly enterprising programmer, you could design simulations which take your child through traumatic experiences such as crossing a road or taking the bus alone for the first time. Obviously the graphic-type simulations are easiest for the child to understand, but they are also the most difficult to write.

An easier route to take, although one not open to you unless your child has learned to read yet, is a question-and-answer-type program. If done creatively, this kind of program could take the form of an adventure game.

You could ask something like 'You are at the corner of a street, there is a zebra crossing in front of you. The light is green but the Walk signal has not yet been given. What do you do?' At this point you will have your program set to look for a certain character string: preferably one that ensures the child doesn't cross until the Walk signal is given.

You might combine this quiz-type simulation with a game. If you have designed a simple game your child enjoys playing, you could have a simple subroutine that allowed the child to play that game every time he or she got a good score on your educational quiz.

Lid off

Another aspect of micro education is the actual physical design of the machine. Provided your child doesn't get too 'handsy', don't be afraid to take the top off your machine and explain to the child how everything inside the machine works. If you don't know yourself, this might be a good opportunity to find out (although you should never take the top off if its likely to void your machine's warranty).

When you feel the child knows enough about the machine — and very often it doesn't take long before they know more about them than you — give them the machine's user manual, their own disk or cassette and tell them to go to it. You'll soon find they'll be coming back with questions about problems you never knew you could have with your machine.

Whichever route you choose — real micro or computer toy — will depend on your bank balance, your programming skills, and the individual child.

But if you choose micros remember the risk. It is embarrassing to have six-year-olds correcting your programs.

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The only full feature machine-code version of the arcade game available for the B.B.C. micro. Features include: scrolling screen, radar display, checkpoint flags, fuel gauge, smoke screens, 6 skill levels, rankings, increasing difficulty and sound effects.

GALAXIANS (32K) £6.50 Cassette/£9.90 Disc
Fast action version of the popular arcade game. 4 types of Galaxian (in 3 initial screen formations) swoop down individually or in groups of two or three. 6 skill levels, hi-score, rankings, bonus laser bases, increasing difficulty, superb graphics and sound.

CENTIPEDE (32K) £6.50 Cassette/£9.90 Disc
Incredible arcade type game featuring mushrooms, flies, snails, spiders, and the centipedes of course. Excellent graphics and sound. 6 skill levels, hi-score, rankings, bonuses, and increasing difficulty as the spiders become more active and the mushrooms increase.

FRUIT MACHINE (32K) £6.50 Cassette/£9.90 Disc
Probably the best fruit machine implementation on the markets. This program has it all . . . HOLD, NUDGE, GAMBLE, moving reels, realistic fruits and sound effects, multiple winning lines. This is THE fruit machine program to buy.

ALIEN DROPOUT (32K) £6.50 Cassette/£9.90 Disc
Based upon the arcade game of ZYGON, but our version improves upon the original arcade game itself. You have to shoot the aliens out of their "boxes" before the "boxes" fill up. Once full, the aliens fly down relentlessly, exploding as they hit the ground. Suitable for use with keyboard or joystick.

INVADERS (32K) £6.50 Cassette/£9.90 Disc
Superior version of the old classic arcade game including a few extras. 48 marching invaders drop bombs that erode your defences, and 2 types of spaceship fly over releasing large bombs that penetrate through your defences. Hi-score, increasing difficulty, superb sound effects and graphics.

SPACE FIGHTER (32K) £6.50 Cassette/£9.90 Disc
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Pete Galliard tallies the Spectrum-based Spreadsheet package against VisiCalc and Supercalc

Crash course in spreadsheets

Microl's spreadsheet package for the Sinclair Spectrum is cheap, especially compared to VisiCalc and Supercalc — its big brothers on the bigger micros. And since the Spectrum is so portable, it's practical to carry it around in your briefcase to the office, home or a hotel, and just plug into a TV set.

Features

The Microl Spreadsheet lets you SAVE models you have created along with the program itself. There is a CALCULATE command, which allows recalculation of the whole model. The REPLICATE command allows calculation rules to be reproduced over different parts of the spreadsheet There's also the option to modify those calculation rules, if you need to do so.

You can make changes to format, such as the number of decimal places, and it is possible to alter the widths of columns. Although you can display only four columns at one time, there is a jump facility to let you move the window to any part of the spreadsheet you wish. You can enter text and numbers into the cells, and all the standard arithmetic rules can be used.

There are also quite a few features not there. You *cannot:-*

- split the screen to give two independent windows on the spreadsheet;
- overlay data from one spreadsheet to another;
- move, insert or delete specific columns or rows;
- search for a particular number;
- protect particular cells from accidental changes or sabotage.

Presentation

The package comes on cassette, along with a simple 15-page manual. Microl says the manual is being updated to include extra information on how to design effective models.

Getting started

It takes about three minutes to LOAD the package from cassette. SAVEing and re-LOADing each model takes about the same time.

If you're new to spreadsheets, expect to spend an hour or two learning how to use them. The knack is fairly easy to pick up, especially if you are used to playing with numbers. The layout itself is identical to that used in larger spreadsheets.

The commands are easy to use — they are simple, reasonably memorable, and consist of single-letter or single key commands. Most are the initial letter of the action you wish to perform, and all are set out in a single long list in the manual.

One of the most annoying problems with this package is the extremely slow response when moving beyond the limit of the window. Program crashes are also frequent and easy to cause.

There are no DELETE, INSERT and MOVE commands, and this reduces the package's scope. Aligning numbers with decimal positions is also a problem.

I used the package to build a budget model for testing, and I found that when I entered a whole number of pounds, with zero pence, the layout ended up looking confusing. The program right-justified it so that the pounds ended up in the pence column. You would have to define a different local format to cope with those cells affected.

If you want good-looking reports on your screen, you will need to spend a good deal of time formatting it. But if you can tolerate truncated titles and headings, and just focus on the numbers, the model can be built up quickly.

When the window passes beyond the nearby range of five columns or 20 rows, there is a delay of about ten seconds. I carried out a benchmark test by building a model of 26 columns and 31 rows and filling the whole matrix to capacity with numbers seven digits long. When the matrix was recalculated I found it took six minutes to complete. I tried recalculations with decimal numbers and text information, and got similar results.

The size of the model you can create is limited. The package comes set up with a default model size of 26 columns and 31 rows. The maximum number of columns remains 26, but you can extend the number of rows to 99, if memory space allows.

This package's reaction to virtually every misdemeanour is to crash. It crashes if you use invalid expressions or command keys, long calculation rules, and if you reach the limit of memory size. Recovery is pretty straightforward and the data is not lost as all that happens is it dives into Spectrum Basic. But program crashes resulting from typing errors are irritating.

Verdict

Overall, I found this product fair value for money. I had to fault it on reliability, and the performance really was too slow on larger models and when the window was moved, not surprisingly since the package is written in Basic. If you have a Spectrum and are prepared to live with those weaknesses, you will probably find plenty of uses for Spreadsheet.

RATING

Features — ■■■
Documentation — ■■■
Performance — ■■
Usability — ■■■
Reliability — ■■
Overall value — ■■■

Name The Spreadsheet **Application** Spreadsheet **System** ZX Spectrum, 48K **Price** £9.95 **Publisher** Microl, 0223-312453 **Format** Cassette **Language** Basic **Outlets** Mail order, Boots, major department stores

Kieren Phelps

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Sinclair Spectrum 16k or 48k	●	●	●					●	●
Dragon 32k or 64k	●				●			●	
VIC20 (16k+)	●	●	●	●				●	●
Sinclair ZX81 (16k+)	●								
Grundy Newbrain	●								
Texas TI99/4A	●								
Osborne 1	●								
Sharp MZ80A	●	●	●	●				●	●
Sharp MZ80K	●	●	●	●				●	●
Sharp MZ80B	●	●	●	●				●	●
BBC micro model A or B 32K	●	●	●	●	●	●	●	●	●

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PCN

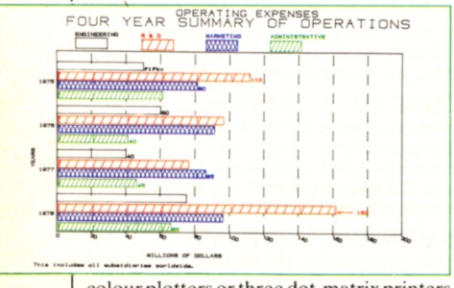
Axes, textures and colours are plotting to boost the IBM's graphics. Mike Whitney investigates

Easy as pie? Not quite

The IBM PC's graphics capabilities are superb — once you've slotted in the necessary hardware extras. A small selection of software packages have become available for this micro in response to the growing awareness of the potential of graphics in the office and lab. Numeric values can be worked up into the much more accessible form of line-graphs, bar-charts and pie-charts, displayed in colour.

The Chartman system is one of these packages. It comes in three models, I, II and III. I reviewed Chartman II, which seems the most flexible in terms of the peripherals it supports. It is fairly complex, and from its documentation appears to be aimed chiefly at the graphics department of largish firms.

You can attach one of three different



colour plotters or three dot-matrix printers with graphics option. The plotters will give the best quality hard-copy output.

Features

For line-graphs and bar-charts you can specify headings, axis ranges and line-type or bar-colour and texture, and whether grids are required. You can also specify axis labels, and supply up to three lines of footnotes.

Up to six separate lines can be presented on a line graph, each in its own colour. Lines can be continuous or in various kinds of pecked format. Two y-axes can be specified, with different ranges — one on each side — and you can choose linear or log scale for any or all of the axes.

Up to 60 points can be specified for each line — enough for business applications.

The log-scale option for the axes is not available for bar-charts and you can only have a single y-axis. You can display the bars in simple format; stacked format for two or more sets, where you want to place the bars for separate sets above one another; and bunched for two or more sets, to display the items for each x-axis point side-by-side.

You can choose from a range of three colours and six textures for each set of points. Up to six sets of data can be displayed simultaneously, but this limits the number of points that can be displayed in the chart. The charts can be displayed in one of six formats, including horizontal, vertical and 'three-dimensional'.

Pie charts can be labelled with percentage or absolute values. You can also highlight one or more slices, specify the colour and texture of each slice, and have the pie shown in 3D.

Presentation

Chartman comes with a loose-leaf manual, in a box matching standard IBM format. Three diskettes containing the programs for producing line graphs, bar-charts and pie-charts are included. The manual has about 140 pages of text, and contains numerous photographs of screens and charts. But it is long-winded in parts, and the information is given in a peculiar order.

Getting started

I met some problems at first. The system stopped dead on two occasions, refusing to respond to any keypress. The message 'SYSTEM ERROR ENCOUNTERED — PRESS ANY KEY TO CONTINUE' came up once, the system again refusing to respond to any keypress.

On some of these occasions the data entered into the system was lost. I couldn't reproduce the errors, so could not pinpoint the circumstances.

I also had problems entering data, but Bonsai — which had supplied the review copy — solved this problem. Two of the three system disks supplied were configured for a colour monitor, and I was using monochrome.

Chartman is controlled by using the IBM's ten function keys to select menu options. I would prefer to be able to flick down the menu with the space-bar and then press 'Enter'. Things are made worse by the slowness of the system's responses — the message '**PLEASE WAIT**' is frequently on the screen for long periods.

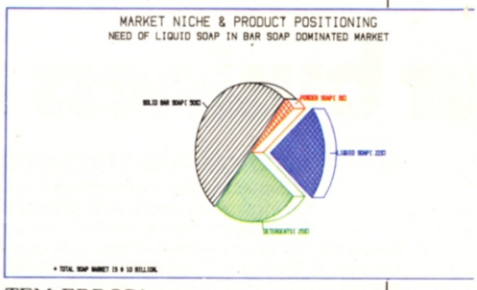
The programs are written in IBM's Basic, which is notoriously slow, but Bonsai says they will be issued later in compiled form.

The chart options provided everything that could reasonably be wanted. The screen display of the finished chart was excellent, with one reservation. The resolution of the graphics screen on the IBM is lower than that of the test screen, so the text in the charts is poorly-formed.

This is acceptable for letters, but the numeric characters were difficult to read. Fortunately, the plotter printouts, far from suffering this disadvantage, are superb. The charts can be plotted onto transparent paper for projection, or on plain paper.

The normal output will be scaled to the maximum size of the plotter paper, but you can reduce the scale of the chart by using the plotter hardware options. Thus you can plot several charts on the same sheet.

There are unnecessary problems in file-handling — for example, if Chartman cannot find its system diskette, the 'SYS-



TEM ERROR' message comes up, and you have lost your data. It is impossible to use the same data for a different type of chart — you re-enter each separately.

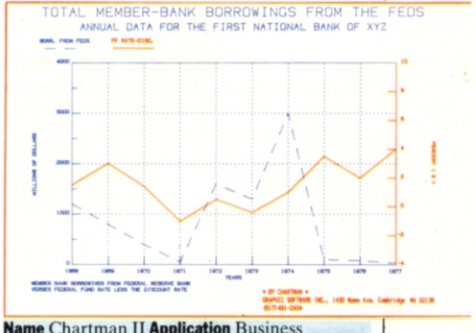
Chartman can read 'data interchange format' (DIF) files, such as those produced by VisiCalc and Microplan (but not Supercalc). It also has a nice feature in that a 'slide presentation' can be made on the screen, by saving the required selection of charts on the diskette, and building a slide presentation text chart; timing of slide changes can be preset or keypress-driven.

Overview

This package is not too easy to use on an occasional basis, is expensive, and you must buy costly hardware extras to use it fully. It would certainly be worth looking at competing products before deciding.

RATING

Features—
Presentation—
Performance—
User interface—
Reliability—
Overall value—



Name Chartman II **Application** Business graphics **System** IBM personal computer, 128K, single disk drive, colour graphics adaptor, graphics monitor **Price** £395 **Publisher** Graphic Software **Format** Disk **Language** Basic **Other versions** Chartman I, monochrome only, £295 **Outlets** Bonsai, 01-580 0902, mail order or off-the-shelf.

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David Janda runs Wordplay, a BBC WP package which finds space for pretty pictures.

Turtle in the text area

Low-cost text processing on the BBC micro is the aim of a new package from Hexadecimal Press. Wordplay is a text formatting program designed to make the preparation of documents easier. The text to be formatted is interspersed with special commands that Wordplay understands, and when the program is run a neatly laid out, paged and justified document is produced on a printer.

The program works on Models A *and* B, but remember that the larger the document to be formatted, the larger the memory requirement will be. I used Model B with an Epson MX80/FT printer.

Features

The text to be formatted is entered at memory location 3000 hex. Using the Beeb's existing editing functions, each line of text is preceded by a line number just as in Basic programs. Then the Wordplay commands follow the line number. So to print 'Hello Mum' in the centre of the page, type:–

10\ceHello Mum

Wordplay will detect the backslash '\', which tells the program that one of its two-letter commands is to follow. The command 'ce', means centre the rest of the text in line 10.

The program recognises 30 commands. These functions range from setting tabs to defining page-lengths. Three of them are \ch, \es and \go. The first two allow the user to send non-printable ASCII characters — such as formfeed — to the printer. With\ es, an escape character is sent before an ASCII character. These two commands let the operator use printers other than the Epson MX80/FT for which Wordplay is designed.

I have not seen the command \go x in any other text editor or word processor. It allows execution of a sub-program at line x. With es, an escape character is sent before an ASCII character. These two commands let the operator use printers other than the Epson MX80/FT for which Wordplay is designed.

I have not seen the command go x in any other text editor or word processor. It allows execution of a sub-program at line x. With this facility you can print some text, go to a sub-program which computes, say, the 12 times table, print the results and then continue with the text.

Some extra features would have been useful. In its present form, Wordplay cannot, for example, underline or produce double line/word spacing.

Presentation

Unfortunately not all is roses with Wordplay. Seven sheets of documentation come with the cassettes and these are repeated on the Wordplay cassette as two 'programs' named 'INSTRUCT' and 'NOTES'. These allow the user to LOAD and LIST them to see what Wordplay commands were needed to make them up.

```
120\bt \sk1
130\ce Getting Started with WORDPLAY
140\ce ------- ------- ---- --------
150 \sk1 \bo \sk1
160\ec
170\sk2
180(1) To load the program
190\ta LOAD "WORDPLAY"
200\sk2
210(2) To load a text file called TEXT
220\ta *LOAD "TEXT" 3000
230\sk2
240(3) To set up the function keys
250\ta First load WORDPLAY (1)
260REM\ta RUN
270\ta Line length?0                    (co
280\ta Keys initialized.
290\sk2


(1) To load the program
        LOAD "WORDPLAY"


(2) To load a text file called TEXT
        *LOAD "TEXT" 3000


(3) To set up the function keys
        First load WORDPLAY (1)
        RUN
        Line length?0
        Keys initialized.
```

Wordplay is this simple — if only you can get it going. Here's an example to help you.

But the instructions are unclear. Although all the information to get Wordplay up and running is there, it took several readings to understand how to get things going. The information on how to get to the text editing area and back to the program area to run Wordplay is particularly obscure. A page giving an example of a sample run would have been in order here.

An index of all commands is included in the instructions, together with a graphics dump using the Turtle Graphics procedure. Another sheet details how Wordplay sets up four function keys of the BBC micro to make text editing easier, and also provides information on parameters.

In use

After reading the documentation several times I loaded the package. Nothing whatsoever happened. Wordplay needs text to act on. I was confused about how to enter new text, as the instructions deal with editing the existing text.

Referring back to the notes I learned that RUNning Wordplay and answering 0 to the question 'Line length?' defines four function keys. These allow the user to skip from the program area for printing to the text area for editing.

User interface

There are few user friendly messages with Wordplay. When it's run, all that appears is the logo and the prompt 'Line length?' Depending on whether you wish to print text already in the text area or create text, you have a choice. A reply of 0 activates the function keys to create text. Once this has been done, pressing function key 3 takes you to the text area.

What happened next took me by surprise. The message 'PAGE=3000: END' came up, followed on the next line by 'INVALID PROGRAM?' In fact, the contents of the function key were being printed on the screen, and the message appeared because the machine couldn't find a program in the text area.

It would have been a simple matter for the author of Wordplay to have incorporated some helpful messages, such as 'You are in the 'text area', rather than have the other gibberish displayed. In the text area the user is not in the Wordplay environment, and Beeb editing facilities apply.

After typing in the text to be formatted, you have to press function key 1, and RUN has to be typed to get Wordplay going. I found this cumbersome and would have liked to see a few messages telling me what was happening.

After the text has been entered and Wordplay RUN, the line-length of the printer and number of copies required are asked for. Once these are entered a request to turn on the printer is displayed and Wordplay prints out the formatted text.

Reliability

The package is extremely stable in use. Whenever it comes across invalid commands as it prints the text, the message 'INVALID COMMAND' appears on the screen — but not on the printer. When replying to requests for line-length and number of copies required, a single copy of the document in the text area is printed out.

Verdict

Wordplay works well, the formatted printout looks good, and learning the commands to format the text is easy enough. Because it uses the Beeb's editing functions you don't have to learn a second set of commands to enter and alter the text.

The lack of messages and poor documentation is off-putting, but as these are easily rectified I hope future versions will be better. For £5.75 it is excellent value for money, and together with the Turtle graphics routines this package rivals others at four times the price.

RATING

Features —
Documentation —
Performance —
Usability —
Reliability —
Overall value —

Name Wordplay **Application** Text Formatter **System** BBC Model A or B **Price** £5.75 **Publisher** Hexadecimal Press, 01-368 7561 **Format** Cassette **Language** Basic **Other versions** Acorn Atom £5.50 to be used with Micro-Power 'Toolbox' **Outlets** Mail order.

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Richard King tests a Japanese newcomer and finds it fast, full-featured and built to last

Toshiba T100: heavy metal micro

Toshiba's T100 micro is built like a tank. It's movable, not portable, and is obviously well able to survive quite severe bashings. The casing of the disk unit is painted metal, though, so it's liable to scratch.

Presentation

The system tested consisted of the central processor, a disk-drive unit, an American-voltage colour monitor and a dot-matrix printer.

Each was packed in a separate box to the normal Japanese standard, and would be satisfactory for shipping. All cables and plugs were included.

Documentation

The documentation consisted of three sets of ring-bound photocopies. The owner's manual presented the most precise step-by-step instructions for assembling the system's components, and an equally precise treatment of trouble-shooting.

Evidently Toshiba intends this system to be sufficiently simple for even the most non-technical of people to assemble, and I feel they've succeeded.

It even has a one-page description of each process which the more experienced person would find valuable, though these would have been better grouped together rather than printed separately at the end of each section.

The Basic manual was split into two parts — a description of the Basic and a reference manual for Basic functions.

Both were arranged as alphabetical listings, with syntax diagrams and so on as well as an example of their use.

I can't help feeling there is a gap between the owner's manual and the Basic manuals. The former is aimed at the novice, while the latter would be useful only to a fairly fluent person.

Construction

The construction of the main processor unit is remarkable for its robustness. There must be several square feet of sheet metal inside it, and the circuit-board is surrounded by sheet steel.

The VDU tilts and swivels to prevent cricks in the user's neck.

The housing consists of a steel tray which carries the PCB, perforated on the sides for ventilation. The upper half of the casing is plastic, much as usual, except for a small blackish window at the top, which swings backwards to reveal a deep well.

At the bottom of this are two multi-pin sockets, one rather longer than the other. The documentation reveals that these are for the RAM-pack and the ROM-pack, of which more later.

Getting started was simple.

The cables were easy to connect. This disk and printer-cables had bolts at either end which screwed into the associated threaded holes to prevent their weight putting a strain on plugs and sockets.

On throwing the switches, the machine went through a five-second self-test, then booted the disk.

A point that was not obvious until I studied the documentation was the fact that the power switches must be thrown in a particular order, at least as far as the disk-drive and CPU go.

The others don't matter, but if the disk-drive is not powered when the CPU has finished its self-check, then it assumes you have no disks, uses the built-in version of the Basic and reverts to a tape-based machine.

Keyboard

The keyboard is well-made. It feels solid under the hands, which is not surprising as this also has a steel chassis. There is a normal alpha keyboard which appears to be a sensible compromise between the needs of the real world and the rarified musings of ISO.

On the right is a number-pad, with the cursor-keys clustered in the top right corner and various special keys above. At the left hand end are the green GRAPH and ESCAPE keys, with the eight double-sized function keys in the centre. On the right-hand side is an unlabelled key which appears to be GRAPH-LOCK,

COPY, LABEL, and BREAK.

Screen

Despite being a 60Hz monitor, which would have a natural tendency to wobble in a 50Hz country, the display was good and quite sharp for a colour-tube. The maximum resolution obtainable is 640 × 200 which is sufficient to display 80 characters.

Lower resolutions of 288 × 192, 160 × 100 and 72 × 96 are available. The number of characters on the screen can be altered by the WIDTH command. It defaults to 36 when T-BASIC is first called, but may be set to 80.

Graphics characters may be generated either from the keyboard or by the CHR$(n) function. These include solid, dashed and double-line characters for drawing out forms, a complete alphabet of lower-case Greek letters, a selection of upper-case Greek letters as used in mathematics, the four card-suits, and block-graphic characters.

Colours — the usual primaries, secondaries, black and white — were very good, as they should be. Text was readable even at 80 characters a line in any colour.

Storage

Data and program storage is on tape if you have the basic machine, or on the disk unit. This is a large metal box which has its own power-supply and connects with the CPU through a half-inch cable.

The disk drives are standard height, and the kind which rotate constantly. This has always seemed a bad idea to me. Granted, the head is not loaded unless the disk is to be read or written, but even so the disk must be subjected to more wear than is necessary. Certainly it doesn't make them faster, which can be the only possible justification.

Expansion

At the back of the CPU are a number of different connectors. The most impressive is a huge three-row D-connector which carries the disk signals and also serves as the system bus. The printer socket is almost as large, which seems a bit excessive for an ordinary parallel.

The other sockets are mostly DIN-types, connecting to things such as the monitor, RS232, tape and LCD display. This was not available for test, but I understand it's a 40 × 8 line 7 × 9 display, which clips into two small sockets on the back of the plastic housing.

The power socket is a three-pin, as usual. The only other features are the tiny reset button and a very small unlabelled hole with two Molex pins just visible.

Plugging the RAM-pack into the well in the casing gives you a kind of RAM-disk . . . a piece of memory which can be read and written as a disk. It looks like a disk to the program, it even has a small NiCad . . . which makes it almost better than a disk.

Top right is a hinged panel which opens to reveal sockets for the ROM and RAM packs. The cursor movement keys and some editing functions are neatly collected below it.

Chris Stevens

The ROM-pack is used for major programs, and Toshiba has plans for dedicated programs. I was told that OA-Basic will be the first program to be sold this way, but unfortunately none were available for this test. There will be a word processor to follow and games cartridges are planned.

Software

The T100 is effectively two machines in one, since it will run CP/M as well as its own Basic-cum-operating system. The former is so well known that I'll just say it seems to be fairly well implemented, with no obvious snags.

T-Basic, the alternative mode of operation, is Microsoft's Basic 5.2, or so close as makes no difference. Basic 5.2 is sometimes known as Gee-Whizz Basic, since it contains so many commands.

The odd fact is that Basic 5.2 is reputed to run only on a pseudo-16 such as the IBM, on which it takes up an enormous amount of memory — about 50K. So certain was a colleague that he insisted on having a look inside to check there wasn't an 8086 there.

The only processors in the T100 are 'outdated' Z80As, honest. Two of them, to be sure, but only one runs the Basic, the other being concerned with input/output.

I wonder why T-Basic occupies only 32K and will do 10,000 14-digit additions in 40 seconds, when the PC and the rest of that motley crew take 43 seconds?

I'm not especially keen on it: it has rather the same feel as PL/1 — too big to be useful. Also, I can't bear Basics which insist on spaces. I know it's to allow for long variable names, but I don't see why these can't be in lower-case, thus avoiding the clash.

T-Basic will not recognise NEXTN, for example. This will cause an FN error. No, not a function error, that's FC. This one means FOR without NEXT. It has a little friend, too: NF. That means NEXT without FOR.

Such clear, useful messages make T-Basic a real swine to work with, quite apart from the fact that it remapped the keyboard so that certain punctuation characters did not correspond with the keys. Toshiba said this was because I had a Japanese machine which normally displayed Kanji characters.

Included in the Basic are two subsidiary languages, GML and MML. Graphics Macro Language and Music Macro Language can be manipulated to produce fascinating effects, since their commands are stored as ordinary Basic strings.

It's possible to perform complex musical operations, such as inversion and transposition, by applying the ordinary string-functions to MML command-strings. The equivalent operations may be performed with GML.

In fact, Basic provides a control-environment for both MML and GML, permitting loops and conditional testing.

Support

Maintenance and support will be through the dealer or from the Toshiba main repair centre. The warranty period is 90 days.

46 ▶

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Overview

The Toshiba T100 is a solid machine, which appears to have been well thought out in most respects. The few peculiarities of T-Basic must be cleared up before that language will be usable, but there seem to be no such problems in OA-Basic or CP/M.

In these latter environments the machine is rather ordinary, but that's no bad thing. At least it's predictable and probably reliable. There is an enormous amount of rather cumbersone software available under CP/M, which will make it useful for business applications.

The built-in graphics and music features and the comprehensive Basic give it a much wider audience.

Overall, it's a good buy . . . it has a solid base behind it and will certanly last.

My main feeling after this test was that the machine did not seem to have any real 'personality'. Perhaps it's self-indulgent to talk of such attributes in boxes full of highly refined sand, but Sinclair and Apple owners wouldn't think so . . . nor would many others.

This is not a business machine alone, nor yet a home machine. In fact it's a direct competitor for the Apple II market, but unless the makers encourage similar attitudes, it won't be such a big seller.

The Toshiba T100 system dot matrix printer and (left) the disk drive unit — large, solid and reliable.

Price:	£2,575 with colour monitor, disk-drive, console
Processor type/speed:	Z-80A at 3.99MHz
Standard RAM/max RAM	64K, 32k or 16k RAM-pack optional
Text screen:	80 × 24 or 36 × 24
Graphics screen:	640 × 200, 288 × 192, 160 × 100, 72 × 96, 8 colours
Keyboard:	89 full-travel keys (8 programmable function keys)
Storage:	Two double-sided, double-density drives, 285K per disk
Interfaces:	1600BPS cassette with remote control, RS232, Centronics parallel, system bus
OS/language(s):	T-Basic, CP/M
Other languages:	as on CP/M
Distributor:	Toshiba
Software supplied:	CP/M 2.2, OA-Basic, T-Disk Basic

Toshiba's moving picture show

Graphics Macro Language has several commands which are used much like any other Basic keyword.

Group 1

DRAW	U	Up
	D	Down
	L	Left
	R	Right
	E	UP and Right
	F	Up and Left
	G	Down and left
	H	Down and right
Prefix	B	Move without plotting
	N	Return to original point after plotting

Prefix is optional, and will default to plotting and leaving the cursor at the last plotted point.

Distance	Number of dots to plot. Default is 1
M (±) X, (±) Y	Draw a line from current position to either absolute position X, Y or relative if sign is included.

Group 2

A	0, 1, 2, 3	rotate coordinates 0-3 times 90 degrees
C	0 .. 7	set line colour to a value between 0 and 7
S	1 .. 255	set step factor for drawing
X	string	execute a string as GML commands.

There are a number of associated commands:—

SCREEN 0	Text mode (either 36 or 80 depending on WIDTH)
1	Low resolution mode (160 × 100, 8 colours)
2	High resolution mode (640 × 200, 2 of 8 colours)
LINE (X,Y)-(X,Y1)	Draw a line from point to point
PSET (X,Y)	Plot a dot
COLOR I,P	Set foreground colour to I, Background to P (Background colour is optional)

CIRCLE X, Y, radius, (colour), (start), (end), (aspect)
Draw a circle with its centre at X, Y, which starts at a point (optionally). Aspect will make ellipses if required. All items in brackets are optional.

PAINT X, Y (paint colour), (border colour)
Fill an area enclosed by the border colour with a paint colour. The place to start is at X, Y

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A new Casio crams 124 operating instructions into one pocket. John Wadkin fumbles with the PB100

A calculated risk by Casio

Casio's new PB100 pocket computer is 'not just a glorified calculator', according to the blurb. But in that case, what is it?

It is too small for easy use, and with tape and printer attached it is not particularly portable. So how viable is it as a bridge between calculators and computers?

Setting it up

The installation instructions are logical and clear, although the instruction manual is detracted from by a rather patronising series of substandard cartoons. Parts of the two manuals — one introductory, one instructional — are not as helpful to a first-timer as they might be, as they tend to list a program without explaining either the logic or possible adaptions. And there are no quick reference notes.

There is also no help in learning Basic via flow-diagrams or other fringe techniques; there is no reading list.

The machine itself is small and compactly designed. In fact, it is so small that it could be bigger all round while still being pocket-sized.

There are 53 keys, including a standard qwerty keyboard with shift for instruction codes, a numeric keypad and a series of command keys. This gives a total of 124 operating instructions. There is access to a second keyboard via an extension mode, but its use is not explained very clearly at the beginning of either manual.

In fact it is used only for additional symbols, and for lower case letters used as part of character strings. None of these symbols can be used for mathematics or program instructions, and I feel more thought might have been given to the allocation of some symbols between the main keyboard and this extension keyboard.

I also feel the signs and symbols given are worse than those of its downmarket calculator ancestors. The signs for COS^{-1}, SIN^{-1}, and TAN^{-1}, are given as ACS, ASN and ATN instead of the more common international codes COSEC, SEC, and COT. Probability and statistics calculations are made more difficult by the lack of both a factorial or "!" symbol and of a fraction facility. But the manual does say that this is not just a glorified calculator, and the availability of 10 program-slots does compensate for some of these criticisms.

Up and running

The various available facilities are:—

Mode ∅, the standard default mode for calculating and program-running
Mode 1 for program-writing giving access to ten program-slots
Mode 2 TRACE, cancelled by mode 3
Mode 4, 5 and 6 are trigonometric options and mutually exclusive
Mode 7 PRINT, cancelled by mode 8
Mode • gives access to the extension keyboard and is self-cancelling

Tight fit for the stubby-fingered on the PB100 keyboard.

The screen is 11 characters wide, and uses a 10 × 7 dot matrix for each character, although each program line can be as long as 64 characters. But it doesn't seem possible to use the machine for straightforward typing without regular interference from error messages.

The printer is neat, and produces a clear output 20 characters wide; but these minor advantages are outweighed by the linkage between the calculator and the printer which is rather flimsy.

Putting the cassette interface together doesn't improve your confidence about moving the whole unit. The block of equipment is now no longer pocket-sized — and you don't have a carrying case.

Fortunately, perhaps, there is no possibility of further expansion beyond the cassette interface and the official Casio-supplied printer.

This is an unusual result for a first foray into this price-range of handcomputers, particularly for a company of Casio's reputation.

Part of the difficulty lies in the lack of any reasonable definition of the machine's aims. Several pages into the introduction we are told: 'The PB100 is not just a glorified calculator — the PB100 is a splendid device for beginning the study of Basic.'

But the PB100 is not really big enough to help students, who will generally have more opportunity for involvement with computers than this machine can give them. And the people who do need machines of this type are those without such opportunities — the younger children at primary school and their parents.

These people are used to the ordinary calculator, the calculator-clock, calculator-diary and the calculator-chequebook, and are just about ready for the multi-calculator. They could also be convinced they are ready to learn programming, using Basic or perhaps Logo.

Verdict

Overall, for the person moving from a clever calculator to a baby computer, the PB100 is not really a helpful step. Too many of the clever calculator functions are lost in favour of gains which are variously good, gimmicky, minimal or poorly described and not immediately recognisable. Nevertheless, as as nearly pocket-sized machine for learning Basic habits of programming it could be useful.

SPECIFICATIONS

Price:	£59.95; Rampack £13.95; cassette £25.95; printer £54.95
Memory:	26 memories as standard, expandable
Capacity:	554 steps; maximum ten programs
Display:	12 character, single line LCD
Keyboard:	53 keys, qwerty, calculator style
Weight:	4.1oz
Dimensions:	6½ × 2¾ × ⅜in
Battery life:	360 hours approx
Language:	Basic
Distribution:	through high street stores

TELEWRITER™
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51 × 24 DISPLAY

The DRAGON 32 is an incredibly powerful and versatile computer, but for text editing it has some major drawbacks. The small 32 character by 16 line screen format shows you too little of the text and, combined with its lack of lower case letters, bears little resemblance to the way text really looks on the page. Reverse video in place of lower case just adds confusion.

Telewriter eliminates these shortcomings with **no hardware modifications required.** By using software alone, Telewriter creates a new character set that has **real lower case letters,** and puts 24 lines of 51 characters on the screen. That's more on-screen characters than Apple II, Atari or TRS-80 Model III. That's more than double the DRAGON 32's standard display.

FULL SCREEN EDITOR

The Telewriter editor is designed for maximum ease of use. The commands are single key (or single key plus control key), fast, and easy to remember. There is no need to switch between insert modes and delete modes and cursor movement modes. You simply type. What you type is inserted into the text at the cursor, on the screen. What you see on the screen is always the current state of your text. You can move quickly through the text with one key cursor movement in all 4 directions, or press the shift key simultaneously for fast, auto-repeat. You can jump to the top or bottom of the text, and beginning or end of a line, move forward or backward a page at a time, or scroll quickly up or down. When you type past the end of the line, the wordwrap feature moves you cleanly to the next.

You can copy, move or delete any size block of text, search repeatedly for any pattern of characters, then instantly delete it or replace it with another. Telewriter gives you a tab key, tells you how much space you have left in memory, and warns you when the buffer is full.

. . . truly a state of the art word processor . . . outstanding in every respect
– The RAINBOW, Jan. 1982

The only one with all these features for your DRAGON 32

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FORMAT FEATURES

When it comes time to print out the finished manuscript, Telewriter lets you specify: left, right, top, and bottom margins, line spacing and lines per page. These parameters can be set before printing or they can be dynamically modified during printing with simple format codes in text.

Telewriter will automatically number A4 pages (if you want) and centre lines. It can chain print any number of text files from cassette without user intervention. You can tell it to start a new page anywhere in the text or pause at the bottom of the page.

You can print all or any part of the text buffer, abort the printing at any point, and there is a "Typewriter" feature which allows you to type straight to your printer. Because Telewriter lets you output numeric control codes directly (either from the menu or during printing), it works with any printer (Tandy, Seikosha, MX-80, Okidata, NEC 8023, C. Itoh 8510, Centronics, GE Terminet, Smith Corona TP-1, etc.). There's even a special driver for the Epson MX-80 that lets you simply select any of its 12 fonts and do underlining with a single underline character.

CASSETTE INPUT/OUTPUT

Because the Telewriter makes using cassette almost painless, you can still have a powerful word processor without the major additional cost of a disk. The advanced cassette handler will search in the forward direction till it finds the first valid file, so there's no need to keep retyping a load command when you are lost in your tape. The Verify command checks your cassette save to make sure they're good. You can save all or any part of the text buffer to cassette and you can append pre-existing files from those you have in the buffer already.

ASCII COMPATIBLE

Telewriter turns your DRAGON 32 into the most powerful, lowest cost, word processor in the world today. But that's not all. The simple ASCII conversion program provided with Telewriter means you can use the full power of the Telewriter editor for creating and editing BASIC and assembly language programs. It means you can use Telewriter to prepare or edit text files used with any data communications program.

Telewriter costs £49.95 on cassette and is

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– Color Computer News, Jan. 1982

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ZX Spectrum Software

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CENTIPEDE AND PAINTER. By the time you read this our latest release for the Spectrum should be available . . . Centipede is a full colour machine code arcade game where the object is to defend yourself with your Laser against a fast moving centipede which weaves in and out of the mushroom patch. There are other versions of this game but we think you'll prefer ours because we always strive for an extra dimension of realism, which makes all the difference!
Painter, is another well-loved arcade game. Here you must paint in between the numbers on a multicoloured screen before you have to overlap. Price for SPECTRUM is £5.00.

SPECMAN & FROGGER

FROGGER AND SPECMAN, two excellent games for the price of one! SPECMAN is probably the best version of its type with great machine code graphics and sound effects with 3 to 5 ghosts, power pills and a real munchie man who munches away in all directions, unlike cheaper versions!
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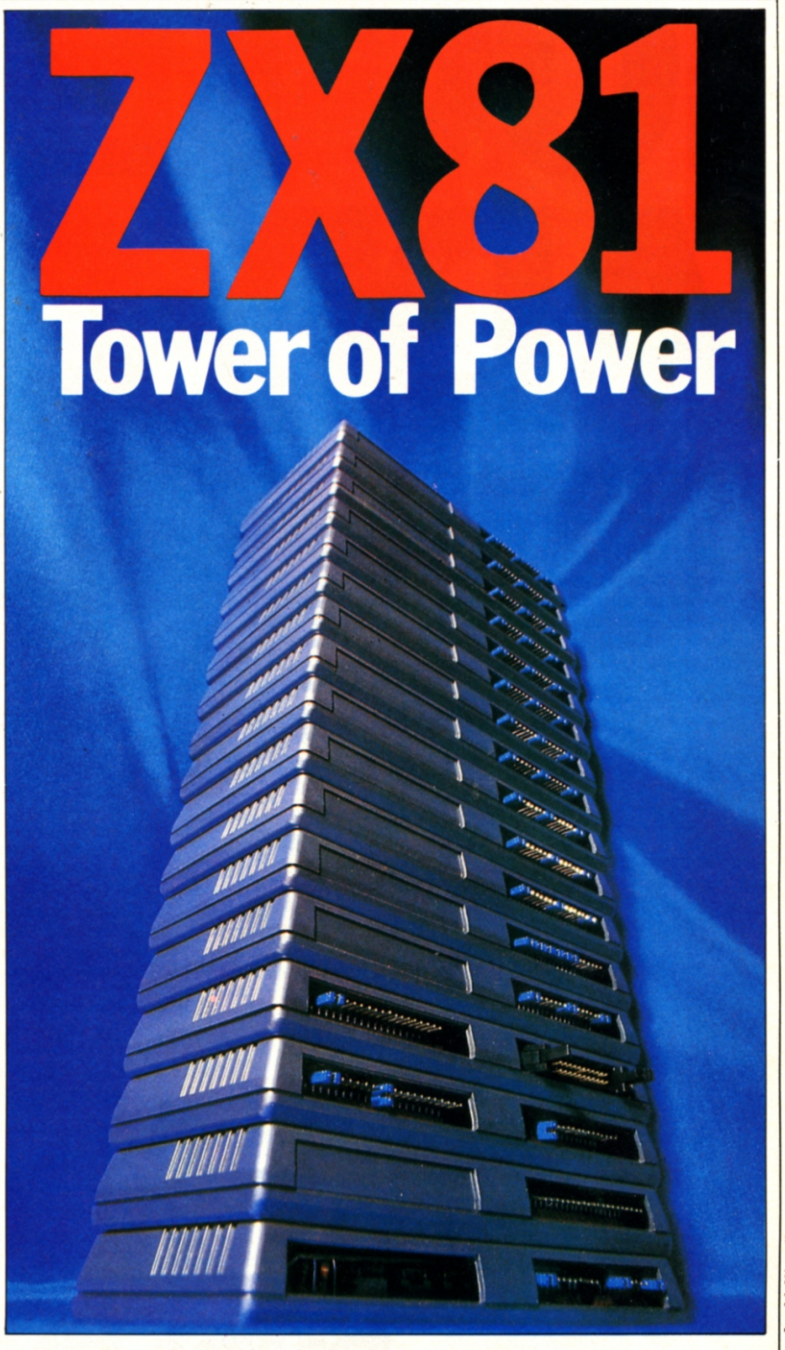
BARCLAYCARD VISA

The Organic Micro concept could give your ZX81 a gigabyte of memory. Ian Scales explains

ZX81 Tower of Power



Ian McKinnell

Is the conventional concept of 'peripheral' outdated?

Imagine a system that costs £49 to start with but grows in modules to provide megabytes of memory. It also enables you to tailor character and graphics sets, store programs in non-volatile memory, add a printer and magnetic storage and control robots or measuring equipment.

These are the claims for BASICare's Organic Micro. It consists of a marriage between a Sinclair ZX81 and BASICare's range of modular memory and interface cards.

BASICare's Organic Micro concept cuts across definable boundaries. It's technically a series of peripherals for a Sinclair ZX81, but it's also planned to offer a 16-bit processor that ousts the host micro — some peripheral.

The idea is that you build your own system from a ZX81. You start with a couple of modules to organise the memory map and buffer the Sinclair signals. Then you just keep adding more memory and interfaces as you require them.

The physical problems of delivering such a system have been overcome by going high-rise. Instead of an untidy slum of boxes and wires the modules interlock and are fastened with 64-way bus connectors on the bottom and top of each module. So long as your ceiling is high enough (*see picture*), it should be possible to keep stacking until the bank balance gives out.

The Organic Micro, says BASICare, avoids the trauma of making the big leap to a new system and writing off the old one. When the system begins to show its limitations new modules are simply bought to bring it up to scratch. Eventually older, obsolete modules can be removed as new 'whizz-bang' gadgets are bought to replace them.

Like its owner, the system can grow and change; continually replacing cells, but keeping its soul intact.

The most immediate advantage to the ZX81 owner is megamemory — up to four megabytes. This sounds rather like towing a lorry with a mini when you consider that the ZX81 comes with 1K RAM and has a conventional address space of 64K. This means the processor is capable of dealing with only 64,000 characters of memory at one time.

The BASICare system gets round this problem with a technique called paging, where the processor literally switches between 'pages' of memory.

Imagine a telephone network. Telephone numbers of four or five digits can be exchanged between people in the same area. People living in another area could have the same local numbers, so when a connection is made between areas it is necessary to dial out of the local areas using an extra code of digits. The destination of the connection is then determined by a set of local digits. 'Paging' involves much the same technique (*see diagram, page 53*).

Peter Choi, the man who developed the Organic Micro, sees a progressive increase in the viability of solid state storage to the point where it overhauls and replaces the magnetic disk.

The micro of the mid to late '80s will therefore have several megabytes of memory. This will contain all the user's data files and programs, and backup could be provided by some form of tape system. The memory need never be cleared, although Mr Choi sees users initially saving memory onto tape at the end of a session and re-booting when the micro is used again.

By this stage true 16- or even 32-bit microprocessors and their attendant software will have put paid to 8-bit chips, and the micro will be able to address megabytes of memory. Remember, too, that even an address space as large as one megabyte could be multiplied by page switching — so a user could conceivably have close to a gigabyte of data — not just a DOS away but literally at the fingertips.

Heady stuff — but what has this to do with putting pep into a Sinclair. Pray, read on.

Normally a manufacturer's visions of the

53 ▶

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- RS232 plug-in PCB.
- Facilitates Apple I and II for RS232 serial connection.
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Full details from sole suppliers: **Duplex Communications Ltd and Duplex Communications (South) Ltd**

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South—52 High Street, Stock, Essex CM4 9BW. Tel 0277 841011

*The OCTET-KSR and MSR typewriter interfaces are sold exclusively by BRITISH OLIVETTI and their distributors. Please contact your local agent for further details.

◄51

rosy future must be taken with a grain of salt. Most would rather sell computers to an existing market they half understand, and leave the future for another day.

The BASICare vision is actually being allowed for in the present range of products. The liftshaft of our fanciful high-rise comprises a full 64-way databus which could theoretically address data for a 32-bit processor.

But in the medium term BASICare has its eye on the 8088 16-bit processor and the IBM PC operating system MS-DOS as a likely upgrade path for Organic Micro users. This is rather neat, as it resembles the breeding strategy of the cuckoo.

The BASICare egg is deposited in the Sinclair nest, grows in value beyond the initial Sinclair investment then kicks the Sinclair out and takes over completely.

BASICare is promising its 8088 housed in a replacement keyboard unit for the ZX81. It is also working on configuring the Spectrum and considering other makes and models.

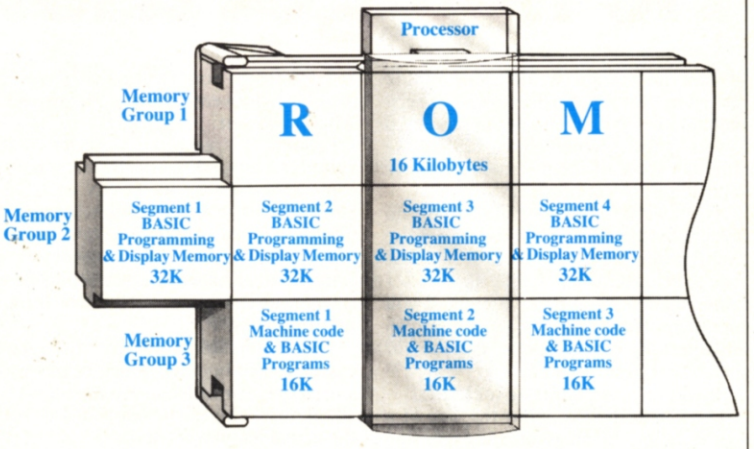
Ground floor module

Present configurations of the Organic Micro always start with the Persona. This 'ground floor' module links in the ZX81, and buffers its signals to perform a few organising tasks on the data flowing between the processor and the modules. The Persona gives you access to most of the features except memory over 64K.

To go any higher the Minimap system must be configured. This acts as the telephone exchange for the different 64K areas of memory, and switches appropriate pages in and out to the processor when they are required by the program.

RAM 08 is a low-cost memory module with 2K expandable to 8K by the inclusion of extra RAM chips. RAM 16 and RAM 64 are available for the more ambitious.

Expanding memory on a sliding scale



This slide-rule diagram illustrates the memory management of the Organic Micro using Minimap.

Since an 8-bit address space is limited to 64K the Minimap's job is to organise a larger memory so the processor (represented by the slide rule cursor) doesn't find itself faced with two blocks of data sharing some of the same addresses. This is done by dividing the entire memory of the system into three memory groups. Each horizontal group is sub-divided into segments. These each use the same set of addresses.

Memory group II has a series of 32K segments containing Basic programs. Memory Group III has 16K segments of machine code or Basic routines, while segment I must always have the Sinclair ROM with its Basic interpreter plus some extra information to organise the modules.

Using our slide-rule analogy you can see that different memory groups can be 'slid' so any segment in group II can team up with any segment in group III under the cursor (processor). Together with group I they then present a vertical 64K 'page' of memory to the processor.

Imagine the processor processing information from a 64K page and using some of the information gleaned from the program to direct the Minimap to slide a different configuration of groups II and III under the cursor. Because several programs can be in memory on different segments, it is possible to use the output of one program from one page configuration to provide input to a program on another, multiplying the memory available for one program. This is especially useful for animated graphics programs.

Toolkit module

The DROM module is a taste of things to come, and relates to BASICare's concept of permanent memory. It uses low power CMOS static memory and 2 to 8K of development programs or routines can be held in place after power-down by a long-life nickel cadmium battery which is charged during normal operation. The 2K segments can be protected against accidental overwriting by manipulating 'shunts' with cap pins protruding from each module.

EPROMs are configured into another class of module called Toolkit. The Toolkit is a conceptual receptacle for handy routines which can be called into a program. The idea is that routines are developed and tested on DROM and then committed to EPROM and left on standby for use with various programs.

Userfont comes as an optional extra for purchasers of RAM 08 and DROM. Using it you can create your own characters, particularly lower-case characters, to give the otherwise rudimentary Sinclair text a bit of class. It also allows specially defined characters to be combined to create blocks of graphics for high-resolution animation of games or diagramatic displays.

The Percon modules provide a means of getting some of the results of these features to the outside world. Pericon-a is defined as a general purpose input/output tool. It provides three eight-bit ports for connection to LEDs or relays. Pericon-b also provides three eight-bit ports which consist of 24 lines of buffered output. It can be used to drive relays directly or very long signal lines.

BASICare is also working on a fast-transfer cassette machine and an analog-to-digital, digital to analog converter.

To make use of the Organic Micro you have to have a good grasp of programming — the modules are mostly for people who know what they are doing, or at least are prepared to sit down and start learning. BASICare suggests that a beginners' system could comprise a Persona and RAM 16, costing £46.90. From there extra modules could be added as the user becomes familiar with the system.

This gradual approach would certainly be wise. Nothing is handed out on a plate. Commercial software is nil, except for those small programs currently available for the Sinclair. As these don't make use of the features you are buying it would be foolish to rely on them.

The documentation is by no means comprehensive and a few listings demonstrating the animated graphics capabilities of the system at its various stages of growth would probably be appreciated.

The fact that the information provided is rather terse shows that BASICare has yet to consider the potential of its products as an upgrade path for the massive crop of ZX 81 users. Many of them have already outgrown their computers, and are hungrily watching for products which offer a reasonable up-grade path.

But I am assured that BASICare has a mass-marketing plan in hand.

System: Organic Micro **Manufacturer:** BASICare Microsystems, 01-735 6408 **Prices** Persona £28.70, Minimap £34.45, RAM 08 (2K) £22.95, RAM 16 £25.25, RAM 64 £74.70, DROM (2K) £37.90, Toolkit £20.65, Pericon-a £26.40, Pericon-b £32.15, Pericon-c £40.20. **Options** Userfont £8, additional 2K for RAM 08 £6.32, additional 2K for DROM £7.48.

Under the tutelage of Karl 'Dr Doolittle' Dallas, the Chatterbox turns out to be no dummy

Vic has got a lot o' gottle

Experimentation is the name of the game with the Chatterbox speech module. Within minutes of power-up I was getting intelligible sounds — although some of them sounded like the ventriloquist's 'gottle o' geer'.

Its powerful features are done no favours by the Chatterbox name and the 'court jester' logo, however. It looks as though it is targeted at the nappy user rather than the computer user, and you get the impression that plugging it into an unsuspecting Vic-20 will be the cue for snatches of panto dialogue.

But let its potential speak for itself.

The Chatterbox is about the size of a cigarette case and plugs into the expansion socket of the Vic. It will also plug into the mother-board if you already have a RAMpack fitted.

There are two dongling plugs — actually, a 5-DIN plug and 5-DIN socket — for which no explanation is given in the brief but clear documentation supplied. You just connect the Vic's audio/video-out socket to the monitor A/V-in, and sounds come out of the monitor speaker.

If you're using a demodulator for normal TV display, you plug the Chatterbox into the socket, and plug the demodulator's 5-pin into the Chatterbox socket.

In use

Speech is synthesised by typing 'allophones'. These are alphabetical symbols which stand for 62 unique sounds, including five pauses from ten to 200 milliseconds long. The allophones are separated by oblique strokes, so my name becomes:—

'C/AR/U/L/P5/DD/P2/A/LL/U/S/S/'

P5 and P2 are pauses of 200 and 30 milliseconds respectively, the latter representing the small explosion that follows the initial letter 'D' in a word.

For some reason the allophone /C/ gave a happier initial sound to my first name than /K/, though both can be used. The /AR/ sound (why not /AH/, since it contains no 'r'?) seemed to need a brief 'uh' before the final 'l' — represented in orthodox phonetics by an upside-down 'a', and here by the allophone /U/.

The whole name is stored in a string, and voiced by calling SYS 41000. To voice strings longer than the capacity of a single VIC program line, you can concatenate them into sentences. But you must remember to insert pauses between the words.

Any mistake will terminate the computer's interest in saying your word at the point where the mistake occurred, as will failure to terminate each word with an oblique.

I never managed to get a satisfactory 'w' sound, but '/OO/EE/' sounded more like 'we' than the more obvious '/W/EE'.

The voice itself is completely toneless, and despite the north-eastern origins of its (presumed) inventor, has a slightly mid-Atlantic flavour.

Pressing 'F1' causes each letter to be voiced as it is typed in, as well as screen-edit commands such as RETURN or CURSOR. (For some reason this acts only in the unshifted mode, so that CsrDn is voiced, but not CsrUp.) The constant vocal commentary can become distracting if one is typing in a program, but it can be turned off by pressing 'F3'.

The documentation consists of a 20-page cassette-sized booklet, which begins with a three-page introduction to the theory of allophones. This can be skipped. Tables of the actual allophones and example words are also included. The words are printed with the allophones separated by dashes rather than obliques, and this could lead users astray.

I found a few minor errors and confusions. The suggestion that '/DD/ sounds good in initial position and /D/ sounds good in final position, as in 'daughter and 'collide' is confusing, since 'daughter' has no final /D/. It should have read 'respectively'.

The allophone table suggests that /DH/ is the 'mu' sound in 'muM' and /DHH/ the 'mer' sound in 'merM', but they're the short and long versions of a voiced 'th'. This turned out not to be a printing error. The maker differs with me on what /DH/ actually sounds like.

There are two programs, one demonstrating each allophone in turn while printing demonstration words on the screen, the other a speaking clock, which uses the VIC's internal jiffy-counter to say things such as:—

'TT/II/M/P5/I/I/S/S/NN/II//N/P4/TH/ER/TT/EE/N/P/ER/EE/S/II/S/L/EE/'

When I keyed in the demo program, I kept getting a syntax error on a perfectly normal data line. I couldn't find the cause, but I think I spotted an error in line 565 of the clock program ('PA5' where, presumably, they mean 'P5').

The manual also says that the allophone /S/ can be doubled to /SS/, but it produced an error when I did this, and I had to use /S/S/.

Verdict

It's a pity the manufacturer doesn't supply a suite of demo programs on cassette, since it is irritating to have to key in a long and at first meaningless (and therefore error-prone) program before you can explore the module's full potential.

I can imagine wanting to use this neat little add-on (I had it talking within a six-line program in a few minutes) in inter-active programs, and I'm quite jealous that I can't plug it into my business PET. But it should be possible to dissect how it works and write a routine machine code. This would be hard on its inventors, but is, I suspect, inevitable.

MACHINE: Chatterbox Speech Module for the Vic 20 **PRICE:** £57.45 inc postage and VAT **AVAILABLE:** from branches of Spectrum shops. **MANUFACTURER:** Curragh Computer Components, 0429-72996

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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.

Each week we list clubs alphabetically by county and user groups alphabetically by speciality, covering about two letters of the alphabet each week.

Entries include up-to-date information as far as possible, and group organisers should let us know of any changes, particularly a move to a new address.

Just started your own club? Drop us a line and we'll spread the word. Write to: Clubnet, Personal Computer News, 62 Oxford Street, London W1A 2HG.

Details of the clubs are based on the Amateur Computer Club's listing.

CLUBS

BERKSHIRE

Small Processor User Group. Runs a data library. Has a lot of information on 8060 processor, peripherals etc, also produces newsletter.

Contact Roger Knight at Department of Meteorology, University of Reading, Earley Gate, Whitenights, Reading, tel: 0734 875123.

BIRMINGHAM

Birmingham Amateur Computer Club. Meets at CBS Consultants, Watery Lane, Small Heath, Birmingham 10, on the first and third Wednesday of each month at 7pm (annual subs: £4.20 adults, £1.50 juniors).

Has a large software library.

Contact Dr M Bayliss, 125 Berryfield Road, Sheldon, Birmingham B26 3UU, tel: 021-743 7197.

BUCKINGHAMSHIRE

Aylesbury Computer Club. Meets at Quarrendon Youth Club every Friday at 7.30pm (annual subs: £5).

Produces monthly newsletter. Members also meet at Mandsville County Secondary School the first Thursday of each month at 7pm.

Contact Ken Knight, 22 Mount Street, Aylesbury, tel: 0296 5181.

Chiltern Microcomputer Club. Meets at the Garden Centre, School Lane, Chalfont St Giles, on the first Wednesday of each month (annual subs: £4 for six months).

Open to both professionals and novices. Informal meetings involving talks, machine demonstrations and discussions.

Contact Mrs W Tibbitts at Ellwood, Deanway, Chalfont St Giles, Buckinghamshire, tel: 024 07 4906.

Iver Computer Club.

Contact P A Seal at 1 Ormonde Flats, Church Road, Iver Heath, tel: 0753 652792.

CAMBRIDGE

Cambridge Microcomputer Club, on the third Wednesday of each month.

Contact Derek Tripp at 3 Spurgeons Avenue, Waterbeach, Tel: 0223-861804.

Haverhill Microcomputer Club meets at St Marys Church Hall, Camps Road, Haverhill, on the secon, third and fourth Wednesday of each month at 7.30 to 10.30pm. Annual subs: £3 adult; £1 OAP & students; meetings 25p.

Contact Andrew Holliman, at 5 Trinity Close, Balsham, Cambridge CB1 6DW, tel: 022 029-583.

USER GROUPS

APPLE

Croydon Apple User Group. Meets at Sidda House, 350 Lower Addiscombe Road, Croydon, on the second Monday of each month (annual subs: £5 private members, £10 commercial members, meetings: 50p).

Future programme includes: extending the Apple hardware, graphics for design and an introduction to machine coding.

Contact Paul Vernon, 60 Flawkhurst Way, West Wickham, Kent, tel: 01-777 5478.

British Apple Systems User Group. Meets at Old School, Branch Road, Park Street, St Albans, Hertfordshire, on the first Tuesday evening and third Sunday afternoon each month (annual subs: £12.50, joining fee: £2.50).

Caters for all Apple and ITT 2020 users, publishes a magazine called Hard Core.

Contact John Sharp, tel: 09273 75093.

Apple Users Group.

Contact Steve Profitt, The Granary, Hill Farm Road, Marlow Bottom, Buckinghamshire, tel: 062 84 73074.

ATARI

Silica Atari 400/800 User Club.

A new Club — no meeting place as yet. Library planned — software, books and cassettes. Newsletter available.

Contact Richard Hawes, tel: 01-301 1111.

Preston Atari Computer Enthusiasts. Meets at KSC Club, Merrion House, Beach Grove, Ashton, Preston, on the third Thursday of each month at 7.30pm(annual subs: £5).

Contact Roger Taylop, tel: 0253 738192.

ATOM

Liverpool BBC and Atom User Group. Meets at Old Swan Technical College, Room C33 on the first Wednesday of each month at 7.30 to 9.30pm and at Birkenhead Technical College, first floor, Science and Maths department on the third Thursday of each month at 7.30 to 9.30pm.

Contact Nick Kelly on 051-525 2934 (evenings).

BBC

Bournemouth BBC User's Group. Meets at Lansdowne Computer Centre, 5 Holdenhurst Road, Bournemouth, on the first and fourth Wednesday of each month at 7.30-10.30pm (meetings: £1).

This club has 10 BBC micros. Meetings made up of lectures, demonstrations and discussions.

Contact Norman Carey, tel: 0202 749612.

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
Compec Wales	March 22-24	University College, Cardiff	Tony Kynaston, IPC Exhibitions, 01-643 8040
Computer Open Day Exhibition	March 31	Holiday Inn Hotel, Plymouth	Tony Kaminiski, Couchmead Communications, 01-778 1102
Computer Technology Exhibition	April 13-16	Recreation Centre, Newton Aycliffe, Co Durham	Jan Huntley, Sedgefield District Council, Spennymoor 816166
Computer Open Day Exhibition	April 14	Midland Hotel, Manchester	Tony Kaminiski, Couchmead Communications, 01-778 1102
London Computer Festival	April 14-16	Central Hall, Westminster, London	Jean Lock, Secretary to the Consortium, 01-633 3348
The Personal Computer World Show	April 16-18	MacRobert Hall, Ingleston, Edinburgh	Tim Collins, Montbuild, 01-486 1951
HP 1000 Users Exhibition & Conference	April 26-28	Heathrow Penta Hotel, London	Conference Services, 01-584 4226
Computer Trade Show	April 26-28	Wembley Conference Centre, Wembley	John Cole, IPC Exhibitions, 01-643 8040
Midland Computer Show	April 28-30	Bingley Hall, Birmingham	Roy Bratt, IPC Exhibitions, 01-643 8040

OVERSEAS EVENTS

Event	Dates	Venue	Organisers
International Computing Exhibition	March 28-31	Royal Dublin Society, Dublin	Mr Sean Lemass, SDL Exhibitions, Dublin 763871
International Computer, Computer & Robot Exhibition	April 14-20	Seoul, Korea	Korea Economic Daily, 441 Chungrimdong, Chung-ku, Seoul 100
Compec Europe Exhibition	May 3-5	Centre Rogier, Brussels	Tracey Cannon, IPC Exhibitions, 01-643 8040
National Computer Conference & Exhibition	May 16-19	Anaheim, USA	American Federation of Information Processing Societies, 1815 N Lynn Street, Arlington, VA 22209

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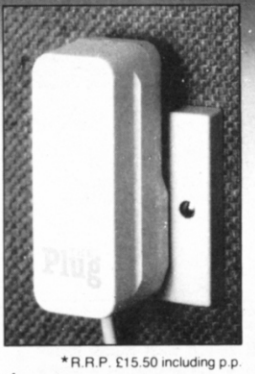

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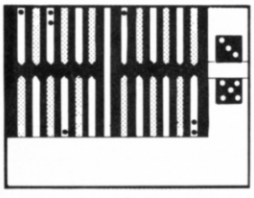

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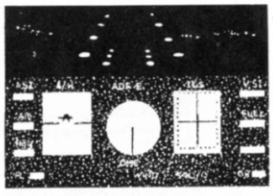

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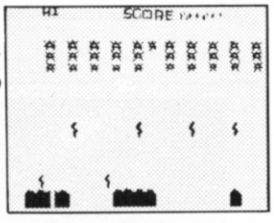

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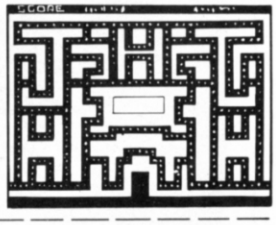

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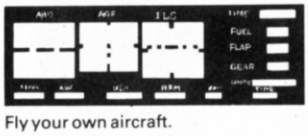

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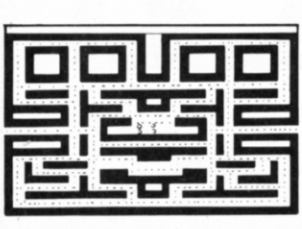

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ADVENTURE

Ultra-violent days

APPLE

NAME Ultima II **APPLICATION** Graphic adventure game **SYSTEM** Apple **PRICE** £42.88 **PUBLISHER** Sierra On-Line **FORMAT** Disk **LANGUAGE** Machine code **OTHER VERSIONS** Atari disk soon, £42.88 **OUTLETS** Mail order through SBD Software, 01-870 9275, also various Apple dealers

Ultima II covers every planet in the solar system, including the sun itself. It ranges from the days of legend to far in the future in five time zones, and has a cast of thousands — including Warren Beatty and Diane Keaton . . .

This has to be the biggest game you have ever seen, by a long chalk. But although it's almost a great game, it falls short. Because of its ambition it is a notch over the top.

Objectives

You are an adventurer — just what sort of an adventurer is up to you. You can be a brawny muscle-man wielding a battle-axe, or a wise but frail wizard living on your wits. You start with a total of 99 points which you share out among a list of attributes for your character. You also have to pick a race and profession.

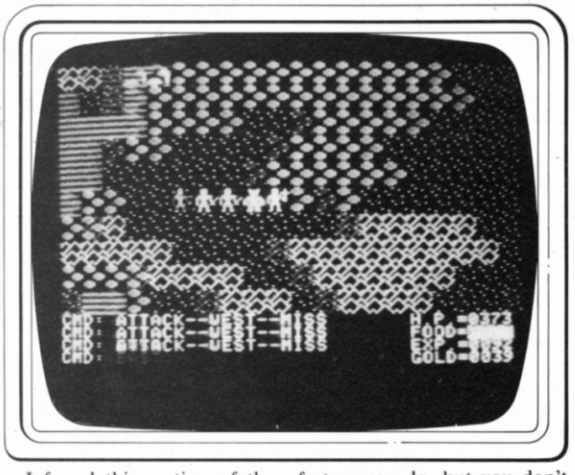
First impressions

The box is emblazoned with suitably romantic artwork, and the first thing you find inside looks suspiciously like a tea-towel. It is a piece of cloth printed with a crude map of the world and emblazoned with strange symbols. They are in fact Tolkien's runic alphabet, the Cirth, described in *Lord of the Rings*.

The instruction manual is written in the dazzlingly twee style the Americans do so well. Your computer, you discover, is 'Ultima's supreme being and controller!' You are told to make a copy of the player-disk here; you can make as many as you like, giving each character a different set of abilities.

In play

The first thing you see is an animated picture of a dragon, spitting fire. You can either create a player, play a game, or demonstrate the game. If you choose to create your character, distribute your 99 points carefully, and watch out when you decide on your race and profession. These two have a noticeable effect on certain of the attributes.



I found this section of the program a little inadequate. Your first try at creating a character for an adventure seldom comes out right. You should therefore be able to modify at will, but Ultima II simply allows you to make an entry, and then moves on.

You must allocate at least ten points to each attribute, but if you give 25 each to the first three, thus making it impossible to satisfy the rules, the program won't let you back up. The only way out is to put in some impossible figure like 88, which wipes the whole display.

Pressing 'P' for play sets the disk in motion, and the screen clears to reveal a small white figure in the middle of a map.

This map is one of the best parts of Ultima II. It's composed of large squares, with different colours and textures, each of which is a different terrain, and where there's water it ripples. Unfortunately, as it was written in the US, where the Apple colour set is reversed, the water is purple, the trees are brown, and the mountains are green.

As you move your character, he or she stays in the centre and the screen scrolls appropriately. The redrawing is very fast, and gives a real feeling of motion if the REPEAT key is held down.

The first thing to look for is some safe place, because you have neither armour nor weapons, and you need to talk to somebody to find out what's going on.

There are all kinds of horrors wandering about, and they all make a beeline for you. They have none but the worst possible intentions, so the only choice is to try killing them with your bare hands. They run as fast as you do, but you don't know where you're going. They do — after you.

If you manage to survive the journey and reach a town or castle, you may enter by pressing 'E' when standing on the square. Towns are where your character can buy equipment, food and transport. Castles have other commodities.

My first character, Ishtar, died of starvation while trying to kill her fourth Orc with her bare hands.

She'd spent almost all her money on chain-mail and a sword, only to be told when she tried them on that she had neither the strength to wear the armour, nor the skill to wield the sword.

I'd created my character as an Elvish Cleric, hoping to capitalise on a bit of agility and wisdom. The instructions suggested that a high charisma rating would be useful for extracting information and bargaining, so I chose a female. This didn't seem to make much difference.

With Ishtar's failure in my mind, I created a new character called Gruma. He was a thoroughly nasty piece of work, largely brute strength and bad breath.

I bought weapons and armour, buckled them on and went off to slaughter the natives. Gruma had no trouble in disposing of almost anything he met, and with him I discovered the function of time-doors.

These are purple squares which appear and disappear. If you move into one you find yourself in a different place, frequently in a different time.

At first this is confusing, and you stumble blindly in and out of them. The cloth map is supposed to guide you, but it's some time before you begin to understand it.

I found myself wandering about, trying to keep out of trouble, visiting anywhere and talking to everybody. Most of the inhabitants say something pretty dull, but a few give away real gems.

But even the strongest warrior takes a few hits, and food gets low, so it's soon time to repair to the place where you can get more of each. No, I won't tell you where.

After some few hours of play Gruma had amassed several hundred experience points, had sailed the seven seas, visited foreign lands and battled with sea-monsters, but despite all that didn't seem to be getting anywhere.

Gruma, was tough, but not exactly smart. He died of starvation in 1990, just outside New San Antonio. There was no food to be had for nearly a thousand years in either direction.

Verdict

The main failing of Ultima II is the poor characterisation. This is probably because the authors spent so much of the memory on the map of the world that they had nothing left to keep half-way-decent data-tables on the actors.

The result is that, apart from in the towns, the only way to get along with anybody is to kill them.

The sheer scale of the game is impressive, and apart from the mind-numbing violence, there's plenty to do and discover. At £42.88 it is expensive but good value, since it will provide a challenge for some time.

Richard King

RATING

Lasting appeal — ☹☹☹☹☹
Playability — ☹☹☹
Use of machine — ☹☹☹☹
Overall value — ☹☹☹☹

ADVENTURE

Starship grocer

SINCLAIR ZX81

NAME Trader **APPLICATION** Graphic adventure game **SYSTEM** Sinclair ZX81, 16K **PRICE** £9.95 **PUBLISHER** Pixel Productions, through Quicksilva 0703 20169 **FORMAT** Cassette **LANGUAGE** Basic **OTHER VERSIONS** Vic 20, £14.95 **OUTLETS** Mail order, various major computer stores

Trentor, space trader and merchant extraordinaire, is two days out from Epsilon Dock with a full cargo of gold nuggets, raw fuel and priceless booster spice. Armed only with an atom blaster, credit card, notepad and pen, Trentor makes his living by flitting between the six moons of his home world Meridien, swapping fuel for food for narcotics for statues for . . .

You can try your own luck as a space trader in this three-part space adventure from Pixel, marketed by Quicksilva.

Objectives

You are in charge of a cargo spaceship. You have a little money, or credits, and your task is to exchange the credits for goods on one moon and visit the others, trading as you go.

The part of the trader is played by one person, but two could co-operate on decision-making. You have little control over the action, and must cope with the sort of activities you've come to expect from a computer, including quizzes, graphic action and strategy.

Your objectives are to return to the main port of Epsilon, and to come back with more credits than you started with.

First Impressions

The cassette comes in a large box, together with an eight page booklet giving instructions, and a story about Trentor's adventures with the statue-collecting Alphans and pet-loving Psions.

You get a short loading test which tells you what to do next, and the instructions are straightforward. LOADing the first part of the game took a good six minutes on my ZX81.

In play

At the start of the game you are at Epsilon Dock and have 1,000 credits. You must buy a tankful of fuel for your hopper — enough to get you to your next landfall.

Now is also the time to spend your credits on a stock of as many commodities as you can afford. Choose from such treasures as Petrochem, munch (a food that comes in sweet red or savoury green varieties), synthomunch, another foodstuff (disgusting to eat, but highly nutritious and cheap), boosterspice (a narcotic with unpredictable side-effects), gold and raw fuel.

But don't go for just one commodity — not even the entrancing boosterspice — or you could lose the game fast.

Now you must travel, and trade. You go to Psi first, but be warned, the inhabitants will look down on you, and will try to humiliate you — they scorn your materialistic lifestyle.

'Use your calculator if necessary,' the game instructions advise. 'They can't think any less of you.'

A calculator, pen and paper really are needed to keep track of your changing cargo and the number of credits you have, or you owe. Without these aids you'll be thrown into a panic the first few times you play. There are different things to do on all five moons, and just getting to them is a major exercise in itself.

You must battle against gravity on your approach to Beta, work out your angle of approach to Alpha, and steer clear of Gamma's sky-high radiation levels.

You are kept in touch with developments by several sentences of background material at each event. But even if you go through the game several times, you still have to sit through all that background, as there is no way of turning it off.

Twice you are left in suspense while you LOAD parts two and three, but these breaks in play are useful, as playing time for the whole game runs to around 15 minutes — unless you are killed.

Verdict

As a trading simulation, this game is quite good, but does have limitations. You have no choice about the moons you visit, or the order in which you visit them. The prices at which you buy and sell and the unexpected events you encounter are all random.

As a result, after you've played two or three times, you will have a good idea of what to expect, though there will still be some surprises even after ten games or more.

What with letting your friends play, not to mention your parents or children, I think the game should retain some interest for several months. But for just one player, I expect it would last maybe a dozen plays.

Mel Pullen

RATING
Lasting appeal —
Playability —
Use of machine —
Value —

ADVENTURE/QUIZ

Interstellar tourist

VIC, SPECTRUM, ZX81

NAME Starquest/Encounter **APPLICATION** Adventure/quiz games **SYSTEM** Sinclair ZX81, 16K **PRICE** £3.95 **PUBLISHER** Pixel Productions, through Quicksilver 0703 20169 **FORMAT** Cassette **LANGUAGE** Basic **OTHER VERSIONS** Vic 20, £7.95. **OUTLETS** Mail order, various major computer stores.

Both these games, on a single cassette, deal with man's first steps away from this planet.

The first, Starquest, sends you on a space adventure. You and your interstellar exploration ship *Starquest* must search for new worlds to colonise.

The second, described as an IQ Game, casts you as an Earthling kidnapped by aliens wishing to probe your intelligence and cultural development.

These games are written by Pixel and marketed by Quicksilva, and come in versions for the Vic, Spectrum, and ZX81. I tried the ZX81 version.

Objectives

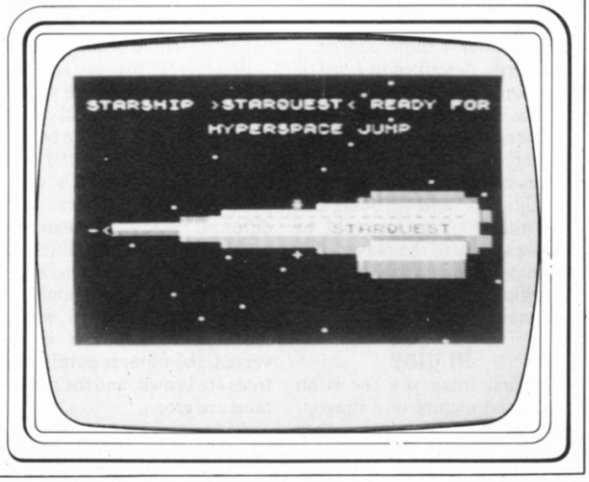
In Starquest, you wander around the universe investigating stars. You are on the lookout for Earth-like planets ripe for colonisation, though your goal is also to chart and claim any planets suitable for mining.

There are hazards to be faced including meteor showers, unidentified missiles, supernovas, and black holes — and the latter two can wipe you out. The game ends if you lose your ship or manage to find a habitable planet orbiting a star.

There is no winning or losing; at the end, you are simply given a score screen that lists stars visited, planets claimed for Earth, and shuttle ships lost.

First impressions

Apart from a brief scene-setting blurb on the back of the cassette label, no instructions are given. But as the game is a simple cycle of finding a star, looking at planets, and claiming them if they are of any value, none are needed. You get a brief LOADING test before the program itself, so you can set your tape volume correctly.



In Play

You have very little to do in this game, and I found that disappointing. You get to press the odd key when you're told to at various points, but you can't modify the action at all.

At the start you see a black screen with a handful of stars, and hit a key to select a star to visit. You are told that your spacecraft is going into hyperdrive, then your arrival is announced seconds later.

'This is Procyon', you may be told, along with details of the star jump you just made and the star's vital statistics. You scan the star system for habitable or mineral-rich planets, and you may orbit any of interest.

But most of the time all you do is sit there and admire the screen. And as the program is written in Basic, everything is rather slow.

The second game on the tape, Encounter, really carries on where you finished with Starquest. It is, says Pixel, 'A simulation of primary contact with extra-terrestrial life.'

That sounds promising, but Pixel warns you that the experience may be rather one-sided. 'It is a much greater intellect that brings these travellers to our insignificant orb', trumpet the game instructions. 'Is man yet ready for membership of the galactic union?'

If you can answer the questions the alien sets you . . . well, why not try it and see?

Verdict

Starquest's format is so repetitive that I don't think anyone will play it for long. I found it downright boring after the first half hour, since you are only required to do anything once every few minutes.

Encounter did have a couple of surprises in store, but all in all, despite a fairly low price tag, I think there are much more interesting games available.

Mel Pullen

RATING
Lasting appeal —
Playability —
Use of machine —
Value —

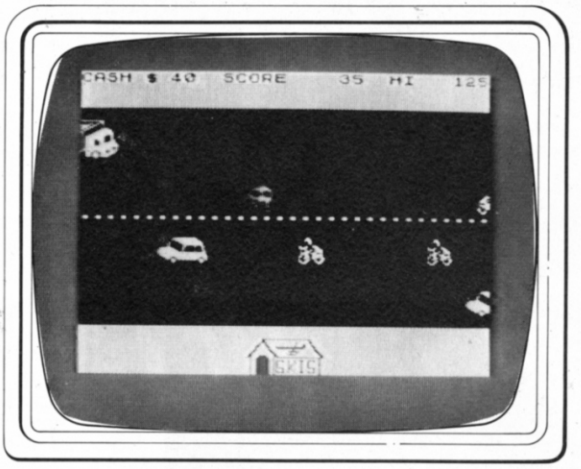
NEXT WEEK

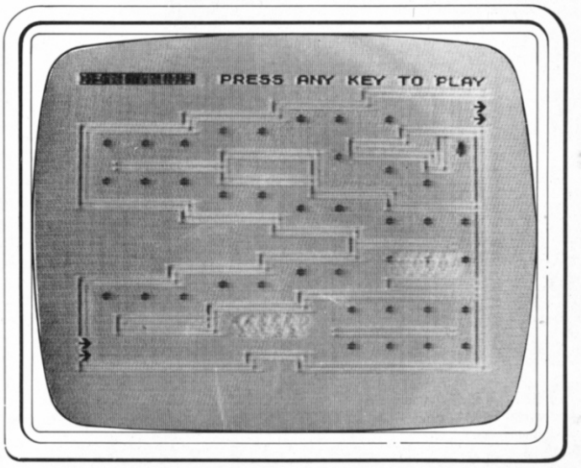
Gameplay sits down at the card table with the Sinclair Spectrum, and looks at a batch of games for the Dragon. These include some old computer favourites and a version of 3D noughts and crosses.

CARTOONS

Horace stories

ZX SPECTRUM





NAME Hungry Horace, Horace Goes Skiing **APPLICATION** animated games **SYSTEM** ZX Spectrum, 16K **PRICE** £5.95 each **PUBLISHER** Psion, 01-723 9408 **FORMAT** Cassette **LANGUAGE** Assembler **OUTLETS** WHSmith, all Sinclair dealers

Just when you thought microcomputer games had nothing more to offer, Psion and Melbourne have come up with the electronic equivalent of the Mr Men books.

The idea is that one cartoon character — in this case Hungry Horace — is central to a whole series of games.

Hungry Horace has been around since September, and now the first successor, Horace Goes Skiing, has been launched.

The Horace games seem suitable for seven-year-olds and upwards, and run on the 16K or 48K Spectrum.

Objectives

The objectives in both games is to amass points while attempting to prolong Horace's life.

Hungry Horace gives you four lives, and you run round a succession of maze-like parks eating flowers while parkkeepers try to catch you.

Horace Goes Skiing gives you $40 to spend on skis and ambulance fees. The idea is to cross a busy road to the ski hire shop.

If you run out of money, you can earn more by pushing your points over pre-set thresholds, or by deliberately crossing and recrossing the roads without mishap.

First impressions

Both Horaces come in attractive packaging. The instructions are clear, although the spelling leaves a little to be desired.

Both games are easy to learn, but hard to master as they become progressively faster and/or more difficult.

In play

The controls used are 'I' and 'A' for vertical movement and 'I' and 'P' for horizontal. Since you must use a keyboard, these are sensible letters to use.

The idea is to negotiate Horace round a park eating the flowers and being pursued by up to four park-keepers, who are portrayed as ferocious-looking disembodied heads. If a park-keeper drops his lunch of cherries or strawberries, Horace earns extra points by eating it.

Somewhere on each screen a bell is tolling. If Horace gets to the bell, the parkies turn white with fear and their hair stands on end.

'Skiing' uses similar controls, although vertical movement is controlled by the 'Q' and 'Z' keys.

First, Horace has to cross a very busy road in order to get to the ski shop where he buys skis for $10. Then he has to cross back to get on to the ski slope.

If hit by a vehicle, Horace has to stump up a $10 ambulance fee and then attempt to cross the road again.

Once on the ski slope, Horace has to negotiate the usual flags, hillocks and trees. If he hits a tree, he can break his skis. But sometimes he gets away with it. A hillock can send him in any direction and passing between flags increases the points.

Verdict

Neither game is completely original, but both are a lot of fun. Horace, like ET, is a lovable little chap and I think £5.95 is a reasonable price to pay for each of his adventures.

David Tebbutt

RATING:

Hungry Horace
Lasting Appeal —
Playability —
Use of machine —
Overall value —

Horace Goes Skiing
Lasting appeal —
Playability —
Use of machine —
Overall value —

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As well as complete programs, a subroutine with an example of its use will be printed each week from the PCN library.

This week

Our first program is a useful utility for the Sinclair Spectrum from Andrew Pennell, an 18-year-old member of the East London Computer Club, showing a good use of the machine — the Sinclair Spectrum — to offer a search/edit facility.

This presents a wealth of opportunities for the imaginative among you to improve text/program editing on your machine.

From darkest Cricklewood comes a very neat analogue alarm and teaching clock for the BBC Model B, submitted by Alan Monaghan.

This uses an interesting technique for hand movement of the clock and was actually found to be quite accurate.

Fernando Marques, an expatriate Portuguese living in Rugby, sent in his statistical graph generator for the Spectrum which allows data entry and editing.

A clever feature of the program is the ability of the user to specify the positions of the appropriate axes so that legibility is maximised.

In the subroutine section we are featuring two linked routines to extract and replace strings within strings — very handy in text editing.

The sample program showing their use is a simple sentence-editing function.

See your name in print!

Become a legend in your own lunchtime. Send your example of programming expertise on disk or cassette with a plain paper printout to the address below.

We'd also like a brief description of what the program does, and notes including memory requirements, special hardware needed etc.

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PCN ProgramCards

String Edit Utility Card 1 of 1

8302 SEU

A useful utility to allow the user to search for a user-defined string within a program so that it can be edited. Load the program to be edited then *merge* (if on tape) or type in. Use *run 9900* then enter string (keywords by shift "G" — "THEN" — enter keyword and delete "THEN"). When string found edit as normal or CONTinue to resume.

```
9900 LET M=PEEK 23637 + 256*PEEK 23838
9901 INPUT "Enter the string you wish to      search for:"; LINE A$
9905 LET I = PEEK 23635 + 256*PEEK 23636
9910 LET L = 256*PEEK I + PEEK (I + 1): PRINT L;: LET I = I + 2
9920 LET J = PEEK I + 256*PEEK (I + 1): LET I = I + 1
9930 FOR J = 1 TO J: LET A = PEEK (I + J)

9940 IF A = 14 THEN LET J = J + 5: GO TO 9970
9950 PRINT CHR$ A;
9955 POKE 23692,255
9960 IF A <> CODE A$(1) THEN GO TO 9970
9961 FOR K = 1 TO LEN A$: IF PEEK (I + J + K - 1) <> CODE A$(K) THEN GO TO 9970
9962 IF K > 1 THEN PRINT CHR$ PEEK (I + J + K - 1);
9963 NEXT K: LET J = J + LEN A$ - 1: POKE 23625,L-256*INT (L/256): POKE 23626,I
NT (L/256): BEEP .05,10: STOP
9970 NEXT J
9980 LET I = I + J
9990 IF I < M - 43 THEN GO TO 9910
9995 PRINT "Search finished."
```

Sinclair Spectrum Spectrum Basic

Min. requirements: 16K
Application: General interest

Refer to chapters 24 and 25 of Spectrum Basic Manual for *peek* and *poke* use.

9900 Store memory address of *9901* in *M*.
9901 Input string — store in *A$*.
9905 Store 1st line address in *I*.
9910 Current line No. in *L*.
9920 *I* is line byte counter.
9930 Scan each byte in current line until string equates.

9963 Found it! Allows correct edit action.

9980 Set next line address.
9990 If line less *9900* try again.
9995 All scanned.

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PCNProgramCards

Analogue Clock Card 1 of 3

8302AC1/3

BBC Model 3
BBC Basic

Minimum requirements: 32K.
Application: General interest.

A clever program demonstrating the graphics capabilities of the computer. Has facilities for a real-time alarm clock with sweep second-hand and also a teaching aspect.

```
  10  MODE 1: VDU 24,0;0;1023;1023;
  20  VDU 28,32,31,39,0
  30  VDU 19,1,5;0;
  40  GCOL 0,129: GCOL 0,3
  50  COLOUR 0: COLOUR 130: CLS: CLG
  60  PROC_CLOCK: GCOL 0,2
  70  R1 = 256: R2 = 312: TH = PI: F = 60: HRS = 6
  80  PROC_HANDS(R1,R2,TH,F)
  90  R1 = 384: R2 = 416: TH = 0: F = 90: MINS = 0
 100  PROC_HANDS(R1,R2,TH,F)
 110  REPEAT
 120    CLS: PRINT TAB(0,4);"CLOCK  C": PRINT TAB(0,6);"TEACH  T": PRINT TAB(0,
8);"LEAVE  L"
 130    INPUT TAB(0,10),"ENTER ",A$
 140    IF A$ = "C" THEN PROC_REAL
 150    IF A$ = "T" THEN PROC_TEACH
 160    IF A$ = "L" THEN MODE 1: END
 170    UNTIL FALSE
 180  DEF PROC_HANDS(R1,R2,TH,F)
 190  MOVE X,Y: MOVE X + R1*SIN(TH - PI/F),Y + R1*COS(TH - PI/F)
 200  PLOT 85,X + R1*SIN(TH + PI/F),Y + R1*COS(TH + PI/F)
 210  MOVE X + R1*SIN(TH - PI/F),Y + R1*COS(TH - PI/F)
 220  DRAW X + R1*SIN(TH + PI/F),Y + R1*COS(TH + PI/F)
 230  PLOT 85,X + R2*SIN(TH),Y + R2*COS(TH)
 240  ENDPROC
```

10 Set four-colour graphics window. Set to magenta. Text window set to yellow.

60 Draw clock-face *PROC-CLOCK*. Set hands to 6.00 using *PROC-HANDS*.

110 Initial prompts — procedures called appropriately until *LEAVE* selected. Main program loop.

180 Hand drawing procedure requires *R1*, *R2* — radii of hand; *TH* — angle of hand (0-2π); *F* — hand width factor. Draws single hand.

PCNProgramCards

Analogue Clock Card 2 of 3

8302AC2/3

```
 250  DEF PROC_CLOCK
 260  R = 504: X = 512: Y = 512: CT = -1
 270  FOR TH = 0 TO 2*PI STEP PI/30
 280    GCOL 0,3
 290    IF CT = 4 THEN GCOL 0,0: CT = -1
 300    MOVE X + R*SIN(TH),Y + R*COS(TH): DRAW X + (R - 64)*SIN(TH),Y + (R - 64
)*COS(TH)
 310    CT = CT + 1
 320    NEXT TH
 330  ENDPROC
 340  DEF PROC_TEACH
 350  GCOL 0,1: PROC_HANDS2
 360  MINS = RND(60) - 1: HRS = RND(12) - 1
 370  GCOL 0,2: PROC_HANDS2: CLS
 380  PRINT TAB(2,4);"WHAT    TIME     IS       IT?"
 390  INPUT TAB(0,12),"HOUR",H: INPUT TAB(0,14),"MINS",M
 400  IF HRS = 0 THEN HRS = 12
 410  PRINT TAB(2,16);HRS;":";MINS
 420  IF H = HRS AND M = MINS THEN PRINT TAB(0,18);"RIGHT." ELSE PRINT TAB(0,18
);"WRONG!"
 430  INPUT TAB(0,24),"ANOTHER TRY",A$
 440  IF A$ = "Y" THEN GOTO 350
 450  ENDPROC
 460  DEF PROC_HANDS2
 470  TH = (PI/30)*MINS: R1 = 384: R2 = 416: F = 90
 480  PROC_HANDS(R1,R2,TH,F)
 490  TH = (PI/6)*HRS + (PI/360)*MINS: R1 = 256: R2 = 312: F = 60
 500  PROC_HANDS(R1,R2,TH,F)
 510  ENDPROC
```

250 Clock-face procedure. Centre at 512, 512, radius 504, mark length 64. Mark colour white — minutes; black — hours. Marks at intervals of π/30.

340 Teaching procedure.
350 Undraw hands. Random hours and mins. Draw hands at new time in yellow. Prompt user for hour value and minute value. Verify input and prompt for repeat or return to main loop.

460 Procedure to set parameters for hand-drawing procedure. *480* for minute. *500* for hour hand — also adjusted by No. of minutes past hour.

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PCNProgramCards

Analogue Clock Card 3 of 3

8302AC3/3

```
  520  DEF PROC_REAL
  530  CLS: PRINT TAB(0,4);"STARTINGTIME?"
  540  INPUT TAB(0,8),"HOUR",H: INPUT TAB(0,10),"MINS",M
  550  IF H < 1 OR H > 12 OR M < 0 OR M > 59 THEN PRINT CHR$(7): GOTO 530
  560     GCOL 4,2: PROC_HANDS2: PRINT TAB(2,12);H;":";M
  570   HRS = H: MINS = M: GCOL 4,2: PROC_HANDS2
  580  PRINT TAB(0,14);"ALARM  SETTING": INPUT TAB(0,19),"HOUR",H: INPUT TAB(0,
20),"MINS",M
  590  IF H < 1 OR H > 12 OR M < 0 OR M > 59 THEN PRINT CHR$(7): GOTO 580
  600   PRINT TAB(2,22);H;":";M
  610    INPUT TAB(0,28),"ALL OK",A$: SW = TRUE: SW1 = 0
  620  IF A$ <> "Y" THEN GOTO 530
  630  REPEAT
  640    FOR STH = 0 TO 2*PI - PI/30 STEP PI/30
  650       IF SW1 = 0 THEN SW1 = 1: GOTO 670
  660       GCOL 4,2: MOVE X,Y: DRAW X + 416*SIN(STH - PI/30),Y + 416*COS(STH -
PI/30)
  670             GCOL 4,2: MOVE X,Y: DRAW X + 416*SIN(STH),Y + 416*COS(STH)
  680        I$ = INKEY$(85): IF I$ = "O" THEN SW = FALSE: GCOL 4,2: MOVE X,Y: D
RAW X + 416*SIN(STH),Y + 416*COS(STH): STH = 2*PI
  690      IF I$ = "A" THEN SOUND &11,0,0,1
  700      NEXT STH
  710    IF SW = FALSE THEN GOTO 780
  720       GCOL 4,2: PROC_HANDS2
  730       GCOL 4,2: MINS = MINS + 1
  740    IF MINS = 60 THEN MINS = 0: HRS = HRS + 1
  750    IF HRS = 13 THEN HRS = 1
  760       PROC_HANDS2
  770    IF H = HRS AND M = MINS THEN ENVELOPE 1,2,20,40,-30,127,127,127,32,32,3
2,0,126,126: SOUND 1,1,1,1
  780    UNTIL SW = FALSE
  790  ENDPROC
```

520 Real-time clock procedure. Set time to start at, if valid (12 hour clock), undraw previous hands, draw start time.

580 Set alarm as above.

610 Prompt to start clock or reset times.

630 Clock loop performed until "O" is pressed for exit. *STH* is second hand position — stops at 59 to reposition hour and minute hands.

680 Pause on keyboard for 0.85 seconds. "O" — exit, "A" — turn off alarm sound.

710 If exit selected then exit.

720 Undraw hands. Calculate new time. Draw hands at new position.

770 If alarm setting reached then turn on sound — continuous until turned off. Round again or return to main loop.

PCNProgramCards

Chart Generator Card 1 of 3

8302SCG1/3

A useful program to allow input of statistical data as X and Y values to produce line or bar charts. User selection of axial positions is a feature of the display. Editing of data is a sensible facility.

Sinclair Spectrum Spectrum Basic

Requirements: 16K.
Application: Statistics.

```
 10 LET A = 25: DIM S(A,2): LET E$ = "ERROR - RETRY"

 20 LET LX = 2.34e15: LET LY = LX: LET HX = -LX: LET HY = HX

 30 LET F = 0: GO SUB 500

 40 GO SUB 2000: INPUT "Is this data correct?",A$
 50 IF A$ = "Y" THEN GO TO 120
 60 IF A$ <> "N" THEN PRINT E$: GO TO 40
 70 INPUT "Select data input no = ",N
 80 IF N = 0 THEN GO TO 40
 90 IF N > A THEN PRINT "Stay in range": GO TO 70
100 IF N > L THEN LET L = L + 1: LET N = L
110 LET F = 1: GO SUB 530: GO TO 70
120 GO SUB 1000
130 INPUT "(E)nd or (M)ore",A$
140 IF A$ = "M" THEN GO TO 20
150 IF A$ <> "E" THEN PRINT E$: GO TO 130
160 STOP
500 PRINT "Please input statistical data"
510 PRINT "End of data is 9999"
520 FOR N = 1 TO A
530 INPUT ("X-Axial data (No ";N;" ) = "), S(N,1)
535 IF F = 1 THEN GO TO 550
540 IF S(N,1) = 9999 THEN LET N = N - 1: GO TO 620
550 IF S(N,1) > HX THEN LET HX = S(N,1)
560 IF S(N,1) < LX THEN LET LX = S(N,1)
570 INPUT ("Y-Axial data (No ";N;" ) = "), S(N,2)
580 IF S(N,2) > HY THEN LET HY = S(N,2)
590 IF S(N,2) < LY THEN LET LY = S(N,2)
600 IF F = 1 THEN RETURN
610 NEXT N
620 LET L = N: RETURN
```

10 *A* defines max. no. of variables. Array *S* contains data.

20 *LX, LY* — low values start high: *HX, HY* — high values start low.

30 Set *F* for full data input. Call input routine.

40 Display data. Prompt. Answer "Y" or "N" only.

70 Edit facility by Data input No. Zero for end. Re-enter both X and Y values. Data can be added to end of previous Data. Re-displays on end.

120 Call chart drawing routine.

130 On return select action then end or restart.

500 Data input routine. If *F* = 1 then edit mode selected. High and low values adjusted as necessary. Returns to appropriate section.

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Chart Generator Card 2 of 3

8302SCG2/3

```
1000 PRINT "Data range is : "
1010 PRINT "X-Axis from ",LX," TO ",HX
1020 PRINT "Y-Axis from ",LY," TO ",HY
1030 INPUT "Select X-Axis lower limit = ",LOX
1040 INPUT "Select X-Axis upper limit = ",HIX
1050 IF HIX <= LOX THEN PRINT E$: GO TO 1040
1060 INPUT "Select Y-Axis lower limit = ",LOY
1070 INPUT "Select Y-Axis upper limit = ",HIY
1080 IF HIY <= LOY THEN PRINT E$: GO TO 1070
1090 INPUT "Select Y-Axis cross-over (as X) = ",OX
1100 IF OX > HIX THEN PRINT E$: GO TO 1090
1110 IF OX < LOX THEN PRINT E$: GO TO 1090
1120 INPUT "Select X-Axis cross-over (as Y) = ",OY
1130 IF OY > HIY THEN PRINT E$: GO TO 1120
1140 IF OY < LOY THEN PRINT E$: GO TO 1120
1150 INPUT "Select X-Axis step size = ",SX
1160 INPUT "Select Y-Axis step size = ",SY
1162 LET IX = 0: LET IY = 0
1164 IF OX = LOX THEN LET IX = 8
1166 IF OY = LOY THEN LET IY = 8
1170 LET XS = (256 - IX)/(HIX - LOX): LET YS = (168 - IY)/(HIY - LOY)
1180 LET RX = SX * XS: LET RY = SY * YS
1190 LET X = IX + (OX - LOX)*XS: LET Y = IY + (OY - LOY)*YS + 8
1195 PAPER 5: INK 6: BRIGHT 1
1200 CLS: PLOT IX,Y: DRAW 255 - IX,0: PLOT X,IY + 8: DRAW 0,167 - IY
1210 FOR M = IX TO 255 - IX STEP RX
1220 PLOT M,Y - 4: DRAW 0,8
1225 NEXT M
1230 FOR M = IY + 8 TO 167 - IY STEP RY
1240 PLOT X - 4,M: DRAW 8,0
1245 NEXT M
```

1000 Chart drawing routine. Displays X and Y data range.

1030 Select range of axes.

1090 Select point where Y-axis crosses X-axis. X origin.

1120 Select point where X-axis crosses Y-axis. Y origin.

1150 Select distance between axial marks.

1162 Calculate indent for X and/or Y if either origin is zero.

1170 Calculate X and Y scaling factor. Absolute mark steps. Absolute origin.

1195 Set display colours. Draw axes.

1210 Draw marks for X-axis.

1230 Draw marks for Y-axis.

Chart Generator Card 3 of 3

8302SCG3/3

```
1250 INPUT "Are the axes correct?",A$
1260 IF A$ = "N" THEN INK 0: PAPER 7: CLS: GO TO 1000
1270 IF A$ <> "Y" THEN PRINT E$: GO TO 1250
1280 INPUT "Select (L)ine or (B)ar chart",A$
1290 IF A$ = "L" THEN GO TO 1500
1300 IF A$ <> "B" THEN PRINT E$: GO TO 1280
1310 INK 3: BRIGHT 1
1320 FOR B = 1 TO L
1330 LET PX = (S(B,1) - LOX)*XS + IX: LET PY = (S(B,2) - LOY)*YS + IY + 8
1340 PLOT PX,Y: DRAW 0,PY - Y
1350 NEXT B
1360 INPUT ("X:";LOX;" TO ";HIX;" BY ";SX;" Y:";LOY;" TO ";HIY;" BY ";SY;" (R)e
run or (N)ot"), A$
1370 IF A$ = "R" THEN INK 0: PAPER 7: CLS: GO TO 1000
1380 IF A$ <> "N" THEN PRINT E$: GO TO 1360
1390 INK 0: PAPER 7: CLS: RETURN
1500 INK 3: BRIGHT 1
1510 LET PX = (S(1,1) - LOX)*XS + IX: LET PY = (S(1,2) - LOY)*YS + IY + 8
1520 PLOT PX,PY
1530 FOR C = 2 TO L
1540 LET PX = ((S(C,1) - LOX)*XS + IX) - ((S(C - 1,1) - LOX)*XS + IX)
1550 LET PY = ((S(C,2) - LOY)*YS + IY + 8) - ((S(C - 1,2) - LOY)*YS + IY + 8)
1560 DRAW PX,PY
1570 NEXT C
1580 GO TO 1360
2000 CLS: PRINT "NO. X              Y": LET CT = 1
2010 FOR B = 1 TO L
2020 PRINT B; TAB 4; S(B,1); TAB 16; S(B,2)
2030 IF CT = 20 THEN INPUT "Next page - Press any key", A$: LET CT = 0
2040 LET CT = CT + 1
2050 NEXT B
2060 RETURN
```

1250 Prompt. If "N" re-enter axial parameters. "Y", continue.

1280 Select type of chart.

1310 Bar chart routine. Set bar colour.

1320 Extract data from array S. Calculate and draw bars until data exhausted.

1360 Display axial data and accept input for change of axes or return to main-line.

1500 Line chart routine. (X must be in ascending order in array S). Set line colour. Plot first point.

1530 Extract data from Array S. Calculate relative positions and draw continuous line until data exhausted.

2000 Display data routine — 20 statistics per page. Press any key to see next page. Continues until data exhausted. Returns to main-line.

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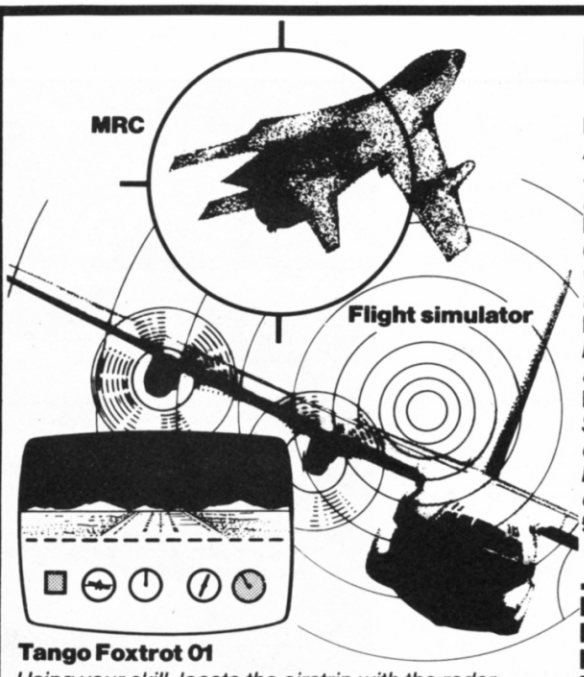

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PCNProgramCards

Replace/Extract Card 1 of 1

8302SubRE

These two subroutines are useful in any data storage and formatting program. Extract takes a string containing fields delimited by any given character (perhaps a /) and extracts the individual fields to array *C$*. Replace changes all occurrences of string *J1$* to string *J2$* with string *J0$*.

Although written in Microsoft Basic this should work with only minor changes on all machines. It could be defined as a procedure in BBC Basic.

```
4730  REM "
EXTRACT J1$ from J0$ and split J0$ at those places
REQUIRES
J0$ string to work on
J1$ string to look for
4735  REM   LOCAL VARIABLES
4736  REM   N  string pointer      J  While not longer
4737  REM   D1 No matches found    D2 counter
4738  REM   D3 length of target
4739  REM   OUTPUT is C$(0 TO D1)
4740 D1 = 0:D3 =  LEN (J1$):D4 = 0: FOR N = 1 TO  LEN (J0$):D2 = N: FOR J =
     1 TO 1:J = ( MID$ (J0$,D2,D3) = J1$):D2 = D2 +  NOT J:J = J + (D2 >  LEN
     (J0$)): NEXT :C$(D1) =  MID$ (J0$,N,D2 - N):D5 = D2 - N:N = D2 + D3 -
     1:D1 = D1 + 1:D4 = (D4 * (D5 <  = D4)) + (D5 * (D5 > D4)): NEXT :D1 =
     D1 - 1: RETURN


4750  REM   REPLACE J1$ in J0$ with J2$
4751  REM   REQUIRES:  J0$ string to work on
4752  REM              J1$ target              J2$ replacement
4753  REM   LOCAL      N   loop counter
4754  REM   OUTPUT     J0$ changed string
4755 N = 1: FOR M = 0 TO 1: IF  MID$ (J0$,N, LEN (J1$)) = J1$ THEN J0$ =  MID$
     (J0$,1,N - 1) + J2$ +  MID$ (J0$,N +  LEN (J1$)):N = N - 1
4760 N = N + 1:M = (N >  LEN (J0$)): NEXT : RETURN
```

4740 Extract routine.
Array *C$* must be dimensioned before using this subroutine.
To call, pass *J0$* = string to search and *J1$* = delimiter between fields. Returns the separated fields in array *C$* from *C$(0)* to *C$(D1)*. Value of *J0$* is unaffected.
N is used to count character by character through the string, while *D1* counts the number of fields found.

4755 Replace routine.
N counts through each character of the string, using *M* to check when the whole string has been searched. If, at character *N*, the search key is found, then *MID$* is used to substitute the replace key in its place.

PCNProgramCards

Extract Demo Card 1 of 1

8302ED

This program demonstrates one use of the Replace/Extract subroutine. Given a sentence, the program will count and list the words in it and then let you change any of them.

Apple II
Applesoft Basic

Application: Subroutine demonstration.

```
10  REM  Program to demonstrate the EXTRACT and REPLACE subroutines
20  REM
30  REM  This program uses REPLACE and EXTRACT to separate the words in
40  REM  any sentence that you enter.  You can then use the REPLACE
50  REM  routine to change certain words in the sentence
60  REM
70  DIM C$(50): REM  set up C$ array for EXTRACT

110  PRINT : INPUT "Enter a sentence : ";J0$
120  IF J0$ = "" THEN  END
130  REM   find and remove any double spaces
140 J1$ = "  ":J2$ = " ": GOSUB 4755
150  REM  now extract all the words


160 J1$ = " ": REM  the delimter is a space
170  GOSUB 4740
180  PRINT : PRINT "There are ";D1 + 1;" words in your sentence"
190  PRINT : PRINT "Here they are :-": PRINT
200  FOR I = 0 TO D1
210  PRINT C$(I)
220  NEXT I
230  PRINT : INPUT "Enter word to change ";J1$
240  IF J1$ = "" THEN 110
250  PRINT : PRINT "Change ";J1$;" to what ? ";: INPUT "";J2$
260  REM  change all occurences of J1$ in sentence to J2$
270  GOSUB 4755
275  REM  show new sentence and loop
280  PRINT : PRINT "Your sentence now is :- "
290  PRINT : PRINT J0$: PRINT : GOTO 140
```

70 Set up *C$* array for Extract routine. Sets an arbitary limit of 50 words.
110 *J0$* holds the sentence to be split up.

140 By replacing any double spaces with single spaces, the program ensures that *J0$* contains words separated by only single spaces.
160 Using a space as a delimiter, split up all the words in *J0$*.
180 Demonstrate that the sentence has been split up.

230 Enter the search and replace keys *J1$* and *J2$* to show *Replace* working.

280 Print the sentence with the changes made and loop to split up the new version.

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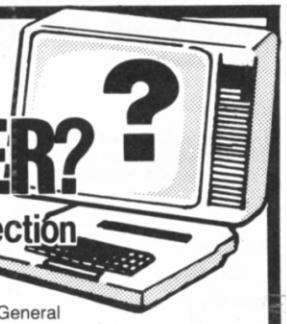

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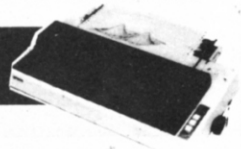

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This week PCN Databasics lists software packages. We can't fit them all in so we've compiled a selection, giving best sellers from 100 publishers and distributors.

We confined coverage to five main types of applications: business, education, games, home and utility. All details published are the latest available.

Companies wanting to add their best-selling packages to Databasics, or wanting to update information already here, should send details to: Databasics, Personal Computer News, VNU, 62 Oxford Street, London W1A 2HG.

APPLICATION Each software package is listed alphabetically by its application.
PRICE includes VAT.
MACHINE/OPERATING SYSTEM on which the best selling package runs.
OTHER VERSIONS indicates whether or not the package runs on a different machine or operating system.
MEDIA SUPPLIED indicates in what format the package comes — either cassette, disk or cartridge.

MAIL ORDER AVAILABLE tells you whether or not the package is available by mail order.
HARDWARE REQUIRED shows the need for special hardware such as disk drive, joystick or printer.
PUBLISHER/DISTRIBUTOR This code refers to the distributor code table which will give the name and telephone number of the publisher/distributor.
COMMENTS any other points of interest.

SOFTWARE

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied			Mail order avail.	Hardware Required			Publisher/ Distributor	Comments
						Cassette	Disk	Cartridge		Disk drive	Joystick	Other		
BUSINESS														
Accounting	£3,320	Apple II	●	Financial Controller	48K		●			●			S1	Also on Apple IIE. 8 modules (£402.50 each) — sales, purchase, invoicing, etc.
	£339.25	Apple II		General Ledger	48K		●		●	●			C1	Supports 1000 accounts and 100 analyses. Self-balancing, full audit trail.
	£552	Apple II		Informex Integrated Accounting System	48K		●		●	●			I1	Contains nominal, sales, purchase ledger + VAT. Can handle 800 accounts.
	£1,147.70	Apple II		Informex Integrated Business System	48K		●		●	●			I1	Contains accounting system modules plus invoicing + stock.
	£172.50	Apple II	●	Micro-General Ledger	48K		●		●	●			G1	Also on ITT 3030 and Basis 108. Goes through profit/loss + balance sheets.
	£402.50	Apple II	●	Nominal Ledger	64K		●			●		●	J1	Also on Sirius, IBM PC, Apple III + UCSD. Requires 132 column printer.
	£431.25	Apple II		Payroll	48K		●		●	●			C1	Supports weekly, monthly, + per monthly. Up to 350 employees per disk.
	£402.50	Apple II	●	Purchase Accounting & Cost Control	64K		●			●		●	J1	Requires 132 column printer, also Sirius, IBM PC, Apple III, UCSD.
	£402.50	Apple II	●	Sales Accounting System	64K		●			●			J1	Also on Sirius, IBM PC, UCSD. Provides conventional ledger.
	£339.25	Apple II		Sales Ledger	48K		●		●	●			C1	Supports 700 + accounts. Direct posting, credit control & 100 analyses, self balancing
	£1,725	Commodore 8000	●	Auditman	32K		●		●				C4	Also on Commodore 4000. Complete accounts production system.
	£1,552.25	Commodore 8000	●	Businessman	32K		●		●				C4	Also on Commodore 4000. Can be used with Auditman. 5 modules.
	£2,025.75	Commodore 8000		Data Lex	32K		●		●				D1	Designed for solicitors + others who need to separate office & client's accounts.
	£345	Commodore 8000	●	Microfacts	32K		●			●		●	M1	Also on Victor & Sirius. £345 per module. Needs hard disk. Integrated accounting.
	£454.25	Commodore 8000	●	Micro-simplex	32K		●			●		●	M2	Also on Commodore 64 (£172.50). Needs printer. For smaller retail business.
	£2,300	Commodore 4000	●	Pegasus Integrated Accounting Suite	32K		●			●			P3	Also on MS-DOS (128K). Contains six stand alone modules.
	£1,437.50	CP/M		Aurora Integrated Accounting Package	64K		●		●	●			G1	Five stand alone modules. Sales, invoicing, purchase, nominal and stock.
	£2,760	CP/M		Boss	64K		●		●				F1	Seven stand alone modules. Can link to Autowriter & Autoindex.
	£805	CP/M	●	Cash Book Accounting	64K		●		●	●			S2	Also on CP/M-86 and MS-DOS. Amalgamation of sales, purchase & nominal ledger.
	£2,300.00	CP/M		dBFlex	48K		●		●	●			E1	Open item six module accounting system, (£575.00) per module. Works with dBase II.
	£402.50	CP/M	●	Exact	64K		●		●	●			S3	Also on MS-DOS. Includes six modules — invoicing, ledgers, stock and payroll.
	£373.75	CP/M	●	Fast Nominal	60K		●		●	●		●	T1	Also on MS-DOS. Needs 132 character printer. Can define up to 99 report layouts.
	£3,059	CP/M		ISBS-W	64K		●		●	●			G2	Comes on hard disk. Contains ISBS functions plus job costing and purchase control.
	£1,840	CP/M	●	ISBS-S	48K		●		●	●			G2	Also on CP/M-86. Contains seven modules.
	£2,271.25	CP/M	●	Multi-Index	64K		●		●	●			B1	Also on MP/M & PC-DOS. Contains five modules. Sales, nominal, VAT & stock control
	£569.25	CP/M	●	Nucleus	64K		●		●	●			C2	Also on MS-DOS. Disk drives of 280K needed. A program generating system.
	£1,431.75	CP/M		Padmede Business Control System	64K		●		●	●			P2	Five modules (£286.35 per module). Nominal, sales, purchase, invoicing, stock.
	£1,380	CP/M	●	Motor Dealers Part Distribution	64K		●		●	●			S2	Also on CP/M 86 & MS-DOS. Combines stock control, order processing ledgers.
	£1,868.75	CP/M	●	Peachtree Basic Accounting Systems	48K		●		●	●			P1	Also on MP/M & MS-DOS. Available on hard disk (£2,156.25). 5 stand alone modules.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied			Mail order avail.	Hardware Required			Publisher/ Distributor	Comments
						Cassette	Disk	Cartridge		Disk drive	Joystick	Other		
	£287.50	CP/M	●	Sales Ledger	64K		●		●	●			S2	Also on CP/M 86 and MS-DOS. Flexible ledger system.
	£45.42	Sharp MZ80A	●	Easy VAT	48K	●			●	●			K1	Also on Sharp M280B & M200K. VAT record system.
Agriculture	£1,150	Apple II		Dairy Package	64K		●			●			F2	Available on floppy or hard disk. Files individual cow production, with herd summaries.
	£1,725	Apple II		Financial Management Program	64K		●			●			F2	Available on floppy or hard disk. Accounts for farm/estate management.
	£1,150	Apple II		Management Program	64K		●			●			F2	Available on floppy or hard disk. Monitors individual field activities, budgets, etc.
Bill of Materials	£373.75	CP/M	●	Fastbill	60K		●		●	●			T2	Also on MS-DOS & TRS-DOS. Will give parts explosion at 10 levels, 99 items/level.
Bookeeper	£56.35	Apple II		Apple Bookeeper	48K		●		●	●		●	H1	Needs printer. Keeps petty cash, sales, other business books, sorts, analysis etc.
Building Specifications	£460	Commodore 8000	●	National Building Specifications	32K		●		●	●			C3	Also on Commodore 4000. Used with Wordcraft. Produces building specifications.
Business Management	£4,140	CP/M		Peach tree Business Management System	48K		●		●	●			P1	Also on MP/M & Unix. Available on hard disk (£6,900). Six modules for single user.
Cataloguing	£46.00	Apple II		Floppy Cat	48K		●		●	●			P4	Enables user to catalogue & store all information.
Estate Agents	£1,092.50	Apple II		Commercial Agency Systems	48K		●		●	●			C7	Matches in both directions with lists, labels and letters.
	£977.50	Apple II	●	Cyderpress Clients Recoverable Costs	48K		●		●	●			C7	Also on Rair Black Box. Designed to keep record of incurred expenditures.
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	£419.75	CP/M		Estate Agents Match & Mail	56K		●		●	●			S4	Matches & prints out potential customers for every property.
Financial Accounting	£1,926.25	CP/M	●	Fast Range	60K		●		●	●		●	T1	Also on MS-DOS & TRS-DOS. Needs 132 character printer. 5 modules.
Financial Planning	£44.85	Commodore Pet		Busicalc	16K	●			●				S5	Also on Commodore 3, 4, & 8000, Vic-20 and Commodore 64. £46.57 on floppy disk.
	£569.25	Commodore 8000	●	Finplan	32K		●			●			M3	Also on Hytec & ICL PC. 96K version available. Helps decide on financial strategy.
	£287.50	Commodore 8096		Financial Director	96K		●			●			P5	Designed to handle large & complex planning & financial applications.
	£188.60	Apple II	●	VisiCalc	48K		●		●	●		●	R1	Also on Apple III, Commodore & IBM PC, etc. The classic spreadsheet.
	£345.00	CP/M		Bottom-Line Strategist	48K		●		●	●			P4	A business/project forecasting program. Allows user to test business assumptions.
	£454.25	CP/M		Fastplan	64K		●		●	●			C5	Needs double density disks. A file based modelling system for business planners.
	£281.75	CP/M	●	Master Planner	64K		●		●	●			C5	Also on MS-DOS & CP/M 86. Needs 80 column printer. Upgrade of a spread sheet.
	£396.75	CP/M	●	Micro Plan	64K		●		●	●			B1	Also on MP/M. Spreadsheet financial planner.
	£343.85	CP/M		Minimodel Financial Modelling	48K		●		●	●		●	G1	Needs 80 column screen. Model consolidation facility, colour option.
	£182.85	CP/M	●	Multi-Plan	48K		●		●	●			P4	Also on PC-DOS, Cromix, Fortune, Corvus & Sirius. Second generation spreadsheet.
	£44.85	CP/M		Plannercalc	64K		●		●	●		●	C5	Needs 80 column screen. Entry level system for spreadsheet planning.
	£218.50	CP/M		SP2020	48K		●		●	●			G2	Forecast effects of proposed actions. Aid to management decision-making.
	£172.50	CP/M		Supercalc	128K		●			●			A1	Electronic worksheet, representing a large flexible accounting work pad.
	£212.75	CP/M		Super Calculator	48K		●		●	●			E1	Spreadsheet calculator.
	£178.25	CP/M		T-Maker	48K		●		●	●			L1	Utility for analysis & presentation of numerical data & test material.
	£224.25	MS-DOS		Pulsar Business System	128K		●			●			A1	Consists of eight integrated packages & provides commercial accounting functions.
	£339.25	Osborne	●	PADA/C	64K		●		●	●			P2	Also on CP/M. Two systems. Incomplete records accounting, time/cost recording.
	£632.50	UCSD-PSystem		Microfinesse	128K		●		●	●			D1	Financial modelling program for businessmen.
	£741.75	UCSD-P System	●	Micro-Modeller	48K		●			●		●	I2	Also on CP/M & MS-DOS. Designed for large corporations.
Industrial Costing	£747.50	Apple II	●	Stock & Production Costing	48K		●		●	●		●	A2	Also on Apple IIE & III & Sirius. Available on hard disk. Needs Pascal system.
Insurance Accounting	£1,380	Commodore 4000	●	Insurance Man	32K		●			●			C4	Also in Commodore 8000, provides insurance broker with sales ledger.
Insurance Broking	£5,462.50	ICL DRS20		HS-100	64K		●		●	●		●	H2	Requires 16 or 27 Mb hard disk to run off. Maintains client & policy records.
Integrated Software	£569.25	IBM PC		Context MBA	256K		●			●			B2	Also on Sirius & Victor. Comprises word processor database management system.
	£908.50	Commodore 8000	●	Silicon Office	256K		●			●			F1	Integrated spreadsheet modelling, graphics, WP, database & communications.
Invoicing	£323.75	CP/M	●	Fast Invoicing	60K		●		●	●			T1	Also on MS-DOS & TRS-DOS. Can link into Fast Sales & Fast Stock.
Linear Programming	£373.75	CP/M	●	Optimiser	48K		●		●	●			C6	Also on Apple. Management tool for optimizing the deployment of scarce resources.
Local Authority	£862.50	Commodore 8000	●	P.U.S.W.A.	96K		●			●			M3	Also on Hytec. Monitors road holes under Public Utilities Street Work Act (1950).
	£569.25	Commodore 8000		Road Register	96K		●			●			M3	D-base network based on road names. Modules (£373.75) on street lighting etc.
Mailing	£86.25	CP/M		Mailing List	56K		●		●	●			S4	Works with Super file. Prints labels, files, names & addresses. Mail merge facility.
Management	£226.16	CP/M	●	Scratch Pad 3.0	48K		●		●	●			M4	Also on CP/M 86, MS-DOS & PC-DOS. Spreadsheet using virtual memory.
Mathematics	£28.75	Commodore Pet	●	Infinite Arithmetic	16K	●			●				S5	Also on Commodore 3000, 4000 & 8000. Available on floppy disk.
Medical	£517.50	Apple II	●	Medical System	48K		●		●	●			A2	Also on Apple IIE, III & Sirius (£573.85). On hard disk. Age/sex register.
Office Information	£402.50	Apple II	●	Prophet II	48K		●		●	●			A4	Also on IBM PC & Corvus Concept. Information system which acts as a noticeboard.
Payroll	£69.00	Apple II		Payroll	48K		●			●		●	H1	Also available as cassette for Spectrum ZX81 (£25.00). Needs printer.

	£287.50	Apple II	●	Tabs Payroll	48K		●		●	●		T3	Also on CP/M & MS-DOS (64K). Up to 2000 employees, nine pay schemes.
	£977.50	CP/M	●	Powerday	48K		●			●		O2	Also on MP/M and MS-DOS. Integrates with Omicrons nominal ledger. Handles SSP.
Project Management	£747.00	IBM PL	●	Micronet	48K		●			●		T2	Also on ICL PC, Sirius, Superbrain, Apple II, & others. Critical path analysis.
Project Planning	£1,150.00	Commodore 8000		Hornet	32K		●			●		C3	Has eight optional variants (all eight £4,025). Network logic & variety of screen display.
Property Management	£517.50	Apple II	●	Property Management System	48K		●			●		A2	Also on Apple III, Apple IIE & Sirius. Prints rent reminders, demands etc.
Purchase Ledger	£287.50	Apple II	●	Tabs Purchase Ledger	48K		●		●	●		T3	Also on CP/M & MS-DOS (64K). Open item ledger — automatic payment facility, etc
	£805.00	CP/M	●	Powerbought	48K		●			●		O2	Also on MP/M & MS-DOS. Integrates with Omicron's Nominal Ledger System.
Sales Ledger	£287.50	Apple II	●	Tabs Sales Ledger	48K		●		●	●		T3	Also on CP/M & MS-DOS. Part of integrated system. 300 analysis codes.
	£373.75	CP/M	●	Fast Sales	60K		●		●	●	●	T1	Also on MS-DOS & TRS/DOS. Needs 132 character printer. Part of Fast Range.
	£805.00	CP/M	●	Powersales	48K		●			●		O2	Also on MP/M & MS-DOS. Multi-user system based on mainframe software.
	£325	DEC Rainbow 100	●	Sales Ledger System	64K		●		●	●		D2	Also on DEC Mate II. Invoicing & monthly statement generating system.
Sales Order Processing	£805.00	CP/M	●	Compact Sales Order Processing	64K		●		●	●		C2	Also on CP/M 80, 86 & MS-DOS. Comes on hard disk. Control, stock, ledgers.
Sales, Purchase, Nominal Ledger	£1,207.50	CP/M	●	Compact Sales, Purchase & Nominal Ledger	64K		●		●	●		C2	Also on CP/M 80, 86 & MS-DOS. Follows Standard accounting procedures.
Sick Pay	£80.50	Apple II	●	Statutory Sick Pay (SSP)	48K		●		●	●		H1	Also on Spectrum. Does all SSP calculations.
Statistics	£172.50	Apple II	●	Inter-Stat	48K		●		●	●	●	G1	Also on Basis 108 & ITT 3030. Needs printer.
	£9.20	Sharp MZ80A	●	Statistical Analysis	48K	●			●			K3	Also on MZ80K. Calculates mean & standard deviation for up to 100 items.
	£15.00	Sinclair ZX81	●	Critical Path Analysis (CPA)	8K	●			●			H1	Also on Spectrum (16K). Activities entered from arrow diagram. Finds critical path.
	£977.50	UCSD-P System		Trend Plot	128K		●		●	●	●	P5	Needs Hewlett Packard Plotter. Developed to analyse historical time series data.
Stock Control	£373.75	CP/M	●	Fast Stock	60K		●		●	●	●	T1	Also on MS-DOS & TRS DOS. Needs 132 character printer.
	£3,289	CP/M		M-SIS	48K		●			●		T2	Stock control system for manufacturing industry.
	£33.92	Newbrain		Stock Control 40/4	32K	●			●			E2	Stores large quantities of stock, accumulates new stock levels & checks stock level.
	£25.00	Sinclair Spectrum	●	Stock Control	48K	●			●			H1	Also ZX81. Fast fwd/add/delete item. Prints complete or selective lists & total value.
Word Processing	£228.85	Apple II	●	Format 80	48K		●			●	●	P6	Also Apple IIE. Needs 80 column card. Storage/retrieval of names & addresses.
	£92.00	Apple II		Piewriter	48K		●		●	●	●	M5	Needs 80 column card. Allows entry, editing & print formatting of any text type.
	£125.35	Apple II		Wordhandler	48K		●		●	●		P4	Word processor for the non-professional — minimum Apple system.
	£152.95	Apple III	●	Apple Writer 2	48K		●			●		P6	Also Apple II. Has word wrap, glossary & word processing language.
	£28.50	BBC Model B		Alphabeta	32K	●			●			H3	Also available on disk. Suitable for home & business.
	£10.50	BBC Model B		Word Pro	32K	●			●			I4	Includes DELETE, INSERT, SAVE, Date etc.
	£90.85	Commodore 64		Infomast	64K		●		●	●		R2	Combined programmable word processor, Database and calculator.
	£89.00	Commodore 64	●	Paperclip	64K		●		●	●		A3	Also Commodore 8000. Compatible with WordPro & SpellPro.
	£488.75	Commodore 8000	●	Wordcraft	32K		●			●		D1	Also on SuperPet & Sirius 1. Routine correspondence, mailing, proposals, contracts.
	£51.75	Commodore Pet	●	Papermate +	16K	●			●			S5	Also on Commodore 64, 3, 4, & 8000. Available on floppy (£53.49).
	£125.00	Commodore BK-20	●	Wordcraft 20	8K			●	●		●	A3	Also Commodore 64 — needs printer. Comprehensive word processor.
	£145.00	CP/M	●	Mail Merge	64K		●			●		X1	Also on CP/M 86 and PC-DOS. An optional MERGE, PRINT, extra for Wordstar.
	287.50	CP/M	●	Peachtext	48K		●			●	●	P1	Also MP/M & MS-DOS. Needs high quality printer. Contains proof reader.
	£339.00	CP/M	●	Perfect Writer Speller	64K		●		●	●		S3	Also MS-DOS & Apple DOS. Contains quick reference card.
	£431.25	CP/M	●	Select Word Processing System	64K		●		●	●		B1	Also MP/M & PC/DOS. Screen-oriented system.
	£316.25	CP/M	●	Spellbinder	48K		●		●	●		E1	Also on Oasis. Word processing & office management system.
	£333.50	CP/M		WP2020	48K		●		●	●		G2	Menu-driven, machine independent. Set of key-tops provided.
	£225.00	IBM PC		Easywriter II	64K		●			●		X1	Bold face & underscoring on screen. 80,000 word spell checker extra (£43.15).
	£340.40	IBM PC		VisiWord	64K		●			●	●	R6	Needs printer.
	£339.25	MS/DOS	●	WordStar	128K		●			●	●	A1	Also on CP/M. Needs printer. Complete screen-based WP.
	£40.25	Newbrain		Word Processor 40/12	32K	●			●			E2	Automatic word wrap, editing, saving paragraphs, deleting.
	£325.00	OS9		Stylograph	32K		●			●		S6	Expandable system with modular design.
	£45.42	Sharp MZ804	●	Wordpro	48K	●			●			K1	Also on MZ80B+K. Available on disk (£91.94). One of few WP packages for Sharp.
	£49.95	Tandy TRS 80 I	●	AJ Edit	32K		●		●	●	●	M6	Also on Genie I & II. Needs printer.
EDUCATION													
Basic Course	£9.95	Texas Instruments 99/4A		Beginners Basic Tutor	16K	●			●			T5	Gives explanations and examples of TI Basic — lets the user try.
	£13.95	Texas Instruments 99/4A		Teach Yourself Extended Basic	16K	●			●			T5	Needs extended Basic module.
Business Game	£9.95	BBC Model A	●	Business Game	16K	●			●			W1	Also on Model B. Two games for economics, business & general studies, teaching.
	£6.84	BBC Model A	●	Inkosi	32K	●			●			C9	Also on Model B. Rule for ten years, overcoming obstacles, e.g. famines.
Chemistry	£14.38	Research Machine 380Z	●	Symbols To Moles	31K		●		●	●		H4	Also on Apple II. Practise using chemical symbols, writing & mole concept.
Children	£37.89	Apple II		Bumble Plot	48K		●		●	●		P4	A set of five programs for developing graphics and maths skills. For children 8 to 13.
	£29.84	Apple II	●	Face Hanger	48K		●		●	●		P4	Also on IBM PC. Designed for children to learn computer keyboard by building up face.
	£37.89	Apple II		Gertrude's Secret	48K		●		●	●		P4	An educational game to teach logical thinking & planning. For children aged 6-9.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied			Mail order avail.	Hardware Required			Publisher/ Distributor	Comments
						Cassette	Disk	Cartridge		Disk drive	Joystick	Other		
	£9.80	Atari 400	●	Jigsaw Puzzles	16K	●							T4	Also on Atari 800. Has 16 puzzles and optional difficulty.
	£11.40	BBC Model B		Letters	32K	●			●				C9	Designed for children aged 4-6 & for dyslexic & remedial children.
	£11.40	BBC Model B	●	Metrics	32K	●			●				C9	Also on Vic-20. Vocabulary and structure of metric system, for children aged 10-15.
	£6.84	BBC Model B	●	Pascal	32K	●			●				C9	Also on Vic-20. Shows construction of Pascal Triangle and tests on it.
	£6.84	BBC Model B	●	Sequences	32K	●			●				C9	Also on Vic-20. Demonstrates number patterns.
	£6.50	BBC Model B		The Early Stages	32K	●			●				H3	Reading aid. Plays nursery rhymes. Available on disk.
	£4.50	BBC Model B		Super Hangman	32K	●			●				I4	Version of famous game. High resolution graphics. 800 words or enter own choice.
	£9.95	BBC Model B		Tree of Knowledge	32K	●			●				A9	Interactive program teaching categorisation. Simplified information retrieval.
	£4.95	Sharp MZ80A	●	Giant Maths	32K	●			●				S8	Also on MZ80K. Big screen figures & humorous error messages. 5 to 11 years.
	£4.95	Sharp MZ80A	●	Rocket	3K	●			●				S8	Also on MZ80A. Four difficulty levels. For five to 11 year olds.
	£9.20	Sharp MZ80A	●	Teach Tables	48K	●			●				K3	Also on MZ80K. Plays like game but motivates children to improve their ability.
	£4.95	Sharp MZ80K	●	Master Builder	48K	●			●				S8	Also on MZ80A. Repair a wall using random blocks. Teaches spacing.
Classroom Monitor	£322.00	UCSD-P	●	Classroom Monitor	64K		●		●	●			K4	Also on Apple II. Provides demonstration facilities & monitors student's progress.
Economics	£28.75	Sharp MZ80K	●	Broadwater Economics Simulation	16K	●			●				W1	Also on Commodore Pet & BBC. Simulates micro & macro economics.
French	£14.38	Research Machine 380Z	●	Repondez	31K		●		●	●			H4	Also on Apple II. Practising French verb formation (present tense).
	£9.20	Sharp MZ80A	●	French Conjugate	48K	●			●				K1	Also on MZ80K. Automatically conjugates regular verbs into tenses.
	£9.20	Sharp MZ80A	●	French Verbs	48K	●			●				K1	Also on MZ80K. Allows user to impart up to 20 verbs & eight tenses at a time.
Graphics	£8.00	BBC Model B	●	Painter	32K	●			●				A5	Also on Spectrum (£5.75), Atom (£6.90) & on disk.
	£9.95	BBC Model B		Creative Graphics	16K	●			●				A9	Book available (£7.50). Designed to illustrate BBC graphics.
History	£20.13	Sharp MZ80A	●	Kings & Queens	48K	●			●				K1	Also on MZ80K. Facts & figures on English monarchs since 1066.
Languages	£7.95	Sharp MZ80A	●	Multilinguist	3K	●			●				S8	Also on MZ80K. A language tutor to suit all European languages.
Mathematics	£10.30	BBC Model B		Angle	32K	●			●				C9	Includes four programes designed to teach simple geometry.
	£9.95	BBC Model A	●	Algerbraic Manipulations	16K	●			●				W1	Also on Model B. Includes four programs designed for use in maths teaching.
	£82.80	IBM PC		Fact Track	64K		●			●			I3	Learning basic arithmetic. Presents simple two-line sums in random order.
	£46.00	Sharp MZ80A	●	Curve Fitting	48K	●			●				K3	Also on MZ80K. Calculates, intercepts & plots power curve.
	£9.20	Sharp MZ80A		Directed Numbers	48K	●			●				K3	Also on MZ80K. Teaches difficult mathematical functions.
	£9.20	Sharp MZ80A	●	Divisor Advisor	48K	●			●				K3	Also on MZ80K. Teaches division at a variety of skill levels.
	£27.60	Sharp MZ80A	●	Numerical Integration	48K	●			●				K3	Also on MZ80K & B. Teaches Simpson's Rule.
Meteorology	£23.00	Research Machines 380Z	●	Weather	31K		●		●	●			H4	Also on Apple II. Gives synoptic charts. Teaches elementary meteorology.
Morse Code	£9.20	Sharp MZ80A	●	Morse Tutor	48K	●			●				K3	Also on MZ80K. Used to teach morse code by sight and sound. At seven levels.
Physics	£14.38	Research Machines 380Z	●	Lenses	31K		●		●	●			H4	Also on Apple II. Illustrates formation of images by lenses using ray diagrams.
	£9.20	Sharp MZ80A	●	Casino Chips	48K	●			●				K3	Also on MZ80K. Uses radioactive chips to teach half-life concept.
Typing	£28.75	CP/M	●	Touch'n'Go	48K		●		●	●			C6	Also on MS-DOS. Typing tutor for mastering numeric pad & Qwerty keyboard.
	£31.05	IBM PC		Typing Tutor	64K		●			●			I3	Presents exercises for learning touch typing or for improving existing skills.
GAMES														
Adventure	£17.95	Atari	●	Arrow of Death	16K	●			●				C8	Also runs on TRS-80, BBC, Vic-20. A 'classic text adventure'.
	£7.99	BBC Model B	●	Adventure	16K	●			●				M7	Also runs on Atom. 'Many rooms to explore and many hazards to overcome'.
	£9.95	BBC Model B		Philosopher's Quest	16K	●			●				W1	'Progress through a world of fiendish puzzles.'
	£9.95	BBC Model B		Sphinx	16K	●			●				W1	'A classic adventure, moving through caves avoiding hazards to collect treasure'.
	£13.80	Commodore Pet	●	Hitch-Hikers Guide to the Galaxy	32K	●			●				S5	Also runs on Commodore 64, Vic-20, 3000, 4000, 8000. 'Invoiced, textual game'.
	£18.40	Commodore Pet		Pythonesque	32K	●			●				S5	'Increasingly difficult textual game based on Monty Python'. Disk available (£20.12).
	£24.99	Commodore Vic-20		River Rescue	8K			●			●		T4	Needs joystick. 'Captain boat through treacherous rivers to rescue explorers'.
	£8.00	Dragon 32		Escape	32K	●			●		●		M16	Needs joystick. 'A 3D maze game. Get clues from 15 rooms for code of elevator'.
	£8.00	Dragon 32		Flipper	32K	●			●				M16	'A game of intrigue and strategy. Requires an agile mind and a lot of fore-thought'.
	£8.00	Dragon 32		Mansion Adventure	32K	●			●				M16	'Wind your way through an old mansion picking up clues to find the diamond',
	£7.95	Dragon 32		Wizard War	32K	●			●		●		S7	Needs joystick. 'Magical combat for two to nine players; interactive duel'.
	£35.00	IBM PC		Adventure in Serema	64K		●					●	I3	Needs colour graphics adaptor and direct drive colour monitor for use.
	£6.90	Oric	●	Zodiac	16K	●			●				A5	Also runs on Atom. 'A thinking persons adventure game'.
	£12.07	Sharp MZ80A	●	Adventure	48K	●			●				K1	Also runs on Sharp MZ80B and MZ80K. 'An interactive adventure game'.
	£12.07	Sharp MZ80A	●	Quest	48K	●			●				K1	Also runs on Sharp MZ80B and MZ80K. 'Dungeons & Dragons type game'.

	£7.95	Sharp MZ80K	●	Nightmare Park	48K	●			●			S8	Also runs on MZ80A. 'Cross Nightmare Park. Every few steps play game or task'.
	£7.95	Sharp MZ80K	●	Tombs of Karnak	48K	●			●			S8	Also runs on MZ80A. 'Bargain for items required before entering tombs'.
	£6.50	Spectrum		Destroyer	16K	●			●			I5	'Destroy the varying alien invaders'.
	£5.95	Spectrum		Faust Folly	16K	●			●			A6	'A 16K adventure with the same traps, magic, fiends, treasure as the 48K game'.
	£14.95	Spectrum		The Hobbit	48K	●			●			M8	'Object is to get treasure. For one player. Can instruct computer in ordinary English'.
	£5.00	Spectrum	●	Orb	16K	●			●			I5	Also runs on Dragon 32 and Commodore Vic-20. 'Explore labyrinth and destroy Orb'.
	£10.00	Spectrum	●	Pimania	48K	●			●			A7	Also runs on Sinclair ZX81, BBC 13, Dragon 32. Reviewed 18.3.83.
	£5.00	Spectrum	●	The Quest	48K	●			●			I5	Also runs on Dragon 32. 'Fighting adventure game'.
	£5.00	Spectrum	●	Star Trek	48K		●		●	●		I5	Also runs on Dragon 32 and Commodore Vic-20. 'Hunt down the Klingon in space'.
	£5.95	Spectrum		Slippery Sid	16K	●			●		● ●	S9	Needs joystic and keyboard to use. 'Snake type game'.
	£10.06	Tandy TRS-80 I	●	Mysterious Adventurer	16K	●			●			M6	Also runs on Tandy TRS-80 III, Genie I, II, Colour Genie and BBC B.
	£3.95	Texas Instruments 99/4A		Chalice of Kalmar	16K	●			●			A8	'The aim is to retrieve a chalice from a temple'.
	£4.95	Texas Instruments 99/4A		Forbidden City	16K	●			●			A8	'You have to explore a deserted alien city with many hazards on the way'.
	£3.95	Texas Instruments 99/4A		Sorcerers' Castle	16K	●			●			A8	'You are trying to rescue the captured princess'.
	£7.50	BBC Model B		Atlantis	32K	●			●			I4	'Guide submarine through caverns & destroy enemy'.
Arcade Game	£9.99	Commodore Vic-20		Night Crawler	5K	●			●			R2	'A Centipede style game. Fast action, graphics and sound effects'.
	£5.50	Spectrum	●	Arcadia	16K	●			●			I6	Also on Commodore Vic-20. '12 levels of aliens attacking in different ways'.
	£5.95	Spectrum		Ground Attack	16K	●			●			S9	'Variable speeds allows this game to be played by everyone'.
	£5.95	Spectrum		Orbiter	16K	●			●			S9	'The only version of this Defender style game that is available for the Spectrum'.
	£5.95	Spectrum		Cyber Rats	16K	●			●		● ●	S9	Needs joystick and keyboard to run.
Asteroids Type	£4.95	Spectrum		Meteor Storm	16K	●						Q1	'Progressive difficulty, variety of controls'.
	£6.95	Spectrum		Time-Gate	48K	●			●			Q1	'Time travel, 3D graphics, colour, cockpit view and instrument display'.
	£4.95	ZX81		Asteroids	4K	●			●			S9	'Fast moving, suitable for all ages'.
Centipede Game	£7.99	Dragon 32		Caterpillar	32K	●			●		●	M16	'A new generation munching game'.
Chess Game	£7.99	BBC Model B		Chess	16K	●			●			M7	'Machine code, high resolution graphics with many play options'.
	£24.95	Dragon 32		Cyrus Chess	32K			●				D3	'Won European microcomputer chess championship 1981. Nine levels of difficulty'.
	£14.50	Sharp MZ80A	●	Chess	48K		●	●				K1	Also on Sharp MZ80B & MZ80K. '14 levels of difficulty'.
	£42.95	Texas Instruments 99/4A		Chess	16K		●	●				T5	'Different difficulty levels. Will solve problems. Can teach chess'.
Darts	£19.99	Atari 400	●	Darts	8K	●					●	T4	Also on 800. 'Aim & throw — the computer does the arithmetic'.
Defender Type	£22.80	Atari 400/800	●	Submarine Commander	16K			●		●		T4	'One player. Nine levels of difficulty. Destroy shipping. Oxygen levels, fuel etc'.
	£9.95	BBC Model B		Planetoid	32K	●			●			A9	'A game of speed & skill'. Available on floppy disk (£11.50).
	£7.95	Commodore Vic-20		Alien Blitz	5K	●			●		●	A3	Needs joystick to run. 'Difficulty levels, colour & sound'.
	£9.99	Commodore Vic-20		Annihilator	3K	●			●		●	R2	'Based on Defender'.
	£6.95	Spectrum		Penetrator	48K	●			●			M8	'Two levels of difficulty difficulty'.
	£21.95	TI 99/4A		Parsec	16K			●	●			T5	'Increasingly difficult. After four onslaughts pass through to next stage'.
Flight Simulator	£22.80	Atari 400	●	Jumbo Jet Pilot	16K	●					●	T4	Also Atari 800. 'Ten difficulty levels. View through cockpit with flight instrumentation'.
	£7.95	Spectrum	●	Flight Simulation	48K	●			●			S10	Also on ZX81 (£5.95). 'Shows control panel & control view'.
	£17.20	Tandy TRS-80	●	Jumbo	16K	●			●			M6	Also on Genie I, II & BBC Model B. 'Simulation of piloting a Jumbo'.
	£3.95	Texas Instruments 99/4A		Bomber	16K	●			●			A8	Also available on disk. 'Must land plane & bomb skyscrapers'.
Football	£29.99	Atari 400	●	Kick Back	8K			●			●	T4	Also available on Atari 800. Needs joystick to run. 'Beat the high score'.
	£19.55	Atari 400	●	Soccer	8K			●				T4	Also on Atari 800. 'Aerial view of field.' Reviewed 11.3.83.
Frogger Type	£5.50	Commodore Vic-20		Wacky Waiters	3.5K	●			●			I6	'Waiter serving drinks in hotel. Has to hop from lift to lift'.
	£9.99	Commodore Vic-20		Hopper	3K	●			●		●	R2	'A version of Frogger'.
	£5.95	Spectrum		Horace Goes Ski-ing	16K	●			●			S10	'Sequel to Hungry Horace. He must cross busy road, fetch skis & ski down slope'.
Golf	£7.95	Dragon 32		Golf	32K	●			●			S7	'For one or two players. Full handicapping system'.
	£3.75	Spectrum		Golf	16K	●			●		●	R3	'For one or two players. Choice of nine or 13 holes'.
	£3.75	Sinclair ZX81		Golf	16K	●			●		●	R3	'Similar to other golf games, in black and white'.
Helicopter	£24.95	Commodore Vic-20	●	Chop Lifter	8K			●	●		●	A3	Also on Commodore 64. Needs joystick to run. 'Vic version of USA's best-seller'.
Jigsaw	£14.99	Atari 400	●	British Heritage Jigsaw Puzzle	8K	●						T4	Also on Atari 800. 'Educational game with selective difficulty'.
Kong Type	£7.95	Commodore Vic-20		Bonzo	8K	●			●		●	A3	'Workman dodges robots on split-level. Sound & full graphics.
	£8.00	Dragon 32		Donkey King	32K	●			●		●	M16	'Popular arcade game'.
	£9.95	BBC Model B		Monsters	●			●				W1	'The player has to run up & down ladders & along walls, pursued by monsters'.
Maze Type	£24.95	Dragon 32		Ghost Attack	N/A			●			●	D3	'The aim is to avoid & eliminate ghosts which roam a maze'.
	£5.95	Spectrum		Hungry Horace	16K	●			●			S10	'Animated maze game with sound & full graphics'.
	£5.95	Spectrum		Muncher	16K	●					●	S9	'A monster munching marathon'.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied: Cassette	Media Supplied: Disk	Media Supplied: Cartridge	Mail order avail.	Hardware Required: Disk drive	Hardware Required: Joystick	Hardware Required: Other	Publisher/ Distributor	Comments
	£8.00	Spectrum		Spectres	16K	●							B3	'An increasingly difficult maze game. The object is to fit light bulbs & destroy ghosts'.
	£10.00	Sinclair ZX81		Mazogs	16K	●							B3	'Three levels. Find & collect treasure in a maze & escape'.
Miscellaneous	£29.95	Atari 400	●	Picnic Paranoia	16K			●	●		●		C8	Also on Atari 800. Needs joystick to run. 'A graphics game based on picnic site'.
	£4.95	Colour Genie		Breakout	16K	●			●		●		M9	'Different levels of skill'.
	£6.95	Commodore Vic-20		Amok	5K	●			●				A3	'Chased by robots in enclosed room. Different levels of difficulty'.
	£9.95	Commodore Vic-20		Black Squid	3K	●			●		●		C8	'Get men to shore in shortest time'.
	£24.99	Commodore Vic-20		Mutant Herd	8K			●			●		T4	'Protect a powerhouse from mutants. Enter their burrows & destroy eggs'.
	£6.90	Dragon 32		Dead Wood	32K	●			●				A5	'A game for all the family'.
Pacman Type	£9.95	BBC Model B		Snapper	16K	●			●		●		W1	'Based on Pacman'.
	£9.50	Colour Genie		Chomper	16K	●							K2	'Based on Pacman'.
	£8.00	Dragon 32		Jerusalem Adventure	32K	●			●				M16	'Aim is to get treasure & avoid being eaten'.
	£8.00	Dragon 32		Scarfman	32K	●			●				M16	'Based on Pacman'.
	£4.95	Spectrum		Gnasher	16K	●			●				R3	Joystick optional. 'Based on Pacman using Beano characters'.
Pool	£8.50	BBC Model B		Billiards	32K	●			●				H3	Available on disk. 'A game for all ages'.
Racing	£7.95	Dragon 32		Grand Prix	32K	●			●		●		S7	'For one or two players, features eight Grand Prix tracks & 10 levels of difficulty'.
	£21.95	TI 99/4A		Car Wars	16K			●	●				T5	'Race through maze whilst avoiding computer controlled car'.
Shooting	£29.95	Atari 400	●	Claim Jumper	16K			●	●		●		C8	Also on Atari 800. 'A two player shoot-out over gold nuggets & cash'.
	£29.95	Atari 400		Shamus	16K			●	●		●		C8	'Player has to move through lair avoiding hazards'.
	£6.84	BBC Model B	●	Invisible Man	32K	●			●				C9	Also on Commodore Vic-20. 'Aim is to shoot man who keeps disappearing'.
	£9.99	Commodore Vic-20		Quacker	3K	●			●		●		R2	'Aim is to shoot down ducks & rabbits on shooting gallery'.
	£19.95	Commodore Vic-20	●	Spiders of Mars				●	●				A3	'Popular game for the Vic-20'. Also on Commodore 64.
	£5.95	Spectrum		High Noon	16K	●			●		●		A6	'Clean up chaos & disorder in town'.
Space	£9.95	Dragon 32		Dragon Trek	32K	●			●		●		S7	'A version of Star Trek with ten levels of difficulty'.
	£5.95	Spectrum		Android Run	16K	●			●		●		A6	'Control android to shoot walls, kill mutants & reach central complex'.
	£5.95	Spectrum		Cosmos	16K	●			●		●		A6	'Defend space convoy from aliens & asteroids'.
	£5.50	Spectrum		Schizoids	16K	●			●				I6	'Space bull-dozer nudges shapes into black hole'.
	£4.95	Spectrum	●	Star Trek	48K	●			●				R3	Also on ZX81 (£3.95). 'One player, sound & full colour graphics strategy game'.
Space Invader Type	£7.99	BBC Model B		Swoop	32K	●			●				M7	'Written in machine code with full colour & high resolution graphics'.
	£7.50	BBC Model B		Model B Invaders	32K	●			●				I4	'A Space Invaders game with high resolution & colour graphics'.
	£9.99	Commodore Vic-20		Orbis	3K	●			●		●		R2	'Based on Missile Command. Fast & colour'.
	£19.95	Dragon 32		Cosmic Invaders	N/A			●					D3	Joystick optional. '15 levels of difficulty'.
	£4.95	Spectrum		Intruders	16K	●			●				Q1	'Includes mutants, random saucers, bonus base & 14 different aliens. Sound & colour'.
	£5.00	Spectrum		Spectral Invaders	16K	●							B3	'For one or two players. Increasingly difficult, high resolution colour graphics'.
	£21.95	TI 99/4A		Invaders	16K			●	●				T5	'Based on Space Invaders. After every two screens a new character appears'.
	£3.95	Sinclair ZX81		Invaders	4K	●			●				S9	'Based on Space Invaders'.
Sport	£33.35	IBM PC		Decathlon	64K		●			●		●	I3	Needs colour graphics adaptor & direct drive colour monitor. 'For up to six players'.
Variety	£5.95	Commodore Vic-20		Innovation Cassette	48K	●			●				M8	'Three tapes each containing seven games'.
	£5.95	Spectrum		Over the Spectrum	16K	●			●				M8	'Three tapes each with 10 games. Defender to geometry, beginners to advanced'.

HOME

Sports and Clubs	£78.00	Sharp MZ80A		Clubman	48K	●			●				S8	Golf handicapping and competition results system complying with 1983 regulations.
	£575.00	Apple II	●	Tabs Golf Package	48K		●		●	●			T3	Alsom on MS/DOS (64K). Maintains members handicaps including 1983 regulations.
	£28.18	Epson HX20	●	Horse Race Forecast	48K	●			●				K9	Also on Newbrain and Sharp. A punters aid to betting.
	£28.69	Sharp MZ80A	●	Navex	48K	●			●				K9	Also on MZ80K. Simulations of navigating a yacht on the English Channel.
Home	£19.99	Atari 400	●	Home Financial Management	8K	●						●	T4	Also on Atari 800. Needs Atari Basic cartridge. Aids money management.
	£9.95	BBC Model A	●	Desk Diary	16K	●			●				W1	Also on BBC Model B. Consists of address book & diary planner (plus instructions).
	£24.99	Commodore Vic-20		Vic Music Composer	8K			●					I4	Aids to aspiring composer. Also for entertainment and education.
	£19.95	Epson HX20	●	Home Budget	16K	●			●				K1	Also on Sharp, MZ80 & Osborne. Keeps records of home finances with graphics.
	£14.95	Sharp MZ80A	●	Sam Analysis	3K	●			●				S8	Designed for balancing home debits & credits.
	£10.00	Spectrum		Spec File	48K	●			●				A5	Stock control program useful in home, e.g. record collection, etc.
Miscellaneous	£12.95	Commodore Vic-20		Home Office	5K	●			●				A3	Comprises VicPro (word processor) & VicData (A database program).

UTILITIES

Basic	£201.25	CP/M		Basic 80	48K		●		●	●		L1	Industry standard Basic.
	£235.70	CP/M		Basic Compiler	48K		●		●	●		L1	Companion to Basic 80. Allows programs to run faster.
	£80.50	CP/M		BDS C Compiler	48K		●		●	●		L1	A subset of 'C' that enables its implementation. Includes symbolic debuggers.
	£121.90	CP/M	●	C Basic	64K		●			●		X1	Commercial Basic. Also on CP/M86 (£265.65).
	£213	Any Z80		X-Basic	48K		●			●		X1	Built-in matrix functions. Supports MP/M record locking. Graphics option.
Basic Upgrader	74.75	Commodore 64	●	VicTree	64K	●			●			S5	Also Commodore Vic-20. Also on floppy (£92.00). Adds 50 commands to Basic.
Business Graphics	£471.50	16-bit machines		Micro-Graphpower	128K		●		●	●	●	I2	Needs plotter. Business graphics which plots business data.
	£120.75	Apple III	●	Business Graphics	48K		●			●		P6	Also on Apple II (£125.35). Supports range of plotters & pie-charts, etc.
	£149.50	IBM PC	●	Graph Magic	96K		●		●	●		F1	Also on Apple II, III. Displays files graphically. Reviewed 18.3.83.
Card Index System	£215.05	Apple II	●	Visidex	48K		●			●	●	R1	Also on IBM PC. Needs printer. One record/screen designed for cross referencing.
	£178.25	CP/M	●	Cardbox	48K		●		●	●	●	C6	Also on MS-DOS. Needs 24×80 VDU & 100K disk storage.
Communications	£102.35	Apple II		ASCII Express — The Professional	48K		●		●	●	●	P4	Needs RS232. Asynchronous serial communications package.
	£448.50	Apple II		Editel	48K		●		●	●	●	O1	Needs modem. A Viewdata frame word processor designed to aid data editing.
	£626.75	Apple II		Owlsync 3780	48K		●		●	●		O1	A full IBM 3780 emulator package allowing communication up to 2400 Baud.
	£454.25	Apple II		Owltel	48K		●		●	●	●	O1	Needs modem. Allows access to Prestel & private viewdata systems.
	£149.50	Apple II	●	Terminal Utilities	48K		●		●	●		C1	Also on Apple IIE. Converts Apple II to intelligent terminal. Speeds of up to 9600 BPS.
	£57.50	CP/M		Xcopy 1.0	64K		●		●	●		X1	Disk copy utility for Cromemco machines. Copies 8" or 5¼" single/double sided.
	£454.25	CP/M	●	Micro-Linkline	64K		●		●	●		I2	Also on UCSD-P. Teletype comms for transferring datafiles.
	£575	CP/M	●	Bisync AC-3780	64K		●		●	●		E9	Also on MP/M & CP/M86. Micro to mainframe comms through IBM terminal emulation.
	£41.40	IBM PC		Asynchronous Communications	64K		●			●	●	I3	Needs asynchronous comms adaptor. Makes PC act as asyncs comms terminal.
	£117.30	IBM PC		IBM 3101 Emulation Program	64K		●			●		I3	Makes PC act as 3101 terminal provides 3270 emulations when connected to host.
	£638.25	IBM PC		PC SNA 3270 Emulation	128K		●			●	●	I3	Needs SDLL adaptor card makes PC act as IBM 3270 terminal.
	£22.43	Sharp MZ80A	●	Zen	48K	●			●			K1	Also MZ80K & B. Full Z80 editor/assembler.
Connector	£115.00	IBM PC	●	Interlink	48K		●			●		T2	Also on Sirius, Apple II, Xerox, Osborne etc. Connects processors for downloading.
Database	£132.25	Apple II		DB Master	48K		●		●	●		M5	Available on hard disk. Allows 1K records over 100 fields. Report generation, etc.
	£224.25	Apple II		Informex Database System	48K		●		●	●		I1	Database system which can be used to & update info on any type of record.
	£402.50	Apple II	●	Mailist	48K		●		●	●	●	A4	Also for IBM PC & Corvus Concept. Requires hard disk. A networking product.
	£96.60	Apple III	●	PFS: File	48K		●			●		P6	Also for Apple II (£135.70). Used in tandem with PFS (£96.60).
	£215.05	Apple II	●	VisiFile	48K		●			●		R1	Also on IBM PC (£273.70; 64K). A database program suitable for up to 500 entries.
	£217.35	Apple IIE		VisiTrend + VisiPlot	64K		●		●	●		R6	Also for CP/M. Graphic representation of data. Compatible with VisiCalc.
	£10.30	BBC Model B		Filer	16K	●			●			M7	Allows searching, sorting, saving & recovery of data.
	£201.25	CP/M	●	Dataflow II	56K		●		●	●		G1	Also on CP/M 86. Needs 160K disk space. Extract files to link with other systems.
	£201.25	CP/M		Datastaff	64K		●			●		X1	Data entry & retrieval system. Interfaces with WordStar.
	£499.74	CP/M		dBase II	48K		●		●	●		E1	Micro DBMS. Can be used for high level programming for a range of applications.
	£557.50	CP/M		Superfile	56K		●		●	●		S4	Multi-file database giving application package information.
	£166.75	CP/M		Supersort I16	64K		●		●	●		M10	A sort utility for handling various forms of data files. Mainframe-like additions.
	£1,840	CP/M	●	MDBS II	64K		●					T2	Also on CPIM86, MS-DOS, Turbo DOS, Unix and Xenix. Mainframe — like facilities.
	£68.42	Newbrain		Invoice & Credit Program	32K	●			●			E2	The invoice program allows you to put in your own information and design invoice.
	£29.32	Newbrain		Database 40/S	32K	●			●			E2	Information gatherer, stores large quantity of information & can be interrogated at will.
Debugger	£258.75	CP/M	●	Animator	64K		●		●	●		M11	Also on UNIX & MS100S, interactive source level debugging tool for CIS-cobol.
File Transfer	£132.25	CP/M		Bstam	16K		●		●	●	●	L1	Needs common interface ports or modem access. Utility for transfering CP/M files.
Graphics	£34.50	Apple II	●	Graphic Utilities	48K		●		●	●		C1	Also for Apple IIE. Parameter driven machine code programs' high res graphics.
	£24.95	Atari		Constructor	48K		●		●	●	●	C8	Less experienced & new programmers can design animated sequences.
	£9.95	BBC Model A	●	Creative Graphics	16K	●			●			W1	Also for BBC model B.30 programs on cassette produce range of pictures & patterns.
	£24.95	BBC Model B		EDG Graphics Package	32K	●			●			S7	Computer aided design package. Reviewed 11.3.83.
	£50.60	CP/M		CP/M Graphics	64K		●			●		D4	Range goes up to £421.70 & conforms to GKS Graphics Standard.
Language	£488.75	CP/M	●	CIS Cobol	64K		●		●	●		M11	Also on Unix. Compact, interactive ANSI 74 standard implementation of Cobol.
	£1,109.75	CP/M	●	Level II Cobol	96K		●		●	●		M11	Also on Unix & MS-DOS. High level ANSI 74. Compiler, mainframe-compat code.
	£396.00	CP/M		Fortran 80	48K		●			●		T2	Useful for scientific applications, where Pascal is inefficient.
	£285.20	CP/M	●	Pascal — MT+	64K		●			●		X1	ANSI standard Pascal for Z80 processors. Also on CP/M 86 (£484-90).
	£210	CP/M	●	Supersoft C Compiler	48K		●		●	●		M4	Also on CP/M86, MS/DOS, PC. DOS. Fast implementation of C.
	£16.85	BBC Model A	●	Lisp on the BBC	16K	●			●			W1	Also on BBC Model B. Book available £7.50. Lisp is artifical intelligence language.
	£230.00	CP/M	●	PROPascal	48K		●		●	●		E1	Also on C/DOS. Needs ZX200 disk drives. Native code Pascal.
	£40.19	Sharp MZ80A	●	Forth	N/A	●			●			K1	Also on MZ80K & Osborne. Allows implementation of full fig Forth.
	£421.70	Any 8 or 16 bit machine		PL/1	48K		●			●		D4	A compact implementation based on Ansi standard general purpose subset of PL/1.

How does the world's biggest selling micro compare with the world's biggest computer company's micro? The no-holds-barred test in this month's Which Micro & Software Review reveals some surprises. As a home computer the ZX81 is not only easier to use and program – it actually rivals the IBM on operational speed for some applications.

Which Micro & Software Review's side-by-side tests reveal other surprises too. Would you have thought that the Cambridge Lynx would slay the Welsh Dragon 32? Better read the test.

We also line up the ageing VIC 20 against the upstart Oric I. A real clash!

Our software supplement reviews a stack of new programs–games, educational and business. And our listings are designed to move you off the

FAIR COMPARISON?

nursery slopes of programming and into areas with a touch of sophistication, using time-savers like letter variables and character statements.

If you want some quick fun, there are five new programs on a free disc with every copy of the April issue. They'd run on ZX81, Spectrum, BBC, Vic 20 and PET. You really can't afford to miss April's Which Micro & Software Review.

WHEN WE TEST A MICRO IT STAYS TESTED.

	Price inc vat	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied			Mail order avail.	Hardware Required			Publisher/ Distributor	Comments
						Cassette	Disk	Cartridge		Disk drive	Joystick	Other		
	£350.75	IBM PC	●	Lattice-C	64K		●		●	●			L1	Also on MS/DOS. C Compiler for 16 bit machines — full implementation & execution.
Linker	£224.25	CP/M		Plink 2	48K		●		●	●			L1	Up to 8 megabytes.
Office Information	£402.50	Apple II	●	Prophet II	48K		●		●	●			A4	Also on IBM PC & Corvus Concept. Information system which acts as a noticeboard.
Operations	£59.80	CP/M		Operating Guide	48K		●		●	●			E1	Works by putting CP/M to sleep & replacing it with operating environment.
Operating system	£22.94	Apple II		Fasdos	48K	●			●				P4	Disk operating system for Apples which speeds up location of binary & Applesoft files.
	£277	CP/M		Concurrent CP/M 86	48K		●			●			T2	Enables four separate tasks to run in a single user station.
	£295.20	Any 8-bit micro		CP/M+	128K		●			●			D4	Upward compatible from CP/M enhanced eight-bit micro. O/S.
	£126.50	Any 8-bit micro		CP/M 2.2	64K		●			●			D4	O/S for eight-bit micros with over 1.5 million users.
	£379.50	Any 8-bit micro		MP/M	64K		●			●			D4	Multiuser, multitasking. Features record & file locking, date & time stamping etc.
	£210.80	Any 16-bit micro		CP/M 86	64K		●			●			D4	Manages up to one megabyte of RAM & allows up to 128 megabytes of on-line storage.
	£548.20	Any 16-bit micro		MP/M 86	64K		●			●			D4	Multi-user. Multi-tasking. Multi-user capability with multi-programming for each user.
	£168.70	Any 8 or 16 bit machine		CP/Net	64K		●			●			D4	A CP/M compatible O/S designed to access. Local & networked resources.
	£295.20	Motorola MC68000		CP/M 68K	64K		●			●			D4	Extends CP/M to Motorola MC6800 microprocessors. Single user, single tasking.
Program Generator	£228.85	Apple II	●	Quickcode	64K		●		●	●			P4	Also on IBM PC. Program generator for dBase II.
	£126.50	CP/M	●	Forms-2	64K		●		●	●			M11	Also for Unix & MS-DOS Programming tool, for generating Cobol code.
	£379.50	CP/M	●	Last One	64K		●		●	●			S3	Also on MS-DOS and Apple DOS.
Programming Tool	£2,500	Apple II	●	Pascal Isam/Pascal Form	48K		●		●	●			A4	Also on IBM PC & Corvus Concept. Needs Corvus hard disk. Pascal prog tool.
	£287.50	CP/M	●	Fileshare	48K		●		●	●			M11	Also on MP/M. Bank-switched memory or CP/M Network.
	£7.95	Dragon 32		Dragon Selection 2	32K	●							D3	Four utility programs which can be listed to see how the program works.
Telex	£2,113.70	Superbrain	●	Micro Telex	64K		●		●	●			E1	Also on Televideo 802. Enables automatic sending — releiving or telex by micro.
Testing Tool	£95.82	CP/M 80	●	Diagnostics II	32K		●		●	●			M4	Also on CP/M86 and MS/DOS. Tests systems.
Time Recording	£862.50	Commodore 8000	●	Minuteman	32K		●			●			C4	Also on Commodore 4000. Time recording system. Can produce range or reports.
	£402.50	CP/M86	●	Time Recording System	64K		●		●	●			D2	Also on CP/M 80. Control overman/hour expenditure by job or account number.
Utilities	£23.00	Apple II	●	Computech Utilities Disk II	48K		●		●	●			C1	Also on Apple IIE. Error checking, copying. Single disk copy. Label disk.
	£115.00	IBM PC		C-Food Smorgasbord	64K		●		●	●			L1	Decimal arithmetic, low level & terminal independent input & output.

A **A1** ACT Pulsar, 021-454 8585 **A2** Advanced Quality Software, Norwich 21117 **A3** Audiogenic, Reading 595647 **A4** Atlantic Software, Nottingham 412777 **A5** A & F Software, 061-223 6206 **A6** Abbex Electronics, 01-203 1465 **A7** Automata UK, Portsmouth 735242 **A8** Apex Trading, Brighton 36894 **A9** Acornsoft, Cambridge 316039 **A10** Advent Data Products, Melksham 706289 **A11** Appropriate Technology, 01-625 5575

B **B1** Bonsai, 01-580 0902 **B2** Bristol Software Factory, Bristol 23430 **B3** Bug-Byte, 051-227 2299 **B4** Bytech, Reading 61031 **B5** British Olivetti, 01-785 6666

C **C1** Computech Systems, 01-794 0202 **C2** Compact Accounting, Dorking 887373 **C3** Claremont Controls, Rothbury 21081 **C4** Computer Services Midlands, 021-382 4171 **C5** Comshare, 01-222 5665 **C6** Caxton Software, 01-379 6502 **C7** Cyderpress, Wallingford 37769 **C8** Channel 8 Software, Preston 53057 **C9** Chalksoft, Wellington 7117 **C10** Centronics, 01-581 1011 **C11** Commodore Business Machines, Slough 79292

D **D1** Dataview, Colchester 869414 **D2** DEC, Basingstoke 59200 **D3** Dragon Data, Kenfig Hill 744700 **D4** Digital Research, Newbury 35304 **D5** Discom, Evesham 3591 **D6** Datatrade, Northampton 22289 **D7** DNCS, 061-643 0016 **D8** DRG, Weston-Super-Mare 415398 **D9** Data Systems Division, Bedford 223889

E **E1** Encotel Systems, 01-686 9687 **E2** Elstree Computer Centre, 01-953 6921 **E3** Epson (UK), 01-900 0466

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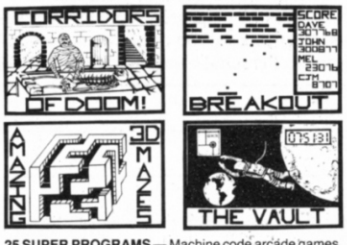

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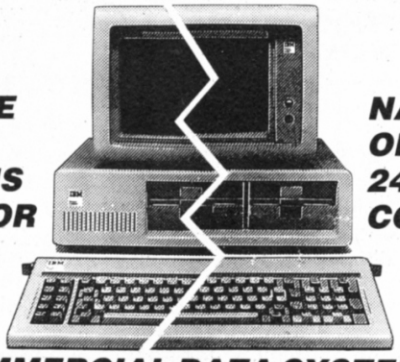

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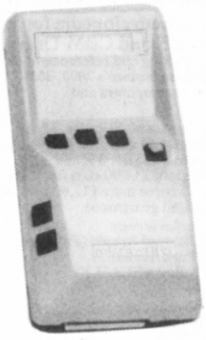

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The Software Manager

IJK Software Ltd.
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TEL: 0253 21555

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£1 to £1,500 cover	£8.00 pa	£10 (excess)
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Ask for details

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Whose pocket are you lining?

It may be the "norm" for someone to charge 40% on top of your pay. But there is now simply no necessity for you to be denied all of this potential additional income.

The National Computer Contract Directory is now working and both contractors and subscribers are deriving major benefits:

FOR CONTRACTORS	FOR SUBSCRIBERS
1. Substantial increases in income. **2.** Far wider choice of assignments. **3.** Service completely free of charge!	**1.** Positive reduction in costs. **2.** Access to a large central source of people AND information. **3.** Total cost of approximately £1 per day!

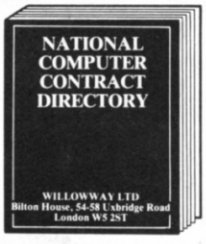
Computer users who would like to find out more about becoming subscribers, please ring Dori - 01-567 5501.

Bringing contractors and computer users into direct contact, in a major and practical way, is the service the industry has been asking for. The National Computer Contract Directory fulfils this need and is becoming the standard tool for anyone whose job it is to resource a project.

Subscribers to date include BANKING, INSURANCE, MANUFACTURING, FINANCIAL, SOFTWARE HOUSES, ELECTRONIC, GOVERNMENT, COMPUTER MANUFACTURING, TELECOMMUNICATIONS, AUTOMOTIVE, PETROCHEMICAL, RETAIL ETC.

FOR CONTRACTORS: Increases in income have varied from **£52** to **£123** per week.

FOR SUBSCRIBERS: Savings in costs have varied from **£50** to **£370** per week!



The National Computer Contract Directory uses technology to provide information at a realistic cost and ensures that **all** of the reward is paid to the achiever.

Your entry will remain permanently in the directory. All you have to do is complete this form. It costs you nothing and gives you access to substantial increases in income and a wider choice of contracts.

DIRECTORY ENTRY DETAILS

THE DIRECT ALTERNATIVE

This section is not for publication. (Contact details are not released without prior consent).

NAME: –

ADDRESS

TEL. NO.:

NO OF YEARS EXPERIENCE

PREFERRED UK WORK LOCATIONS:

WILL YOU CONSIDER WORKING ABROAD?

WHEN WILL YOU BE ABLE TO START YOUR NEXT CONTRACT? MONTH YEAR

JOB CATEGORIES

CATEGORY	NO OF YRS	CATEGORY PREFERRED
PROGRAMMER		
ANALYST		
ANALYST PROGRAMMER		
SYSTEMS PROGRAMMER		
CONSULTANT/PROJECT MANAGER		
OTHER – SPECIFY		

HARDWARE EXPERIENCE MACHINE(S)	MONTHS	PROGRAMMING LANGUAGES E.G. APL FORTAN ETC	MONTHS	APPLICATIONS SOFTWARE E.G. DCS TOTAL ETC	MONTHS	SYSTEMS SOFTWARE E.G. DOS MVS ETC	MONTHS	APPLICATIONS E.G. PAYROLL ORDER ENTRY ETC	MONTHS	ENVIRONMENT E.G. BANKING MANUFACTURING ETC	MONTHS

FURTHER INFORMATION: (NOT MORE THAN 50 WORDS) PROGRAMMERS ARE ADVISED TO DESCRIBE THE DEPTH OF THEIR PROGRAMMING EXPERIENCE AND ANALYSTS SHOULD LIST THOSE AREAS OF SYSTEMS ANALYSIS IN WHICH THEY ARE EXPERIENCED I.E. FEASIBILITY STUDIES, SYSTEM DESIGN, PROJECT RESPONSIBILITY, USER INVOLVEMENT, MANAGEMENT EXPERIENCE ETC. IN ADDITION YOU SHOULD MENTION ANY SPECIALIST EXPERIENCE YOU FEEL IS RELEVANT TO THE CURRENT MARKETPLACE.

PLEASE RETURN TO: **WILLOWAY LTD (THE NATIONAL COMPUTER CONTRACT DIRECTORY)**
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Virgin Games, a new entertainment home computer software company and part of the Virgin Group, is looking for a **first-class programmer** with team management experience to run its software development activities.

The successful applicant will need a good working knowledge of machine code and Basic for a number of popular home computers, considerable experience in working with computer graphics and games programs.

He or she will need to be **creative, gregarious, self-motivated** and have a good commercial feel for the home computer market.

If you are looking for an exciting challenge in the home computer entertainment field and you feel that you can match up to our requirements, write to us at the address below. Include your C.V. giving details of your computing experience and let us know, in no more than 500 words, why you think you should get the job.

Salary negotiable, according to experience.

Contact: **Nick Alexander** Managing Director

Virgin Games Ltd, 61/63 Portobello Road, London W11.

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Acorn and BBC users will find everything they want – and we mean everything – at our Nottingham retail store. For instance we have just been appointed distributors of the BBC Buggy, the clever little mobile featured in the television series "Making the Most of Your Micro" and BBC software. Don't worry if you can't get to Nottingham. Just send us a SAE and we will send you a list of dealers, and details of our mail order stock.

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Name: _____

Address: _____

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