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NEWS

JUNE 30-JULY 6 Vol 1 No 17

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CP/M on a plate

JAPAN'S JUKI PRINTER
Pro-Test of a professional
daisywheel at a hobbyist price

PRO-TEST OF THE DUET
Fujitsu's new micro gives
business more colour

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part 1**



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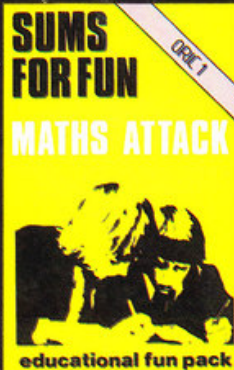
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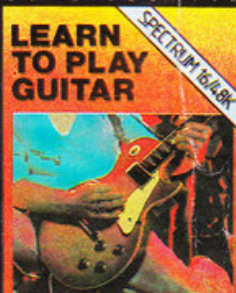
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house of horror**
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PULL-OUT Micropaedia Sound: Part 1

In the first of five parts —
Background and glossary,
Sounding out the Vic 20,
Unleashing the Dragon, Voices
of the Atari.

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PCN SPECIALS

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John King outlines other ways (strictly legal, of course) of acquiring the goods, in the first of a two-parter.



Atari Screen Action 25

More on the GTIA wonder chip from Les Howarth, who helps you put a bit of class into your gameplay.

PCN PRO-TEST: SOFTWARE

The Organizer

A package that makes CP/M more appetising by putting a menu in your hands — a boon for the busy office, reviewed by David Janda.



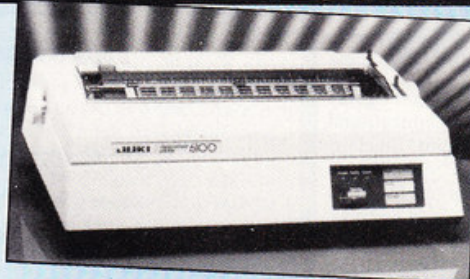
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A double-header from Ted Ball: Trace to help you dig out the bugs, and ZXText to mimic teletext.

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Daisywheel Debut 34

A major breakthrough at £399? Barry Miles reads a promising world debut into his test of the Japanese Juki 6100.

Apple UltraTerm

A peripheral to make Applemaniacs just stop and stare? Richard King thinks so. UltraTerm could set new standards for video displays.

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Duet 16 42

The 8086-based Duet 16 (another flank of the Japanese invasion) is put in a time trial against the IBM PC and Sirius. It looks competitive, says Mike Whitney.



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MSX calls the tune

by Max Phillips

A new hardware and software standard looks set to change the habits of home computer buyers. Fourteen Japanese manufacturers and two US firms have adopted the new MSX standard, defined by Microsoft (PCN, issue 16).

MSX is a standard for micros costing under £200. It covers hardware, based on the Z80, the Texas 9918 display chip and a General Instruments sound chip. And it covers software, based on a cassette operating system with a 32K Basic similar to the 16-bit GWBasic. So MSX systems are not only high performers. They're compatible. A

cartridge for one machine will run on any other MSX machine.

Japanese policy is obvious. MSX was designed for Japan's own home market where a lack of software was damaging the growth of home computers. MSX turns home computers into record players... the software becomes interchangeable. So the Japanese get out of a sticky problem.

But, on a wider scale, MSX may give all but the UK's top producers a hard time. Software houses will see little point in writing for non-standard machines with small user bases. With MSX, they can write one program for a whole range of

machines. Sounds unlikely? CP/M offered far less compatibility but you'd be hard put to find a top selling 8-bit business machine without it.

If you're unsure what to expect, MSX supports everything its hardware is capable of. So you'll have features like sprite graphics available from Basic. Other devices which can be supported include touch pads, joysticks, light-pens, disks, speech synthesisers and, of all things, FM radio! With companies like Yamaha and Pioneer involved what did you expect?

It would be simple to see MSX as the prime weapon of the so-called

and much awaited 'Japanese invasion'. Indeed, since deliveries to Japan of MSX software have already begun we are once again in the position of waiting for the Japanese to move. Their days of sitting on the fence and timid test marketing may soon be over.

But don't view MSX as solely a Japanese threat (or promise). Two American companies are already involved and a number of European manufacturers are said to be 'interested'. It may take a while for the first MSX products to make it into the shops, but it does look as though such standards will shape the future of the industry.

Removable Winnie deal

Bouncing back after reports of its death in last week's PCN the removable Winchester drive is alive and well and soon to be manufactured in the UK.

Although Seagate has temporarily shelved its production model (PCN, issue 16) another US company, DMA Systems, has concluded a deal with UK company Newbury Data. Newbury will distribute and eventually manufacture DMA's Micro-Magnum system here.

The Micro Magnum is billed as the first fixed and removable 'true' Winchester in volume production. The idea is to combine the advantages of mass data storage and fast access with the ability to remove the media floppy-style.

One 5 1/4 in Winchester drive is fixed in the unit along conventional lines, while a second drive accepts cartridges containing identical hard disks.

Newbury has renamed the system the Newbury Data 505 and has stocks awaiting dealers. End-user prices are expected to be around the £2,000 mark. The company will begin manufacturing here in November and in the meantime will import stocks from the US. The system's drives have identical access times and a capacity of 5Mb.

Newbury is also promising a low-cost 5Mb cartridge disk drive for the first quarter of 1984. This removable-only unit is expected to cost around £1,000.



Stocks of Newbury's removable Winchester are awaiting dealers.

Ile Corked

by Nigel Cross

Those of you who have or are about to purchase a European Apple IIe could find you have a problem. It has become apparent that the mother-board has undergone a design change in Cork.

This re-design is thought to have been in order to allow the correct colour signal generation for the European market (ie PAL/

SECAM). Unfortunately, this relatively small adjustment to the design has been structured in such a way as to move the auxiliary port closer to slot 3 (where they are wired in parallel, thus being mutually exclusively in use). No real hardship here, but for reasons best known to Apple both RAM and ROM have been moved.

This small adjustment is where for some US-designed and manufactured interfaces, the problems begin. For instance, the voice input

module (VIM) from Voice Machine Communications requires the installation of a card in one of the I/O slots plus another PCB to be located piggy-back fashion on the motherboard. In the US there is no problem. In the UK, no chance—it just doesn't fit. How many other interfaces this is likely to affect is a matter of conjecture.

Apple (UK) was not aware of this until very recently. It says the responsibility for the connection lies with the manufacturer.

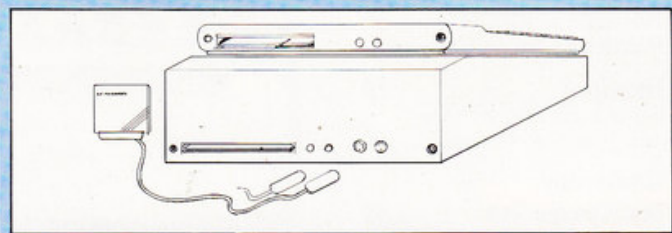
Primary aim

By November Spectrum users should be able to buy educational software under a joint Sinclair/Macmillan label.

The first batch of about ten titles will focus on reading and science, while mathematics titles will be out next year. Prices are expected to be around £9.

The programs are aimed at 5-11 year olds for both home and school use, they can be used on their own or with specialist Macmillan publications, says the manufacturer.

They will sell through Sinclair outlets and from Macmillan, Basingstoke (0256) 29242.



PEEK AT MICRODRIVE — PCN is proud to bring you the latest contribution to the 'I've actually seen the Microdrive' competition. Our artist's impression, culled from hearsay, crossed lines and normally reliable sources, will we predict prove more accurate than the false alarms (many from Sinclair itself). The serial interface necessary to communicate with the drives is housed in a special console unit which actually fits under the Spectrum, leaving the keyboard on a standard 'typist's slant'. The top of the unit has a female edge-connection and the computer, so we are informed, simply slides up the console and connects. The edge connector is continued at the rear of the console and connects. It is continued at the rear of the console so you can configure the printer.

Workshop softens Lisa

by Richard King

Apple's flagship and putative masterpiece, Lisa, has come a step closer to being a real computer rather than a neat but expensive executive bauble. Apple has released Workshop, the first of a line of development software for the machine. 'Future availability' of Toolkit 1.0 was also announced, but no details beyond 'it does some amazing things'.

Workshop consists of an environment, in the Lisa tradition, which provides a mouse-editor, windows, icons and so on. Everything is done

with the mouse, and all similar functions are done in identical ways, as one has come to expect from Lisa.

The programs may be written in Pascal, BasicPlus or Micro Focus level 2 Cobol, but a 68000 assembler is also available. Jobs may also be done in the background, so time-consuming but automatic tasks such as cross-references and printouts can be done without clogging up the machinery.

One of the benefits of using a real 16-bit processor, as opposed to a half-baked impostor, is that it is

much easier to compile programs into pure machine code. Instead of interpreted p-code with its in-built sluggishness, you get much of the real speed of a good fast chip.

Also included in the package is QuickDraw, a graphics language which does the clever typesetting and drawing that makes Lisa so spectacular, but this is available only from Pascal.

Prices are BasicPlus £240, Micro Focus Level 2 Cobol £800, Pascal £480. They will be available in August from Lisa Information Centres. Toolkit will come later.



Acorn is upstaged

By David Guest

Big fleas, so it's said, have little fleas to bite them.

And there was Acorn occupying centre stage at the BBC Micro User Show, outmanoeuvred and often bitten by little fleas. With no Electrons, second processors, speech modules or Tubes to serve as insect repellent, Acorn saw its exhibits matched and surpassed by many of the other, lesser-known companies.

Its display consisted of new games and educational software that were advertised some time ago but are only just out. A spokesman declared that the company's purpose in Manchester last week was to cram machines on to the stand to let as many people as possible try out the packages.

In a limited way this is a worthy aim, but there was much chuckling up sleeves on other stands where far more was on display. And poor Acorn even got stung by the public — reluctant to disturb the package-

ing of its software offerings by removing the cassettes, it put them on display intact and promptly lost a few to light-fingered visitors.

Elsewhere, legitimate transactions were taking place. Pace Software Supplies did a brisk trade with its Disk Filing System, and Watford Electronics sold out of its 13 ROM Socket board. At the Asky Computing stand something more sinister seemed to be happening — a smartly turned-out Japanese gentleman was asking questions of the proprietors in fractured English. Industrial espionage in Manchester? No, but the object of his interest was a plotting program.

Nobody reported many sales of books, but this was a serious show for literature and educational software seemed to have the upper hand over the games. Unless this is a false impression the BBC's endorsement of Acorn's micro is serving its purpose.

And it's getting the message across the generation gap, which



UMIST: scene of the BBC Show

might be assumed to thrive in Manchester if it does anywhere in the country. For sure there was a new software house born of the talent of a 17-year-old prodigy, but visitors to the show were of all ages and they had to be dedicated last Saturday to spend much time in the Renold Building of UMIST (Uni-

versity of Manchester Institute of Science and Technology).

The heat in the hall was of tropical intensity and the crowd would have done justice to a United/City derby match. One visitor grumbled gently: 'You can't get a pass out. So you stay in... and pass out.'

OutPaced . . .

The pressure on Acorn's Disk Filing System (DFS) is growing with the launch of Pace Software Supplies' Amcom DFS at less than a third of Acorn's price.

The Pace system, written by Chesham software producer Amcom, is implemented in a single 8K EPROM. It claims full compatibility with Acorn's 16K DFS and according to Pace it gives you some extra features.

These include the ability to store up to 63 files per disk, with file names of up to 15 characters.

Nor does it make any demands on user memory, since no part of the DFS is moved into RAM. Other features are a built-in formatter and the ability to use any Acorn-compatible disk.

The Amcom DFS is available now. It comes with a manual and fitting instructions for £29.95 from Pace on Bradford (0274) 575973.

. . . Watford plugs the gap

Watford Electronics was showing off another DFS, again undercutting Acorn and offering extra features.

This is a 16K implementation which will give you a maximum of 62 fields per disk side, and it uses the same amount of RAM as Acorn's version. Watford says it will read

40-track disks on 80-track drives, including Acornsoft protected games disks, and that there is no need to switch between 62 and 31 file modes.

The ROM itself costs £42.

Watford also demonstrated a 13 ROM socket board — this is intended mainly to give you the capacity for more ROM-based software but it will also take 16K of RAM which is switched into operation by any Write signal to the sideways ROM area.

The board is supplied ready-built for £35. For more information contact Watford Electronics on Watford (0923) 40588.

Full marks for Clares

Local software supplier Clares of Winsford won the ultimate accolade for its educational software — visiting teachers thought it was excellent.

The products were largely for children of pre-school and primary school ages. But Intro, a Logo-like language, will probably appeal to children of up to three score years and ten.

It uses the visual techniques of turtle graphics to demonstrate programming concepts and methods in a mathematical context. Its main difference from Logo, at first sight, is in the screen layout where a section is given to you as a

scratchpad area with room for 20 or more instructions. Intro costs £7.95.

Some of Clares' utilities were also impressive. Its £5 joystick routine converts non-joystick programs to use joysticks and it gives you the opportunity to vary their sensitivity through the software. The routine is relocatable and you can save it in 100 bytes.

Clares is on (06065) 51374.

Torchure

Look out on July 20 for the silliest event of the year so far — the Torch Cambridge-to-Bradford run.

As in the prelude to the Olympic Games, a Torch will be carried by a runner up the Great North Road. But this Torch won't be an immortal flame — more like 35lbs of micro, unless Torch comes out with something lighter in its July 4 product launch extravaganza.

Sideways RAM from Ikon . . .

The company that stole a march on Acorn with its Hobbit storage system has pressed home its advantage by launching a sideways RAM board for the BBC Micro.

Ikon Computer Products released its Zero Memory option at the show, but it doesn't expect to have the unit available in production quantities for another four to

five weeks. The unit will give you about 9.5K, makes no demand on the machine's existing user memory and comes with a utility program that is intended to solve the problem of transferring software (in machine code or Basic) from a cassette to a Hobbit (PCN, issue 15).

The board will cost £29.95.

In response to public demand Ikon has smartened up the Hobbit. The floppy tape system now comes in a trim cream box with an 'improved' manual.

. . . and IEEE opens Beeb

If you get fed up with waiting for a BBC disk system you can always plug in a Commodore one.

Bradford Office Systems demonstrated at the show a new device from Cambridge Systems Technology that adds an IEEE interface to the BBC micro. It comes complete with an 8K EPROM that allows the user to hook up a Commodore disk drive and access data and programs on the Commodore disks.

The device, called the CSTprocyon, costs £325. In addition to its use with Commodore drives it can be used to hook up any other IEEE drive such as data logging equipment, plotters and scientific equipment.

Bradford Office Systems is on (0274) 726783.

VIEW FROM JAPAN



Epson clones a-plenty on show

From Serge Powell

One of the abiding mysteries of life in either hemisphere is why trade fairs should be called 'fairs'.

Have you ever tried to buy candyfloss at a trade fair? Or won a goldfish in a plastic bag? Of course not. Trade fairs are a serious business. Perhaps it's time they changed.

Tokyo hosted a couple of trade shows recently, one on business systems and the other on PCs, and I'd guess they aren't much different from their counterparts in the west. In fact one of the most evocative sights at the first was a particularly successful stand surrounded by a *mélée* of visitors, like a gaggle of old ladies jostling each other to get at old clothes at a jumble sale.

Not to say that the Japanese are exhibiting old clothes these days, but one of the telling features of a trade show is the way it reveals the preoccupations of the exhibitors. The predominant exhibits tell you something about which way the wind's blowing — and the things that aren't there are no less eloquent.

The Eighth Annual Business Show became something of a shop window for makers of office automation systems. There were 204 companies present, and 16,000 items on show (I didn't count them all — some things you have to take on trust).

The most interesting of the personal computer-related items were the ones in the prototype stage. There's a temptation to look at these devices and be conned into thinking that they are real. Tomorrow they might be, but today reality is more mundane.

Take for example one of the most interesting units at the Business Show — a metal box to protect your floppies from magnetic emanations. These evil rays steal through the air unheard and unseen with only one purpose — the corruption of your data. Almost anything can set them off — solar flares, close proximity to a Van der Graaf generator, perhaps even nylon shirts. How can you live in peace with yourself with no more than a flimsy cardboard box around your floppies? A lead model may be released later in the year to give them added protection against green kryptonite.

Some of the less adventurous Japanese manufacturers are homing in on daisywheels with a vengeance. Quality is the goal, and devices with no more than 15 or 20 characters per second were prominent — most offer full face, subscripts and superscripts, interchangeable wheels and other features. And the price is coming steadily down. The units on show will probably sell for less than £400.

There were a couple of novelties — Silver-Reed had a dedicated word processing PC built around a Z80 and Wordstar, running CP/M and sporting 15 word-processing function keys. For those of us with messy desks the unit combines processor, display and drives in a cabinet with a cavity across the bottom so that you can slide the keyboard away when you're not using it.

And 3in or 3½in disks were there in force, but relatively few drives, and few hard disks. This applied to the PC Show as well, where a further contrast was apparent in the portable field. I saw few large portables in the Osborne class, but plenty of small ones in the Epson style. With much of the development work going into flat-tube TVs and compact disks it may be that the Japanese will simply leave this market to Westerners of a sturdier build.

But they haven't ignored it completely. Toshiba has its token portable in a brief case, Sharp has its inelegant Gavilan-style PC5000, and there are others but the Epson clones predominate.

Meanwhile at least one of them looks likely to take on Sinclair on his own ground. The Sagor SG3000 made its first appearance at the PC Show; its memory starts at 2K but you can build it up to 32K, and its graphics and colour are exceptional. The Basic was written in Japan and looks similar to the Vic 20's — not the highest recommendation, perhaps, but the machine will only cost about £85 and negotiations are under way with a UK agent. Sagor, incidentally, made its name as a maker of coin-op amusement arcade games — a sign of the times.

Manchester's micro mart

by Ralph Bancroft

Depending on which legend you care to believe, Manchester was where they invented computers. With names like Mark I and Atlas they consisted of hundreds of valves, miles of wiring and filled a large room.

Things have come a long way since then. Computers with an equivalent power can now be packed into a box no bigger than a book and cost around £100.

Compec North demonstrated just how much the differences between mainframes, minis and micros have become blurred.

Undoubted star of the show was a new 32-bit computer from NCR called the 9300. At £22,000 it may be out of your range — but Atari and Texas Instruments are interested in its innards.

The 9300 comes on four printed circuit boards, and has 1Mb of RAM. That's 1Mb of 32-bit words, which equals 4Mb of 8-bit words!

Its unique feature is the four 32-bit processor chips that power it. No ordinary chips these. They come in small square packages that carry the equivalent of 70,000 transistors. Since NCR is the first company to get 32-bit chips into production machines, other manufacturers are beating a path to its door. 'Both Atari and Texas Instruments have expressed an interest in them,' an enthusiastic NCR man said.

The price/performance overlap was also to be seen with peripherals. Facit was demonstrating its 4544 full colour flexihammer printer. Its graphics performance was impressive — but so was its price, well over £2,000.

Just down the way Mannesmann

Tally was demonstrating its new A4 triple pen plotter — the Pixy-3. By doing several plots using different colour pens it could produce graphics every bit as impressive as the Facit. And the price? Just £690.

The plotter can be linked to any micro through an RS232C or parallel interface. Throughout the show it was happily zipping through a series of graphs, pie charts and bar charts picking up and dropping off its selection of pens en-route. It will be in the shops in a few weeks.

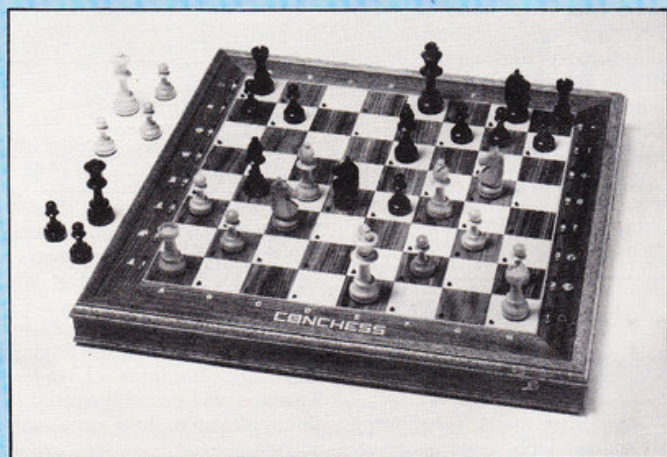
Also on the Mannesmann stand was the new MT80 dot matrix printer. It will also be in the shops in a few weeks and costs £328.

Two products that should have cost the same but didn't were the Gulfstream Hyperion and Anderson Jacobson Ajile IBM-compatible portables. The machines are identical and manufactured in Canada by Bytec.

Gulfstream is a Bytec subsidiary and upped the stakes in its battle with the Ajile by announcing price cuts at the show. The single drive version will now sell for £2,695 and the dual double density, double-sided disk drive version for £2,995.

Sixteen-bit machines were well to the fore at the show, with Cifer taking the prize for the cheapest implementation. Its add-on board for its Series 1 microcomputers costs £1,145.

Another British company out to make an impact with the 68000 is IMP. Its IMP-68 comes in a variety of options starting with a machine that houses 256K of RAM, an 8in floppy and 10Mb hard disk. Running the Unix-like operating system Idris it would set you back something like £10,000.



CHESS MOVE — Apparently there are three million chess players in the UK, and the chances are that many of you prefer to use standard pieces on a standard board. This new model from Conchess will let you do just that, giving you the challenge of an electronic opponent in a traditional style. The Conchess system lies in a cartridge which slots underneath the board — three models are on sale and according to the style of board you choose they cost between £179 and £279. Conchess is on 01-977 9850.

Prêt à porter Zita micro

The style-conscious executive should note that ITCS has revamped its Andromeda Zita portable.

The Executive (an increasingly



Neater Zita.

common tag) comes in a leather carrying case, with an optional monogram.

Standard features are a 10in screen, 128K main memory, and a Z80 running CP/M 2.2. Storage is provided by two or three 1Mb floppy disk drives or a range of hard disks from 5 to 24Mb. The character set includes pixel characters to give a resolution of 160 x 75 and there are RS232, IEEE488 and Centronics interfaces.

Prices start from around £1,600 and include a free voucher for ITCS software worth £2,500 and valid for two years. This allows you to choose what software you want bundled with the machine from ITCS's range of proprietary packages.

The Andromeda Zita Executive joins a choice of 90 different

custom-built models, including desk-top and portable systems sold under ITCS's special lease scheme. Purchase of ITCS software gives the buyer the 'loan' of a free machine.

ITCS was set up in 1981 with a call on £500,000. The Andromeda range was established last year with the Zita P, which ITCS claims was the world's first portable to use a Z80 with a floppy and to offer a 5¼in Winchester hard disk. These drives are supplied by the UK manufacturer Rodime, making ITCS one of the strongest flag wavers in the UK micro building business. Rodime has since launched 3½in Winchesters (PCN issue 1).

ITCS and a choice of maroon, black or brown leather is one Ashford (07842) 47371.



FAST CARD—This tightly-packed little card will allow users of the Euro-6 bus to plug a really fast processor into their system, the currently fashionable MC68000.

In fact this is one of the 'baby' members of the Euroka family, the 68008, which looks like an 8-bit to the rest of the system.

The card is produced in Finland and should be available in about four weeks. It will cost £470 from Hawke Electronics on 01-979 7799.

PCN Charts

PCN Charts give you an up-to-the-minute guide to the action in Britain's High Street stores. They're updated every two weeks, so you can follow the rise and fall of the top-selling games and micros.

PCN Charts are compiled from both independent and multiple sources across the nation. They don't take account of mail order sales, and in the case of the micro charts deposit-only orders are

also excluded. The prices quoted include VAT, and are for the no-frills models.

Both micro and games charts this week show what was selling best in the two-week period up to June 16. Our next update will be published in two weeks' time.

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

GAMES

TOP THIRTY

		GAME TITLE	PUBLISHER	MACHINE	PRICE
▲ 1	(2)	The Hobbit	Melbourne House	Spectrum	£14.95
▲ 2	(4)	Arcadia	Imagine	Spectrum	£5.50
▼ 3	(1)	Donkey King	Microdeal	Dragon	£8
▼ 4	(3)	Flight Simulation	Psion	Spectrum	£5.95
▲ 5	(16)	Transylvanian Tower	Richard Shepherd	Spectrum	£6.50
▲ 6	(12)	Horace Goes Skiing	Psion	Spectrum	£5.95
▲ 7	(9)	Parsec	Texas	TI 99	£25.95
▲ 8	(29)	Gridrunner	Llamasoft	Vic 20	£6
▲ 9	(—)	Trader	Quicksilva	Spectrum	£9.95
▼ 10	(7)	Miner 2049er	Big Five	Atari	£28.95
▲ 11	(—)	Attack of the Mutant Camels	Llamasoft	Cmdr 64	£8.50
▼ 12	(8)	Blitz	Commodore	Vic 20	£4.99
▲ 13	(24)	Moon Raider	Program Power	BBC	£6.95
▲ 14	(25)	3D Tunnel	New Generation	Spectrum	£4.95
▲ 15	(19)	TI Invaders	Texas	TI 99	£17.95
▲ 16	(—)	Crazy Kong	Interceptor Micros	Vic 20	£6
▼ 17	(5)	Penetrator	Melbourne House	Spectrum	£6.95
▼ 18	(6)	Panic	Bugbyte	Vic 20	£7
▼ 19	(18)	Zaxxon	Datasoft	Atari	£29.90
▲ 20	(—)	Jet Pack	Ultimate	BBC	£5.50
▲ 21	(—)	Schizoids	Imagine	Spectrum	£6.00
▼ 22	(10)	Croaker	Program Power	BBC	£7.99
▲ 23	(—)	Preppie II	Atari	Atari	£21.95
▲ 24	(—)	Frenzy	Quicksilva	Spectrum	£4.95
▲ 25	(—)	Maze Death Race	PSS	Spectrum	£4.95
▼ 26	(23)	Flight	Tansoft	Oric	£7.95
▼ 27	(11)	Planet of Death	Artic	Spectrum	£6.95
▼ 28	(13)	Choplifter	Broderbund	Atari	£29.95
▼ 29	(26)	Hungry Horace	Psion	Spectrum	£5.95
▼ 30	(22)	Cosmic Invaders	Dragon Data	Dragon	£19.95

HARDWARE

Top Twenty up to £1,000

		MODEL	PRICE	DISTRIBUTOR
► 1	(1)	Sinclair Spectrum	£99	(SI)
▲ 2	(6)	Dragon 32	£200	(DR)
▲ 3	(7)	Vic 20	£150	(CO)
▼ 4	(3)	ZX81	£40	(SI)
▼ 5	(2)	BBC B	£399	(AC)
▲ 6	(8)	Atari 800	£300	(AT)
▼ 7	(4)	Atari 400	£150	(AT)
▼ 8	(5)	Oric 1	£100	(OR)
▲ 9	(11)	Newbrain A	£228	(GR)
► 10	(10)	Lynx 48	£225	(CA)
▼ 11	(9)	Texas TI 99	£150	(TI)
▲ 12	(13)	Colour Genie	£224	(LO)
▲ 13	(15)	Commodore 64	£345	(CO)
▼ 14	(12)	Epson HX20	£472	(EP)
▲ 15	(17)	Apple IIE	£969	(AP)
► 16	(16)	Sharp MZ80A	£549	(SH)
▲ 17	(20)	Sord M5	£218	(SO)
▲ 18	(—)	Nascom 3	£549	(LL)
▼ 19	(14)	Jupiter Ace	£90	(JU)
▼ 20	(19)	Tandy Colour	£240	(TA)

Top Ten over £1,000

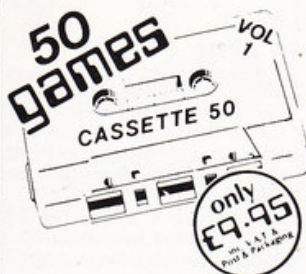
		MODEL	PRICE	DISTRIBUTOR
▲ 1	(2)	Sirius 1	£2,754	(ACT)
▲ 2	(3)	IBM PC	£2,392	(IBM)
▲ 3	(4)	Apple 3	£2,780	(AP)
▼ 4	(1)	Osborne 1	£1,581	(OS)
▲ 5	(6)	Commodore 8032	£1,129	(CO)
▲ 6	(—)	Olivetti M20	£2,754	(OL)
▲ 7	(8)	DEC Rainbow	£2,714	(DEC)
▲ 8	(—)	Rair Black Box	£2,242	(RAIR)
▼ 9	(5)	HP86A	£1,541	(HP)
► 10	(10)	Superbrain II	£2,070	(IC)

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

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DEALERS WANTED

OS war cools

The Digital Research/Microsoft battle has thrown up an unexpected bonus for users. Digital Research is plugging all its language compilers into Microsoft's PC-DOS operating system.

PL/I, Pascal, Cobol, Basic, C, and a pile of Digital Research's utility packages are going on to the IBM PC under PC-DOS during the next two months. But company founder and president Gary Kildall insists the move is striking a blow for portability, and that it isn't an admission of defeat for CP/M-86.

Instead he's making a lot of noise about the as yet little-seen multi-tasking system Concurrent CP/M-86. 'Microsoft has inadvertently blessed Concurrent CP/M-86 by

saying they'll do their own version,' he says while dismissing Unix as a 'paper tiger'.

Nor has CP/M-86 been seen off by Microsoft, he claims. 'MSDOS isn't our competition. PC-DOS is, and the two are very different. We aren't selling languages for MSDOS... We reckon MSDOS and CP/M-86 are equivalent, and both of them are a bridging strategy to multi-tasking systems.'

He says Digital Research is aiming to end the OS duel by developing a switchable operating system that can mimic the operating software of your choice. And work is also going on to get Concurrent CP/M up and running on top of PC-DOS — for September.

We will also be seeing Digital Research products for much smaller micros this year, says Mr Kildall, as the company has just set up a consumer products division.

That division will be bringing out educational software written in Logo, which Mr Kildall says will replace Basic, for diskless machines such as the Commodore 64. It may also develop a scaled-down CP/M for non-disk micros and portables such as the Epson HX-20.

'There's no real reason why the CP/M family should mean only disk systems,' says Mr Kildall. 'Cassette-based systems are now appearing with enough memory to have something approaching an operating system like CP/M.'

Four-colour at a stroke by Seikosha

A single-pass colour printer has been launched by Seikosha and should be available next month.

The GP-700A, which will cost £425, uses a four-colour ribbon and four print-hammers to print any combination of colours in one go. Most printers require several passes to print in colour.

The machine is distributed in the UK by DRG Business Machines, which says that the GP-700A can print in 30 shades selected from seven basic colours.

The printer will be Pro-Tested in PCN.

DRG is on 01-622 3434.



Eight games from Abbex await the 4K Laser

Abbex opens fire with Laser

With the £70 Laser (PCN, issue 16) in the shops next month, Abbex Electronics hopes to cash in with the release of new packages.

It has about 30 titles planned for the 16K version of the Laser. But for starters it has brought out eight games for the 4K machine — Laser Chase, Laser Bykes, 3-D Maze, Laser Invaders, Laser Shoot-out, Chess, Draughts and Othello — all £3.95.

Martin Ford, marketing manager

of Abbex, said: 'We've produced a special Basic for the Laser for people who want to write games. It's a machine-code type language that uses Basic symbols. And we have written a forth package.'

Abbex also has software packages in the pipeline for the Comx 35 (PCN, issue 12) and the Newbrain, which it hopes to have ready by August.

Contact Abbex on Bedford 213571.

Prism packs Rumbelow rack

Moves to get software out of specialist computer shops have taken a step forward with a deal between Prism Micro Products and Rumbelows.

In 258 Rumbelows stores Prism will set up software racks to hold products for the Sinclair Spectrum, TI99/4A and the Vic 20 from July. Later there'll be software for the Commodore 64, and Prism hopes to sign up another retailer to extend the scheme.

Though intended mainly to save shopkeepers the burden of ordering and stocking software, it will also bring a range of products into high street stores, and should make it easier to get hold of popular packages.

Prism said last week that it is now distributor for US software makers Sierra On-Line, Sirius Software, and Datasoft, giving it a stronger hand in the Apple, Atari, Commodore and IBM markets.

Sierra's main claim to fame is its origination of Frogger.



Prism — all set for Rumbelows.

ISRAELI INTERFACE — From the Promised Land comes the Professional RS232C interface for the Sinclair Spectrum. The unit is manufactured by an Israeli company and is expected to be available soon in the UK at £49.95. The box sits on top of the Spectrum and has a cable running to the edge connector. The RS-232C attachment is a standard D-type connector which will operate through an acoustic coupler at software-selectable baud rates from 150 to 19200bps. The system features full handshaking with all RS232C interfaces in printers and other computers and the operational software is available in ROM.



Forth bridge

Not many Spectrum owners will have bought the machine because of its potential as a Jupiter Ace, but a small Poole company has produced a Forth cartridge to turn your system into a dedicated Forth machine.

David Husband's cartridge takes the place of the Basic ROM in the 16K or 48K Spectrum. It carries 12K of FIG-Forth, an RS232 interface via an 8251 interface chip, and 24 bits of parallel I/O via an 8255.

Mr Husband predicts that once you've switched out the Basic ROM to make room for the Forth, you won't want to switch back. But since the cartridge, at £49.95, costs close to half what a 16K Spectrum sets you back, he anticipates serious but limited interest in it.

It is on course for an August

launch and will come with a manual and a year's membership of the xForth Users Group.

Besides standard FIG-Forth features, the cartridge holds a Z80 Assembler for machine code Forth definitions, a built-in routine to support a modem or allow access to bulletin board systems, a machine code monitor and, not least, an 8K RAM-disk simulation. And it's been designed to support Micro-drives — when they appear.

Mr Husband says it contains all the standard FIG-Forth words and gives full use of the colour, sound and graphics facilities of the language. He expects routines and applications to come from the User Group.

David Husband is on Bourne-mouth (0202) 764724.

Life beyond VisiCalc

The company that developed VisiCalc has produced its version of what the business software of the future will look like.

It goes beyond spreadsheets, addresses unstructured problems and leads to a technique known as back-solving. According to its designer it should open a new category of business software.

TK!Solver, from Software Arts, runs under MSDOS. It is designed to cope with the kind of rather unstructured problems that normally need a fairly heavy load of programming, rather than the more clear-cut 'What-If' questions that

VisiCalc and its clones will handle.

'The groups of users who will understand TK!Solver at once are the technicians and scientists, architects and so forth — anybody who has to use a lot of equations and formulae,' said Bob Frankston, one of Software Arts' founders.

'It will be the answer for anyone whose problems are not well structured, or who needs to solve problems backwards to find out how to get a particular result.'

Apart from solving problems backwards from the result — back-solving — TK!Solver will also let you make a guess at unknown

values. Then it will carry out a series of calculations — iterative solving — to converge on an answer. And the package will also let you set up conversion tables, to translate pounds, say, to dollars, so you can alter the units in which your answer is expressed.

In addition, you can plot the results, and feed them into packages such as VisiCalc using the Data Interchange Format. It's also likely to run under VisiCorp's VisiOn operating environment when that comes out in the autumn.

TK!Solver has been out in the US since January, but it has only just

reached the UK, where it is to be distributed by Marketing Micro Software. It's going to cost £286 for the package itself, and there are also add-on packages selling at £106, providing sets of ready-built models to suit particular applications.

Six are already out, each consisting of a dozen or so models for financial management, electrical engineering, building design and so forth.

But another 80 packages are on the drawing board from publisher McGraw Hill as well as from Software Arts.

Pegasus takes flight on Rainbows

By August you'll be able to get the full range of Pegasus business software for use on DEC Rainbows.

DEC plans to have MSDOS implemented on the Rainbow by the end of July. Pegasus will adapt its packages for this event, and launch two new systems into the bargain.

The new elements are Job Costing and Sales Order Processing — they join sales, purchase and nominal ledger, invoicing, stock control and payroll.

Prices are left to Pegasus dealers — Adda Computers of Ealing, for example, charges £300 per module and £1,250 for a set of five.

Allez France with the BBC

No need to worry about following up doubtful postcards in your newsagent's window; now you can take lessons from your own French Mistress on a BBC Model B.

Kosmos Software's French Mistress comes in two complementary cassettes covering a range of vocabulary in different subjects, phrases and lists of verbs.

But it aims to go beyond learning by rote and according to Kosmos you can create your own lessons and store them on cassette.

The French Mistress may spare the rod but it does have a test mode to check your progress, the machine keeping an eye on your speed and accuracy of translation.

The cassettes cost £9.95 each. Kosmos is on Dunstable (05255) 3942.

Epson twins get business applications from APS

If you're running a business with an Epson HX20 or QX10, AP Systems has just broadened your choice of software.

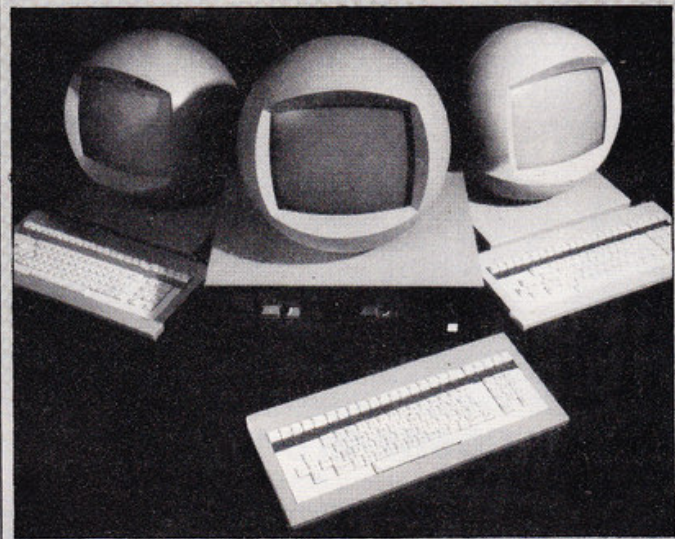
Selling at £25 each are Apwriter, a word processing package, Receipt Program, which has accounting

facilities to issue invoices, and Restaurant Program, which itemises receipts at the point of sale.

AP Systems is also designing a network system for the hotel, catering and grocery industries. It is on 01-399 1257.



WP, accountancy and restaurant packages are now on the Epson menu.



EYE FOR DESIGN — Proving that British neglect of design is a thing of the past ABS Computers has its new Orb systems off the production line. You can choose from eight colours including orange, which make them look twice as hideous. Their innards hold an Intel iAPX 186 processor, 256K of RAM, one parallel and eight serial ports, and the options to attach floppy or Winchester disk drives. The system runs MP/M-86 and can support six users. For a system with two displays and twin 1Mb floppies you pay £5,950. ABS is on Brighton (0273) 421509.

FMS converts for MSDOS

Living down its name as a bird of ill-omen Raven Computers has slashed the price of the FMS 80 database and at the same time adapted it for use on the IBM PC and other MSDOS systems.

FMS 80/86 will now set you back £395, from its previous price of £650. The new entry-level system, FMS 81, is added to Raven's catalogue at £250 — it is upgradable

to the full database management system.

FMS 80 started life as a strictly CP/M product and Raven claims it is one of the top five best sellers in the CP/M category. Its conversion to MSDOS and CP/M-86 is due to be followed by adaptation to other formats.

Raven Computers is on Bradford (0274) 309386.

Soft-hearted?

From the depths of darkest West Java, the Centre for Animal Research sends a plea — can you spare any Apple software?

The centre was given an Apple II, CP/M, disk drive and printer, but no software. With an annual budget of £100 for its computing and statistical operations it can't buy the software it needs — a database,

agricultural applications, and a program for learning exercises.

John Diment, a volunteer at the centre, has written educational and statistical software, but in order to advance, the centre needs help.

If you can help contact John at the Centre for Animal Research, PO Box 123, Bogor, West Java, Indonesia.

Mr. Chip

SOFTWARE

VIC 20 GAMES AND UTILITIES

BUGSY (Joystick Only)

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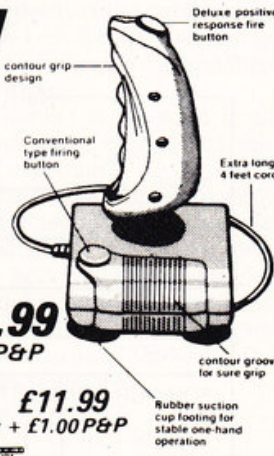
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Share your thoughts in the UK's liveliest micro weekly letters columns. Funny, feisty or fanciful, your letter could win you £10 if it's of star status.

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

Laws in order

Many thanks to John Reynolds for his 'alternative glossary' (PCN, issue 15).

I would like to expand on it by offering a collection of axioms constituting the Alternative Guide to Personal Computing. **Smith's laws of micro purchasing**

If you do not seek advice, the chances are you will buy the wrong micro. Seeking advice results in you paying more for the wrong micro.

O'Brian's ordering law

The availability of a micro is directly proportional to the time elapsed since its launch.

Corollary

By the time yours arrives, it's obsolete.

International Society of Electrical Engineers' Laws

If it's fragile, you'll drop it.

If it's reasonably robust, you'll fall on it.

PCN £10 Star Letter



The most obvious way of connecting it up is that which results in the most damage.

Only irreplaceable parts break.

Willhelm's 'Power Up' laws

Try plugging it in.

If all else fails, read the manual.

Cambridge Institute of Mathematics axioms

Variables won't

Constants aren't.

GOTOs don't.

GOSUBs do, but generally don't come back.

Oxford English Society text manipulation laws

Text must be handled carefully.

The inexperienced user frequently falls prey to producing output that is badly punctuated, misspelt, or garbled. Thaxioc nok ickle dip... ixi nexol bow.

Drain's law of programming

If it won't work, give up.

D J Fazackerley
Creigiau, Cardiff

Laws of ancient ROM

After reading Mr Reynolds's alternative glossary of computing jargon, I was reminded of a list originally compiled at the end of 1980 by Jim Black and other members of the Newcastle Personal Computer Society.

I am sure they will not object to my repeating some of that list:

Static RAM A lazy sheep

Assembler Someone who buys a Nascom kit

Cross-assembler Someone who can't get their Nascom to work
Syntax It varies — but I believe £25 per hour is the going rate
David McAuley
Chester-le-Street, Co Durham

And still they come!

I would like to add the following to John Reynolds's alternative glossary (PCN, Random Access, issue 15).

Access time The period that expires between the application for and the receipt of a credit card.

Algorithm Digital music.

Alpha-numeric Twice as much as a quarter-numeric.

Cursor Bad mannered person.
Dedicated chip Loyal fried potato.

Mainframe Important vacuum tube.

Scroll Ancient media.

Carl Thomas
Grimsby, S Humberside

Pros should POKE more

Re Ian Linwood's letter asking for the whereabouts of a complete list of useful PEEKs and POKes for his Spectrum, I think your reply provides the classic Catch 22, or should I say, peerless POKE '83?

How does one evaluate an address if in the first place one doesn't know who or what abides there? Most dabblers in the micro arts do not have the time and, in most cases, the necessary experience, to produce the required lists.

It is here that the professionals can most help. They are paid for their time, their experience, their 'help'.

If magazines like PCN, with

its very own Micropaedia, cannot find the time nor space to publish if not complete, then long lists of PEEKs and POKes for the various micros on the market, I think they are failing in the job of growing up with their readers, and guilty of staying with those alien manufacturers of software who are all front cover but no content.

Wake up, PCN. You are the biggest weekly micro mag. Be like the best or else...

F Duckworth
Orrell, Wigan

Hmmm... I wonder how many of you really would like us to publish such an 'alternative manual'. I may be wrong, but isn't it fun to delve and discover new PEEKs and POKes for yourself? Anyway, there's no such thing as a complete list; it's one that runs and runs depending on your input. (Anyway, I think we are biggest AND best, but I'm open to suggestions...)
— Ed.

Fuel for fraud?

For those people who keep getting somewhere exciting on Acornsoft's Sphinx Adventure, and then they die, here is a tip.

If it says 'Your lamp is getting dim' and you want to carry on and not die after a few more turns, simply push escape and then reset the variable LF (lamp fuel) to about 500 — LF=500 (it starts off at 150 so this should give you plenty of time). Then type GOTO 231 and you will start off in the same place as before.

Jeremy Slater
Salisbury, Wilts

Clearly a new version of the old genie line — Ed.

Newbrain compiler queried

Does David Janda really think the Newbrain has a Basic compiler or is he just quoting very misleading information supplied by Grundy which seems to have jumbled buzz phrases into an attractive format?

Basic on the Newbrain may be in token form but it seems to do just the same as all other Basics and interprets line by line (compiles source code to machine code line by line, if you like), although it does check ahead for loops which some Basics don't.

A compiler is not so flexible because all the source code (the program listing) is processed in the one compilation process to object (or machine) code and from that point becomes fixed and uneditable unless a complete recompilation takes place which, on early IBM System 3 Basic compilers, could take 50 minutes, before you could use your program.

Anthony D Hodge
Wakefield, W Yorks

Sorry to confuse. Many people define a compiler as a program which produces independent object code which can be run independently from the main compiler. But some runtime routines have to be in memory when object code is running. The Newbrain doesn't allow you to do this, but it has a pre-compiler of sorts.

Newbrain calls its compiler an interactive compiler. In a sense it's a threaded code compiler. But it's not a Basic interpreter in the normal sense. However, those in the know at PCN do believe that the Newbrain Basic is a compiler — Ed.

A better editor wanted

I think one of the all-time, most user-unfriendly features a computer can have is the Basic editor. The most difficult editor that I have learnt to use is the Microsoft editor, as used on the Dragon and Video Genie. This includes useless commands such as 'X' which is the same as pressing RETURN.

The simplest editor I have come across so far is the one used on the Vic 20 (among others), in which all you need to do is position the cursor using arrow keys for the direction in which you want to go and then start typing.

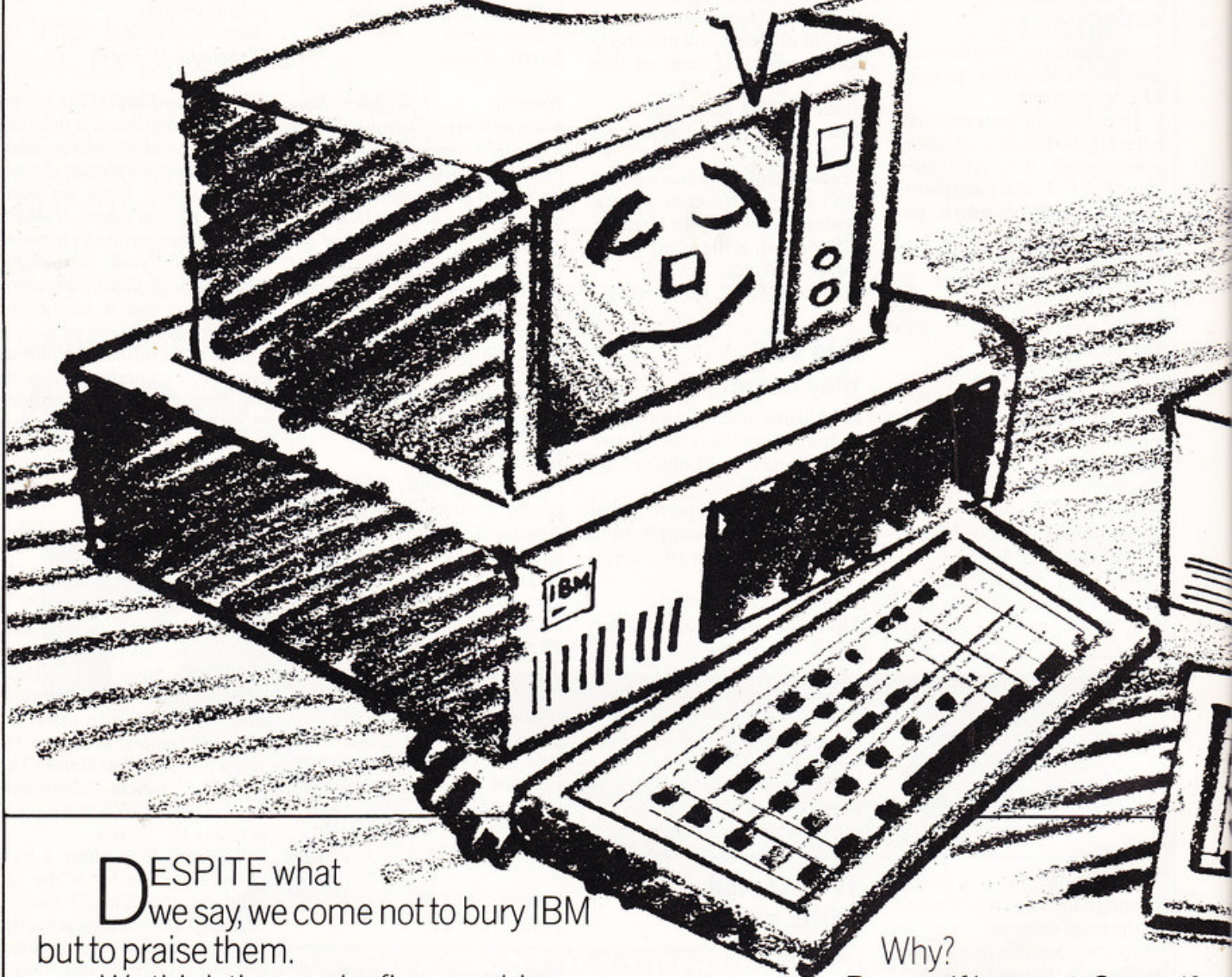
Wouldn't it be good if all editors were changed to this kind of system?

Could it ever happen or will it be rejected by the 'It's too late to change now' or 'This editor is the best anyway' attitudes which have already ruined any chance that Basic had of becoming standardised?

Julian Skidmore
Trowell, Notts

The more you nag, the quicker this will be put right — we hope — Ed.

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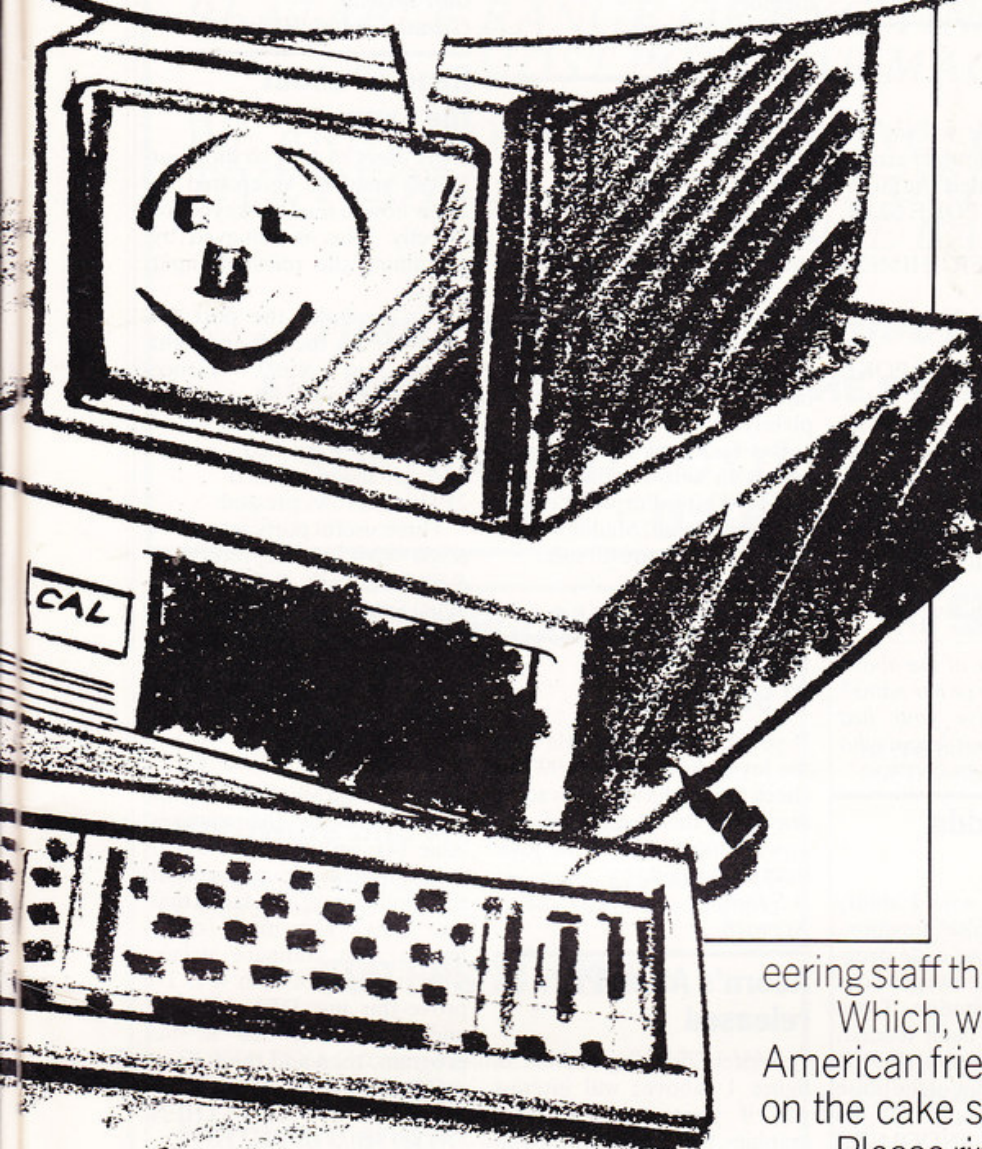
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Oric a reformed character

It's great to be able to reproduce teletext graphics on the Oric. But it is plain annoying to discover that the pixel characters are wrongly designed.

The imaginary vertical line used to divide the character cell into two columns is placed between the second and third pixels from the left. It should really be in the middle. Perhaps Oric used a pre-production Oric to divided six by two!

If you want to go back to sensible definitions, try this routine:

```
10 FOR A = #B800 TO #BB7F
20 IF PEEK(A) = 240 THEN
   POKE A,56
30 IF PEEK(A) = 15 THEN
   POKE A,7
40 NEXT
```

Chris Thompson,
Orpington, Kent

Scroll up for The Oric

Vertical scrolling on the Oric 1? Up or down? To go up try:
10 PLOT 10,26, "Scroll up"
20 PRINT CHR\$(10)
30 GOTO 20
to go down, try
20 PLOT 10,0, "Scroll down"

```
10REM**INTEGER CIRCLE DRAWING**CARL THOMAS**MAY '83**
200=70;X=127;Y=95;CLEAR4;C=D;MOVE(X+D),(Y+C);P=C
300DDRAW(X+D),(Y+C);D=D-C/5;C=C+D/5;U.P=C;DRAW(X+D),(Y+C);P.#7
40END
```

Figure 1: How to make your Atom go around in more refined circles.

```
30 PRINT CHR$(11) CHR$(11)
40 GOTO 30
H S Lim,
Manchester
```

Big screen for the Vic

This short routine will let you have a 28 x 36 character screen on your unexpanded Vic 20:

```
10 POKE 56,28: POKE 52,28: CLR
20 REM LOWER HIMEM TO $2800
30 POKE 36866,28: POKE 36867,72
40 POKE 36864,7: POKE 36865,19
```

The routine uses up ½K (from 7168 to 7680) to give a 1K screen display. Characters can be POKED to the screen as normal, but the address of the top left corner will be 7168.

Anon.
Stirckley, Birmingham.

Would the author of the above like to send us his or her name? You won't receive your just rewards if we don't know who you are — Ed

Spectrum adds white noise

The Spectrum's sound ability lacks a 'white noise' function. The short machine code program in figure 2 (below) provides a reasonable imitation: Once the routine has been loaded, you can set the duration (POKE 32583) or frequency of the noise (POKE 32589) and call the routine with RANDOMIZE USR 32581. The routine can be

SAVED with SAVE "NAME" CODE 32581,16.

48K users might like to locate the program higher up in memory.

Rupert Goodwins,
Plymouth

Beware of the 64 bug

Commodore 64 owners may have noticed a bug which will crash the machine. It occurs if the user is on the bottom line of the screen, keys in a program line which spills onto the next line, presses 'return' and then presses 'delete' to try to edit the line. The 64 locks up completely.

But fear not! The bug only occurs in certain colours . . . Black, White, Purple, Yellow, Orange, Brown, Medium Grey and light green are all safe.

Steve Binks,
Brough, Yorkshire

More joy for TI 99/4A users

If you are having trouble with the joysticks on your TI 99/4A, check the Alpha lock. For some reason, if this is engaged, the upward movement of the joysticks is disabled.

A S Jones,
Norwich

Acorn's Atom Pls released

The circle drawing routine in figure 1 (above) will interest you if your Atom has 6K graphics but no floating point ROM. X and Y are the centre of

the circle and the radius is proportional to D. You can adapt the routine to draw ellipses by altering C and D.

Carl Thomas,
Grimsby, South Humberside

Read all about the Lynx

Lynx users wishing to short cut KEY\$ may be interested to know how to read the keyboard directly. This is achieved by examining the relevant input ports.

For example, the port responsible for the left and right arrows is &980. Hence INP(&980) gives:

255 for no keys pressed
251 left arrow pressed
223 right arrow pressed
219 both arrows pressed

Three useful ports are:
&980 →, ←,], delete, return
&80 ↑, ↓, shift, shift lock, 1
&480 Space bar, B,H,T,G

Mark Naylor,
Watford, Herts

Lynx wears shorter shorts

I refer to John Moulson's 'Short sort for the Lynx', (Microwaves issue 14): isn't the bubble sort method slow enough without this timewaster? The fact is that the Lynx, like many other micros, can compare strings with '>' (but not with '<'). To prove this just DEL 140,150, and DEL 210, 330 in his program, then add the following line:

```
210 IF A$(G)>A$(F) THEN GOTO 370.
```

The program will now run at least twice as fast and takes up far less memory.

Admittedly, this comparison technique is not mentioned in the manual, but if other micros can do it, then why can't the Lynx? Indeed, owners who go solely by the book (and take reviewers' words as gospel) may have been led to believe that the Lynx does not have a STR\$ function. Not so! Just try LET A\$ = STR\$(A). Simple ain't it.

D Messenger,
Wareham, Dorset

```
1 REM White noise function
2 REM for 16K Spectrum
10 CLEAR 32580
20 FOR F=32581 TO 32597
30 READ A: POKE F,A
40 NEXT F
50 DATA 33,00,10,43,126,211,254,06,7,05,32,-3,175,132,200,24,-14
60 :
70 :
80 REM Demonstration
90 BEEP .007,19: PAUSE 10: BEEP .007,31: PAUSE 10: RANDOMIZE USR 32581: PAUSE 5:
   RANDOMIZE USR 32581: PAUSE 5: BEEP .007,19: PAUSE 10: BEEP .007,31: PAUSE 10: R
   ANDOMIZE USR 32581: PAUSE 5: BEEP .007,31: PAUSE 10
100 GOTO 90
```

Figure 2: This program produces white noise on the Spectrum.

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My Pet can't spell

Q My dad owns a Commodore Pet which can't spell. When you turn it on it says: *** Commodore Basic *** 7167 "ytes Free Ready."

The machine is an old ROM, 2001 series. What chip is responsible for this?

Thomas Phillips, Kettering, Northants

A This is a strange one. Like the 2001, you should attempt to preserve it rather than fix it. Maybe you should have your Pet stuffed.

The fault is two bits in the 'C to hash' error and three bits in the B to quote'. Theoretically, it's a ROM fault, the chips where the boot messages are stored. But it's so far fetched as to be unbelievable.

You could try buying a new set of ROMs . . . but try them out before actually paying for them. If it's the only thing wrong with the Pet, I'd ignore it.

The CP/M story told

Q In part 1 of the Spectrum Micropaedia (PCN issue 14) it said that 'the Spectrum's Z80A can't run the CP/M business operating system'. This was mentioned as a disadvantage of the Z80A.

Surely, the ability to run CP/M also depends on other factors, such as support chips. For example, the Lynx uses a 4MHz Z80A and Computers hopes to release CP/M for the machine in September.

Clive Newton, Cumbrian, Gwent.

A Micropaedia wasn't wrong . . . it was just a little misleading. Being able to run CP/M depends on a couple of things . . . having an 8080 compatible processor (8080, 8085 or Z80) and having RAM in low memory.

CP/M was developed for the 8080. Intel's 8085 and Zilog's Z80 are basically the same chip with brass knobs on. So any Z80 will run CP/M. But not the one

in the Spectrum . . .

CP/M divides neatly into several pieces. From 0 to 100 hex in memory is used for bits and pieces, primarily for passing information between CP/M and programs. From 100 hex onwards is the TPA or transient program area. CP/M loads your programs here. It goes on but the main point is that this memory must be RAM. If it were fixed ROM, CP/M just wouldn't go.

The Spectrum's memory map has its 16K ROM in this area, from 0 to 4000 hex. So, as it stands, you couldn't put CP/M up on the Spectrum.

There are other moral objections. CP/M will work with anything that can print characters out in a row. But most CP/M programs assume you have an 80 column by 24 line display.

Of course, someone will now sit down and prove me wrong. You can put CP/M up on anything . . . using monkeys' rule that you can do anything provided you are prepared to sit down and develop it. The Torch Z80 disk pack for the BBC is a good example.

Which must leave you in some confusion as to the Lynx. Yes, it's got ROM (the Basic) from 0 to 4000 hex. But the thing about the Lynx is that you can switch the ROM off and have RAM there instead.

Oric flicker fears

Q Recently, I tried out the sound facilities on a 48K Oric 1 in my local John Menzies. As a prospective buyer, I was disgusted to see the display jump and flicker whenever the speaker emitted a sound. I have heard that a change in the power supply has cured this fault. But if this is so, why are faulty (and I consider the flicker a fault) Orics still being sold?

Where can I get a flicker-free Oric?

D Winston, Burghmuir, Perth

A Early Oric's did suffer from a flickering screen whenever sound was produced. Newer production models seem to have lost the problem.

Why then, can you still buy Orics with this problem? It's got a lot to do with the cost of returning and replacing large

stocks of machines.

So what do you do? You could wait and search until you find a dealer selling flicker free machines. Or you could spend your money elsewhere.

My Oric draws a blank

Q I own a 48K Oric 1 and have come across a problem while trying to develop a program. In it, I use strings such as `Y$=CHR$(130)+"a character"`.

I thought this would display the character in green. It does if I use a PRINT statement but if I use a more convenient PLOT statement, it displays a blank square before the character.

I can't find a way round this. What's happening?

Philip Prince, London NW6

A Oric attributes do seem to be confusing. I don't think you've a real problem here. It's a question of picking the right codes. As you know, whenever you use an attribute (that is change colour or flash the text and so on), that attribute uses up a space on the screen.

In your case, the 130 means 'set the foreground colour to green'. On the Oric, any code with its high bit set (that's greater than 128 in decimal) instructs the computer to display characters in 'inverse'. So with 130, you get an inverse space rather than a white space before your character. If you're on a white screen, you get a black hole before your green stuff.

That's if you PLOT it. Now a funny thing happens with PRINT. It seems that the PRINT routines turn the high bit off. If you PRINT `CHR$(130);"X"`, the attribute that actually gets used is 2. So you get a white space before the green character, not a black one.

So why don't you avoid the top set of attributes (from 128 to 159) when you use PRINT? Simply because there are other uses associated with PRINTING `CHR$()` with codes from 0 to 32. These are the control codes for things like Caps Lock, Key click, Cursor on/off and so on.

These are listed on page 146 of the manual opposite the incredibly cryptic list of attribute codes. If you PRINT one

of these control codes, it is intercepted and the relevant toggle switched . . . the keyboard click is changed or whatever.

So, although you can see `PRINT CHR$()` in the range 0 to 32 for most attributes (eg, green or yellow) you'll find that some codes don't make it. All you have to do to avoid this is use the top set of codes, simply by adding 128 to the attribute you want.

If you don't believe me, reset your Oric and try `PRINT CHR$(6);"Silence is cyan"`. Here the 6 as an attribute should make the text appear in cyan. But it's taken as a control code. So the key-click is switched off.

Now type `PRINT CHR$(134);"Silence is cyan"`. Here, the 134 isn't a control code. So it's used as an attribute. The PRINT routines turn the high bit off, so the code becomes 6, which is cyan.

Fun, isn't it? So it's just a question of picking the right codes to use with POKE, PLOT and PRINT. With POKE and PLOT, you can use either the 0 to 32 or the 128 to 160 codes. The top set however, will produce inverse effects. With PRINT, you use the codes from 128 to 160 but they give 'normal' effects.

The key to Vic success

Q I've recently purchased a Vic 20 and want to know how to use the four function keys. I've tried the manual but it's very little help

Richard Robertson, London

A First of all, you can't use the keys BBC-style during program development. Not unless you use a Superexpander or do your own machine code routines. But you can use the keys in your own program.

The easiest way is with GET. Pressing any of the function keys in response to GET `AS$` gives the following codes in `AS$`: F1 133, F2 137, F3 134, F4 138, F5 135, F6 139, F7 136, F8 140.

Alternatively, you can use `PEEK(197)` to read the current key pressed. This might be more useful in a games program, since you can test for a particular key being held down and thus program auto repeat-

ROUTINE INQUIRIES

ing lasers or whatever.

PEEK(197) returns 64 if no key is pressed. It can't recognise the shift key so you've only got four keys . . . F1/2 returns 39, F3/4 returns 47, F4/5 returns 55 and F7/8 returns 63.

All this and more, in Commodore's Vic 20 Programmers Reference Guide.

My Oric's so forgetful

Q I'm developing a short game (70-80 lines) for my 48K Oric 1. The problem is that after I've shot down a few aliens, the program grinds to a halt with an 'out of memory' error. This happens with another of my programs. Both are in HIRES mode.

I've tried forcing garbage collection with X=FRE('') but it has no effect. Could you tell me what I'm doing wrong?

G N Clifford,
Wolverhampton, Staffs

A It's hard to say what's wrong without having a good look at your program. You should check that you really are not using memory up with the data and program. Although Microsoft Basic will take a large DIM statement, it won't always discover that it's not got room for it until you try and fill it.

Even so, you've got around 37K to play with. You'd need a lot of data to fill that. But Microsoft Basic doesn't always mean it's out of user memory when it says 'out of memory'.

Some of the other situations that might generate the message are leaping out of FOR/NEXT and GOSUB/RETURN constructs without finishing them properly or simply just demanding evaluation of a too complex formula.

So check that your program is doing everything in an 'official' way. If you are having problems with a complex formula try simplifying it or breaking it up into stages.

Lacking in resolution.

Q So the Colour Genie has high resolution graphics does it? (PCN issue 15). Since when has 15,000 pixels qualified? One day, my BBC's teletext graphics will gain this dubious honour.

Changing the subject, can we expect PCN to Pro-test the Kenda DMFS for the BBC? I

understand that this alternative disk operating system does not use any of the BBC's RAM. Will it be possible to dump Acornsoft programs to disk and expect them to run when re-loaded?

J M McGoughan,
Harrogate, North Yorks.

A 15,000 pixels? Sounds a lot to me. But you're right, 160x96 is a little conservative for 'high resolution'. The point is that Eaca calls the Colour Genie graphics high resolution so it's a great help if all of us stick with the term. And just to keep your BBC ego intact, I've heard lots of people quite reasonably refer to 640x256 as medium resolution.

Let's change the subject. Kenda's DMFS will allow you to move Acornsoft programs onto disk. It doesn't use up any of the BBC's RAM because it's got its own. Of course, we'll have a look at it as soon as we can get hold of a copy. Kenda says that it will be a couple of weeks before it's ready.

Advice for a Vic victim

Q Can you help a Vic 20 owner suffering from poor documentation? How do you find the position of the cursor? How do you get keys to auto-repeat? How do you imitate PRINT@ without POKEing characters to the screen?

PS — Why do you hate the Vic 20 micro?

Peter Antonioni,
London N22.

A From the top, you can read the cursor's position with PEEK(214) for the row and POS(0) for the column. Auto-repeat is available by POKEing location 650. A value of 128 sets a repeat on all keys . . . other numbers give combinations of keys.

Simulating a PRINT@ is a little harder. You can do it by calling a routine in the Vic's kernel. The subroutine below moves the cursor to (X,Y) in this way:

1000 POKE 781,X: POKE

782,Y: POKE

783,PEEK(783) AND 254

1010 SYS 65520: RETURN.

Why do I hate the Vic 20 micro? Who me? I'm not that passionate about any micro but the examples above don't endear me to the machine. It's also got a small screen and tiny memory. But we at PCN have nothing against it.

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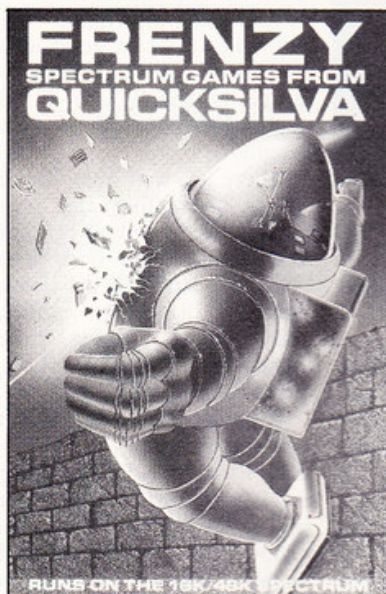
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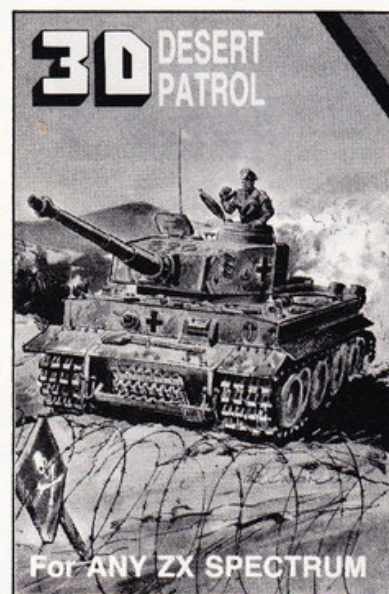
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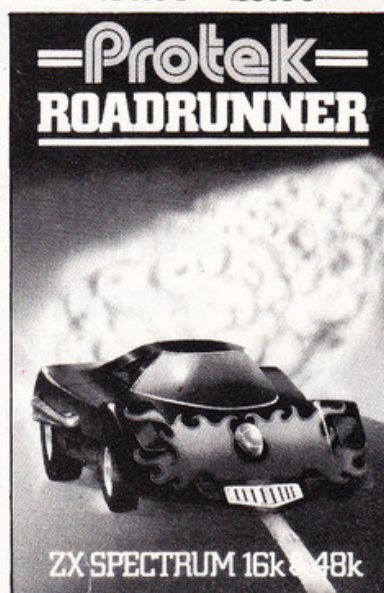
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THE COMPLETE PROGRAMMER

A guide to better programming in BASIC

MIKE JAMES

'The Complete Programmer' by Mike James, published by Granada at £5.95 (paperback 149 pages).

The debate about 'my language is better than yours because it's a "structured" language and yours lacks any form of modularity' will continue as long as there are computers and their various languages around.

One of the main criticisms aimed at Basic is that it lacks structure and does not allow for various data types to be used, and recursion is almost non-existent. *The Complete Programmer*, billed as a guide to better programming in Basic,

aims to provide another view of Basic.

This book is intended for the majority of computer users who use Basic and wish to improve their programming techniques. It does not profess to teach programming, but introduces you to the concepts of defining data in a clear and easy-to-understand style, along with detailed chapters on sorting, searching, graphics, recursion, methods of programming and other such goodies.

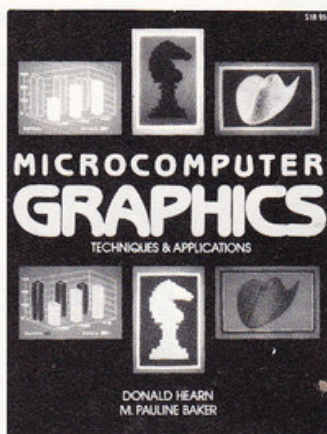
Methods and methodology in Basic are well covered, with a lot of the examples having a Pascal feel about them. A good feature of this book is that the ideas expounded are independent of the different variants of Basic that are available.

Program listings are included in some chapters to illustrate the point being made.

Chapter ten covers the ingredients that make a good program from the user point of view, along with helpful suggestions about making programs more user-friendly. It also includes a good section on handling errors.

A lot of the ideas presented in this book can be applied to any language, and for those with no

knowledge in this area the book provides a comprehensive introduction. TJ



'Microcomputer Graphics Techniques and Applications' by Donald Hearn and M. Pauline Baker, published by Prentice-Hall at £16.10 (paperback 302 pages).

Microcomputer Graphics Techniques and Applications aims to provide a comprehensive introduction to computer graphics with the emphasis firmly on micros.

The book is divided into five parts, covering the use of graphics in part one and progressing to making simple pictures in part two. Part five looks

at the applications of graphics, with examples from the business sector and the education field, and there is material for games addicts.

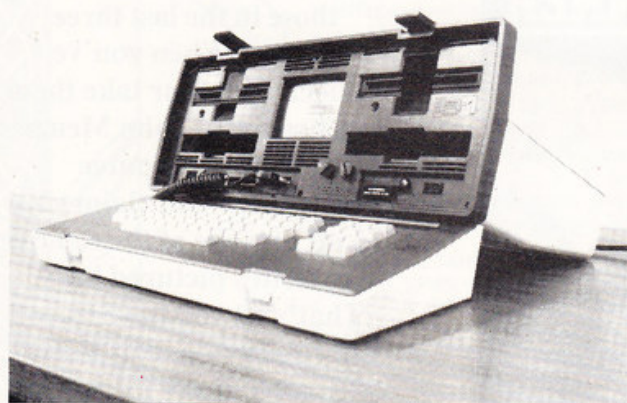
The 14 chapters are divided into small sections in which a particular technique is explained, with examples including a program listing, and screen shots. The book also includes a mass of schematic drawings and equations.

The well-illustrated text embodies a lot of good ideas and algorithms and these are usually supplied with a program, some of which are quite lengthy.

There are well over 90 programs, presenting such techniques as labelling graphs, removing hidden lines from drawings, drawing pie-charts, shading diagrams, plotting data trends, drawing three-dimensional shapes, scaling pictures, and animation.

If what you want is not covered you will probably be able to code it yourself after reading and trying out examples given in the book; some chapters have exercises which usually entail developing a piece of code to produce graphics. TJ

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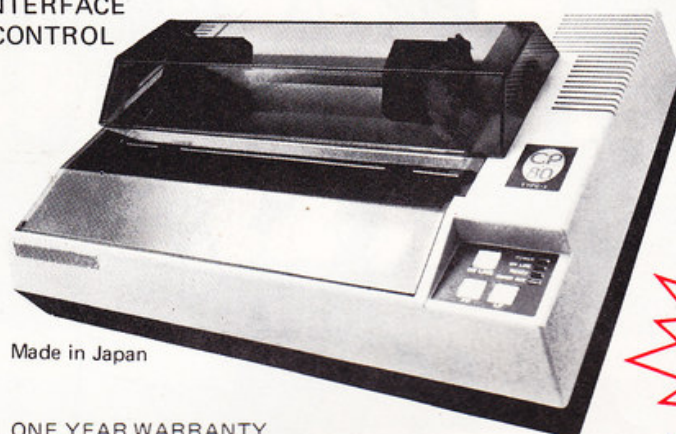
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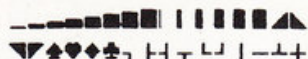


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In the first of two articles on buying a micro, John King considers HP sources.

Hire forms of life?

The computer is fast approaching the car as one of the most sought-after 'big' consumer goods — so it should come as no surprise that more and more leasing and alternative buying options are being developed to make expensive machines more affordable.

While it needn't be said that you want to get the most for your money, average computer buyers are often unaware of the options. But it's essential that those options are explored if you're to get the most for your money.

But finding independent, professional and cheap advice can be a problem. Even the most well-meaning of computer store sales staff have the goal of removing the shekels from your pocket and their advice will inevitably be biased.

Buying impulse

Many people dutifully wander into their local computer shop and rely on the sales staff as their sole source of advice — and then look at only one computer system, despite the fact that they may be paying for a computer in the same way they pay for their car.

It seems that the marketing axioms of 'impulse buying is not restricted to supermarkets' and 'buyers are most influenced by the advertisement they last saw or the person they talked to most recently about the purchase' still apply.

It would probably be hard to prove the rationality of such a purchase in terms of cost, efficiency, value for money and need. Some people buy certain makes of cars just because they like the colour.

But if you're buying equipment to the tune of £3,000 — more than a quarter of most people's annual income — it's essential to look at a variety of machines with their relevant software and consider the best way to finance the purchase.

Among the most common methods of purchase are cash, credit-card with immediate repayment, credit-card with gradual repayment and hire purchase in a variety of forms.

A small company or partnership can also try more complicated methods, including leasing purchase, leasing secondary hire, sale and leaseback — as well as secured loans. These all give you capital allowance claims and the opportunity for VAT reclamation.

Obviously, the first two methods (cash or credit card with immediate repayment) require large amounts of available loot. There is a slight advantage in using the credit card because you often have up to six weeks interest-free before you have to pay the invoice.

But most people have neither the type of credit card nor the credit limit necessary to buy more than a small part of a system.



Individual credit cards are used mostly to get smaller pieces of software, peripherals or small 'pocket' micros such as the ZX81 and Spectrum. The purchase of serious microcomputer business systems is unlikely to be considered with a credit card unless it's a company card or an American Express card. The American Express card, however, is not strictly a credit card it requires immediate complete repayment of you bill.

Special offers

There are also occasional special offers in which shops sell their goods for delayed cash and minimal interest payments, but these often run when the computer is becoming obsolete and the manufacturer is planning to end production of it.

The alternative to these sales is hire purchase.

The details of hire purchase will be dealt with in detail in Part 2 of this feature next week, but generally the common varieties of financing hire purchase require a deposit of up to 20 per cent, with the remainder of the cost apportioned over two, three, four or five years with the relevant amounts of interest. It depends on the exact terms of the agreements as to whether the interest rate is fixed at the time of purchase or

whether it is linked, say, to the Bank base rate.

An indirect financing option is the bank loan. Leaflets put out by the banks emphasise the benefit of using a bank loan in order to give you the cash to go out and make the best deal you can at the computer shop of your choice.

But make sure that the cheaper price doesn't mean cheaper back-up service. You also have to be certain of the machine you want to buy when you apply for the loan.

Banks and finance houses vary greatly in the details of their terms and conditions. Generally they require repayment over two or three years, with occasional exceptions for odd periods.

Repayments are usually made monthly — and you often have to supply 20 per cent or more of the purchase price as a down-payment.

NEXT WEEK: A closer look at bank loans, hire purchase agreements, finance leases, tax allowances for computers and other little details to make your purchasing power stretch that little bit further.

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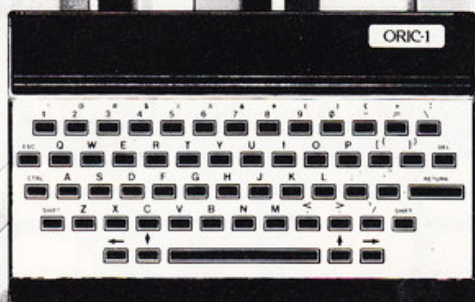
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With the GTIA chip, says Les Howarth, you'll put a bit of character into your home-brew games.

Scoring on your Atari

The Atari 800's GTIA modes are good for drawing patterns or colourful scenes. But with all those extra colours available it's very tempting to create a game in one of the modes. The problem is that it's difficult — you can't print characters to the screen, so you can't display scores and messages. Or can you?

It is possible, and it's surprisingly easy. Not only can you print characters in many colours, but the characters themselves can be multicoloured. You can also use the same method in other modes, although the number of colours available will be reduced.

The most obvious solution to the problem would be to take a character direct from the character set and POKE it onto the screen. But unfortunately, it's not that simple — when you try this it will only result in a few meaningless plotted points.

Each character occupies eight consecutive bytes within the memory, and so by PEEKing at each byte then POKEing them to the screen, you should end up with your chosen character, right?

Well nearly. This method does work in modes 4, 6 and 8, but not in multicolour modes 9, 10 and 11. Example 1 (below) shows how you POKE the letter A to a

graphics 4 screen. The character set starts at memory address 57344, and page 55 of the Atari manual shows the order in which characters are stored in memory.

The letter A is character 33, and the following calculation locates the starting address required:

$$57344 + 33 \times 8 = 57608$$

So the first byte of the letter A can be POKEd to the screen from address 57608. The next seven bytes are then POKEd immediately below this screen position for each byte.

In each program replace the £ sign with a #.



Stuart Briers

Example 1

To use this example in graphics 6, alter line 50 to W=W+20. Unfortunately this idea doesn't work in the 4 colour or GTIA modes. A different method has to be found.

Graphics 10 allows nine colours to be displayed at the same time, these being

controlled by addresses 704 to 712. Address 704 is the background colour and is also COLOR 0, so a plot of COLOR 0 would be invisible. These colours can be set by POKEing a value between 0 and 255 into the above registers. To calculate the numbers to be POKEd, look up the table

on page 50 of the Atari reference manual and multiply the number of the chosen colour by 16. Then add the luminance value, ie COLOR 1 is to be set to GREEN with a luminance of 4, GREEN = 12 so $12 \times 16 + 4 = 192$. POKE 705,192.

Although we normally plot and draw to in graphics modes, it is also possible to use the print #6 command, although in this case text will not appear — only a few plotted points are displayed.

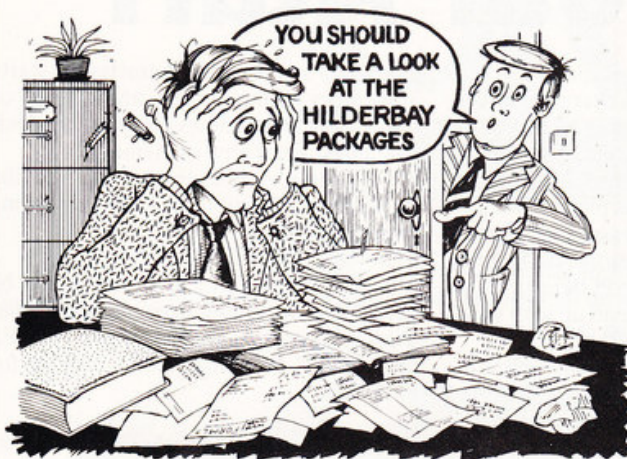
But try printing a series of ones and noughts and you will find that each number one will appear as a plot of COLOR 1 and each nought will be a plot of the background and therefore unseen. If you then think of these numbers as being a byte of binary code then it is possible to plot a character using a number of hand made bytes. The bytes in example 2 have been shrunk to 3 bits in order to display the character in a better shape.

```

10 GRAPHICS 4
20 DL=PEEK(88)+256*PEEK(89):REM find start of screen memory
30 W=4:FOR I=57608 TO 57615:REM loop through 8 bytes
40 POKE DL+W,PEEK(I):REM poke byte to screen
50 W=W+10:NEXT I
99 STOP:REM start of example 2
100 DATA 010,101,111,101,101
110 DIM B$(3)
120 GRAPHICS 10:POKE 704,8:POKE 705,52
130 FOR I=1 TO 5:READ B$
140 POSITION 4,10+I:PRINT #6;B$
150 NEXT I
160 GOTO 160
200 DATA 010,101,111,101,101

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You could, of course, use 8 bits per byte as in normal character structure, but in graphics 10 this would result in a very wide

character due to the elongated plots. Using just three-bits-width gives a more standard shape.

■ Line 20 sets two of the colour registers.

- Line 30 reads each byte of the character shape.

It is important to make sure each line is printed directly under the previous line as the invisible cursor will not do this automatically in this mode.

Changing the colour of a character is absolute simplicity. Just change the digits in the data, *ie* change all the ones to twos for COLOR 2. You will also have to POKE a colour into register 706 to set COLOR 2. Try POKE 706, 192 and re-run the amended program.

All this leads to a multi-coloured character simply by mixing ones and twos in the data, although it is preferable to keep one particular value per line. This idea also makes it possible to display characters of various sizes at the same time — even striped letters are possible. Example 3 gives an amazing display of a two-colour and striped character.

And now for the ultimate — whole words printed in one go. Printing one letter at a time to write a word would be rather a slow job, not to mention involving a lengthy program. You would have to re-calculate the position to print each character. However, there is no reason why this idea can't be extended to print a complete word in one loop.

The best way to work out the data required for a word is to draw a grid five lines deep. The number of columns will be four times the number of letters in the word.

Fill the grid with ones in the shape of each letter.

Every fourth column is filled with zeroes to act as a divider between each letter. Each row of the grid is then put into a data statement. Example 4 will demonstrate whole-word printing and show the speed at which this idea can operate. In fact, it is so fast that you will need a delay loop to show the digits clearly. After running this program remove line 85 to bring in the delay routine.

The best way to update scores is to keep the data for each digit on a separate line. Atari Basic allows the user to RESTORE to any chosen line of data, so if your score was 3, then an instruction could be given as:
RESTORE 140 + SCORE*10

This would set the data pointer to line 170, ready to print a number three. Now add or change the following lines to the previous example for a text and graphics program.

This article marks the second appearance of the Atari GTIA chip in the pages of *PCN*. It was first featured in the April 29 issue in an article covering use of the chip to set colour/luminance levels and control sprite graphics and high-resolution colour modes.

```

10 DIM B$(20)
20 GRAPHICS 10:POKE 704,8:POKE 705,52:POKE 706,196
30 FOR I=1 TO 5:READ B$
40 POSITION 4,10+I: ? £6;B$:NEXT I
50 W=1
60 FOR I=1 TO 5:READ B$
70 POSITION 27,10+I: ? £6;B$:NEXT I
80 W=W+1:IF W>4 THEN W=1:RESTORE 150
90 FOR I=1 TO 100:NEXT I:GOTO 60
95 GOTO 95
100 DATA 11101110111011101110
110 DATA 10001000101010101000
120 DATA 11101000101011001110
130 DATA 00101000101010101000
140 DATA 11101110111010101110
150 DATA 020,220,020,020,222
160 DATA 222,002,222,200,222
170 DATA 222,002,222,002,222
180 DATA 202,202,222,002,002

```

```

10 DIM B$(32)
20 GRAPHICS 10:FOR I=704 TO 712:READ W:POKE I,W:NEXT I
26 DATA 8,52,196,220,130,14,92,24,0
30 FOR I=1 TO 5:READ B$
40 POSITION 4,10+I: ? E6;B$:NEXT I
42 A=1:FOR I=0 TO 15:FOR W=84 TO 100:COLOR I:PLOT I,W+A:DRAWTO 79-I,W-A:A=A+0.2:
NEXT W:NEXT I:W=40
43 RESTORE 300:READ B$:POSITION 12,W-1: ? E6;B$:RESTORE 300:FOR I=1 TO 5:READ B$:
POSITION 12,W+1: ? E6;B$:NEXT I
44 POSITION 12,W+1+1: ? E6;B$
45 COLOR 2:PLOT 36,120:DRAWTO 36,150:PLOT 35,123:PLOT 35,150:DRAWTO 37,150
46 PLOT 39,120:DRAWTO 41,120:DRAWTO 41,150:DRAWTO 39,150:DRAWTO 39,120
59 RESTORE 150:W=1
60 FOR I=1 TO 5:READ B$
70 POSITION 27,10+I: ? E6;B$:NEXT I
80 W=W+1:IF W>4 THEN W=1:RESTORE 150
90 FOR I=1 TO 200:NEXT I:GOTO 60
100 DATA 11101110111011101110
110 DATA 10001000101010101000
120 DATA 11101000101011001110
130 DATA 00101000101010101000
140 DATA 11101110111010101110
150 DATA 010,110,010,010,111
160 DATA 222,002,222,200,222
170 DATA 333,003,333,003,333
180 DATA 404,404,444,004,004
300 DATA 8880888008008880808088808880888
310 DATA 8000808080808080808080808000800
320 DATA 8080880088808880888088808000888
330 DATA 8080808080808000808080808000000
340 DATA 8880808080808000808088808880888

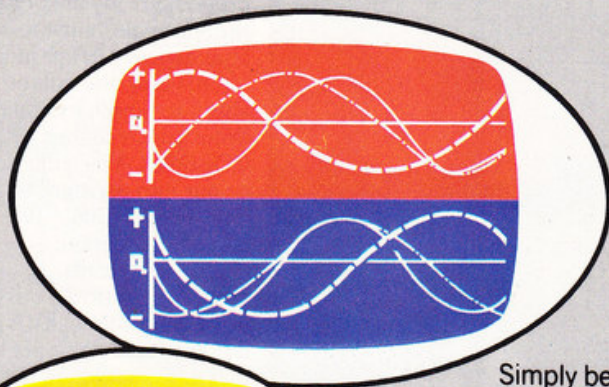
```

```

10 DIM B$(32)
20 GRAPHICS 10:POKE 704,8:POKE 705,52:POKE 706,196
30 FOR I=1 TO 5:READ B$
40 POSITION 4,10+I:? £6;B$:NEXT I
50 W=1
60 FOR I=1 TO 5:READ B$
70 POSITION 27,10+I:? £6;B$:NEXT I
80 W=W+1:IF W>4 THEN W=1:RESTORE 150
85 GOTO 60
90 FOR I=1 TO 200:NEXT I:GOTO 60
100 DATA 11101110111011101110
110 DATA 10001000101010101000
120 DATA 11101000101011001110
130 DATA 00101000101010101000
140 DATA 11101110111010101110
150 DATA 010,110,010,010,111
160 DATA 222,002,222,200,222
170 DATA 333,003,333,003,333
180 DATA 404,404,444,004,004

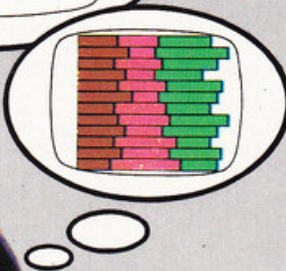
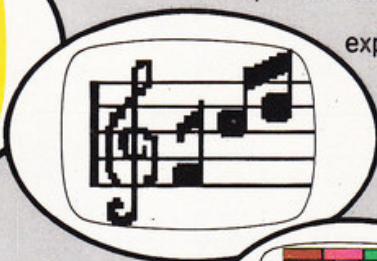
```


For those that do,



$$a \frac{dy}{dx} - by = f(x)$$

$$a \frac{dy^2}{dx^2} - b \frac{dy}{dx} cy = f(x)$$



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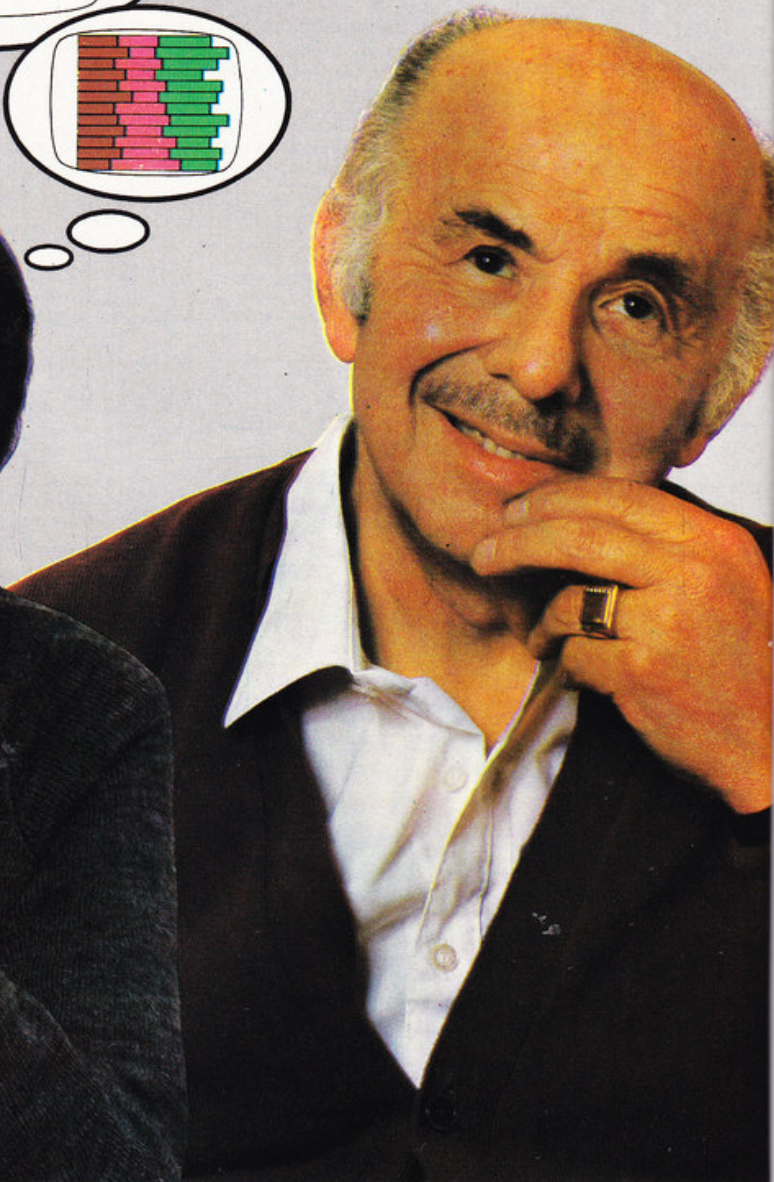
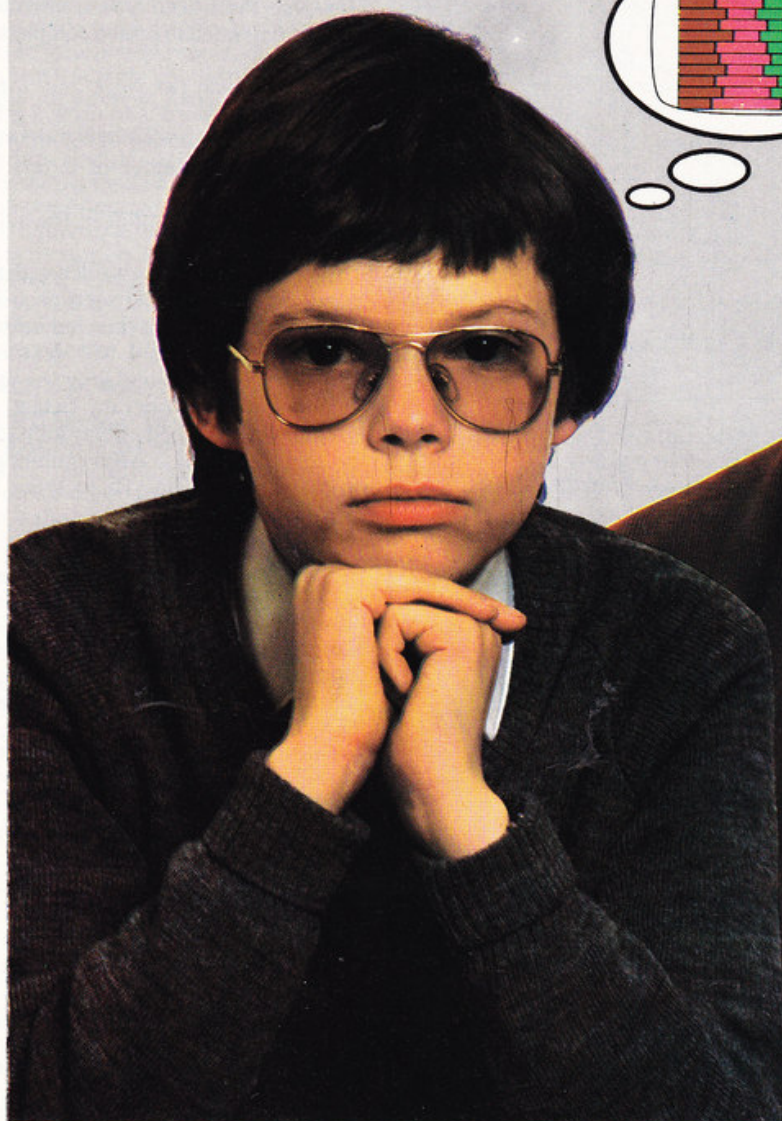
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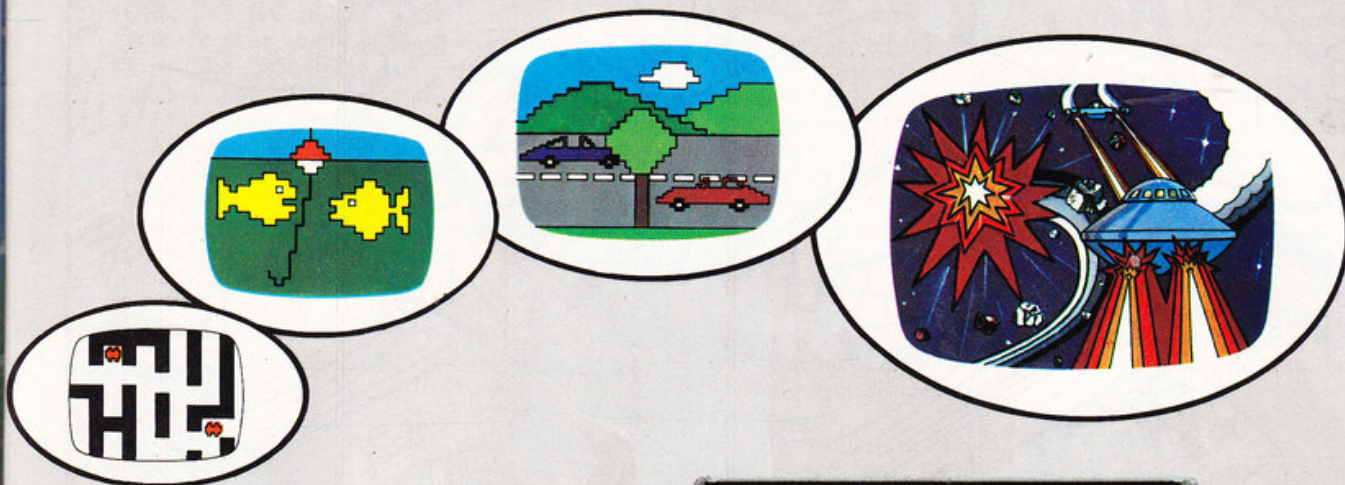
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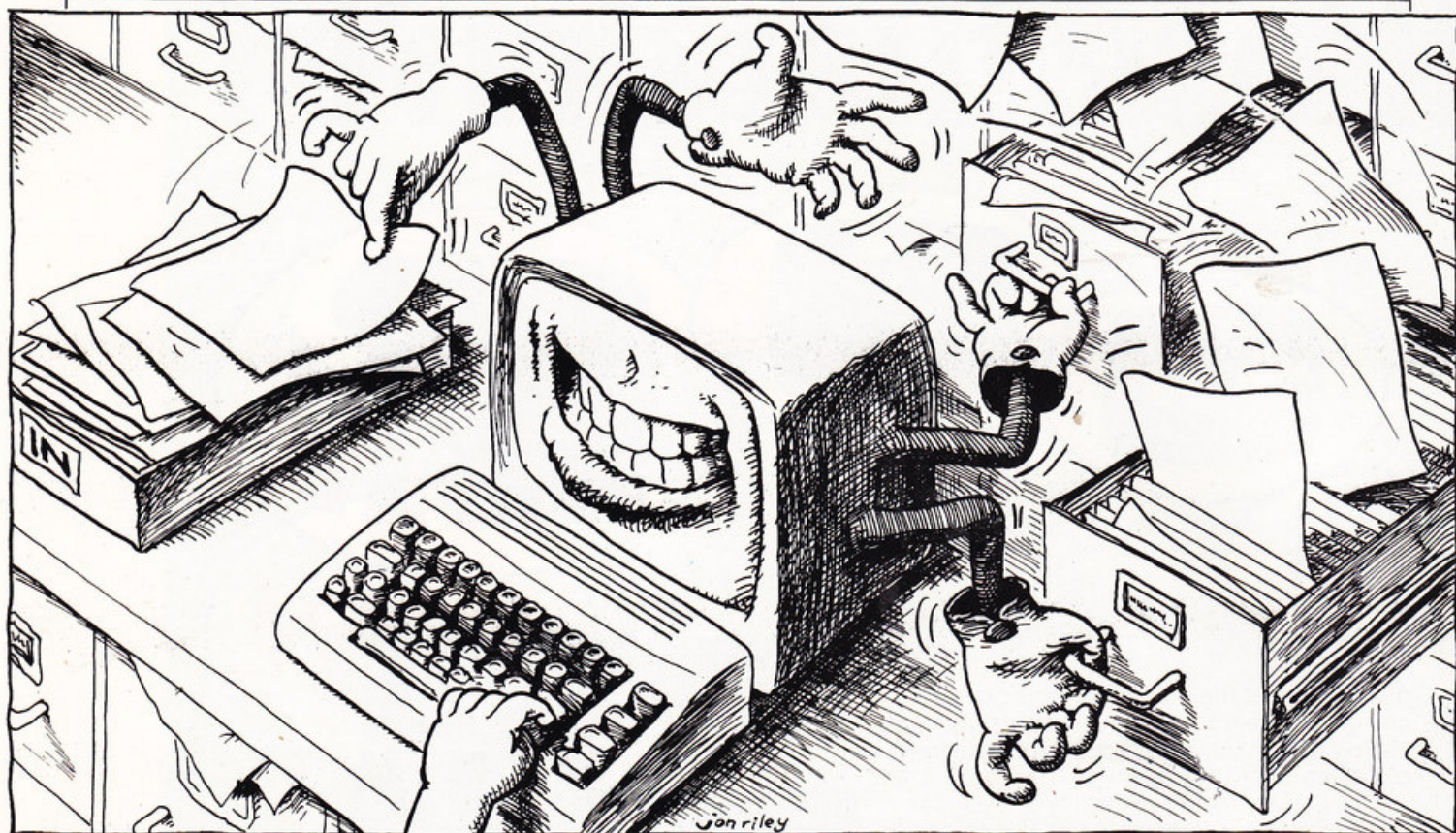
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PCN/20/6/83

The Organizer helps operators interface with CP/M. But can it organise David Janda?



Jon Riley

Signposting CP/M

For those of you who are confused by the CP/M operating system, there are programs available now that will make the CP/M environment appear a lot friendlier than it really is.

The Organizer from The Information People is a program that claims to help untrained computer users (secretaries, accountants and so on) to use a CP/M-based micro and software without worry.

The way this is achieved is really quite simple. The Organizer is set up to display neat menus instead of the awkward directories CP/M offers. You then enter your selection (by number), and the program or data file of your choice is loaded into memory and run.

So the Organizer effectively functions as a menu generator, job control processor and a CP/M operator interface.

The Organizer will operate on most CP/M or MP/M micros, and for the purpose of this review I tested it on a Vector Systems 3 micro. The only constraint on using The Organizer is that you must have at least 48K user available RAM.

Features

The Organizer comes with a standard 'front end' menu which allows you to access sub-menus or run applications directly. This menu can be altered to suit your own particular needs, and again, you can create sub-menus. In addition:

- You can set up the Organizer's menus with most text editors.
- Menus can be structured so that when an operator asks for a program that is not on the systems disk, the Organizer will request a disk change.
- Help files can be created—the standard menu has many.
- Command streams may be set up within a menu, so that a string of different functions can be carried out.

As mentioned previously, you can set up menus to suit yourself. This can be done by copying the existing menu, MAIN MENU.MNU and modifying it, or by creating your own main menu from scratch. The manual recommends you to take the first option as the main menu contains many useful file descriptions, and all you have to do is attach the appropriate file to the description.

The Organizer is quite comprehensive and there are many features in the package. However, there is a distinct shortage of error detection routines. For a program that is meant to keep the user away from the CP/M environment and its cryptic error handling, the Organizer could do better.

Presentation

The Organizer disk, operator's manual, agreement and registration form come in a transparent plastic cover. It would be quite

easy to bend the package accidentally, and thus damage the disk.

Unfortunately, for the inexperienced operator, the operating manual is not much good at all. If you are not frightened of CP/M yet, then reading the first part of the manual will put you off for life.

In general, the documentation is not aimed at the 'inexperienced operator' as the manual claims. I found it hard reading, and I have been using CP/M packages and associated documentation for the past four years. For those who buy this package, I would recommend two to three thorough readings of the manual before using the package.

The really useful information in the manual was scattered about in various places, not organised into logical sections as you would expect. The examples shown, however, were clear enough, and the manual gives good advice on how to organise your disks.

Getting started

The operating manual itself contains a section on 'getting started', and it really is quite comprehensive.

When used for the first time, a program called GENORG must be run. This will display the names of 20 commonly used terminals, one of which will probably be yours. You will need to configure the Organizer to your particular terminal, so if

your terminal is not on the list, then a mode can be entered in which you enter some control codes associated with your terminal. This process is not too difficult, and if you get it wrong, the program can be re-run and there will be no damage done.

In use

The screen layouts and menu structure depend on how good you are at designing them. The manual and the main menu supplied show how to structure the menus and sub-menus. The main menu on the package looks good and is structured very well, and I left it as it was and attached sub-menus to it. All you have to do to get a program or file running is to enter the number to the left of the description, eg 1. LANGUAGES (leads on to sub-menu).

So, if you enter 1, a sub-menu would be called. I structured my sub-menu like this:
1. CISCOSOL (sub-menu).
2. F80 FORTRAN 80.
3. MBASIC5 (sub-menu).
4. PASCAL MT+.

If you now enter '2', the Organizer will immediately invoke the Fortran compiler. However, if you enter '1', further sub-menus would be displayed, eg

1. SC Scope Text Editor.
2. COMP COBOL Compiler.
3. F2 FORMSII utility.

To actually get the Organizer to run a program, a 'stream' of information follows the program description:

1. SC Scope Text Editor: SC ((Enter file name));

Each time you enter option 1, the prompt, 'Enter file name' is displayed. You enter your choice and the text editor SC (Scope) goes into action.

It is also possible to attach help menus to the end of menus, so instead of entering a choice such as '1', you could enter '?1', and if there is a help file present, it will be displayed.

I should point out that all the above examples were created by myself. You will have to do the same if you purchase the package. Or else you can 'tag' your own files on to the existing main menu.

The whole package is quite flexible when you've got used to it. Some pretty comprehensive command streams can be set up, asking for user input, allowing disk exchanges, initialising help files, etc.

Once you have become used to the system, you can skip past menus and go directly to the final menu. You can adjust the package easily to suit different skill levels.

Depending on the speed of your micro, the response time will vary between selection and execution. On the Vector, response time was quite acceptable, but I was using 8in disks, rather than 5 1/4in. The Organizer looks after file handling very well, and will cope with tedious jobs such as deleting *.BAK files.

Reliability

If you enter invalid commands in the command stream, the Organizer normally tells you so when it tries to execute the

command stream. But this does not always happen. On some occasions, when I gave it bad file names, the Organizer crashed into the CP/M operating system. When this happened, I had to re-enter it manually, after which the Organizer carried on from where it left off. On the whole, there could have been more error trapping, and I hope The Information People will rectify this in future versions.

Verdict

If you have a micro in a busy office environment where operators unfamiliar with CP/M will use it, the Organizer could come in handy. It will be useful if there is someone in the office with some idea of how to set up menus and how to run the machine, as setting up the package to suit your own particular needs can be difficult.

But once this is done, it should prove to be a handy utility for your system.

RATING

Features

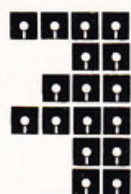
Documentation

Performance

Usability

Reliability

Overall value



Name The Organizer Application Menu driven CP/M System CP/M or MP/M (48K RAM minimum) Price \$149 Publisher The Information People, 443 Hudson Avenue, Newark, OH 43055 USA. Format 8in SS-DD disk Language Machine code Outlets mail order

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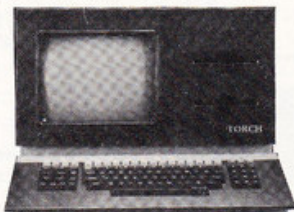
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A stethoscope on your programs, and a teletext display facility. Ted Ball peers at two packages.

Spectrum tracer . . .

When you are debugging a Basic program it can be difficult to find out what the program is actually doing instead of what you meant it to do. Trace for the ZX Spectrum helps your debugging by displaying each statement in the program as it is executed, allowing you to follow the progress of the program step by step.

Features

To start Trace you have to give the instruction `RANDOMISE USR 31840` on a 16K Spectrum, or `RANDOMISE USR 64608` on a 48K Spectrum. This can be in immediate mode or in the program, and you can use a similar `USR` call within your program to turn off the trace, so you can trace the whole program or just part of it.

In use

When a program is being traced each statement is displayed in the lower part of the screen, together with the line number and the statement number within the line, before it is executed. When you press the Caps shift key the statement is executed and the next statement displayed. You can use the Symbol shift instead of Caps shift to

get the statement listed on the printer as well as on the screen. The top 22 lines of the screen are left for use by the Basic program, so the screen display works in the normal way while a program is being traced.

Trace allows almost all Basic commands to work as usual, including `INPUT`, `INKEY$` and `USR`, although there are some points noted in the instructions about the use of `INKEY$` and `USR` in a program that is to be traced.

The Basic commands that do not work in the usual way are `GOTO`, `GOSUB` and `NEXT`. As described in the instructions, Trace will stop with an error report if it comes across a `GOTO` or `GOSUB` that points to itself, for example `10 GOTO 10` or `20 GOSUB 20`. However, this type of `GOTO` is often used in the form:

```
10 IF INKEY$ = " " THEN GOTO 10
where the program is waiting until a key is pressed. The problem with NEXT is not mentioned in the instructions, but is probably related to the restriction on GOTO and GOSUB.
```

```
If you have a line of the form:
100 FOR a = 1 TO 10: IF x>y THEN
NEXT a
```

with `FOR` and `NEXT` on the same line and `IF . . . THEN` in front of `NEXT`, Trace will stop with an error report instead of executing the `NEXT`. Curiously, Trace will quite happily execute the `NEXT` if it is not preceded by `IF . . . THEN`.

Verdict

Apart from the problems with `GOTO`, `GOSUB` and `NEXT`, Trace works very well, and I couldn't find anything else that would crash it, or make it miss a program error.

There are a number of toolkit programs available that include a trace as well as other programming aids, although usually the trace in a toolkit will display only the line number. You should consider whether getting the Basic statements displayed by Trace is a sufficient extra feature to justify your buying this program.

RATING
Features
Documentation
Performance
Usability
Reliability
Overall value



. . . and text placer

ZXText is a program for the ZX Spectrum which allows you to set up displays that mimic the teletext broadcast news and information services — Ceefax on the BBC and Oracle on ITV.

The cassette received for review had a hand-written label, but was marked 'Test copy only'. The instructions consisted of seven pages photocopied from a typed original. They cover all the features of the program and how to use them, but a lot of space is taken up explaining how to use colour and graphics on the Spectrum, and you'd need to know this beforehand if you are going to use ZXText successfully.

Features

Teletext is organised into numbered pages, each page filling the TV screen. With ZXText, to set up a page you have to write and type in the program lines needed to produce the page. This allows you to use all the Spectrum's colour and graphics features in the display, but you are limited to what you can get into nine multi-statement program lines.

In use

The top line of each page includes the page number, the day and date, and the time in hours, minutes and seconds. The day, date and time have to be entered every time you

run ZXText. The day and date are not updated by the program, but the time is advanced while ZXText is running.

The clock is about as accurate as you can expect from the Spectrum — comparing it with a digital watch guaranteed accurate to within six seconds a month I found that the ZXText clock gained four seconds in one hour.

There is an alarm clock facility in the program. This uses the Spectrum's built-in beeper, but when it sounds the only way to stop it is to use the Break key to stop the program.

When ZXText is running you can display any page on the screen by typing in the page number. You can also set it up to cycle through a selection of pages, but to do this you have to alter the program.

Once you have your pages set up you can save them on tape using one of the pages provided. However, once you have called up the save page there is no way to get out of it without actually saving the program or using the Break key. When you have saved your pages the program waits for you to verify the tape, but there is nothing on the screen to tell you to verify.

When you've done this the program automatically runs again from the beginning, so you have to type in the date and time again.

Verdict

ZXText is rather difficult to use and includes very few error checking and user-friendly features. Invalid dates result either in garbage being displayed in the date field or the program crashing with an error message.

Since you have to write the program code to produce the displays you want, you might just as well do the whole thing yourself and write the small amount of extra code needed to call up pages.

RATING
Features
Documentation
Performance
Usability
Reliability
Overall value



Name Trace **Application** Programming aid
System ZX Spectrum, 16K or 48K **Price** £6.95
Publisher Texgate Computers, 14 Brook Lane, Corfe Mullen, Dorset BH21 3RD **Format** Cassette **Language** Machine code **Outlets** Mail order.

Name ZXText **Application** Simulated Teletext display
System ZX Spectrum, 16K or 48K **Price** £4.95 **Publisher** Iain Stewart, 17 Torry Drive, Alva, Scotland FK12 5NQ **Format** Cassette **Language** Basic **Outlets** Mail order.

Daisywheel prices cut? Barry Miles sees how Japan's new entry, the Juki has pruned them.

The Juki 6100 is a low-cost daisywheel printer from Japan. It uses Triumph Adler daisywheels, IBM ribbons, and Diablo 630 software — the sincerest form of flattery is imitation.

It is clearly designed to bring daisywheel print quality into the hands of the sort of user who, for reasons of cost, could previously think only in terms of dot matrix. It's a major breakthrough at £399, and the Japanese have chosen the UK as the first country in which to set up a dealership.

Clearly they take their responsibilities very seriously. Juki sent two engineers from Tokyo to photograph the entire first consignment, and meticulously checked every single printer after it had arrived in this country. I spoke to one of the engineers, who told me that this involved 100 printers.

Juki employs 10,000 people in Japan, and has been making computer peripherals and typewriters for 45 years. In addition to making its own-brand machines, the company manufactures the Olivetti Praxis.

Getting started

The machine comes well protected, with lots of internal packing to be removed. There is even an unpacking schedule provided, although it's a little ambiguous because the translation from Japanese is less than perfect.

The machine is housed in a fairly tough off-white plastic case, and the control panel is easy to read. It has touch-sensitive switches in orange, mauve and blue. These control reset, pause, and Form feed.

The reset switch is used to release the printer from a check or error status. The pause button takes the printer off-line temporarily, until the reset switch is set. In addition, a sliding switch controls pitch. This may be 10, 12, 15, or proportional spacing. You may vary this in software, not hardware, once the printer has been switched on.

Lights indicate 'power on', 'ready' and 'check' respectively. This is a little unconventional, but reference to the comprehensive manual tells you exactly what these mean. The 'ready' light will blink if errors relating to data transfer occur. The manual disconcertingly suggests that in addition to parity errors, or buffer overflow errors,

Print at a low

'Flamming errors' may cause problems. Well, yes, I imagine they would!

The 'check' light comes on to warn you that ribbon or paper has run out: if it blinks at you, this is to indicate an error status. When you have cleared the error, you can print the contents of the 2K buffer, by pressing reset. The 2K buffer comes as standard. Strangely enough, space has been left on the printed circuit board for three more RAM chips to be soldered in — the holes are there, but no sockets! Ship for a hap'orth of tar, I feel.

The lid lifts up and off to gain access to the daisywheel, which drops into place, and is secured by the use of a single lever. The IBM-type ribbon is relatively easy to insert, although it is a slightly mucky task. The ribbon is very wide, and sure enough, when printing starts, you find that it uses the top, middle and bottom, of the ribbon in turn. Commendable economy, particularly as the ribbons are very cheap.

With the lid off you notice that there is a lot of sound-proofing foam stuck around and you begin to wonder why. The manual boasts of an induction motor, and says this gives a simpler mechanism, and a more accurate printing position. I thought simplicity would give greater quietness, but now I am not so sure.

The manual, in a rather confusing way, describes the use of the bail lever to wind the paper round the fifth line. It does not deliver the paper into precisely the right alignment every time, and only has the aid of a single plastic paper guide, and two rubber rollers on the platen. And there's another snag — it won't work with the top on the printer! As is usually the case, the lever concerned protrudes through a slot on the top of the printer's case. But the Juki's slot isn't long enough. The trouble appears to be that the lever, being plastic, slender and long, bends so much that it cannot complete its travel before hitting the end stop. There doesn't seem to be any easy way of adjusting it either.

I can only hope that the sample I had

wasn't typical. But on the other hand, what did those engineers do if they didn't find this fault?

This was particularly disappointing, as much of the design has been thought out with considerable care. There is a 10, 12, and 15 pitch calibration on the transparent lid of the machine. But just a moment — there is something a little strange here: the maximum number of columns is only 110 if you are using 10 pitch. Reference the manual confirms my fears: the maximum paper width is only 13in.

On the face of it, this doesn't matter much — after all, who needs great widths? Many people won't find this a problem. But the daily proliferation of spreadsheets means that more and more people are going to be wanting to print out columns of figures. The Triumph Adler range of print wheels includes some very attractive 15 pitch versions, and I'd rather have a maximum of 198 columns than 165, which is all that the Juki can offer.

Ten dip switches are available. They're reasonably accessible by raising the clip-on part of the top of the body. These control automatic linefeed when carriage return is sent; impression level, for when you are using multistrike ribbons; selection of international character set; form length; 11in or 12in line spacing, 6 per inch or 8 per inch, and continuous or cut paper — giving a pause to change sheet (pressing the reset switch sets printing going again).

Self-testing of the machine is more complete than in some cases. The buffer is checked first, and then, if you have the serial interface option fitted, that is checked next. Finally the character set is printed out

Up and running

There were no particular problems in running the printer, although I did experience difficulty in using it with the word processors I have. I couldn't get to the bottom of this, but it appears that the handshaking may be somewhat out of the ordinary in its reaction with my hardware.

Certainly, the print quality is superb, and the wide range of daisywheels available gives a good choice to the customer. Unfortunately the changing of daisywheels proved troublesome in the extreme. The manual was no great help either. The problem is that the carrier bolt, which locates into the slot in the daisywheel in order that the motor can drive it round, proved extremely unwilling to engage.

This was aggravated by the fact that the bolt doesn't always stop at the same point, even on reset. You would normally expect the bolt to stop at top dead centre, but it did not. This would matter to you only if you change daisywheels frequently, and I suspect that most users will buy only one,

```
( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 ; : < = > ? @ A B C D E F G H I J K L M N O P Q R S T
U V W X Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z
( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 ; : < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X
Y Z [ \ ] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z
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```

A selection of the typefaces available on the Juki 6100. You can also set up bold and shadow printing, as well as automatic underlining. A wide range of daisywheels is available for the printer.

price

or if they buy more, will not bother to change them often.

Features

The number of control codes available is outstanding, and the description in the manual is quite adequate for you to be able to get full value out of them. The introduction runs like this: 'The control codes come in special control codes based on escape codes and those control codes shown in ASCII table.'

But once you're past that you can make progress. You can backspace by one column, or 1/60in in graphics mode. Horizontal and vertical tabulation are both possible, as are upwards line feeds, and half line feeds in both directions for subscripts and superscripts. The left and right margins may be set, as can the top and bottom. The printer may be completely reset from software. The extra symbols on the daisywheels may be accessed by escape sequences. Automatic backward print may be set and reset at will, and you can reset after a remote error.

Word-processing functions are numerous. You can set up bold or shadow printing, and also set an automatic underline. You can also switch proportional spacing on and off from software.

It is possible to slow down the printer with an escape sequence which allows more time for the carriage to settle before printing. This is no doubt to enhance precision, though there seems to be little need for it.

You can define the line feed in multiples of 1/48in, and you can decide the character spacing in 1/120th increments. This enables graphics to be printed and lets you close-up letters if you are trying to cram them in. You can turn off the bi-directional printing if you wish. The manual specifies how to send these commands, but it falls



The Juki 6100 is a major advance for daisywheel printers, bringing high-cost facilities down to the level where daisywheel can become a real competitor to dot matrix. It is versatile, with a wide range of functions, but although Juki places much emphasis on quality-control, there are a few rough edges.

short of giving examples in one of the dialects of Basic.

One thing Juki has been able to do away with is the fan for cooling. This is attractive, because often you print intermittently, and silence in between is good. The printing itself is pretty quiet, but the reason for all the foam is fairly obvious: there is a

continuous high pitched whine all the time the printer is printing. This is fairly distracting, and quite unpleasant, although I think most users could learn to live with it.

The speed of printing is as close to the rated 17 cps as are other printers to their rated speeds. If the paper loading lever worked, the print speed would be less important, of course.

Verdict

This is a very interesting entry into the market, and is rather like the Japanese entry into the car market—lots of facilities for your money, but a few design deficiencies into the bargain. There is no doubt that the Juki competes extremely well on price/performance ratio.

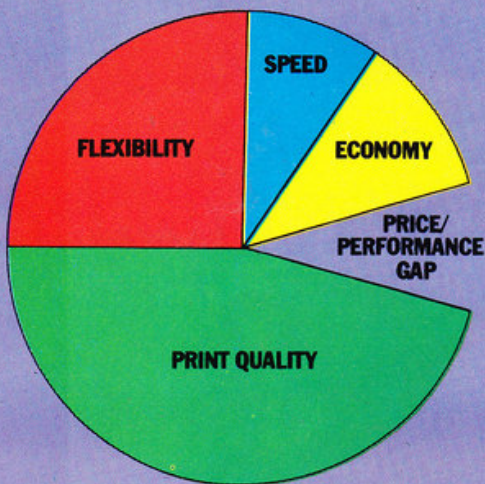
The machine has a range of facilities that would do justice to a much more expensive machine. There are flaws in it, but not sufficient to put off the budget-conscious consumer. I'm told Juki policy is to produce a new model each year. After this promising debut, the next one will be worth looking out for.

Item Juki 6100 daisywheel printer **Manufacturer** Juki **Price** £399 plus VAT **Interface** Centronics **Parallel Contact** Microperipherals 0256 54057.

This pie chart represents a rough guide to what we feel is the trade-off between price and capabilities on the Juki 6100, as determined by the PCN Peripheral Pro-Test.

It's based on the premise that a high capability in one direction will cause either a low capability in another or a higher price. For this reason 'economy' is a negative way of expressing price—the cheaper the printer the bigger the economy segment.

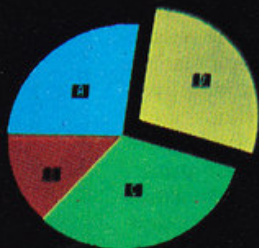
If a printer has lots of everything it will close the price/performance gap—obviously a wide gap doesn't represent a good buy, 30 degree is good and none is excellent.





Construction Costs Profile

A - Materials (24%)
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C - Overhead (23%)
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5-slot expansion bus

Keyboard

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

Display Units

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

Mass Storage

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Additional internal storage of 320K byte diskette, or 5 or 10 Mbyte Winchester disks optional

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3270 SNA stand-alone
3270 BSC and SNA cluster

Operating Systems

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

Languages

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Printers

150-cps TI 850 Series for most applications

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

Will the UltraTerm board set new standards for video displays? Richard King testing.

Apple of your eye

probably the Videx Videoterm, which is the only one which has been widely copied, cloned and emulated, and which is recognised by almost all software companies as a regular option.

Videx's new product not only provides an 'ordinary' 80×24 display, but displays of 80×32 , 80×48 , 96×24 , 128×32 , 132×24 and an incredible 160×24 ! As if so many formats were not enough, it also provides inverse and normal, as well as highlight and lowlight, two character fonts and special graphic symbols.

Presentation

The UltraTerm comes wrapped in deep foam with a manual and demonstration disk, all in slip-over cover with an attractive design. It catches the eye and, although providing sufficient protection for the PCB, it would need extra wrapping for posting, otherwise the book will suffer.

Documentation

As is usual with all Videx products, the documentation is immaculate, and an example to everybody else. Videx is a company which believes that its products will be most useful if they are 'open', ie that all necessary information is not only available but is put in the hands of the buyer.

This attitude contrasts sharply with that of many other companies who don't do this and, out of either narrow-minded protectiveness or bone-idleness, offer products which are less useful, though potentially no less capable.

The book has a short table of contents, followed by an expanded table of contents, which is broken up into sections, with the essential installation, troubleshooting, beginner's guide, and operation sections at the beginning, where they belong.

Following these are chapters on software environments, some specific software, the programmer's guide, and the hardware interface and several appendices on the ASCII code chart, character sets, CRTC registers, firmware listing, schematic diagram and theory of operation. They finish up with a glossary and an index.

With the aid of a manual as good as this, I don't think that there's any question that couldn't be answered, but there are so



128 x 32 for Visicalc.

many ways you can use this board that it would have been useful to include a quick-reference card so that you don't need to keep looking at chapters five to eight and appendix B all the time.

A very important detail covered in the hardware interface chapter is selecting the correct monitor for use with this card. If you have a standard 9in B & W monitor, then I'm sorry to say it just won't do. You'll need one with a much higher bandwidth, and you'll probably find that the persistence of the phosphor is too short.

What all that means is that the UltraTerm makes much smaller dots than most monitors can handle, so you need one which can respond at a frequency of at least 17MHz, as against the 7 to 8MHz of most monitors.

Colour is perhaps the best indication to choosing a monitor. Most ambers have a long persistence, as do the deeper greens. The pale greens are possible, though they will give a small amount of shimmer, but any B & W is quite useless.

The bandwidth must be checked from the specification, but unless you have some special prejudice, the Apple Monitor is probably the best buy since it has all the necessary characteristics.

Kieren Phelps



80 x 24 in high and low intensity.

Just once in a while a peripheral for Apple-bus computers comes along which is so advanced that even seasoned Applemaniacs just stop and stare.

The Videx UltraTerm is such a device. Essentially it's an improved video display card, but the extent of the improvements is such that it's a whole new ball-game.

There have been many '80-column' cards made for the Apple, some better than others, but overall the most popular is



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TEC 40cps Daisywheel	£1095
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Paddles	£20
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Monitor Stand	£18
Vinyl Carrying Case	£17

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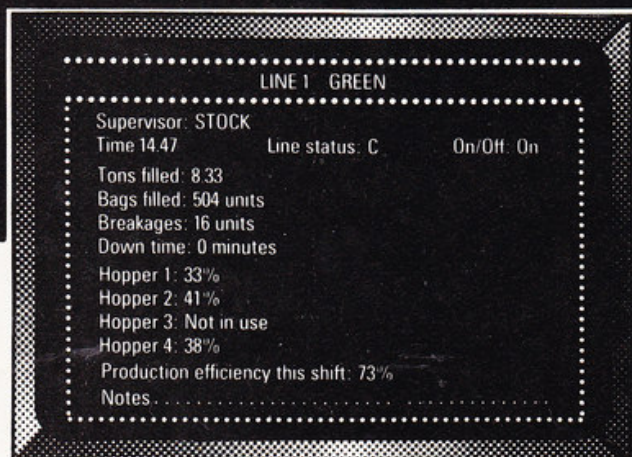


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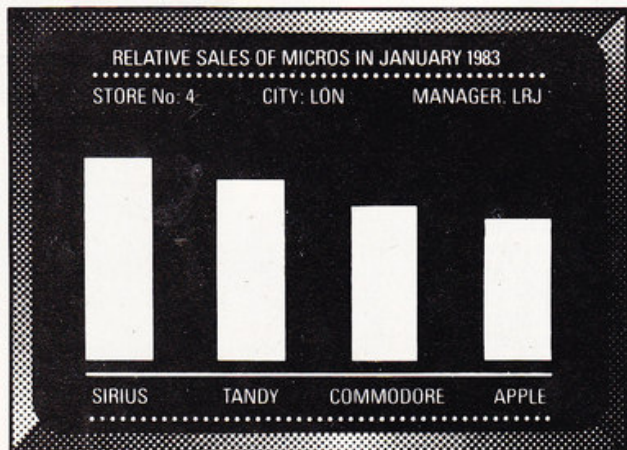
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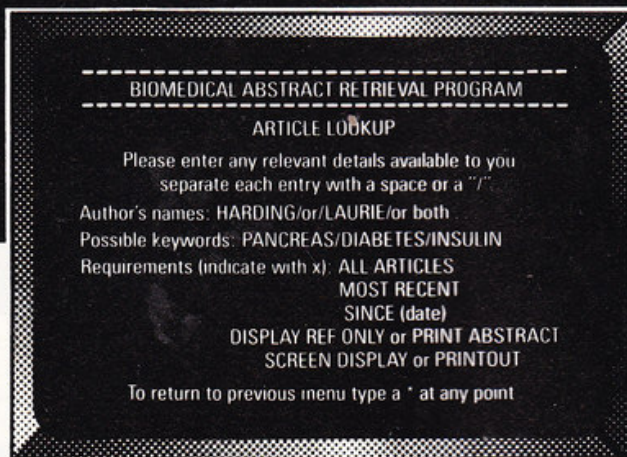
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The biochemistry department of a major Scottish university had a need for a filing system which could store details of abstracts of biochemical articles and which would allow retrieval of relevant material through entry of key words alone. A massive database had to be implemented on an Apple II computer and retrieval times needed to be measured in seconds not hours. TLO did it and the solution has since been widely published for use on other machines.

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A glance through the three examples on this page will give you some idea just how versatile TLO is.

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Construction

The UltraTerm board is a real work of art, if such a thing is possible in an electronic device. The chips are packed, with almost no space between them.

There's more advanced technology in the screen memory, which is 4K of very high-speed static RAM . . . 100 nanoseconds! That's more than twice as fast as good dynamic RAM, and more than four times faster than normal DRAM.

The really tricky stuff is the use of three PAL chips. These are second cousins to the infamous ULA, but smaller, simpler and far more reliable.

On the top of the board is a set of four DIP rocker-switches which are used to select the default operation of the board.

There are two sets of Molex connector-

standard set, and 9 by 16 for the alternate or high-quality set.

The various options are mostly controlled by the use of control characters. This is how the original Videoterm worked and where the functions are the same, the control character has been kept. This means that old software will work quite happily on the new board.

The UltraTerm is much easier to use than its predecessor, since almost all the standard Basic editing commands have been implemented.

Provided the card is in Slot 3, the UCSD p-system recognises the UltraTerm as a serial device and uses it at bootup. The system can be made to use the wider display modes by using SETUP to build a new SYSTEM.MISCINFO file. Once this has been done, the only detail necessary is to send the correct initialisation string, and this is best done by writing a small program to do the job. Call it SYSTEM.STAR-TUP, and it will work at boot time . . . I found that the 80 x 48 mode was best for writing text, and the 128 x 32 was best for programming.

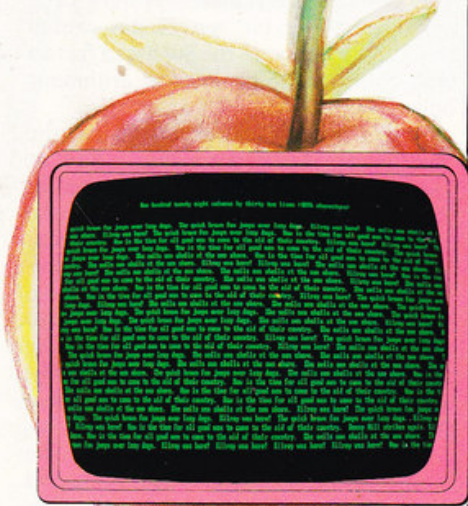
The documentation suggests that much the same can be done with CP/M, and that Wordstar, in particular, can be configured to use any of the available display formats.

Under DOS, the various display formats may be selected either by using the control key sequence or by a special set of escape codes. These complement the usual set nicely, and make switching from one format to another easy.

A software case switch is provided by the use of Control A, as is customary on Apple. This is the same as on the older card, and applies to all operating systems, but with DOS there is a difference in that Basic keywords entered in lower case (which would be illegal) are converted to upper case before being sent to the computer. This is a brilliant idea, since it obviates the need to constantly switch cases, which was a problem on older boards.

A few things could have been better. The most serious shortcoming is the fact that the board does not use the standard window and cursor scratch locations in quite the same way. Writing to locations 36 and 37 will move the cursor, as expected, but reading from them will not necessarily return the correct information.

As for windowing by POKEing locations 32 to 35 . . . forget it. The UltraTerm doesn't even look at them, and even if it



80 x 32 mode — good for text editing.



No, it isn't Lisa but it looks like it.

pins, one for the output signal and light-pen connections (J3), and one which carries composite sync and video signals, as well as the UltraTerm select signal (J6). This last is not explained further, but it would appear that it can be used to pass the output from the UltraTerm to a colour-encoder board . . . 128 x 32 VisiCalc in colour? Could be.

Operation

In use the UltraTerm is a real pleasure. The display is solid and crisp with not the slightest trace of instability. The characters are beautifully shaped, and put all others to shame. The actual matrix is 9 by 12 for the

did, the manual says it would not be possible since the card uses a hardware scrolling method which doesn't permit this. A pity, but in view of the supporting software, not absolutely essential.

The accompanying disk has an impressive demonstration, which whetted my appetite (as it was meant to do). Run it, and suddenly almost Lisa-like displays seem eminently possible.

The guarantee period is for 90 days, which is a bit short, but no worse than that offered by many other companies. My only concern is that with such an advanced piece of engineering, and with so many unusual chips, fixing a broken one may prove a lengthy business.

Verdict

This is a real beauty. It's a pleasure to use and works well with every program that might possibly need a wide display. In fact, it is so good that it shines a rather unflattering light on the Apple II.

What a shame Apple didn't see fit to apply the kind of inventiveness that Videx has. Apple's 80-column card is pitifully restrictive and difficult to use in comparison.

Videx claims in its advertising that the UltraTerm will set a new standard for video displays. I think in this case it may well be right. I want one.

Name Videx UltraTerm **Application** Multi-mode terminal device **System** Apple II **Price** £299 plus VAT **Manufacturer** Videx **Contact** Pete & Pam Computers (01) 796 1022/3/4.

Mike Whitney thinks the Duet won't necessarily play second fiddle to Sirius and IBM.

Japanese Duet

Several microcomputers based on the Intel 8088 chip have appeared in the past few years. The most popular, in this country at least, is the Sirius—with the IBM PC coming up strongly on the rail. The fact that these machines have been marketed as '16-bit' micros has caused some controversy, as the 8088 is in fact an 8-bit chip with 16-bit internal arithmetic only.

From the end-user's point of view, the question of whether a machine is 8-bit or 16-bit is of no great importance — unless this difference can be shown to affect the performance of the machine. Both the Sirius and the IBM have been a disappointment in this respect, as can be seen from the bench test figures published from time to time. It is a tribute more to the marketing skills of the companies concerned than to any inherent qualities of the machine that they sell as well as they do.

But the 8088 has a brother chip — the 8086 — which is, to all intents and purposes identical, except that it has a 16-bit data bus and can therefore be described correctly as a 16-bit chip. Machines based on the 8086 are now becoming available, and the Duet-16 is one of them. The Duet is interesting in another way too: it is manufactured in Japan, and is a pointer to the kind of competition to be expected from this quarter when the much heralded Japanese invasion gathers full steam.

Presentation

The hardware is adequately packed in three boxes containing, respectively, the monitor, the keyboard and the processor and manuals. Setting up involves plugging keyboard, screen and printer (if any) into the processor unit with the cables supplied, and checking the configuration switch settings. These switches are readily accessible from the back of the cabinet, using a ball-point pen, and specify the disk-drive type, and whether you're using a colour or a monochrome screen. I had no difficulty at all in getting the system connected up and running.

Documentation

The manuals are bound in three matching

ring-binders, with a hinged arrangement allowing them to be placed on the desk-top at an angle so you can turn pages with one hand. This is a useful feature, and I hope others will copy it.

The manuals are well laid out, informative, and contain detailed line illustrations wherever these are necessary. In some of them, however, the text is marred by rather too many typographical errors. And the quaint phraseology of one or two of them show evidence of their Oriental origins. This caused no problems in practice, but I will never understand why some Japanese manufacturers seem so reluctant to have their copy properly corrected by a native English speaker.

The manuals supplied are the MSDOS diskette operating system manual, the Basic language manual, and an introductory manual describing the hardware and

set-up procedures. I was also supplied with a selection of additional software, of which more later.

Construction

The Duet is very solidly constructed and should stand up well to normal use. As 16-bit machines contain quite a bit more electronics than their 8-bit counterparts, I was pleasantly surprised to find that the processor unit, complete with two 5in diskette drives, has been fitted into a box only 15.5 × 13 × 3.5in. There are two reasons for this: the electronics have been very carefully laid out, and the drives used are of the 'slim-line' variety — only about half the height of normal drives.

The Duet is supplied in three basic configurations. The processor unit is common to all three, but there is a choice of screen and keyboard. The monochrome



The keyboard is pleasant to use. Each section is well-defined and colour-coded without being harsh on the eye. Along the top are eight programmable function keys giving 16 functions.

configuration includes a standard keyboard, with 12in amber monitor. The colour configuration has the same keyboard but with a high-quality 12in colour monitor. The third choice includes a slightly smaller but similarly laid-out keyboard and a 5.5in green monochrome monitor, providing portability of sorts.

The system supplied for review included the colour monitor and standard keyboard. These both appeared to be of adequately solid construction.

I did have occasion to take the lid off, and can report that the electronic construction is of the high standard we have come to expect of the Japanese.

Keyboard

The keyboard is a separate, low-profile, 95-key unit. The keys are arranged in four well-separated groups — essential for a keyboard of this size. The alphanumeric keyboard is arranged in standard Selectric fashion — no ISO nonsense here! To its right is a small group of cursor and other control keys, and there is a standard numeric pad on the extreme right.

The eight programmable function keys are sensibly arranged along the top of the keyboard, making it simple to locate the required function from the function-key display on line 25 of the screen. These keys are modified by the shift keys, giving a maximum of 16 programmable functions.

The keys have a light, but smooth and positive feel. Programmers in my experience usually prefer stiff keys whereas other users — particularly typists — like a lighter movement, as found here. It's very much a matter of taste, but I had no problems with accidental double-keying or miskeying as I have had on some other very soft keyboards.

A sterling sign is available (as shifted '3') by a software command, although this is not indicated on the key-cap.

Screen

The Duet-16's screen can function either in text mode, 40 or 80 columns by 24 lines, or in high-resolution graphics mode (640 by

400 pixels). The text font exploits fully the resolution of the screen and is of high quality, and text can be superimposed on graphics without restriction. The high-resolution graphics function with all three screen options, although, of course, in monochrome only with the two monochrome screens.

With the colour screen, eight colours (black, blue, red, magenta, green, cyan, yellow and white) are available independently at each pixel, and for each character on the text screen. All the colours are pure and well saturated with no trace of fringing or other aberration. I doubt if you will be able to find better on any other machine in this class.

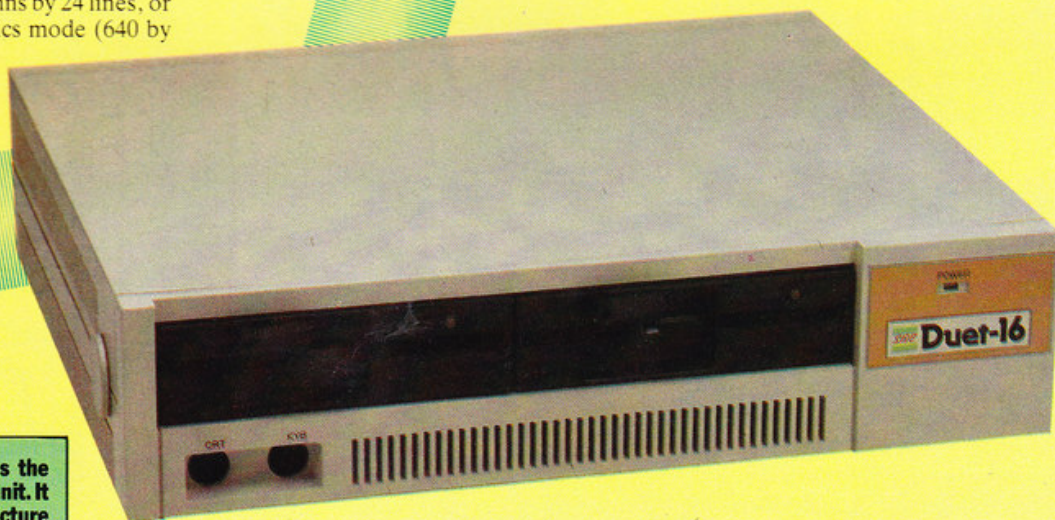
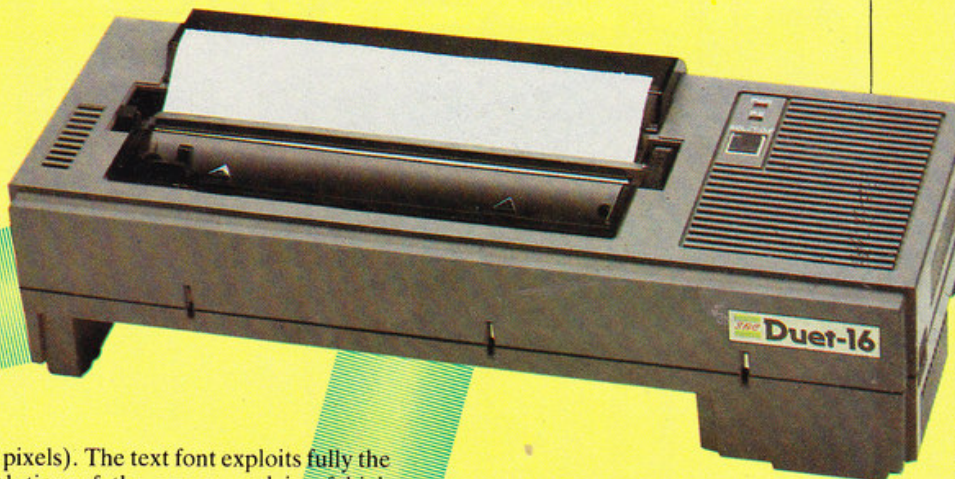
Colour graphics of this quality require a lot of memory, and the designers of the Duet have approached this problem in rather a novel way. With the minimum memory configuration, only full colour text is implemented, to ensure that a reasonable amount of memory is left available for user programs. With each 128K of additional memory installed 32K is reserved for high-resolution colour, enabling the full range of colour features to be utilised. To be able to program high-resolution graphics you will also need Advanced Basic, since the standard Basic has no high-resolution capability

Storage

The basic configuration includes 128K of RAM, of which 32K is reserved for the screen, and 32K for the operating system software. If the standard Basic is in use, a further 32K is occupied by the interpreter, leaving 32K for the user program. If Advanced Basic is in use, 50K is required for the interpreter, leaving a mere 14K for user programs. Up to two additional 128K memory banks can be added internally, and at least one of these will almost certainly be required if you will be using Advanced Basic. They cost £420 each, which is a bit on the steep side. The memory can be made up to a full 512K by the addition of an external memory unit.

Two 5.25in floppy diskette drives, with a formatted capacity of over 700K each, come as standard — this is more than twice the capacity of the maximum configuration on the IBM PC. A 10Mb Winchester drive is also available, and a 16Mb drive will be available shortly.

The floppy drives will not normally read IBM format diskettes, but software is available to make this possible; at the moment, this is supplied only to software houses, but it may later be made available to end-users.



The VDU (above left) has the same styling as the main unit. It produces a very good picture and you have the choice of 12in amber or colour monitors, or a 5½in green screen.

The main unit is angular but smaller than it looks — at the left side you can see the boss, which is where the handle goes. Thus you get a kind of portability with it.

The printer (top) is a thermal-type, 80 columns wide. Three slots in the front clip it to the back of the main unit and the cutaway gives space for the plugs.

AMDEK BY Roland DG

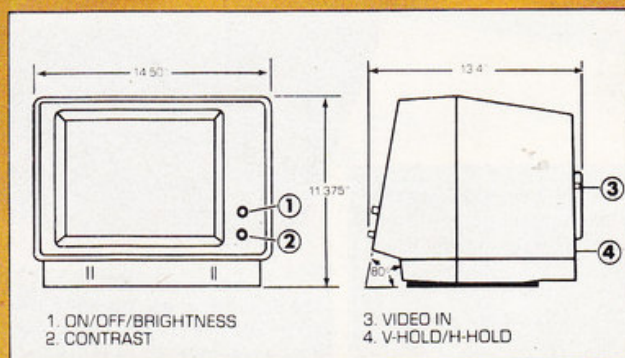
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ITEM	SPECIFICATIONS
CTR.....	12" diag. 90° deflection angle
CTR.....	Etched non-glare, green or amber
Signal.....	Composite video input
Input Signal.....	1.0 Vp-p, sync negative
Input Impedance.....	75 ohms
Scan Frequencies.....	Horizontal: 15.75 KHz. Vertical: 50/60 Hz
Display Size.....	210 (W) x 158 (H) mm
Deflection Linearity.....	Horizontal: 10% Max. (refer to EIA ball chart and dot pattern). Vertical: 8%
Video Response.....	18 MHz (± 3 dB)
Resolution.....	Centre: 900 lines. Corners: 800 lines
Power Source.....	120/220 V Convertible 50/60 Hz
Controls.....	See diagram (focus, sub-brightness, H-size V-linearity and +B adjustment are on PCB)



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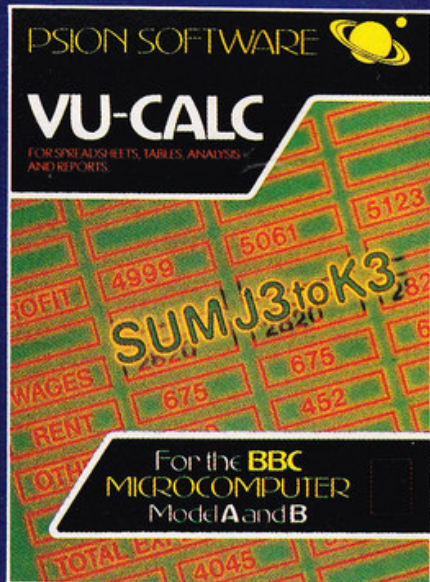
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The only trouble I experienced with the system occurred when one of the floppy drives failed to function correctly. The importer, Lambart, immediately supplied a complete replacement system unit, and informed me that this will be standard policy in the event of hardware failures. Unfortunately, one of the drives on this one also failed to function correctly. Transferring a drive from one machine to the other solved this problem.

Lambart says that the only problems that have previously arisen with the drives have been caused by diskettes without reinforcement rings. Considering the undoubted quality of the rest of the hardware, I am certainly inclined to give the company the benefit of the doubt here, and put this malfunction down to Murphy's Law.

Expansion

The Duet-16 has three serial ports and one Centronics parallel port fitted as standard, so enabling any type of printer or communications device to be used without the need for additional boards. An IEE-488 interface board is available as an option, if required.

A small thermal printer, which can be clipped to the back of the system unit, is also available. At first I was puzzled by this, as a machine of this class deserves a rather more professional quality service; but this printer is supplied for use with the small screen and keyboard, and a purpose-built carrying-case, to provide portability. The thermal printer has an unusually wide range of print options, and produces a quite reasonable print quality, but only on specially treated roll-paper.

The standard system can be configured to make full use of all the features of two C.Itoh dot-matrix printers and two C.Itoh daisywheels or to use the basic features of

any ASCII type printer. I tried it with an Apple dot matrix printer (which is in fact a modified C.Itoh), and had no difficulty at all.

There is no other provision internally for expansion, since the Duet's designers have chosen to provide expansion features which come as extras on other machines as standard.

Software

The standard operating system supplied is MSDOS, as on the IBM PC. CP/M-86 is promised as an option by August and a multi-user version of Unix will be made available in this country early next year — it is already in use in Japan. Basic 86 is supplied as standard, with Basic A (an advanced version, similar to IBM Basic A, but with several extensions to exploit the colour graphics capabilities of the Duet) as an option.

Versions of WordStar, MailMerge and SpellStar, and the spreadsheet package Multiplan, all modified to use the colour features of the Duet, are now available, as is Microfocus level II Cobol, with Forms-2 and Animator. This is one of the best Cobols available on microcomputers. An accounting package — the Dataserve DTS system — is also available, again adapted to use colour text.

Lambart says that the Derwent Data Systems Retrieve database software is ready, and the company is looking for other packages suitable for the Duet. Since MSDOS is the standard IBM PC operating system, it is likely that there will soon be a very respectable choice of software for this machine.

Verdict

There are two ways of summing up this machine: first, in relation to other 8086 and

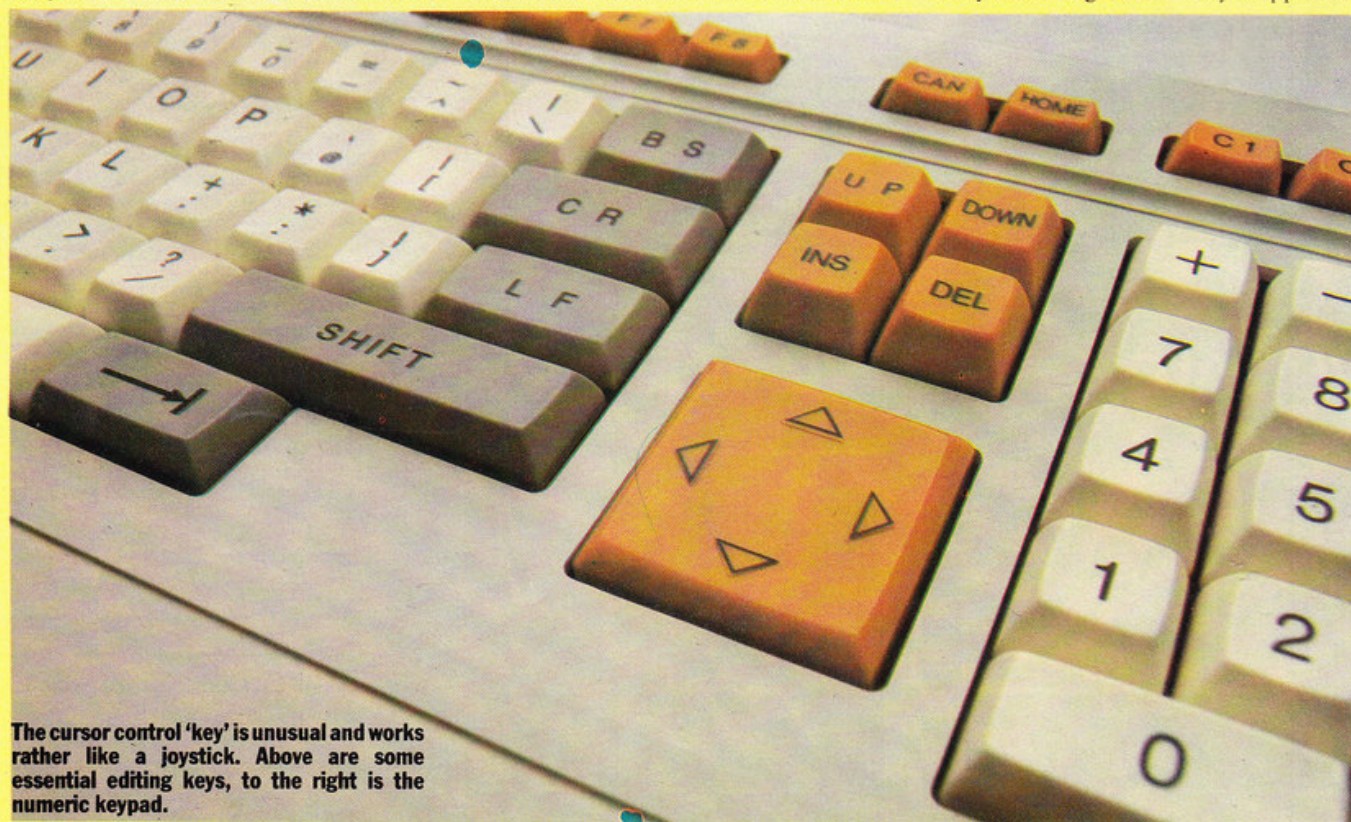
8088 machines, and second, in relation to microcomputers in general. The Duet-16 is based on a true 16-bit 8086 chip, running at 8 MHz. I used an Apple IIe, based on a 6502 chip running at 1MHz, as a benchmark for a simple series of timing tests of the four standard Basic arithmetic operations. On a very rough and ready basis one would expect — all else being equal — an eight times improvement in execution speed because of the CPU clock speed, and a further doubling or better because of 16-bit operation.

Judged by this criterion, the performance is disappointing to say the least. The greatest improvement I measured was in multiplication, where 10,000 repeats of 'A=A*A' took 31 seconds on the Apple and 19 seconds on the Duet-16. Even this is not as good as it looks, since single-precision (seven digits) is used on the Duet, whereas the Apple operates at a precision of nine digits, and would therefore be expected to take longer.

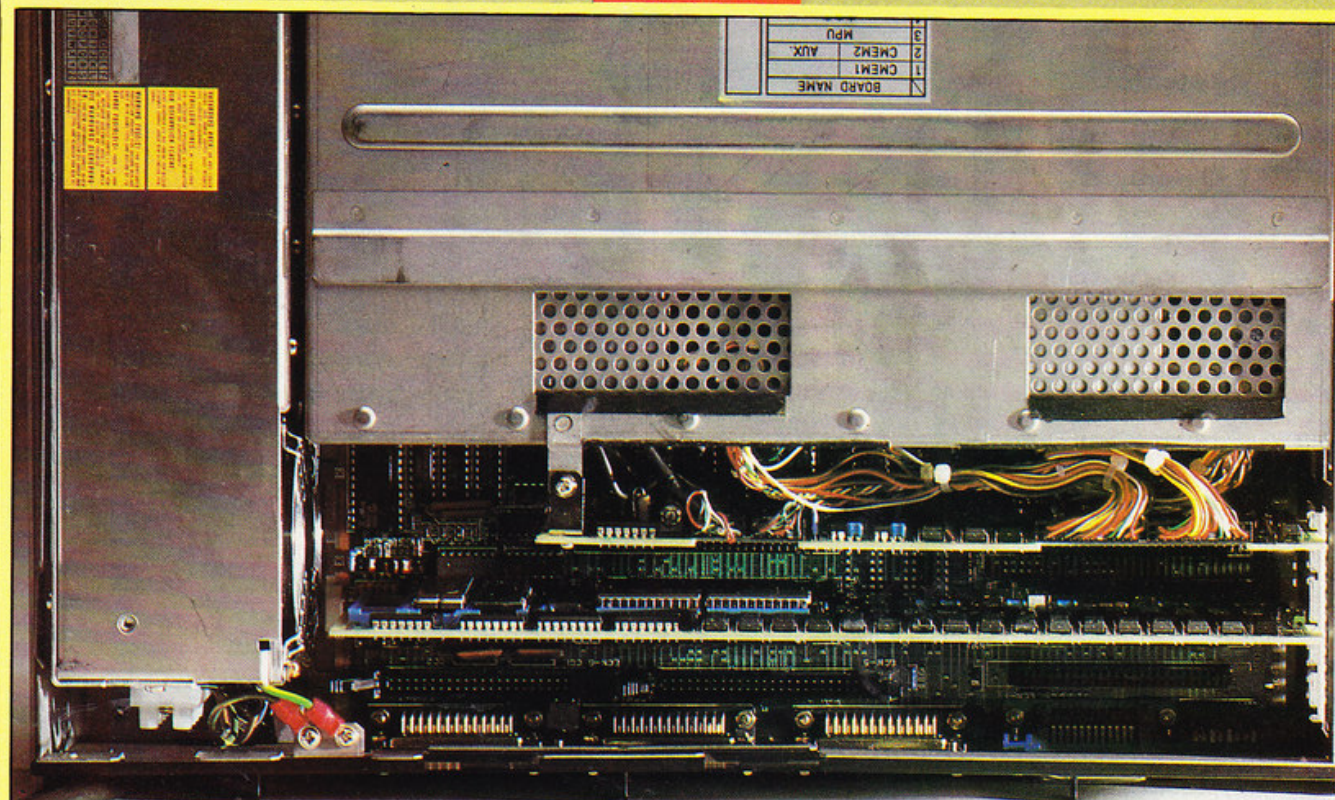
There could be many of reasons for this. Performance is affected by a number of factors, including clock-speed, the efficiency with which the CPU uses clock-cycles, and Basic interpreter software efficiency. Both of the machines mentioned have Basic interpreters written by Microsoft, and there seems no good reason to expect any wide variation in their quality.

I have long believed that the 8086/8088 family of chips, taking into account the software which is associated with it, is a blind alley in the forward march of microcomputer technology, and the Duet-16 has given me no reason to reconsider this opinion — in fact it has reinforced it.

Others may disagree with this view, but of all the machines using 8086/8088 chips, to my knowledge none has yet appeared



The cursor control 'key' is unusual and works rather like a joystick. Above are some essential editing keys, to the right is the numeric keypad.



Internally the machine is neat and solid. The main board is underneath, with the various interfaces on cards at the back. The drives are well-protected in metal with the power supply beside them. The back of the main unit (below) showing the clips for the printer. There are two central ports, an auxiliary connector and a Centronics port. At the right are several DIP switches, used for configuration.



which has produced the kind of performance improvement over the earlier 8-bit technology which could reasonably be expected.

But given that you have a particular requirement for a machine based on the 8086, you would be well advised to look seriously at the Duet before deciding to go for the Sirius or IBM PC. It appears to be significantly faster than either of them, and has a number of convenience improvements. The diskette capacity is twice that of the IBM, and the colour screen and graphics are in a different league.

As regards price, this is heavily dependent on the extra features you will require. The basic configuration is £2,595 for the standard monochrome version, and £2,995 for the colour or portable versions. This

includes all the input/output ports you are likely to need.

If you want full colour high-resolution graphics you will have to fork out for Basic

A (£250) and an extra memory board (£420), but even with these extra costs, I suspect that the Duet-16 will prove competitive.

SPECIFICATION

Price	£2,995 (£2,495 for monochrome)
Processor	Intel 8086 running at 8MHz
RAM memory	128K expandable to 384K internally
ROM memory	Bootstrap and diagnostics
Text screen	40 or 80 x 25, eight colours
Graphics screen	640 x 400, eight colours
Keyboard	95 keys, eight function keys, numeric keypad
Storage	Two 720K 5 1/4 in half-height drives
OS/Language	MSDOS, Basic 86 (Advanced Basic extra)
Distributor	Lambart, 52 Moorbridge Road, Maidenhead, Berks, tel: 0628 72037.
Software supplied	None

MICRO CHESS

ORIC 1

Knights and days

Name Oric Chess System Oric-48K
Price £9.99 **Publisher** Transoft,
0353-2271 **Format** Cassette
Language Basic and machine code
Outlets Mail order

Far from being squeezed out by arcade games, chess is alive and well and living on micros of just about every make you can think of. The Oric-1 is no exception, since Transoft has just brought out a chess game, with five levels of difficulty and classy graphics.

The micro is your opponent and you enter moves by giving the starting and finishing co-ordinates of your chosen piece.

In play

Your only instructions for the game are held as the first file on the cassette, not on paper. Learn how to play the game first, since the instructions assume you are a player already.

Loading this tape I found to be a little difficult, with both volume and tone levels needing to be set precisely. And though the first file should load the second automatically according to the instructions, it wouldn't oblige for me.

Once loaded, the display shows the board, a scratch-pad where moves are displayed, and messages. The graphics are good enough to play the game without needing to use a board of your own. But the standard

of play was quite a different story.

Of the five levels of play, I won easily at the first three levels. At levels four and five, I found things were little better. The delay between moves was so long that I lost all patience with the game, and quickly gave up.

I thought the length of thinking time was out of all proportion to the level of difficulty the game offers.

Oric Chess lacks a number of features that are standard in other programs. For example, there is no facility to set up the board for problem solving, the computer will not suggest a move, you cannot move between levels of play during a game.

The result is a mediocre game of chess and little else.

Verdict

I am a keen chess player but I'm no Boris Spassky so I think a lot of people will be disappointed with Oric Chess. A 48K machine with a very fast processor is capable of greater things than this.

It is not without redeeming qualities, however. Error checking for invalid moves is of a very high standard and the endgame is strong.

The graphics are excellent with each piece clearly defined, and after moves have been entered both the piece to be moved and its destination square are flashed.

David Janda

RATINGS

Lasting appeal

Playability

Use of machine

Overall value



COMMODORE 64

Master games

Name Grand Master System
Commodore 64 Price £17.95
Publisher Audiogenic, PO Box 88, Reading, Berks, tel (0734) 586334 **Format** Cassette
Language Machine code **Other versions** Vic 20 **Outlets** all major suppliers.

Grand Master is the latest in a long line of chess programs for microcomputers, and this one runs on a Commodore 64, with cassette deck.

You're greatly helped in Grand Master by a very clear display, and a large number of special facilities. Although the game commences with a black board on a white background, screen, border and background colours can be changed throughout the game if required.

In play

There are ten levels of play, with a response time ranging from about five seconds up to hours and even days.

While waiting for a move from the computer, the best move it has thought of so far is displayed on the screen, and if you wish, simply pressing RUN/STOP will make it take that move.

When it's your move, you enter your move with the co-ordinates of the square you want to move from, and the co-ordinates of the one you want to go to. Correcting moves

is done by pressing the DEL key, and you can even take back moves by using the left arrow key.

While Grand Master is playing from its large repertoire of opening moves, and before entering the middle game, you can ask for a hint on what it thinks your best move is. Thus it can be an instructive opponent.

All moves are timed throughout play and the clocks reset to zero after every game. You have the option of playing either black or white but cannot swap during a game.

Grand Master does appear to be better at defending than at attacking, as is the case with many chess programs. Throughout the middle game it pulls its punches and doesn't go in for the kill.

In the end game, though, the program is a very effective opponent indeed. It goes straight for the jugular.

Finally, it sticks to the rules of chess allowing castling, capturing en passant and promotion. But it suffers one fault: when promoting a pawn you automatically get a queen, it chooses what it wants.

Verdict

That one error apart this is a superior chess game and provides worthy opposition for players up to quite a high standard. The display is good, it is extremely versatile and cannot really be faulted.

A helpful instruction manual completes a value-for-money package.

Pete Gerrard

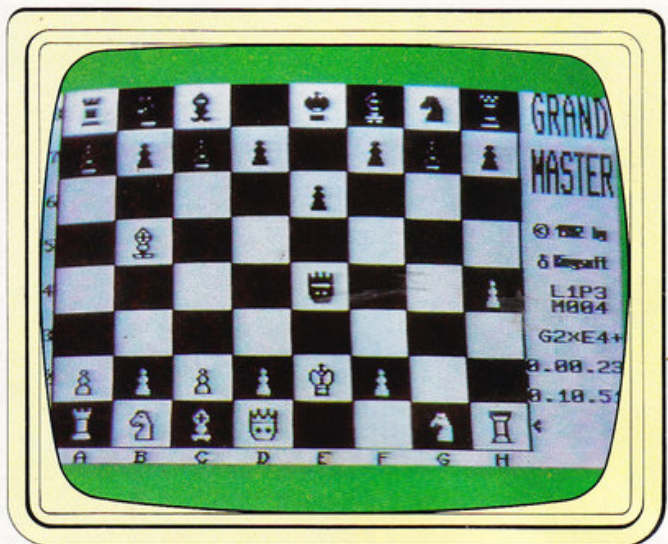
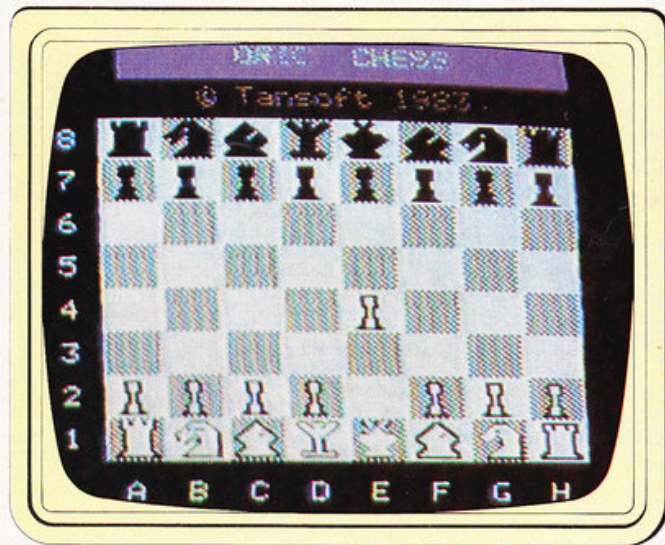
RATING

Lasting appeal

Playability

Use of machine

Overall value



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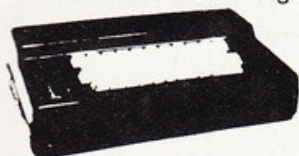
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SPACE DODGES

BBC

Orion ups and downs

Name Escape from Orion **System** BBC 32K **Price** £6.75 **Publisher** Hopsoft, Hope Cottage, Winterbourne, Newbury, Berks RG16 8BB **Format** Cassette **Language** Machine code **Outlets** Mail order.

Escape from Orion is another of those games involving a lot of running up and down ladders and across platforms collecting things and awaiting the attentions of an assortment of gremlins bent on doing you in.

Objectives

You are landed in the top left-hand corner of the screen by a flying saucer. Then you have to scale the scaffolding, pick up an assortment of goodies and get back to your waiting vehicle and away unscathed (could have been called Supermarket Shopping). You also have the ability to make running jumps to clear holes or low-flying missiles.

Variety is provided by four different sets of scaffolding. You can choose which you'd prefer to climb. Variations within these include conveyor belts, a gremlin launching deadly missiles, vertically moving platforms, electric doors which come down and trap you, and a gobble which can dispense the ultimate penalty if given the opportunity.

In play

Those of you familiar with

Donkey Kong and its arcade variants should find yourselves at home with this one. Control of the player is similar but there is also enough that is sufficiently different to ring the changes.

The availability of four screen formats is a big plus and should increase the enjoyment of playing it, if only because you are less likely to get bored or stumped — you just move on to another variation. Multiply this by the selectable difficulty levels and it should keep the most easily jaded gamesperson amused for a while.

The graphics are pretty good too. The hero of the piece is recognisably humanoid — you almost feel his desperation as he struggles against the conveyor belt. He did seem to have problems with one of the platforms, however, which insisted on impaling him even though a neutral observer declared he had landed fair and square.

The best feature is the 'jump'. A bang on the space bar and our hero does a slow-motion leap.

Verdict

Escape from Orion seems a good investment for keen action games players. There are facilities for both keyboard and joystick operation and the graphics are good enough to keep you identified with the starring screen object — especially if you're very short and walk with a limp in both legs.

Ian Scales

RATING

Lasting appeal

Playability

Use of machine

Overall value



SPECTRUM

Planets of plenty

Name Jet Pac **System** Spectrum 16K **Price** £5.50 **Publisher** Ultimate Play the Game (0530) 411485 **Format** Cassette **Outlets** WH Smith, John Menzies, Sinclair dealers, mail order.

Jet Pac is the first product from a newly formed company which claims it has 'the most experienced arcade video game design team in Britain.'

Objective

In a word — greed. You're the chief test pilot for Acme Interstellar Transport and have been asked to go to various planets and assemble rockets. But that seems a mildly boring activity — once you've built one rocket the others are the same.

So when you arrive on the planet and start jetting around, you decide to take a few 'souvenirs' in the form of jewels, elements and gold — which oddly keep falling from the sky.

The aliens are a mite peeved that you've tried to walk off with their treasure, without so much as paying the V in VAT. So you have to shoot them with your Quad Photon Laser Phasers.

You also have to fuel the rocket you've assembled in order to get off each planet — and that means collecting six fuel pods — which also drop from the skies.

First impressions

This is one of the only cassette-based games — no, the only —

I've ever played whose on-screen graphics match the artists' impressions that look so enticing on cassette sleeves. The documentation is also quite sufficient to explain the principle, so Jet Pac wins on both counts.

In play

The first planet features fireball-type creatures that don't get in your way too much as you build your rocket and then re-fuel to move on to the next planet. The trick is to stay hovering above the planet on the three 'safe areas' above the ground — if you don't the fireballs will get you.

However, the air seems thinner at the top of the screen and the aliens tend to keep away from it. The second planet harbours mean furry creatures, the third vicious bouncing spheres and the fourth some strange-looking little insects.

The insects are a new breed of tough creature that jealously guard both jewels and fuel pods and seems to have a heat-seeking capability that allows them to follow you around. The fifth planet (I didn't get any further than that) features flying saucers which seem even meaner than the insects.

Verdict

Little to say here, except that I have never had more fun playing a game on the Spectrum.

A classic which should rank with Space Invaders and Pacman in the computer game annals of fame.

Geof Wheelwright

RATING

Lasting appeal

Playability

Use of machine

Overall value



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A stack of software boxes is shown at an angle, creating a sense of depth. The top box is dark with 'M SOF' in yellow and red. Below it, several other boxes are visible, mostly in shades of black and grey. The background is a solid red color. The word 'ooking' is printed in large, white, sans-serif font across the top. The overall composition is dynamic and modern.

If you already have a machine, you'll want to know about compatibility. So we've included an index by machine make and model. And, just to make life easier still, we also cross refer machine type with operating system.

3 ACCOUNTING **GENERAL PACKAGES**

Sord

Operating system: Sord Operating System

Machine model: Sord M23 - all models, Sord M243 - all models, Sord M343 - all models

Memory: 64

Package: ABC Stock Control Accounting Business Controller (ABC) (page 24)

Supplier: ABC Software Ltd.

Machine model: Sord M23 MKII, MKV, MKVI; Sord M243 - all models, Sord M343 - all models

Memory: 64

Package: ABC Nominal Ledger/Accounting Business Controller (ABC) (page 23)

Supplier: ABC Software Ltd.

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There's little point in identifying the perfect package unless you know where to go for it. Our separate alpha listing of suppliers provides all the information you need; addresses, phone numbers, who to speak to, and an outline of which other packages are available from them. This section could save you a few fruitless journeys.

[illegible]

GMS - Garage Management System (page 23)
Cost: £1,800
Supplier: AC Software Ltd. (page 400)
Hardware: Commodore 8032 8050 8023
Operating System: CBM DOS

Some packages may be tailored to the unique requirements of your business or profession. The quick reference Occupation Index at the back of the book can cut your search time to minutes. And if you already know of a package by name, just go straight to it. They're all indexed by title and acronym in the A-Z index.

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PCN 17

Adventure-scout Mike Gerrard has an elvish time in his quest for the Ring of Darkness.

ADVENTURE

DRAGON 32

Ring-pull plan

Name The Ring of Darkness
System Dragon 32 **Price** £10
Publisher Winterson, 30 Uplands
Park Road, Enfield, Middlesex
EN2 7PT, 01-367 5720 **Format**
Cassette **Language** Basic and
machine code **Other versions**
Spectrum, Oric to come **Outlets**
Boots, Dragon dealers, mail order

Until now, the Dragon has been more than a little lacking in adventure games, despite the fact that the machine has 32K to play with. But this adventure/graphics quest from Winterson uses up all that memory and more. If you don't understand how that's possible, read on.

Objectives

Your task is to find Shedir, the Ring of Darkness, hidden somewhere in the enchanted land. This is presented to you as a high-resolution map at the start of the game. It's a land of forests, lakes, rivers and other enchanting features, but also of less-than-enchanting ones such as bandits, dungeons and giant rats.

You name your own character, and you also decide on the various qualities you are going to have. The game plays slightly differently according to your choice.

First impressions

The fold-out cassette insert gives you all the basic instructions you need, including the 14

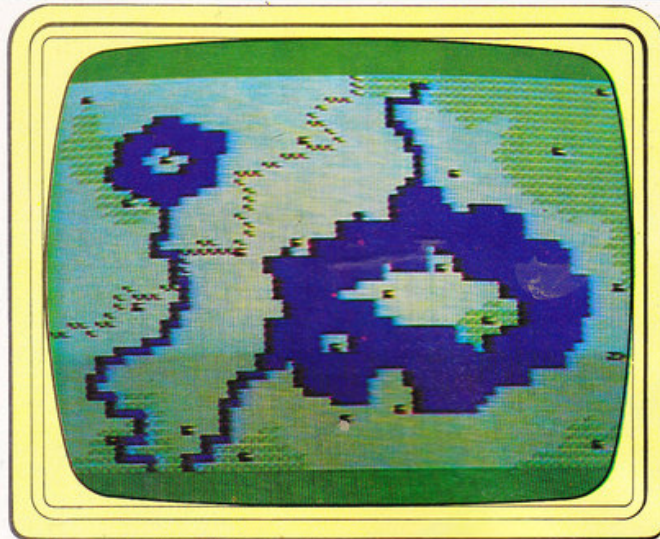
single-key commands, without giving too much away about the adventure itself, which takes up both sides of the cassette and loads in several stages. You are quite rightly advised to have a blank tape handy to save a game in progress, as you are unlikely to finish it at one sitting, unless you have stamina above and beyond the call of duty.

Even when the game has apparently been loaded, you must keep the tape in the cassette player, there being a separate 3D maze that you may stumble across at some point of your quest, and as this couldn't be squeezed into the Dragon's available memory it has to be loaded by itself when needed. This means that when you come out of the maze, dead or alive, the tape needs rewinding and part of the main program re-loading, but this takes very little time and is a small price to pay for the fun of the maze itself. All these instructions for loading and reloading are in the program and are quite easy to follow.

In play

The adventure itself isn't so easy. I began by trying to think up a suitable fantasy-type name for my character, and christened him Godorful. Next I distributed 40 points between the qualities of intelligence, strength and agility, to decide whether he was an elf, a dwarf or a human, and whether his principal skill was that of a thief, a warrior or a wizard. This completed the build-up of the character, and Godorful the wizard elf was born.

Before setting off, you are



handed a supply of gold, food, and what are called Hit and Experience points. The former measure your mortality when up against bandits and the like; take too long to dispose of your attacker and your Hit points diminish and you die.

Experience points build up as you go, and represent your skill in dealing with some of the problems you'll come across. Your food will last you just 21 days, each movement on the map (controlled by the arrow keys) taking one day. To let you know the size of your task, there are almost 3,000 travel days on the map, on which you appear as a flashing red Z to tell you where you are.

Various interesting landmarks are scattered about the countryside, so naturally you head for one of them. But don't worry, I'm not going to commit the reviewer's mortal sin of giving away too much about the game itself. Only experience will tell you how to deal with the various problems, and when you're killed yet again you'll find yourself muttering, 'Now if only I'd had one of those, I could have seen him off. So where do I get one?'

What you ought to know is that some of the landmarks when approached and entered turn into separate graphics routines. You therefore have many other places to explore, and you aren't simply moving about the main map the whole time. Some of these locations will even help you solve the problem of your diminishing food supply.

The 3D maze is a welcome inclusion, and shows that the writer, John Humphreys, hasn't stinted on the game's features. The quality and size

isn't quite as good as you'd find if it were a complete game in itself, but it is still quite impressive. I wonder if there's more in there than the giant rat that's seen me off twice so far?

To give you some idea of the options you'll have, the commands include Attack, Cast a Spell, Enter, Board a Craft, Inform and Search, Transact, Climb, Steal, Get and Unlock. As the game progresses, you might need to use these in combination, and there is naturally an increasing number of items available to you, such as weapons, spells and so on.

One useful feature the game has is instant reincarnation. Your character, when deceased, will be returned to a different part of the map to start all over again. My own character, Godorful, turned out to be rather appropriately named, and he still hasn't figured out how to cross the river that divides the map in two, or how to cross the lake to discover what's hiding on the island. Perhaps I'll try him again with a few more intelligence points, or turn him into a dwarf warrior and see what happens.

Verdict

The responses to your keyboard entries are instant, though in certain places the printing doesn't stay on the screen long enough for you to take all your options in. But apart from that, and the typically high Dragon software price, you won't get bored with the game for some time.

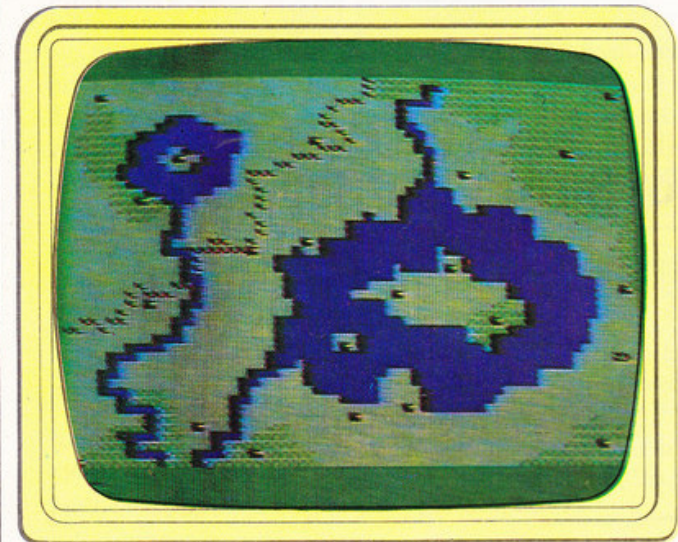
RATING

Lasting appeal

Playability

Use of machine

Overall value





Spectrum spectacle

And still they come at you, trying to turn your home into the ultimate arcade. Games good, bad and indifferent — this latest batch of 16K Spectrum cassettes has examples of all three.

BEETLEMANIA

To start with the good, Beetlemania is a Pacman style game, written in machine code, in which four beetles chase you round a maze. I found it even more addictive than the original it is based on. For one thing, the graphics are excellent, with the green beetles scuttling round like scorpions, while the man races frantically along with his little legs going at nineteen to the dozen.

The game begins with a brief demonstration showing you how you're to collect the eggs, which are left one at a time by the beetles, and deposit them safely in what is described for some reason as a lock. Eggs and locks appear randomly in the maze, and when four eggs have been safely collected an exit will flash, and you must scurry out of that to the next level.

This is the same maze, but with several of the walls joined up, so giving you a little less breathing space. Succeed here and the same thing happens again, making it very tricky indeed to avoid the beetles in the increasing numbers of blind alleys. Further success takes you back to the original maze, opened up again, but this time with a purple spider racing along the corridors to add to your problems. Beyond that I don't know, as the spider got me every time.

This increasing difficulty is a welcome feature, as is the sensible way the control keys are spread: Q for up, Z for down, I for left and P for right. You have five lives, three skill levels, and while there is a high-score record the game's only fault is that as soon as the last life is lost it switches instantly back to the opening screen without giving you a chance to check your score. But that apart, congratulations to

the game's author, Steve Hughes, for improving on a good original.

MAZE CHASE



What a contrast to Maze Chase, which is a simple (and I do mean simple) variation on the same game. The action is quick enough, being also in machine code, but this isn't so much Pacman as Matchstickman. Control here is by use of the arrow keys, which has never seemed to me the most sensible part of the Spectrum keyboard layout, and the graphics are disappointing after Beetlemania.

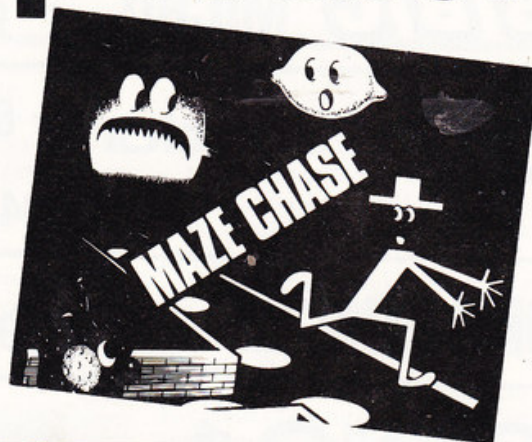
There are four mazes in the 16K version, with 12 in the 48K program also on the tape, and your opening options are instructions, demonstration, resetting the high-score to zero, or play. A major complaint is that if you don't press any key within about 30 seconds, which is quite possible if you've left the tape to load, you automatically get a long demonstration game, with all three lives, and no way to break out of it that I could find. Otherwise you get the usual features of four ghosts, fruit to eat, and increased speed as you go. Not a patch on the original, though.

JAWZ



Jawz is the underwater space invaders which most people will know — in fact you'll need to know it as there are no instructions in the program to explain exactly what you're meant to be doing. You are told the control keys and the cassette insert tells you that you're meant to be killing the sharks while avoiding the poison pellets the jellyfish at the top of the sea are dropping down on you.

This isn't a game that ever particularly appealed to me, but Jawz is an adequate if slightly limited adaptation offering you a one or two-player game, a high-score record and three skill levels. Unfortunately the sharks look as frightening as a bowl of goldfish.



GALAKZIONS



The aliens in Mikro - Gen's Galakzions are more menacing — or at least the first five rows are. The final row contains what look remarkably like two pairs of flying yellow knickers. The action in this game should be fast enough to appeal to the addicts, though the creatures don't move off the side of the screen and back on again.

In fact the aliens are quite restrained to begin with, the first wave peeling off in ones and twos and firing very few shots at you — but you have to watch the shots they do fire, which spit down the screen with great speed. From the second wave on, though, they come at you in great swirling bunches, and while they don't exhibit the usual nasty tendency to herd you into a corner for the kill, they are nevertheless very nippy movers — especially those knickers. Not a perfect copy, then, but still a satisfying version.

PANIC



Panic, or Space Panic as it's better known, comes from the same company.

It is the familiar aliens and ladders game where you control a little man, or as in this version, a tall thin man, who is being pursued along levels and up ladders by nasty little creatures which he must kill by luring them into holes and then bashing them on the head.

It's just as well they're not an

endangered species.

With the wealth of colour available on the Spectrum, it's hard to see why anyone would choose to make the creatures purple against a black background, unless they have a strong sadistic streak. As with Galakzions, if you like the original you probably won't be disappointed with the speed and features of this version. The man turns into an ominous skull and crossbones should he be sent to meet his maker, while if you fail to bash an alien after luring him into a hole he will change colour (or she will, it being difficult to tell with aliens). It will then take a plunge through two holes to see the alien off.

If you fail again you get another colour change, and will need three holes to despatch him. After that, forget it. A choice of skill levels would have been nice, but you can't have everything, I suppose.

Both these Mikro-Gen games will work with Mikro-Gen joysticks, though when I attempted to use my Kempston ones I got some very odd results. Or maybe I've just been killing too many aliens lately, I don't know.

Beetlemania, £4.95, AWA Software, 50 Dundonald Road, Didsbury, Manchester M20 0RU, 061-445 4081

Maze Chase, £4.95, Hewson Consultants, 60a St Mary's Street, Wallingford, Oxon OX10 0EL

Jawz, £4.95, Elfin Software, Hudsons House, Battery Road, Great Yarmouth NR30 3NN, (0493) 53170

Galakzions and Panic, £5.95 each, Mikro-Gen, 24 Agar Crescent, Bracknell, Berkshire RG12 2BK, (0639) 887730

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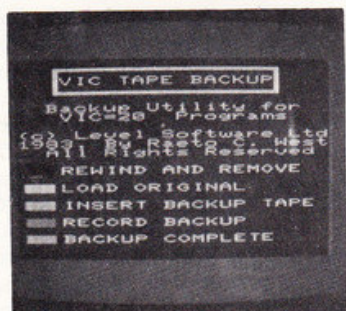
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PCN Program Cards

We start with the second half of John Waters' Video Titler program for the TI 99/4A. In fact this program has found more than one user in our office for a home video library.

At last, all you Atarians — we finish off Philip Green's adventure game, *Pirate Island*. You were left last week either drowning in a whirlpool or dying on your own sword.

Can you escape? Will this be the end of our hero? Only you can supply the answers, so carry on programming.

To bring a little sanity back to the proceedings, we are starting a program from James Bridson, of Barnsley, for the BBC Model B.

At just 70p, for two weeks' worth of PCN, this has got to be the cheapest, most readily available word processing package.

This is quite a sizeable program and therefore disk users should either use the Mover routine (PCN, issue 15, ref 8315M) to recapture the disk workspace, or set PAGE = &E00 (3584) then use tape for storage.

However, this small drawback is easily offset by the features available.

These include the ability to open and close text, load and save files, plus an advanced feature allowing right justification of blocks of text.

Automatic word-wrap is also included, as is a printer interface for the AP100A. Users of other printers will probably find no problem with this, but should you use a printer offering more than 80 characters, you must adjust the relevant code accordingly.

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Programs Editor, *Personal Computer News*, VNU, Evelyn House, 62 Oxford Street, London W1A 2HG.

All disks and cassettes will be returned, at our expense, after consideration or publication.

For those of you who might have a sneaking feeling that we're ignoring your micro, here is a breakdown of the machines we've covered in our first 16 issues.

If your micro doesn't feature at all, or is trailing at the bottom of the chart, you've only yourself to blame. We can only publish what you send us.

Vic owners who might be feeling hard done by should also note that CBM programs can easily be converted to run on their machines.

In addition to the machines below, we have also run a total of ten programs and sub-routines in Microsoft Basic which should run with minimal alterations on any micro (except for those Forth fanatics who have bought Jupiter Aces).

PROGRAM TALLY

Spectrum	7	Apple	2
BBC	7	Vic 20	1
Dragon	4	MZ80K	1
Commodore 64	3	Lynx	1
Oric 1	3	ZX81	1
CBM	2	Colour Genie	1
Atari 400/800	2	TI99/4A	1

PCN Program Cards

Video Titler Card 4 of 6

8317VT4/6

TI99/4A/TI Extended Basic/
John Waters/continued

```

600 IF M>=0 THEN 630 ELSE 610
610 IF F=68 THEN 630 ELSE 620
620 DISPLAY AT(22,1):"NO. OF SPAC
ES BETWEEN ROWS:" :: ACCEPT AT(2
2,27)VALIDATE(DIGIT)BEEP:M
630 R(A)=A :: GOTO 650
640 DISPLAY AT(22,1):"ROW NO. (1-
24):" :: ACCEPT AT(22,16)VALIDAT
E(DIGIT)SIZE(3)BEEP:R(A)
650 DISPLAY AT(23,1):"TITLE LINE
:" :: ACCEPT AT(24,1)BEEP:LL$(A
)
660 CALL TPRINT(LL$(A),R(A),TC,T
B)
670 NEXT A
680 IF T=83 THEN 690 ELSE 710
690 DISPLAY AT(21,1):"TITLE COMP
LETE. ENTER TIME REQUIRED(SECON
DS) FOR SCREENDISPLAY.TITLE WILL

```

```

RE-APPEARFOR VIDEO RECORDING:"
700 ACCEPT AT(24,24)VALIDATE(DIG
IT)BEEP:P
710 IF (F>=68)*(F<=72) THEN 800 E
LSE 730
720 REM TITLE PRODUCTION
730 CALL CLEAR :: GOSUB 1020
740 FOR B=1 TO L
750 CALL PRINT(LL$(B),R(B),TC,TB
)
760 NEXT B
770 PD=P*250 :: FOR N=1 TO PD ::
NEXT N :: GOSUB 1080
780 IF K=82 THEN 730 ELSE 790
790 IF K=78 THEN 350 ELSE 1000
800 DISPLAY AT(21,1):"TITLE COMP
USED AS ABOVE. IF CORRECT ENTER
Y FOR ROLLING TITLES - IF NOT EN
TER N FOR RE-START:"

```

600-650 Requests for title spacing and title
660-770 Displays title on screen. Requests
length of time for display of static
titles. Displays static titles
780-800 Prompt for correctness of
composed titles



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```

810 ACCEPT AT(24,24)VALIDATE("YN
")BEEP:R$
820 W=ASC(R$)
830 IF W=89 THEN 840 ELSE 560
840 IF F=68 THEN 930 ELSE 850
850 CALL CLEAR :: GDSUB 1020
860 FOR C=1 TO L
870 R(C)=23
880 CALL HPRINT(LL$(C),R(C),TC,T
B)
890 FOR Q=M TO ( STEP -1
900 PRINT :: NEXT Q :: NEXT C ::
GDSUB 1070
910 IF K=82 THEN 850 ELSE 920
920 IF K=78 THEN 360 ELSE 1000
930 CALL CLEAR :: GDSUB 1020
940 FOR E=1 TO L
950 R(E)=23
960 CALL DPRINT(LL$(E),R(E),TC,T

```

```

B)
970 NEXT E :: GDSUB 1070
980 IF K=82 THEN 930 ELSE 990
990 IF K=78 THEN 350 ELSE 1000
1000 END
1010 REM TIME DELAY=
1020 FOR T=1 TO 1250 :: NEXT T :
: RETURN
1030 FOR C=1 TO 14 STEP 1 :: CAL
L COLOR(C,TC,TB):: NEXT C :: RET
URN
1040 REM DISPLAY COLOR
1050 CALL SCREEN(5):: FOR C=1 TO
14 STEP 1 :: CALL COLOR(C,16,1)
:: NEXT C :: RETURN
1060 REM SUB DISPLAY
1070 FOR T=1 TO 2000 :: NEXT T
1080 CALL SOUND(100,440,2):: CAL
L SOUND(100,330,2)

```

810-840 Was it correct or not?
850 Clear screen. Perform delay loop to
turn on VCR to record
860-900 Routine to display, with time delay,
horizontal titles
910-1000 Routine to display diagonal titles

1010-1020 Time delay routine
1030 Set up selected colours for display
1040-1050 Set up colours for information
display
1060-1080 Part of routine to repeat displays

```

1090 PRINT "PRESS E TO EXIT, R T
O REPEAT OR N FOR NEW TITLES : "
1100 CALL KEY(0,K,S):: IF S=0 TH
EN 1100
1110 RETURN
1120 REM STATIC PRINT
1130 SUB PRINT(LL$,R,TC,TB)
1140 V=16-INT(LEN(LL$)/2)
1150 FOR I=1 TO LEN(LL$)
1160 CD=ASC(SEG$(LL$,I,1))
1170 CALL HCHAR(R,V+I,CD)
1180 NEXT I :: SUBEND
1190 REM TITLE PRINT
1200 SUB TPRINT(LL$,R,TC,TB)
1210 V=16-INT(LEN(LL$)/2):: CALL
CHAR(128,"0000001818"):: FOR I=
1 TO LEN(LL$):: CALL COLOR(13,2,
16):: CALL HCHAR(R,V+I,128)
1220 FOR C=1 TO 14 STEP 1 :: CAL

```

```

L COLOR(C,TC,TB):: NEXT C
1230 CD=ASC(SEG$(LL$,I,1))
1240 CALL HCHAR(R,V+I,CD)
1250 CALL SOUND(20,-3,0)
1260 NEXT I :: SUBEND
1280 SUB HPRINT(LL$,R,TC,TB)
1290 V=16-INT(LEN(LL$)/2)
1300 FOR I=1 TO LEN(LL$)
1310 CD=ASC(SEG$(LL$,I,1))
1320 CALL HCHAR(R,V+I,CD)
1330 NEXT I :: SUBEND
1350 SUB DPRINT(LL$,R,TC,TB)
1360 FOR K=6 TO 0
1370 V=16-INT(LEN(LL$)/2)
1380 FOR I=1 TO LEN(LL$)
1390 CD=ASC(SEG$(LL$,I,1))
1400 CALL HCHAR(R,V+I,CD)
1410 PRINT :: NEXT I :: NEXT K :
: SUBEND

```

1090-1110 Final part of repeat display routine
1120-1180 Routine to display static titles
1190-1260 Routine to display titles during
composition

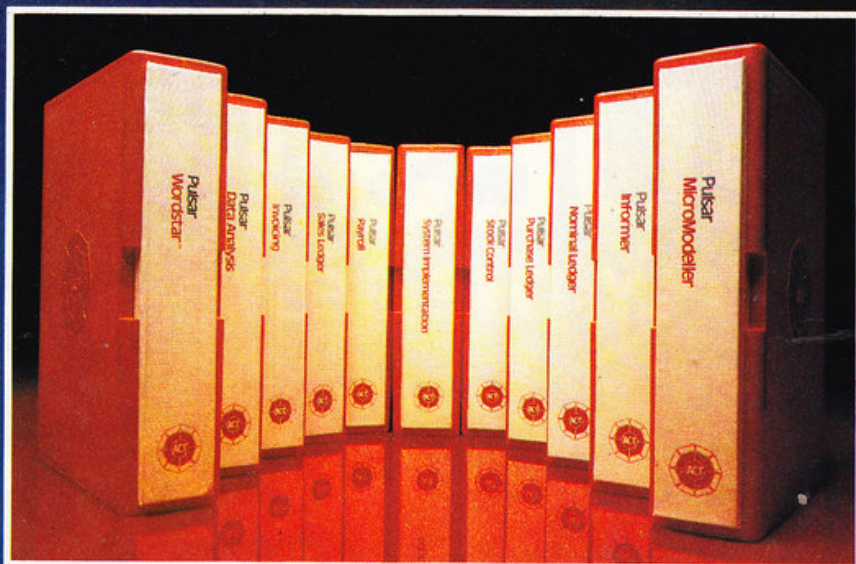
1270-1330 Routine to display horizontal titles
1360-1410 Routine to display diagonal titles

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PCNProgramCards**Pirate Island Card 8 of 9**

8317PI8/9

Atari/Atari Basic/Philip Green/continued

```

1860 ? "AFTER A WEEK AND A DAY YOU LAND ON HAWAII ISLAND"
1865 ?
1870 ? "WHO'S FOR ASHORE THEN"
1875 ?
1880 ? "1.GO ASHORE":INPUT DD
1890 IF DD=1 THEN ? "":? "You are on a sunny beach,VISIBLE ITEMS:Sign saying we
1come to HAWAII, Sleeping pirate"
1895 ?
1900 PRINT "1.WAKE PIRATE":INPUT EE
1910 IF EE=1 THEN ? "":? "PIRATE AWAKES AND SAYS AY MATEY COULD I HAVE ME SHOVE
L BACK"
1915 ?
1920 PRINT "1.GIVE SHOVEL":INPUT FF
1930 IF FF=1 THEN ? "":? "PIRATE GRABS SHOVEL AND DROPS A GOLDEN CHAIN,IT'S A T
REASURE"
1935 ?
1940 PRINT "1.TAKE GOLDEN CHAIN":INPUT GG
1950 IF GG=1 THEN ? "":? "GREAT!!! YOU HAVE FOUND THE THIRD AND FINAL TREASURE,
BUT NOW YOU HAVE TO GET BACK ??????"
1952 ?
1955 PRINT "1.GO EAST"
1960 PRINT "2.GO SOUTH":INPUT HH
1970 IF HH=1 THEN ? "":GOTO 2050
1980 IF HH=2 THEN ? "":GOTO 2000
1990 GOTO 1960
2000 ? "YOU TOOK A WRONG TURN AND FELL INTO A SNAKE PIT"
2010 FOR I=1 TO 50:NEXT I
2020 ? "YOU ARE DEAD"
2025 ?
2030 ? "HIT Y FOR ANOTHER TURN":INPUT Y$
2040 IF Y$="Y" THEN 5
2050 GOTO 2030
2060 ? "You are in a lagoon,VISIBLE ITEMS:Dark pit,Seaweed"
2065 ?
2070 PRINT "1.EXAMINE SEAWEEED"
2080 PRINT "2.GO PIT":INPUT II
2090 IF II=1 THEN ? "":GOTO 2120
2100 IF II=2 THEN ? "":GOTO 2140
2110 GOTO 2070
2120 ? "YOU SEE NOTHING SPECIAL"
2125 ?
2130 GOTO 2070

```

1860-2130 Selfexplanatory

PCNProgramCards**Pirate Island Card 9 of 9**

8317PI9/9

```

2140 ? "YOU ARE FALLING DOWN A VERY DEEP PIT,I THINK YOU'RE A GONER"
2150 FOR I=1 TO 1100:NEXT I: ? " "
2160 ? "BOY WAS YOU LUCKY, YOU HAVE LANDED ON A OLD MATTRESS IN A DARK ROOM"
2170 FOR I=1 TO 700:NEXT I: ? " "
2180 ? "You are in a very dark room,VISIBLE ITEMS:Pencil of light shining from t
he bottom of a door"
2185 ?
2190 PRINT "1.OPEN DOOR":INPUT JJ
2200 IF JJ=1 THEN ? "":? "You are back in the corridor."
2205 ?
2210 ? "VISIBLE ITEMS:Two doors one with a sign on it saying NO ENTRY,which you
have just come out of."
2215 ?
2220 ? "And another door right in front of you,with a sign on it saying STORE TR
EASURES IN HERE."
2225 ?
2230 ? "1.OPEN DOOR":INPUT KK
2240 IF KK=1 THEN ? "":? "You are back in the room where you started."
2245 ?
2250 ? "VISIBLE ITEMS:Warm glowing fire,large rug,sleeping pirate sat in armchai
r."
2255 ?
2260 ? "1.WAKE PIRATE":INPUT LL
2270 IF LL=1 THEN ? "":? "PIRATE AWAKES AND SAYS AY MATEY LAY YOUR TREASURES DO
WN HERE"
2275 ?
2280 ? "1.DROP TREASURES":INPUT MM
2290 IF MM=1 THEN ? "":? "GREAT !!!!!"
2295 ?
2300 ? "YOU HAVE FINISHED THIS ADVENTURE"
2305 ?
2310 ? "THANK YOU FOR PLAYING"
2335 ?
2340 ? "HIT Y FOR ANOTHER TURN":INPUT Y$
2350 IF Y$="Y" THEN 5
2400 GOTO 2340
3000 END

```

2140-2280 Selfexplanatory

2290-3000 Well done! You've survived to the end

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Home Computing Weekly 3/5/83

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SPELL-IT: Let your children learn spelling at their own pace. Build-up your own question pages; have what subjects you wish; add more whenever you like. Instructions included: cassette £7.95, ssd/dd mini-disk £10.95 inclusive of packing, post & VAT.

BUSINESS

QUICK-CHANGE: Price list editor: prices of single entries or whole lists changed by user chosen factors. Minimum system required: 16K level II; please state memory size for diskette system. Instructions included: cassette £9.95, ssd/dd mini-disk £12.95 inclusive of packing, post, VAT extra.

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OPERATING SYSTEM

MINDOS: Authorised subset of Apparat's NEWDOS+. This can be supplied if required to run above 40 track disk packages; model I only. Abridges instructions included: ssd mini-disk £15.00 price includes packing, post and VAT.

PCNProgramCards

Word Processor Card 1 of 9

8317WP1/9

A WP program allowing 50 × 80 lines of text incorporating LOAD, SAVE, OPEN, CLOSE, PRINT, and JUSTIFY. NB disk users see note in introduction.

```
10
200N ERROR GOTO 3500

30MODE 3
40HIMEM = &3000
50PROCtitle
60PROCempty
70PROCprinterselect
80PROCkeys

90PROCchoice

100REPEAT
110PROCgetinput
120UNTIL FALSE
130
140DEF PROCcommand(as1%)
150ON as1% GOTO 160,170,180,190,200,210,220,230
160PROCprint: ENDPROC
170PROCload: ENDPROC
180PROCsave: ENDPROC
190PROCopen: ENDPROC
200PROCclose: ENDPROC
210PROCexit: ENDPROC
220PROCclear: ENDPROC
230PROCjustify: ENDPROC
240
250DEF PROCtitle
260PRINT TAB(22,4):"HOME WORD PROCESSOR"
270PRINT TAB(22,5):"=====
300ENDPROC
310
```

BBC Model B BBC Basic

Application: word processor
Author: James Bridson

20	Error trap. Routine checks memory availability
30-40	Set screen and text area
50	Perform title and routine
60	Perform clear text area routine
70	Perform printer set-up routine
80	Perform function key set-up routine
90	Perform menu and response routine
100-120	Loop to accept input forever
140-230	Procedure to appropriate action
250-300	Procedure for title

PCNProgramCards

Word Processor Card 2 of 9

8317WP2/9

```
320DEF PROCkeys
330*KEY0
340*KEY1
350*KEY2
360*KEY3
370*KEY4
380*KEY5
390*KEY6
400*KEY7
410*KEY10
420*KEY01A
430*KEY11B
440*KEY21C
450*KEY31D
460*KEY41E
470*KEY51F
480*KEY61G
490*KEY71H
500*KEY100LD:MRUN:M
510ENDPROC
520
530DEF PROCchoice
540PRINT TAB(0,24):"[ctrl] A:PRINT B:LOAD C:SAVE D:OPEN E:CLOSE F:EXIT G:CLEAR
H:JUSTIFY ";
550PROCscreen(p%)
560ENDPROC
570
580DEF PROCscreen(p%)
590LOCAL a%
600VDU 23:11,0:0:0:0:31,0,0
610FOR a%=p% TO p%+1919
620VDU ?a%
630NEXT a%
640VDU 31,x%,y%,23:11,255:0:0:0:
650ENDPROC
660
670DEF PROCleft
680x% = x%-1
690IF x%=-1 THEN x%=79: y%=y%-1
700IF y%=-1 THEN y%=0: IF p%>12288 THEN p%=p%-80: PROCscreen(p%)
710ENDPROC
720
```

320-510	Procedure to set-up function keys NB for OS 1.00 and later 330-410 can be omitted and use 330 *FX18
530-560	Display command line prompt and correct position of screen/text
580-650	Procedure to display text on screen. First byte referenced by P%
670-710	Procedure to move cursor left and check screen scroll, illegal move

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London W1M 5AB

PCNProgramCards**Word Processor Card 3 of 9**

8317WP3/9

```

730DEF PROCright
740x% = x%+1
750IF x%=80 THEN x%=0: y%=y%+1
760IF y%=24 THEN y%=23: IF p%<14368 THEN p%=p%+80: PROCscreen(p%)
770ENDPROC
780
790DEF PROCup
800y% = y%-1
810IF y%=-1 THEN y%=0: IF p%>12288 THEN p%=p%-80: PROCscreen(p%)
820ENDPROC
830
840DEF PROCdown
850y% = y%+1
860IF y%=24 THEN y%=23: IF p%<14368 THEN p%=p%+80: PROCscreen(p%)
870ENDPROC
880
890DEF Fnyesorno
900LOCAL d%
910REPEAT
920d%=GET
930UNTIL (d%=89) OR (d%=121) OR (d%=78) OR (d%=110)
940IF (d%=78) OR (d%=110) THEN =0 ELSE =-1
950
960DEF PROCjustify
970LOCAL a1%,b1%,c1%,gaps%,spaces%,flg%,pass%,firstchr%,lastchr%,firstln%,
secn%
980PRINTTAB(0,24);"Position cursor on first line to justify and press <SPACE>
then repeat for last";
990pass%=1
1000REPEAT
1010REPEAT
1020VDU31,x%,y%
1030a1%=GET
1040IF a1%=136 THEN PROCleft
1050IF a1%=137 THEN PROCright
1060IF a1%=138 THEN PROCdown
1070IF a1%=139 THEN PROCup
1080UNTIL a1%=32
1090VDU 7
1100IF pass%=1 THEN firstln%=p%+(80*y%) ELSE secn%=p%+(80*y%)
1110pass%=pass%+1
1120UNTIL pass%=3

```

730-770 Procedure to move cursor right checking screen scroll, illegal move etc

790-820 As above but cursor up

840-870 As above but cursor down

890-940 Function to return — 1 for "Y", 0 for "N"

960-1120 First part of procedure to perform right justification and proportional spacing for a block of text.

PCNProgramCards**Word Processor Card 4 of 9**

8317WP4/9

```

1130IF firstln%>secn% THEN b1%=secn%: secn%=firstln%: firstln%=b1%
1140REPEAT
1150c1%=0
1160FOR a1%=0 TO 79: c1%=c1%+(a1%+firstln%): NEXT: IF c1%=2560 THEN 1540
1170b1%=-1
1180REPEAT
1190b1%=b1%+1
1200UNTIL (b1%+firstln%)<>32
1210firstchr%=b1%+firstln%
1220b1%=80
1230REPEAT
1240b1%=b1%-1
1250UNTIL (b1%+firstln%)<>32
1260lastchr%=b1%+firstln%
1270gaps%=0: spaces%=0
1280c1%=0: flg%=0
1290REPEAT
1300c1%=c1%+1
1310IF (firstchr%+c1%)=32 THEN spaces%=spaces%+1: flg%=TRUE
1320IF (firstchr%+c1%)<>32 AND (flg%=TRUE) THEN gaps%=gaps%+1: flg%=0
1330UNTIL (firstchr%+c1%)=(firstln%+79)
1340a1%=16288: FOR c1%=0 TO 79: (a1%+c1%)=32: NEXT
1350IF gaps%=0 THEN 1540
1360remainder%=spaces%MOD gaps%
1370b1%=spaces%DIV gaps%
1380a1%=16367
1390REPEAT
1400REPEAT
1410?a1%=?lastchr%
1420a1%=a1%-1: lastchr%=lastchr%-1
1430UNTIL ?lastchr%=32
1440FOR c1%=1 TO b1%
1450?a1%=32
1460a1%=a1%-1
1470NEXT
1480IF remainder%>0 THEN ?a1%=32: a1%=a1%-1: remainder%=remainder%-1
1490REPEAT
1500lastchr%=lastchr%-1
1510UNTIL (?lastchr%<>32 OR lastchr%<firstchr%)
1520UNTIL lastchr%<firstchr%
1530FOR a1%=0 TO 79: (firstln%+a1%)=? (16288+a1%): NEXT
1540firstln%=firstln%+80
1550UNTIL firstln%>secn%
1560PROCchoice
1570ENDPROC
1580

```

1130-1570 Final part of justification procedure

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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.

We publish a list of these two groups on alternate weeks. This week it is the turn of user groups, which are listed alphabetically by machine and special interest.

Each issue will also focus on the activities of an individual club or

group with a fly-on-the-wall report. This week we feature the Colchester Sinclair User Group.

If your association has something special on the agenda or if you've just started a new one, contact us at *Clubnet*, *Personal Computer News*, VNU, 62 Oxford Street, London W1A 2HS.

The user groups listing is based on that of the Amateur Computer Club.

Colchester coders

It was a busy evening for members at the Colchester Sinclair User Group with several events on the agenda.

More than 20 members packed into Straight Road Centre for the regular get-together, laden with their Spectrums, ZX81s, TVs and cassettes for some Sinclair action.

The club started three months ago under the supervision of Richard Lown. He told me: 'I was teaching some teachers about micros on a teacher training course, and after it finished some of the people on the course and myself decided to start a computer club.'

'We have 37 members on our books — a mixture of young and old with different capabilities. The club is run on an informal basis — but there's usually a talk.'

ESP, a local software and hardware retailer from Southend-on-Sea dropped in to show its wares. The kids swarmed around the table to see demonstrations on

the latest zap and blast games and to look at add-ons for sale.

The directors of ESP, Mike Foy and David Baker, are the authors of a version of *The Hitch Hiker's Guide to the Galaxy* translated for the Spectrum.

In another corner of the room Richard Lown demonstrated a word processing package on his ZX81. By using a Centronics interface he was able to show members the ZX81's capabilities in writing letters and printing labels.

Halfway through the evening the more

Mike Foy and David Baker of ESP chat to club members about software packages.



Richard Lown demonstrates a word-processing package on his ZX81.

experienced members shifted to an adjoining room for a talk on machine coding. Don Cruickshank explained to fellow-members the concepts involved, relating it to a Z80 processor. His talk was the third in a series planned to run for several months.

Name Colchester Sinclair User Group **Venue** Straight Road Centre, Colchester **Meetings:** Every fortnight **Contact:** Richard Lown, 102 Prettygate Road, Colchester, Essex.

USER GROUPS

Acorn

Coventry Acorn Atom User Group. Subs: £4. No meetings but quarterly newsletter. Contact Peter Frost, 18 Frankwell Drive, Coventry, 0203 613156.

Kent Medway Acorn User Group. Meets at St John Fisher School on last Monday of month at 7pm. Session at 9pm Thursday at the Fox and Hound, Chatham. Contact Clem Rutler, c/o St John's Fisher School, Ordance Street, Chatham, Kent, 0634 42811 (day), 0634 373459 (eve).

Manchester Acorn User Group. Meets at AMC, Crescent Road, Crupsall, Manchester 8 on Tuesday except school holidays, fees: £1. Contact John Ashurst, 192 Vendure Close, Failsworth, Manchester, 061-681 4962.

Apple

Bristol Apple Users and Dabblers. Meets at 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, once a month. Newsletter. Contact Ewa Dabkowski, c/o Datalink, 10 Waring House, Redcliffe Hill, Bristol BS1 6TB, 0272 213427.

Buckinghamshire Apple User Group. Contact Steve Proffitt, The Granary, Hill Farm Road, Marlow Bottom, Buckinghamshire, 062 84 73074.

Croydon Apple User Group. Meets at Sidda House, 350 Lower Addiscombe Road, Croydon, on second Monday of month. Subs: £5, £10 commercial members. Contact Paul Vernon, 60 Flawkhurst Way, West Wickham, Kent, 01-777 5478.

Hertfordshire British Apple Systems User Group. Meets at Old School, Branch Road, Park Street, St Albans, Hertfordshire, on first Tuesday and third Sunday each month. Annual subs: £12.50, joining fee: £2.50. Publishes magazine. Contact John Sharp, 09273 75093.

London Apple Music Synthesis Group. Contact Dr Davis Ellis, 22 Lennox Gardens, London SW1.

Milton Keynes Microcomputer User Group. Meets every Tuesday, 7.30pm. Contact Brian Pain, Sir Frank Markham School, Woughton Centre, Chaffron Way, Milton Keynes.

Atari

Birmingham User Group. Meets at the Malaga Grill, Matador Public House, Bull Ring shopping centre, Birmingham, on second and fourth Thursday every month at 7.30pm. Subs: £5. Meetings: 25p members, 50p non-members. Contact Mike Aston, 42 Short Street, Wednesbury, West Midlands.

Carshalton Atari User Club. Contact Paul Deegan on 01-642 5232.

Hull Atari Users Local Group. Proposed new user group. Contact Harvey Kong Til, 546 Holderness Road, Hull HU9 3ES. Hull 7911094. **London Silica Atari 400/800 User Club.** New club, library planned, newsletter. Contact Richard Hawes on 01-301 1111.

Norwich Atari User Group. Contact Ken Ward, tel: Norwich, 661149. **Preston Atari Computer Enthusiasts.** Meets at KSC Club, Merriem House, Beach Grove, Ashton, Preston, on third Thursday of month at 7.30pm. Subs: £5. Contact Roger Taylor, 0253 738192.

Atom

Liverpool BBC and Atom User Group. Meets at Old Swan Technical College, Room C33 on first Wednesday of month at 7.30pm and at Birkenhead Technical College on third Thursday of month at 7.30pm. Contact Nick Kelly, 051-525 2934 (evenings).

BBC

Laserbug is an international user group for the BBC micro. Produce monthly magazine. Subs: £12 for one year, £6 for six months. Contact Paul Barbour, 10 Dawley Ride, Colnbrook, Slough, Berks. 02812 30614.

Beebug. Ten magazines with programs. Discount deals, library and query service. Contact Sheridan Williams or David Graham at PO Box 50, St Albans, Hertfordshire AL1 2AR.

Bournemouth BBC User Group. Meets at Lansdowne Computer Centre, 5 Holdenhurst Road, Bournemouth on first and fourth Wednesday of month at 7.30pm. Contact Norman Carey on 0202 749612.

Brent/Barnet User Group. Meets on last Sunday of month. Subs £3. Newsletter. Contact Joseph Fox, 4 Harman Close, London NW2 2EA.

North London BBC Micro Users Group. Meets at The Prince of Wales, 37 Fortune Green Road, on Tuesdays at 7pm. Wide range of skills and expertise. Contact Dr Leo McLaughlin, Department of Chemistry, Westfield College, University of London, Kidderpore Avenue, London NW3 7ST, 01-435 0109.

Preston Area BBC Micro User Group. Meets at Boatmans Arms, Marsh Lane, Preston, on last Thursday of month. Subs: £5. Contact Duncan Coulter, Membership Secretary, 8 Briar Grove, Ingol, Preston, Lancashire, 0772 725793.

Witham (NAMEBUG) BBC Micro User Group meets at comprehensive school, Witham on second Thursday each month at 7.30pm. Contact Dave Watts after 7pm, 0245 358127.

Comal

London Comal User Group. Meets at Polytechnic of North London, Holloway, second Wednesday of month, term time. Subs: £7.50. Contact John Collins, 75 74111.

Commodore ICPUG

Barnsley. Subs: £7.50. Contact Bob Wool, 13 Ward Green, Barnsley, South Yorkshire. 0226 85084.

Blackpool. Meets at Arnold School, Blackpool, on third Thursday of month. Contact David Jarrett, 197 Victoria Road, Thornton Cleveleys, Blackpool FY5 3ST.

Canterbury SE. Meets at The Physics Lab, Canterbury University, on first Tuesday and Wednesday of month. Subs: £7 adults, £3.50 juniors. Contact R Moseley, Rosemount, Romney Hill, Maidstone, 0622 37643.

Carrickfergus. Contact David Bolton, 19 Carrickburn Road, Carrickfergus, Antrim BT38 7ND, 09603 63788.

Cheltenham. Meets at The Cheltenham Ladies College on last Thursday of month at 7.30. Contact Alison Schofield, 78 Hesters Way Road, Cheltenham, Gloucester, 0242 580789.

Clwyd. Contact John Poole, 6 Ridgway Close, Connah's Quay, Clwyd CH5 4LZ.

Corby. Contact Peter Ashby, 215 Wincobn Way, Corby, Northamptonshire, 05363 4442.

Coventry. Meets at Stoke Park School and County College at 7pm on fourth Wednesday of month except July, August, December. Subs: £2.50. Contact Will Light, 22 Ivybridge Road, Styvechale, Coventry, Warwickshire.

Derby. Meets at Derby Professional Colour every other Tuesday at 7pm. Contact Robert Watts, 03322 72569.

Durham. North-East Pet and ICPUG. Meets at Lawson School, Burnley at 7pm second and third Mondays of month. Contact Jim Cocallis, 20 Worcester Road, Newton Hall Estate, Durham.

Essex. No meetings, software library. Contact Simon Kniveton, 097 086 303.

Hainault. Meets at Grange Remedial Centre, Woodman Path, Hainault. Contact Carol Taylor, 101 Courtlands Avenue, Cranbrook, Ilford, Essex.

Glasgow. Contact Dr Jim MacBrayne, 27 Daidmyre Crescent, Newton Mearns, Glasgow, 041-639 5696.

Gloucester and Bristol Area. Meets at 23 Sheppard Leaze, Wotton-under-Edge, Gloucester, on last Friday of month.

Hampshire. Meets at 70 Reading Road, Farnborough, on third Wednesday of month. Contact Ron Geere, 109 York Road, Farnborough, Hants, 0252 542921.

Hertfordshire North. Meets at Provident Mutual Assurance, Purwell Lane, Hitchin, on last Wednesday of month. Contact B Grainger, 73 Minehead Way, Stevenage, Herts SG1 2HS, 0438 727925.

Kilmarnock. Meets at Symington Primary School on first and third Thursdays of month at 7pm. Software library. Contact John Smith, 19 Brewlands Road, Symington, Kilmarnock KA1 5RW, 0563 830407.

Liverpool. Meets at The Merchant Taylor School for Boys, Crosby, on second Thursday of month at 7pm. Software exchange. Contact Tony Bond, 27 Ince Road, Liverpool L23 4UE, 051-924 1505.

London. Contact Alan Birks, 135 Queen Alexandra Mansions, Judd Street, London WC1, 01-430 8025.

London North. Contact Barry Miles, Department of Business Studies, North London Polytechnic, Holloway Road, London N7, 01-607 2789.

Norfolk. Contact Peter Petts, Bramley Hale, Wretton, King's Lynn, Norfolk PE33 9QS, 0366 500692.

Northumberland. Proposed new club. Contact Graham Saunders, 22 Front Street, Guide Post, Northumberland. **Slough.** Meets at Slough College on second Thursday of month at 7.30pm, visitors — 65p adults, 40p students. Contact Brian Jones, 53 Beechwood Avenue, Woodley, Reading RG5 3DF, 0734 661494.

South-East. Regional Group. Meets at Charles Darwin School, Jail Lane, Biggin Hill, Kent, on third and fourth Thursday of month at 7.30pm. Subs: £7.50. Free library, discount service, courses and newsletter. Contact Jack Cohen, 30 Brancaster Road, Newbury Park, Ilford, Essex, 01-597 1229.

South Midlands. Meets at 12 York Street, Stourport-on-Severn on last Thursday of month. Help available with business programming problems. Contact M J Merriman at above address.

Staffordshire. Annual subs: £6.50. Group newsletter. Contact at 57 Clough Hall Road, Kildgrove, Stoke-on-Trent.

Teddington. Contact G Squibb, 108 Teddington Park Road, Teddington, Middlesex, 01-977 2346.

Watford. Meets on second Monday of month. Contact Stephen Rabagliati, c/o Institute of Grocery Dist. Grange Lane, Letchmore Heath, Watford, Herts, 01-779 7141.

Commodore Pet Blackpool. West Lancashire Pet Users Club. Meets at Arnold School, Blackpool on the third Thursday of month. Contact D Jowett, 197 Victoria Road, East Thornton, Blackpool FY5 3ST.

Southern Users of Pets Association. Contact Howard Pilgrim, 42 Compton Road, Brighton BN1 5AN.

Pet User Group Crawley. Contact Richard Dyer, 33 Parham Road, Ilfield, Crawley.

Pet Users Education Group. Produces newsletter. Contact Dr Chris Smith, Department of Physiology, Queen Elizabeth College, Camden Hill Road, London W8 7AH.

UK Pet Users Club. Annual subs: £10, newsletter. Contact 360 Euston Road, London NW1 3BL.

Pet Users Group. Meets at Polytechnic of North London, Eden Grove, Room 320. On alternate Tuesdays, 6pm. Meets at Barry Miles on 01-607 2789.

Pet User Club. Contact Margaret Gulliford, 818 Leigh Road, Slough Industrial Estate, 0753 74111.

Independent Pet Users Group. Contact 57 Clough Hall Road, Kielsgrove, Stoke-on-Trent, Staffordshire.

Commodore Vic Burnley. Proposed club. Contact John Ingham, 72 Ardwick Street, Burnley, Lancashire.

London. Vic Users Group. Meets on alternate Tuesdays at 6.30pm at Polytechnic of North London, Community Centre. Contact Robin Bardbeer.

Norfolk. Proposed club. Contact J Blair, 7 Beach Road, Cromer, Norfolk, 0263 512849.

Compucolour Caversham. Compucolour Users Group UK. Meets at Community Centre, Caversham Park Village twice a year. Subs £15. Contacts with USA, Australia and Canada. Newsletter,

program library. Contact Peter Hiner, 11 Pennycroft, Harpenden, Hertfordshire, 05827 64872.

CP/M

Irish CP/M Users Group. Subs: £5, meets monthly in Dublin area. Newsletter. Contact Doug Notley, Gardner House, Ballsbridge, Dublin 4, Dublin 686411.

UK CP/M Users Group. Subs: £7. Software library, newsletter, help service. Contact Lesley Spicer, 11 Sun Street, London EC2M 2QD, 01-247 0691.

COSMAC

COSMAC Users Group. Contact James Cunningham, 7 Harrowden Court, Harrowden Road, Luton, Bedfordshire, 0582 423934.

Digital Equipment

Digital Equipment Users Society. Program library. Contact The Secretary, PO Box 53, Reading, Berkshire, 0734 387725.

Dragon

Brixham Dragon Owners Club meets at Computer Systems (Torbay), Pump Street, Brixham, every Saturday at 2.30pm. Contact Ian Chipperfield, 22 Brookdale Court, Brixham, Devon, Brixham 59224.

Education

Birmingham. Education ZX80/81 User Group. Subs: £2.50. Contact Eric Deeson, Highgate School, Balsall Heath Road, Highgate, Birmingham B12 9DS.

Birmingham. MUSE. Subs: £10, student £6.50. National body for co-ordinating activity in schools, colleges. Contact Lorraine Boyce, MUSE Information Office, Westhill College, Weoley Park Road, Birmingham, 021-471 3723.

Dublin. Computer Education Society of Ireland. Subs: £3. Contact Dairmuid McCarthy, 7 St Kevins Park, Kilmacud, Blackrock, Co. Dublin.

Middlesex. Educational Users Group. Offshoot of national TRS-80 Users Group. Contact Dave Fletcher, Head Teach, Beaconsfield First and Middle School, Beaconsfield Road, Southall, Middlesex.

Worcestershire. Mini and Microcomputer Users in Education. National organisation. Contact R Trigger, 48 Chadcote Way, Catshill, Bromsgrove, Worcestershire B61 0JT.

Forth

Forth Users Group. Produces newsletters and covers a variety of machines. Subs £7.50. Contact David Husband, 2 Gorleston Road, Branksome, Poole, Dorset BH12 1NW, 0202 764724.

Forth Interest Group UK. Meets at Room 408, South Bank Polytechnic on the first Thursday of month. Subs: £7. Newsletter. Contact K Goldie-Morrison, 15 St Albans Mansion, Kensington Court Place, London W8 5QH, 01-937 3231.

Forum

Forum 80 Users Group. Contact Frederick Brown, 421 Endike Lane, Hull HU6 8AG.

FX-500-P

FX-500-P Users Association. Contact Max Francis, 38 Grymsdyke, Great Missenden, Buckinghamshire HP16 0LP.

Genealogists

Society of Genealogists Computer Interest Group. Subs: £3. Newsletter. Contact Anthony Camp, 01-373 7054.

Intel MDS

UK Intel MDS Users Group. Newsletter. Contact Lewis Hard, c/o S.P.A.C.E., The Old Coach House, Court Row, Upton-on-Severn, Worcester WR8 0NS.

Ithaca Audio S100

Ithaca Audio S100 Users Group. Software exchange, discount. Contact Dave Weaver, 41 Dore Avenue, North Hykeham, Lincoln LN6 8LN.

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Jupiter Ace

Jupiter Ace Users Group. Subs: £7. Newsletter, add-ons. Contact John Noyce, Remsoft, 18 George Street, Brighton BN2 1RH.

Mattel

Mattel Intellivision TV Game Group. Proposed group to organise games, competitions. Contact Warrington 62215 after 4pm.

Medical

Durham. Primary Health Care Group. Contact Dr Alastair Malcolm, British Computer Society, Cheveley Park Medical Centre, Belmont, Durham, 0385 64282.

London. Medical Micro Users Group. Newsletter. Contact Medicom, 1-2 Hanover Street, London W1.

Middlesex. TRS-80 Medical and Laboratory Users. Newsletter. Contact Dr Robinson, The Residency, Northwick Park Hospital, Harrow, Middlesex.

Nascom

Berkshire. Nascom Thames Valley User Group. Meets at Frogmore Hotel, Windsor, on Thursday fortnightly, 8pm. Newsletter. Contact Mike Rothery, 37 Eaton Wick Road, Eton Wick, Windsor, Berkshire, Windsor 56106.

Birmingham Nascom User Group. Meets at Davenports Social Club, Granville Street, Birmingham on the last Thursday of month, 8pm. Contact Martin Sidebotham, 021-744 3093.

International Nascom Microcomputer Club. Subs: £5. Newsletter, program library. Contact 80 Oakfield Corner, Sycamore Road, Amersham, Buckinghamshire HP6 5EQ.

Merseyside Nascom User Group. Meets at Mona Hotel, St James Street, Liverpool, on the first Wednesday of month, 7.30pm. Contact Mr T Searle, 051-526 5256.

Newbrain

Wakefield Independent Newbrain User Group. Contact Anthony Hodge, 15 St John's Court, Wakefield WF1 2RY.

Ohio

Ohio Scientific User Group. Subs: £5. Newsletter. Contact Tom Graves, 19a West End, Street, Somerset, 0458 45359.

Oric

Oric Owners Group. Subs: £10. Communicates through bi-monthly newsletter. Contact Paul Kaufman, 3 Club Mews, Ely, Cambridgeshire.

Osborne

British Osborne Owners Group. Subs: £18. Newsletter. Contact J Angelsea, Flat 19, Rowan House, Mitton Road, Handsworth, Birmingham B20 2JR.

OSI

OSI UK User Group. Contact Richard Elen, 12 Bennerley Road, London SW11 6DS.

Pascal

Pascal User Group. Subs: £9. Contact Nick Hughes, PO Box 52, Pinner, Middlesex HA5 3FE.

PDP

Buckinghamshire. PDP8 User Group. Newsletter. Contact Nigel Dunn, 21 Campion Road, Widmer End, High Wycombe, Buckinghamshire, 0494 714483.

Hertfordshire. PDP11 User Group. Information service only. Contact Pete Harris, 119 Carpenter Way, Potters Bar, Hertfordshire EN6 5QB, 0707 52091.

Pilot

UK Pilot User Group. Contact Alec Wood, Wirral Grammar School for Boys, Cross Lane, Bebington, Wirral, Merseyside LG3 3AQ.

Prestel

ACC National Prestel Committee. Administrates Club Spot 800 (hobbyists on Prestel). Contact secretary, Rupert Steele, St John's College, Oxford OX1 3JP.

Research Machines

Birmingham. Research Machines 380Z. Contact Peter Smith, Birmingham

Educational Computing Centre, Camp Hill Teachers Centre, Stratford Road, Birmingham B11 1AR.

Leamington Spa. West Midland RML User Group. Contact Spencer Instone, c/o 59 Avenue Road, Leamington Spa. **Newcastle.** NERML 380Z User Group. Meets monthly at Micro-Electronics Education Centre of the Polytechnic Coach Lane Campus. Subs: £5. Contact Mr Hatfield or Mr Reed, Computer Unit, Northumberland Building, Newcastle Polytechnic. 0632 326002.

Oxford. Research Machines National User Group. Contact RML, Mill Street, Osney, Oxford OX2 0BW, 0865 249866.

Oxford. Research Machines Ltd National User Group. Contact M D Fisher, PO Box 75, Oxford OX4 1EY.

Sharp MZ80

Aberdeen. International Sharp Users Group. Subs: £3. Newsletter. Contact Graham Knight, c/o Knights Computers, 108 Rossmount Place, Aberdeen, 0224 630526.

Essex. Sharp MZ80K User Group. Contact Joe Street, 16 Elmhurst Drive, Hornchurch, Essex RM11 1PE.

Leeds. Sharp PC1211 Users' Club. Subs: £5. Newsletter. Contact Jonathan Daykeyne, 281 Lidgett Lane, Leeds LS17 3AQ.

Somerset. Sharp MZ80 Users Club. Contact Tim Powell, Computer Centre, Yeovil College, Yeovil, Somerset BA21 4AE.

Sinclair

Brighton. ZX Users Group. Contact J Ireland-Hill Jnr, 145 Godwin Road, Hove, Brighton.

Aylesbury. Sinclair ZX Computer Club. General monthly meeting, newsletter. Equipment for hire, specialist meetings, library. Contact secretary, Ken Knight, 0296 5181.

Colchester. Sinclair User Group. Meets fortnightly. Contact Richard Lawn, 102 Prettygate Road, Colchester, Essex.

Cardiff. ZX Club. Meets on last Sunday of month, 2pm. Subs: £5. Telephone service, software library. Contact Mike Hayes, 54 Oakley Place, Grange town, Cardiff, 0222 371732.

Edinburgh. ZX. Meets at Claremont Hotel, Claremont Crescent, Edinburgh on second and fourth Wednesdays every month, 7.30pm. Subs: £5 adults. £3 juniors, students, OAP and unemployed. Newsletter. Contact John Palmer, 56 Meadowfield Drive, Edinburgh, 031-661 3183.

Glasgow. ZX80/81 User Group. Contact Ian Watt, 10 Greenwood Road, Clarkston, Glasgow, 041-638 1241. **Liverpool.** ZX Computer Club. Meets at ZX Computer Centre, 17 Sweeting Street, Liverpool, on Wednesday, 6.30pm. Contact Keith Archer, 051-260 4950.

London. National ZX User Club. Monthly magazine 'Interface'. Contact Tim Hartnell, Interface, 44-48 Earls Court, London W8.

London. Sinclair User Group. Meets at Polytechnic of North London, Room 2-5 Tower Block, Monday, 6.30pm. Contact Irving Brand, Polytechnic of North London, Holloway Road, London.

ZX Spectrum Club. Proposed new club for teenagers. Contact D Beattie, 63 Kingsley Crescent, Sawley, Long Eaton, Nottingham NG10 3DA.

Staffordshire. ZX80 National Software Association. Subs: £6. Newsletter, software available on cassette. Contact 15 Woodlands Road, Wombourne, Staffordshire WV5 0JZ.

Suffolk. ZX Amateur Radio User Group. Newsletter. Contact Paul Newman, 3 Red House Lane, Leiston, Suffolk. SAE essential. No telephone enquiries.

Surrey. Guildford ZX81/80 Users Group. Meets Fridays, club magazine. Contact A Bond, 54 Farnham Road, Guildford, Surrey GU2 5PE, 0483 62035.

Surrey. ZX80/81 User Club. Newsletter. Contact David Bigden, PO Box 159, Kingston-upon-Thames, Surrey KT2 5UQ.

West Sussex. Hassocks ZX Micro User Club. Contact Paul King, 25 Fir Tree Way, Hassocks, West Sussex.

Sirius

Sirius User Group. Newsletter, program library. Contact Ray D'Arcy, Sirius User Club, The Microsystems Centre, Enterprise House, 7-71 Gordon Street, Luton. 0582 412215.

68XX

68XX Special Interest Group. Contact Tim Turner, 63 Millais Road, London E11 4HB, 01-558 3681.

Software

London. Software Group. Meets at Polytechnic of North London, Room 2-3 Tower block Thursday, 6pm. Contact Mike Duck at Polytechnic of North London, Holloway, London N7.

Oxford. Program of the Month Club. Discount programs, newsletter. Contact Mr Durrant, 55 St Thomas Street, Oxford OX1 1JG, 0855 250333.

Sorcerer

Liverpool European Sorcerer Club. Monthly meetings. Subs: £7.50, newsletter. Contact Colin Marle, 32 Watchyard Avenue, Formby, near Liverpool L37 3JU, 070 48 72137. **Surrey.** Exidy Sorcerer User Group. Newsletter, program exchange. Contact Andy Marshall, 44 Arthurs Bridge Road, Woking, Surrey GU21 4NT.

Spreadsheet

International Electronic Spreadsheet Users Group. Newsletter. Contact UK Alpha House, 7th Floor, Rowlandsway, Manchester M22 5RG.

Tangerine

Avon. Tangerine Users Group. Hardware/software suppliers for One 1 and Microtan. Monthly newsletter. Contact Bob Green, 1 Mrlborough Drive, Worle, Avon, 0934 21315. **Bristol.** Tangerine Homebrew. Contact A Coates, 35 Mogg Street, St Werburghs, Bristol BS2 9UB.

Texas Instruments

Leeds. TI99/44 User Group. Meets at 30 Gipton Wood Road, Leeds 8, Mondays 7pm. Subs: £6. Contact I Youlden, 0532 401408.

Manchester. TI User Group. Proposed new club. Contact T Grimshaw, 21 Allingham Street, Longsight, Manchester.

Manchester. TI9900 User Group. Software, data libraries. Contact Chris Cadogan, Department of Computer Science, University of Manchester M13 9PL.

Triton

Triton User Group. Subs: £4. Newsletter, software exchange. Contact Nigel Stride, Transam Ltd, 12 Chapel Street, London NW1, 01-402 8137.

TRS-80

Birmingham. National TRS-80 User Group. Meets at Adam & Eve Pub, 1st Floor, Bradford Street, Birmingham on last Friday of month. Subs: £2.50. Newsletter, software library. Contact Michael Gibbons, 1 New Street, Castle Bromwich, Birmingham B38 9AP, 021-747 2260.

Chelmsford. TRS-80 User Group. Contact Michael Dean, 22 Roughtons, Galleywood, Chelmsford, Essex.

Durham. North East TRS-80 User Group. Meets at Information Technology Centre, Gateshead on the third Wednesday of month, 7pm. Subs: £5. Newsletter. Contact J Dunn, 8 Ettrich Terrace, North Gateshead, County Durham.

Edinburgh. Scottish TRS-80 and Genie User Group. Meets at Mansion House Hotel, Milton Road, second Thursdays of month, 7.30pm. Contact Dick Mackie, 3 Warrender Park Crescent, Edinburgh EH9 1DX, 031-229 6032. **Isle of Wight.** TRS-80 User Club. Meets at London Hotel, Ryde on last Friday of month, 7.30pm. Contact Sean Coulson, 0903 614589.

Kent. TRS-80 User Group. Contact Alan Reid, 22 Woodways Road, Rainham, Kent, 0634 367012.

Bolton. Northwest TRS-80 User Group. Meets at Barton Aero Club, Barton Aerodrome, Irlam, near Manchester on last Wednesday of month, 8pm. Subs: £8. Sub-group meets at Crown Hotel, Blackfriars Street, on first and third Monday of month. Newsletter, software library. Contact Melvin Franklin, 40 Cowlees, Westhoughton, Bolton, Lancashire.

Liverpool. UK DOSPLUS User Group. Contact Peter Tootill, 101 Swanside Road, Liverpool L14 7NL.

Liverpool. Merseyside TRS-80/Video Genie User Group. Meets second Thursday of month, 7.15pm. Contact Peter Toothill, 101 Swanside Road, Liverpool L14 7NL, 051-220 9733.

London, SW. TRS-80 User Group. Contact Ron Everitt on 01-394 2123.

Merseyside. TRS-80 User Group. Subs: £5. Software library, newsletter. Contact N Rushton, 123 Roughwood Drive, Northwood, Kirby, Merseyside.

Milton Keynes. National TRS-80 and Genie User Group. Fee £7 for six months, newsletter. Contact Brian Pain, 24 Oxford Street, Stony Stratford, Milton Keynes.

London. TRS-80 Genie Group. Meets at Central Common Room, The Residency, Northwick Park Hospital on first Sunday of month. Contact Dr Nick Robinson, Central Room, The Residency, Northwick Park Hospital.

Northants. TRS-80 Users Group. Meets at Welwyn Park Community Centre on alternate Thursday at 7pm. Subs: £12, Saturday workshop. Contact Neil Griffiths, 0858 657118.

Nottingham. East Midlands TRS-80 Users Group. Newsletter. Contact Mike Costello, 15 Langbank Avenue, Rise Park, Nottingham NG5 5BU, 0602 751753.

Colour Genie

National Colour Genie User Group. Subs: £10. Products monthly newsletter, has software library and prepares national workshops. Contact Marc Ledue, 46 Highbury Avenue, Nottinghamshire NG6 9DB.

UCSD

Hants. UCSD System Users Society. Contact John Ash, Dicoll Data Systems Ltd, Bond Close, Kingsland Estate, Basingstoke, Hants RG2 0QB.

Oxford. UCSD Pascal UK Users Group. Contact Malcolm Harper, Oxford University Computing Laboratory Programming Research Group, 45 Banbury Road, Oxford OX2 6PE.

CUA

CUA User Group. Contact Adrian Waters, 9 Moss Lane, Romford, Essex.

6502

Bedfordshire. 6502 User Group. Contact Walter Wallenborn, 21 Argyll Avenue, Luton, Bedfordshire LU3 1EG, 0582 269227.

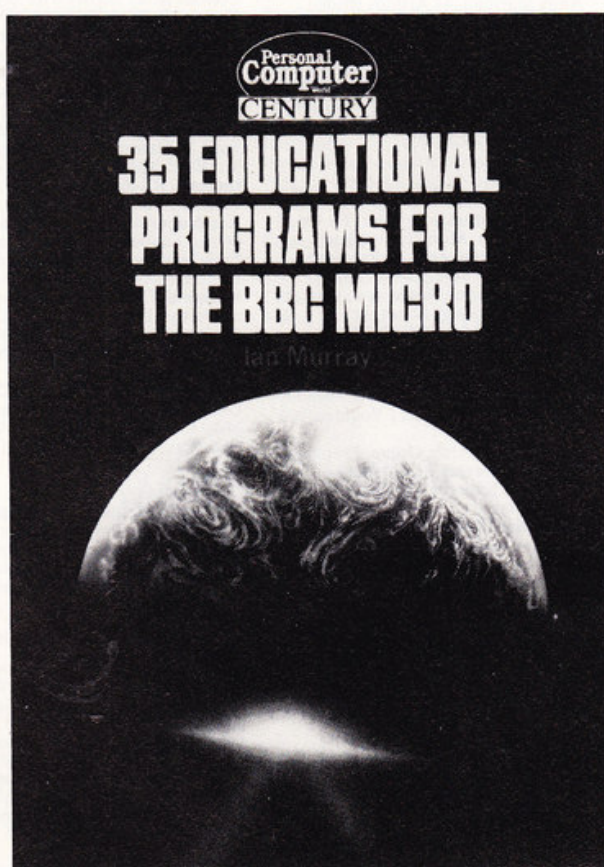
Hants. 6502 Users Club (Southern Region). Contact Steve Cole, 70 Sydney Road, Gosport, Hants.

Remember

Let us know about your micro club or user group so we can be sure the information printed here is up to date. Drop a card to Sandra Grandison, Listings Editor, at *Personal Computer News*, 62 Oxford Street, London W1A 2HG, or give her a call on 01-636 6890.



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BUSINESS

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	£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.
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	£402.50	Apple II	●	Nominal Ledger	64K	●	●	●	J1	Also on Sirius, IBM PC, Apple II + 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 II, 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.
	£2,052.75	Commodore 8000	●	Data-Lex	32K	●	●	●	D1	Designed for solicitors + others who need to separate office & client's accounts.
	£2,070	Commodore 8000	●	Microfacts	32K	●	●	●	M1	Also on Commodore 700, Victor & Sirius. £345 per module. 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 & MZ-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	Distributor	Comments
						Cassette Disk Cartridge		Disk drive Joystick Other		
	£287.50	CPM	●	Sales Ledger	64K	●	●	●	S2	Also on CPM 86 and MS-DOS. Flexible ledger system.
	£45.42	Sharp MZ80A	●	Easy VAT	48K	●	●	●	K1	Also on Sharp MZ80B & 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	CPM	●	Fastbill	60K	●	●	●	T2	Also on MS-DOS & TRS-DOS. Will give parts explosion at 10 levels, 99 items/level
Bookkeeper	£56.35	Apple II	●	Apple Bookkeeper	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 Graphics	£471.50	16-bit machines	●	Micro-Graphpower	128	●	●	●	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.
Business Management	£569.25	Commodore 8000	●	The Administrator	96K	●	●	●	S11	Complete applications generator. No programming required.
	£4,140	CPM	●	Peachtree Business Management System	48K	●	●	●	P1	Also on MP/M & Unix. Available on hard disk (£6,900). Six modules for single user.
	£684.25	IBM PC	●	Tomorrow's Office	128K	●	●	●	S11	Also on Sirius, Victor & MSDOS. Complete applications generator.
Cash Book	£224.25	Commodore 4000	●	Electronic Cash Book	32K	●	●	●	D1	Also on Commodore 8000 & 64. For small business or add-on products.
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	●	Cyberpress Clients Recoverable Costs	48K	●	●	●	C7	Also on Rair Black Box. Designed to keep record of incurred expenditures.
	£1,121.00	Apple II	●	Cyberpress Residential System	48K	●	●	●	C7	Also on Rair Black Box. An applicant & property matching system.
	£419.75	CPM	●	Estate Agents Match & Mail	56K	●	●	●	S4	Matches & prints out potential customers for every property.
Financial Accounting	£1,926.25	CPM	●	Fast Range	60K	●	●	●	T1	Also on MS-DOS & TRS-DOS. Needs 132 character printer. 5 modules.
	£569.25	Commodore 8000	●	Finplan	32K	●	●	●	M3	Also on Commodore 3, 4, & 8000. Vic-20 and Commodore 64. £46.57 on floppy disk
	£287.50	Commodore 8096	●	The Financial Director	96K	●	●	●	D1	Designed to handle large & complex planning & financial applications.
Financial Planning	£44.85	Commodore Pet	●	Busicalc	16K	●	●	●	S5	Also on Hylec & ICL PC. 96K version available. Helps decide on financial strategy.
	£188.60	Apple II	●	VisiCalc	48K	●	●	●	R1	Also on Apple III, Commodore & IBM PC, etc. The classic spreadsheet.
	£345.00	CPM	●	Bottom-Line Strategist	48K	●	●	●	P4	A business/project forecasting program. Allows user to test business assumptions.
	£454.25	CPM	●	Fastplan	64K	●	●	●	C5	Needs double density disks. A file based modelling system for business planners.
	£281.75	CPM	●	Master Planner	64K	●	●	●	C5	Also on MS-DOS & CPM 86. Needs 80 column printer. Upgrade of a spreadsheet.
	£396.75	CPM	●	Micro Plan	64K	●	●	●	B1	Also on MP/M. Spreadsheet financial planner.
	£343.85	CPM	●	Minimodel Financial Modelling	48K	●	●	●	G1	Needs 80 column screen. Model consolidation facility, colour option.
	£182.85	CPM	●	Multi-Plan	48K	●	●	●	P4	Also on PC-DOS, Cromix, Fortune, Corvus & Sirius. Second generation spreadsheet
	£44.85	CPM	●	Plannercalc	64K	●	●	●	C5	Needs 80 column screen. Entry level system for spreadsheet planning.
	£218.50	CPM	●	SP2020	48K	●	●	●	G2	Forecast effects of proposed actions. Aid to management decision-making.
	£172.50	CPM	●	Supercalc	128K	●	●	●	A1	Electronic worksheet, representing a large flexible accounting work pad.
	£212.75	CPM	●	Super Calculator	48K	●	●	●	E1	Spreadsheet calculator.
	£178.25	CPM	●	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 CPM. Two systems. Incomplete records accounting, time cost recording.
	£632.50	UCSD-P System	●	Microfinesse	128K	●	●	●	P5	Financial modelling program for businessmen.
Industrial Costing	£741.75	UCSD-P System	●	Micro-Modeller	48K	●	●	●	I2	Also on CPM & MS-DOS. Designed for large corporations.
Insurance Accounting	£747.50	Apple II	●	Stock & Production Costing	48K	●	●	●	A2	Also on Apple IIE & III & Sirius. Available on hard disk. Needs Pascal system.
Insurance Broking	£1,380	Commodore 4000	●	Insurance Man	32K	●	●	●	C4	Also in Commodore 8000, provides insurance broker with sales ledger.
Integrated Software	£5,462.50	ICL DRS20	●	HS-100	64K	●	●	●	H2	Requires 16 or 27 Mb hard disk to run off. Maintains client & policy records.
	£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	£923.75	CPM	●	Fast Invoicing	60K	●	●	●	T1	Also on MS-DOS & TRS-DOS. Can link into Fast Sales & Fast Stock.
Linear Programming	£373.75	CPM	●	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 Hylec. 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 Management	£86.25	CP/M	CP/M	●	Scratch Pad 3.0	56K	●	●	●	●	S4	Works with Super file. Prints labels, files, names & addresses. Mail merge facility.
Mathematics	£226.16	Commodore Pet	Commodore Pet	●	Infinite Arithmetic	48K	●	●	●	●	M4	Also on CP/M 86, MS-DOS & PC-DOS. Spreadsheet using virtual memory.
Medical	£28.75	Apple II	Apple II	●	Medical System	16K	●	●	●	●	S5	Also on Commodore 3000, 4000 & 8000. Available on floppy disk.
Office Information	£517.50	Apple II	Apple II	●	Prophet II	48K	●	●	●	●	A2	Also on Apple IIE, III & Sirius (£573.85). On hard disk. Age sex register.
Payroll	£402.50	Apple II	Apple II	●	Payroll	48K	●	●	●	●	A4	Also on IBM PC & Corvus Concept. Information system which acts as a noticeboard.
	£69.00	Apple II	Apple II	●	Tabs Payroll	48K	●	●	●	●	H1	Also available as cassette for Spectrum ZX81 (£25.00). Needs printer.
	£287.50	CP/M	CP/M	●	Powerday	48K	●	●	●	●	T3	Also on CP/M & MS-DOS (64K). Up to 2000 employees, nine pay schemes.
Project Management	£977.50	IBM PL	IBM PL	●	Micronet	48K	●	●	●	●	O2	Also on MP/M and MS-DOS. Integrates with Omicrons nominal ledger. Handles SSP.
Project Planning	£747.00	Commodore 8000	Commodore 8000	●	Hornet	32K	●	●	●	●	T2	Also on ICL PC, Sirius, Superbrain, Apple II, & others. Critical path analysis.
Property Management	£1,150.00	Apple II	Apple II	●	Property Management System	48K	●	●	●	●	C3	Has eight optional variants (all eight £4,025). Network logic & variety of screen display.
Purchase Ledger	£517.50	Apple II	Apple II	●	Tabs Purchase Ledger	48K	●	●	●	●	A2	Also on Apple III, Apple IIe & Sirius. Prints rent reminders, demands etc.
	£287.50	CP/M	CP/M	●	Powerbought	48K	●	●	●	●	T3	Also on CP/M & MS-DOS (64K). Open item ledger — automatic payment facility, etc.
	£805.00	Apple II	Apple II	●	Tabs Sales Ledger	48K	●	●	●	●	O2	Also on MP/M & MS-DOS. Integrates with Omicron's Nominal Ledger System.
Sales Ledger	£287.50	CP/M	CP/M	●	Fast Sales	60K	●	●	●	●	T3	Also on CP/M & MS-DOS. Part of integrated system. 300 analysis codes.
	£373.75	CP/M	CP/M	●	Powersales	48K	●	●	●	●	T1	Also on MS-DOS & TRS-DOS. Needs 132 character printer. Part of Fast Range.
	£805.00	DEC Rainbow 100	DEC Rainbow 100	●	Sales Ledger System	48K	●	●	●	●	O2	Also on MP/M & MS-DOS. Multi-user system based on mainframe software.
	£325	CP/M	CP/M	●	Compact Sales Order Processing	64K	●	●	●	●	D2	Also on DEC Mate II. Invoicing & monthly statement generating system.
Sales Order Processing	£805.00	CP/M	CP/M	●	Compact Sales, Purchase & Nominal Ledger	64K	●	●	●	●	C2	Also on CP/M 80, 86 & MS-DOS. Comes on hard disk. Control, stock, ledgers.
Sales, Purchase, Nominal Ledger	£1,207.50	Apple II	Apple II	●	Statutory Sick Pay (SSP)	48K	●	●	●	●	C2	Also on CP/M 80, 86 & MS-DOS. Follows standard accounting procedures.
Sick Pay	£80.50	Apple II	Apple II	●	Inter-Stat	48K	●	●	●	●	H1	Also on Spectrum. Does all SSP calculations.
Statistics	£172.50	Commodore Pet	Commodore Pet	●	Statistical Analysis	32K	●	●	●	●	G1	Also on Basis 108 & ITT 3030. Needs printer.
	£287.50	Sharp MZ80A	Sharp MZ80A	●	Critical Path Analysis (CPA)	48K	●	●	●	●	P7	Also on Commodore 64 (two modules at £99 each) & Sirius. Fully interactive.
	£15.00	Sinclair ZX81	Sinclair ZX81	●	Trend Plot	8K	●	●	●	●	K3	Also on MZ80K. Calculates mean & standard deviation for up to 100 items.
	£977.50	UCSD-P System	UCSD-P System	●	Fast Stock	128K	●	●	●	●	H1	Also on Spectrum (16K). Activities entered from arrow diagram. Finds critical path.
Stock Control	£373.75	CP/M	CP/M	●	M-SIS	60K	●	●	●	●	P5	Needs Hewlett Packard plotter. Developed to analyse historical time series data.
	£3,289	Newbrain	Newbrain	●	Stock Control 40/4	48K	●	●	●	●	T1	Also on MS-DOS & TRS-DOS. Needs 132 character printer.
	£33.92	Sinclair Spectrum	Sinclair Spectrum	●	Stock Control	32K	●	●	●	●	T2	Stock control system for manufacturing industry.
	£25.00	Apple II	Apple II	●	Format 80	48K	●	●	●	●	E2	Stores large quantities of stock, accumulates new stock levels & checks stock level
Word Processing	£228.85	Apple II	Apple II	●	Piewriter	48K	●	●	●	●	H1	Also ZX81. Fast fwd/add/delete item. Prints complete or selective lists & total value
	£92.00	Apple II	Apple II	●	Wordhandler	48K	●	●	●	●	P6	Also Apple IIe. Needs 80 column card. Storage/retrieval of names & addresses.
	£125.35	Apple III	Apple III	●	Apple Writer 2	48K	●	●	●	●	M5	Needs 80 column card. Allows entry, editing & print formatting of any text type.
	£152.95	BBC Model B	BBC Model B	●	Alphabeta	32K	●	●	●	●	P4	Word processor for the non-professional — minimum Apple system.
	£28.50	BBC Model B	BBC Model B	●	Word Pro	32K	●	●	●	●	P6	Also Apple II. Has word wrap, glossary & word processing language.
	£90.85	Commodore 64	Commodore 64	●	Infomast	64K	●	●	●	●	H3	Also available on disk. Suitable for home & business.
	£89.00	Commodore 8000	Commodore 8000	●	Paperclip	64K	●	●	●	●	I4	Includes DELETE, INSERT, SAVE, Date etc.
	£488.75	Commodore Pet	Commodore Pet	●	Wordcraft	32K	●	●	●	●	R2	Combined programmable word processor, Database and calculator.
	£51.75	Commodore BK-20	Commodore BK-20	●	Papermate +	16K	●	●	●	●	A3	Also on SuperPet, Sirius 1, IBM PC & CBM 64. Routine correspondence, mailing, etc.
	£125.00	CP/M	CP/M	●	Wordcraft 20	8K	●	●	●	●	D1	Also on Commodore 64, 3, 4, & 8000. Available on floppy (£53.49).
	£145.00	CP/M	CP/M	●	Mail Merge	64K	●	●	●	●	S5	Also Commodore 64 — needs printer. Comprehensive word processor.
	287.50	CP/M	CP/M	●	Peachtext	48K	●	●	●	●	A3	Also on CP/M 86 and PC-DOS. An optional MERGE, PRINT, extra for Wordstar.
	£339.00	CP/M	CP/M	●	Perfect Writer/Speller	64K	●	●	●	●	X1	Also on CP/M 86 & MS-DOS. Needs high quality printer. Contains proof reader.
	£431.25	CP/M	CP/M	●	Select Word Processing System	64K	●	●	●	●	P1	Also MP/M & MS-DOS. Needs quick reference card.
	£316.25	CP/M	CP/M	●	Spellbinder	48K	●	●	●	●	S3	Also MP/M & PC-DOS. Screen-oriented system.
	£333.50	CP/M	CP/M	●	WP2020	48K	●	●	●	●	B1	Also on Oasis. Word processing & office management system.
	£225.00	IBM PC	IBM PC	●	Easywriter II	64K	●	●	●	●	E1	Menu-driven, machine independent. Set of key-tops provided.
	£340.40	MS-DOS	MS-DOS	●	WordStar	128K	●	●	●	●	G2	Bold face & underscoring on screen. 80,000 word spell checker extra (£43.15).
	£339.25	Newbrain	Newbrain	●	Word Processor 40/12	32K	●	●	●	●	X1	Mail merge facility with Visi file.
	£40.25	OS9	OS9	●	Sylograph	32K	●	●	●	●	R6	Mail merge facility with Visi file.
	£325.00	Sharp MZ804	Sharp MZ804	●	Wordpro	48K	●	●	●	●	E2	Also on CP/M. Needs printer. Complete screen-based WP.
	£45.42	Tandy TRS 80 I	Tandy TRS 80 I	●	AJ Edit	32K	●	●	●	●	S6	Automatic word wrap, editing, saving paragraphs, deleting.
	£49.95			●			●	●	●	●	K1	Expandable system with modular design.
				●			●	●	●	●	M6	Also on MZ80B + K. Available on disk (£91.94). One of few WP packages for Sharp
				●			●	●	●	●		Also on Genie I & II. Needs printer.

EDUCATION

	Price Inc Vat	Machine/Operating System	Other versions	Title	Memory required	Media Supplied	Hardware Required	Publisher/Distributor	Comments
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.
	£5.95	BBC Model B	●	Inkosi	32K	●		C9	Also on Vic-20. Rule for ten years, overcoming obstacles, e.g. famines.
Chemistry Children	£14.38	Research Machine 380Z	●	Symbols To Moles	31K	●		H4	Also on Apple II. Practise using chemical symbols, writing & mole concept.
	£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 IBMPC. 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.
	£9.80	Atari 400	●	Jigsaw Puzzles	16K	●		T4	Also on Atari 800. Has 16 puzzles and optional difficulty.
	£9.95	BBC Model B		Letters	32K	●		C9	Designed for children aged 4-6 & for dyslexic & remedial children.
	£9.95	BBC Model B	●	Metrics	32K	●		C9	Also on Vic-20 + Spectrum. Structure of metric system, for children aged 10-15.
	£5.95	BBC Model B	●	Pascal	32K	●		C9	Also on Vic-20. Shows construction of Pascal Triangle and tests on it.
	£5.95	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.
	£5.25	Spectrum		Alphabet	48K	●		W2	'Picture for each letter of the alphabet. Option for lower case.' Aimed at ages 2-6.
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	●	Multilingual	3K	●		S8	Also on MZ80K. A language tutor to suit all European languages.
Mathematics	£8.95	BBC Model B		Angle	32K	●		C9	Also on Spectrum. Includes four programmes designed to teach simple geometry.
	£9.95	BBC Model A	●	Algebraic 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.
	£5.25	Spectrum		Counting	16K	●		W2	Graded programs. 'Good as a first introduction to numbers.' Aimed at ages 3-6.
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.'

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	Price	Machine/ Operating System	Other versions	Title	Memory required	Media Supplied	Mail order avail.	Hardware Required	Distributor	Comments
						Cassette Disk Cartridge		Disk drive Joystick Other		
Helicopter Jigsaw	£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'.
	£24.95	Commodore Vic-20	●	Chop Litter	8K	●	●	●	A3	Also on Commodore 64. Needs joystick to run. 'Vic version of USA's best-seller'.
	£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	●	●	●	M12	'Popular arcade game'.
	£9.95	BBC Model B		Monsters	32K	●	●	●	W1	'The player has to run up & down ladders & along walls, pursued by monsters'.
	£24.95	Dragon 32		Ghost Attack	N/A	●	●	●	D3	'The aim is to avoid & eliminate ghosts which roam a maze'.
Maze type	£8.00	Dragon 32		Jerusalem Adventure	32K	●	●	●	M12	'Aim is to get treasure & avoid being eaten'.
	£5.95	Spectrum	●	Hungry Horace	16K	●	●	●	S10	'Animated maze game with sound & full graphics'.
	£4.95	Spectrum		Mined-Out	48K	●	●	●	Q1	Reviewed in PCW week ending April 22. Also on Dragon 32.
	£5.95	Spectrum		Muncher	16K	●	●	●	S9	'A monster munching marathon'.
Pacman Type	£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'.
	£9.95	BBC Model B		Snapper	16K	●	●	●	W1	'Based on Pacman'.
	£9.50	Colour Genie		Chomper	16K	●	●	●	K2	'Based on Pacman'.
Pool	£8.00	Dragon 32		Scarfan	32K	●	●	●	M12	'Based on Pacman'.
	£4.95	Spectrum		Gnasher	16K	●	●	●	R3	Joystick optional. 'Based on Pacman using Beano characters'.
	£8.50	BBC Model B		Billiards	32K	●	●	●	H3	Available on disk. 'A game for all ages'.
	£7.95	Dragon 32		Grand Prix	32K	●	●	●	S7	'For one or two players, features eight Grand Prix tracks & 10 levels of difficulty'.
Racing	£21.95	T199/4A		Car Wars	16K	●	●	●	T5	'Race through maze whilst avoiding computer controlled car'.
	£19.95	Apple II		Lunar Lopper	16K	●	●	●	S12	Reviewed in PCW week ending April 22.
	£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'.
Science Fiction Shooting	£5.95	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	N/A	●	●	●	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'.
Space Invader type	£5.95	Spectrum		Starship Enterprise	48K	●	●	●	S9	'Based on the classic Star Trek. Includes arcade action'.
	£4.95	Spectrum	●	Star Trek	48K	●	●	●	R3	Also on ZX81 (£3.95). One player, sound & full colour graphics strategy game'.
	£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'.
Sport	£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'.
	£6.50	Spectrum		Destroyer	16K	●	●	●	I5	'Destroy the varying alien invaders'.
	£4.95	Spectrum		Intruders	16K	●	●	●	Q1	'Includes mutants, random saucers, bonus base & 14 different aliens. Sound & colour'.
Strategy Variety	£5.00	Spectrum		Spectral Invaders	16K	●	●	●	B3	'For one or two players. Increasingly difficult, high resolution colour graphics'.
	£21.95	T199/4A		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'.
	£33.35	IBM PC		Decathlon	64K	●	●	●	I3	Needs colour graphics adaptor & direct drive colour monitor. 'For up to six players'.
Various	£7.95	Dragon 32		Wizard War	32K	●	●	●	S7	Reviewed in PCW week ending April 8.
	£5.95	Commodore Vic-20		Innovation Cassette	48K	●	●	●	M8	'One tape containing seven games'.
	£5.95	Spectrum		Over the Spectrum	16K	●	●	●	M8	'One tape with 10 games. Defender to geometry, beginners to advanced'.
	£29.95	Atari 400	●	Picnic Paranoia	16K	●	●	●	C8	Also on Atari 800. Needs joystick to run. 'A graphics game based on picnic site'.
Various	£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'.

	£24.95	Commodore Vic-20		Mutant Herd	8K				T4
	£6.90	Dragon 32		Dead Wood	32K				A5
	£3.95	Texas Instruments 99/4A		Chalice of Kalmar	16K				A8
Clubs and Sports	£78.00	Sharp MZ80A		Clubman	48K				S8
	£575.00	Apple II	●	Tab's Golf Package	48K		●		T3
	£28.18	Epson HX20	●	Horse Race Forecast	48K		●		K1
	£28.69	Sharp MZ80A	●	Navex	48K		●		K1
Diary	£9.95	BBC Model A	●	Desk Diary	16K		●		W1
	£19.99	Atari 400	●	Home Financial Management	8K		●		T4
Home budget	£19.95	Epson HX20	●	Home Budget	16K		●		K1
	£14.95	Sharp MZ80A	●	Sam Analysis	3K		●		S8
Music composition	£24.99	Commodore Vic-20		Vic Music Composer	8K		●		T4
Stock control	£10.00	Spectrum		Spec File	48K		●		A5
Various	£12.95	Commodore Vic-20		Home Office	5K		●		A3
UTILITIES									
Basic	£201.25	CP/M		Basic 80	48K		●		L1
	£235.70	CP/M		Basic Compiler	48K		●		L1
	£80.50	CP/M		BDS C Compiler	48K		●		L1
	£121.90	CP/M	●	C Basic	64K		●		X1
	£213	Any Z80		X-Basic	48K		●		X1
Basic Upgrader	74.75	Commodore 64	●	VicTree	64K		●		S5
Card Index System	£215.05	Apple II	●	VisiDex	48K		●		R1
	£178.25	CP/M	●	Cardbox	48K		●		C6
Communications	£102.35	Apple II		ASCII Express — The Professional	48K		●		P4
	£448.50	Apple II		Editel	48K		●		O1
	£626.75	Apple II		Owisynd 3780	48K		●		O1
	£454.25	Apple II		Owitel	48K		●		O1
	£149.50	Apple II	●	Terminal Utilities	48K		●		C1
	£57.50	CP/M		Xcopy 1.0	64K		●		X1
	£454.25	CP/M	●	Micro-Linkline	64K		●		I2
	£575	CP/M	●	Bisync AC-3780	64K		●		E1
	£41.40	IBM PC		Asynchronous Communications	64K		●		I3
	£117.30	IBM PC		IBM 3101 Emulation Program	64K		●		I3
	£638.25	IBM PC		PC SNA 3270 Emulation	128K		●		I3
	£22.43	Sharp MZ80A	●	Zen	48K		●		K1
	£115.00	IBM PC	●	Interlink	48K		●		T2
Database	£132.25	Apple II		DB Master	48K		●		M5
	£224.25	Apple II		Informex Database System	48K		●		I1
	£402.50	Apple II	●	Mailist	48K		●		A4
	£96.60	Apple III	●	PFS: File	48K		●		P6
	£215.05	Apple II	●	VisiFile	48K		●		R1
	£217.35	Apple IIE		VisiTrend + VisiPlot	64K		●		R6
	£10.30	BBC Model B		Filer	16K		●		M7
	£201.25	CP/M	●	Dataflow II	56K		●		G1
	£201.25	CP/M		Datastaff	64K		●		X1
	£499.74	CP/M		dBase II	48K		●		E1
	£557.50	CP/M		Superfile	56K		●		S4
	£166.75	CP/M		Supersort 116	64K		●		M10
	£1.840	CP/M	●	MDBS II	64K		●		T2
	£569.25	Commodore 8000		The Administrator	96K		●		S11
	£68.42	Newbrain		Invoice & Credit Program	32K		●		E2
	£29.32	Newbrain		Database 40/S	32K		●		E2
	£684.25	Sirius	●	Tomorrow's Office	128K		●		S11

UTILITIES

Debugger	£258.75	CP/M	●	Animator	64K	●	●	●	●	●	●	M11	Also on Unix & MS100S, interactive source level debugging tool for C/S-Cobol.
File Transfer	£132.25	CP/M	●	BSTAM	16K	●	●	●	●	●	●	L1	Needs common interface ports or modem access. Utility for transferring 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-compatible 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/M-86, MS-DOS, PC. DOS. Fast implementation of C.
	£1114.43	Commodore 64	●	DTL-Basic Compiler	32K	●	●	●	●	●	●	D1	Also on Commodore 8000, 4000 & 3000. Also tape version on CBM 64 (£39.90).
	£16.85	BBC Model A	●	Lisp on the BBC	16K	●	●	●	●	●	●	W1	Also on BBC Model B. Book available £7.50. Lisp is artificial intelligence language.
	£253.00	CP/M	●	ProPascal	56K	●	●	●	●	●	●	E1	Also on CDOS. Needs two disk drives. Native code Pascal.
	£40.19	Sharp MZ80A	●	Forth	48K	●	●	●	●	●	●	K1	Also on MZ80K & Osborne. Allows implementation of Forth.
	£25	Spectrum	●	Hisoft Pascal	48K	●	●	●	●	●	●	H5	Reviewed in PCN week ending April 8. Pascal compiler and screen editor.
	£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.
	£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.
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	8086 micro	●	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 8-bit micro. O/S.
	£126.50	Any 8-bit micro	●	CP/M 2.2	64K	●	●	●	●	●	●	D4	O/S for 8-bit micros with over 1.5 million users.
	£379.50	Any 8-bit micro	●	MP/M	64K	●	●	●	●	●	●	D4	Multitasker, 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 MC68000/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-receiving or telex by micro.
Testing Tool	£95.82	CP/M 80	●	Diagnostics II	32K	●	●	●	●	●	●	M4	Also on CP/M-86 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/M-86	●	Time Recording System	64K	●	●	●	●	●	●	D2	Also on CP/M 80. Control over man/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.

A1 ACT Pulsar, 021-454 8585 **A2** Advanced Quality Software, Norwich 21117 **A3** Audiogenic, Reading 595647 **A4** Atlantic Software, Nottingham 412777 **A5** A & P Software, 061-223 6206 **A6** Abbox Electronics, 01-203 1465 **A7** Automata UK, Portsmouth 735242 **A8** Apex Trading, Brighton 36894 **A9** Acornsoft, Cambridge 316039
B1 Bonisi, 01-580 0902 **B2** Bristol Software Factory, Bristol 23430 **B3** Bug-Byte, 051-227 2299
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** Cyberpress, Wallingford 37769 **C8** Channel 8 Software, Preston 53057 **C9** Chalksoft, Wellington 7117
D1 Dataview, Colchester 869414 **D2** DEC, Basingstoke 59200 **D3** Dragon Data, Kenilg Hill 744700 **D4** Digital Research, Newbury 35304
E1 Encotel Systems, 01-686 9687 **E2** Elstree Computer Centre, 01-953 6921
F1 Ferrari, 01-751 5791 **F2** Farplan Computer Systems, Ross-on-Wye 64321
G1 Great Northern, Leeds 589980 **G2** Graffcom Systems, 01-727 5561
H1 Hilderbey, 01-485 1059 **H2** Hartford Software Northwich, 781156 **H3** H & H Software, Runcorn 65566 **H4** Heinemann, 01-637 3311 **H5** Hisoft, Swindon 26616
I1 Informex, 01-318 4213 **I2** Intelligence (UK), 01-543 3711 **I3** IBM UK Product Services, Basingstoke 56144 **I4** UK Software, Blackpool 21555 **I5** Impact Software, 031-441 4257 **I6** Imagine Software, 051-236 6849
J1 Jarman Systems, Tring 6841
K1 Kuma Computers, Maidenhead 71778 **K2** Kansas City Systems, Chesterfield 850357 **K3** Knights, Aberdeen 630526 **K4** Keen Computers, Nottingham 412777 **K5** Kobra Micro Marketing, Henley-on-Thames 2512
L1 Lifeboat, 01-836 9028
M1 MMS, Bedford 40601 **M2** Microsimplex, Macclesfield 615000 **M3** McDowell Knapp & Associates, Worcester 612261 **M4** Micro Technology, Tunbridge Wells 45433 **M5** Micromedia, 01-843 9457 **M6** Molliex, Bexhill-on-Sea 223636 **M7** Micro Power, Leeds 683186 **M8** Melbourne House, 01-977 9160 **M9** Mercury Software, Darwen 776677 **M10** MicroPro, 01-499 5777 **M11** MicroFocus, Swindon 695891 **M12** Microdeal, St Austell 67676
O1 Owl Microcommunications, Bishops Cleeve 763848 **O2** Omicron, 01-636 6575
P1 Peachtree Software International, Maidenhead 32711 **P2** Padmede, Fleet 21892 **P3** Pegasus, Kettering 522822 **P4** Pete & Pam Computers, 01-769 1022 **P5** PE Consulting Group, Egham 34411 **P6** Personal Computers, 01-377 1200 **P7** PTRC, 01-836 2208
Q1 Quicksilver, Southampton 20169
R1 Rapid Terminals, High Wycombe 26271 **R2** Rabbit Software, 01-863 0833 **R3** R & R Software, Gloucester 502819
S1 Systematics International Microsystems, Haverhill 61121 **S2** SGS Software Products, 01-486 7498 **S3** Silicon Valley Trade, 01-242 2807 **S4** Southdata, 01-994 6477 **S5** Silversoft, 01-861 1166 **S6** Seed, Bournemouth 378151 **S7** Salamander, Brighton 771942 **S8** Solo Software, Worcester 424152 **S9** Silversoft, 01-748 4125 **S10** Sinclair Research, Cambridge 353204 **S11** Stage One Software, Poole 735656 **S12** SBD Software, 01-870 9275 **S13** Starcade, 051-236 6628
T1 Tridata Micros, 021-622 6085 **T2** Tamsys, Windsor 56747 **T3** Tabs, Andover 5893 **T4** Thorn EMI, 01-836 2444 **T5** Texas Instruments, Bedford 63211
W1 John Wiley & Sons, Chichester 784531 **W2** Widgit Software, 01-444 5285
X1 Xilan Systems, Southampton 334711

BACK ISSUES SERVICE

FILL THE GAPS IN YOUR PCN COLLECTION

Issue 1, March 11-18.

Pro-Tests: Apple's Lisa, Text TX8000; Spectrum speech synthesiser, Apple printer, Commodore network; 3D on Spectrum, graphs package for Apple and IBM, BBC graphics system.

Features: computer chess, Occam parallel processing language, Victor/Sirius function keys.

ProgramCards: Towers of Baramah (Pascal), Biorhythm (Apple II), Roman Year (Apple II), Shape Utility (Apple II).

Gameplay: Darts, Soccer (Atari); Castle of Riddles (BBC Model B); Pimania (Spectrum); Flight Simulator (IBM PC).

Databasics: micros and peripherals.

Issue 2, March 18-25.

Pro-Tests: Toshiba T100, Casio PB100, ZX81/Basicare, Vic speech synthesiser, Spectrum spreadsheet, IBM graphics, BBC word processing.

Features: Colecovision, micro backgammon, nursery computing.

Gameplay: Ultima II (Apple), Trader (ZX81), Starquest (Vic 20), Hungry Horace (Spectrum).

ProgramCards: String editor (Spectrum), Analogue Clock (BBC Model B), Chart generator (Spectrum), String extract/replace.

Databasics: full software listings.

Issue 3, March 25-April 1.

Pro-Tests: TI Professional, Apple speech synthesiser, Facit 410 printer, IBM keyboards, Petspeed compiler, Sirius toolkit, Dragoncalc.

Features: Atom upgrade, Lynx programming, Apple music.

Gameplay: Mangrove (Vic 20), Mutant Herd (Vic 20), Compendium (Dragon), Patience (Spectrum), Noughts and Crosses (Dragon), Great Britain Ltd (Spectrum), Ulysses (IBM PC).

ProgramCards: Magnify (Spectrum), Spider (Vic 20), Firing Range (BBC).

Databasics: micros.

Micropaedia: Anatomy of the BBC, part 3.



Issue 4, April 1-8.

Pro-Tests: Pied Piper Communicator, Olympia ESW3000 printer, Namal Supertalk, Commodore Calcresult, Spectrum Pascal, Cashbook (BBC).

Gameplay: Dark Crystal (Apple II), St George (Dragon), Wizard War (Dragon).

ProgramCards: Fruit Machine (C64), Tunesmith (Oric), Array Editor.

Databasics: peripherals.

Clubnet: Clubs and user groups.

Micropaedia: Go Forth, part 1.

Issue 5, April 8-15.

Pro-Tests: Commodore 700, Ikon Hobbit, 1-2-3 (IBM), ZX81 machine code.

Features: speech packs, monitors, Gameplay: Grand Prix (Dragon), Derby Day (Spectrum), Deadline (Apple).

ProgramCards: Wacky Racers (Oric), Fruit Machine (C64), Parse Integer.

Databasics: Software.

Clubnet: full list of user groups.

Micropaedia: Go Forth, part 2.

Issue 6, April 15-22.

Pro-Tests: Tycom Microframe, IBM PC, Scorpio Disks, Dragon sound module, ZX81 graphics, Bottom Line Strategist (CP/M), PaperClip word processor.

Features: IBMPC DOS, BBC word processing, PC-1251.

Gameplay: Mined Out (Spectrum), Transylvanian Tower (Spectrum), Lunar Lopper (Apple II), Evolution (Apple II).

ProgramCards: Wacky Racers (Oric), Mortgage Comparison (Sharp MZ80K), Computer Set Up (BBC), Day of Week.

Databasics: micros.

Micropaedia: Graphics, part 1.

Issue 7, April 22-29.

Pro-Tests: Mattel Aquarius, Epson FX80, Olivetti JP101, Lisp on Spectrum, Vic 20 assembler, Supergraf on Victor/Sirius.

Features: Dealer support, Atari graphics.

Gameplay: Krakit (ZX81), Cruising On Broadway (Spectrum), Kaktus (Vic 20), Fantastic Voyage (ZX81).

ProgramCards: CBM controls, Computer Set Up (BBC), Wacky Racers (Oric), Julian Dates.

Databasics: Peripherals.

Micropaedia: Graphics part 2.

Issue 8, April 29-May 6.

Pro-Tests: Atari Home Files Manager, Kobra's Vic Stat for the Vic 20, Hestacrest's Accounts for the Spectrum; Epson RX80 printer, NCR's Decision Mate V, Future Computer's FX20.

Features: Micronet, Compact programming on the TI99/4A.

Gameplay: Harvester (Vic 20), Strategic Command (Dragon 32), A first Book of Micro Rhymes (BBC), Telling the Time/Money (Spectrum).

ProgramCards: Program Indexer (BBC B), CBM Database cards 1-4, Sort/Extract.

Databasics: software.



Issue 9, May 6-13.

Pro-Tests: Structured Basic on the Apple, Pixel Power on the Vic 20; Star DP510 printer, Dams and Interpod interfaces for Commodore 64; Micro-Professor.

Features: BBC function keys, Atari word-processing part 1.

Gameplay: Dungeons of Intrigue (Oric), The Castle (Oric), Starship Command (BBC B), Dragon Trek, Nowotnik Puzzle (Spectrum).

ProgramCards: Lower case (Dragon 32), CBM database cards 5-6, Monster (Spectrum), Wildcard Search (MBasic).

Databasics: hardware.

Micropaedia: Graphics, part 4.

Issue 10, May 13-20.

Pro-Tests: Infomast on Commodore 64, Dragon Maze; MC202 and CMU800 music synthesisers (Apple), Prism directly coupled modem; Epson QX10.

Features: ZX81 graphics part 1; Atari word-processing part 2.

Gameplay: Rescue (Spectrum), Dictator (Spectrum), Roman Empire (Spectrum), Choplifter (Vic 20), Skyhawk (Vic 20).

ProgramCards: Union Jack (Lynx), Escape (Spectrum), CBM Database cards 7-9, Evaluate (MBasic), Formula (BBC B).

Databasics: peripherals.

Micropaedia: Graphics, part 5.

Issue 11, May 20-26.

Pro-Tests: BBC Vufile, PFS:File for IBM, Apple Pascal; printer comparison, Pickard Joystick Controller for ZX81 and Spectrum; C9E Computer Board.

Features: ZX81 graphics part 2, Basic on the Sharp MZ80K.

Gameplay: Motor Mania (Commodore 64), Oric Flight, BBC Music Synthesiser, Music Maker (Spectrum), Embassy Assault (Spectrum), Tobor (Spectrum).

ProgramCards: Homeward Bound (ZX81), Connect Four (Dragon 32), CBM Database, cards 10 - end.

Micropaedia: Keyboards.

Issue 12, May 27-June 2.

Pro-Tests: Spectrum word processor, PFS:Report on IBM, File Handling for Colour Genie; CTI CP80 type 1 printer, TG Trackball; Sord M5.

Features: Epson Basic, Oric sound part 1, Tandy Colour graphics.

Gameplay: Mad Martha (Spectrum), Frenzy (Spectrum), Headbanger (Spectrum), Oric roundup.

ProgramCards: Election Barchart (Commodore 64), Memory Utility (BBC B), Munch (Spectrum).

Databasics: Hardware.

Clubnet: clubs (Cambridge Microcomputer Club special).

Micropaedia: Disk Drives, part 1.

Issue 13, June 3-9.

Pro-Tests: Teletwriter for Dragon 32, Abersoft Forth for Spectrum, GPS graphics processing system for Apple II+; joysticks, rulers; Ajile.

Features: Dragon meets Tandy, Oric music part 2, transferring Basic for Colour Genie and Genie 1.

Gameplay: Everest Ascent (Spectrum), Colour Genie roundup, Micro Maze (Jupiter Ace), Qix (Atari).

ProgramCards: Cupid (Oric), Alien (Dragon 32), Time Bomb (Atari).

Databasics: peripherals.

Micropaedia: Disk Drives, part 2.

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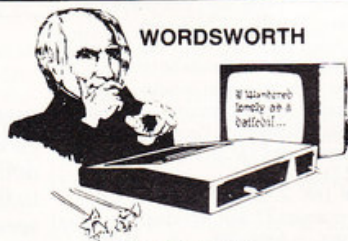
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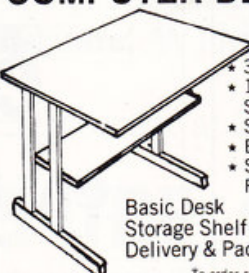
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● **Looking** for Lynx games? Well look no further. Computer Attack by Marcus is here. Send cheque for £5.00 to Fiddament, 7 Elmtree Avenue, West Bridgford, Nottingham NG2 7JU. Utilities on reverse!

● **TI 99/4A Software** computer card game for one or two players. Joystick compatible. Excellent graphics. Beat computer or your friends. £3.95. Teksoft (UK), 30 Gipton Wood Road, Leeds 8. Cat. No. 00501.

● **Dragon 32.** 3 exciting new games. "Grandad's Will" £4.00. "Daredevil Pilot" £7.00. "Chain Reaction" £7.00. Spectrum "Supatrek" £7.00. Oric 1, "Smugglers' Island" £7.00. Intersoft, 4 Craig Place, Aberdeen, Scotland.

● **Lynx 48K software.** Labyrinth—3D Maze. Chancellor—UK Economy simulator. Othello—Traditional Board Game. Space Trek—Zap the Klingons. £4.75 each including P & P. Quazar Computing, 17 Teg Close, Portslade, Sussex.

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For exhibitor list and further information write to Montbuild Ltd, 11
Manchester Square, W1M 5Ab, Telex 24591.

* correct at 20.4.83

BARBICAN CENTRE, CITY OF LONDON
28 September — 2 October 1983

Words in edgeways

Just to set your minds at rest PCN is able to reveal that Victor's most recent ad deliberately shows the machine upside-down. This is supposed to catch your eye, and it certainly works. It may even have drawn your eye away from a surprising claim in the text.

The hard disk option, we are told, gives you 10Mb — 'equivalent to three million words'. Very short words!

Pupils?

A revolutionary new training method seems to be just the thing for businessmen in a rush. The system claims to be able to take users to full proficiency in . . . well, no time at all.

Silicon Valley Computer Centre is advertising on-sight training courses for people who, we assume, find ten minutes to learn Lisa a bit of a strain. On-sight training presumably involves the use of flash cards and a series of tutors hiding behind the door.



EPSON RACES — Hurling into a tight left-hander at 130 mph you are suddenly seized by the desire to work out your petrol consumption. You strip off your gauntlets and, using your knees to guide the bike, you enter '130 Arggh' and plough into a handily placed straw bale. Isn't it the pits? No, it's a picture from Epson demonstrating that the Suzuki Grand Prix team is using an HX20. Epson is becoming the sportsman's computer. Manchester United players appeared in an earlier promotion.

**NEXT WEEK
EXCLUSIVE**

- Pro-Test of the Tandy TRS-80 Model 100
- The new Digital Research Basic for CP/M 86 machines
- Utility packages for the Newbrain
- RS232 interface for the ZX machines
- ROMs for Commodore machines
- New games for Vic20, Spectrum, BBC, Commodore 64
- Micropaedia Sound Part 2

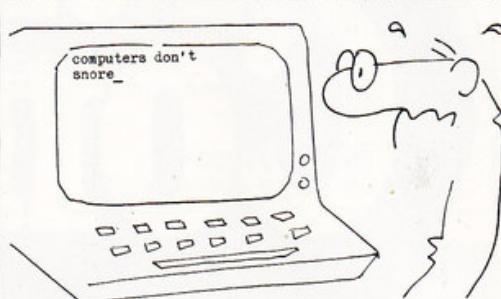
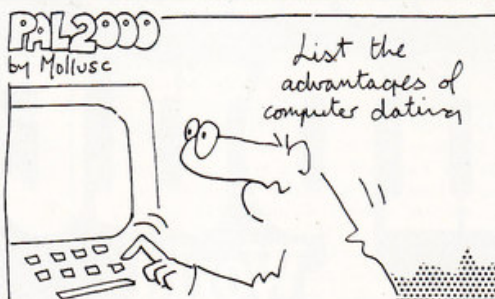
SLANTAX ERRORS

HASH-UP . . .

The Program listing in Portrait of the Atari as an Artist, PCN issue 16, was slightly misleading — Atarians should note that, where the program says £, they should type #. Sorry for the irritation!

BUT NO COVER-UP

Apologies to Jay Myrdall, whose cosmic concept featuring the BBC micro and the Atari 800 in orbit around the earth on last week's cover was wrongly credited.



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
Dexpo Europe '83	June 29-July 1	West Centre Hotel, London	Expo Consul Inc, 01-948 3111
Malvern Microcomputer Fair	July 2	Winter Gardens, Malvern, Worcestershire	Personal Computer Fairs, Worcester 22659
Micro Trade '83	July 6-8	Barbican Centre, London	Timothy Collins, Montbuild Ltd, 01-486 1951
IBM Users Conference & Exhibition	July 12-14	Wembley Conference Centre	Online Conferences Ltd, 09274 28211
8th ZX Microfair	August 20	Alexandra Palace, London	Mike Johnstone, 01-801 9172
Acorn User Exhibition	August 25-18	Cunard International Hotel, London	Computer Marketplace Ltd, 01-930 1612
Computer Open Day	September 1	Draganora Hotel, Leeds	Tony Kaminiski, Couchmead Communications Ltd, 01-778 1102
Home Entertainment Show	Sep 17-25	Olympia, London	Montbuild Ltd, 01-486 1951
Computer Open Day Exhibition	September 22	Central Hotel, Glasgow	Couchmead Communications Ltd, 01-778 1102
Microcomputers in Business	Sep 27-29	Warwick University, Coventry	Peter Bubb, 01-892 4422
Personal Computer World Show	Sep 29-Oct 2	Barbican Centre, London	Montbuild Ltd, 01-486 1951

Event	Dates	Venue	Organisers
International Micro Computer Exhibition	Aug 2-5	Kuala Lumpur, Malaysia	Conference & Exhibition Management Services SDN BHD, 9-A Jalan SS24/8 Taman Megah, Petaling Jaya, Selangor
National Computer Business & Office Systems	Aug 16-19	Auckland, New Zealand	Trade & Industrial Exhibitions, 12 Heather Street, Parnell, PO Box 9682, Auckland
Personal Computers & Office Automation Systems Exhibition	Sep 5-8	Amsterdam, The Netherlands	RAI Gebouw BV, Europaplein 2, 1078 GZ, Amsterdam
Australian Computer Exhibition	Sep 13-16	Melbourne, Australia	Riddell Exhibition Promotions PTY Ltd, 166 Albert Road, South Melbourne, Vic 3205
International Peripheral Equipment & Software Exposition	Sep 13-15	Moscone Centre, Anaheim, USA	Cahners Exposition Group SA, 0483 38085

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THE ACORN SPARK-JET PRINTER

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If you're interested in joining the jet set, simply call in at one of the dealers listed below. He'll tell you everything you need to know.

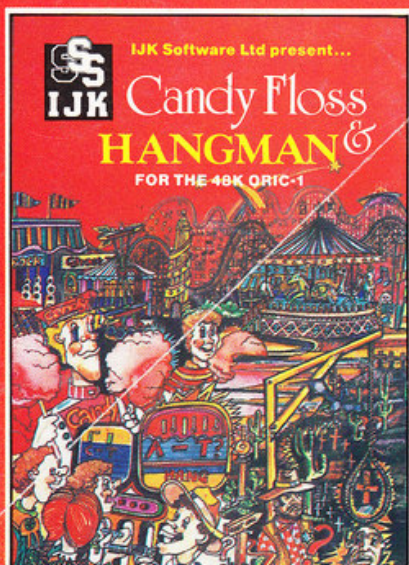


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0473 59181.
MICROSTYLE
47 Cheap Street, Newbury, Berkshire. 0635 41929.
COMPUTERS FOR ALL
72 North Street, Romford, Essex. 0708 60725.
JESSOP MICROELECTRONICS LIMITED
Unit 5, 7 Long Street, London E2 8HN.
01-739 3232/729 1851.
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26 Tottenham Court Road, London W1. 01-580 1328.

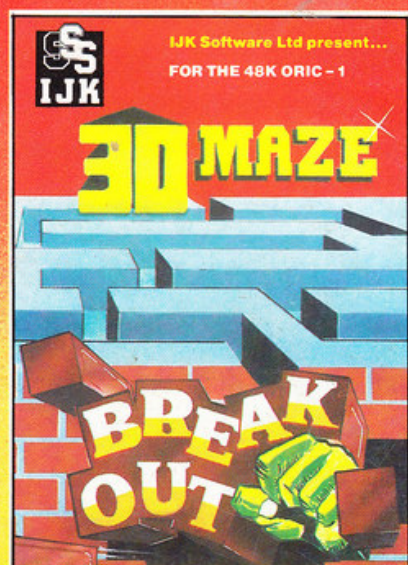
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Nottingham NG10 5BA. 0602 399484/396976.
CARDIFF MICROCOMPUTERS
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0926 29211.
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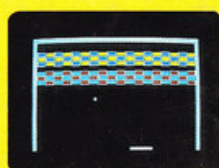
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