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COMPUTER

SEPTEMBER 1985

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Vol. 5 No. 9

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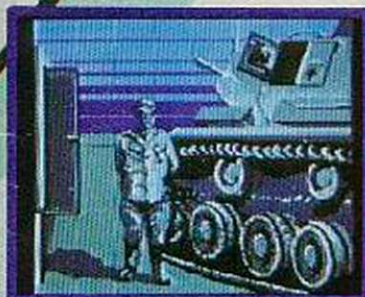
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Graphics - digitiser,
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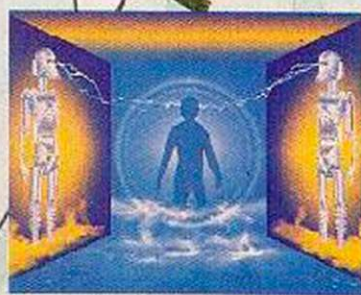
Spectrum Mad Caverns,
Turtles and Pseudodisc

CBM-64 Snake, Macros and Rockfall



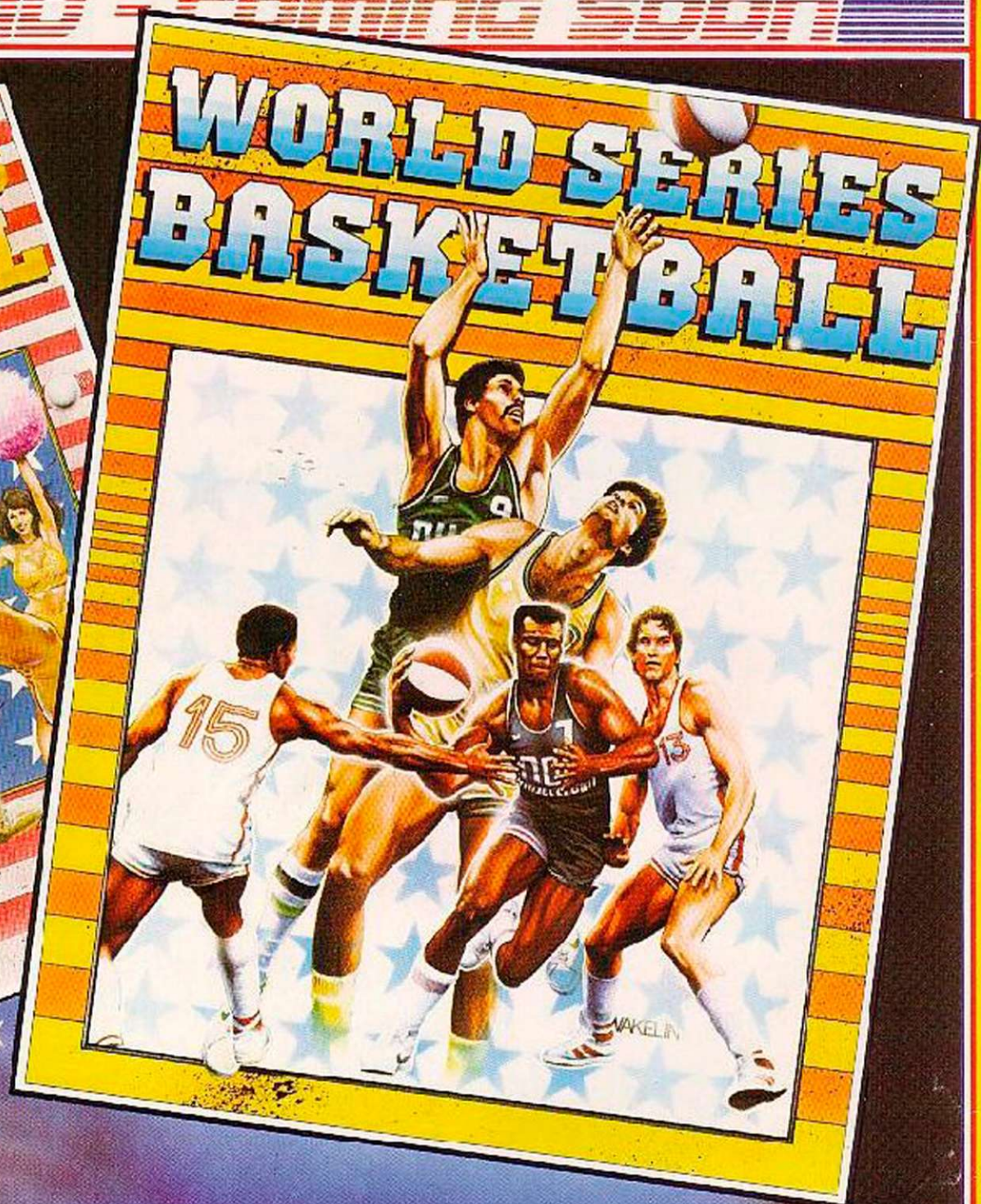
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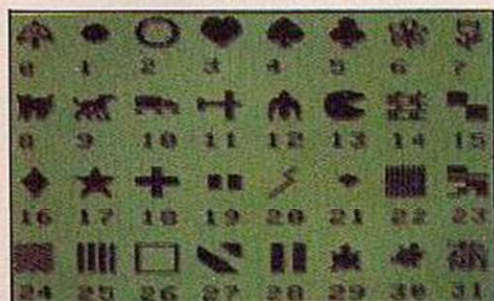
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SEPTEMBER 1985



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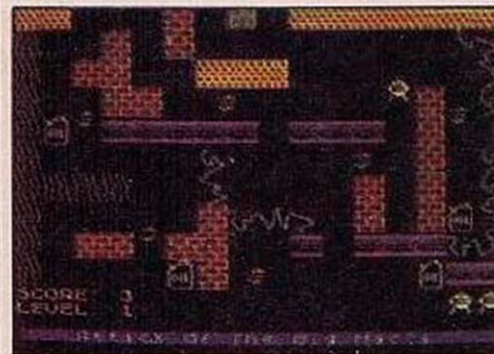
Education review: page 51.



Inside US Gold: page 56.



Philips monitor competition: page 63.



Mad Caverns: page 64.

12 NEWS: Eureka — Britain finds a European alternative to MSX; Commodore Amiga launch; Acorn reborn; Sinclair future; CBM-128 price £269; Pi-Man found.

19 YOUR LETTERS: Jumping out of For/Next loops — a professor writes; an enraged reader calls out: Kath to account; something fishy about Micronet 800?

23 SOFTWARE SHORTLIST: Memories of the UN police action in Korea relived in Mig Alley Ace; Frank Bruno and Rocco fight it out; Martex's stunning Highway Encounter.

37 HARDWARE HITLIST: Logotron sprite board for the BBC Micro; and Minor Miracle's modem featuring Databeeb communications package — all the add-ons and more.

39 QUEST CORNER: The classic adventure continues — Melbourne House's Mordon's Quest; roll up for the magical mystery tour with the Beale Quest.

40 AMSTRAD'S BATTERING RAM: Yee-hee! 128K micro plus disc plus monitor and CP/M — all this for only £300. Excited? Simon "Scoop" Beesley certainly is.

43 AMSTRAD 6128 COMPETITION: Win one of the new Amstrad machines exclusively reviewed in *Your Computer* this month. You saw it here first, remember.

44 MUD — MULTI-USER DUNGEON: Lee Paddon plunges into the modem dungeon; your chance to win a MUDpack — map, instructions — all you need to get into MUD.

46 THE LIGHTPEN FANTASTIC — graphics, lightpens, plotters. John Dawson scribbles away and introduces you to all the hardware you need for micro-doodling.

51 EDUCATION — SWOTWARE AND THE PUPIL: Smartest girl in school Josephine Adams delivers an end of term report on so-called educational software.

56 INSIDE US GOLD: Meirion Jones sneaks out with candid shots of Desert Fox, Winter Games, Goonies, Zorro and glimpses an Alternative Reality.

60 SPECTRUM MIRA: Allows you to do something you wouldn't normally be able to do — turns your Microdrive into more of a disc drive with random access.

63 PHILIPS MONITOR: Competition to win a £300 Philips CM-8533 as first prize to make life brighter.

64 SPECTRUM MAD CAVERNS: Karl Jeffery brings you another in our popular unofficial series of games that look like Boulderdash. Ten different screens.

68 KING BURGER: You must deal with a hostile fried egg called Freda.

72 BBC CORE WARS: How to eat programs. Jon Cottrell.

76 CBM-64 ROCK FALL: Paul Hammond brings you a game in which you have to guide a little man around 10 caves, collecting diamonds, dodging rocks. A favourite.

78 SPECTRUM TURTLES: No more need you dream of blue turtles, Ian Collier has put flipper to keyboard and brought you a Logo graphics program for the Spectrum.

80 CBM-64 MACRO-EDITOR: Define simple one-line Basic routines to help in the development of a program. Geoff Hatto's blow to structured programming.

82 AMSTRAD CPC-464 TIMEBOMB: Another Amstrad exclusive. Arnold the Anarchist has blundered in his bomb-planting. C Turner lets you help the cause.

84 TELSOFT: Games on our exclusive modem service this month are: CBM-64 Snakes, Basic Macros, BBC Core Wars and King Burger and Spectrum Mad Caverns and Turtles.

86 CBM-64 SNAKES: Anders Gustafsson unleashes nine screens of ophiuchan chaos, so lay off the rollmops and get stuck into some nice snake and egg.

91 FIRST BYTES: Languages, haywire programs and bluffs.

93 RESPONSE FRAME: Tim Harnell's postbag.

95 SOFTWARE FILE: Ten pages of readers' software; fun-packed programs for most home computers, including the Atari, Amstrad, Commodore, Spectrum and ZX-81.

106 DATABASE: Paul Bond rounds up local, national and international micro events — and supplies a list of essential phone numbers.

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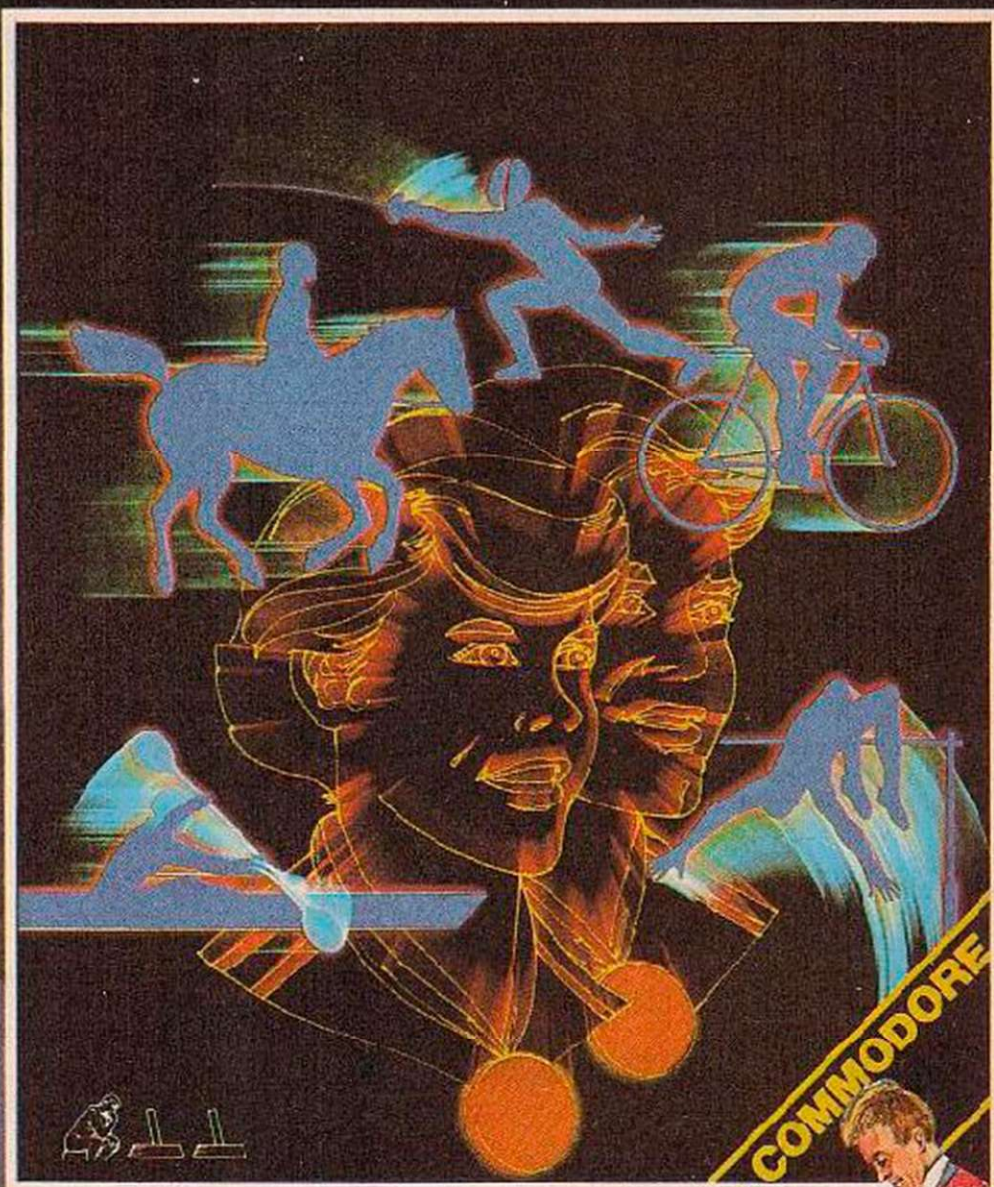
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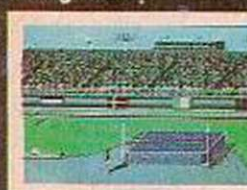
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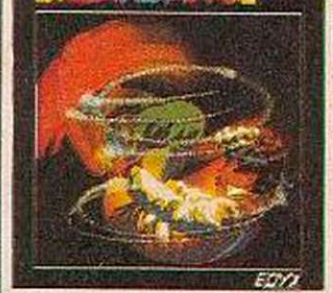
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PROSECUTING SOFTLIFTERS

EX-CHIEF SUPERINTENDENT Bob Hay, billed as the man who helped crack the Iranian Embassy siege, police the Grunwick dispute and quell Sikh unrest in Southall, now faces his toughest case. Software piracy.

He's head of the special unit set up by the Federation Against Software Theft (FAST) to root out infringers of program copyright wherever they lurk. His weapon is the tough new legislation just enacted by Parliament. It will leave software thieves open to punishment identical to the stiff crackdown that hit video pirates a couple of years ago.

If the Copyright (Computer Software) Amendment Act works out as intended, program counterfeiters — already driven out of the video industry — will have to go back to selling Mexican-built "Cartier" watches.

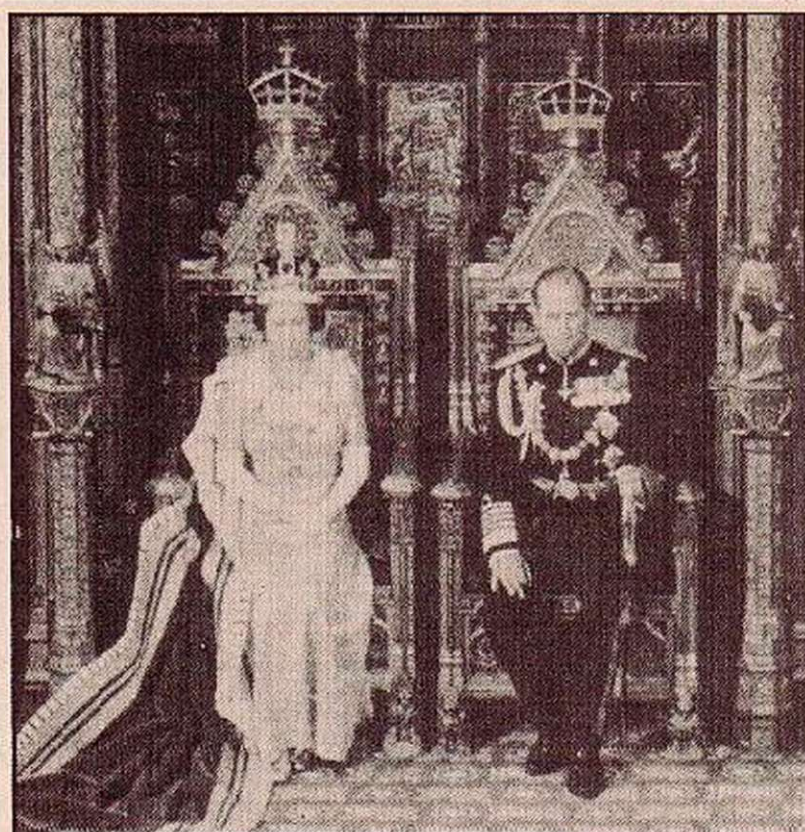
Although the biggest deterrents are reserved for the commercial forgers — up to two years' inside and unlimited fines — anyone selling, exhibiting or even possessing illegal copies could be stung for up to £2,000 or locked up for a maximum of two months, or both.

Thanks to the new Act and the activities of FAST the mood against petty copiers has changed. In last year's anti-piracy campaign software supremo Geoff Brown of US Gold said they should be hanged. Now that the software houses have the power of the Act at their disposal they are aware that the criminal remedy is not always the best option.

People must realise that most copying takes money away from the industry — and that will lead to a loss of software choice and a loss of jobs. In the meantime games houses will have to take whatever action they can to make petty copying as difficult as possible — using protection devices or hardware solutions like Mikro-Gen's Mikro-Plus Interface.

But until computer users become more aware of the damage that making and swapping copies does, it will continue to be a drain on the market. As former Chief Super Bob Hay puts it, the loss of money to producers and retailers is the same whether you shoplift £500 of goods or softlift £500 of games.

Let's hope for the sake of all of us who enjoy computing that the Act will be as effective as its video equivalent. Film companies estimate that video copying is down a massive 60 percent on two years ago.



"It's OK by me." — Royal assent for piracy bill.

P-DAY FOR PIRATES

SEPTEMBER 16 is P-Day. That's the date when the tough new penalties against piracy come into force.

They are the punishment that anyone charged under the Copyright (Computer Software) Amendment Act will face.

The Act became law in July and

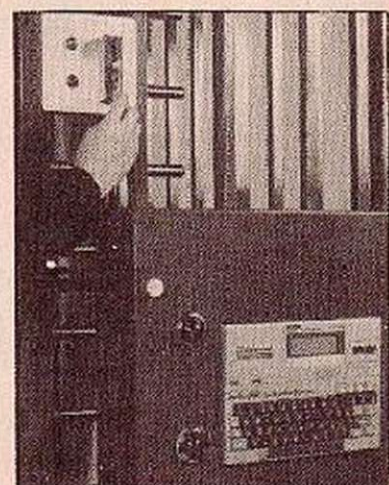
aims to hammer all illegal copying of computer software for gain. Summary offences like selling, possessing or exhibiting illegal copies can be hit with fines up to £2,000 or two months' imprisonment or both. Indictable offences can carry up to two years' prison and unlimited fines.

Late kick-off

DESPITE ALL assurances that tough new measures would be introduced following the Brussels disaster, the football season looks like it will kick off without any computerised anti-hooligan entry card systems in place.

The Sperry identify card system, backed by former-Liverpool star Emlyn Hughes, is now no longer being pushed by the company. Sperry had a good response from soccer clubs — Chelsea signed up for a partial system and then pulled out when it was clear that it couldn't be installed in time. But there's been a complete lack of interest from the football authorities.

With the Government pushing hard for entry systems to be installed, but offering no money to help with the expense, the major



Epson's cut-price entry.

stumbling block still seems to be cost.

One answer could be a low-cost system like PASS UK, Epson's identity-check scheme, based on a HX-20 portable.

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ARRIVA AMIGA!

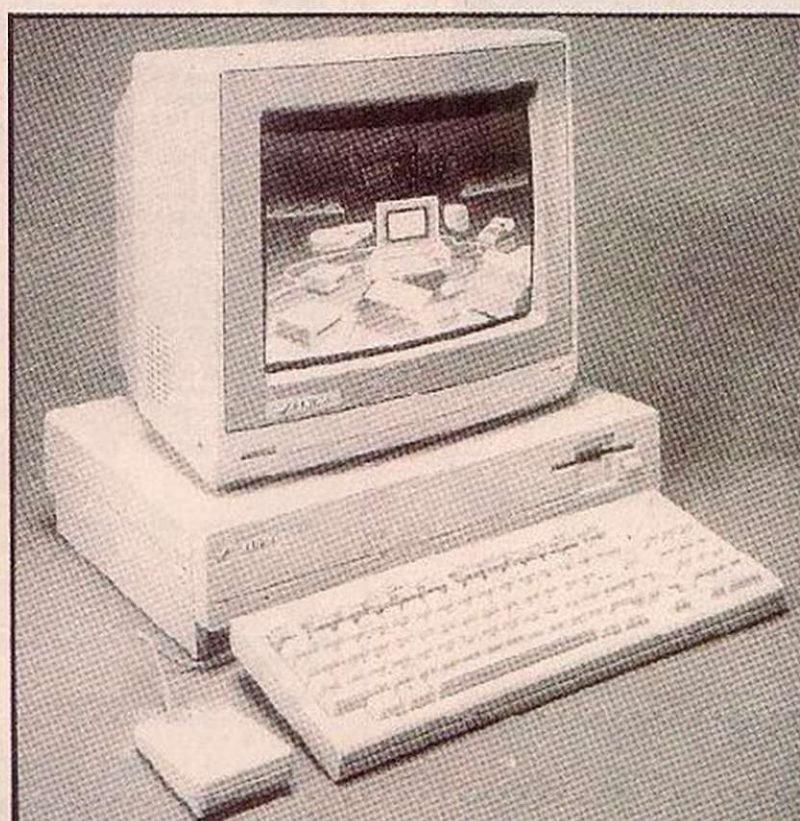
Commodore's 16-blitter

COMMODORE'S ANSWER to the Atari ST, the Amiga, looks like being the one machine everyone will want to own — if they can afford it. Like the ST the Amiga is built around the 68000 processor and has a Macintosh style operating system — written by UK company Metacom — with icons and windows under mouse control.

Unlike its rival, the Amiga is multitasking — it can run more than one program at once. But it is the machine's graphics facility that puts the opposition in the shade. A graphics chip coupled to a high speed bit image manipulator, a blitter, allows the Amiga to draw, shift and transform shapes on screen at a much faster rate than it could with the processor alone.

You can animate figures with just a few lines of code. There are two different types of sprites and a high resolution of 600x200 with 16 colours. The graphics chip is one of the three custom chips that make all the difference to the Amiga. They also give it a very sophisticated sound capability over four channels.

The stock machine comes with



Enter the Amiga.

a 380K 3.5in. disc drive, 128K Rom and 256K Ram expandable to 512K. When it arrives in this country it could cost as much as £1,250. On top of this owners will need to spend at least £300 more on a high res colour monitor. At

these prices you might expect forthcoming software to be mainly business applications. But the graphics potential is so great that software houses are said to be equally enthusiastic about writing games for the Amiga.

Robcom's CBM-64 cartridge speed up

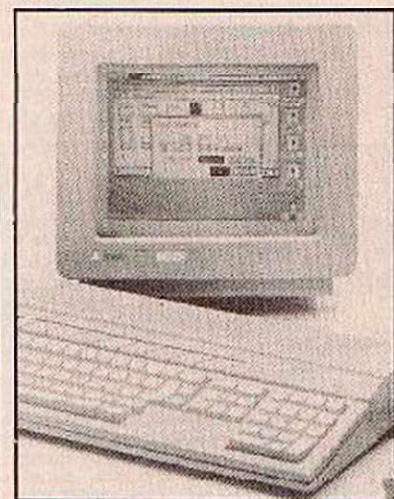
BUY A COMMODORE! On yer bike. Look, you've got to buy a Centronics interface, extra basic, a tape turbo loader and a new disk filing system, I mean, that lot'll set you back nearly as much as the machine itself.

Well, not anymore. Robcom's new range of cartridges contain all this and more without even whipping any of the precious user memory. From the basic package at £24.95, right the way up to the all bells and whistles Turbo 50 at £39.95, these packages offer exceptional value for money.

Atari 260ST Tramiel's back in town

ATARI'S JACK Tramiel is returning to these shores in September with the 260ST. The same month the 520 will go on sale to the general public in a package including computer, 500K disc drive, 12 in. black and white monitor and mouse with Gem Write, Gem Paint, Atari Logo and Atari Basic for £750. Over 100 STs are already being used by software houses like Ocean, Firebird and Llamasoft as they race to be first with product for the Atari.

Jack's sprat — the 260ST.



CLIVE-PLUS IS A TV REPAIR MAN



Has Bill Jeffrey more in store for the Spectrum?

SINCLAIR sources do not deny the existence of a 128K Spectrum with a proper sound chip — the AY-38910 used in the Amstrad, MSX and so on. Meanwhile

Robert Maxwell's takeover of Sinclair should be completed by the middle of this month and a new chief executive — Bill Jeffrey — to replace Sir Clive has been

appointed. Hoover has still not served the writ for £1.5 million against Sir Clive which was issued a month ago in connection with the C5 electric tricycle project.

Bill Jeffrey was head of radar and navigation sales for Mars Electronics until March when he became managing director of Sinclair TV and Communications. Since then the fabled flat screen TV has at last started to appear in the shops in numbers.

Bill Jeffrey would not be specific about future plans for a 128K Spectrum or for next year's portable but he says 'we have very exciting plans for the future with our existing products as well as some new ones.'

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DIARY

SIR CLIVE'S just back from Mensa's annual bash for those who think they are geniuses. At last year's conference he predicted a world in which people would have to retire in their forties. This year he celebrated his 45th birthday with Maxwell taking over his company and Bill Jeffrey taking over his job. I hope nobody said anything about self-fulfilling prophecies.

INFCOM who did so well with Hitch Hiker have started sending out interactive press releases. The first page congratulates you on opening the right envelope and by page 2 offers choices such as — if you are patient proceed to page 3, if you are not logical proceed to page 4. 4 asks if you are really sure you should have done this before sending you to page 3 or 13. 13 just tells you off for not having any patience before sending you back to 3.

TWO OF OUR rival magazines which we will call Unclear User and Crass — have been having a little legal tangle after Crass made an unsubstantiated suggestion that User might give good reviews on the basis of which software houses placed most advertising. User sent a writ winging over to Crass which forced them to rip the offending pages out of all their issues. Fortunate for User that Imagine refugee Bruce Everiss did not force them to rip up their issues a few months earlier when User printed something about Bruce which Mr Everiss and his lawyer believed was damaging. Instead he accepted an apology and a right to reply in the next issue.

A LITTLE BIRD in a software house rings to tell me that he has been rung up by an ad rep from a magazine — not Crass or Unclear User — and offered a colour page of advertising for nearly £1,000. He refuses so the ad rep drops his price eventually to £500 but the little bird will still not book space. The rep pauses for a second then plays his trump card. "All right £450 — and we'll make your program our game of the month."

Elsie Dee

BAILING OUT

Olivetti runs the RISC

ACORN IS STILL alive and kicking thanks to another cash infusion from Olivetti and some spectacular progress from the research and development teams which has produced a cheap fast new 32-bit chip.

Olivetti now owns 80 percent of Acorn under a deal which has cost Olivetti £4 million, the BBC £2 million in unpaid royalties, and Acorn's other creditors £8 million in bad debts. Brian Long will now take over as managing director with Alex Ubaldi helping out temporarily pushing Hermann Hauser and Chris Curry yet further down the pecking order behind Chairman Alex Reid. Brian has been recruited from the Canada Development Investment Corporation.

Meanwhile the stripped down company — down from 450 to 275 staff — has managed to launch a new work station while R&D has announced details of a Reduced Instruction Set Chip.

Companies like IBM have been racing to produce RISCs — which use a small number of instructions in combination rather than having an exhaustive list of specific operations.

This makes the chip smaller — hence cheaper and faster than the



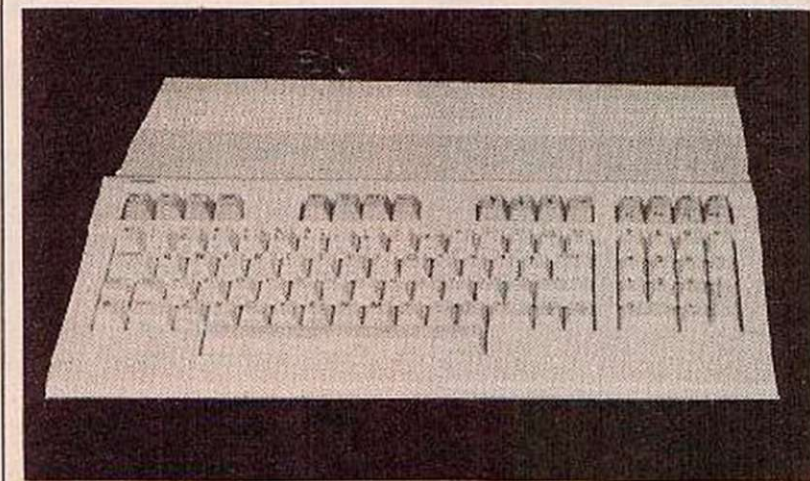
Workstation launch shows Acorn is back in business.

existing 32-bit processors.

It will be some time before can incorporate the RISC technology in future models. At the moment they still hope to be able to sell

BBC E Pluses at over £400 — when Amstrad can sell a complete 128K system including monitor, disc drive and printer for little more.

128 GUNFIGHT AT THE UK CORRAL



Commodore 128 pitches in at £269.

ENTERPRISE is finding Commodore a tough opponent in the 128K micro war. Commodore

is pricing the 128 at £269 and releasing it now with a plan to spend £5 million advertising the

CBM128 as the perfect machine for class of 82/83 who bought a Spectrum or CBM 64 and now want to upgrade.

Commodore is discounting fears that "clever" software which makes unorthodox use of the 64's video chips may not be fully compatible. So far few American software houses are making use of the 128 mode — preferring to write for the 3 million 64s rather than bring out specific versions for the initially small number of 128s. But the real threat to Commodore, Enterprise and Atari in the 128 stakes is the new Amstrad CPC 6128 — (exclusive review page 40) at £300 including drive and monitor.

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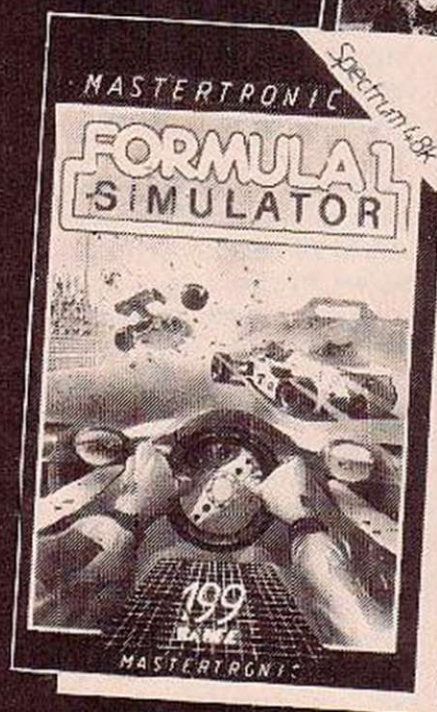
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(Original letters available for inspection.)

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UPDATE

OLD GAMES for new, conversions are a good way for games publishers strapped for cash to make a quick buck or two. They are also nice little earners for the small software houses given the spade work of conversion whilst the original program's authors go on to pastures new.

U.S. Gold is going for the Amstrad in a big way. *Beach Head II*, *Pole Position*, *Up 'n' Down*, *Buck Rogers*, *Congo Bongo*, *Dambusters* and *Bounty Bob Strikes Back* are amongst the games due to have the dust knocked off them. The even older *Beach Head* is opening several new fronts on the Amstrad, BBC, Electron and Enterprise.

Following the success of the Softaid compilation, Virgin has decided to pull together a tape containing a number of titles from various software houses. Called *Now Games*, just to make sure no-one thinks they're buying a compilation LP, it contains *Lords of Midnight*, *Everyone's a Wally*, *Strangeloop*, *Brian Bloodaxe*, *The Arabian Nights* and *Falcon Patrol II*.

Virgin is promising to bring the pzazz and advertising clout normally associated with music compilations to this new venture. They may not be alone in the field for long however. U.S. Gold is also busy compiling.

Virgin has also revamped and relaunched *Sorcery*, bigger and better they say, on the Commodore, presumably with an Amstrad version hard on its heels. This follows up Software Project's successful relaunch of *Jet Set Willy* by cramming nearly twice as many rooms in it. Is this a trend other platform adventure hits will follow?

CCS has converted *Arthen* for the Amstrad. For £9.95 you can go a bridge too far. Also Palace are bringing out *Cauldron* for the same machine. Never one to miss a bandwagon when they see one, Firebird are getting in to the conversion market with old Ultimate hits, *Underworld* and *Sabrewulf*, as well as revamping their Silver range to include some new Isomorphic (à la Alien 8) games.

IRON HEROES

Beyond Superman at Denton

IS IT A BIRD? Is it a plane? You'll be seeing a lot of this sort of thing when First Star's Superman game is released for distribution in the UK by Beyond. But though it's a graphically strong arcade action game, Beyond are even more fired up about the home-grown products.

Sequels are well to the fore — though Eye of the Moon scheduled to retail at £9.95 on the Spectrum has been delayed. The final part of the Tolkien-esque *Lords of Midnight* trilogy, it would have been cast more in the mould of an adventure with less emphasis on strategy.

Follow-up to icon-driven Shacowire is called *Enigmaforce* and features Zark, Sylk, Maul and the lovely Serena — "We put her in because it seemed a bit one-sided otherwise," say programmers at Denton Designs. Set in a complex on Sylk's home planet, it moves beyond mere icon control, insofar as you can do a mindprobe and "become your character", going round the screen performing various tasks. Sounds like a game



Beyond *Lords of Midnight*.

that could really take you out of yourself. Not bad at £9.95 on Spectrum and Commodore 64.

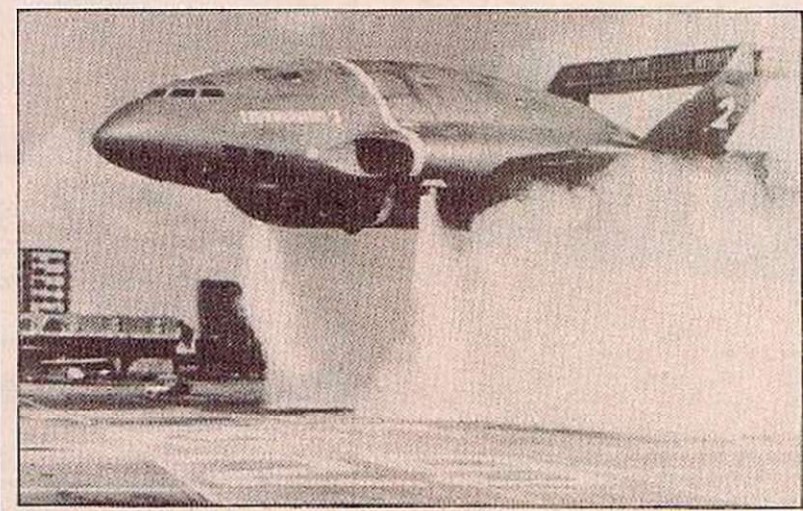
Liverpool trendsetters Denton are also working on a futuristic — and violent — sports game for Beyond, tentatively called *Iron Heroes*. "Rather than take a sport and turn it into a computer game, we took a computer game and

turned it into a sport". The result, an all-action graphic game will also be out at £9.95 for Spectrum and CBM-64, this time on Beyond's new Monolith label.

Billed as a 10-hour Megathon, *Quake Minus One* has certainly got programmers Mike Singleton and Warren Foulkes so bogged down that Beyond have been forced to shelve long-awaited *Lords of Midnight* sequel *Eye of the Moon*. In *Quake*, the Robot Liberation Front demand freedom of thought and association for droids. They seize control of the Titan Undersea Power Station and hold humanity to ransom. With animated landscaping or "Actionscape", Beyond are confident that this game, along with all their new titles present techniques which will set the trend for 1986 computer games.

The game that people in the know are really excited about is *Nexus*, it's even got its own label — called *Nexus*. So good they named it twice, this will be a graphics adventure along similar lines to *Enigmaforce* with digitised graphics and maximum playability.

NO STRINGS ON FIREBIRD



Thunderbirds are go again.

STAND BY for action — Firebird, British Telecom's leisure software house, has bought the rights to '60s TV puppet series *Thunderbirds*. The series is a favourite of Firebird supremos Herbert Wright and Phil Pratt. "It's my

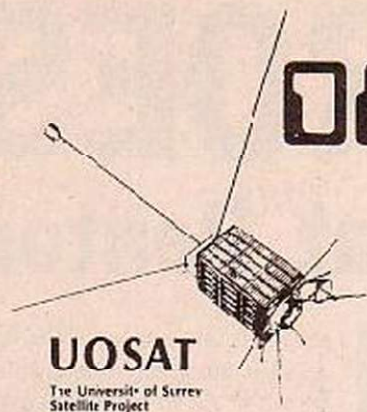
favourite, too", says Gerry Anderson, creator not only of *Thunderbirds*, but *Stingray*, *Supercar*, *Fireball XL5* and, currently, *Terrahawks*. CRL computerised the latter in a small way — "but this is the first major one".

Filmation II the Ultimate sensation

SKELETONS with rotting flesh waiting, prowling — not Saturday night in Milton Keynes but the village of Nightsade, location of Ultimate's new "Advanced Home Computer Action Adventure Simulation". Utilising *Filmation II*, a technique ensuring fast smooth action, the £9.95 game for 48K Spectrum emerges along with Blackwyche for CBM-64.

Novagen's Mercenary

Freedom of choice is the keynote of Novagen's 3D vector graphic games, billed as a cross between *Elite* and *Solo Flight*. But don't let that put you off as word has it that these are some of the fastest-moving wire-frame graphics around as the mercenary searches planet Targ looking for energy crystals.



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POP★ TOPS

TOP 20

1	Hyper Sports	Imagine	Sp
2	Shadow Fire	Beyond	Sp/64
3	Dur Durach	Gargoyle	Sp
4	Way of the Exploding Fist	Melbourne House	64
5	Dor't buy this	Firebird	Sp
6	Cauldron	Palace	Sp
7	Grand National	Elite	Sp
8	Softail	Ethiopia Appeal	Sp
9	Rooty	Firebird	Sp
10	Arnhem	CCS	Sp
11	Desert Burner	Sparklers	Sp
12	Graham Gocche's Test Cricket	AudioLogic	64
13	The Fourth Protocol	Hutchinson	Sp
14	Nodes of Yesod	Odin	Sp
15	The Rocky Horror Show	CRL	Sp
16	World Series Baseball	Imagine	Sp
17	Quackshot	Sparklers	Sp
18	Starion	Melbourne House	Sp
19	Thing on a String	Grimlin	64
20	View to a Kill	Domark	Sp

Source: WH Smith
Sp = Spectrum; 64 = CBM 64

TOP 3 BY MACHINE

1	Rockman	M. Tronic	Vc
2	Doodlebug	M. Tronic	Vc
3	R.I.P.	M. Tronic	Vc
1	Action Biker	M. Tronic	64
2	Kikstart	M. Tronic	64
3	Way of the Exploding Fist	Melbourne House	64
1	Action Biker	M. Tronic	Sp
2	Hyper Sports	Imagine	Sp
3	Fencers Keepers	M. Tronic	Sp
1	Rep'on	Superior Software	Bc
2	Lode Runner	Project's	Bc
3	Revs	Acorn	Bc
1	Airwolf	Elite	At
2	Drop Zone	US Gold	At
3	Brute Lee	US Gold	At
1	Sword of Destiny	Grimlin	16
2	BMX Racers	M. Tronic	16
3	Airwolf	Elite	16
1	Rep'on	Superior	El
2	Overdrive	Superior	El
3	Football Manager	Addictive	El
1	Mordons Quest	Melbourne House	Am
2	Dur Durach	Gargoyle	Am
3	Rocky Horror Show	Computer Rentals	Am
1	Fencers Keepers	M. Tronic	Ms
2	Chiller	M. Tronic	Ms
3	Crazy Golf	Mi Micro	Ms

Source: Websters Software
Vc = Vic 20; 64 = CBM 64;
Sp = Spectrum; Bc = BBC;
At = Atari; 16 = CEM 16;
El = Electron; Am = Amstrad;
Ms = MSX.

"GOOD VALUE"

YOUR NEWS story in the June issue about the new Acorn BBC B+ complains at the £499 price tag but if you consider what you get for £499 it is a different matter:

BBC Micro Model E	£330
Aires B20 Board	£100
Ram Expansion Board	£ 55
Acorn DFNS 1.2	£100
TOTAL	£585

Your basic BBC B has five Rom slots of 16K each, whereas the BBC B+ has six Rom slots of 32K each giving an extra 112K of Rom space! However in the BBC B you lose two 16K Rom slots for the Basic and O.S. Roms leaving you with only 48K of Rom space. In the BBC B+ you lose one 32K Rom slot leaving you with 160K of Rom space! Secondly, the DFS is the new 2.1 version with a 1770 controller chip. There is also an extra 12K of Ram spare which nobody at Acorn can decide what to do with, but no doubt somebody will find a use for it.

Buying a BBC+ saves you £85 on the price of upgrading a BBC B. This must be considered a bargain and not, as one reviewer claimed, £170 for an extra 32K Ram. I give it an A+ not a D-!

Chris Armes,
Stockport,
Cheshire.

MICRONETTING

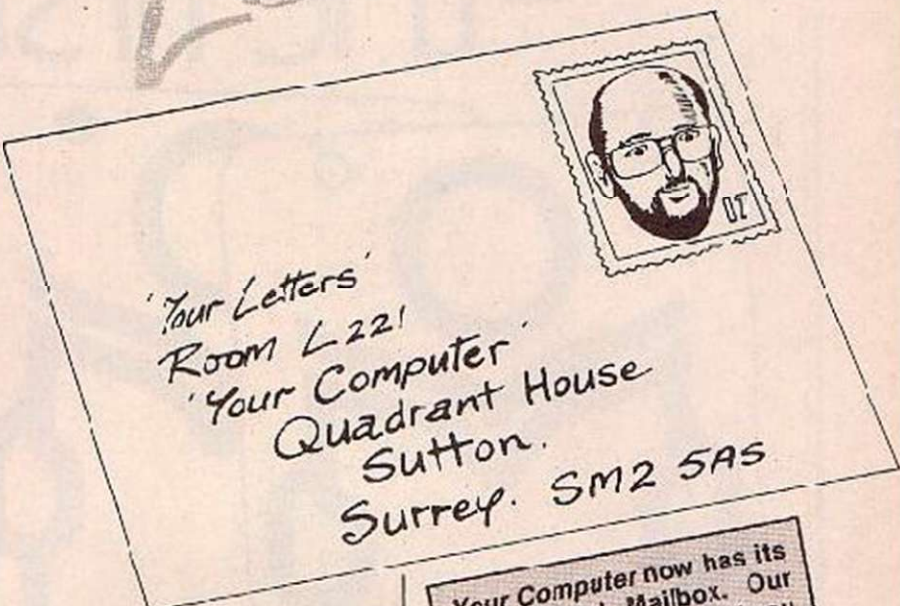
I RECENTLY WON a Prism VTX 5000 Modem in a competition organised by British Telecom. Since then the strings of G.T.'s Micronet 800 have been slowly but relentlessly closing around me.

It is true that by using the downloader program published in *Your Computer* I have been able to receive a number of excellent programs on your Telsoft service. But where do we go from there? To download six programs took less than an hour, even though it was spread over two days because of the staggered transmission times. Now I can expect, at most, two or three new programs each month from Telsoft. This would mean that the modem was used for about five or six hours each year.

So why not join Micronet 800? "One pound a month and the cost of a local telephone call" is B.T.'s advertising slogan. What is not mentioned is the fact that you must take out a year's subscription which is subject to V.A.T. As a youngster, some years ago, I was persuaded by a man on the local market into paying half-a-crown for an envelope into which I had seen him place a gold watch. It turned out that my envelope contained a packet of razor blades worth six old pence. Since then I have been very wary of people who want to sell me something without letting me see it first, particularly when it is going to cost me £59.80 plus telephone charges.

So who needs Micronet 800 when there are all those independent bulletin boards waiting to welcome me? Surely the VTX 5000 instruction manual would give me the information I required? Oh dear! The manual deals

YOUR Letters



exclusively with accessing Micronet 800. The answer was obviously to write to Prism and ask for more details. Just to be sure I also wrote to the firm Modem House who were advertising user to user and bulletin board software for the VTX 5000. The day after sending the letters I read that both the manufacturers of the modem and Prism were defunct and that Modem House had taken over the distribution. So what arrived through the post from Modem House? Yes, you guessed it, more advertising material for Micronet 800.

A visit to the local library provided a list of bulletin board telephone numbers and the disturbing information that most of them operated on a 300/300 baud system. The VTX 5000 operates on a 1200/75 system. I also found that I would need special software and would in some cases have to pay to access the 1200/75 system that existed. What is more most of these operators seemed to be located at the other end of the country. What price the "cost of a local call"?

R. Houlton,
St. Helens,
Merseyside.

"QL IS OK"

HAVING JUST READ the July edition of *Your Computer*, and flicked the pages to the Atari review, I have a question to ask. Quite simply it is: Why does Kathleen Peel despise the QL? Since this excellent machine appeared on the market, she has been giving the machine a hell of a slating. In any reviews or comparisons of machines in your magazine, I have always been impressed by how fair the writer has been in picking out the good points, but also the bad ones. Kathleen Peel, however, seems to be extremely happy to pick out only the bad points of the QL. For example, in the review in the July 1984 edition:

"... loading times, these figures are

Your Computer now has its own Prestel Mailbox. Our number is 019991800. If you have any program enquiries send us a message. We will try and give you an answer within a few days.

in no way good enough". "There are a number of notable omissions from the list of keywords, the ones I found most irritating were On Error and Rename". "The output was extremely difficult to format..."

The list could go on and on, but these are just three. I have chosen at random. In the Microdrive loading times section, she said that the Microdrives were just not comparable with disc drives. This is a rather stupid statement as Microdrives are only designed to load and save programs faster than cassette! All "tape drives" are slower than discs! As for the omissions of the two keywords, all I can say is "so what?". I use a Beeb at school for my A level computer science course, and I have only used "On Error" a handful of times and "Rename" only once. Their omissions from the machine appears to me as being no great loss.

In the Atari review, she says in the Opposition box: "Adequate software". "Adding a black and white monitor and 512K Ram expansion takes you up to £800". "On that basis, not worth thinking about".

Good God! She rates machines such as the IBM PC, Apple Macintosh and Apricot FII higher than the QL! How on earth can you compare a £400 machine with those costing over £600! OK, I admit it, I myself think the Atari ST range will be tough competition, but it has taken Uncle Clive's QL to give the computer industry the kick in the groin needed to get home computers out of the old 8-bit forest. Let's all face it, if the QL had been an 8-bit machine, the new STs and the Commodore Amiga would probably be
(continued on page 21)

IN ★ TOUCH

How to write for Your Computer

We called this magazine *Your Computer* precisely because we welcome your views, tips and hints and even your criticisms of machines and software in general. Here's how you go about getting your name into print. Your article should be typed, double-spaced, on A4 paper. A name and address on each sheet would help. Don't forget to tell us which machine it runs on. With programs please include a cassette or disc and some indication of how long it is. Please put what machine it's for on the envelope. Don't forget full instructions to us how to load and list your program and how to enter it for the readers.

The article must be submitted exclusively to *Your Computer*. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

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Telsoft is *Your Computer's* software downloading service. Any program for the Spectrum or the BBC — and soon the Commodore — which has a telephone symbol next to it is available on the service. Both 1200 and 300 baud speeds are catered for. For more details call Colchester (0206) 8068. No more lonely nights typing in endless pages of hex digits.

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(continued from page 19)

8-bitters also. I do not as yet own a QL, but I am considering it among a list of others, and so far it is top of the list.

What I would like to read now is Kathleen Peel's review of the BBC B+. Almost certainly it would be along the lines of "excellent value for your £500. On Error and Rename commands supplied, 54K Ram, built in DFS".

It would probably not mention the fact that at £399 the existing BBC B is considered over-priced, nor the fact that the machine is still 8-bit, nor the fact that some existing disc-based games may not run because of a difference in the chips used.

If it weren't for Uncle Clive and his innovations, we'd all be sitting out here waiting eagerly for the sixteenth "—" version of our 8-bit machines, wishing someone would be brave and go into 16 or 32 bits for a change...
Colin Grant,
Newcastle upon Tyne.

HATCHED FILL

THE HATCH FILL routine for the Spectrum, in the August issue of *Your Computer* by A.J. Renton, is a very useful routine. I would like to point out that it is not necessary to use the first User Defined Graphic each time.

The routine uses the byte value at address 23675 which points to the first UDG — see manual — and is normally set at 38. By Poking this address with another value the routine can be made

YOUR Letter

SPRITE DESIGN

In R. Newman's Spectrum Sprites program that appeared in the June 1985 issue of *Your Computer*, there is a sprite designing program. Unfortunately, due to the use of the In command, it has been rendered unusable by model 3 owners. Up until now that is. The secret is to take 64 from any .in results. Therefore to alter the sprite designer to run on a model 3 Spectrum.

Line	Appears in	Change to
	Frog as:	
3060	255	191
3065	251	187
3080	251	187
3080	243	179
3080	235	171
3085	254	190
3090	239	175
3100	251	187
3105	247	183
3110	239	175
3115	243	179
3120	235	171

For example:

3100 If a = 251 THEN LET X2=X1+(X1 15) should be
3100 If a = 187 THEN LET X2=X1+(X1 15)

Jon Ross,
Bognor Regis,
Sussex.

to use any of the UDGs. The value Poked needs to be divisible by eight to capture the first byte of the UDG but intermediate values may be Poked to vary the choice of patterns. For example

POKE 23675,93

will produce a hatched pattern using the last three bytes of graphic "A" and the first five bytes of graphic "B".

Extra patterns can be produced by calling the routine more than once with 23675 Poked with different values each time. As an extra bonus any eight byte sequence in the Spectrum memory can be printed as a pattern by Poking 23675 and 23676 with suitable values to point at the required address.

To avoid complications reset the variable area to normal when not using the Hatch routine, i.e.

POKE 23675, 88: POKE 23676, 255.

Keith Selby,
Old Coulsdon,
Surrey.

A CHILDS' VIEW OF LOOPING THE LOOP

I SIMPLY cannot let Geoffrey Childs' letter in the July issue stand uncorrected.

The first thing that a beginner should learn about loops is that you should not jump into them. Jumping out of them is not only legal but often necessary, as when searching an array for some target element.

It is true that many versions of Basic cause problems when one jumps out of a loop. However, this is a bug in Basic — see my article, "A Bug in Basic", which appeared in the American magazine *BYTE*, January 1981. It is not in Fortran, Pascal, C, or other higher-level languages.

The line L = 10 which Childs cites is a line which, although it is allowed in Basic — which does not check such things — violates a rule of almost every other higher level language; namely, that in a loop for "variable" from "minimum" to "maximum" one must not change the values of either "variable" or "maximum" inside the loop; if one does, then unpredictable behaviour may result.

If you have a version of Basic with the bug, the best way to avoid it is to "write out" your For

loops without the For statement. That is, instead of

For I = M TO N:code:NEXT I,
write

I = M:"label" code:I = I + 1:IF
I <= N THEN "label".

Instead of

FOR I = M TO N STEP J:code:
NEXT I

write

I = M:"label" code: I = I + J:IF
I <= THEN "label".

It's true that if you do this you are using an extra Goto statement. But if you're avoiding Goto statement, use Pascal in the first place, or Simons Basic.

Douglas Maurer,
George Washington University,
USA.





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Creating Arcade Games on the Commodore 64 by Robert Woolford (ISBN 0 907563 75 9) is £7.95, and is available at most book and computer stores, or directly from the publishers, post free.

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Interface

Star★ chart

KEY

- ★★★★★ Best of its type
- ★★★★ Very good
- ★★★ Good
- ★★ Average
- ★ Below par

Frankie Goes To Hollywood

CBM-64
Ocean
Adventure
£9.95

★★★★★

Extensively previewed in our June issue, the game has deigned to come on to the market at last, but it's just as good and revolutionary as when we raved about it last time. You have to solve a murder mystery and strive to become a complete person. The music is excellent and the use of window graphics is superb. Frankie Goes To Hollywood may be last year's model as a band, but the game will definitely run and run.

Repton

BBC
Superior Software
Arcade Adventure
£9.95

★★★

Just as every Western is said to be a variation on one of seven basic plots, so new computer games usually just ring the changes on a handful of familiar game concepts. Repton is a case in point. It contains elements of Dig-Dug, Boulderdash, and maze games, wrapped up in an arcade adventure format.

The game is also on an impressively large scale. There are 12 levels and on each the screen scrolls in four directions over an area 16 times its size. You have to tunnel through the earth collecting diamonds. But as you do so you dislodge boulders which invariably tumble down to trap you or seal off a vital passage.

Fortunately at any point in the game you can consult a map.

All these features add up to produce a highly playable game.

SOFTWARE

Mig Alley Ace

■ CBM-64
■ U.S. Gold
■ Simulator
■ £15

★★★★★

THERE'S ONLY one thing better than blowing away a computer-controlled plane and that's blowing away a plane controlled by a human opponent. Introduce the element of competition in a computer game, and you're on to a winner. No more arguments about high scores made at one in the morning after five hours play, in Mig Alley Ace reputations are made where it counts: head to head.

The game is all about air combat over Korea. The name comes from the area between the Yalu river and the 38th parallel; it was a place where a pilot picked his fights carefully, if you didn't like the odds, you get the hell out, at least the pilots that survived did.

In the game, the screen is split into two, each half giving an out of the cockpit view with some rudimentary instruments. Each player uses a joystick to control his aircraft, plus keyboard controls for throttle and bail out.

There are three different ways you can play the game: single player for practice, two player co-operative or head to head. You can add computer controlled aircraft to taste: if you're feeling sadistic you can gang up on the computer two to one. After you've decided the sides, there are five



Mig Alley Ace: split screen gives twice the action.

scenarios to choose from including choosing bombers, fighters or transports, altitude, night or day.

Each side starts off with three lives, which are lost if you crash, get shot down or bail out unsuccessfully. You get points for planes shot down depending on the difficulty level you set yourself: the harder the task, the more points you get. So much for the bald facts, what's it like to play? My favourite is head to head with an extra computer controlled wingman each.

The game makes no pretence of simulating flying a Sabre or Mig, it concentrates on the all-important matter of getting your opponent in your sights and keeping him there long enough to

blow him away. Whilst not detailed, it is superbly accurate. From tight turning on the edge of a stall to aiming off with your cannon to allow for gravity and the enemy's movement.

It's unfortunate that player one can only operate his throttle if player two is prepared to let go of his joystick.

Another problem is getting used to the way other planes are displayed. This is fairly rudimentary and is based on their respective ranges and attitudes.

This is a game that will instantly appeal to the simulator buff. For the novice, it's going to be a rough, one-way ride to oblivion, at least to start with. But persevere, and find out if you've got "the right stuff".

... BEHIND THE SCREENS ... BEHIND THE SCREENS

IF YOU'RE LOOKING for a flight simulator, then look no further than Microprose. A small outfit set up two years ago, they've built up a solid reputation under the driving force of ex-fighter pilot "Wild Bill" Stealey and now have over eight per cent of the U.S. market.

Andy Hollis met Bill when they both worked for General Instrument Corporation and, soon after Bill formed the company with Sid Meyer, Andy started moonlighting for the company, working on Mig Alley for the Atari. "I first got interested in computers at college whilst majoring in mathematics. I got an Atari video console and really got hooked on Breakout. It's been downhill ever

since. Mig Alley was always a compromise between realism and playability.

"I wanted it to be fun to play but still make the fighters handle accurately. I used plenty of ideas from Sid Meyer and his work on Hellcat Ace."

Andy Hollis: "It's been downhill ever since."



But Mig Alley was a far greater challenge — over three times as much mathematics was required to get the planes moving relative to one another. "My current favourite game is the one I'm working on right now. It's called Gunship. I really don't get much time to fool around with the other stuff that's on the market." Gunship promises to break new ground in simulator graphics with realistic motion of buildings as you skim along the tree tops.

Andy wouldn't reveal if he'd ever succeeded in shooting down his fighter pilot boss but then it pays to let your company president win now and again.

Lee Padden

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Star★ chart

Southern Belle

Spectrum 48K
Hewson Consultants
Simulator
£7.95

★★★★

The golden age of steam is dragged kicking and screaming into the digital age of the micro. All aboard, the whistle blows, and the mighty Southern Belle pulls out of Victoria on its way to Brighton with you at the controls.

You take the part of an engineer, with the computer holding your hand to start off with; as your confidence grows, you can take on harder and harder runs, and use more of the controls. What will make this game a huge hit with the steam fraternity is the "chrome", with perspective line drawings of all major trackside features. Unique idea, superbly executed.

War Zone

Amstrad
CCS
Wargame
£7.95

★★★★

Capable conversion of the Spectrum game, abstract war game, you versus computer with artillery, tanks and infantry. Move, fire and melee in an attempt to invade the enemy heartland before he does the same to you.

April Showers

BBC
Bevan Technology
Dodge about
£2.50

★★★★

You are a cloud — well, why not. Your task for the day is to avoid evaporating by crashing into other clouds and raindrops, whilst keeping a delicate little bloom from wilting under the barrage of the hot sun and hordes of umbrellas. If you manage to fend off the offending umbrellas, on to the next day. The graphics are colourful with some nice touches, like the pair of eyes in the cloud which look in the direction it's moving.

Beach-head II

■ CBM-64
■ US Gold
■ Combat simulation
■ £14.95

★★★

STORIES FOR BOYS — in the tradition of War Picture Library comic books, the soldiers in this follow-up to US Gold's blockbuster Beach-head cry "Argh!", "I'm hit!" and "Medic!" when they get blown away.

Beach-head II is a two-player game, which you can play against another human, or the computer.

The first scenario, "Attack", pits a detachment of chopper-borne paratroops versus the dictator's machine gun emplacement. If you are in command of the attacking force, you start off controlling the helicopter. Make sure you don't come in too low, or you'll kill your troops when you drop them — this is done by pressing the fire-button. They hide behind a wall with three gaps in it. Both sides of the gaps flash periodically, and if you hit the fire-button, troops move out in pairs from that side. Usually one soldier seems to be under your control, while the other has a mind of his own, and acts as a decoy.

One man may throw himself over the second wall while another emerges from the sole central gap in this wall to make a frontal assault

SOFTWARE

Shortlist



with hand grenades.

In the second scenario, "Rescue", some pretty bizarre things appear to be going on, but basically, if you were in control of the troops before, you should now have control of the machine gun emplacement. Your job is to cover your hostages as they escape from the Dictator's fortress.

The third scenario "Escape" involves flying a helicopter up a roadway with things firing at you.

An enjoyable game which should keep the kids away from tearing the legs off insects or teaching the cat to fly, but for my money the first scenario is the one which will get played most. £14.95 on disc, £9.95 on cassette.

Paul Bond

Great American Cross Country Road Race

■ CBM-64
■ Activision
■ Road racing
■ £9.95

★★★

THIS MAY BE THE computer game with the longest name in the world. It may be, as one American newspaper has it "Cannonball Run on a Home computer". Burt Reynolds may have his doubts. At first glance the main game is a little like Audiogenic's Talladega. But there is plenty of geographical and chronological variation — it gets darker as the day wears on, and some nice additions.

You can, for example, race from San Francisco to Washington, Los Angeles to New York, Seattle to Miami, or there is even a U.S. tour. Once you have selected a route the map screen pops up, allowing you to check where you're going and what the weather is going to be like. So if you drive up on the Range, Minnesota way, you tend to



Longest race: longest name.

get snow, but other scenarios take you through desert and plains.

You have a certain amount of time to complete each leg of a race. If you go too fast you attract the attention of the highway patrol and get flagged down. Also you must keep your eye on the gear shift: as the RPM increases, the car's engine whine gets higher — if you let the tachometer reading get too high without slowing down and shifting gears — the engine blows, and you have to "push" it to the next gas station, using the fire button.

The facility to down-load games so that you can build up a file of fields to race against is a nice touch. A nasty touch is that it's very easy to drive past gas stations you really wanted to stop at. People playing the forthcoming European Road Race from the same company will doubtless have a "Sacre bleu!" option for this eventuality.

Paul Bond

Juggernaut

■ Spectrum
■ CRL
■ Truck simulator
■ £7.95

★★★

TIME TO dig out them Farin Young records and settle down to a little silicon truckin' on the Spectrum. Believe it or not this is an articulated lorry simulator. Better yet, it's icon-driven.

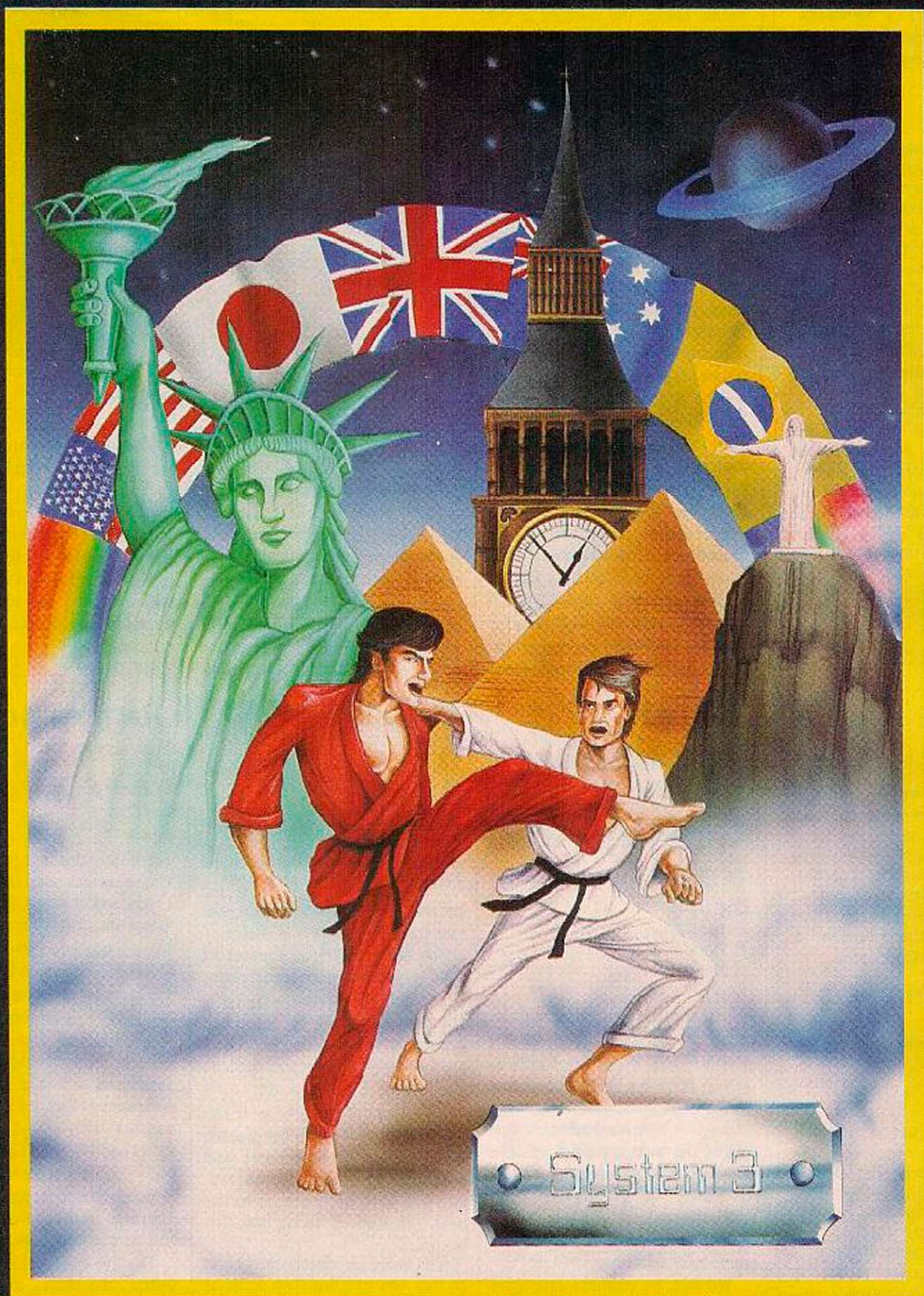
The entry screen is divided into two sections — driving information at the top and five icons at the bottom. The driving display has dashboard data like fuel, speed, distance travelled and time elapsed, together with a stylised steering wheel and joystick. There are some traffic lights represented here, too — points are given against you for jumping traffic lights, speeding and damage done to the lorry.

The five icons enable you to re-define the keys, see hi-score, practice, change the size of your lorry or just drive.

A nice idea, could have been more smoothly implemented for this price, and a third and a fourth gear would have made it a useful driving simulator. But still, loads of fun, so keep on trucking, CRL.

Paul Bond

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Star★ chart

3D Voice Chess

Amstrad
CP Software
Chess Game
£12.95

★ ★ ★

Amstrad conversion of successful Spectrum game, this version also features "speech" and a 3D perspective view of the game like the recent Ps on QL chess game. After you've turned the sound down to get rid of the speech, it plays a competent, if rather uninspired game. Book openings, hints and editing are available with seven levels of play.

Grand Prix Rally II

Amstrad
Amsoft
Motor racing
£8.95

★ ★

On a planet long ago lived a race of people so amazingly primitive they thought Pole Position was a really neat game. Well, this is worse. Take Pole Position, throw out most of the scenery, most of the cars, the smooth scrolling and the time/speed display and you get the idea of this one. Only for those sincerely desperate to burn some rubber on their Amstrad. One shudders to think what the first bite at the cherry must have been like.

Cryptomania

BBC B
Black Knight
Arcade type adventure
£6.95

★ ★

Armed with a laser, you traverse a crypt's tight-fitting passages in search of four keys to freedom. However, there are more complex crypts and hideous nasties beyond which they'll try their best to hinder you. The graphics are clear but simple and a little originality would have helped, but interesting to play if only to find out what's in the next crypt.

Rocco

■ Spectrum
■ Gremlin Graphics
■ Boxing simulation
■ £7.95

★ ★ ★

"I COULD HAVE been a contender!" you may feel tempted to echo Marlon Brando's words in *On the Waterfront* as you stumble bloodied but unbowed away from the keyboard.

Not exactly good clean fun, Rocco consists of punching four different boxers in your struggle to become champion of the world. The graphics are excellent, even if it is a little disturbing to see this sort of thing portrayed in such gruesome detail. However, this game is certainly a feather in Gremlin Graphics' cap.

The game, originally produced by Dinamic Software, has fallen foul of Sylvester Stallone insofar as it was originally named Rocky — but you don't argue with copyright or Rambo, it would seem.

To beat your opponent, you must knock him down three times. So much simpler than the comparable Frank Bruno game and much more satisfyingly brutal for those used to having large amounts of sand kicked in their faces.

Paul Bond

Frank Bruno's Boxing

■ CBM-64
■ Elite Systems
■ Sport simulation
■ £6.95

★ ★ ★

YOU CAN DUCK, dodge left, dodge right as well as landing right and left punches on your opponent's jaw. When the KO sign is flashing you can land a right hook/uppercut depending on whether your guard is up or down. Whether you make body blows or head blows is determined in the same way.

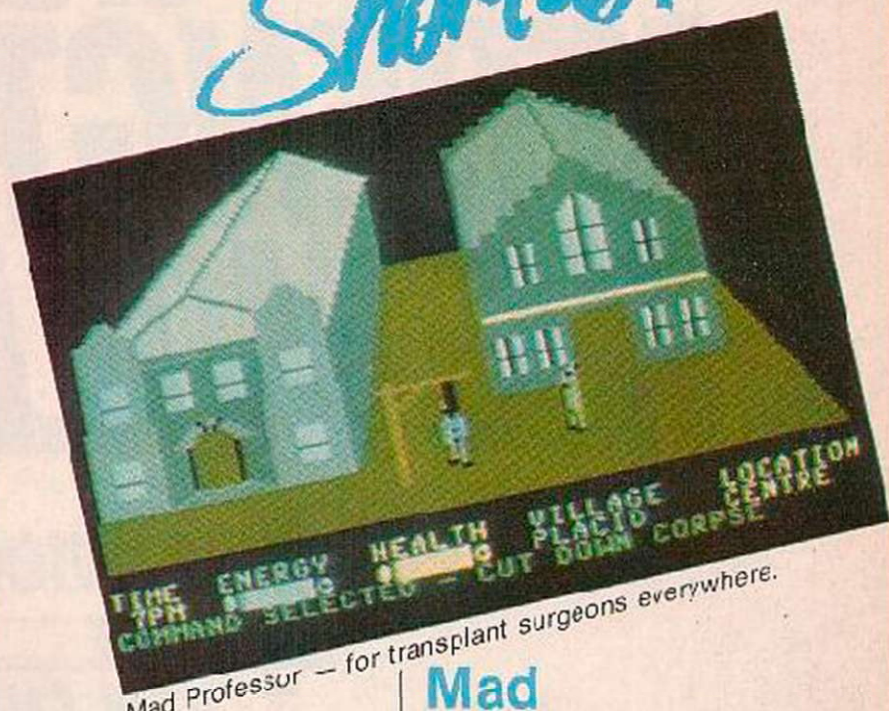
All of which makes Frank Bruno's boxing technically a more sophisticated game than Rocco, the other contender in the boxing stakes this month. If you win the bout you get a secret code which enables you to go on and load in the next boxer. You have to take on

Frank Bruno: Well, Harry...



SOFTWARE

Shortlist



Rocco: Don't mess with Rocky



eight boxers as opposed to the four in Gremlin's Rocco in order to become heavyweight champion of the world. Each of the boxers has a different fighting style.

Yet somehow the game doesn't succeed graphically in the way Rocco does. Punches don't produce the same squelching effect on your opponent, and your first opponent the Canadian Crusher, could be anything from a gorilla to a barrage balloon.

The screen is divided into two main sections. The upper half shows fight time, score and bonus — together with Bruno's status. The lower half shows a perspective view of the ring. It's fairly easy to defeat the Canadian Crusher, sometimes you can knock him out with just left and right jabs. I'm not totally convinced about the difference between head blows and body blows. It seems to be largely a random piece of luck if your blows have any effect.

The eight boxers are all fantasy characters laden with boring old national stereotyping. Ravioli Mafiosi (Italy) knows all the dirty tricks and uses them without a care in the world. That's not going to endear us to any computer users in Turin, is it?

Paul Bond

Mad Professor

■ CBM-64
■ Creative Sparks
■ Arcade adventure
■ £7.95

★ ★ ★

THIS IS AN adventure game for people who hate adventure games. You don't have to key in a wide variety of commands only to be told that you died of hunger and thirst while still on the first screen. By pushing the joystick forward and back you scroll through the commands necessary to the particular part of the scenario that you are inhabiting. Push the joystick left and press the fire button to execute the command. You'd have to be a real dummy to die on the first screen of this game. The graphics may not be exactly luxurious, but they're a passable 3-D.

You wake up in your castle, Schloss Strudelberg — where you as Franz Johann Blockenspiel the Mad Doctor are free to carry on with your gruesome hobby, reanimation of dead tissue with a view to constructing an artificial human.

There is a map screen showing the layout of the village near your castle: there are six main areas; the castle, the dwellings, Lightning Hill — a good place to zap some energy into your necro-android — the village centre near the police station, the forest and the graveyard.

The aim of the game is obviously fairly unpleasant. Of course you can construct a fair amount of your creature from dead

(continued on page 29)

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Star★ chart

Confidential

Spectrum
Radar Games
£6.95

★★★

Another Quilled adventure, Confidential casts you in the role of a private investigator in a small coastal town.

The adventure has some neat touches. The persistent ringing tone in your office — the Craig Adams Detective Agency — at the start of the game is one. Others include the attractively presented text, with use of some small graphics, and the inclusion of a detailed street map.

You are called out to the home of a woman who badly needs your assistance. Getting there is not too difficult provided you don't try to walk the eight or so miles. Once you've arrived at the distraught lady's house, you'll discover that this is going to be a search for a missing husband.

An enjoyable adventure but not an easy game to solve.

St Crippens

Spectrum
Sparklers
Adventure
£2.50

★★★

Value for money from Creative Sparks again. Their low price good-quality software range now includes a game which might be interpreted as a searing indictment of the effect of government cuts on hospitals. So bad are things at St Crippens that you would rather escape from the hospital than risk treatment. Pursued by nurses, matrons, porters and even creatures from the genetic engineering lab, you must find your clothes so you can slip past the security guards.

Contact with the staff and patients gradually debilitates you to the point where you end up on crutches. Then you die. Simple but well-executed graphics, and dashed tricky to play using the cursor keys.

(continued from page 27)

bodies, hanged men and so on, but sooner or later you will have to knock someone off, take them back to the schloss and dismember them. You can't use too many parts from the same dead body or the resultant thing will be uncontrollable. Best not to knock someone off in a crowded pub because the villagers will attack.

You steer your character around the screen using the joystick, and if you are in a position to attack a villager, the relevant command will appear and if you think it is wise you can start in on a little mayhem. Then you will find it easy to get the command "carry body" and thence back to the castle for a little home surgery. Best to use the underground passage way — there's one from the castle to the pub, for example, otherwise the villagers will cease to be placid.

One you've got your cadaver together and energised it, you present it to the people at the village hall. If you're lucky, the villagers will rave about the thing from the grave and hail you as genius. If they don't dig it, they'll bury you. The game has a potentially monstrous appeal and will be enjoyed by transplant surgeons everywhere.

Paul Bond

Mad Prof: a little home surgery.



Thing On A Spring

CBM-64
Gremlin Graphics
Arcade adventure
£7.95

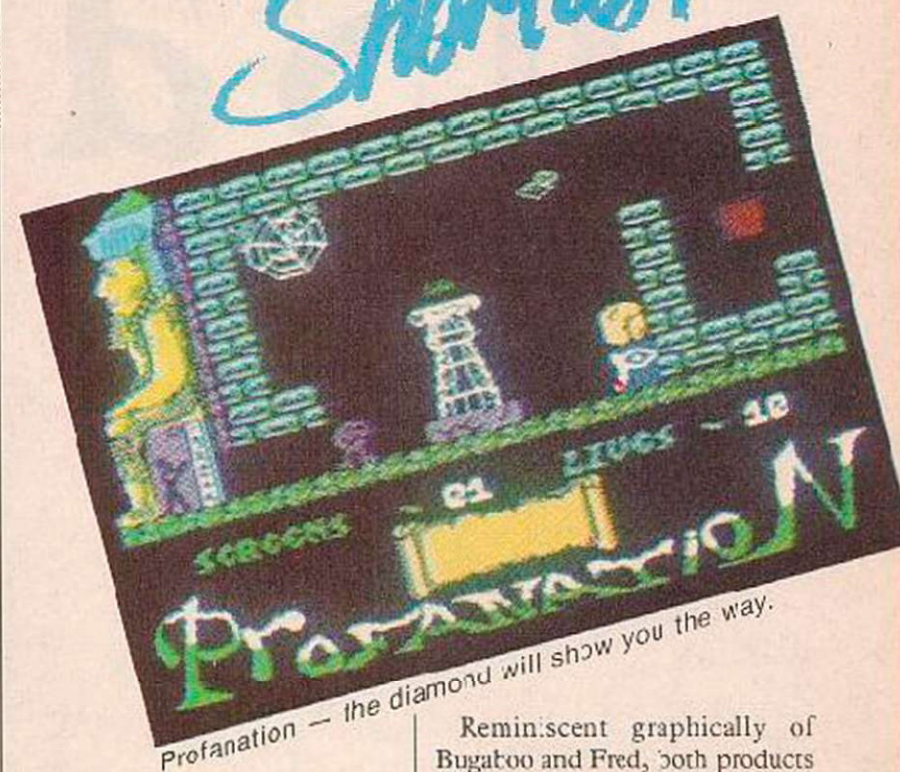
★★★

A REALLY PROMISING program from Gremlin Graphics, showing that with or without Tony Crowther they are capable of still coming up with the goods — maybe not great innovation but still a game that is pleasant to look at and absorbing to play.

Since the Evil Goblin is lousing things up as per usual, our hero — Thing On A Spring — has hopped into the enemy's underground factory to save the world. An appealing little fellow, he has to bounce on and off various platforms and conveyor belts to achieve his goal. But this is no simple platform game-cum-shoot-'em-up.

SOFTWARE

Shortlist

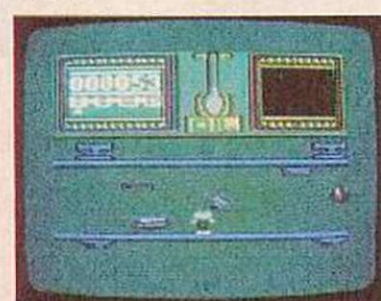


Profanation

Spectrum
Gremlin Graphics
Arcade adventure
£7.95

★★★

PROFANATION is certainly the name of the game here, since the idea of easing you into the game gently is not the idea. So you will be tempted to use all sorts of naughty words as you signally fail to get your little purple blob to jump past the acid drip on the first screen.



Thing On A Spring: catchy tune, now catch the goblin.

In order to use certain parts of the screen, you must first acquire the five control boxes. These take the form of little parcels lying about in fairly inaccessible places.

Apart from this, there are nine pieces of jigsaw to collect. When assembled, these provide the vital clue to the extinction of the aforesaid Evil Goblin.

There are four floors to work through and by the end of the game you should know how to trap the Evil Goblin. Either way the catchy musical soundtrack will be firmly embedded in your brain.

Paul Bond

Reminiscent graphically of Bugaboo and Fred, both products of those immortal Spaniards Paco and Paco, and with names like Victor Ruiz, Florentine Petrejo, Santiago, Morga B and Snarcho on the credits list, we leave you to draw your own conclusions, i.e. they have nothing to do with Paco e Paco except being Spanish. You have to discover the secret of Abu Simbel, the ancient Egyptian temple and free Johnny Jones from the spell.

Since this is just about the most fiendishly difficult platform-style game that you are ever going to meet, or want to meet, you will be doing an awful lot of tooth-gritting. You have to learn that you don't need to stand vertically on top of objects. Wait, calculate and think before you act, hints the program at the beginning — it also hints that "The diamond will show you the way".

This means that on one of the screens there is a diamond. You should note the colour of the gem as at another point in the game you will encounter a screen with five coloured squares on it. You must touch the square that is the same colour as the diamond if you want to progress further. Otherwise things get very profane indeed.

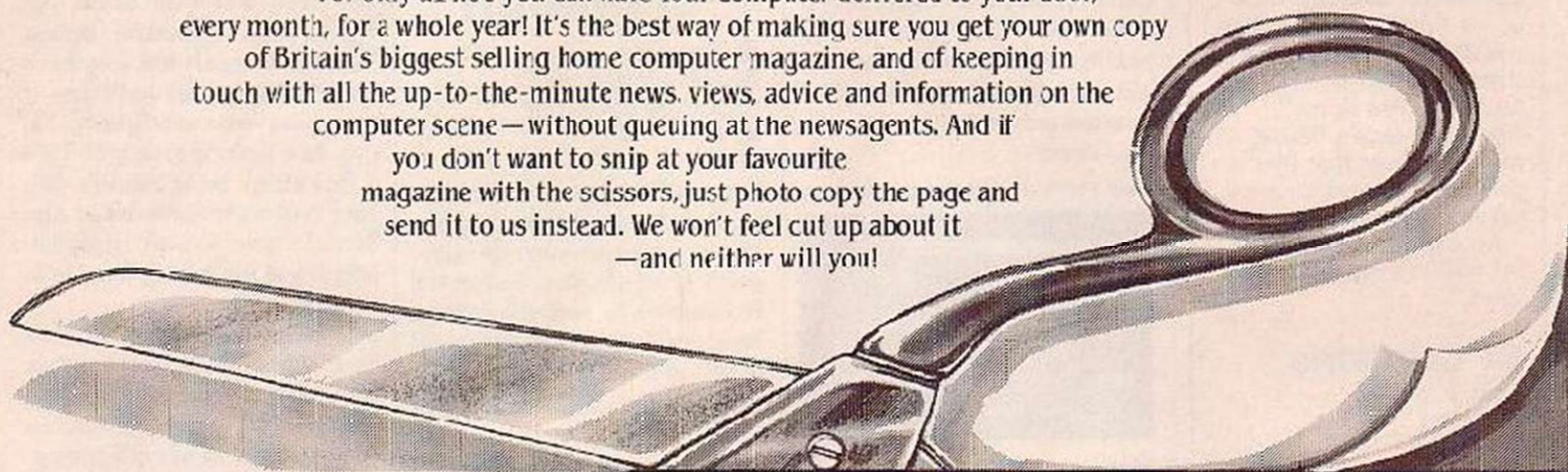
Graphics are pleasantly executed — as you yourself are from time to time — and the purple blob which is Johnny Jones has a whimsical way of looking around and grinning while waiting for the next move. Could be a distant relative of Roland Rat. All in all, one of the best things I've ever had to work in.

Paul Bond

(continued on page 31)

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YOUR COMPUTER

Star★ chart

Paws

Spectrum
Artic
Maze game
£7.95

★ ★ ★

Just when you thought it was safe to change the cat tray — Artic have come back into the games market. In this setting of feline ferocity, you as the top cat have to get all your kittens together before the local dogs attempt a final solution to the caterwauling problem. So you scour the maze looking for the little ones and battling with any dogs you encounter. You can despatch canines by spitting fur balls at them. Not as pretty as Caesar the Cat but might appeal to Spectrum owners whose cats sit on the machine because it is the warmest place in the house.

Glass

Spectrum
Quicksilver
Shoot 'em up
£7.99

★ ★ ★

Stunning graphics, but a prolonged opening sequence of blasting away at different aliens zooming towards you might put some people off. There are, however, three cities to attain. Also the gigantic megaships which crawl across the screen periodically become more numerous as the game progresses. Usual witty comments about what your status in the galaxy should be — like "Commodore owner".

Aabatron

BBC
Bevan Technology
Shoot-em-up
£2.50

★ ★ ★

Good, safe familiar territory here. 20 screens, lots of action, colour and noise, indiscriminate destruction, touching just about anything kills you, variable speeds from boring to suicidal. Good, clean, harmless fun. Mildly addictive and good value.

(continued from page 29)

Highway Encounter

Spectrum
Vortex Software
3D shoot 'em-up
£7.95

★ ★ ★ ★

ZONE ZERO is your goal. You have to take five Vortons there. And they in turn are trundling the world's most advanced weapons system, the pyramid shaped Lasertron in front of them. You have to get past marauding aliens, floating mines and abandoned oil-drums to destroy the invader stronghold.

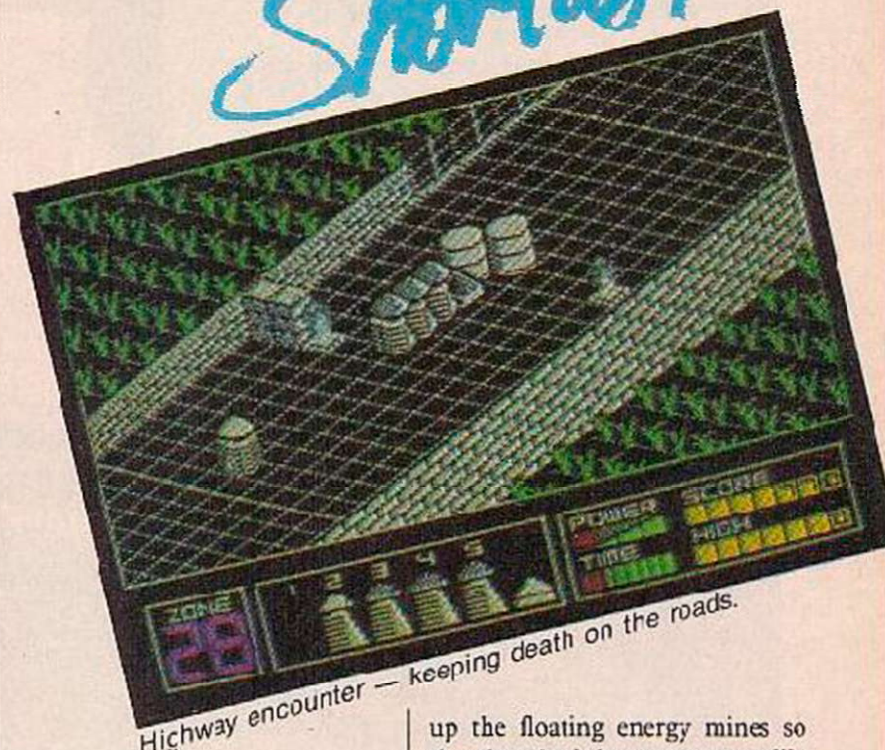
The screen gives a Zaxxon-esque three-quarter overhead view of a futuristic highway leading through the hydroponic fields, oxygen forests and fish-farms of the future. You start in zone 30 with a main Vorton and four auto-Vortons, plus of course your Lasertron. Your job is to troop along like a convoy of lorries carrying nuclear waste through the city at dead of night.

With the joystick or keyboard you control the main Vorton who is basically in the role of Sunday school teacher shepherding rather manic Dalek schoolchildren on a nature walk. They will charge along with their deadly toy until they run into something.

The best plan seems to be to stall the gang behind some oil drums

SOFTWARE

Shortcut



Highway encounter — keeping death on the roads.

then nip through the zones and take out the various hornswogglers, squiggles, mouffs and hostile ice-hockey pucks that assail you. Most of these creatures defy description, but are well-designed down to a gleaming reflection on the road.

There is plenty of opportunity for doing strategic things like moving oil drums around to box

up the floating energy mines so that they don't hurt your crocodile of chumblies once they start charging down the highway.

At the base of the screen the display tells you which zone you are in, how many Vortons are left, and displays power, score, time left and high score.

A game for control freaks and Dalek and droid lovers everywhere.
Paul Bond

Rupert and the Toy-maker's Party

CBM-64 and Spectrum
Quicksilver
Arcade adventure
£7.99

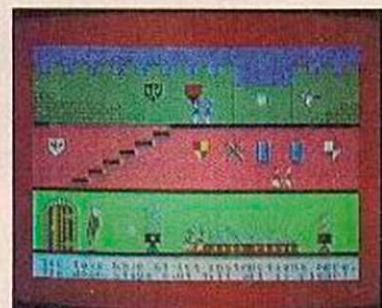
★ ★ ★

RUPERT'S CHUMS are holding a wild party — oodles of currant buns and lashings of pop. But getting the ancient teddy bear there on time is going to be no picnic.

You have to manoeuvre the geriatric Rupert through seven screens of great graphics to what are presumably his sixty-fifth birthday celebrations. Rupert's first computer escapade is played out in and around the toy-maker's castle.

The toymaker himself never puts in an appearance but there are plenty of his products about — most of the toys are out of control and aiming to make a nasty mess of the cuddly bear. But animal lovers shouldn't worry; no nasty incidents of mammal mangled in clockwork. The worst that happens is that Rupert takes a tumble and after six of those the game ends.

Toymaker's Party is a platform



Rupert gate-crashes a wild party.

game with the action viewed from the side. You have to get Rupert to collect the party invitations pinned to the walls to progress to the home and buns.

He hops and jumps energetically over an assortment of runaway jack-in-the-boxes, toy soldiers and trains, and can hitch a lift to safety on the back of magpies and toy aeroplanes. Be careful in the later stages — toys that were benign become killers and what were dangerous gadgets suddenly become Rupert's allies.

The setting for this game may be out of the nursery, but it's good clean fun to play and the graphics and music are as good as any you'll find in a CBM-64 platform adventure.

Toby Wolpe

The Scout Steps Out

Amstrad
Amsoft
Platform
£8.95

★ ★ ★

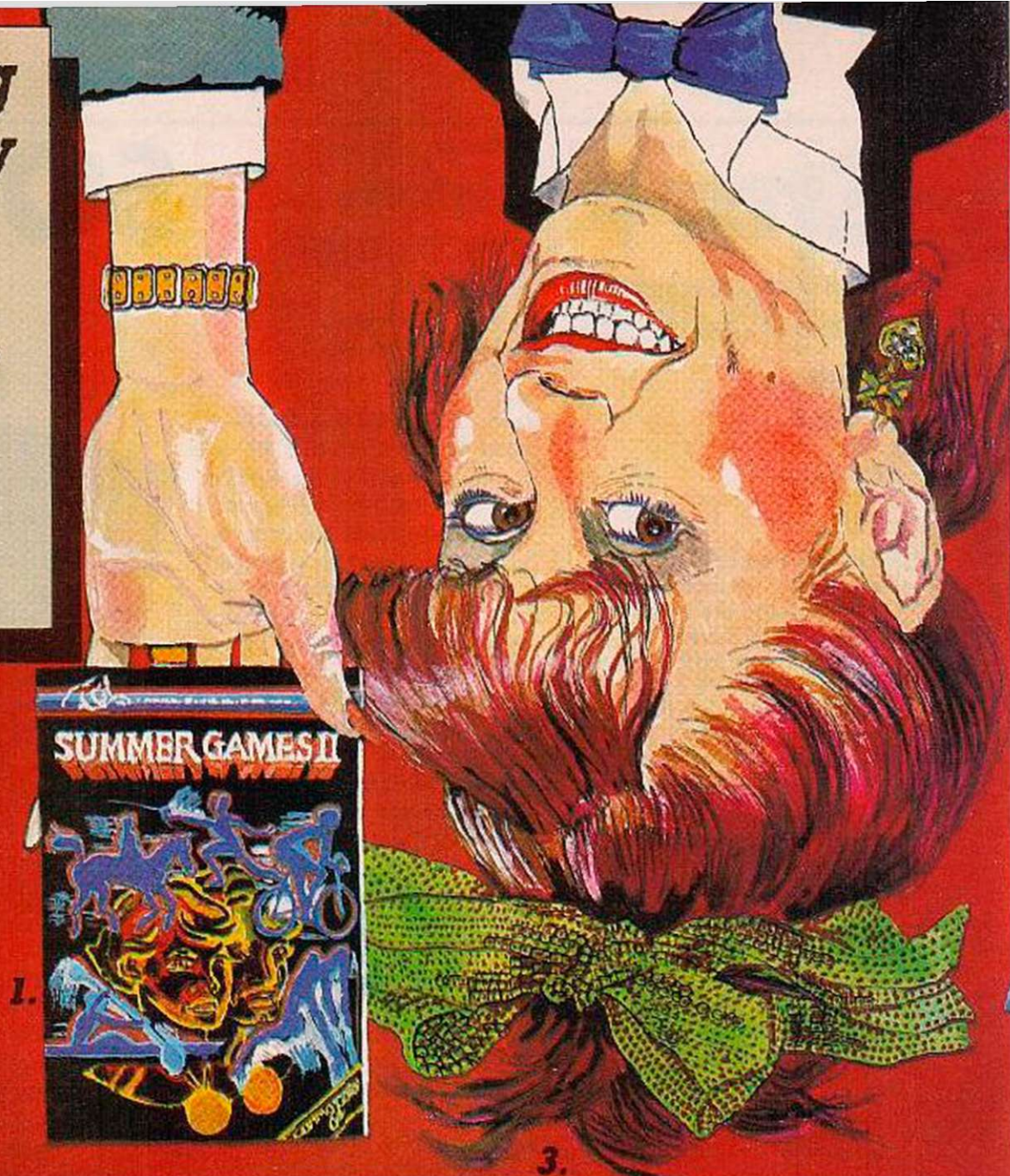
TO CALL THE Scout Steps Out a platform game may be a trifle unfair. Only a few of the game's 13 screens contain platforms and there is not a conveyor belt or crumbling ledge in sight. Instead you may have to swim underwater, pick your way through a forest in search of mushrooms, or dodge the keepers in a park. Other exotic locations include an animated circuit diagram and a rain-swept block of flats.

You start off at base camp where
Be prepared — Scout Steps Out.



(continued on page 34)

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releases,
our Mystery
Microgamer
has finally
flipped
over two...**



'Three of a kind, O.'

My really brill two:

1. Summer Games II
from US Gold. I'm a
value freak and a closet
athlete and now I can
play in my silver lurex
tracksuit!

2. Sparklers Special
from Sparklers – 'cause
this way I get four
absolutely triff games
for the price of one!

3. Just Mystery Me!

My pick of Arcade and Adventure

GLADIATOR

by Microgen

This is Roman arena 'Hail Caesar stuff'.
Slay or be slain in 15 very gory contests.
Plus gambling for your life. Even worse than a
series with Lenry Henry. Well, almost.
Spectrum 48K

£7.95

DYNAMITE DAN

by Mirrorsoft

I warn you – your mind and everything else –
is going to be *blown*! I mean boom, boom.
Believe me, these are horribly impossible
puzzles, only so good. And really special
graphics that keep you jumping all the way
through.
Spectrum 48K

£6.95

Amstrad

£7.95

Quake MINUS 1 by Monolith

You look like a
recruit for the Robot Liberation Front – they
only take weirdos like us! All we have to do is
demolish the undersea Titan power plant and
sort of bust up the world with quakes and
tidal waves. OK yz?

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utterly ough family holiday you have to enter a
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by Creative Sparks

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Atari 32K **£8.95**

SUMMER GAMES II

by US Gold

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by Anirog

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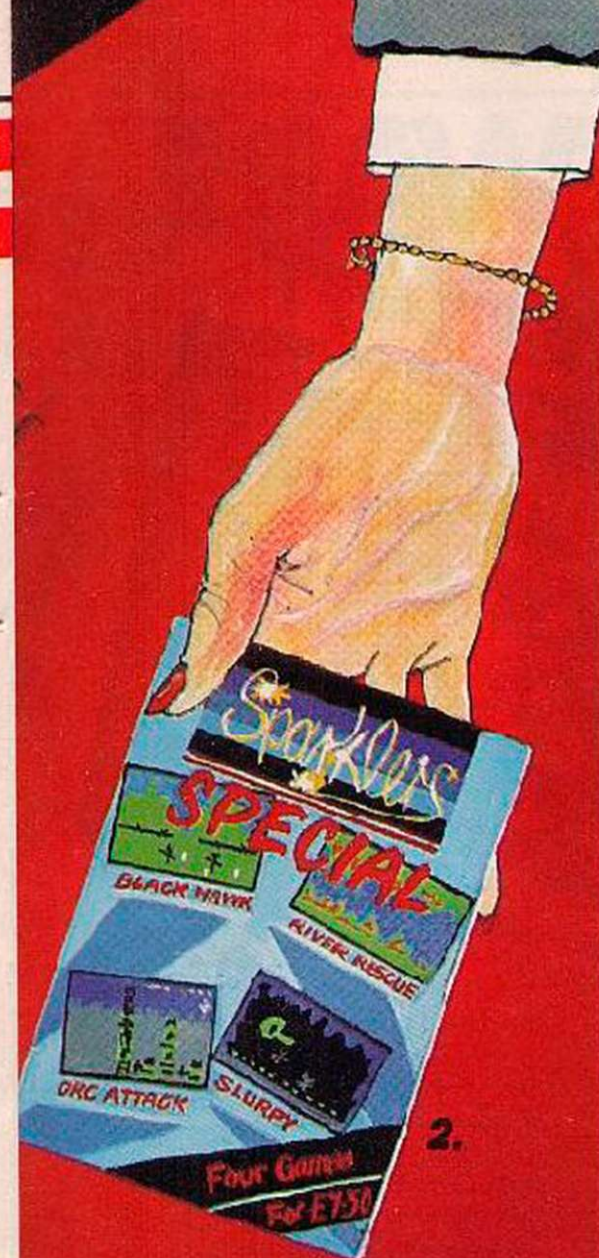
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K ya?'

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by CRL

From the micro-makers of the Rocky Horror Show comes this 'rocky road show'. You drive a giant articulated lorry through roads and blockages you won't believe.

Spectrum 48K **£7.95**

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by Sparklers

How did they cram so much in? Like *Slurpy* the greedy-guts who guzzles Glowbugs and other similar yuk. Like *Orc Attack* with you defending your castle against plebs. Like *Black Hawk* the ultimate combat plane with 30 levels of play. And like *River Rescue* with you in the speedboat trying to save scientists, as if you'd bother!

Commodore 64 **4 games £7.50**
Spectrum 48K

Star★ chart

Desert Burner

Spectrum
Creative Sparks
Shoot-em-up
£2.50

★★★

Another implementation of the ever-popular moon-buggy genre. You have to loop over various obstacles whilst keeping an eye on the various things flying around chucking things at you. However, this version combines this with speed control which varies the length of the jump. This makes the process of jumping over things a great deal more fraught. Too fast and you won't come down in time for the next jump, too slow and you won't get over. All in all a good little pot-boiler.

Metabolis

Spectrum
Gremiin Graphics
Arcade adventure
£6.95

★★★

You are a bird. The Kremins metamorphosed you, so you have to find the serum room to get back to human form. There is a wizard who cures you of all ills. You need a licence to kill as well. Interesting and quite humorous graphics.

Nick Faldo Plays The Open

Spectrum
Argus
£9.99

★★★

Icons are all the rage these days and are well to the fore in what is probably one of the best golf simulations around.

The icons at the base of the screen allow you to choose clubs and control, force and direction of shot. You have a caddy who doesn't tell you what to do, but says things like "OK" in a little speech bubble if you're making sensible decisions. Not a golfer myself, but the accompanying booklet is informative and should appeal to learners of the ancient game.

(continued from page 31)

your troop of scouts is bivouacked. The game tells you that your mission is to be a good moral example to your troop. Translated into playing action: this means finding the route that will take you to the next screen and picking up objects along the way. As each screen is crowded with a different set of life-forms, all of them hostile, this is no easy task. But if you can get back to screen one there is a large bowl of cornflakes which will restore any lives lost.

The authors, Dave Rogers and Colin Hogg, are regular *Your Computer* contributors; and if you have ever keyed in one of their programs, you will know that their games have a highly original flavour. What makes this one special is its graphics. Almost every screen has some pleasingly inventive touches, while the wet scenes in particular are a maritime marvel: rolling waves, rotting octopuses, and some superbly convincing sound effects.

Simon Beesley

Dynamite Dan

■ Spectrum
■ Mirrorsoft
■ Platform game
■ £6.95

★★★

THERE is certainly plenty here on the menu: eggs, cocktails, fruit, cheese, cake, ice cream, tea, soup — certainly the greatest variety of cuisine ever encountered by anyone trying to stay alive in an arcade adventure game.

Plenty of interesting things to pick up as well — credit card, deodorant, test tube, oxygen, dynamite — of course — and the top secret plans.

As *Dynamite Dan* you must thwart the plans of Donna and Blitzen (gedditt?) as they try to take over the world. The top secret plans are for a super psychon mega-ray; *Dynamite Dan* must garner eight sticks of dynamite so he can bust into the safe where the plans are kept. As you guide the prospective peterman in his odyssey, plenty of ugly insects, acrobatic hydrae and other nasties assail him.

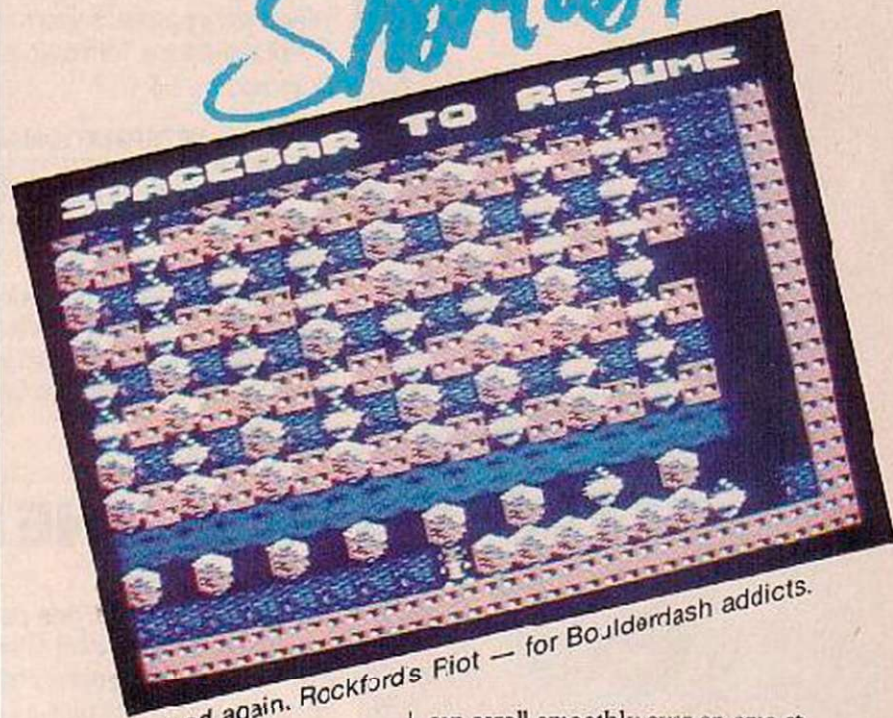
You should also beware of attacks of negative buoyancy — Dan can't swim — warning beeps indicate imminent starvation.

An interesting permutation on the theme is the use of trampolines at strategic points in the game — you can bounce around to your heart's content.

Paul Bond

SOFTWARE

Shortlist



Stoned again. *Rockford's Riot* — for Boulderdash addicts.

Rockford's Riot

■ CBM 64/Spectrum
■ Monolith
■ Excavation game
■ £9.95

★★★★★

INSTANT RELAPSE. Just when you thought you had licked your addiction to *Boulderdash* — easily the most potent game of 1984 — someone offers you a go at its sequel, *Rockford's Riot*. Pretty soon you dislodge a boulder, triggering off an avalanche. It gives you your first rush and the craving for more returns. To make matters worse, Monolith has included a copy of *Boulderdash* on the other side of the tape.

Rockford's Riot uses the same ingredients — boulders, jewels, amoebas, butterflies, fireflies, enchanted walls — but presents a brand new set of problems. There are 16 levels or caves as the cassette inlay calls them. In each cave you

can scroll smoothly over an area at least six times the screen size. And in each you have to collect a given number of jewels within a time limit. But beyond this common factor there is enormous variety so that each level could almost be described as a separate game.

Take cave B for example. Amoebas are oozing out from the tops of three large vats. So you must first shift boulders to seal them in. If you succeed the amoebas turn into jewels. Then you have to dash down to the bottom of the vats, unplug them, and when the avalanche of boulders has settled, collect 75 jewels before time runs out.

Collecting jewels is a problem in itself. They are invariably embedded in a pile of boulders. As the game simulates perfectly the physics of rock falls, you only have to extract one for the whole lot to come tumbling down. When it is accompanied — as it is on the CBM-64 — by a distant booming this provides one of the most satisfying experiences in computer gaming.

Simon Beesley

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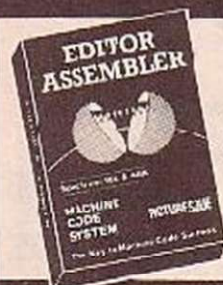
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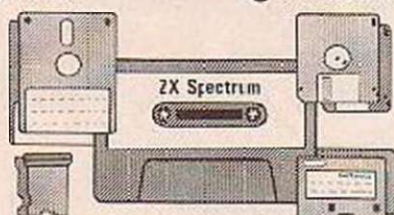
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Amstrad SSA-1

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Amstrad

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Hot on the heels of the UK Tronics unit reviewed in June, this is the "official" version. As it uses the same chip, and most of the commands do similar things, there isn't a great deal to choose between the two.

However, this version makes "legal" calls and so is compatible with all past and any future add-ons.

Hyper Shot

Game Controller
Various

£9.95

Joystick just so much twisted plastic? Still after that elusive four-minute mile? Well, for sports enthusiasts everywhere, Korami has brought out a box with three hopefully very robust buttons which simulate left, right and fire joystick movements. Plugs into any Atari-style joystick port. Available direct from Korami on 01-429 2446.

Discovery 1

Disc System
Spectrum

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Granted the Spectrum owner's reluctance to buy a peripheral that costs more than the original system, does the Discovery add up? For your money you get a disc drive, a printer port, a joystick port, a built-in power supply and a monitor output.

The disc system is excellent. The single-sided drive gives you 80% formatted capacity. It is compatible with all Microdrive commands, but also has a full complement of "proper" disc commands. These include random access files as well as a Ram disc system where an area of memory is set aside and acts like a fast disc.

Blank 3 1/2 in. discs are widely available, and are rugged and reliable. A fast disc drive with a powerful operating system. But will it tempt the budget-minded Spectrum owners? Available from Boots.

HARDWARE

Databeeb

- SBC
- Miracle Technology
- £25

IF YOU FANCY breaking into the world of micro communications, you'll need three things: a computer, a modem, and, perhaps most importantly, the software. Along with the usual Prestel and Bulletin Board software, Databeeb has facilities for controlling the company's Minor Miracles modem, in much the same way as the ZROM works for the Demon.

However, there are major differences. Databeeb uses the User port to control the modem, leaving the RS-423 port free for data handling. It also has BAPT approval! The modem can be upgraded to get the most out of the new Rom. Auto answer, auto dial and mode selection upgrades are available. The whole lot, modem with all the extras and Databeeb, comes to around £200. But this is a piece of kit designed up to specification rather than down to cost.

If you are looking at Databeeb as a Comms Rom for any modem, it compares well with Pace's Commstar, its main rival. In Prestel mode, the last 16 pages are stored in Ram and the user can select eight others. These can be redisplayed and then treated as

Logotron Sprite Board

- BBC Micro
- Logotron Sprite Board
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THERE'S MORE to Logo, say Logo enthusiasts, than turtles. And indeed there's more to turtles than plotting those familiar geometrical patterns. With Logotron's sprite board, you can even write a game.

The board comes in a small metal box which links via a ribbon to the BBC's 1MHz bus and by a second cable to the power connector.

You activate it by selecting Logo and loading a .long — &4300 bytes — file, whereupon you're prompted to switch to the sprite screen. This you do by plugging your monitor into the sprite board, which now directly provides the video for your screen — there's a



The Databeeb: — software on a Comms Rom for any modem.

though they were the current frame for routing purposes.

Unfortunately, no off-line message editor is provided, and a printer dump is available for text only. The operating system can be accessed at any time by pressing the copy key. The bulletin board type software has the usual facilities to direct output to printer and/or disc.

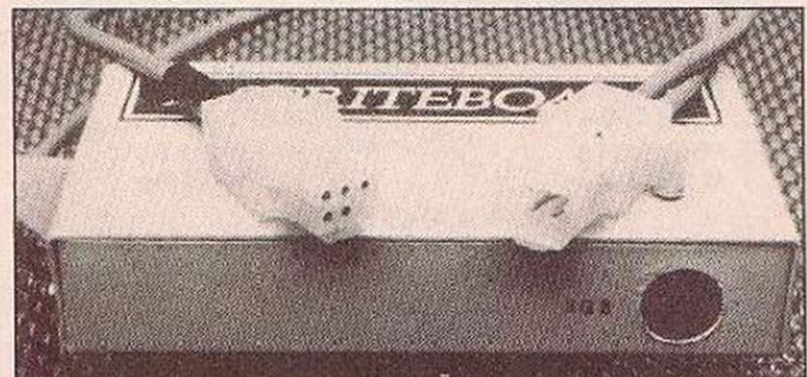
40 and 80 column modes are available, and the various commands are displayed optionally at the bottom of the screen. File transfer uses the X-modem format of Commstar. The software supports X-on X-off

protocols, local echo, line feeds and a variety of data formats are provided.

All the modem's functions are available through "star" commands, which means writing simple bulletin boards, doing unattended downloading, or even a little hacking should not tax anyone's basic programming skills.

If you've got a Miracle modem, and are thinking about upgrades then this is a good starting point. For anyone else, there is little to choose between this and Commstar. It's really a matter of personal taste.

Lee Padon



Logotron Sprite Board — write games without learning code.

choice, RGB, composite PAL or plain ordinary uhf TV signal.

The result of this is a sort of super-Mode 2 screen with 16 colours, including dark and light shades. At your disposal now are 32 sprites masquerading as turtles, each of them capable of assuming any of 64 shapes. There's a selection ready-made: a lorry, a tulip, a dog, a cross and so on; and of course a profusion of turtles, both realistic and symbolic. To define your own shapes, you can call up an excellent built-in editor.

And to animate them you can

draw or nearly 50 new Logo commands. You can whizz turtles around the screen, manipulate them independently or together, detect collisions and fill this or that with colour. So in theory you could write your own Frak! without having to learn machine code.

All great fun, and educationally very sound if rather expensive. But the software wouldn't run with my non-Acorn disc interface. And the computers I tried wouldn't always power-up correctly with the board connected. Check before you buy.

Richard Lambley

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C combines high-level structuring with direct control over the machine, all at compiled speed. Our compiler is now available from good retailers, and has proved extremely popular. It supports all statement types (plus inline code) and over 40 operators; whilst char, int, unsigned and combinations using pointers, arrays, structures, unions, functions, and typedef are all allowed data types. External and static variables can have initializers, whilst auto variables support recursion. There are six preprocessor directives and over 60 library functions with a selective inclusion scheme.

FONT 464 is an easy-to-use program enabling you to design, edit, and save your own characters and graphics for simple use in BASIC programs. There are 6 pre-designed fonts and sophisticated printer-driving software which allows high-resolution screen dumps and letter writing on Epson compatibles or the DMP1.

DEVPAC is a complete machine code development package. It is the second one that many people buy, because after the first one they know what to look for! The 'front panel' debugger is the only way to really see programs in action, and assembly from multiple source files is fast enough to satisfy its most demanding users - ourselves.

Pascal is a valuable educational and development tool as well as running typically 40 times faster than a BASIC equivalent. Our compiler is an almost full implementation which compiles direct to machine code (no slow P-codes). Multiple file inclusion allows very large programs to be compiled.

MON QL is our latest product and our first on the QL; it was written by Andy Parnell, who has a great deal of experience on the QL. It is similar in style to the well-known MON 'front panel' in DEVPAC and includes additions like job control and multi-tasking support. It also catches system exceptions and includes fixes for QDOS.

Product Price Table

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ADVANCED Z80 MACHINE CODE

A new authoritative guide, for those who want to improve their Z80 machine code programming skills to a genuinely professional level, has just been published by Interface, at £12.95.

If you already know the fundamentals of programming in Z80 machine code, and now want to expand your skills, to tackle advanced, serious and practical program development, then this is the book for you.

Advanced Z80 Machine Code Programming, by William Nitschke, fills a serious gap in the literature on programming the Z80. Rather than dealing with the elementary concepts of Z80 architecture, this new book discusses the material you now need to know to advance your skills. The core of the book looks at popular programming applications. Starting with the basics of organising information, generating arrays and tables, block moving, shifting and erasing, string manipulation, data compression and command tables, it moves on to advanced applications like word and sentence decoding. Games programming is then examined in detail, including three-dimensional maze generation, animated graphics and the development and coding of arcade games, and the synthesis of speech and sound effects. There is also a complete set of 'undocumented' Z80 instructions.

You can buy Advanced Z80 Machine Code Programming by William Nitschke (ISBN 0 907563 90 2) at £12.95 from most book and computer stores, or direct from the publisher, post free, at:

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Interface

NEWS
o a e o
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h h

The crystal ball

Melbourne House has now brought out a new and vastly improved version of *The Hobbit* on disc for BBC B owners. As well as having an increased number of locations, the game features graphics for the first time for Beeb owners — over 50 different screens of them.

The BBC B disc version costs £17.95. A superb disc version is already available at the same price for the CBM 64. Tape versions cost £14.95 and include BBC B, Commodore 64, Spectrum, Oric/Atmos, MSX and Amstrad micros. Only one thing to say — when can we expect an Atari version?

Great news for Infocom addicts — a new adventure called *Wishbringer* has just been released.

A helping hand

Fulvio Cerlesia, an Italian devotee of English adventures, has called again, this time to request help with *Adventure International's Gremlins* (his phone bill must be colossal!):

Cannot kill all the gremlins?
METS YSTN EVEH TNIM
EHTP ART
Want some more assistance?

SNIL MERG PUWO LBNE
NTST NEVR EVOS ETAL
FLAT EMDL EW
Don't know the essential kit?

EPIP SAGD NA(P UTUC)
XOB LIAM

Some players are puzzled in Acornsoft's

Philosopher's Quest:
Portuallis won't open?
TELU MAYB UREH TBUR
Can't get out of the whale?
HTCO TEHT QNIT TEQE
FOFE BDOO WTFI RDTH
GIL

Yours against ghosts and gremlins,
Hugo North.

QUEST

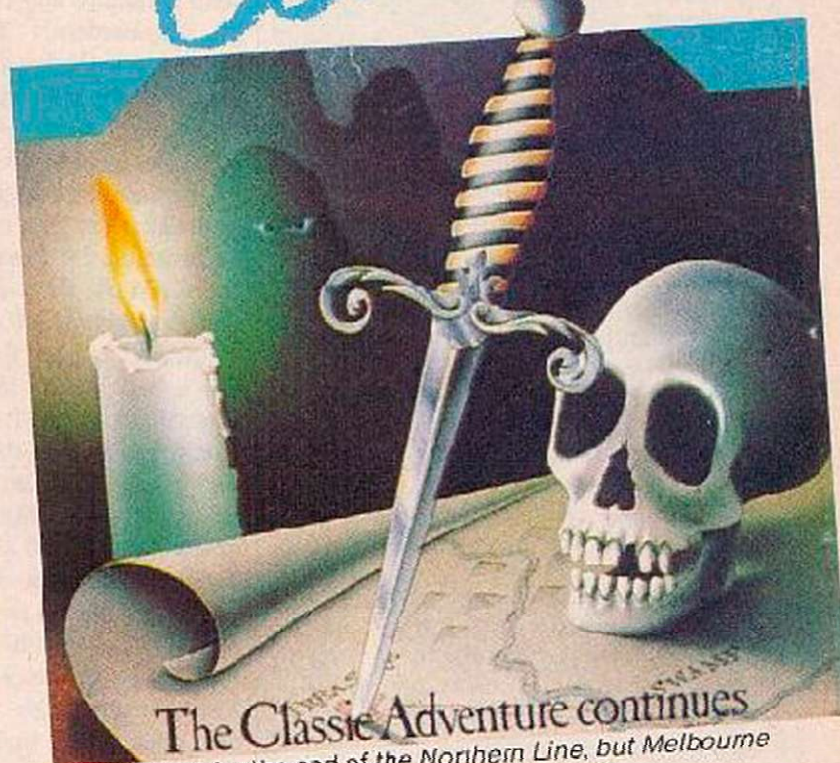
Our man with the brass lamp and the key to a thousand mysteries sheds light on new adventure programs. Lost? Never fear, Hugo North is here.

Mordon's Quest

■ Spectrum/CBM-64/Amstrad
■ Melbourne House
■ £6.95

FROM JOHN JONES-STEEL, the author of Melbourne House's popular *Classic Adventure*, comes this superb new text adventure. It has over 150 locations, a vocabulary of more than 400 words and uses clever text-compression techniques.

You begin in the master bedroom of a house, having just fallen out of a four-poster bed. Mordon, one of the seven Lords of Realities, soon appears to tell



The Classic Adventure continues
Not the hunt for the end of the Northern Line, but Melbourne House's latest adventure — *Mordon's Quest*.

you that a power-crazed Lord has broken up a life-controlling machine and dispersed its seven component parts through time and space. Your task is to seek out the pieces and return them to the house.

Armed with a blanket, torch and transporter unit, you're soon in a jungle where the quest begins

in earnest. Quicksand, a carnivorous plant which can't be killed — it's a protected species! — and a pygmy's hut — complete with AA, plate and knife symbols — are the first of many challenging problems.

With its detailed atmospheric text and touches of humour, *Mordon's Quest* guarantees many hours of stimulating pleasure.

Beatle Quest

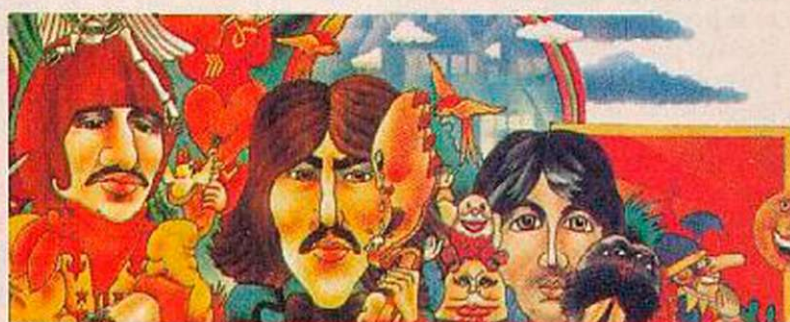
■ CBM-64
■ Number 9 Software
■ £9.95

PREPARE YOURSELF for a trip back to the Swinging Sixties — the Fab Four have just made their first-ever authorised appearance in an adventure.

Beatle Quest is a Quilled text adventure which revolves around a wide selection of lyrics from the Beatles' songs. Much of the fun comes from spotting them. The game contains over 150 locations, 60 objects and 200 messages. You must amass 1,000 points by solving puzzles, collecting items and completing certain actions.

The quest begins in a bedsitter where a strange but beautiful girl is asleep on the divan bed. Tempting as it might be, trying to awake her with a kiss results in a deadly embrace and it's goodbye, goodbye, goodbye.

Out in the street, those shops



Magical mystery tour — Number 9's *Beatle Quest*.

that are not closed for the half-day merit further exploration. You'll need to find a certain object fairly quickly because your body soon starts to tremble and vibrate. Unless you obtain this vital nutrient, you'll end up as dead as surely as if you had been walloped with Maxwell's silver hammer.

The text abounds with reference to the songs. For example, in a lonely side street you can't help wondering where all the lonely people come from, where do they all belong. A dental surgery is owned by a Dr Robert.

Down at the railway station, a sign informs you that the "one after 909 has been cancelled".

Asking for help is answered with "you'll get by with a little help from your friends" while attempting to do something impossible is met by "Oh... you can't do that".

If most or all of these allusions mean nothing to you, then you won't get much out of the game unless you brush up on the Beatles' songs first. For those still steeped in Beatlemania, the quest offers a tough but nostalgically enjoyable experience.

CP/M — PLUS OR MINUS?

One of the earliest microcomputer disc operating systems, CP/M runs on hundreds of different makes of computer. Z-80 versions are known as CP/M-80, in contrast to CP/M-85 or CP/M-68 which run on 16-bit processors.

Originally written — by Digital Research's Gary Kildall — to fit on micros with only a limited amount of Ram, it has remained a relatively unfriendly system to work with. Some CP/M commands are cumbersome to use; while, far from being friendly, its error messages are often downright hostile.

But the crucial point about CP/M is that it can be implemented on almost any Z-80 micro and its software is portable. Programs written for one CP/M machine will run on any CP/M machine.

There is a vast range of application software running under CP/M. Because the system has been around for so long and on so many machines there are literally thousands of programs available to the CP/M user.

Two qualifications need to be added here. First, business software is not cheap. Home computer owners who are used to paying, at the most, £50 for a word processor on Rom will be staggered to find that some of the best-selling CP/M programs can cost several hundred pounds. Second, buying a CP/M program involves more than just choosing the right package. You need to find a distributor who can supply software on 3in. discs and in the Amstrad's disc format. You will also have to customise CP/M software to work with the 6128's screen and keyboard configuration.

However, as it turns out, neither of these problems looms large. Anyone seriously committed to using a micro to help run a small business should be prepared to spend as much on software as the hardware itself. And apart from CP/M classics like Wordstar, dBase II, and Supercalc, there is a considerable amount of software that comes a lot cheaper.

Customising a program to work with a particular computer is mainly a matter of telling it what the machine's screen parameters and control codes are. Amstrad has made the task easy by setting the 6128 up to emulate a VT-52 terminal. Most CP/M software comes with an installation program which includes an option for this widely-used type of terminal. On top of this there is already a number of distributors — Timatic Systems and Honeysoft in particular — who supply CP/M programs tailored for the Amstrad on 3in. discs.

Business applications apart, one of CP/M's other attractions is that it supports compilers for almost every known computer language. You can even run the Z-80 version of BBC Basic on it. Quite a few languages are also in the CP/M User Group's large Software Library. Its contents include assemblers, word processors, text adventures, communications software, music files, and hundreds of miscellaneous disc utilities. Most importantly, it is in the public domain. In other words, except for a small copying charge, it is all free.

THE AMSTRAD 464 was launched in June last year at about the same time as the bug-free QLs began to hit the streets. 15 months later only 50,000 QLs have been sold while the Amstrad has established itself as one of the three best-selling home computers in Britain. How is it that in a year when almost every other micro manufacturer folded or flourished, Amstrad has flourished?

Undoubtedly one reason is that the 464 comes with a monitor and built-in cassette recorder at an unprecedentedly low price. But equally important is the fact that, although its design is not especially advanced, it scores highly in almost every department — graphics, sound, Basic, construction, and I/O connections.

This computer is largely free of the quirks and omissions that flaw most other micros: a tacky keyboard on the Spectrum, antiquated Basic on the CEM-64, bugs on the QL and Oric, the memory-starved BBC, and so on.

Amstrad followed the 464 with the 664, which has a built-in 3in. disc drive in place of the cassette recorder. It has a few extra Basic commands such as the graphics command Fill, and sacrifices 1,280 bytes Ram to the disc operating system. But its major difference is the ability to run CP/M 2.2, which is supplied partly on disc and partly on Rom. The idea behind providing CP/M is to widen the machine's scope for attracting business users.

Just a few months after the launch of the 664, the company has now produced another computer with a built-in disc drive, the 6128. This comes with a total 128K Ram and runs an enhanced version of CP/M 2.2, CP/M Plus. It is still software compatible with the earlier models.

Although the 6128 offers more than the 664 — which will be quietly dropped from production — it costs less: £299 with a monochrome monitor, £399 with a colour monitor. If you are not fussy about picture quality you can buy a £30 modulator and use the monochrome unit with a colour TV.

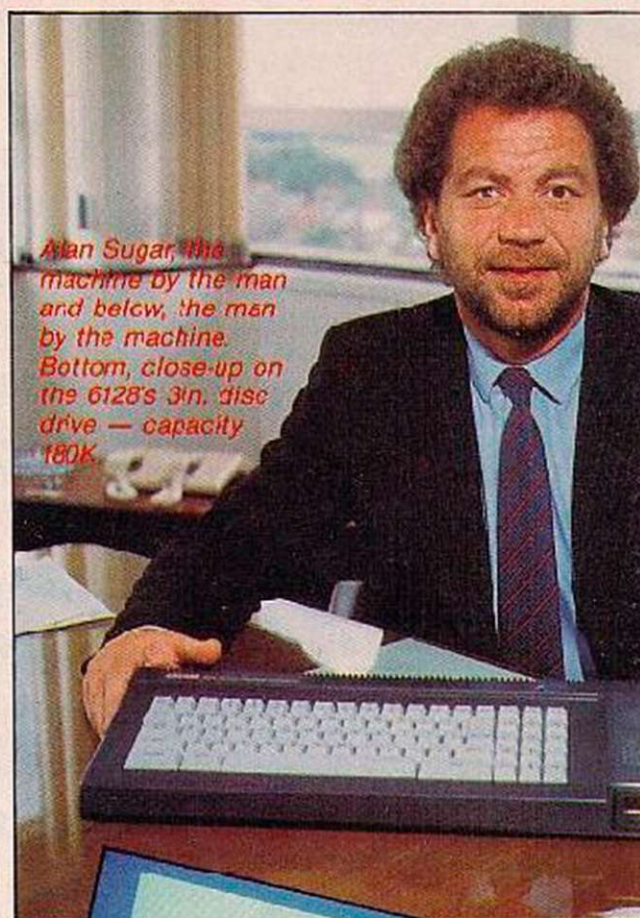
Originally Amstrad announced that the 6128 was solely for the American market. It is not hard to guess why the company has delayed the announcement of the machine's U.K. launch until the last minute. But it is tough if you have just spent £449 on a 664.

In appearance the 6128 is more or less the same as the 664. Amstrad has sensibly repositioned the cursor keys at the front of the keyboard and the overall height has been reduced. At the back there is the same array of ports as on the earlier model — a Centronics-style printer interface, an expansion port, and a socket for a second disc drive. Also unchanged at the side are the cassette and joystick ports together with a stereo jack for sound output.

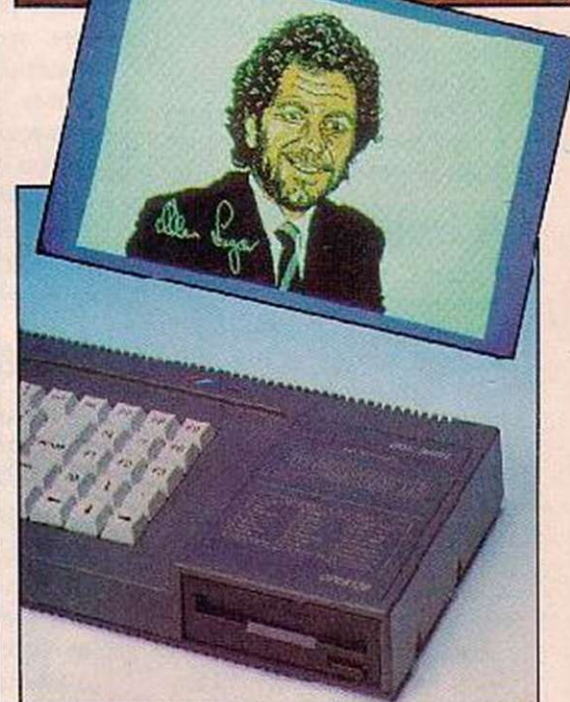
Apart from the addition of CP/M Plus and another 64K Ram the machine's specification is the same as the 664's. Based around a Z-80A processor running at 4MHz, it carries 128K Ram and 48K Rom. The Basic interpreter and the operating system are held in 32K of the Rom, while the remaining 16K contains Amsdos and a small part of CP/M. Amsdos is Amstrad's own disc operating system which serves as an alternative to CP/M.

The two systems coexist peacefully, reflecting the 6128's dual nature both as a small business machine and a home computer. Basic is switched out when CP/M is running so you cannot then

AMS



Alan Sugar, the machine by the man and below, the man by the machine. Bottom, close-up on the 6128's 3in. disc drive — capacity 180K.

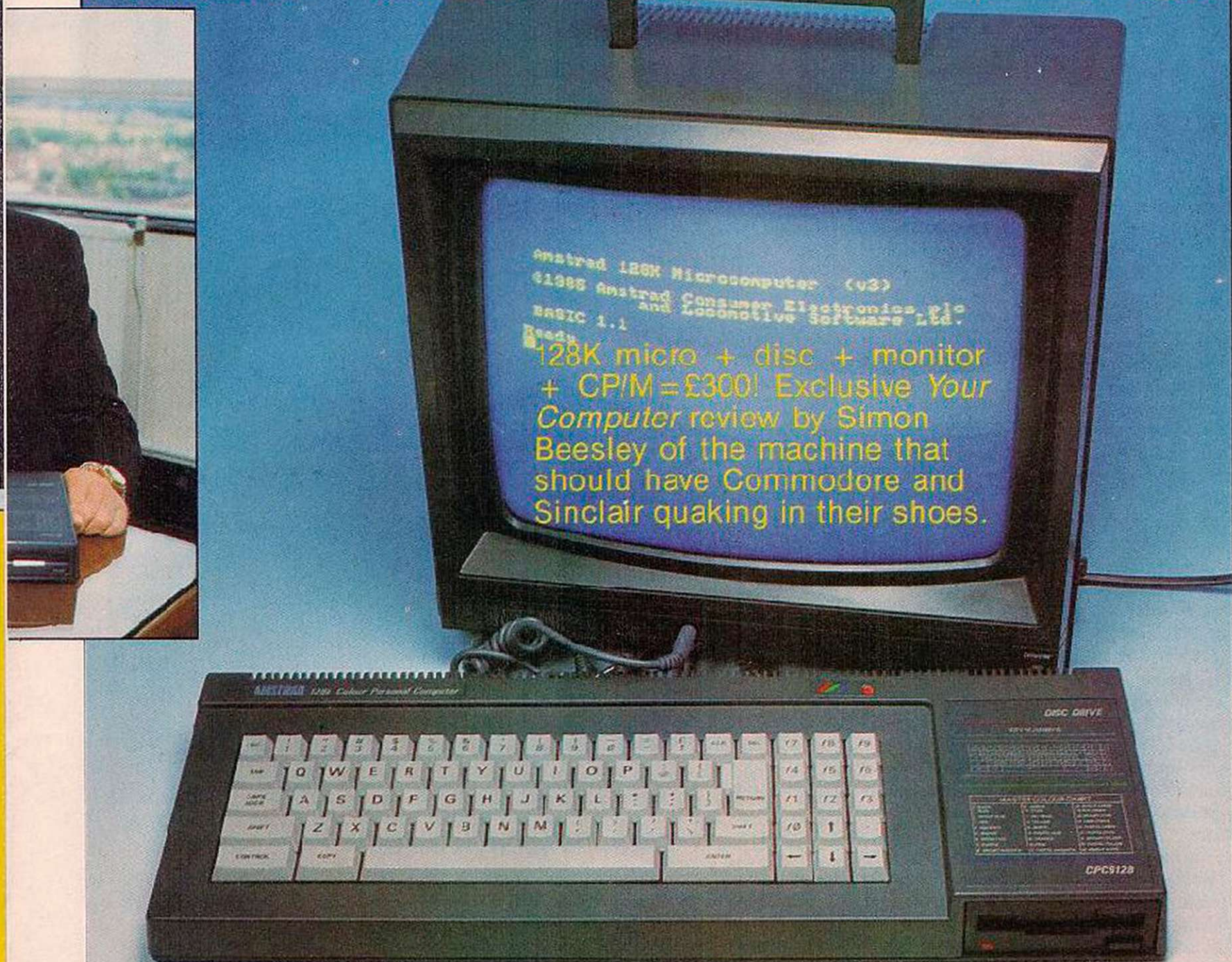


load or save Basic programs. If you are using Amsdos you need to run CP/M to format discs, back up and copy files; otherwise you can ignore it.

When Amsdos was first introduced Amstrad described it as a fast cassette system. You might expect a disc operating system to be rather more than this. And, indeed, as disc operating systems go Amsdos is fairly rudimentary. There is no facility for creating random-access files and only a limited spread of disc commands. Still, what it does offer is probably quite adequate for the average user's purposes.

Some people have berated Amstrad for choosing 3in. disc drives rather than the more common 3.5in. drives. But the 3in. discs have

AMSTRAD'S 6128



BATTERING RAM

a respectable capacity of 180K on each side, and you can always add a 3.5in. or 5.25in. as a second drive.

Two discs are supplied with the machine. Along with CP/M Plus and its accompanying disc utilities, they hold a useful collection of programming utilities, a full 48K version of DR Logo, and GSX, a Graphics System Extension designed to let CP/M programs handle graphics. For good measure Amstrad has also thrown in the software that went with the 664 — CP/M 2.2 and a stripped-down version of DR Logo.

GSX is the 8-bit forerunner of Digital Research's GEM. Introduced a bit late in the day, so far it has had little success. With the notable exceptions of DR Graph and DR Draw not much

software has been written for it. If someone were to add the 8-bit equivalent of GEM Desktop, GSX could give the Amstrad icons and windows in CP/M. But the result would probably be rather slow.

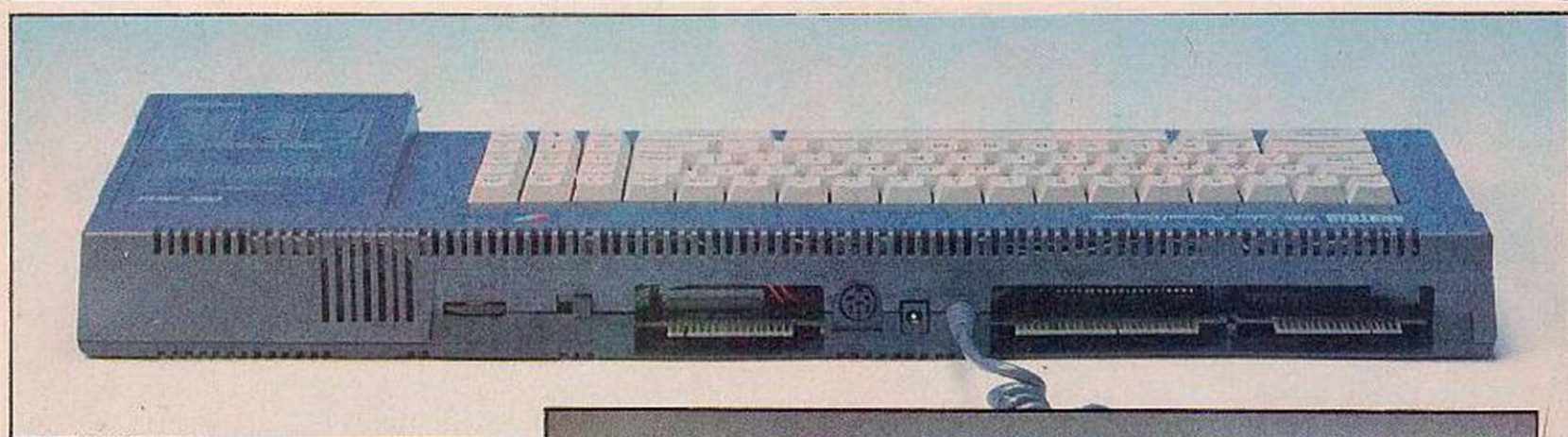
Another of the disc programs, Bank Manager, demonstrates some extra Basic commands which make use of the spare 64K Ram. As an 8-bit microprocessor the Z-80A can only address 64K of memory. So the 128K Ram is not organised as one block of contiguous memory, but as two banks of 64K, only one of which can be accessed at a time. You could not, for example, run a Basic program larger than 64K.

Two of the commands supplied by Bank Manager allow Basic programmers to store and

display up to five screen images. The others use the second memory bank as a filing system. What these commands do not provide is a facility for storing programs, or variables as on the Commodore 128. No doubt machine-code programmers will find all sorts of interesting applications for the extra Ram; and, possibly, commercial games writers will be able to exploit it. But by and large it is not of much benefit if you are working in Basic.

In fact the main reason for giving the 6128 128K is to allow it to run CP/M Plus, which is designed to take advantage of bank-switched memory. One of the problems with running CP/M 2.2 on the 464 and 664 is that it leaves

(continued on next page)



(continued from previous page)

only 39K Ram for programs — not enough for most heavyweight CP/M packages like Wordstar.

By contrast CP/M Plus sits in one of the two banks of 64K Ram and loads programs into the other. In this way it makes 61K Ram available for programs, which is more than enough for any 8-bit CP/M program.

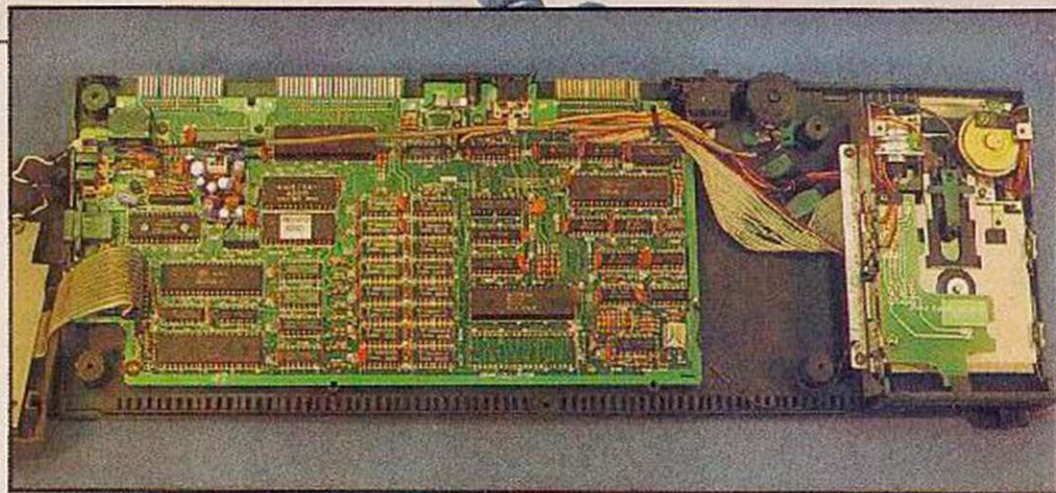
CP/M Plus takes up around 21K and represents a substantial improvement on the earlier 8K version. Not only is it faster in loading and saving to disc, but it is also easier to work with. Thus you can give it multiple commands on a line, recall previous commands, and edit lines. Along with a number of other enhanced features there is also a provision for switching to different national character sets — German or American, for example.

None of these features will interest people who use the 6128 as a home computer: pure and simple — the sort of owner, say, who has moved up from a Spectrum. CP/M programs cannot, of course, take advantage of the Amstrad's graphics or sound. With the exception of text adventures, most CP/M games are of the sort that date back to the dawn of microcomputing — Tic-Tac-Toe, Ping Pong and the like.

So, leaving CP/M and the extra 64K aside, it is worth considering how the 6128 matches up against the opposition on the home computer front.

Amstrad Basic is almost as extensive as BBC Basic, and only a fraction slower. Among its special features are commands to harness interrupts from Basic — Every and After — and the facility for defining up to eight text windows, and one for graphics. As on the BBC, the operating system is unusually accessible via a large number of jump blocks — or vectors — in Ram. Extending Basic is easily done by defining Resident System Extensions — RSXs — to act as new commands.

There are three graphics modes which are well



World processing — top, how the 6128 interfaces with the outer world. The bare bones — middle, what the 6128 is like inside, and bottom, the fully-clothed machine.

supported by Basic graphics commands. At the lowest resolution, 160 by 200 in Mode 2, you have a choice of 15 colours from a palette of 27. The highest resolution is 640 by 200 or 80 columns by 40 rows of text. Again, the machine's graphics are only equalled by the BBC Micro.

Sound is supplied through the internal speaker by the AY-3-8192 chip, as found in MSX machines and dozens of other micros. It is not quite as powerful as the CBM-64's chip but still gives three voices with full envelope definition.

Another plus is the facility for switching out the Basic Rom and adding alternative 16K Roms which plug into an external sideways Rom card. Once again this is also available on the BBC. Where the Amstrad scores over the BBC is in providing over twice the amount of user Ram. And it is also a lot cheaper.

Instead of sharing 64K between Rom and Ram, it switches Rom and Ram in and out of the same memory space. The screen memory and operating system work space take 21K of one of the two Ram banks, leaving the user 43K to play with.

The only serious rival to the 6128 at this price level is the new Commodore 128. Like the Amstrad the CBM-128 offers CP/M Plus and 128K Ram. It can also run CBM-64 software. Although there is already a large amount of games software for the Amstrad it does not begin to compare with the range of CBM-64 software.

Set against this factor is the Amstrad's price advantage. The stock CBM-128 is expected to cost around £270. To kit it out with a monitor and disc drive will cost you twice as much. Both machines probably represent the final flowering of 8-bit micros, a species now reaching the end of its term. But in terms of value for money the 6128 is the best buy on the market.

CONCLUSIONS

- The Amstrad 6128 is exceptionally good value. Add the cost of a printer and you have a complete system for around £500, equally suitable for home computing and small-scale business purposes.
- CP/M Plus together with 128K Ram give the 6128 an important advantage over the 664: It can run the entire range of 8-bit CP/M software.
- CP/M and the extra Ram are of less interest to home computer users. But features like its excellent Basic and graphics are enough to make

the 6128 superior to most other home computers on the market; and, to clinch the matter, it comes with a disc drive and monitor.

- There is already a substantial amount of games software for the Amstrad and its software support looks likely to improve as more companies include Amstrad versions of their new releases.
- The 6128's only rival at the moment is the CBM 128. But although the Amstrad cannot match the CBM 128 for games software, the 6128's monitor and disc drive give it a decisive edge.

WIN AN AMSTRAD 6128

Competition

Your chance to win a 128K microcomputer plus disc drive plus monitor — all this, and it can run CP/M with its wealth of applications software too! It can only be Amstrad's 6128, exclusively reviewed this month. All you have to do is put yourself in the place of someone writing a book entitled "1001 uses of a disc drive". Dream up one thing you might use your disc drive for — it can be serious or silly — and send us a description and/or a drawing of your idea.



RULES

- The winner of the competition will be the person who, in the view of the editor, comes up with the most amusing or original use for a disc drive.
- The name of the winner will be printed in the December issue of *Your Computer*.
- All entries must arrive at the *Your Computer* offices by the last working day in September 1985.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of Business Press International or their relatives may enter the competition.
- The decision of the editor is final.
- No correspondence on the result of the competition will be entered into.
- Business Press International assumes no responsibility or liability for any complaints arising from this competition.

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COMPETITION

Don't forget to enclose this coupon, or a photocopy of it, when you send in your idea for an original use for a disc drive to 6128 Competition, *Your Computer*, Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

Name _____

Address _____

Idea (written or drawn, use extra space if necessary) _____

6128

Lee Paddon enters the dank and mysterious depths of a Telecom mainframe and discovers the eerie world of MUD.

How DO YOU recognise a Wizard? Not as you might have thought by the pointy hat, billowing gown and flowing white beard. More reliable pointers are bleary bloodshot eyes, a tendency to fall asleep, and a phone bill as big as Boris Becker's pay cheques. All these are sure signs that he is up to his eyes in MUD, or to give it its full title Multi User Dungeon.

Night after night poring over a hot modem have taken their toll. Adventure games have been around since Crowther & Woods discovered that you could do something more exciting with a computer than scare old ladies out of their wits by sending them gas bills for three million quid. They wrote *Classic Adventure* and thus a genre of computer games was born. The genre must now be relegated to the status of SUD, or single user dungeon. These are basically passive, and once you have solved them, however long that might take, they are consigned to the bin.

What they lack is interaction. Picking up the gem in the treasure room will always produce the same result. With MUD, all this goes out the window. It won't be just you down there. Along with the usual perils, monsters and prizes there will be up to a hundred others trying to help or hinder you. So how do you get into MUD? Your first step is to get yourself a MUD pack.

This contains a map, a security card with ID and password, instructions and 30 credits, enough for three hours. After that, its 20p per unit which lasts six minutes. Armed with this, your micro, a modem and some software suitable



MUD CHALLENGE

MUD: once upon a time . . .

MUD was originally written by Roy Trubshaw at Essex University about five years ago. Ever since then it has undergone expansion and revision under the watchful eye of Richard Bartle. It quickly became a cult with the students of the university, and began to take off nationally when Essex installed PSS facilities for the computer.

Despite access hours that meant becoming virtually nocturnal, it has become an obsession for many, some Wizards clocking up many hundreds of hours on line. As with any cult, myths have grown up around the game.

There was a craze for a time of combining MUD and Trivial Pursuit, with Wizards shouting out the questions, and right answers being rewarded with snippets of useful information. There was even a MUD wedding, between Kate, a las

Margaret Lawton from Liverpool and Frobozz the Wizard. All the other characters were invited, the Christmas box was raided for suitable bunting and the wine flowed.

After the celebrations Kate & Frobozz retired to the Wizard's Chamber, and what interaction occurred thereafter is unknown.

The new improved MUD has been developed by Richard Bartle. It had first to be converted from the Dec it ran on at Essex into Mudcl, which made it machine independent, and then vastly enlarged and improved. MUD veterans will find at least some of the new MUD familiar, it incorporates the old dungeon. As time goes on, further improvements and enlargements are planned.

If you are an adventure freak, then you won't want to miss out on MUD, it'll knock the froth off your SUDS.

for accessing bulletin boards, you are all set to descend into the depths.

If this seems like an expensive way to play adventures, perhaps a brief run down on the specification might convince you otherwise. The labyrinth consists of over 1,000 locations and over 60 commands are initially available. On first entering MUD, you are a novice, your ultimate aim is to make the grade of Wizard. To make your way to the top you need experience points. You get these for killing monsters and finding treasures. You also get points for killing any fellow adventurers that you might find hanging about the place, and this is where the interactive nature of MUD starts to come into its own.

When you are in the dungeon you can ask which other players are logged on to the system. When you meet them it's up to you how you approach them. Exchange hints, team up, or just beat the hell out of each other. Another breed of animal you may meet on your travels is a mobile. This will seem like another player, you

M.U.D.

MULTI USER DUNGEON

will even be able to have an Eliza style conversation with it.

As time goes on, your experience and powers will grow. There are 60 different spells which are available to you from the word go; however, you will have little chance of successfully casting them. As your level increases, so does your chance of casting a successful spell, until you reach the ultimate level of Wizard/Witch where you are virtually immortal and all-powerful. Once you attain these dizzy heights, life becomes more a question of wielding absolute power, deciding which of the pitifully struggling Novices and Champions you will favour.

This whole anarchic system is policed by the Arch Wizards, alias the Sys-ops who keep an eye out for maverick Wizards going insane with power, and also the odd common-or-garden hacker. The ultimate in Wizard luxury is some software from Jez, author of the Demon Zrom. This gives you a separate window giving information over any player the Wizard is tracking.

Another attractive aspect of MUD is the user-friendliness of the system, and the successful creation of atmosphere by the text descriptions of locations — very much in the spirit of *Dungeons and Dragons* (TM).

MUD is due to hit the fan after its official launch at the PCW show. Even better news is that it won't cost you a thing, apart from the phone costs. It will be available between 6pm

and 8am weekdays and all day at weekends. This trial period will end on November 5th when the most successful MUD slingers will be invited down to the London Dungeon for a MUD spectacular.

These are promised as regular events and basically the system is locked so that no one can get in out, and then battle is joined. When the dust clears the survivor staggers out victorious. The bad news is that after the November 5th spectacular, every one will be busted down to novice level, and the battle commences in earnest, at the full rates.

Simon Dally, managing director of Multi-User Entertainments (MUSE) who market MUD worldwide, hopes that this initial trial period will get people hooked on MUD and also get any remaining bugs out of the system. Initially the system will be run from London, and there are no plans at the moment to make a Packet Switch gateway available, so would-be Wizards from the provinces might find things a bit expensive.

Simon Dally sees a rosey future for this new concept in computer games. "Our Muc development language — Muddl — will allow anyone to come to us with an idea for an interactive type of game, and Muddl will allow us to implement it quickly and cheaply. We are certainly a long way ahead of the States where Megawars III, a rather limited interactive game, is going down well, and we have high hopes of selling MUD to the Americans."

MUD COMPETITION

This month's prize is a MUD pack, plus on-line tuition from an arch Wizard on the arcane mysteries of the game. Thus equipped, you will be ready to take on nine other champions at the first MUD spectacular on an all expenses paid trip to the London Dungeon on November 5. Once there, the system will be locked, and the entrances sealed until one champion emerges triumphant. The prize for this champion of champions will be either 100 free hours of MUD'ing, or £100 cash, with free MUD time for the runners-up. For the runners-up of the *Your Computer* competition, there will be prizes from Firebird's popular Silver range of software. In return, all we ask you to do is sketch out a scenario for a new adventure which would exploit the interactive features of MUD. You must explain what features of your adventure would require the players to interact with one another. Don't forget, you'll need a computer, a modem, and appropriate bulletin board style software to play MUD.

Don't forget to enclose this coupon, or a photocopy of it, when you send in your idea, which can be written or drawn or both, to *Your Computer*, Room L221, Quadrant House, The Quadrant, Sutton, Surrey SM2 5AS.

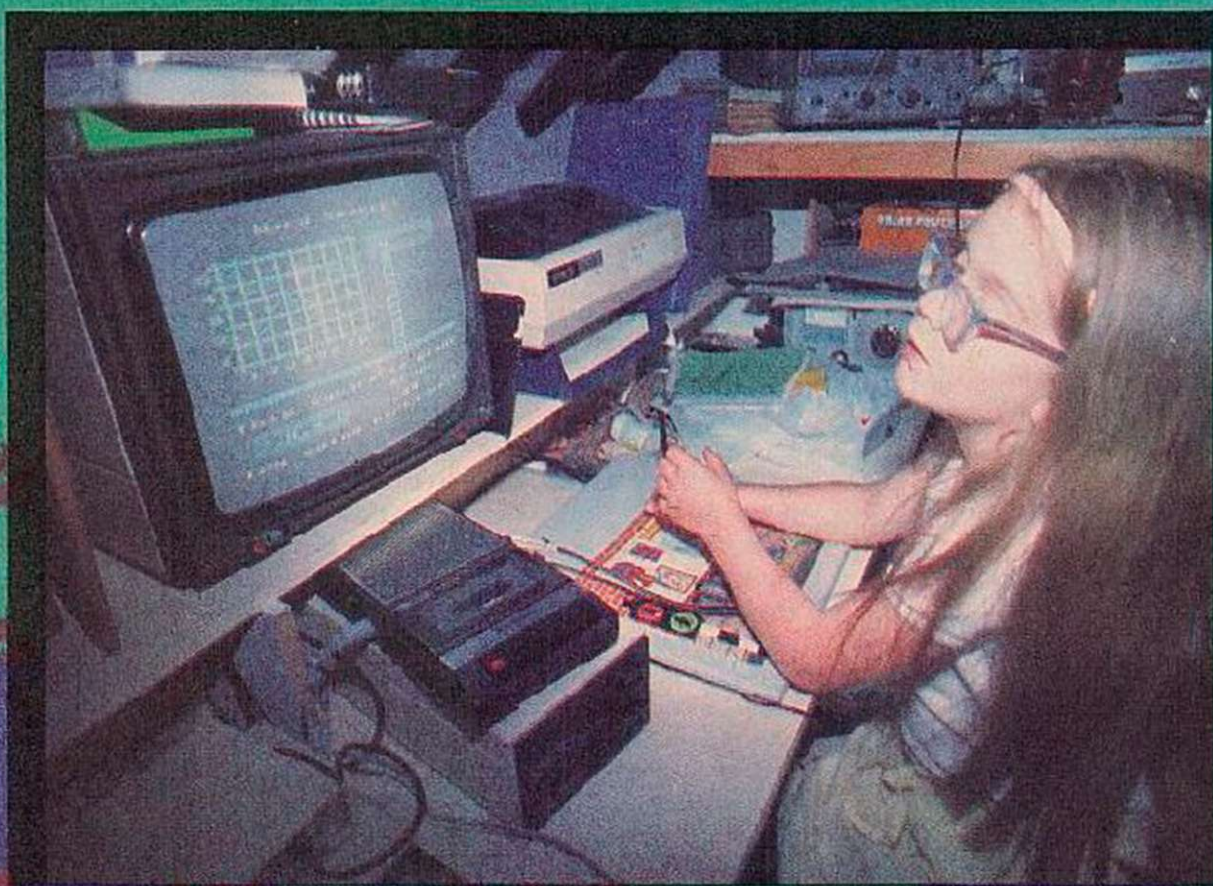
Name _____

Address _____

Written or drawn idea for new interactive adventure — use extra paper if necessary.

RULES

- The winner of the competition will be the person who, in the view of the editor, comes up with the most amusing or clever idea for a new interactive type of game.
- The name of the winner will be printed in the December issue of *Your Computer*.
- All entries must arrive at the *Your Computer* offices by the last working day in September 1985.
- Each person may enter the competition only once.
- Entries to the competition cannot be acknowledged.
- No employees of BPI or their relatives may enter the competition.
- The decision of the editor is final.
- No correspondence on the result of the competition will be entered into.
- BPI assumes no responsibility or liability for any complaints arising from this competition.



GRAPHICS PADS... PENS... DIGITISER

John Dawson trips the light pens fantastic, plus graphics pads and a budget digitiser.

ANIMATED AND still computer generated pictures are used in feature films, commercials, cartoons and advertisements. Computer assisted design is big business for architects, engineers and large computer software houses. There is a vast range of diagrams, pictures, plans and shapes that can be drawn for different purposes.

You may want to draw a two dimensional chart using bars, lines, pie segments or symbols, a circuit diagram for a piece of electronic equipment, a printed circuit board layout, a three dimensional plan for a house extension or an engineering blueprint to give to a toolmaker.

Graphpad is a graphics pad which can measure the position of a stylus in two axes and

return the X and Y co-ordinates to the computer. The version of Graphpad that I examined was intended for use with the BBC micro but other versions, with different software, can be used with a number of other machines. The pad draws its power from the BBC microcomputer.

Comfortable to use

The Graphpad weighs only one kilogram and is 14 by 10.25in. with an effective drawing area of approximately 10.5 by 7.5in. The drawing area is a little smaller than a piece of A4 paper and that can be very convenient for transferring diagrams to the computer. One lead from the

pad is connected to the user port of the BBC microcomputer and a second lead runs from the left hand side of the pad to a lightweight stylus or pen.

The pen is comfortable to use and has a metal tip which presses on to the perspex overlying the surface of the graphics pad. The manufacturers suggest that you should place this sheet on the surface of the graphics pad for the best results. There is a microswitch inside the body of the pen and the cursor appears on the screen of the computer VDU when the tip is pressed. If you press the pen tip when it is not pressed down on to the pad the cursor moves randomly on the screen.

British Micro supplies three programs on disc to accompany the graphics tablet. The first prints the X and Y co-ordinates of the pen on the VDU screen and the second program is a general purpose drawing program with commands to draw lines, rectangles, triangles, circles and freehand lines.

You can fill any enclosed shape or the background, draw lines in three different widths, save and load drawings to disc or tape and print a drawing in positive or negative using a screen dump routine for the Epson MX and FX series printers. The third part of the software is called a "CAD" program.

CAD stands for Computer Assisted Design. Flexible manufacturing systems are just beginning to appear in which computer assisted design is the first part of the process. After drawing something that is to be manufactured, a new washing machine for example, on the screen of a computer, it should be possible to check the strength of various components or the validity of the electrical wiring diagram using a separate computer program.

When the design has been confirmed, the computer should generate instructions to be sent to numerically controlled machine tools that will press metal panels, machine rotors and wind armatures for electric motors, weld sections of the case and lay wires in a wiring jig to form the cable harness. By changing the program that's sent from the CAD computer the product can, in theory, be turned from a washing machine into a dish washer or tumble dryer.

The Graphpad CAD program is not a competitor for the Automatic Dishwasher Designer Award 1986. It is actually quite disappointing for all you can do is design a series of shapes on a 16 by 16 grid, place these into a number of pigeonholes and then arrange the scaled down shapes on the screen linking them with lines. It is not possible to alter the scale of the shapes once they have been defined, nor can you add text to the diagram for labels or titles. Despite being able to place a grid pattern on the VDU to help with the alignment of various shapes, I found it quite difficult to drag the shapes or icons to precisely where I wanted them.

I liked the Graphpad hardware for its neat, robust design and the drawing program worked well. There is a listing of the drawing program at the back of the instruction manual and it should be easy to extend or modify this to suit your own requirements. The CAD program was disappointing.

The sensitive area of the Touchmaster graphics pad is exactly the same size as a piece of A4 paper. The Touchmaster is self powered by its own mains plug/transformer and must contain a dedicated microprocessor. Both serial and parallel ports are fitted to the back of the case and there is a socket for a foot switch as well. The short handbook supplied with the pad shows how it can be connected to popular machines such as the BBC micro, CBM-64, Dragon 32/64, Spectrum and Vic-20.

In the case of the BBC micro, a lead connects the touch pad to the RS-423 serial port. Unlike the other touch pads and light pens, the Touchmaster outputs X and Y co-ordinates as information that can be read as the equivalent of a key stroke in a Basic program. All you need to include in your programs are the following

Basic instructions:

```
10 *FX 2,1
20 *FX 7,7
30 *FX 21,1
40 IF (GET AND &7F) < 64 THEN 40
50 X = GET*64 + GET
60 Y = GET*64 + GET
```

That's really not very difficult. Accessing the RS-423 serial port is also easy in machine code if you need the whole system to run faster than is possible in Basic. Interfacing the Touchmaster is very easy and the use of the serial port may well avoid clashes with other peripherals — it is at least easier to plug and unplug leads to the serial socket than to the user port. The resolution of the Touchmaster pad is not stated in the user instructions.

Multipaint was supplied on cassette. It works well and is a lot of fun to use. Probably it's the best simple drawing program that I've found for the BBC. The program is written in Basic and can be modified to suit your own needs. Unfortunately, I couldn't get Simon's Squares to load but Word Search entranced my six year old younger daughter. The program requires concentration and as good a memory as you can manage.

The instructions contain a couple of mistakes but the bright overlay for the touch pad works well with the screen display. Spell-copier was less successful, partly because the program requires a fiddly attention to the exact positioning of the helicopter carrying the letter you have to drop into place.

Pad has two switches

The Saga Bitmap is made in West Germany and plugs into an analogue-to-digital interface designed for use with the Kempston joystick on the Spectrum computer. The sensitive area is smaller than the other two pads — 5ins. by 3.75ins. — but this didn't seem to make it more difficult to position the cursor where I wanted. The pad has two switches on the left hand side of the case that are used to tell the computer when you have a choice from a menu or set the cursor correctly in place.

The Touchmaster pad is set up with two soft "keys" at the bottom right side of the drawing area when you are using Multipaint and the Graphpad device requires you to press keys on the computer keyboard. I preferred the Touchmaster approach because you can concentrate on the pad and the screen without being distracted by the keyboard or a separate switch. Nevertheless I liked the consistency and feel of the Bitmap pad while I was using it with the Saga Style program.

Style can be used with either the Bitmap or a joystick. The program can be transferred to a Microdrive. It has all the usual facilities for drawing lines, rays — multiple lines from a single point — circles, triangles, boxes, freehand shapes and freehand points. You can fill any enclosed shape and can unfill the shape if you make a mistake.

The most advanced facility allows you to zoom into a section of the picture, alter individual pixels and then zoom out again. Other utilities provide for solid or shaded fill, localised or universal colour changes and two different brush types.

The Touchmaster Multipaint program has more brush styles and widths and will draw regular polygons with between three and nine

EQUIPMENT AND SOFTWARE MANUFACTURERS

GRAPHPAD BBC

Supplied with:
XY coordinates program
Drawing package
CAD program

British Micro, Penfold Works, Imperial Way, WATFORD, Hertfordshire WD2 4YY
Telephone: 0923 48222

TOUCHMASTER BBC, Spectrum, CBM-64, Vic 20, Dragon

Supplied with:
Multipaint drawing package
Also supplied for review:
Spell-copier, Simon's Squares, Word Search

Touchmaster Ltd, P.O. Box 3, Port Talbot, West Glamorgan SA13 1WH
Telephone: 0656 744770

SAGA GRAPHICS PAD Spectrum

Also supplied for review:
Style

Saga Systems Limited, 2 Eye Road, WOKING, Surrey GU21 4JT
Telephone: 04862 22977

DATAPEN BBC, Spectrum

Supplied with:
SKETCH — Drawing program
SHAPE
INTRO

Also included for review:
DEFINE — Sprite designer and animator
BRITAIN — Map of the UK with questions and lightpen answers
CIRKWIK — a program for drawing electronic circuit diagrams
Datapen Microtechnology Limited, Kingsclere Road, OVERTON, Hampshire RG25 3JB
Telephone: 0256 77084

PLOTMATE BBC

Supplied with:
Main system disc and utilities
Demonstration character set and 'enter data and plot program'
Vibrating string displacements
Rainfall chart
Function keys reminder
Map of Britain

Also supplied for review:
LINCAD — Technical drawing package
LINTRONIC — Electronic circuit diagram plotting program
LINCHART — Bar and pie chart program for plotting flat and 'solid' charts

Linear Graphics Limited, 28 Purdeys Way, ROCHFORD, Essex SS4 1NE
Telephone: 0702 541664/5

ANIROG SUPER SKETCH PAD CBM-64

Supplied with:
Super Sketch starter kit
ANIROG, Unit 10, Victoria Industrial Park, Victoria Road, DARTFORD, Kent DA1 5AJ
Telephone: 0322 92513/8

LEONARDO Spectrum

Graphics package
Creative Sparks, Thorn EMI Software

sides. These things apart, the two programs are very similar. Unlike Graphpad, neither will dump a drawing to a printer.

The **Anirog Super Sketch - Model G2100** works on different principles to the graphics pads that I have described so far. A long arm protrudes over the drawing area from a housing at the top of the pad. The position of the stylus at the end of the arm is calculated from the rotation of two potentiometers inside the housing. The arm has a geared track underneath and this provides information about how far the stylus is up or down the pad while the rotation of the arm provides the other signal. Buttons on the top housing can be used to select a function from a menu displayed on the VDU, "Lift" the pen from the pad — electronically at least — and return to the Menu. The software supplied with the Anirog sketch pad works well and has a couple of unique features.

"Undo" will erase the work you have done since the menu was last displayed and "Mirror", "Quad" and "Flip" will split the screen and copy what you are doing either to the other side, into the three other quarters, or from top to bottom. That's a good way to achieve symmetrical drawings and the undo command is much easier to use than the erase functions in most of the other packages.

I didn't like the mechanism in the Anirog sketch pad particularly after using the Bitmap and Touchmaster graphics pads. I would be concerned about wear developing in the gear mechanism that turns the potentiometers and the steadiness that you might appear to gain from the arm as opposed to the free pen didn't help my two children to draw straighter lines.

However, the Anirog sketch pad works perfectly well and the drawing package is perfectly adequate for designing pictures and saving them on tape or disc. The manual suggests that photographing the screen is one way of reproducing what you have created.

Well made unit

A light pen is a device which detects when the spot of light on a scanning visual display unit — an ordinary TV or monitor — has passed underneath the sensor. In conjunction with software or hardware, the CRTC chip in the BBC micro, the position of the lightpen on the screen can be determined and the information fed into a program running in the computer.

The **RH Lightpen** is a well made unit. The body of the pen is a slim, comfortable to hold, cylinder with a red LED at the back of the pen — facing the user — and a tapering nozzle at the front. A flexible lead connects the pen to a metal cased unit that connects in turn to the analogue port of the BBC microcomputer.

The software included with the RH Lightpen consists of a number of procedures that can be incorporated into your own programs in addition to two good games which are played with the lightpen. The drawing routine works in Mode 0 and is much simpler than the software provided with other products. However, R H Electronics also produce a program known as Art Master.

Two versions of the **Datapen** were sent for review. One connects to the A to D port on the BEC microcomputer and the other is connected to a socket which plugs into the bus on the back of the Spectrum. It is not possible to plug

another unit on to the back of the Datapen connector — it must be the last item in the stack. The Spectrum version of the pen can be used with both the 16K and 48K computers although the programs to save a picture to tape and load it back in again have to be loaded separately if you have the 16K machine.

A lot of software was supplied with the Datapen. You can create teletext screens, animate sprites — this is great fun — play a quiz about the British Isles and draw pictures. Cirkwik is a disc based program that allows you to create circuit diagrams for electronic, hydraulic or pneumatic circuits, flow diagrams or any other drawing that requires only symbols and lines drawn at rightangles.

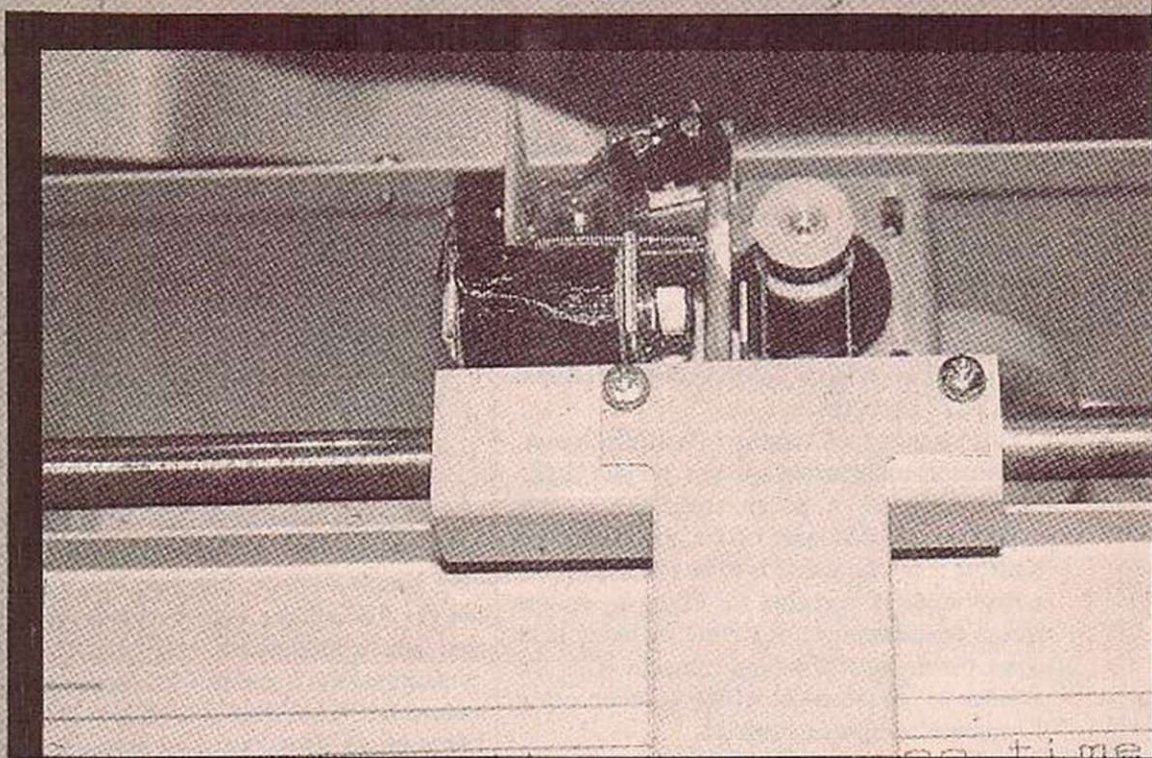
Multiple screens can be linked together to produce a diagram four screens wide by two screens high and up to 640 different symbols can be used in the course of preparing a diagram. Cirkwik is really rather like a graphics

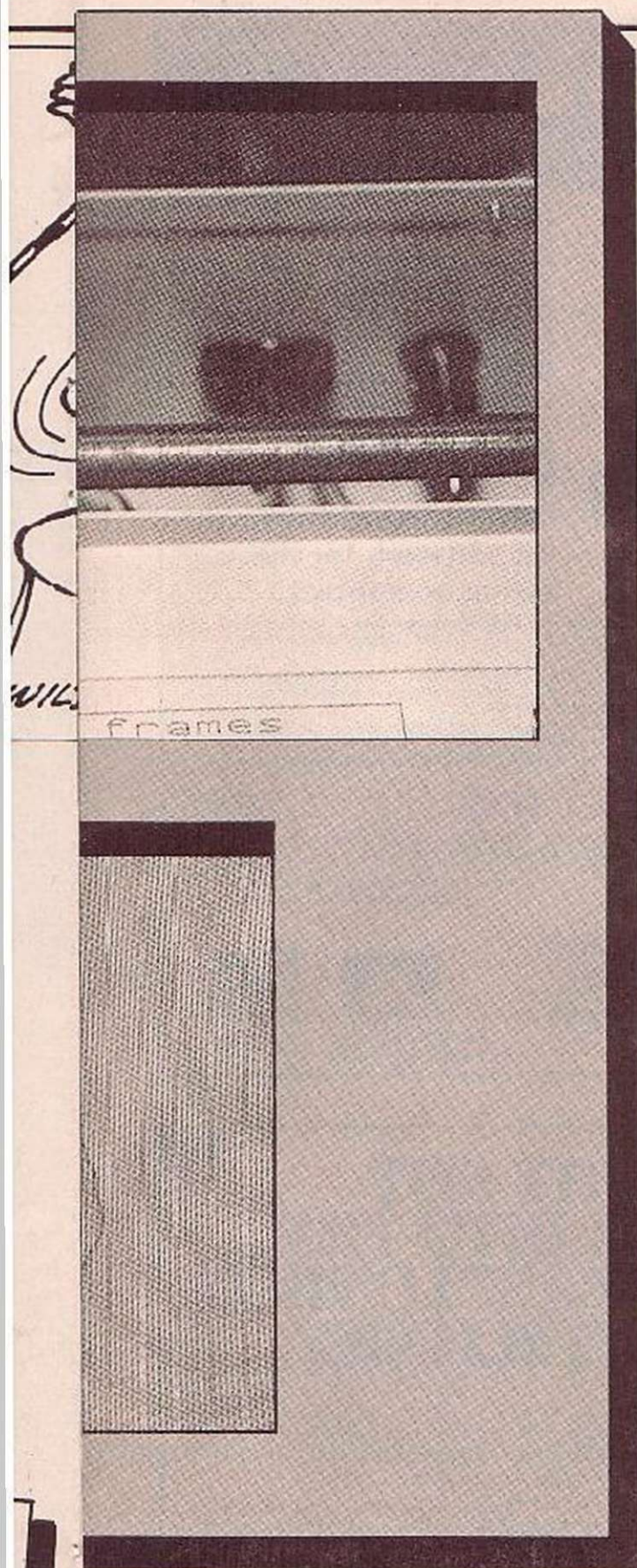
word processor in which symbols are placed in position and linked by lines. If you change one symbol in the symbol table, each occurrence of the symbol in the diagram will also be altered.

The **Plotmate** plotter is a delight to use. It is a flatbed plotter where the pen is moved in two dimensions. Other machines, the Epson HI-80 for example, move the pen in one dimension and the paper in the other. The Plotmate will handle card or thick paper that will stop the Epson dead in its tracks. The penalty is the Plotmate's greater size — 15 by 14 by 6.5in.

The Plotmate is very solidly constructed with a steel case that will take a lot of wear and tear. The plotting mechanism reminds me of the standard of manufacture you find inside a commercial Qume or Diablo daisywheel printer — intended for continuous use over prolonged periods. Despite this reassuringly massive feel, the Plotmate weighs only 6.5 kilograms.

There's so much you can do with the Plot-





mate that it's impossible to cover it all in part of one article. I hope to write about the Plotmate in much more detail later in the autumn. However, for the moment here is a selection of the facilities that come with the basic machine:

- The VDU 23,255 instruction can change the logical colour on the VDU and can be used to prompt the user to change the pen colour in the Plotmate. Black, Red, Green, Brown, Blue and Violet pens are available.
- Text can be plotted in different sizes, orientations — up, down, left to right and right to left — and four different slants — italics. The VDU 23,255 instruction accepts parameters to modify the character height, character width, character slant, character orientation, pen speed, shading and broken line patterns and scale. One more parameter controls functions such as up-

side down plotting, setting the plotter origin and toggling the colour change prompts.

- You can fill triangles and other blocks quite automatically with either solid colour or a large variety of less dense or broken lines.

Plotmate gets its data by intercepting the commands in the OSWRCH channel and sending them on afterwards to the BBC micro operating system. One version of the plotter driver is designed to be located just below the Mode 4 screen RAM, another leaves more room for your Basic program but does not permit simultaneous plotting on screen and to the Plotmate.

You can run the Plotmate driver with the second processor leaving all the secondary Ram free for your programs. The Plotmate driver can be loaded from within a Basic program when you require it by simply changing HIMEM and using the instruction

*RUN H.PLTIMATE

Finally, you can directly access routine to move the pen, and generally control the plotter in both Basic and machine code.

The figures show how a screen display can be transferred to the plotter. The programs to produce both diagrams are standard Accorsoft software from the Creative Graphics and Graphs and Charts packages run with Plotmate in operation. The map of Great Britain and the circuit diagram were produced by demonstration programs supplied with the plotter.

The **Print Technik Digitiser** is a small box that plugs into the user port of the CBM-64 computer. The digitiser works by sampling a number of video frames and building up a picture in four levels of brightness in the computer memory. The stored picture is 256 by 256 points in size and 150 by 200 points are visible on screen at any one time.

You can assign different colours to each of the grey levels and can run a separate program to resolve 16 levels of brightness for special purposes. Once a picture has been acquired by the digitiser, the device can be disconnected from the computer and the image manipulated by the software alone.

The image can be dumped to black/white and colour dot matrix printers and may also be 'edited' using a light pen. Another program in the package will detect a change in the digitised image and sound an alarm if certain parameters are exceeded. The Print Technik digitiser was easy to set up using a Panasonic A2 camera and Panasonic NV 180B video recorder as the signal source.

The pictures were clear although the camera and the object must both be kept stationary as the digitising process takes three or four seconds to complete. It's very clever and a lot of fun.

There is one graphics package for the Spectrum that doesn't cost a lot of money and is more sophisticated than the other drawing software included in this review. **Leonardo** can draw in three dimensions and has a 'programmed draw' facility for drawing patterns, shapes, singly or repetitively, with scale expansion, translation or rotation. The rotation increment can be set to any number of degrees unlike many other programs which cope only with rightangle changes. **Leonardo** will work with the keyboard alone or any of the popular Spectrum joysticks.

PRINT TECHNIK VIDEO

DIGITISER

CBM-64

Supplied with:

Program suite to capture video picture, 'edit' the picture, store picture on disc, dump a picture to dot matrix printer

CRL Group PLC, CRL House, 9 Kings Yard, Carpenters Road, LONDON E15 2HD

Telephone: 01-533 2918

R H ELECTRONICS LIGHT PEN BBC

Supplied with:

Light pen utilities
Draughts game
Kwartet game
Mode 3 free hand drawing program
Swan — Mode 2 picture

R H Electronics (Salce) Limited, Chesterton Mill, Frenchs Road, CAMBRIDGE CB4 3NP

Telephone: 0223 311290

COMPUTER ART AND GRAPHICS —

How to program with personal computers

Written by Axel Bruck

Published by Paul Petzold Limited London (1984) ISBN 0-946970-06-8

CONCLUSIONS

■ A lot of software has been written for onscreen graphics displays on most of the popular microcomputers. Plotmate can use those programs directly to transfer data from the BBC screen to the plotter.

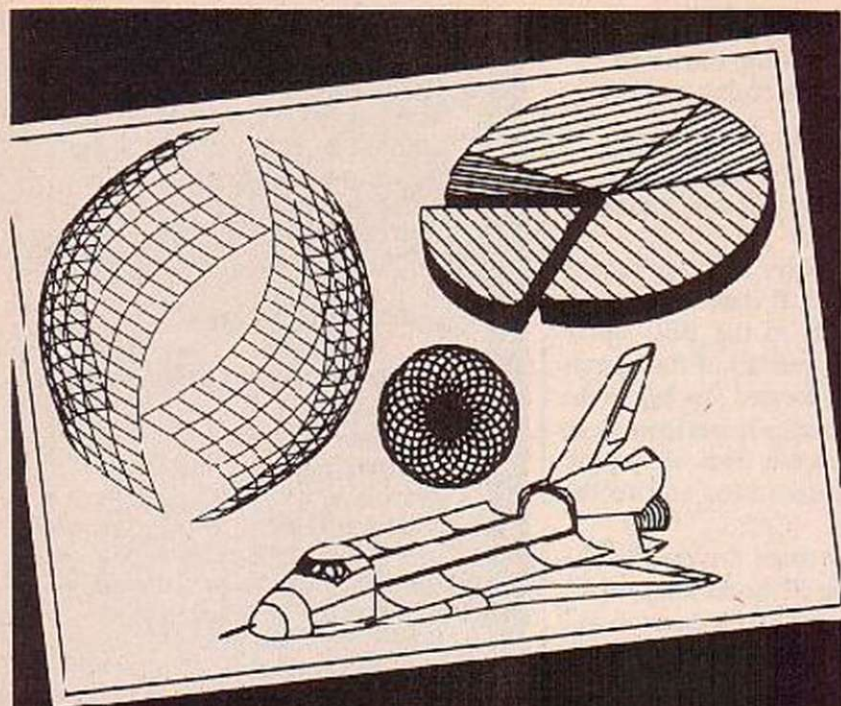
■ Graphics tablets or pads have been available for some time for minicomputers and big, serious jobs. Until recently they came with big, serious prices attached to them so the Graphpad, Touchmaster and B-map are all good value for money as peripherals.

■ **Leonardo** is the best drawing and painting program for the Spectrum and you don't even need a joystick or a graphics pad.

■ Axel Bruck's book *Computer Art and Graphics* is superb. It illustrates magnificently how a computer can be used to draw complex repetitive patterns that appear to have depth and perspective. The explanation and programs in the book can be adapted to draw and plot almost any shape. But that is done by entering figures that describe the various lines and movements necessary to construct the shape. None of the software included in this review will allow you to draw a diagram in three dimensions on the computer's screen with either a graphics pad or a light pen and then rotate or scale the figure to suit your needs.

■ The video digitiser could be useful for preparing sales literature or catalogues where you want to include a picture of a piece of equipment or a logo into the middle of a text. It is certainly great fun to play with but remember you'll need a standard source of video signals, an ordinary video camera for example, to feed the device.

■ For my purposes I would buy an R H Electronics lightpen or the Graphpad or Touchmaster graphics pad and couple that to the Plotmate, writing the software to manipulate the data with the help of Axel Bruck's book.



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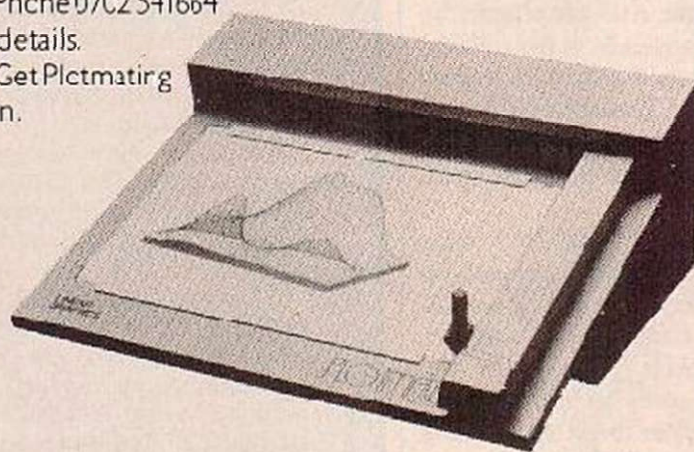
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EDUCATION: REPLACING TEACHER

Software or swotware? Josephine Adams' end of term report reviews the class.

WHAT MAKES a good piece of educational software? Ask 20 different people and you'll get 20 different answers. To the parent, it has to help their children be better scholars and get a better job. To teachers it adds something to their task that would otherwise be difficult, impractical, or even impossible. To the kids, it makes what is usually boring a bit more fun. To the supplier, well, the educational label can give an indifferent program credibility and so possibly greater sales. But unfortunately to most people, it means very little at all!

1981 marks the beginning of the computers in education boom. With government help, schools started to equip with micros, namely, the BBC — plus the Research Machines' 380-Z and 480-Z with a few Spectrums to boot.

Unfortunately, the software of that era did more than anything to put teachers off using computers — not that many of them were keen anyway. Chalk and talk could achieve much better results than most educational software of the day. In retrospect, it was asking too much for it to have been otherwise.

Programs performed on screen what the teacher did in class — except not as well. The dreaded drill and practice program dominated: the computer asks a question, the children answer it and, if they're lucky, receive a graphical reward sequence — a big screen tick.

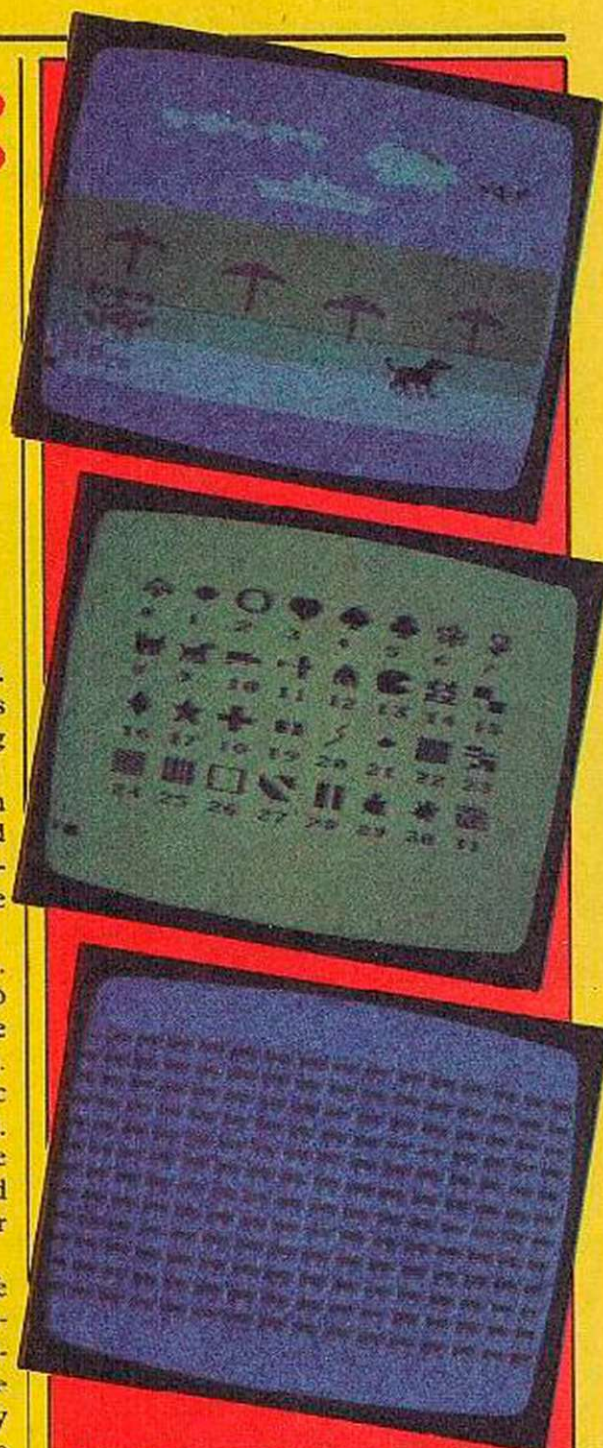
But the situation has improved, dramatically. Over the past year or so, teachers and suppliers have got together to develop some very exciting applications.

Lessons have been learned: the computer can do some things well — not everything — and these areas have been exploited. Where educational software has succeeded, the results have been spectacular.

Consider these examples: remedial English. The mechanical ability to write is not there so the creative expression has dried up and the desire to learn with it. Enter word processing. Perfect hard copy every time thanks to a few basic functions — insert, delete, search and replace. The BBC Micro, currently the standard machine in education, supports quite a few good word processors, though none better than Computer Concepts' Wordwise Plus.

Or, history. How can you get a real feel for life in the Viking era? Enter the historical simulation. Decisions have to be made based on conditions of the time — the outcomes of which have no less significance in the 20th century than they did in the 10th. In case you're wondering, there is in fact a wonderful program from Fearnleaf called *The Vikings*.

Let's stay with the humanities and take a look at geography. One of the best collections comes from BBC Publications, called *Introducing*



Logotron Logo and sprite creation. Top, arcade graphics using simple Logo commands. Middle, this Logo can handle up to 32 sprites at a time. Bottom, multiplying cats.

(continued on next page)

WARNING: COMPUTER STUDIES CAN DAMAGE YOUR FUTURE!

One: a home computer is not really going to help youngsters get a job because all they want to do is play games. Nothing wrong with that: there are some marvellous games around and the entertainment aspect of the computer at home is its main appeal.

Two: computer studies as taught in the majority of schools is almost completely irrelevant to what goes on in the real world. That, I hasten to add, is not the fault of the teachers but the exam boards. Whether the O or A level computer studies candidates go into higher education or employment, they will have to unlearn what they have acquired so far and then tackle what is being asked of them.

Employers rarely want Basic programmers; they want people skilled in Cobol, Fortran and assembly language. Universities and polytechnics don't give a hoot for Babbage; they demand a working knowledge of Winchester hard-disc systems, protocols for computer communication, user-friendly software interfaces.

Three: social interaction, organisational skills, people management are all more important than the vast amount of technical knowledge believed to be necessary when working with computers. A number of educationalists are becoming rightly concerned with the computer junkies, the increasingly common place of youngsters becoming hooked and ignoring everything else in life. If you can't communicate effectively with other people, you will be seriously hindered in your

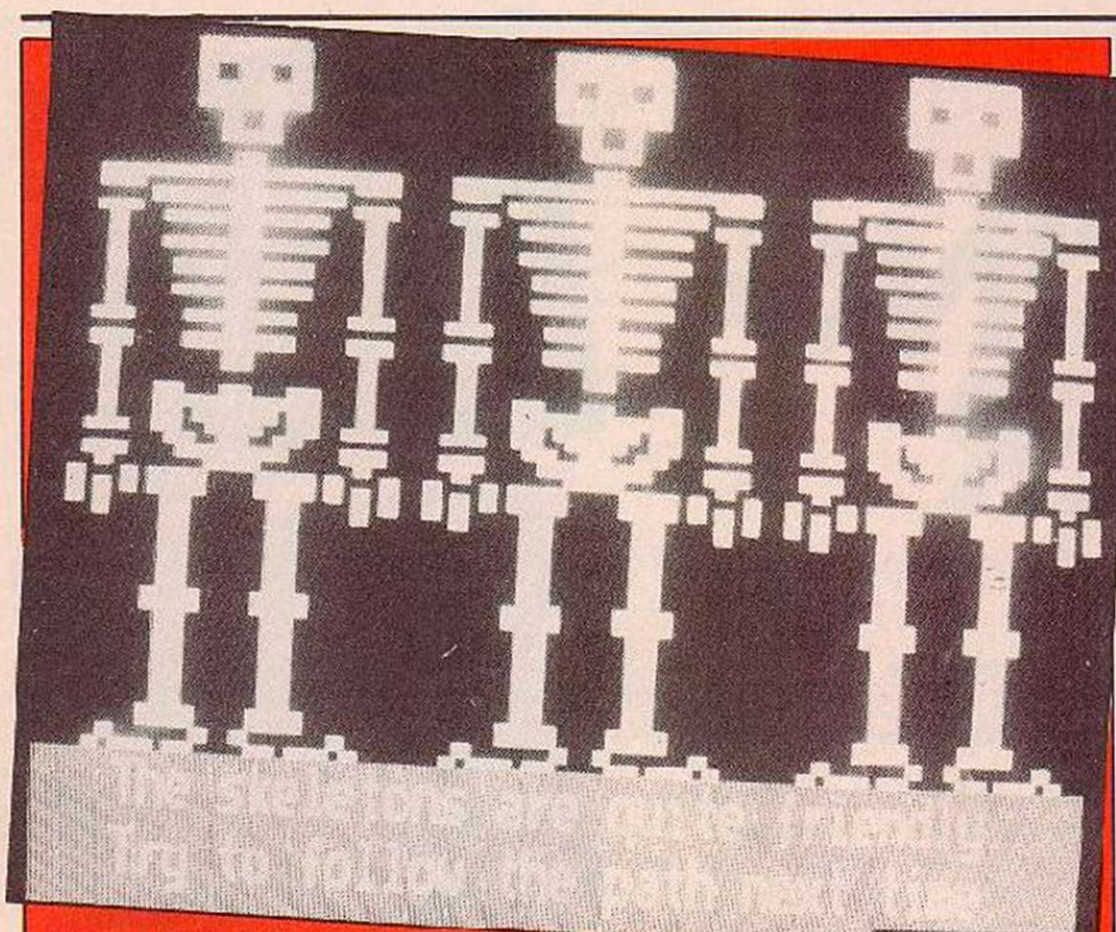
working life, whatever you choose to do.

This is not meant to be pessimistic, just cautious. High expectations more often than not end up as disappointments.

One step in the right direction is the increasing number of training centres of one description or another which attempt to meet specific needs above and beyond conventional educational institutions. ITECs (Information Technology Centres) are springing up all over the country and provide courses for predominantly unqualified 16 and 17 year olds in various aspects of computers from viewdata editing to word processing.

Within schools themselves, an initiative has been introduced by the DES to cater for the broad range of skills required within the hi-tech industries ranging from computer-aided design to electronic engineering. This is the so-called TVEI scheme or Technical and Vocational Education Initiative.

A skills shortage undoubtedly exists where jobs remain unfilled because so far inadequate attention has been paid to meeting industry's requirements. Those jobs are not for programmers but for creative technical people: I've seen many primary school children with the potential to meet those needs, if only Rank Xerox, ICL and others can wait 10 years or so!



Above: 4 Nation's Dragon World.

(continued from previous page)

Geography. Four programs take you through different aspects of the subject via simulations of a nomadic lifestyle, an expedition to Everest, a river journey and an airline flight: all first-class learning material.

Maths has always been considered an appropriate subject for the computer. For the early years of school, there are a couple of outstanding programs that are a must for any primary school software library. The first is called Maths with a Story (BBC Publications); the second is Cars — Maths in Motion from a highly respected educational software supplier, The Cambridgeshire Software House.

But computer assisted learning aside, there are new opportunities for learning that the computer and its software have created. This is the real breakthrough.

One example, and perhaps the best, is Logo. All the common home computers have an implementation of Logo though the better ones are Logotron Logo for the BBC Micro and Atari Logo.

Logo basically offers the young computer user the chance to explore for themselves the world of maths, programming, computer graphics and control. In school, it can form the basis of a year's work; at home, it means hours and hours of fun — much more so than the average game. And it's very educational!

Another example is information handling. Success in this world depends on the individual's ability to manipulate information not to store it: to find it, collect, retrieve and interrogate it. It is here that being able to use a computer may help its user to get a good job.

Forget programming, systems analysis and computer science; computers will soon be able to do all that for themselves. What is important is the information handling skill — the heart of the information technology boom.

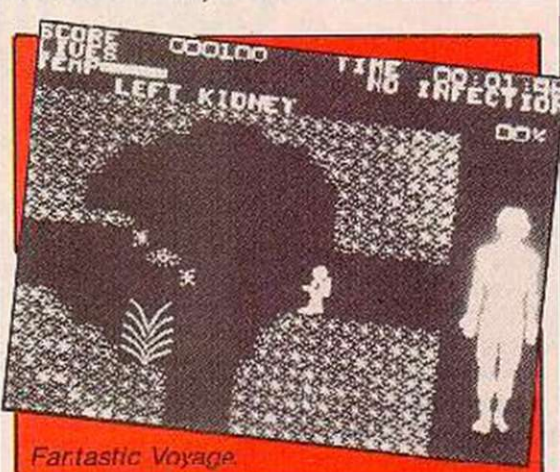
It is here too that the computer fits most comfortably into other, more familiar, areas of classroom activity. Kids go out daily to survey

traffic, wildlife, the eating habits of classmates and a thousand other things as part of normal project work. The creation of a database on the computer of information they have gathered can help this kind of project work but it is also a marvellous learning opportunity in its own right.

Two of the best educational database packages are Quest from the Advisory Unit of Computer Based Education (AUCBE) in Hatfield and Inform from the Nottinghamshire Computer Education Centre. The first runs on RML micros, the second on the Beeb.

In the primary school, adventures have proved to be enormously successful learning aids. Children work together in groups, share decision making responsibilities, delegate tasks — all very important aspects of a later, working life and things all too often neglected in exam-dominated syllabuses.

The spin-offs too are tremendous — creative and written work, even drama and music. With



Fantastic Voyage.

an average ratio of 20 kids to one computer, these associated activities are extremely important. The maestro in this field is 4Mation Educational Resources: little has generated as much enthusiasm or fun as Flowers of Crystal and Dragon World.

Another good example of an educational adventure is GSN's program called Merlin's Magical Shop. Within the package, you'll be

hard-pressed to find the software. There's so much additional resource material, teaching suggestions, children's worksheets, documentation, etc. Really makes you feel you're getting your money's worth.

Helping to appreciate the natural world may be the last thing you would imagine the micro being any good at. But there are two brilliant pieces of software that do just that — Osprey from Bourae Educational Software and Suburban Fox from Ginn & Co.

In one, you just protect the precariously small osprey population in the highlands of Scotland from threats ranging from nosy tourists to natural predators. You really begin to understand what conservation is all about and what it's like to be an osprey. Suburban Fox takes the process even further — you take on the role of a fox: you live, breathe and survive as a fox.

All the software monitored so far is purely educational in the sense that it was designed for use in the classroom. But what about home education?

Well, home education software took off in the boom period when millions were rushing out to Laskys and W H Smith to buy their Commodore 64s or Spectrums. Making learning fun made money for suppliers like Mirrorsoft, Longman and Macmillan who all brought out some pretty good programs.

Other names also cashed in on the market with predominantly early learning games for the seven to 12 age group. A few braved the exam revision market like Collins and Penguin, but the majority of material was for the younger age group.

One of the few companies to remain successful in this field is ASK. Time Trucker, Podd and the latest in the line — Pazzzzz — are all top quality programs. There are plenty of others too. There are versions of ASK software for most micros and at a reasonable price.

A couple of other good examples of, er, well, interesting software are Bodyworks and Fantastic Voyage. Remember the pop-up body book with the flapping lungs? Well, Bodyworks is an adaptation of that written in conjunction with Jonathan Miller. Available for the Spectrum, the graphics are tremendous. Both apply to Fantastic Voyage too — a similar program to Bodyworks but with much more of a game approach. Both will undoubtedly spur budding biologists to greater heights.

This represents but a small selection of what is on the shelves that is good and worth buying. But what will the next generation of educational software bring? One thing is for sure, it will have to be good to sell. Teachers and parents will soon acquire the confidence to discard what they know is rubbish and to demand what they know to be good; not only in terms of software but curricular and applications too.

Curriculum development — changes in what is taught in schools — is a slow, slow process. For the computer to be utilised to the full, the curriculum must change. It's beginning to happen slowly but surely in the form of new courses and qualifications. Take for example the diploma in microcomputer applications which is now being offered at a number of schools and colleges.

From Babbage and Basic, we've come to view-data and spreadsheets — practical useful subjects with a real application to the outside world: a rare enough thing in schools. Courses of this type

have identified and addressed particular needs in the commercial world and in the pupils themselves. They are modular by design and combine applications such as word processing, database, financial analysis, graphics, videotex, etc., and upon successful completion are worth much more than the average clutch of O levels and CSEs. They also demand a new approach to educational software.

This brings us neatly to one of the major new developments within the educational field and elsewhere — the availability of cheap 16-bit computers. This combats two of the restrictions of current activities. The first is that working on machines like the RM Nimbus and Apricot FIE has direct relevance to industry where the same if not very similar machines are being used. So when you learn about word processing or databases, you're learning on the same machines with the same software as is in commercial use.

Also, writing decent, interesting and extensive educational software on the BBC Micro is not easy, as any software house will tell you. The machine is just not up to it. But with whizz-bang 16-bit graphics, speed and performance, developers will really be able to get their teeth into applications.

16-bit computing with its icon technology, high-speed graphics, large memory capacity and most important, ease of use, adds up to better software, better applications and a better learning environment.

What look like being the final push from MEP — the quango set up in 1981 to oversee educational computing — is in the area of 16-bit educational software development. Recently, a contract worth £25,000 was awarded to ASK to develop material for use in schools. If the company's present range of programs is anything to go by, the end result should be pretty good.

There are many scenarios for the school of the future but one of the most feasible is the increased amount of time pupils will study at home. A micro at home connected by phone to a larger computer elsewhere is a realistic possibility for home study. Many students with special educational needs use this kind of set up to undergo study because they simply can't attend school or college. If this became commonplace, we'd really see some advances in home education software.

Software and Suppliers

Wordwise Plus Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts. HP2 6EX, BBC micro, £56.35, Rom.
The Viking, Fernleaf Educational Software, Fernleaf House, 31 Old Road West, Gravesend, Kent DA11 0LH. £35.95, introducing *Geography*, BBC Publications, 35 Marylebone High Street, London W1M 4AA, BBC micro, £17.40 disc

Maths with a Story, BBC Publications (see address above), BBC micro, £9.95 cassette
Cars — Maths in Motion, Cambridgeshire Software House, The Town Hall, St Ives, Huntingdon, Cambs. PE17 4AL, BBC micro, £18 cassette and disc

Logotron Logo, Logotron Ltd, 5 Granby Street, Loughborough, Leics. LE11 4DJ, BBC micro, £39 Rom chip.

Atari Logo, Atari UK Ltd

Quest (Quest), AUCBE, Endymion Road, Hatfield, Herts. AL10 3BZ and 480-Z, £10 disc

Inform, Nottinghamshire Computer

Education Centre, Eaton Hall, Retford, Notts. BBC micro, £15 (check) disc

Flowers of Crystal, 4Mation Educational Resources, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ BBC micro and 480-Z(?), £16 cassette £17.65 disc

Dragon World, 4Mation Educational Resources (see address above), BBC micro, RML version in preparation, £16 cassette, £17.65 disc

Merlin's Magical Shop, GSN, Manchester University Press, Oxford Road, Manchester M13 9PL, BBC micro and 480-Z, £25 disc

Osprey, Bourne Educational Software, Bourne House, The Hundred, Romsey, Hants. SO5 8BY. £11.95, disc

Surburban Fox, Ginn & Co. Ltd, Prebendal

House, Farson's Fee, Aylesbury, Bucks. HP20 2QX. £30

Podd, ASK Ltd, London House, 68 Upper Richmond Road, London SW15 2RP. BBC micro, £9.95 cassette

Time Trucker, ASK Ltd (see address above), Commodore 64, £7.95 cassette


Pazzazz, ASK Ltd, (see address above), Commodore 64 and BBC micro, cassette

Bodyworks, Genesis Productions Ltd, 30 Great Portland Street, London W1N 5AD, Spectrum, £14.95 cassette

Fantastic Voyage, Quicksilver Ltd, Carlton Lodge, 16 Carlton Crescent, Southampton, Hants. SO1 2EJ, Spectrum, £6.95 cassette

NOMAD

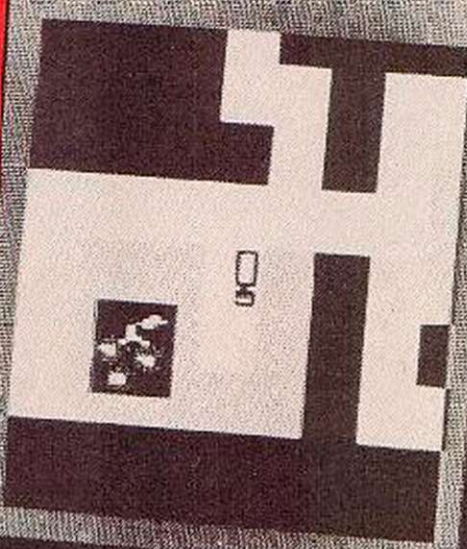
Can you keep your
cattle alive in the
Sahel of West Africa?



(c) AUCBE 1984

British Broadcasting Corporation
 Press SPACE for explanation

Above: Introducing Geography
Below: ASK's Time Trucker



02:45	02:20
03:15	03:00
03:15	03:20
03:45	04:00
03:30	02:35
04:00	03:10

£00

11	12	1
10		2
9	—	3
8		4
7	6	5
		A.M.

• THE NEW AMSTRAD CPC 664 WITH BUILT-IN DISC DRIVE



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If you know anything about computers you'll know that disc drives are up to fifty times faster than cassette when you're loading and saving programs. In fact, a disc drive makes computing faster, more reliable, more efficient and more fun. But up till now the only way to gain these advantages for a home computer was to buy a separate disc drive attachment. Now Amstrad are pleased to announce the first complete home computer with built-in disc drive: The Amstrad CPC 664.

And when you buy a CPC 664 you'll find it's not just the disc drive that's built-in.

You'll get everything you need, including a monitor (green screen or full colour). We'll even give you a free CPM and Logo disc, so all you do is plug in and you're in business.

BUSINESS OR

• PLEASURE •

Although a disc drive will make games more fun (and there are loads of them to choose from) it also makes the CPC 664 a serious proposition for the business user.

There are accounting, word-



Amsoft Business Control, is a complete suite of programs for integrated sales invoicing, stock control and sales ledger for around £99. (Requires an additional FD-1 disc drive around £159 and DL-2 cable around £7).

business more efficient and effective by providing access to the famous range of CP/M* software.

processing, spread-sheet and data-base programs (to name but a few).

The CPC 664 is also supplied with CP/M* to help make your

business more efficient and effective by providing access to the famous range of CP/M* software.



WITH COLOUR MONITOR AROUND

• £449 •



WITH GREEN SCREEN AROUND

• £339 •

THE HOME COMPUTER THAT MEANS BUSINESS.

HIGH PERFORMANCE

• LOW COST •

The one thing you won't need a computer to work out is that the Amstrad CPC 664 represents outstanding value for money.

You only have to check the cost of buying all the elements separately (64K computer, disc-drive, monitor) to realise that the Amstrad package is very hard to beat.

With a green screen monitor the cost is just £339. With a full colour screen it costs £449. And after you've saved money on the price of the computer itself, you go on saving on the price of software.

There are hundreds of programs for business or pleasure available on disc (and cassette) to CPC 664 users. Many from Amsoft, others from other

famous-name software houses. Few will cost you more than £49 and most will cost you considerably less.

AN EXPANDING

• SYSTEM •

There is a complete range of peripherals available to CPC 664 users which plug directly into the built-in interfaces.

These include a joystick, additional disc drive (to double your on-line storage) and the Amstrad DMP-1 dot-matrix printer. (There's also a cassette interface so that you can use CPC 464 programs on tape). And there are many more peripherals from Amstrad and other manufacturers which can be used to enhance the CPC 664.

• AMSTRAD USER CLUB •

Join the optional Amstrad User Club and we'll keep you informed with our monthly user magazine, and information on all software as it is introduced. Your membership details will be recorded on your personal club card, which entitles members to various privileges and offers.



Figure analysis made easy with Microspread. An easy to use spreadsheet with pull-down menus and a wide range of mathematical options. Around £49.



Please send me more information

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Address _____

Amstrad CPC 664

Amstrad, P.O. Box 462, Brentwood, Essex CM14 4EE

YC/654/4

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WITH JUST four full-time staff you could call U.S. Gold a Mickey Mouse company. And now that Geoff Brown has acquired the rights to Walt Disney productions — outbidding multi-billion dollar corporations like British Telecom along the way he just might agree with you.

In a year and a half since Geoff and Anne Brown formed U.S. Gold they have launched one title every ten days, selling a million cassettes and taking much the biggest share of the British software market. Even their bitterest critics, and they have many 'they like to knock success' claims Geoff "success breeds jealousy", admit that the invasion of American software has forced up the minimum acceptable standard for programs.

Geoff, a former Maths teacher and mainframe programmer, was running Centresoft importing mainly Atari games from America since 1981, when he realised that there was a wealth of Commodore 64 software over there and every chance that the 64 was going to be the main games machine over here. What was keeping American software out was not its quality but its price.

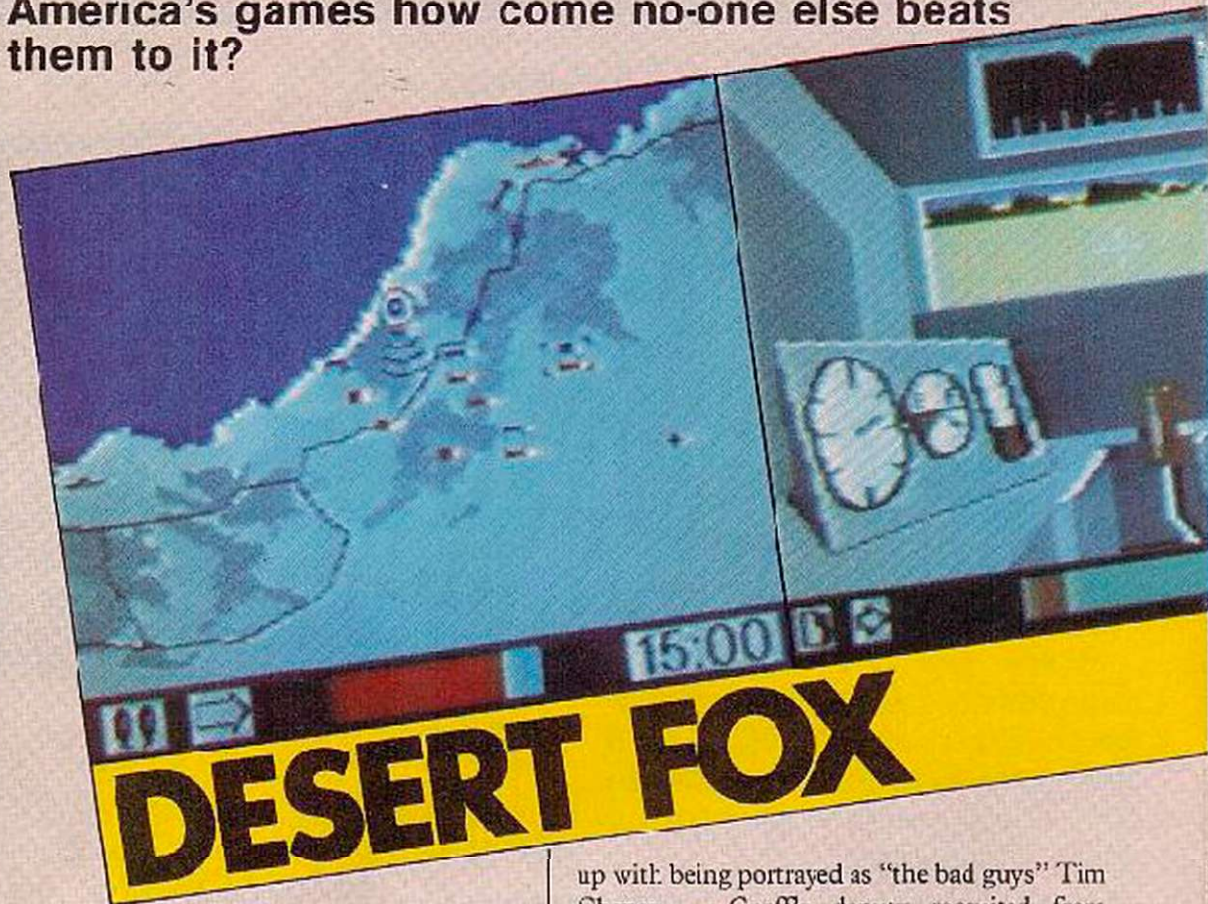
The Atari 400/800 which Geoff still believes was a "brilliant machine way ahead of its time" never sold well over here because much of the software was only available on disc and usually cost £35 a time. No-one doubted that games like Pole Position and Zaxxon were the best on any micro but people were not prepared to pay high American prices out of low British wages especially when they could buy games for the Spectrum at £5 and £6.

Geoff used his experience of negotiating licensing deals to persuade American houses to let him repackage into cassette format and reprice at around £10 so he could go for the mass market. This was the thinking behind the creation of U.S. Gold in April 1984, then he brought in Ocean to write Spectrum, Amstrad and BBC conversions of the 64 hits.

Companies like Datasoft, Sega, Microprose, Strategic Simulations and Access were all signed up on a first refusal option. Datasoft's strengths were its existing product list including the Atari-soft titles and its ability to sign up films and personalities. Microprose specialised in simulations like F-15 Strike Eagle while Epyx wrote the technically brilliant Impossible Mission which not only won awards but also stayed in the charts for six months. Sega could offer proven hits from its arcade operation such as Spyhunter, and earlier Buck Rogers and Zaxxon.

INSIDE

Sneak screen shots of the next batch of games from Britain's biggest selling software house. If it's so simple for U.S. Gold to scoop the best of America's games how come no-one else beats them to it?



But it was Access that put U.S. Gold on the map with Beachhead and the controversial Raid over Moscow, which ended up being condemned in the House of Commons, not so much for the game itself which was a well written if unimaginative shoot-em-up but for the American originated advertising copy which was so full of cold war cliches that it could have come from the Ronald Reagan Storybook.

At any rate the publicity did no harm to the sales and despite assertions that U.S. Gold is fed

up with being portrayed as "the bad guys" Tim Chaney — Geoff's deputy recruited from Commodore early this year reveals in the company's spaghetti western image. "We're like a war machine" he swaggers "we don't have competitors we only have adversaries — we're out to crush them." Nevertheless Geoff and Tim have a high regard for the other top software houses.

Ocean are almost part of the family as is Gremlin Graphics which Tim calls a "boutique-type company" — literally downstairs from U.S. Gold and controlled by the Browns. But Geoff also admires Beyond and Ultimate, "a

WINTER GAMES

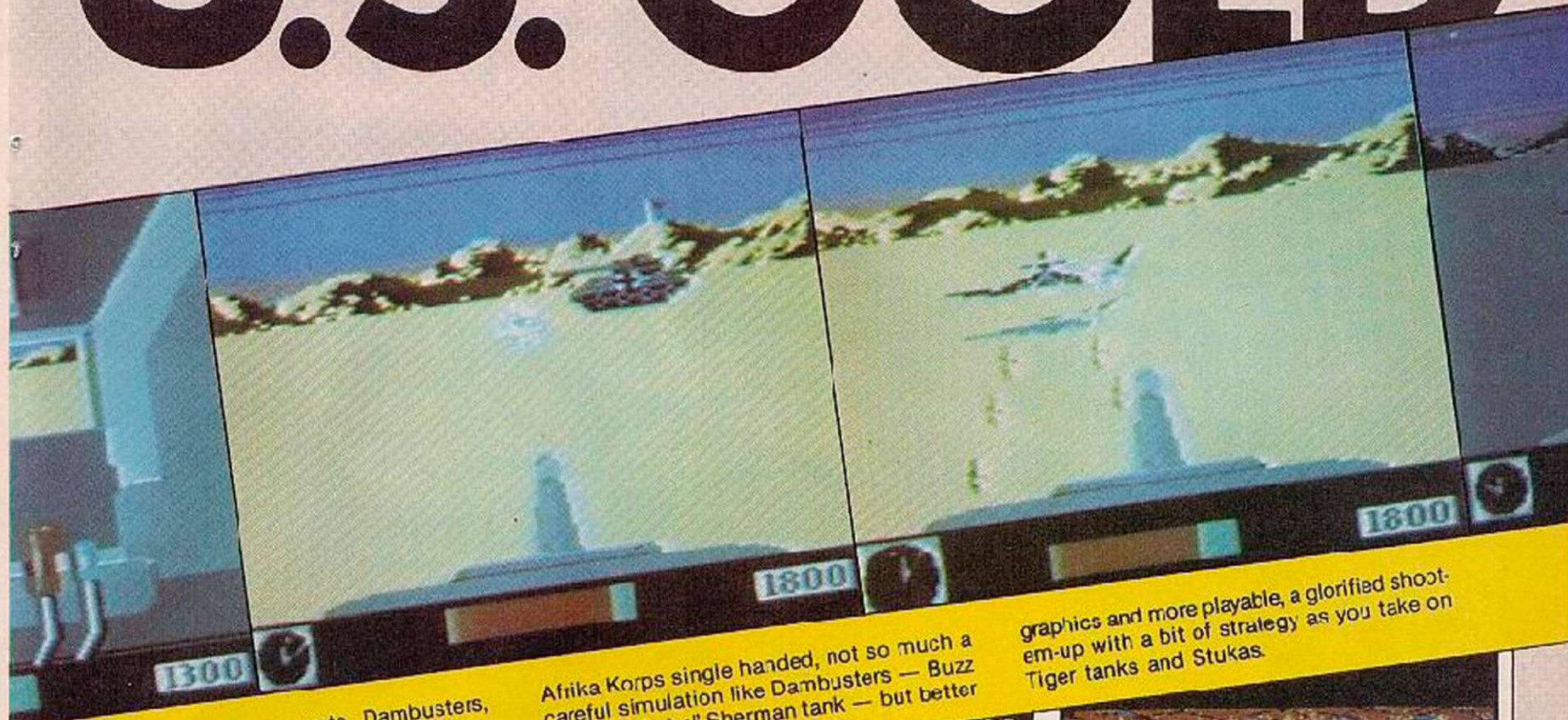
With Summer Games II already on the starting blocks U.S. Gold is counting on Epyx's

Winter Games to bring in the bread after Christmas. Summer Games I was eclipsed

by Daley Thompson's Decathlon but since then Epyx has made its mark with Impossible Mission. Winter Games again uses a decathlon approach where you have to compete in a series of disciplines such as the ski jump and cross country skiing.



U.S. GOLD



From the team that wrote Dambusters, Sydney Development, comes Desert Fox. This time you are Buzz Baxter taking on the

Afrika Korps single handed, not so much a careful simulation like Dambusters — Buzz drives a "Turbo" Sherman tank — but better

graphics and more playable, a glorified shoot-em-up with a bit of strategy as you take on Tiger tanks and Stukas.

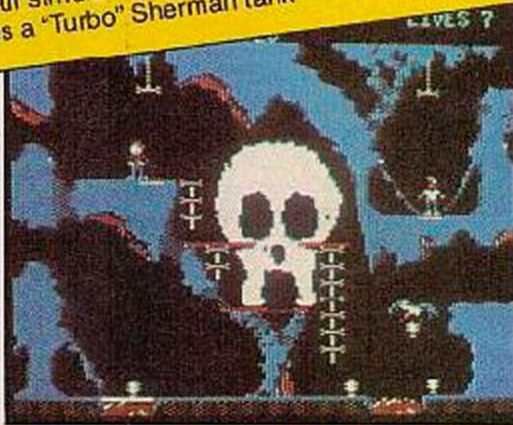
fantastic company but they're in a different part of the market — they concentrate on arcade adventures' and keeps an eye on the sleepers — middle-ranking software houses with big corporations behind them — like Robert Maxwell's Mirrorsoft and British Telecom's Firebird.

When he is wearing his Centresoft hat Geoff tries out most of the games that he plans to distribute to see if they are up to scratch "although I don't look at a new Ultimate game — I take it". He is remarkably free with his praise for other houses' games — both he and Tim feel that Boulderdash was great — should have been a number one hit, and still relish old favourites like International Soccer and Matchpoint.

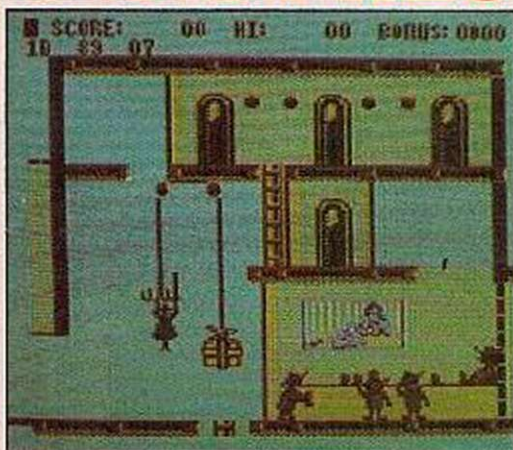
Naturally Geoff still hankers after old Atari classics and Tim prefers the Commodore 64. He believes that programmers have stretched the capabilities of the 64 to the limit now "but you can still get new tunes from an old violin".

They can appreciate the technical skill involved in a well-written Spectrum game but they don't use the machine for games playing themselves — whereas hits from the States can turn them back into addicts. "We stayed up till two in the morning when Aztec Challenge arrived to try to finish it". When Tim enthuses about Dropzone as being "like going into a china shop and smashing everything" and scars around the room you worry for a moment in case the elegant Scandinavian reading light is about to find out the risks of living on a war machine's desk.

Critics have suggested that U.S. Gold pays
(continued on page 59)



GOONIES



Alternative Reality is a quirky mixed text and graphics adventure with a slightly hippy feel — well it does come from Paradise Programming — as you steer your way through a three-dimensional maze to the Betelgeuse sales. Philip Price wrote the game with excellent music from Gary Gilbertson.

ALTERNATIVE REALITY



Goonies may look like an ordinary platform game to you but based on Spielberg's latest blockbuster, Geoff Brown hopes it will be this year's Ghostbusters.

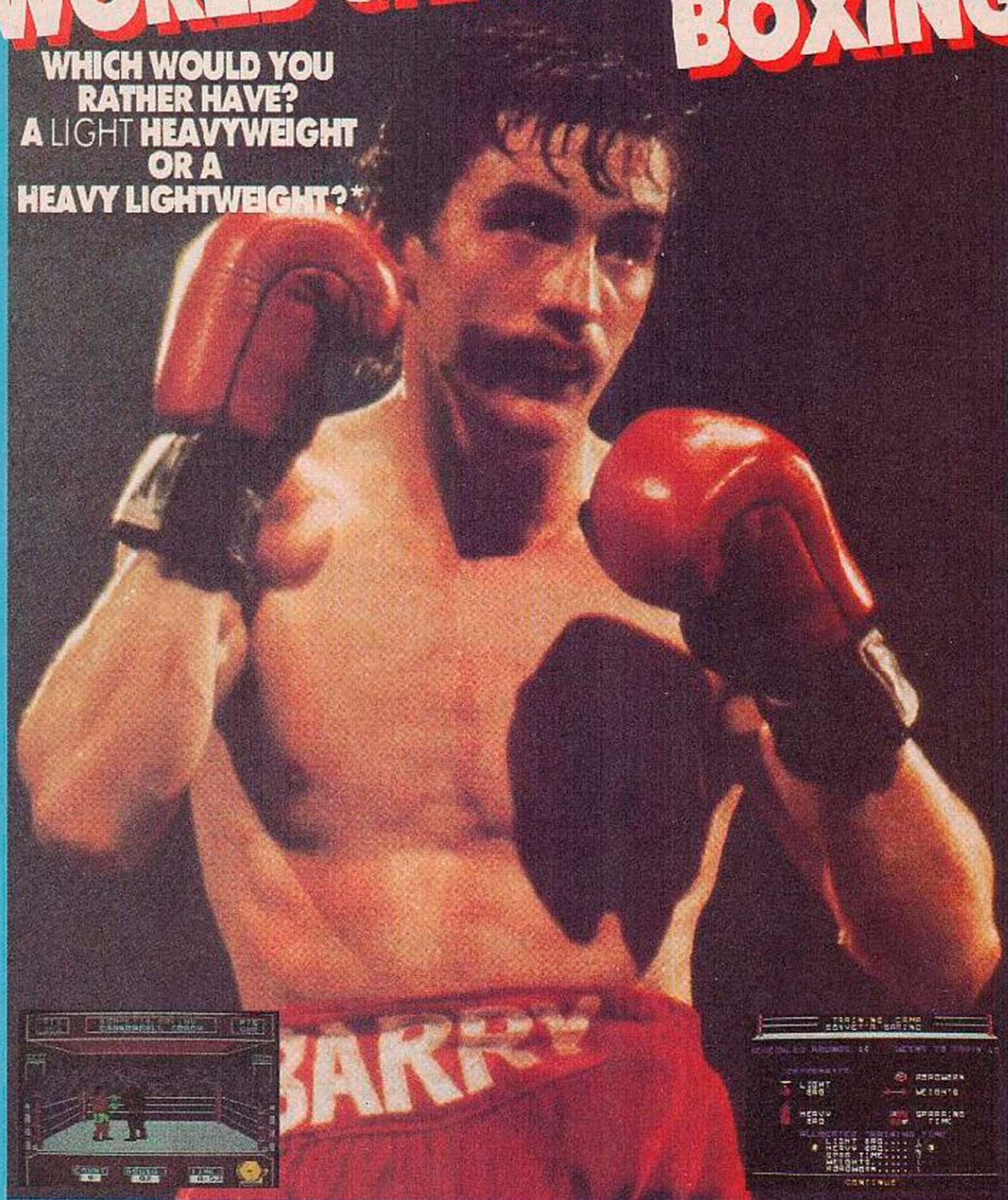
ZORRO

Zorro lets you swashbuckle like Douglas Fairbanks Senior. As champion of the common people you swordfight your way across screen after screen of oppressors.



BARRY McGUIGAN WORLD CHAMPIONSHIP BOXING

WHICH WOULD YOU
RATHER HAVE?
A LIGHT HEAVYWEIGHT
OR A
HEAVY LIGHTWEIGHT?*



Barry McGuigan World Championship Boxing. The first computer boxing game to give you 'real-life' action with all the style and strategy of the big fight.

Round One. You're up against 19 top boxers including, the champ himself, Barry McGuigan. You'd better box clever to beat these boys.

Round Two. You're aiming for the title. Time to create your very own boxing partner. You decide how he looks, how he fights. You put him through his paces to build up stamina and endurance.

Round Three. What a fight! What a champ! It's a knock-out!

*We know he is the best featherweight but we thought it was a good line.

Sport

ACTIVISION
HOME COMPUTER SOFTWARE

INSIDE U.S. GOLD



BOXING

(continued from page 57)

the Americans too high a price for the rights to their software but Geoff points out that money up front is only part of the business —

Geoff and Tim are coming to blows with the boys downstairs at Gremlin. Championship Boxing scores over Gremlin's Rocco and Elite's Frank Bruno on graphics and has train-

ing facilities and the option to create your own boxer, but its light hearted approach to the noble art of self defence will not go down well on the Old Kent Road.

otherwise the likes of CBS could have simply bought success with its superior financial resources. Geoff uses a network of talent spotters in the U.S.A. so he can concentrate resources on suitable programs. Given Gold's track record on promoting and selling he can offer a relatively accurate forecast of what a program should sell. Sliding scale payments safeguard against dollar/pound exchange rate fluctuations.

Geoff often buys the rights to programs from

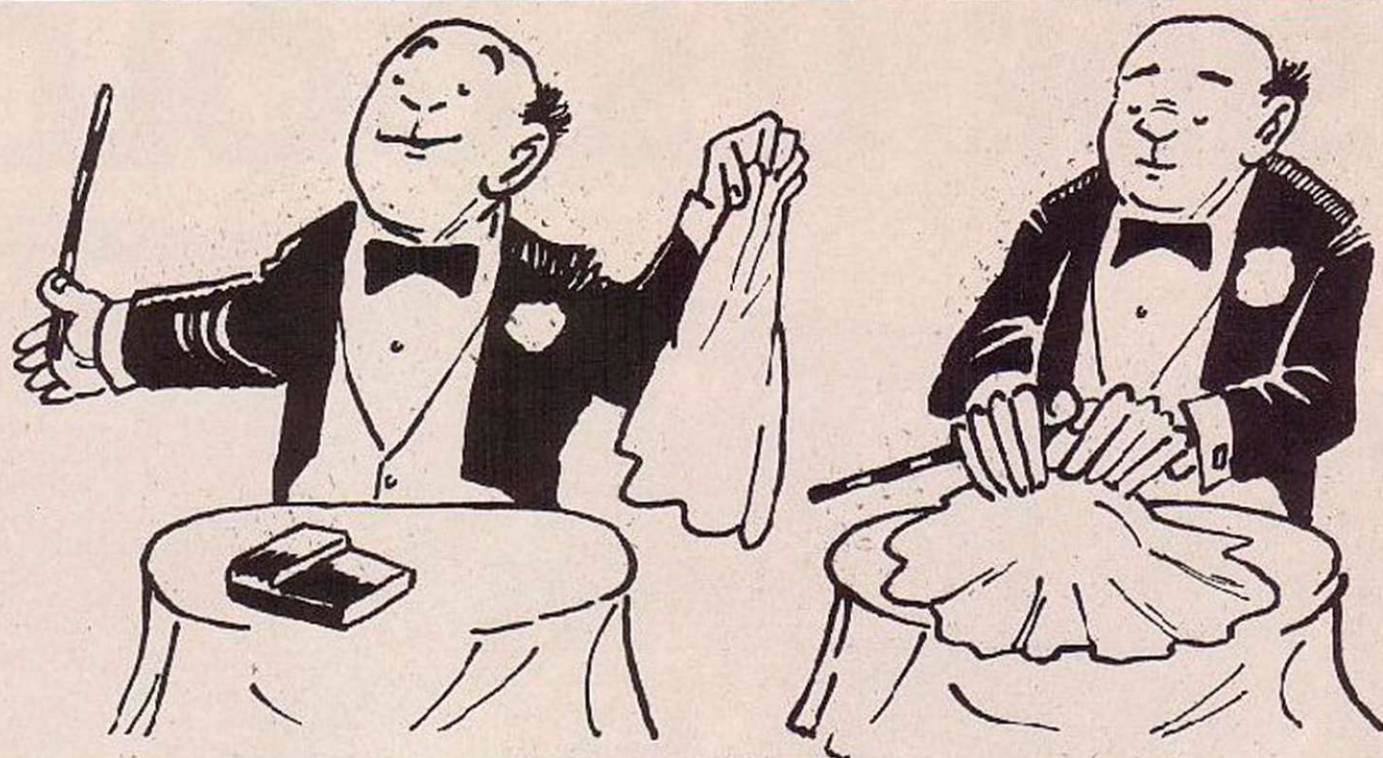
houses with a proven record when they are little more than ideas. Sydney Development Corporation, the Canadian — oddly enough — programmers who wrote Dambusters only had to show a game plan for Geoff to sign up Dambusters II. In the meantime, Sydney's Desert Fox is ready for launch.

Geoff's personal preference for shoot-'em-ups has not blinded him to the growing market for simulations, and Microprose run by gung ho Bill Stealey. "I'm selling these games to men. If you haven't got the right stuff I don't want to know" is his trump card. Already F-15 Strike Eagle, Nato Commander, Solo Flight and Kennedy Approach have made their mark. Now Crusade in Europe and Decision in the Desert are on their way under U.S. Gold's new Transatlantic Simulations label, with a hefty £20 price tag.

But sequels and conversions are the name of the game at the moment. After Beachhead II "blood and guts on a computer" comes Pole Position II, and Summer Games II. U.S. Gold should keep its tape duplicators, Ablex in Telford, running flat out over the next few months and there are plans for merchandising deals in other areas "why not Zaxxon soap?" he asks, but Geoff is not complacent. "There is no divine right of U.S. Gold to be successful. There is no masterplan, we were successful by accident with hard work and a few gambles. It's pressure — but it's better than working down a coalmine".

When companies produce a game that flops he believes they should "send them to the crusher" rather than sell them off cheap — and he thinks that if and when U.S. Gold makes a serious error the press will suggest he deserves a similar fate — "look at Clive Sinclair, all that he's done for the industry, the moment he makes a mistake the headlines are 'IDIOT', 'FINISHED'. I get tired of being knocked."





ONE OF the main restrictions of the Sinclair Microdrive system is that it is only possible to access data files from Basic which imposes a severe restriction on database and other similar applications which access data files. For example, changing a record in a data file involves opening a new file, copying the preceding records from the old to the new, writing the altered record to the new file, copying the rest of the old file, deleting the original file and renaming the new file as the old file.

Even this last is not straightforward as Sinclair Basic lacks a Rename command. In practice, the following code illustrates the type of subroutine that would be required to alter the *n*th record of a file of 100 records called "data" in which each record is 24 bytes long. The new *n*th record is in the string *n\$*.

```
9000REM Alter a record (Sinclair BASIC)
9010OPEN#5:"m":1:"data"
9020OPEN#6:"m":1:"new.data"
9030IF n=1 THEN GOTO 9070
9040FOR p=1 TO n-1
9050INPUT#5: LINE x$: PRINT#6:
x$
9060NEXT p
9070INPUT#5: LINE x$: PRINT#6:
n$: REM write new record
9080IF n=100 THEN GOTO 9120
9090FOR p=n+1 TO 100
9100INPUT#5: LINE x$: PRINT#6:
x$
9110NEXT p
9120CLOSE#5: CLOSE#6
9130ERASE "m":1:"data"
9140MOVE "m":1:"new.data" TO "m":1:"data"
9150ERASE "m":1:"new.data"
9160RETURN
```

It should be clear that this is both tortuous and very slow as it involves many operations of the microdrive which also causes increased wear and tear on the cartridge and drive. MIRA solves these problems by providing Sinclair Basic with three new commands which together allow the maintenance of random access files similar to those available on micros such as the BBC with disc interface.

The new commands (RND #, Point #, Restore #) are all obtained by using existing Sinclair keywords but in new contexts. The use

and syntax of the new commands and the theory behind their implementation are explained below but first, as an example, the above subroutine re-written using the MIRA commands.

Note that a 24 byte record occupies 25 bytes in the file because of the inclusion of a carriage return (CHR\$ 13).

```
9200RPM Alter a Record (MIRA)
9210OPEN#5:"m":1:"data" : RND#5
9220POINT#5.25*(n-1) : PRINT#5:
n$
9230RESTORE#5
9240RETURN
```

The first of the new commands, RND followed by a stream of identifier (e.g.: #5) causes the file attached to the given stream to be declared as a random access file. The file must already have been opened with the standard Open # command and must be a "read" file.

The RND command cannot be used to create or open a file. In the example above, the file "data" would originally need to have been set up with code such as:

```
100DIM x$(24)
110OPEN#5:"m":1:"data"
120FOR p=1 TO 100 : PRINT#5:x$
: NEXT p
130CLOSE#5
```

Point followed by a stream identifier and a numeric expression separated by a comma (e.g. Point: #5, n) moves the internal pointer of the file attached to the given stream to the *n*th byte of the file, where the next Input #, Print #, or Inkey\$ # will take place, provided that the file has been opened with Open # and made random with RND #.

An error will be generated if you try to move the pointer outside the limits of the file. The Basic loader program for MIRA — listing 1 — also defines a function, FN p(x), which returns the current value of the internal pointer of the file attached to stream *x* — e.g. LET pos=FN p(5). For what it's worth, this will work with any "rac" file, not just a random access one.

Restore followed by a stream identifier (e.g. #5) closes the random access file attached to the given stream. Restore # must be used in preference to Close # to correctly close a file that

Figure 1. Microdrive channel structure.

Byte	Length	Description	Byte	Length	Description
0	2	"output" routine	42	2	unused (see text)
2	2	"input" routine	44	10	10 bytes of cartridge name
4	1	channel specifier "M"	54	1	header checksum
5	2	shadow Rom output	5	12	12 bytes of data
7	2	shadow Rom input	67	1	pre-amble
9	2	length of this Chans area (595)			bit 0—reset—not a header
11	2	current buffer position (0-512)			bit 1—reset—not end of file
13	1	position of record in file (0-255)			set—end of file
14	10	10 bytes of filename			bit 2—reset—a Print file
24	1	bit 0—reset—"read" file set—"write" file			set—not a Print file
25	1	bits 1-7—unused (all reset)			bits 3-7 unused (all reset)
2	2	drive number (1-8)	68	1	record number (0-255)
28	12	drive map location	69	2	number of bytes in record (0-512)
40	1	12 bytes of header pre-amble	71	10	10 bytes of filename
		bit 0—set to signal header	81	1	checksum
41	1	bits 1-7—unused	82	5*2	buffer data
		sector number (0-255)	594	1	data checksum



MIRA

Mike Rains gives your Microdrive a random access facility.

Listing 2.

```

9000 REM ***MIRA Initialization***
9010 CLEAR 62999: LOAD "MIRA" CODE 63000
9020 CLOSE #0: LET org=63000: LET h=INT (org/256): LET
l=org-256*h
9030 POKE 23735,l: POKE 23736,h: REM Both must be in o
rg line.
9040 DEF FN q(x)=PEEK 23621+256*PEEK 23632+PEEK (23574
+*21+256*PEEK (23575+*21)-1
9050 DEF FN a(x)=510+PEEK (FN q(x)+13)-256*PEEK (FN q(
x)+12)+PEEK (FN q(x)+1)
9060 CLS: PRINT #0;"MIRA (1.0) - (c) Mike Rain
s 1985": PAUSE 0

```

has been marked as random with RND#, but may not be used to close any other type of file.

The theory of adding new commands to Sinclair extended Basic (i.e.: with Interface 1 attached) is fully described by A Per.nell, *Master Your ZX Microdrive* (Sunshine 1983) and I Logan, *Spectrum Microdrive Book* (Melbourne House 1983). In short, the shadow system variable Vector (address 23735), which usually contains the address of the Rom error handling routine, must be loaded with the address of the new commands routine which must then perform two distinct functions.

First, it must check the syntax of the new commands and cause an error if it is incorrect, and then, at run-time only, execute the command. "Run-time" means during the running of a program or during the execution of a direct command. Lines 9030-40 of the MIRA Basic loader program alter the value of Vector (lines 9030 first ensures that the shadow system variables have been created).

As well as providing the new commands as described above, MIRA must also provide new routines to replace the standard Print and Input commands. To demonstrate how this is done and to explain the actual operation of the new commands it is necessary to first describe the structure of a Microdrive channel.

Each Microdrive channel takes up 595 bytes in the area of memory reserved for channel information. The start of this area is contained in the system variable Chans (address 23631). The actual location of a particular channel is found by adding the displacement contained in the relevant Streams system variable — two bytes for each of streams — 3 to 14 starting at address 23568 — to the value in Chans and subtracting 1. FN c(x) defined in the Basic loader program performs this function for stream x. The byte allocation within a Microdrive channel is shown in figure 1 and should be referred to during the following discussion of the operation of the various MIRA routines.

The RND# command run-time routine performs three actions:

- Bit 0 of byte 24 in the relevant channel is set to signify a "write" file.
- The addresses of the new output and input routines are loaded into bytes 56

and 7-8 of the channel.

- Bit 0 of the unused 42nd byte of the channel is used as a flag to signal whether the buffer contents have been altered. RND# resets this bit to signify "unaltered".

The following actions are performed by the Point# command:

- The record number in which the desired file position lies is calculated and compared with the value in byte 13 of the channel.
- If they do not match, the "write buffer" and "read buffer" sub-routines are called to fetch the required record into the buffer.
- The desired position within the record is loaded into channel locations 11 and 12.

The Restore# calls the "write buffer" sub-routine to write the current record if it is flagged as "altered" (i.e.: bit 0 of byte 42 set), resets bit 0 of channel byte 24 to flag the file as "read" and then calls the shadow Rom Close# routine.

The new output routine used by all Print# statements is entered with the character to be written to the file in the A register. The following actions are performed:

■ The current buffer position is obtained from bytes 11 and 12 of the channel, added to 82 — the start of the data area — to give the correct address, and the character from the A register stored there.

■ The buffer position is incremented and re-stored in bytes 11 and 12.

■ The record is flagged as "altered" by setting bit 0 of byte 42.

■ The "next record" sub-routine is called if the end of the present record has been reached.

The new input routine used by Input# and Inkey\$# statements performs the following actions:

■ Tests for the end of the current record and calls "next record" if required.

■ Increments the buffer position in bytes 11 and 12 of the channel.

■ Using this position — added to 32 as before — reads a character from the buffer into the A register and sets the carry flag to signal a successful read.

MIRA can be entered into your Spectrum in the following way:

■ The Basic loader program — listing 1 — will Poke the machine code from the Data statements into memory and then initialise MIRA.

Once the MIRA code has been entered it may be saved to Microdrive with the command SAVE "m";1;c:mira CODE 63000,410

Listing 2 may then be used to load the code and initialise MIRA. If you have relocated the code you will need to change the Clear address in line 9010 and the value of "org" in line 9020. Note that MIRA will need to be re-activated by the use of lines 9020-60 of listing 2 following a New command.

Listing 1.

```

1 REM *****
2 REM ***MIRA (BASIC LOADER)***
3 REM ***(c) Mike Rains 1985***
4 REM *****
5:
6 CLS: PRINT "          STOP: TAKE CARE!"
MIRA (1.0): "Please note that although it is supplied
on cassette, this program will only operate with
Interface 1 attached and is entirely concerned
with micro drive operations." Press any key to c
ontinue": PAUSE 0

```

```

8:
10 DATA 254,202,215,824,000,254,165,040,011,254,227
11 DATA 1283,040,069,254,169,040,060,195,240,001,215
12 DATA 1051,052,000,204,050,032,246,215,032,000,215
13 DATA 1640,150,020,205,103,005,205,222,240,221,205
14 DATA 0791,024,070,040,003,195,002,009,221,205,024
15 DATA 1165,198,033,001,247,221,117,007,221,116,000,221
16 DATA 1231,033,040,247,221,117,007,221,116,000,221
17 DATA 1272,205,042,134,195,195,305,024,044,195,032
18 DATA 1062,001,215,032,000,254,033,032,244,115,032
19 DATA 1439,000,215,130,020,205,103,005,205,222,240
20 DATA 1014,217,229,217,205,117,247,221,205,024,134
21 DATA 1639,205,164,010,217,225,217,195,195,005,195
22 DATA 1273,240,001,215,032,000,254,033,032,244,215
23 DATA 0970,032,000,215,130,020,205,103,005,205,222,240
24 DATA 1013,000,215,032,000,215,130,020,205,103,005,205,222,240
25 DATA 1067,215,162,045,197,205,001,036,221,126,013
26 DATA 0619,000,075,030,000,040,001,036,221,126,013
27 DATA 1610,105,040,013,217,229,217,229,117,011,221
28 DATA 1639,205,164,010,217,225,217,195,195,005,195
29 DATA 1543,116,012,217,225,217,195,195,005,195,009,094
30 DATA 0500,030,135,079,000,000,032,246,215,032,000,215
31 DATA 1609,035,000,135,079,000,237,079,075,092,221,025
32 DATA 1040,003,195,079,000,237,079,075,092,221,025
33 DATA 1691,221,045,201,221,000,012,221,221,011,221,114
34 DATA 1341,094,011,221,225,019,221,115,011,221,114
35 DATA 1740,119,002,221,225,019,221,115,011,221,114
36 DATA 1453,012,221,225,019,221,115,011,221,114,195
37 DATA 1409,247,201,221,042,001,052,033,058,247,195
38 DATA 1177,109,012,221,074,011,221,000,012,221,110

```

```

39 DATA 1114,069,221,102,070,055,237,002,040,007,221
40 DATA 1716,229,205,095,247,221,225,024,230,019,221
41 DATA 1194,115,011,221,114,012,027,221,229,221,025
42 DATA 1794,221,120,002,221,225,055,201,217,229,217
43 DATA 1495,205,117,221,119,012,217,225,217,201,030
44 DATA 1303,119,011,221,119,012,221,203,042,070,040
45 DATA 1147,000,221,116,013,229,221,203,042,070,040
46 DATA 1460,025,221,116,013,229,221,203,042,070,040
47 DATA 1007,041,221,119,013,225,145,026,251,062,000
48 DATA 1700,205,247,023,251,220,000,205,247,023,251,221
49 DATA 1309,023,026,251,062,000,205,247,023,251,221
50 DATA 0500,205,042,134,201,000,000,000,000,000,000
60 DATA 54050
100:
100 CLEAR 62999: LET ef=0: RESTORE 10: POKE 25692,255
110 LET t=0: FOR p=0 TO 40: REA: ch: LET t=t+FOR q=
0 TO 9
120 READ at: LET t=t+POKE 63000+10*p,q:at NEXT q
130 LET t=t+ch: IF t<ch THEN BEEP .2,50: PRINT "E
rror in line "t+10: LET ef=1: GO TO 150
140 PRINT p+10: " "
150 NEXT p: READ at: IF at<ch THEN BEEP .2,50: PRINT
"Error in checksum": LET ef=1
160 IF ef THEN BEEP .2,50: PRINT "Correct errors and
re-run": STOP
170 PRINT "All data OK - Initializing MIRA": PAUSE
100
100:
1000 REM ***MIRA INITIALIZATION***
1010 CLOSE #0: LET org=63000: LET h=INT (org/256): LET
l=org-256*h
1020 POKE 23735,l: POKE 23736,h: REM Both must be in o
rg line
1030 DEF FN q(x)=PEEK 23621+256*PEEK 23632+PEEK (23574
+*21+256*PEEK (23575+*21)-1
1040 DEF FN a(x)=510+PEEK (FN q(x)+13)+PEEK (FN q(x)+1
1)+256*PEEK (FN q(x)+12)
1050 PRINT "Save Machine Code to Microdrive? Y/N: "
1060 IF INKEY$="Y" THEN GOTO 1070: IF INKEY$="N" THEN PR
INT "YES: Save Machine Code to Microdrive? Y/N: "
1070 CLS: PRINT #0;"MIRA (1.0) - (c) Mike Rain
s 1985": PAUSE 0
1080 CLS: PRINT #0;"MIRA (1.0) - (c) Mike Rain
s 1985": PAUSE 0

```




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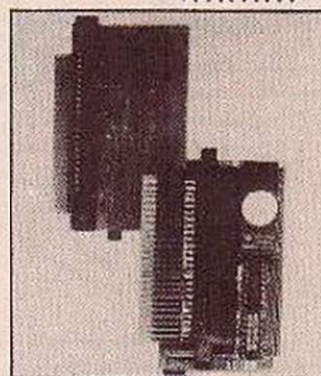
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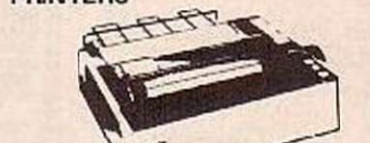
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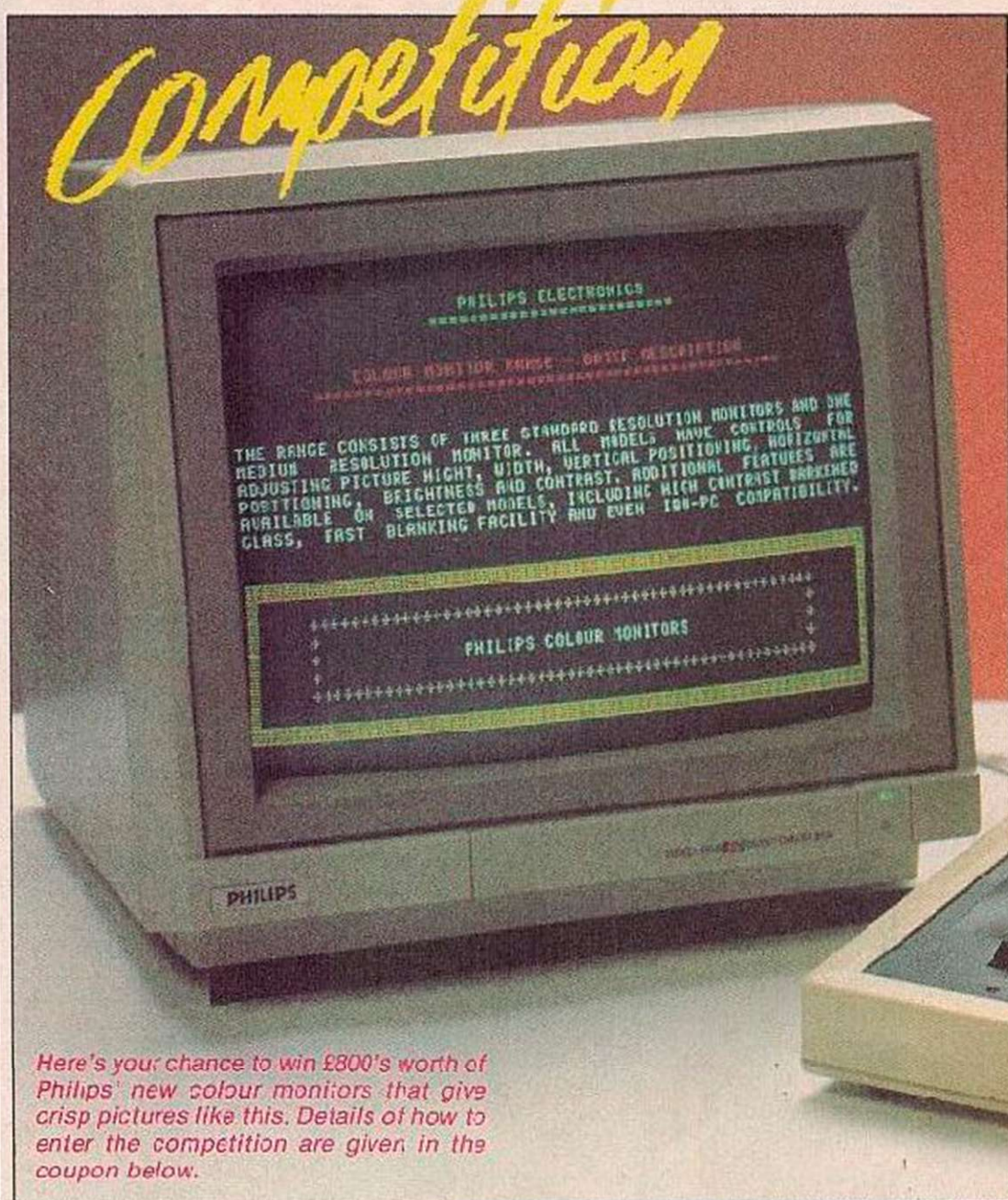
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ZCBM — right
XVN — left

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To enter the game first save listing 1 at the front of your games tape. Then type in the hex loader in listing 2 and save it elsewhere. Now use it to enter the hex code for the game itself from listing 3. Once you have typed it all in save it after listing 1 with:

SAVE "M.Caverns" CODE 34240,6800

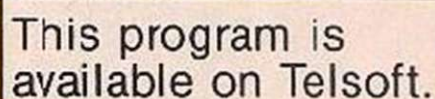
If you can't face the effort of entering over 6K of machine code the program is available on tape for £2.00 from Karl Jeffery, 27 Testcombe Road, Alverstoke, Gosport, Hampshire PO12 2EL.

Karl Jeffrey crams 10 screens of zero-G action into 6K of code on the Spectrum.

SCORE = 3
LEVEL = 1

Attack

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```

      1 BORDER 0 PAPER 0 INF 0  

      36000 LOAD CODE RUN US
    
```

```

10 DEF FN h(h$)=16+CODE h$(2)
-48-(7 AND h$(1))+"9")+CODE h$(2)
-48-(7 AND h$(2))+"9")
20 INPUT "Star: ";s
30 INPUT "Finish: ";f
40 FOR n=s TO f STEP 8
50 LET tot=0: PRINT n;" ":
60 INPUT h$: PRINT h$;
70 LET x=0
80 FOR b=1 TO LEN h$ STEP 2
90 LET z=FN h(h$): LET tot=tot
+Z
100 POKE n+x,z
110 LET h$=h$(3 TO ): LET x=x+1
120 NEXT b
130 PRINT " = ": INPUT t: PRINT
T
140 IF tot>1 THEN PRINT "input
error - try again": GO TO 50
150 NEXT n
160 REM enter STOP to stop

```

(continued on next page)

(continued on next page)

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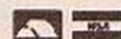
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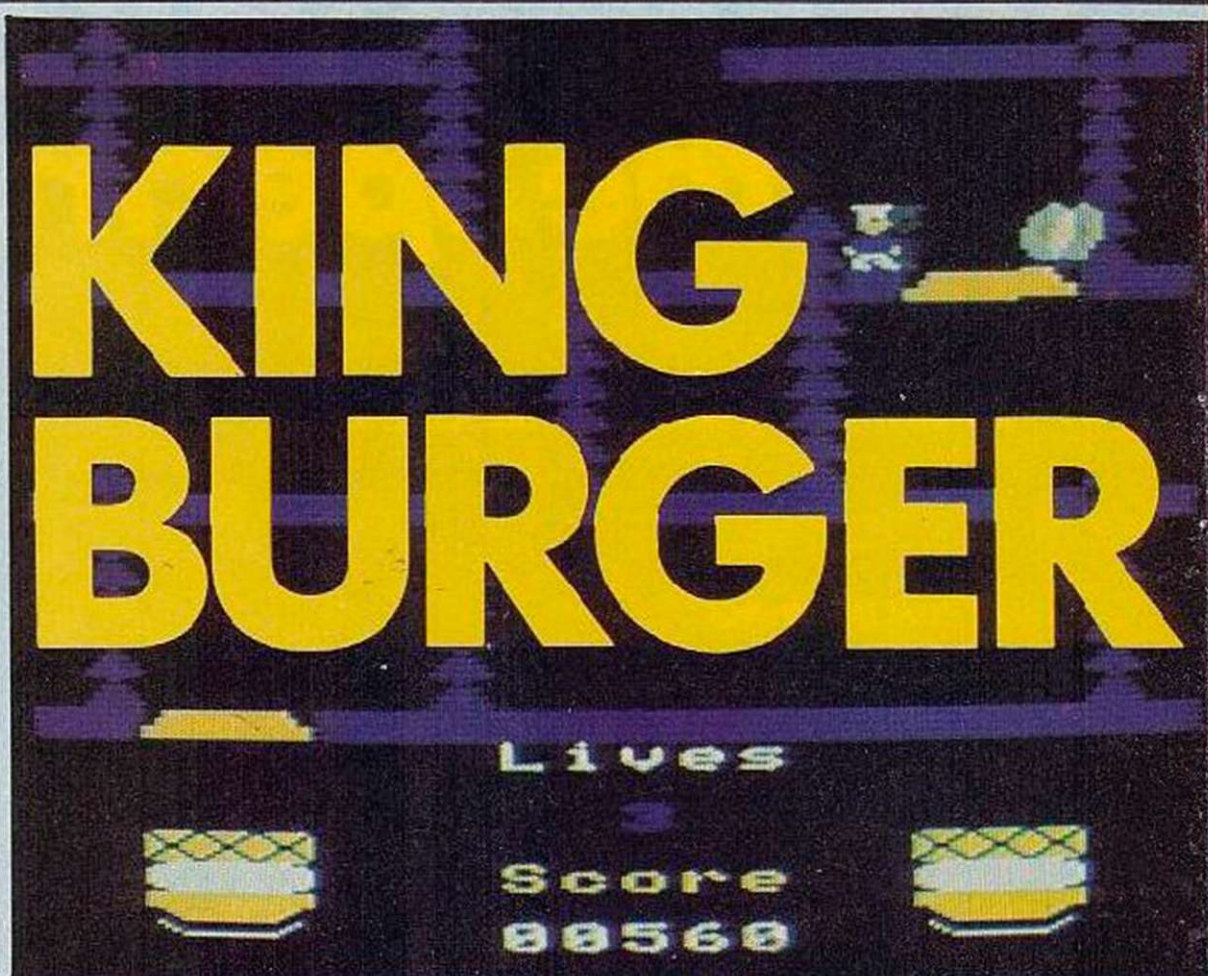
Ram Electronics (Fleet) Ltd
 (Dept YC), 106 Fleet Road,
 Fleet, Hampshire GU13 8PA.



Trade and Export enquiries welcome.

[illegible]

The burgers are made in four sections each of which must be walked across causing it to fall down a level and knock down anything which is below it until it reaches the tray at the bottom. There are six levels, each of which gets progressively harder until, on the sixth sheet,



```

100DATA0,17,51,119,119,118,252,252,204,238,255,255,2
55,247,243,243
200DATA254,255,255,119,119,51,2,6,247,238,238,204,20
4,204,6,0
30FX=&5000
40FORT=0T031:READD:T?FX=D:NEXT
50TEMP=FX+128:UX=TEMP+64:FORT=0T02STEP2:PX=UX:[OPTT
60LDA#&40:STA&D70:LDA#&5A:STA&D71:LDA#32:STA&D72:LD
A#21:STA&D73:LDA#1:STA&D74
70LDA#TEMP MOD256:STA&D76:LDA#TEMP DIV256:STA&D77
80LDA#0:STA&D75:LDY#0:TYA:YS STA TEMP,Y:INY:CPY#64:
BNEYS
90LDA#64:STA&D78:LDA#89:STA&D79:LDA#0:STA&D7A:LDA#2
1:STA&D7B:LDA#0:STA&D7C:LDA#0:STA&D7D
100LDA#(TEMP+32) MOD256:STA&D7E:LDA#(TEMP+32) DIV256
:STA&D7F:RTS
110.rout JSRrub
120LDA&A5:CMP#&FF:BEQN
130LDA&A3:CMP#76:BNE nosam
140LDA&A2:CMP#D02:BMInoleft:JSRleft:JMPNORU:.noleft
JSRright:.NORU JMPN
150.nosam

```

```

160LDA&A4:CMP#1:BNENo:JSRleft:JMPN:.no JSRright:.N
170JSRSEE:LDA&A5:CMP#&FF:BNENoLAD:JSR_LADR:.NOLAD
180JSRDIS:JSRsame:CPX&FF:BEQySP:JSRBJRG:CPX&FF:BNE
ySA:JSRrub:JSRU%:JMPDIS:.ySA
190.DIS CLC:LDA&A0:ADC#&30:STA&4D:LDA&A1:ADC#1:STA&4
E:LDY#0:.A LDAF%,Y:STA(&A0),Y:INY:CPY#16:BNEA:.B LDAF%
,Y:STA(&4D),Y:INY:CPY#32:ENE8:RTS
200.check LDA&A4:CMF#0:BEQaa:LDA&A2:CMF#0:BEQhit:JMP
AU:.au LDA&A2:CMF#38:BEQhit:.AU LDX#0:LDY#0:.C LDA(&4D
),Y:BEQhit:RTS:.hit LDX&FF:RTS
210.BURGLDX#2:SEC:LDA&A0:SBC#&40:STA&4D:LDA&A1:SBC#
1:STA&4E:LDY#0:.Bur LDA(&4D),Y:AND#240:BNEhit:INY:CPY#
16:BNEBur:RTS
220.CHECK LDX#0:LDY#B:.AaA LDA(&4D),Y:CNPF%,Y:BEQhit
:INY:CPY#16:BNEaA:RTS
230.left LDA#1:STA&A4:CLC:LDA&A0:ADC#&7B:STA&4D:LDA&
A1:ADC#2:STA&4E:JSRcheck:CPX&FF:BEQright:SEC:LDA&A0:S
BC#16:STA&4D:LDA&A1:SBC#0:STA&4E:JSRCHECK:CPX&FF:BEQ
END:SEC:LDA&A0:SBC#8:STA&A0:LDA&A1:SBC#0:STA&A1:DEC&A2
:JMPread
240.EEND LDA#1:STA&A4:RTS
250.right LDA#0:STA&A4:CLC:LDA&A0:ADC#&90:STA&4D:LDA
&A1:ADC#2:STA&4E:JSRcheck:CPX&FF:BEQleft:CLC:LDA&A0:A
DC#16:STA&4D:LDA&A1:ADC#0:STA&4E:JSRCHECK:CPX&FF:DEC#1
eft:CLC:LDA&A0:ADC#8:STA&A0:LDA&A1:ADC#0:STA&A1:INC&A2
:JMPread

```

```

10VDU23,130,31,31,63,63,255,255,255,0,23,131,255,255,255,255,255,255,0
20VDU23,132,240,240,252,252,255,255,255,0,23,133,126,189,219,231,231,219,189,126
30VDU23,134,31,127,255,255,255,255,127,31,23,135,255,255,255,255,255,255,23,136,248,254,255,255,255,255,254,248
40VDU23,137,255,255,255,255,63,31,15,7,23,130,255,255,255,255,252,248,240,224
50VDU23,139,32,16,8,7,0,0,0,23,140,0,0,0,255,0,0,0,0,23,141,4,8,16,224,0,0,0,0
60ENVELOPE1,1,2,10,2,5,2,10,126,0,0,-126,126,126
70ENVELOPE2,1,10,-30,10,20,4,4,126,0,0,-126,126,126

80VDU23,128,255,0,255,0,255,0,255,0,23,129,24,0,60,0,126,0,255,0
90DATA119,51,51,48,48,48,16,3,238,204,204,64,224,19,2,128,12,7,7,135,195,51,119,102,119,14,14,22,56,204,102,238,119
100DATA119,51,51,48,48,48,16,3,238,204,204,64,224,19,2,128,12,22,22,22,7,3,17,17,17,14,14,14,134,12,136,136,204
110DATA119,51,51,32,112,48,16,3,238,204,204,192,192,192,128,12,7,7,134,193,51,102,119,238,14,14,30,60,204,238,102,238
120DATA119,51,51,32,112,48,16,3,238,204,204,192,192,192,128,12,7,7,7,22,3,17,17,51,134,134,134,14,12,136,

```

```

36,136
130DATA119,51,51,48,48,176,144,131,238,204,204,192,1
92,192,128,12,135,7,7,7,3,34,102,0,14,30,30,30,28,68,6
8,102
140DATA119,51,51,48,48,48,16,3,238,204,204,192,192,2
08,144,28,7,135,135,135,131,34,34,102,30,14,14,14,12,6
8,102,0
150DATA0,11,0,1,0,120,0,1,0
160DATA0,17,136,0,68,0,0,68,0,17,0,34,0,0,68,0
170DATA0,0,1,0,20,0,3,0
180DIM G% 6000:FOR T=0TO222:READO:T?G%=0:NEXT J%=G%+3
00:M1=G%:M2=M1+64:M3=M2+64:S0=M3+64:PEP=S0+8:S02=PEP+1
6:TEMP=S02+8
190FORT=0TO2STEP2:P%=J%:LOPTT
200LDA#G% MOD256:STA&70:LDA#G% DIV256:STA&71:LDA#&80
:STA&72:LDA#&73:STA&74:LDA#0:STA&60:STA&D02:STA&D03:ST
A&D04:STA&D05:STA&76:STA&D06:STA&D0E:STA&D0B
210LDA#0:STA&A7:JSRL%:SEC:LDA&B0:SBC#5:STA&B0:JSRSCD
RE
220.start JSRDIS
230LDY#0:.wrT LDA&D50,Y:AND#240:CMP#96:BNEngs:JSRBUR
G:.hgs INY:CPY#8:BNEwrT
240LDA&D58:CMP#0:BEQtTS:JSRMOBU:.tS
250JSR1%
260LDX#0:JSRf1orr:CPX#&FF:BNEyr:RTS:.yr DEC&A3:LDX#0
:JSRf1orr:CPX#&FF:BNEyr:RTS:.yr INC&A3:INC&A3:LDX#0:JS
Rf1orr:CPX#&FF:BNEVR:RTS:.VR DEC&A3
270JSRdelay
280LDA&D58:CMP#0:BEQtTS:JSRMOBU:.tTS

```




This program is
available on Telsoft.

Brian Lewis finds
a difference at
Macdonalds.

Lives
Score
88578

a second egg is introduced. My first major problem was to find a workable algorithm for the movement of the egg. I ended up partly pinching an idea I had seen in a friend of mine's game "Monsters" which he wrote some time ago on the Atom. The basic idea is that the egg or eggs check whether or not you are on the same level as them — if so they move towards you or else they move about randomly until they find a ladder and then, depending on your position, move up or down. Thanks to Andrew Greene for the idea.

The next problem was the movement of the two burgers. I solved this by setting aside eight memory locations, each containing a number which corresponds to the piece of burger and the extent to which it has been walked on. These memory locations are then moved around after the piece of burger has stopped moving. You have an advantage over Freca — the ability to drop one level and leave the egg stranded on a platform. However, this advantage is slowly taken away from you as you go through the six sheets. Any EBC users who wish to play the game will have to increase the numbers held in the X and Y registers in the "delay" routine and thus slow down the game. Each of the four programs should be typed in, checked, saved and then run to ensure you do not get a bad program.

```
260.rub CLC:LDA#A0:ADC#30:STA#4D:LDA#A1:ADC#1:STA#4
E:LDY#0:.D LDA#A5,Y:AND#15:STA#4D,Y:INY:CPY#16:BNE
D:.E LDA#A6,Y:AND#15:STA#4D,Y:INY:CPY#32:BNE:RTS
270.read CLC:LDA#A0:ADC#30:STA#4D:LDA#A1:ADC#1:STA#
4E:LDY#0:.F LDA#A0,Y:STA#A6,Y:INY:CPY#16:BNEF:.G L
DA#4D,Y:STA#A6,Y:INY:CPY#32:BNEG:RTS
280.LADDR JSRf1oor:CPX#FF:BNEB:LDA#76:CMF#A3:.SS B
EQend:LDA#FF:STA#A5:LDA#A3:CMF#76:EMI:noup:JSRdown:JMP
Njw:.noup JSRup:.NDw:RTS
290.up SEC:LDA#A0:SBC#40:STA#4D:LDA#A1:SEC#1:STA#4E
:JSRcheck:CPX#FF:BEQend:INC#A3:SEC:LDA#A0:SBC#40:STA
#A0:LDA#A1:SBC#1:STA#A1:JMPread
300.down CLC:LDA#A0:ADC#C0:STA#4D:LEA#A1:ADC#3:STA#
4E:JSRcheck:CPX#FF:BEQend:DEC#A3:CLC:LDA#A0:ADC#40:S
TA#A0:LDA#A1:ADC#1:STA#A1:JMPread
310.end LDA#0:STA#A5:RTS
320.SEE LDY#4:LDA#A6,Y:CMF#7:BEQFOUN:RTS:.FOUN LDA
#FF:STA#A5:RTS
330.f1oor LDA#A3:.ID CMF#0:BEQon:SEC:SBC#7:CMF#22:BP
L off:JMPID:off LDX#0:RTS:on LDX#FF:RTS
340.SAME LDX#0:LDA#D58:CMF#0:BEQa1:RTS:.a1 LDX#FF:R
TS
350.1% LDY#0:.AaA LDA#D70,Y:STA#A0,Y:INY:CPY#8:BNEAa
A:JSRrout:LDY#0:.BbB LDA#A0,Y:STA#D70,Y:INY:CPY#8:BNEB
bB
```

```
360LDA#BA:CMF#0:BEQRWR:
370LDY#0:.CcC LDA#D78,Y:STA#A0,Y:INY:CPY#8:BNECcC:JS
Rrout:LDY#0:.DdD LDA#A0,Y:STA#D78,Y:INY:CPY#8:BNEDdD:.
RWF RTS
380:NEXT
390MODE4
400PRINTTAB(14,2):"Burger King!"
410PRINT""You (GORDON BLUE the chef) must go round t
he screen knocking down pieces of the burgers to form
two stacked burgers in the bottom trays."
411PRINT"
420PRINT"However a rampant fried egg (FREDA) is try
ing to stop you in your task,if she touches you then
you loose one of your lives an the burgers are reset."
421PRINT"
430PRINT"There are six screens each of which getspro
gressively harder as you slowly looseyour advantages o
ver FREDA,your advantage being the ability to
drop one level without killing yourself,drop any futher
r and it's bye bye."
440PRINTTAB(5):"The controls for Gordon are :-"
441PRINT"
450PRINT"Z - Left , X - Right , * - UP , / - DOWN"
460VDU28,0,31,39,28,17,129,17,0,12
470CHAIN"
```

```
290JSRSEE:CPX#FF:BNEg:LDA#FF:STA#D04:INC#D05:DEC#
76:JSRdrop:JMPHys:gs LDA#D05:CMF#0:BMIHE:RTS:.he LDA#0
:STA#D04:STA#D05:.hy
300LDA#D59:CMF#FF:BEQyS:LDA#D58:CMF#0:BNEyS:JSRse
e:.uYS
310LDA#D04:CMF#FF:BNEHys:JMPno1e:.HYS
320LDA#D02:CMF#38:BEQnor1:LDA#B1:LDX#B0:LDY#FF:JS
RFFF4:CPY#FF:BNEnor1:JSRrub:LDA#D03:CMF#1:BEQ1e
f:LDA#M2 MOD256:STA#70:LDA#M2 DIV256:STA#71:LDA#0:STA#
60:LDA#1:STA#D03:.lef
330JSRani:DEC#D02:SEC:LDA#72:SBC#8:STA#72:LDA#73:SBC
#0:STA#73:JSRread
340.nor1 LDA#D02:CMF#0:BEQno1e:LDA#B1:LDX#9E:LDY#&
FF:JSRFFF4:CPY#FF:BNEno1e:JSRrub:LDA#D03:CMF#1:BEQ1e
f:LDA#M2 MOD256:STA#70:LDA#M2 DIV256:STA#71:LDA#0:STA#
60:LDA#1:STA#D03:.lef
350JSRani:DEC#D02:SEC:LDA#72:SBC#8:STA#72:LDA#73:SBC
#0:STA#73:JSRread
360.no1e LDA#B1:LDX#B7:LDY#FF:JSRFFF4:CPY#FF:BN
Enoup:JSRCEH:CPX#FF:BNEncow:INC#76:JSRrub:LDA#D03:CMF
#2:BEQup:LDA#M3 MOD256:STA#70:LDA#M3 DIV256:STA#71:LDA
#0:STA#60:LDA#2:STA#D03:.up
370JSRani:SEC:LDA#72:SBC#40:STA#72:LDA#73:SBC#1:STA
#73:JSRread
380.noup LDA#B1:LDX#97:LDY#FF:JSRFFF4:CPY#FF:BN
Enoup:JSRcheck:CPX#FF:BNEncow:DEC#76:JSRrub:LDA#D03
:CMF#2:BEQdown:LDA#M3 MOD256:STA#70:LDA#M3 DIV256:STA#7
1:LDA#0:STA#60:LDA#2:STA#D03:.down
390JSRani:CLC:LDA#72:ADC#40:STA#72:LDA#73:ADC#1:STA
```

```
&73:JSRread
400.nodow
410LDA#D58:CMF#8:BNERz:RTS:.Rz JMPstart
420.rub LDY#0:.A LDATEMP,Y:STA#72,Y:INY:CPY#16:BNE
A:CLC:LDA#72:ADC#30:STA#4D:LDA#73:ADC#1:STA#4E:.A1 LD
ATEMP,Y:STA#4D,Y:INY:CPY#32:BNEA1:RTS
430.ani LDX#50 MOD256:LDY#50 DIV256:LDA#7:JSRFFF1:L
DA#60:CMF#1:BEQCLC:LDA#70:ADC#32:STA#70:LDA#71:ADC#0
:STA#71:LDA#1:STA#60:RTS
440.B SEC:LDA#70:SBC#32:STA#70:LDA#71:SBC#0:STA#71:L
DA#0:STA#60:RTS
450.delay LDX#80:.D LDY#90:.E DEY:BNEE:DEX:BNE:RTS
460.read LDY#0:.F LDA#72,Y:STATEMP,Y:INY:CPY#16:BN
EF:CLC:LDA#72:ADC#30:STA#4D:LDA#73:ADC#1:STA#4E:.G LD
A#4D,Y:STATEMP,Y:INY:CPY#32:BNEG:RTS
470.check LDX#0:CLC:LDA#72:ADC#80:STA#4D:LDA#73:ADC
#2:STA#4E:LDY#0:LDA#4D,Y:CMF#1:BEQH:RTS:.H LDX#FF:R
TS
480.CEH LDX#0:SEC:LDA#72:SBC#40:STA#4D:LDA#73:SBC#1
:STA#4E:LDY#0:LDA#4D,Y:CMF#1:BEQH:RTS
490.SEE CLC:LDA#72:ADC#80:STA#4D:LDA#73:ADC#2:STA#4
E:LDY#4:LDA#4D,Y:CMF#0:BEQH:RTS
500.drop JSRrub:CLC:LDA#72:ADC#40:STA#72:LDA#73:ADC
#1:STA#73:JMPread
510.DIS LDY#0:.a LDA#70,Y:STA#72,Y:INY:CPY#16:EN
Ca:CLC:LDA#72:ADC#30:STA#4D:LDA#73:ADC#1:STA#4E:.b LD
A#70,Y:STA#4D,Y:INY:CPY#32:BNEb
```

(continued on page 71)

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(continued from page 69)

```
520RTS
530.scroll JRSRCL:LDY#7:CLC:LDA#72:ADC#80:STA#4D:
LDA#73:ADC#2:STA#4E:LDA#4D,Y:PHA:LDY#6:.e LDA#4D,Y
:INX:STA#4D,Y:DEY:DEY:CPY#FF:BNE#LDY#0:TYA:STA#4D
,Y:LDY#4D:STA#6D:LDA#4F:STA#6E:CLC:LDA#4D:ADC#40:STA
#4D:LDA#4E:ADC#1:STA#4E
540LDY#0:P.A
550STA#4D,Y:RTS
560.see CLC:LDA#72:ADC#80:STA#4D:LDA#73:ADC#2:STA#4
E:LDY#0:LDA#4D,Y:AND#240:CMPI#0:BEQ#W:JSR#scroll:JSR#W
H:ER:qW RTS
570.WHER LDY#0:LDA#18:CMPI#02:BPLOVER:LDY#4:.over LD
A#21:.OV STA#4D:LDA#76:CMPI#4D:BEQ#foun:INX:SEC:LDA#4C:S
BC#7:CMPI#249:BNEOV:RTS
580.foun LDA#D50,Y:STA#4D:AND#240:CLC:LSRA:LSRA:LSRA
:LSRA:TXA:INX:TXA:CLC:ASLA:ASLA:ASLA:STA#4E:LDA#4
D:AND#15:ORA#4E:STA#D50,Y:RTS
590.BURG CPY#3:BEQ#rew:CPY#7:BEQ#rew:TYA:TXA:INX:LDA#D
50,Y:AND#15:STA#4D,X:rew TYA:PHA:LDA#D50,Y:STA#4D:LD
X#2:LDA#18:CMPI#02:BPLOVE:LJX#15
600.OVE LDA#D50,Y:AND#15:STA#D50,Y:CPY#0:BEQ#1:CPY#4
:BEQ#1:CPY#1:BEQ#2:CPY#5:BEQ#2:CPY#2:BEQ#3:CPY#6:BEQ#3
:CPY#3:BEQ#4:CPY#7:BEQ#4:RTS
610.a1 LDY#3:JMP#5:.a2 LDY#10:JMP#5:.a3 LDY#17:JMP#5
:.a4 LDY#24:.a5
620.SIX#90:STY#91:JSR#f11:PLA:TYA:STY#92
630.print LDA#D50,Y:AND#15:CMPI#0:BEQ#1:CMPI#1:BEQ#2:C
MPI#2:BEQ#3:CMPI#3:BEQ#4
640.h1 LDA#130:STA#960:LDA#131:STA#961:LDA#132:STA#9
62:LDA#2:STA#4D:LDA#128:STA#4E:JMP#5:.b2 LDA#133:STA#9
60:STA#961:STA#962:LDA#2:STA#4D:LDA#128:STA#4E:JMP#5
650.b3 LDA#134:STA#960:LDA#135:STA#961:LDA#136:STA#9
62:LDA#3:STA#4D:LDA#128:STA#4E:JMP#5:.b4 LDA#137:STA#9
60:LDA#135:STA#961:LDA#133:STA#962:LDA#2:STA#4D:LDA#12
3:STA#4E:.b5 LDA#17:JSR#FEE:LDA#4D:JSR#FEE:LDA#17:JS
R#FEE:LDA#4E:JSR#FEE
660LDA#31:JSR#FEE:LDA#90:JSR#FEE:LDA#91:JSR#FEE:L
```

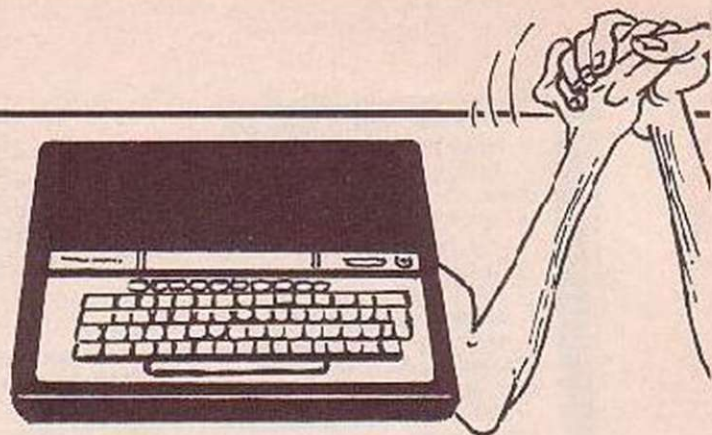
Listing 4.

```
10VDU23,142,0,31,31,63,63,255,255,255
20VDU23,143,0,126,189,219,231,231,219,189
30VDU23,144,0,31,127,255,255,255,255,127
40VDU23,145,0,255,255,255,255,63,31,15
41VDU23,146,0,1,3,7,7,31,15,63,23,147,63,63,31,63,1
27,63,31,31
42VDU23,148,31,63,63,63,127,63,127,63,23,149,63,31,
31,15,7,3,3,0
50MODES:VDU23:8202:0:0:0:0:19,1,4,0;
60DIMA#(3):A#(0)=CHR#130+CHR#131+CHR#132:A#(1)=CHR#
133+CHR#133+CHR#133:A#(2)=CHR#134+CHR#135+CHR#136:A#(3
)=CHR#137+CHR#135+CHR#138
70DATA2,2,3,2
80PROCDEMO
90COLOUR128:CLS:lives%=3:SCX=0:FORT=0TC4:"?&BA=0:NE
XT
100RESTORE70:FORT%=0TC3:READD:COLOURD:PRINTTAB(8,TX+
14):A#(TX):NEXT
110FORG=0TC1000:NEXT:SOUND0,1,4,4
111VDJ5:GCOL0,0:MOVE640,576:VDU146,10,8,147,10,8,148
,10,8,149,10,8
120VDU4:COLOUR3:PRINTTAB(5,6):"SHEET NO.":SCX+1
130FORG=0TC1000:NEXT:CLS
140FORT%=0TC31:TX?(GX-224)=0:NEXT
150FORT%=0TC7:AX=TX:IF AX>3 AX=(AX-4)
160TX?&D50-AX:TX?&A50=AX:NEXT
170FORT%=0TC31:TX?(GX+224)=0:NEXT:FORT%=1TC3:VDU19,T
X,0,0:NEXT
180COLOUR1:FORT%=3TC24STEP7:PRINTTAB(0,TX):STRING$(2
0,CHR#128):NEXT
181IF SCX>4 THEN ?&BA=1 ELSE ?&BA=0
190IF SCX<4 PRINTTAB(8,3):" "
200IF SCX<2 THEN PRINTTAB(8,17):" "
210FORT%=1TC9:PRINTTAB(1,TX):CHR#129TAB(7,TX):CHR#12
9TAB(18,TX):CHR#129:NEXT
220FORT%=8TC16:PRINTTAB(9,TX):CHR#129:IF SCX<4 THEN
PRINTTAB(13,TX):CHR#129
230NEXT
240FORT%=15TC23:PRINTTAB(1,TX):CHR#129TAB(7,TX):CHR#
129TAB(18,TX):CHR#129:NEXT
250IF SCX>0 AND SCX<4 THEN FORT%=8TC16:PRINTTAB(7,TX
):CHR#129:NEXT
260IF SCX>=3 THEN FORT%=1TC9:PRINTTAB(13,TX):CHR#129
:NEXT
270RESTORE70:FORT%=3TC24STEP7:READD:COLOURD:PRINTTAB
(12,TX):A#(TX-3)/7:TAB(15,TX):A#(TX-3)/7:NEXT
280COLOUR3:VDU31,2,31,139,140,141,31,15,31,139,140,1
41
290PRINTTAB(8,25):"Lives":COLOUR1:PRINTTAB(10,27):li
ves%:COLOUR2:PRINTTAB(8,29):"Score"
300RESTORE318:FORT%=1TC3:READD:VDU19,TX,D,0:SOUND#1
1,1,TX*70,5:FORG=0TC1000:NEXT
310DATA4,3,7
320CALLJ%
330*FX15,0
340IF ?&D5B=8 THEN 390
350COLOUR128:SOUND0,1,255,255
```

```
DY#0:.resY LDA#960,Y:JSR#FFFF:INX:CPY#3:DNE#resY:INL#D5
B:RTS
670.3rUB LDA#17:JSR#FEE:LDA#128:JSR#FEE:LDA#31:JSR
#FEE:TXA:JSR#FEE:INX:TYA:JSR#FEE:LDA#32:JSR#FEE:JS
R#FEE:JMP#FTCC
680.MOBJ LDX#90:LDY#91:DEY:JSR#rUB:LDY#92:INC#91:JSR
print:JSR#30T:LDA#D58:CMPI#6:BNE#Sa:JSR#EE3:.hSa LDA#D58
:CMPI#7:BEQ#ND:RTS
690.eND LDY#92:LDA#0:STA#D58:LDA#D50,Y:AND#15:STA#D5
0,Y:STA#4D:LDA#D59:CMPI#FF:BNE#S:INC#92:LDY#92:LDA#D50
,Y:ORA#96:STA#D50,Y:LDA#0:STA#D59:JMP#sou:.hS LDY#0:.jh
LDA#D50,Y:AND#240:ORA#A50,Y:STA#D50,Y:INX:CPY#8:BNE#j
h:RTS
700.eEE3 LDA#31:JSR#FEE:LDA#90:JSR#FEE:LDX#91:INX:
TXA:JSR#FEE:LDA#135:JSR#FEE:CPX#128:BEQ#qz:LDA#FF:ST
A#D59:STA#D5A:.qz RTS
710.BOT LDA#25:CMPI#91:BPL#YS:LDA#31:JSR#FEE:LDA#90:
JSR#FEE:LDY#91:INX:TYA:JSR#FEE:LDA#135:JSR#FEE:CPX#
32:BEQ#YS:LDA#7:STA#D58:INC#D5B:JSR#SCORE:JSR#SCORE:JSR#
CORE:JSR#SCORE:.tYS RTS
720.fi11 LDA#D5A:CMPI#FF:BEQ#az:LDA#17:JSR#FEE:LDA#1
28:JSR#FEE:LDA#17:JSR#FEE:LDA#1:JSR#FEE:LDA#31:JSR#
FEE:TXA:JSR#FEE:TYA:JSR#FEE:LDA#128:JSR#FEE:JSR#FF
EE:JSR#FEE:.az LDA#0:STA#D5A:INC#91:RTS
730.sou LDA#7:INX#502:MOD#56:LDY#502:VDI256:JMP#FFF1
740.florr LDA#A2:CMPI#D02:BNE#A1:LDA#A3:CMPI#76:BNE#A1
:LDX#FF:RTS:.aA1 LDY#A2:INX:CPY#D02:BNE#15:LDA#A3:CMPI#
76:BNE#15:LDX#FF:RTS:.iS DEY:DEY:CPY#D02:BNE#15:LDA#A3:
CMPI#76:BNE#15:LDX#FF:RTS:.s1 RTS
750.SCORE LDA#17:JSR#FEE:LDA#3:JSR#FEE:CLC:LDA#B0:
ADC#5:STA#B0:CMPI#10:BNE#SHOW:LDA#0:STA#B0:INC#B1:PLA#B1
:CMPI#10:BNE#SHOW:LDA#0:STA#B1:INC#B2:LDA#B2:CMPI#10:BNE#
SHOW:LDA#0:STA#B2:INC#B3:LDA#B3:CMPI#10:BNE#SHOW:LDA#0:ST
A#B3:INC#B4
760.SHOW LDY#0:LDX#12:.vinc LDA#31:JSR#FEE:TXA:JSR#
FEE:LDA#31:JSR#FEE:LDA#B0,Y:CLC:ADC#48:JSR#FEE:INX:
DEY:CPY#5:BNE#vinc:RTS
770:NEXT:CHAIN"
```

```
360FORT%=0TC0:FORG=0TC30:NEXT:VDU19,0,1,0:SOUND#11
,2,30,20:FORG=0TC30:NEXT:VDU19,0,0,0:NEXT:*FX?1,5
370lives%=lives%-1:IF lives%=-1 THEN 420
380COLOUR128:CLS:GOTO150
390FORT%=0TC255STEP5:SOUND1,1,TX,1:NEXT
400SCX=SCX+1:VDU28,0,31,19,25:FORT%=1TC8:PRINTTAB(0,
0):CHR#11:SOUND#11,1,TX*20,15:NEXT:VDU26:*FX?1,5
410CLS:GOTO100
420CLS:COLOUR2:PRINTTAB(5,16):STRING$(10,CHR#133):A
#="GAME OVER":COLOUR1:FORT%=1TCLENA#
430PRINTTAB(TX+4,16):MID$(A#,TX,1)
440SOUND#11,2,TX+25,6:FORG=0TC200:NEXT
450*FX15,1
460COLOUR3:PRINTTAB(0,18):"PRESS SPACE TO START"
470A#="INKEY$(500):IF A#="" THEN PROCDEMO ELSE GOTO90
480GOTO90
490DEFPROCDEMO: ?&BA=0
500CLS
510COLOUR1:PRINTTAB(0,12):STRING$(20,CHR#128):
520COLOUR2:PRINTTAB(8,12):A#(1):COLOUR3:PRINTTAB(8,1
3):A#(2):COLOUR2:PRINTTAB(8,14):A#(3)
530COLOUR3:PRINTTAB(3,19):"KISS YOUR YJKE":COLOUR2:P
RINTTAB(6,21):"GOOD BYE":COLOUR1:PRINTTAB(7,23):"SUCKE
R"
540CALLU%: ?&D70=880: ?&D71=864: ?&D74=0: ?&D72=1: ?&D02=
39
550FORT%=0TC5000:NEXT
560FORT%=0TC17:CALL1%
570SOUND#11,1,25,10
580FORG=0TC50:NEXT
590FORT%=0TC700:NEXT:COLOUR2:FORT%=0TC10
600PRINTTAB(8,TX):A#(0)
610FORT%=0TC60:NEXT:SOUND#11,2,TX*20,10
620PRINTTAB(8,TX):" ":NEXT
630PRINTTAB(8,TX):A#(0):COLOUR3:PRINTTAB(7,10):"TA
B(4,9):"AH!"
640FORT%=0TC13000:NEXT
650CLS:RESTORE70:FORT%=0TC3:READD:COLOURD:PRINTTAB(2
,TX):A#(TX):TAB(15,TX):A#(TX):NEXT
660COLOUR3:PRINTTAB(5,0):"PREPARE TO":COLOUR2:PRINTT
AB(6,1):"MEET THY":COLOUR1:PRINTTAB(8,2):"DNOO"
670FORT%=0TC27:PRINTTAB(0,0):CHR#11:SOUND#11,1,TX*8,
1:FORG=0TC50:NEXT
680PRINTTAB(9,31):SOUND0,-15,5,5:FORG=0TC90:NEXT
690PRINTTAB(0,0):CHR#11:SOUND0,-15,5,5:FORG=0TC90:NE
XT
700FORG=0TC100:NEXT:A#="IN BRIAN LEWIS'S":B#="ALL NE
W!":C#="BURGER KING!"
710FORT%=1TCLENA#:PRINTTAB(1+TX,10):MID$(A#,TX,1):S
OUND#11,2,TX*20,1:FORG=0TC90:NEXT
720COLOUR2:FORT%=1TCLENA#:PRINTTAB(5+TX,12):MID$(B#,
TX,1):SOUND#11,2,TX*20,1:FORG=0TC60:NEXT
730COLOUR3:FORT%=1TCLENA#:PRINTTAB(3+TX,14):MID$(C#,
TX,1):SOUND#11,2,TX*20,1:FORG=0TC60:NEXT
731*FX15,1
740PRINTTAB(0,23):"PRESS SPACE TO START":REPEAT:UNTI
L GET=32
750CLS:ENDPROC
```


CORE



MOST PROGRAMMERS seem to play arcade games in their spare hours, but now, from America, the land of hacking, the Big Mac and War Games comes the new line in strategy games — Core Wars.

I first came across the idea of Core Wars in, unsurprisingly, an American magazine, *Scientific American*, a few months ago. The idea seemed excellent, so I dug out my Advanced User Guide, and put together this half Basic, half machine code version of Core Wars, to the best of my knowledge, the first version in this country.

The game scenario is original — the Americans have succeeded in penetrating a giant Russian mainframe, and each player is trying to cause his opponent's program to crash, by the simple means, familiar to all machine code junkies, of making it execute an illegal instruction.

In Core Wars, two programs try to deliberately corrupt each other. A number of techniques have been developed so far; there are the simple methods like overwriting sections of memory at random, or alternatively, "intelligent" methods involving searching out the opposing program. Most people who have written machine code will be familiar with the problem — an incautiously calculated jump, and the processor is trying to execute data rather than a program, with unpredictable and surprising results.

This means the game is played by two players. Each writes a program, of maximum length 100 lines, in a specially-developed language called Redcode, which looks rather like a stripped-down assembly language. These programs are then assembled; play takes place in a memory space of the 3000 locations in the "core" from which the game takes its name —

core is a now obsolete term once used to describe a computer's memory space — and each location can contain either a single Redcode instruction, or a piece of data.

If you try to execute data as an instruction, the program will not recognise it, and the opposing one will win! The core is organised slightly differently from a present-day memory, in that core location 2999 "wraps round" and is next to location 0. This means that attempting to access location 3000 results in accessing location 0, and so on. Then play starts for real — the computer executes one instruction from each player's program in turn, rather in the manner of a time-sharing system. Play continues until one program is forced to crash by executing an invalid instruction, and so the other player wins.

Obviously, one simple tactic is just to write a program that overwrites various areas of memory at random, hoping to score a 'hit' on a vital part of the other program, making it crash when it tries to execute that part. But an experienced player could find a way round such an attack — if he set up a block of memory with known contents, which was continuously checked, as soon as a byte was corrupted, he could arrange for his program to transfer itself somewhere in memory less vulnerable, and start a counter-attack.

Easy to pick up

The sort of instructions used will be immediately familiar to anyone who has dabbled in machine code, but don't despair if you never ventured beyond Basic — the limited instruction set will be easy to pick up, and will leave you with some knowledge of the techniques used in genuine machine code. At this point it seems appropriate to describe briefly the

Jon Cottrell makes war, not love, on his BBC.

instruction set and some details of how the instructions are assembled, and then run through how to use the program.

Each instruction has a code, as for any assembly language, also a mnemonic. The mnemonic is what you might consider the 'real' instruction — it is the mnemonic that you type in to the computer as a line of your Redcode program. The instructions are dealt with in numerical order of code.

Each instruction has either one or two "arguments" — the numbers that follow the mnemonic. The largest argument allowed is 3000 — anything larger will be reduced modulus 3000. Negative arguments are assembled in "complement form"; i.e. an argument of -1 becomes 2999, since subtracting 1 has the same effect as adding 2999 in a core of 3000 contiguous locations.

0 — DAT — Used for putting data in a location. Although this instruction has a code of 0, it is a special case, as it assembles as an unexecutable instruction followed by the byte of data. Strictly speaking, any location in the core containing an unexecutable statement followed by data could be regarded as a data statement, but DAT is provided to actually store data in specified locations. It takes one argument.

1 — MOV — Moves data from one location to another. It takes two arguments, so the format is MOV a,b. It will move the contents of location a to location b, without affecting the contents of a.

1 — ADD — This instruction takes two arguments, which makes its format ADD a,b. It adds the contents of location a to the contents of location b, leaving the result as the new contents of b, and leaving the contents of a unchanged.

3 — SUB — Takes two arguments, so its format is SUB a,b. The effect is to subtract the contents of location a from location b, leaving the contents of a unchanged.

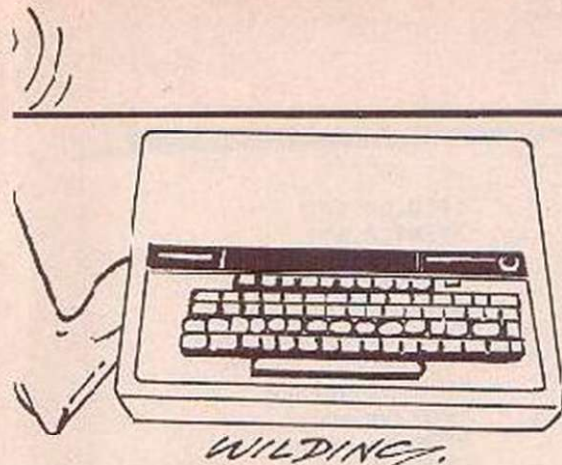
4 — JMP — Has but one argument, which makes its format JMP a. It is an unconditional jump to location a — used for the same purpose as Goto in Basic, but is relative rather than absolute, as explained below.

5 — JNZ — This is a conditional jump instruction which takes two arguments, making its format JNZ a,b. If the contents of location b is 0, the program will jump to relative location a — otherwise it will carry on with the next instruction after the JNZ.

6 — JMG — As above, except that a jump occurs if the contents of location b is greater than zero.

7 — DJZ — Takes two arguments, making

```
100N ERROR RESTORE:VDU 170LDA &72
26:CLS:CLFAR:RIN 180RCL A:STA &72
200DIM code 1000:table 190LDA &73
17,arg 8,PC(1),IN$(8),B$( 200RCL A
1) 210STA &73
300DIM mode 1:gover 0,a 220CLC
rgL 1,argH 1,mask 1,data 230LDA #base MOD 256
1,PC 1 240AEC &72
40current=&74:mask=15 250STA &72
:mask?1=240 260LDA &73
500DIM rcw 0,col 0,flag 270AEC #base DIV 256
0 280STA &73
500DIM base 11999,p$(1, 290RTS
100),E(1),ad(1) 300.get LDA (current).Y
70FOR LL=0 TO 2 STEP 2 310STA argL,X
30P%=code 320TYA:PHA
70[ OPT LL 330LEY #3
100.convert LDA &70 340LDA (current).Y
110CLC:ROL A 350AND mask,X
120STA &72 360CPX #1
130LDA &71 370BNE :rcw
140ROL A 380CLC:ROR A:ROR A
150STA &73 390RCL A:ROR A
160CLC:DEY 400.tran STA argH,X
410LDA PC:CLC
420ADC argL,X
430STA argL,X
440LDA PC+1
450ADC argH,X
460STA argH,X
470JSR sizeck
480PLA:TAY
490RTS
500.getbyte LDA data
510STA &70
520LDA data+1
530STA &71
540LDY #2
550LDA (&70),Y
560STA data
570INY
580LDA (&70),Y
590STA data+1
600RTS
610.start LDA PC
620STA &70
630LDA #0
640STA flag
```

WARS

the format DJZ a,b. The effect is to decrement the contents of location b by one, then jump to location a if the contents of location b is now 0.

8 — CMP — this also has two arguments, so its format is CMP a,b. It compares the contents of location a and location b, and if they are not equal to each other, the computer will skip the next instruction, and continue execution with the one after.

Assumes direct mode

As I have said, arguments lie in the range 0-2999 when assembled, but in addition, each can take one of three modes, called addressing modes. These modes are immediate, direct and indirect. Unless you specify otherwise, the computer assumes the argument is in direct mode. Prefixing the argument with # means it is immediate, and prefixing with @ means it is indirect. Taking as an example the complete instruction MOV 0,1 the full effect would be:

(1) The computer finds neither argument has a prefix, so assumes both are direct.

(2) It therefore adds the first argument onto the current address to find out where to get the data to be moved from, and then adds the second argument onto the current address to find out where to put it.

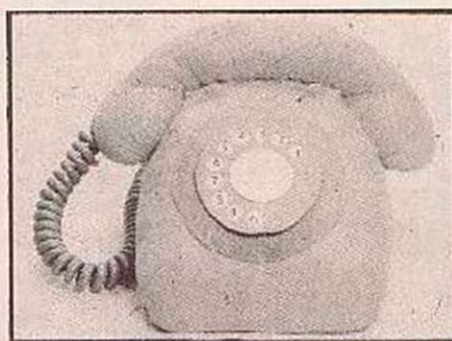
The instruction therefore moves the data 0 locations beyond the instruction — i.e. the instruction itself — to a position 1 location beyond the instruction i.e. in the next location. Incidentally, this is an example of a complete one-line program — when the instruction has been executed, the computer will look for the next instruction, and find the instruction "MOV 0,1" that has been put there by the previous one, and execute this, and this will continue, leaving a trail of MOV 0,1's throughout the core.

Machine code programmers will have noticed that the direct mode, as are all modes, is relative — there is no way for a program to know its absolute address in the core, and the start address for each program within the core is assigned randomly on assembly.

The other two modes I mentioned work as follows — first immediate mode. This causes the argument to be interpreted as a number, rather than an address in core. This means that MOV #3,2 will place the number 3 in the location 2 places further on from the present one, as opposed to MOV 3,2, which would copy the contents of the location three places on from the present one into the location two on from the present one.

Indirect mode is rather more complicated, and is best explained by an example.

ADD @2,4 means "read the contents on location 2. Add this number on to the current location. Now read the contents of this location,



This program is available on Telsoft.

and that is the value to be added to that four locations on from the current one."

So, if you're still with me, type in the program, save it and type Run. After the title page press space and you should see the second screen, headed 'Phase 1 — Rawcode entry', and below that, the heading 'Player 1' and an input prompt, '0>'. Here's where you use those instructions I just explained, and type in your program.

Remember, you have a maximum of 100 lines of program each, and each prompt is numbered to show you how you're doing for space.

When you finish your program, press Return in response to the prompt, and then the other player will be given the chance to input his program. After each player enters his program, he is asked to specify which instruction he wishes execution to commence with; in response to the question, enter the number of the instruction you wish to execute first.

When both players have finished, you will be asked to enter the number of turns of execution — i.e. how many instructions the computer is going to execute from each program before it announces a draw.

When both players have entered their code, it is assembled. If an error such as an illegal instruction or format is encountered, the appropriate player has to re-input his code. Assuming no errors are present in either program, however, the game starts in earnest.

This is where I made a major change to the game as I discovered it. Apart from the fact that the original game had no assembler, and the code had to be put together by hand, I have stuck to the original guidelines. But the game as it stood wasn't exactly visual — each player typed in a mass of numbers, sat back and waited. This was all very well in the early days, but now people expect something more in the way of a display.

Semi-graphic display

So to that end, I added a semi-graphic display, which takes the form of an array of graphic blocks, 20 blocks wide by 10 high. Each block represents 15 locations in the core, numbered across the screen, so the top left hand block represents locations 0-14, the top right hand locations 295-299, the bottom left 2700-2714, and the bottom right 2985-2999. When the game starts, the area occupied by player one's code is shown in red, and that occupied by player two's in green.

This is the first time either player can know where their code is in memory. After that, whenever a player's program changes the contents of a location in the core, the block representing that location changes to the appropriate colour, so, if a program is overwriting areas of memory as an attack, it is possible to see how close the attack is to a vital point.

The game ends when one program or the other tries to execute an illegal instruction, or when the set number of turns has elapsed.

```

650STA qover
660LDA PC+1
670STA &71
680JSR convert
690LDA &72
700STA current
710LDA &73
720STA current+1
730LDY #0
740LDA #48
750AND (current),Y
760CMP #32
770BNE n1
780LDA #2
790.nh CMP #15
800BNE n1
810LDA #1
820.n1 STA mode
830LDA #192
840AND (current),Y
850CMP #128
860BNE n1
870LDA #2
880.nh1 CMP #54
890BNE n11
900LDA #1
910.n11 STA mode+1
920LDA (current),Y
930AND #15
940CMP #1
950BCC end2
960CMP #5
970BCS end2
980LDX #0
990LDY #1
1000.rep LDA mode,X
1010CMP #1
1020BNE n1
1030JSR get
1040JMP finish
1050.end2 LDA #1
1060STA qover
1070RTS
1080.nd CMP #2
1090BNE irm
1100JSR get
1110LDA argL,X
1120STA &70
1130LDA argH,X
1140STA &71
1150JSR convert
1160LDA &72
1170STA cata
1180LDA &73
1190STA data+1
1200JSR getbyte
1210LDA data
1220CLD
1230ADC PC
1240STA argL,X
1250LDA data+1
1260ADC PC+1
1270STA argH,X
1280JSR sizeck
1290.finish CFX #1
1300BED exec
1310LDY #2
1320INX
1330JMP rep
1340.imm LDA (current),Y
1350STA argL,X
1360TYA:PHA
  
```

(continued on next page)


```

1370LDY #3
1380LDA (current),Y
1390AND mask,X
1400STA argH,X
1410PLA:TAY
1420JMP finish
1430.exec LDY #0
1440LDA (current),Y
1450AND #15
1460STA &74
1470CLC
1480ADC &74
1490TAX
1500LDA table,X
1510STA &74
1520INX
1530LDA table,X
1540STA &75
1550JMP (&74)
1560.sizeck LDA argH,X
1570CMP #11
1580BCC clr
1590BNE nce
1600LDA argL,X
1610CMP #105
1620BCC clr
1630.nce LDA argL,X
1640SEC
1650SEC #184
1660STA argL,X
1670LDA argH,X
1680SBC #11
1690STA argH,X
1700.clr RTS
1710.getarg LDA mode,X
1720CMP #0
1730BEQ transfer
1740LDA argL,X
1750STA &70
1760LDA argH,X
1770STA &/1
1780JSR convert
1790LDA &72
1800STA data
1810LDA &73
1820STA data+1
1830JSR getbyte
1840.LDA data
1850STA argL,X
1860.LDA data+1
1870STA argH,X
1880.transfer RTS
1890.inc JNC PC
1900BNE return
1910INC PC+1
1920.return LDA PC
1930CMP #185
1940BNE rt
1950LDA PC+1
1960CMP #11
1970BNE rt
1980LDA #0
1990STA PC
2000STA PC+1
2010.rt RTS
2020.zp LDA argL,X
2030STA &70
2040LDA argH,X
2050STA &71
2060JSR convert
2070CPX #0
2080ENE high
2090LDA &72
2100STA &74
2110LDA &73
2120STA &75
2130RIS
2140.high LDA &72
2150STA &76
2160LDA &75
2170STA &77
2180RTS
2190.mov LDA mode
2200BEQ immd
2210LDX #0
2220.TSR zp
2230INX
2240JSR zp
2250LDY #0
2260.agn2 LDA (&74),Y
2270STA (&75),Y
2280INX
2290CPY #4
2300BNE agn2
2310JSR inc
2320INC flag
2330RTS
2340.immd LDX #1
2350JSR zp
2360LDY #0
2370TYA
2380.agn3 SIA (&76),Y
2390INX
2400CPY #2
2410BNE agn3
2420LDA argL
2430STA (&76),Y
2440INX
2450LDA argH
2460STA (&76),Y
2470JSR inc
2480INC flag
2490RTS
2500.add LDX #0
2510JSR getarg
2520INX
2530JSR zp
2540JSR getarg
2550CLC
2560LDA argL
2570ADC argL+1
2580STA argL
2590LDA argH
2600ADC argH+1
2610STA argH
2620LDX #0
2630JSR sizeck
2640.thn LDA argL
2650LDY #2
2660STA (&76),Y
2670INX
2680LDA argH
2690STA (&76),Y
2700JSR inc
2710INC flag
2720RTS
2730.sub LDX #0
2740JSR getarg
2750LDX #1
2760JSR zp
2770JSR getarg
2780SEC
2790LDA argL+1
2800SRC argL
2810STA argL
2820LDA argH+1
2830SEC argH
2840STA argH:LDX #0
2850JSR sizeck1
2860JMP thn
2870.sizeck1 LDA argH,X
2880CMP #11
2890BCD clr1
2900BNE nce1
2910LDA argL,X
2920CMP #185
2930BCC clr1
2940.nce1 LDA argL,X
2950CLC
2960ADC #184
2970STA argL,X
2980LDA argH,X
2990ADC #11
3000STA argH,X
3010.clr1 RTS
3020.jmp LDA argL
3030STA PC
3040LDA argH
3050STA PC+1
3060RTS
3070.jmz LDX #1
3080JSR getarg
3090.jm LDA argL+1
3100BNE ret2
3110LDA argH-1
3120ENE ret2
3130JMP jmp
3140.ret2 JSR inc
3150RTS
3160.jmc LDX #1
3170JSR getarg
3180LDA argL,X
3190BNE jmp
3200LDA argH,X
3210BNE jmp
3220JMP ret2
3230.diz LDX #1
3240JSR zp
3250JSR getarg
3260LDA argL+1
3270SEC
3280SBC #1
3290STA argL+1
3300LCA argH+1
3310SBC #0
3320STA argH+1
3330JSR sizeck1:LDY #2
3340LDA argL+1
3350STA (&72),Y
3360INX
3370LDA argH+1
3380STA (&72),Y
3390LDA &72
3400STA &76
3410LDA &73
3420STA &77
3430INC flag
3440JMP jm
3450.cmp LDX #0
3460JSR getarg
3470INX
3480JSR getarg
3490LDA argL
3500CMP argL+1
3510BNE skip
3520LDA argH
3530CMP argH+1
3540BNE skip
3550JSR inc
3560RTS
3570.skip JSR inc
3580JSR inc
3590RTS
3600.display LDA #0
3610STA row
3620STA col
3630LDA #(HIMEM+160) MOD
256
3640STA &80
3650LDA #(HIMEM+160) DIV
256
3660STA &81
3670LDY #0
3680.agn LDA #150
3690STA (&80),Y
3700JSR incl
3710LDA #255
3720STA (&80),Y
3730JSR incl
3740LDA col
3750CMP #19
3760BEQ nrow
3770CLC
3780ADC #1
3790STA col
3800JMP agn
3810.nrow LDA #0
3820STA col
3830.NA row
3840CMP #18
3850BCS end
3860CLC:ADC #2
3870STA row
3880LDA &80
3890CLC
3900ADC #40
3910STA &80
3920LDA &81
3930ADC #0
3940STA &81
3950JMP agn
3960.end RTS
3970.incl LDA &80
3980CLC
3990ADC #1
4000STA &80
4010LDA &81
4020ADC #0
4030STA &81
4040RTS
4050J:NEXT LL
4060P:PCinit

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[illegible]

ATARI 600XL ENTERTAINMENT PACK

Great news for games addicts who appreciate high quality graphics and sensational arcade action gameplay. For only £69, you can buy a 16K Atari 600XL Computer with two top arcade ROM cartridge titles and a joystick. These two ROM titles are the famous arcade hit Donkey Kong and another favourite Qix (We only have a limited number of packs with Qix. When these run out, Qix may be substituted for an arcade entertainment cartridge of the same value). The 600XL Entertainment Pack offers real value for money and enables you to save £83.96, nearly half of the normal RRP's of the pack items when purchased individually. Silica Shop has a wide range of ROM cartridges available including arcade favourites such as Asteroids, Centipede, Missile Command, Popeye, Q*Bert, Star Raiders, Super Cobra for only £9.95 each! The 600XL is a programmable home computer with the Basic Programming Language built in and if you later add a 1010 Program Recorder (XLP 1010 - £34), a range of hundreds of cassette programs will become available to you. The Atari 600XL is recommended as a first class games machine.

ATARI PACKS - POWER WITHOUT THE PRICE!



ATARI 600XL ENTERTAINMENT PACK	
16K Atari 600XL	£99.99
Donkey Kong (R)	£14.99
Qix (R)	£9.99
Single CX40 Joystick	£7.99
Total (if purchased separately)	£132.96
Less Discount (approx 48.1%)	£63.96
PACKAGE PRICE (XLC 1600)	£69.00

£69

ATARI 800XL AND RECORDER PACK

The 64K 800XL is packaged here with the 1010 recorder, an economical storage and retrieval unit, a smash hit arcade game and programming aid, all for a package price of only £129 (ref: XLC 1010), a saving of £85.96 off the RRP's of the individual items which total £194.96. The game included in this pack is Pole Position. Now on cassette from Atari, Pole Position is an accurate reproduction of Atari's own highly successful arcade driving game which has all the thrills and spills of the grand-prix race track. On the reverse of this cassette is a demonstration program of Atari's amazing sound and graphics capabilities giving an example of the high quality performance of the Atari 800XL. Also included is an invitation to Programming 1 cassette which takes you step by step through the first stages of programming in Atari Basic using Atari's unique soundthrough facility which allows pre-recorded human speech to be played through your TV speaker. All you need is a joystick (ATJ 400 - £7.99 for Pole Position), to be up and running with this package. The Atari 800XL in this pack comes with a Silica two year guarantee.

ATARI PACKS - POWER WITHOUT THE PRICE!



ATARI 800XL + PRG. RECORDER PACK	
64K Atari 800XL	£129.99
1010 Program Recorder	£34.99
Pole Position + Demo Prog (C)	£9.99
Invitation to Programming 1	£19.99
Total (if purchased separately)	£194.96
Less Discount (approx 33.8%)	£65.96
PACKAGE PRICE (XLC 1010)	£129.00

£129

ATARI 800XL AND DISK DRIVE PACK

This pack includes the 64K 800XL with a 1050 Disk Drive for mass storage and speedy information retrieval as well as a brand new adventure game and a powerful home file program, all for only £249 (ref: XLC 1050), a saving of £115.96 off the RRP's of the individual items which total £364.96. The first of these programs is The Payoff on disk, a new adventure game which is a fantasy simulation in which you play the leading role. An exciting introduction to adventure programs which are always popular (with a demonstration program of Atari's amazing sound and graphics on the reverse). Also included in this pack is Home Filing Manager to help you organise your files. It allows you to catalogue and file details of birthdays, books, your stamp collection or anything else which would normally require you to use filing cards. The instructions for Home Filing Manager are on the reverse of the disk and all the disks which come in this package are in protective paper wallets. You get an extended two year guarantee on the 800XL and 100 free programs with the disk drive when you buy this package from Silica.

ATARI PACKS - POWER WITHOUT THE PRICE!



ATARI 800XL + DISK DRIVE PACK	
64K Atari 800XL	£129.99
1050 Disk Drive	£199.99
Home Filing Manager (D)	£24.99
The Payoff + Demo Prog (D)	£9.99
Total (if purchased separately)	£364.96
Less Discount (approx 31.9%)	£115.96
PACKAGE PRICE (XLC 1050)	£249.00

£249

NEW ATARI 130XE NOW IN STOCK

Atari's new 128K computer, the Atari 130XE offers an enormous 131,072 bytes of RAM for only £169. The 130XE comes with built in Basic and full operating instructions and is now in a newly designed case with a modern full stroke keyboard. The XE is fully compatible with both the 400/800 and the XL ranges of machines, this means that it can run approximately 90% of all Atari Computer software on the market. This provides a range of over 1,000 software titles as well as a large selection of accessory and peripheral items. Initial stock of the 130XE will be limited, so it's first come first served.

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CBM ROCK

Listing 2.

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10 REM*****PAUL ARMOUR 1985*****
20 REM*****SET UP SCREEN*****
30 PRINT "POKE5228,0:POKE5280,0"
40 POKE5228,29:POKE5270,FECH(5270)/016
50 POKE5280,1:POKE5282,5
60 DIMS(10,12)
70 REM*****VARIABLES*****
80 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```


FALL

Paul Hammond
simulates the laws of
gravity on the CBM-64.

ROCK FALL IS A game in which you have to guide a little man around 10 caves collecting the 16 diamonds in each. If you burrow under a rock it will fall on you and kill you unless you move out of the way quickly.

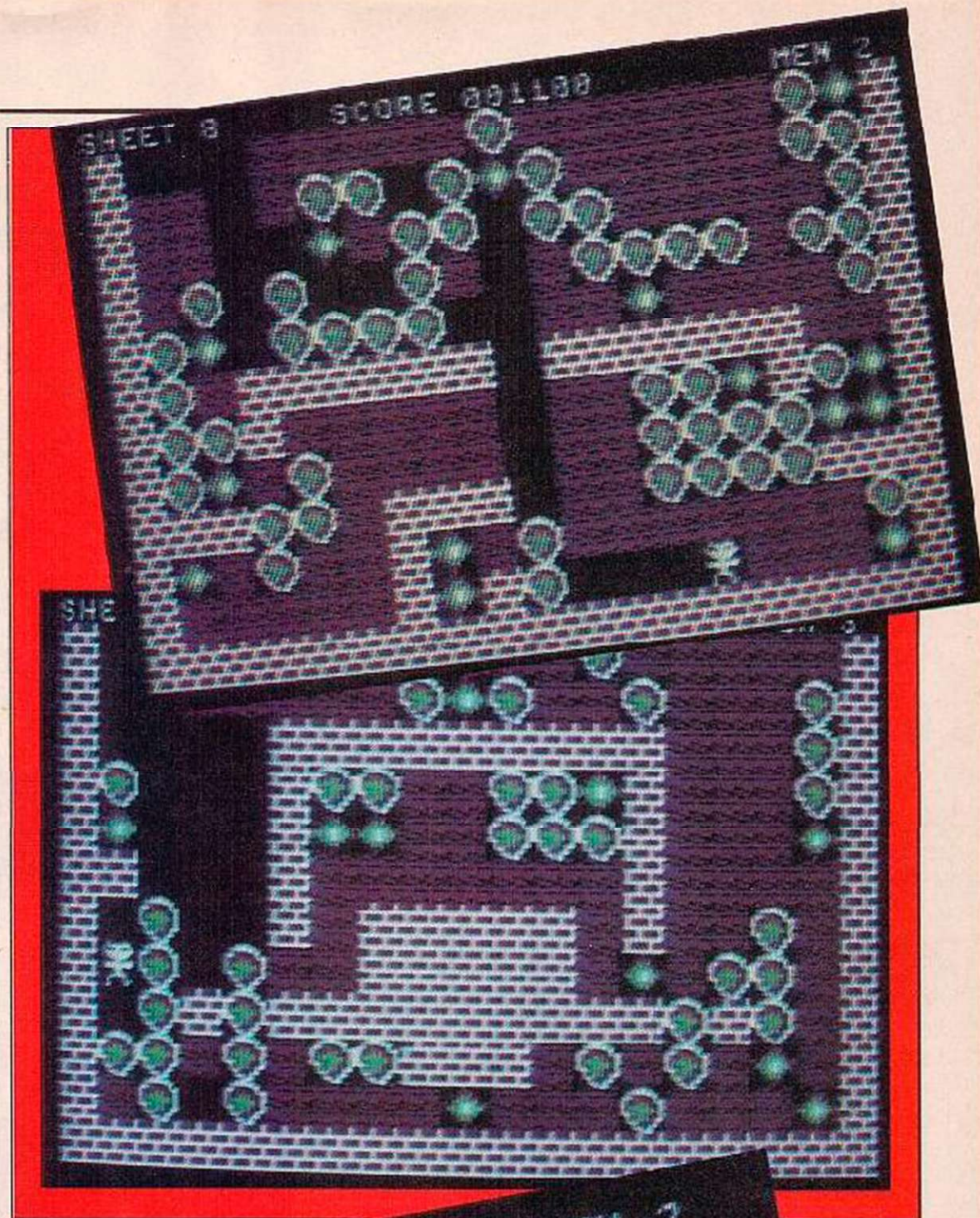
During the game you will probably find that you have dropped a rock and it has cut you off from one or more of the diamonds. If this happens press the F1 key to lose a life and the screen will be redrawn. On most of the screens the rocks are placed strategically so that under mining one could block you off or the diamonds off from each other, it could also unblock the way to a diamond.

The game is keyboard only and the following keys should be used:

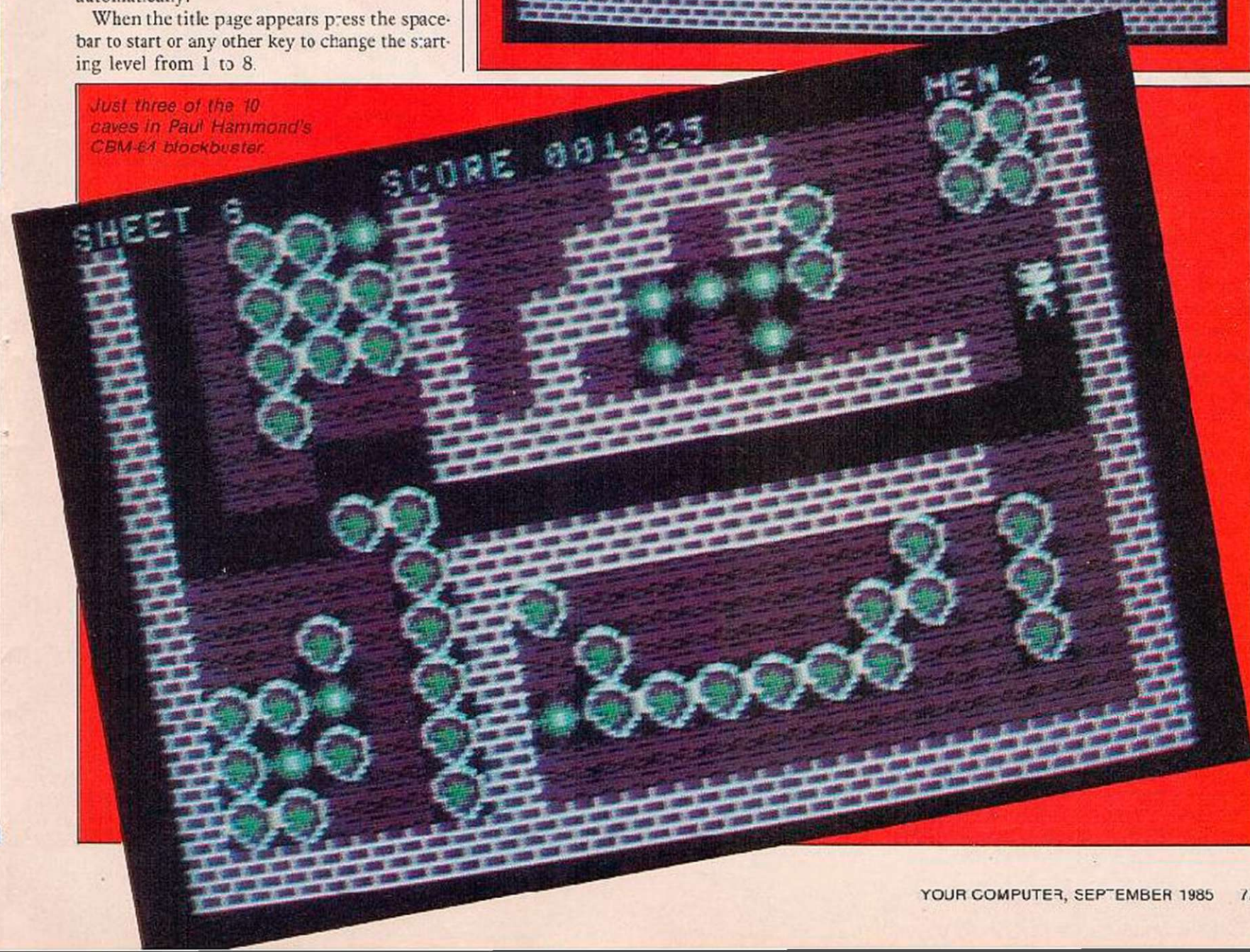
- S = Up
- X = Down
- ← = Left
- = Right
- F1 = Die

To play the game type in the first program which sets up the machine code and graphics and save it. Next type in the Basic program and save it after the first. Now, when you press Shift and Run/Stop the game should load and run automatically.

When the title page appears press the spacebar to start or any other key to change the starting level from 1 to 8.

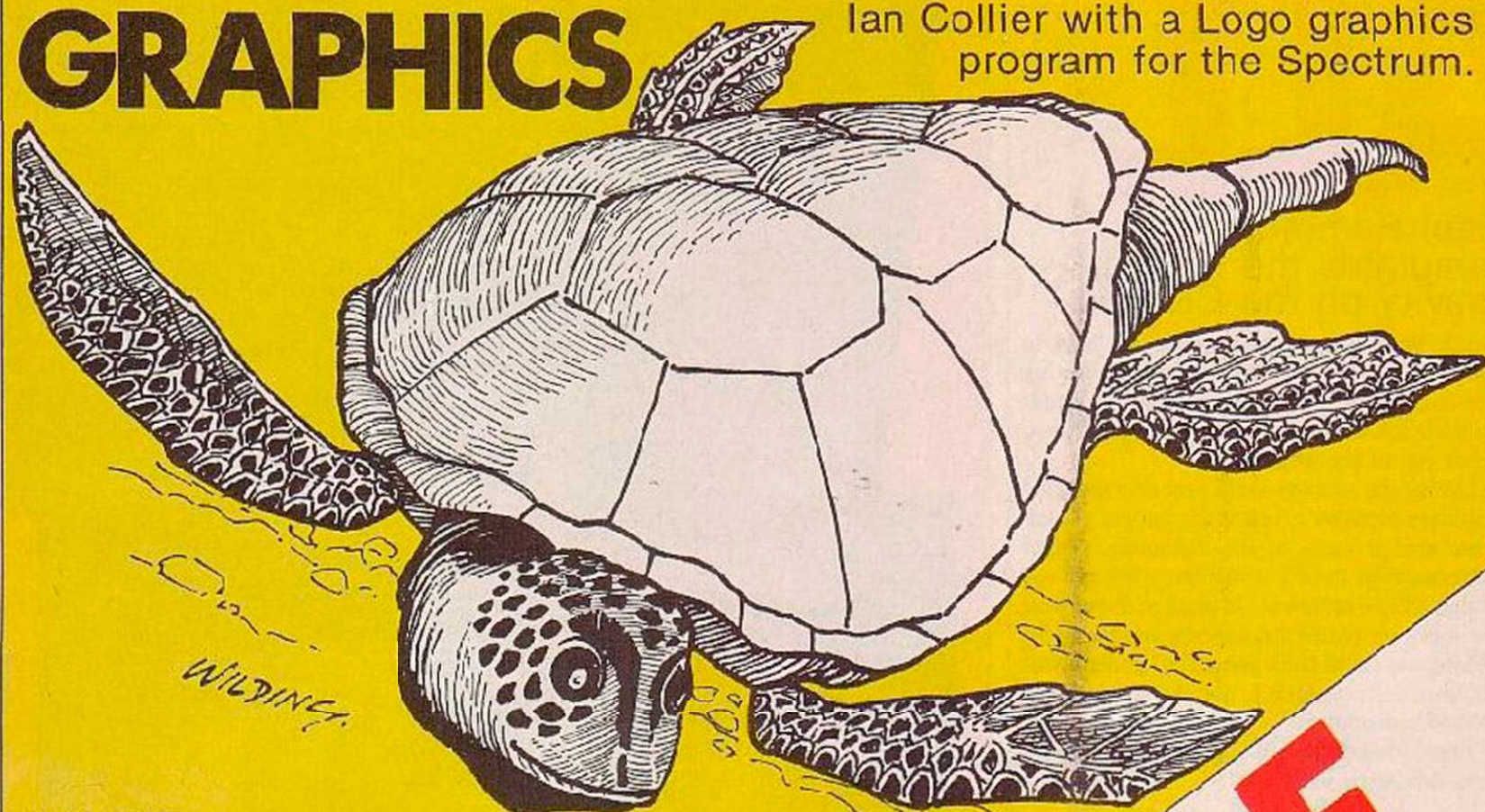


Just three of the 10
caves in Paul Hammond's
CBM-64 blockbuster.



GRAPHICS

Ian Collier with a Logo graphics program for the Spectrum.



Demo program.

```
10 BORDER 0: PAPER 0: INK 7: C
LS : RANDOMIZE USR 30000
20 "dir:mov127.87:rep90:for45-
rep/2:rot30:end
30 "for44:rot90:for10:fil125.85
.4
40 PAUSE 50:"scr2.0": PAUSE 50
:"scr0.2
50 ".sta:rep5:fora:rot150:fora:
rot-78:end
60 PAUSE 50: CLS
70 "box255 175:mov100.70:pol5.1
40.60
80 LET a=20:"mov130.87:dir5:st
a:fil140.100.2
90 "bor2:ink4:cir60
100 INPUT ""
110 "mov8.8:dir0:ink6:rep4:rep30
-10*(rep=1 OR rep=3):for4:jum4:e
nd:rot90:end
```



On
Telsoft.

TURTLE

THIS IS an implementation of the turtle graphics part of Logo, adapted into about 15 commands.

To set up the machine code the listing of data must be entered and run. The data will be read and Poked in by the Basic program.

After creating the graphics code it should be ready for use at 30000. It may, however, need to be moved, for example to a higher address in

a 48K Spectrum. Having saved the code with: Save "logo"CODE 30000,1000 the relocate program will move the code, first by loading it in at the new address, if this has not already been done, then changing the absolute addresses. A copy of the code at 30000 should

be retained for the demonstration program.

Program 1 allows you to use the turtle graphics without writing a program. It incorporates one loop using the control variable ϵ , which can be set up. Commands are as follows:

- DIR x — Points turtle in a direction x degrees anticlockwise from horizontal right.
- CIR x — Draws a circle around the turtle, radius x pixels.
- BOX xy — Draws a box with two diagonally opposite corners at the turtle and (xy).

Data loader.

```
10 DEF FN d(a#)=CODE a#-48-(22
AND a#>"2")-(7 AND a#>"9"): DEF
FN h(a#)=FN d(a#(1))*16+FN d(a#
(2))
20 RESTORE : CLEAR 29999: LET
a=30000
30 FOR x=100 TO 340 STEP 10
40 READ a#: LET t=VAL a#( TO 4
): LET a#:=a#(5 TO )
50 POKE a, FN h(a#): LET t=t-PE
EK a: LET a=a+1
60 LET a#:=a#(3 TO ): IF a#>" "
THEN GO TO 50
70 IF t THEN PRINT "Error in 1
line ":x: STOP
80 PRINT "Line ":x: OK: NEXT
x
90 CLS : PRINT AT 10,10:"Finis
hed"
100 DATA "67072a3d5c36dc233675d
f225f5c21d77ae52a535c2b1e22ed8A1
d384be7fe2e2819237ecdb618fe0d2e
bfe2220032318e4fe3a20ec23fe2e20e
```

```
7225d5c0603d1e7"
110 DATA "6965cbaf121310f9e7eb7
3237223e5cb7ecdb618fe0d20be23fe2
220f37efe3a28b4fe0d20ea18aeel3e0
021d675225d5ccdb2283817233600233
60023224a752336"
120 DATA "54180023360022a5f5c225
d5cc92a4b5ce500010800cd5516e3224
b5cel2336b22336652336f018ce52455
03a595d11cc75d53a3a5cfe0b2013cd1
576210313cd3025"
130 DATA "7056200421cf12e5c3761
be13a3a5cd3600ffcd302528043cc31
3132a5d5c225f5c225b5cc3bd12f33e0
0ff2a3d5ce5e5ed733d5ce1cd3275e12
23d5cfdcb007ec0"
140 DATA "670618c7df2b7efe22c28
alc225d5ccdb30252807cd4d0d4d3556f
8of110677e50603e7cbe4f1ab920061
310f5c11070e1225d5c1313131310fd1
ae720e1e7fe2e20"
150 DATA "57551ecd3025063a29070
622237ecdb618fe222807fe0d2803b82
0f0225d5c183dcd3025200c0603dfte0
```

```
dca8a1ce710f7182b1d77ae50603cba
f4f1ab9200715e7"
160 DATA "742910f5c1180fe1225d5
c13131310fd1aa720e2cf18eb4e23460
3cd407a1812e71ad5cdf576e1235e235
6ebcd3025c42c16cd541fd27b1bdfefe0
dc8fe3aca497afe"
170 DATA "616622c28a1ce7c9a7c84
7c5cd821cfe2c2001e7c110f4c944495
2017c78434952019e78424f5802c8784
64f52010279424f5201942246494c036
677504f4c032379"
180 DATA "5401494e4501f6794a554
d01fe79524f5401177a434f56022f7a5
04c4f02377a53435202517a524550016
f7a454e4400807a43414c013d7a3e10d
7cd452dd7cd0723"
190 DATA "704311010121fe00cd2d7
87cfe203051e60ffe033061cd6678798
34cd087828e/cbb55c0a7935f814f7a8
047cd0878280a75834fcd087820f818c
a21ff0279934fcd"
200 DATA "873708782016cd2d787cf
e1038f0c5d5af92573047cd7377d1c11
8df79834f18a4c5e5d5af92573047cd7
```


Relocate program.

```
1 DEF FN h(a$)=FN d(a$(1))*16
+FN d(a$(2)): DEF FN d(a$)=CODE
a$-48-(32 AND a$)*2)-(7 AND a$)
"q")
2 DEF FN a(a)=INT (a/256): DE
F FN b(a)=a-256*INT (a/256): DEF
FN c(a)=PEEK a+256*PEEK (a+1)
3 INPUT "New address? ":a: CL
EAR a-1
4 INPUT "Original address? ":
f: LET t=PEEK 23730+256*PEEK 237
31+1
10 RESTORE : DIM a(70)
20 LET a=1
30 FOR x=1 TO 3
40 READ a$: LET tot=VAL a$( TO
4): LET a$=a$(5 TO )
50 LET 1=FN h(a$): LET h=FN h(
a$(3 TO 4))
60 IF NOT 1 AND NOT h THEN GO
TO 80
70 LET tot=tot-h-1: LET a(a)=h
```

```
*256+1-30000+t: LET a=a+1: LET a
$=a$(5 TO ): IF a$<>" THEN GO T
O 50
80 IF tot THEN PRINT "Error in
line ":90+10*x: STOP
90 NEXT x
100 DATA "5188347537753d759a75a
c75d375e87525764e76a276ca76d276e
d760a77107716771c7728772e7734773
a77407746774c77"
110 DATA "5728527758775e7764777
77785778b779b77a377b077b577c477c
877f177fa77067828783378507887789
978067914792479"
120 DATA "568627795a79717981798
b799c79ae79bd79c379d279da79e079e
679e9790c7a247a2d7a4a7a737a8f7aa
97a527b00000000"
135 LET a=t-f
140 IF PEEK t=42 THEN GO TO 170
150 PRINT "Insert tape & press
a key": PAUSE 0
155 CLS
```

```
160 LOAD "logo"CODE t
170 FOR x=3 TO 70
180 LET c=FN c(a(x))+a: POKE a(
x),FN b(c): POKE a(x)+1,FN a(c)
190 NEXT x
200 LET a=a+PEEK (t+4)-256*PEEK
(t+7)
210 POKE t+4,FN b(a): POKE t+7,
FN a(a)
```

Program 1.

```
10 RANDOMIZE USR 30000
20 PRINT AT 0.10:"code:";TAB 1
0:
30 INPUT "Instruction >": LINE
a$
40 LET z=0: FOR x=1 TO LEN a$:
LET a=a+1: IF a=4 THEN PRINT "
":
50 IF a$(x)="-" THEN PRINT TAB
10: LET a=0: GO TO 70
60 PRINT a$(x):
70 NEXT x
80 INPUT " FOR a=":x1:" TO ":x
2:" STEP ":x3
140 CLS : "mov128.88:d:r0
145 LET xx=FN x()
150 LET a=x1
160 "calxx
170 LET a=a+x3: IF a<=x2 THEN G
O TO 160
180 GO TO 20
9500 BORDER 0: PAPER 0: INK 7: C
LEAR 29999: LOAD "logo"CODE : RU
N
9510 DEF FN x()=FN v(USR 31500,a
$): DEF FN v(v)=v
```

- FOR x — Moves the turtle forward, leaving a trail.
- BOR x — =BORDER x
- FIL x,y,z — Fills in any enclosed area in ink z, starting at (x,y). If filling starts at the edge of the area, then it is possible that only half will be filled, so aim for the middle.
- POL x,y,z — Draws a polygon with x sides, moving first to (x,y) and going anticlockwise.
- INK x — Any further drawing will be in ink x; this only lasts to the end of the line of instructions.
- JUM x — Moves the turtle forward x pixels without changing the screen (Jump).
- ROT x — Rotates the turtle x degrees anticlockwise.
- MOV x,y — Moves the turtle to (x,y).
- PLO, x,y — Moves the turtle to (x,y) and plots a pixel.
- SCR x,y — Changes the screen colours to paper x and ink y without erasing the patterns.
- REP x — Marks the start of a set of instructions to be repeated x times. Also sets up the Basic variable Rep which is equal to the counter of the innermost loop. Note Rep starts at x and goes down to 1.
- END — Marks the end of the repeated instructions.

The instructions can be in upper or lower case.
The prompt Instructions will appear and the instructions must be typed in. I have printed out:

some examples). Then the prompt For a= will appear and you must set up the loop as in Basic by typing three numbers followed by Enter, e.g.

FOR a= 1 TO 50 STEP 1

If a loop is not required, three Is can be entered. If a mistake has been entered in the instructions, the program will stop with a report. Otherwise, the instructions will be carried out and you may then enter some more. Each time a set of instructions is entered, the screen is cleared and the turtle is moved to the centre of the screen, and pointed horizontally right.

To use the commands in a program they must be initialised. If the code is still in its original position, this is done by:

RANDOMIZE USR 30000

The syntax checker will now accept the new commands, but to use the commands, they must be re-initialised if the program has been altered. This is so that the new position of the variables is recognised, and the new defined procedures are found. The commands need to be initialised after Clear and Run, as these reset the machine stack. If Interface I is connected, this adds complications.

The new commands are regarded by the program as syntax errors unless followed by a turtle graphics command, but they work within a program. Also, when one of the new error reports — e.g. Microdrive not present — is caused, this resets the machine stack and the graphics commands need to be re-initialised.

To enter the new commands, they must be

placed inside quotes, but at the end of a line, the final quotes may be omitted. For use in a program, there is one more command — Cal.

It calls instructions at the address given. If these instructions are in a string, the address of the instructions needs to be found and the string needs to be prepared by inserting the hidden floating point forms after the numbers — these will not be hidden in a string and will appear as question marks and other characters. This is done by the routine at 31500 and is demonstrated in program one in lines 145,9510.

New commands are like definable procedures. For an example see the command .sta in the demo program. To define a procedure, open quotes as usual and type a full stop followed by the three-letter name, then a colon. The commands following this will be executed every time the new command is encountered. The end of the defined command is at the first close quotes encountered in the definition, or at the end of the line.

```
377d1e1c17ce60f67cb85188ec5e5d57
88247af935f814f"
210 DATA "8383cd08787b20f821fe0
0cd7377d1e1c17ce6f067cbcdc373777
93c281b3d281878a72814feaf2810e5c
5cdad2247047e0710fde601c1e1c9cd6
678af3cc9c5c578"
220 DATA "91828247cd087887f5adc
b4f280124e6fd6f1b56f87f6fba56fd
1c1c5d5789247cd0878f5adcb4728047
cc610677de6fe6f1b56fd1c1c9c5d5e
5cdad2247043e01"
230 DATA "67930f10fdb677cddb0be
1d1c1c9efa3043440b0005a053811b97
acd033ef3120011f020230010a00eb1
1be7aedb0c93a7d5cccd282def01383a7
e3cccd282def0138"
240 DATA "74982a7d5ce53a8f5c5f5c
d2d23f1328f5ce1227d5cfd3656f8c9e
fc102383a7d5cccd282def03e1383a7e5
ccd282def0338cd0723c50600cdba24c
1c50e00cdba24c"
250 DATA "7596c5af5257af735f060
0cdba24c10e00c3ba24ef3:3821be7ac
```

```
dc033ed53655cef04013821c37acdc03
7ed53655cef0438e3b72421b97a11c87
a010f00ed0b0efc4"
260 DATA "638302c502382a7d5ce57
ced2824e17dcd282defc3342c0003e50
301e403010524e3e50337a3a30f040f3
B11b97acdc033ef5e438cd0723c5ef3
120011f020238eb"
270 DATA "698411be7a010a00ed0b0c
12a7d5c7d91c5e5dcf179cd282de1c17
c90dcf179cd282def31040131040f280
238eb11af7acdc033ef31a30105310f3
10f0233eb11b47a"
280 DATA "8030ccc033cdd52d47c5e
f3138e21af7acdc033cd079ef31313
E010a00a7ebcd42eb21b47aedb0ef0f3
E11b97acdc033cd8c78c110d221c87a1
1b97a010f00ed0b0"
290 DATA "8672c92f3c2ef4c93e12d
7cdc52d7c9fd3656ff21915c7e5c5bc
Arhc4rd079af132915cfd3656f8c9efa
3043440b0005a053138eb21b97acdc03
3ef0f38c38678cd"
300 DATA "74730723ed437d5cc9cd0
```

```
723c3e522cda22d2a5d5ce50bed435d5
ecd4976e1225d5cc93e10d7edd52dd73
e11d7cdd52dd73a8f5c2100581101580
1bf0277eds0c9cd"
310 DATA "5265d52d2ada75772a5d5
ce3f511841dc5e9e1c178fe1d2804c5e
5c400f:3ded5bda75122809d1d5f5c5e
d35d5ce931c17afe1d2009f1f5d5ed5
bja7512e9d5e985"
320 DATA "50813b46736a81060a91c
1377bad2dbd607c1c5aed7e31d0f5498
77bad2dbd307c1c5aed7e31d0f549414
1410e5d0000000000000000000000000
0000000000000000"
330 DATA "353/000000000000000000
00000000000000000000000000000000
0000000e7cbb228da2e1c235e2356e51
77e2323225f5c2ufed02806cd52:6233
62de1e5237efe22"
340 DATA "72072806cd5216233622e
1e523eda7112a5d5c225b5ce1e5225d5
cfdb30a6fcb01becd49762a5b5c225
d5cfdcb01fe2a5+5c2b2bd1a7ed52eb4
44d722b7303c900"
```


BASIC

Geoff Hatto with a routine to help in the development of a program by storing and executing individual lines of Basic text

from within a standard editor. For the CBM-64.

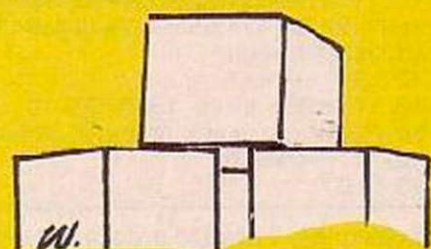
THIS PROGRAM allows individual Basic macros — lines of Basic text — to be stored and executed from within the standard editor. This means that you can define simple one line Basic routines to help in the development of a program. The macros are themselves completely separate from the main program under development.

They are stored in a different area of memory and can be defined, listed, edited and executed using a special set of simple commands. The program also supports an Old command and has two further commands for disc drive owners, a screen directory and command string utility.

The program has been designed to be easy to use and has full error-checking facilities in addition to the standard error routines. The extensions are in the form of single character commands, and all the standard Basic abbreviations are left intact — i.e. L shift, I for List etc.

Up to 10 macros can be defined at any time. Each one can access the main program with a Run or Goto/Gosub statement, but a macro cannot be called from within another macro. Macros only work in direct mode, and therefore cannot be accessed by the main program. Also, the Input and Get commands cannot be included in a macro because they are not direct mode statements.

To define a macro, the letter M is typed followed by the desired macro number — 0 to 9. This is then followed by the Basic text as though you were typing in a standard line in Basic. When return is finally entered, the line is stored in memory ready to be executed.



PROGRAM

To run the macro, the letter M is again typed followed by the macro number, but this time with no following text. The macros can then be run — or redefined — as many times as required. To list a macro, the letter L is typed followed by the desired macro number.

After hitting return the macro is listed to the screen preceded by an M and the macro number. This allows you to directly screen edit the listed macro.

When using Macro 0, the macro number 0 itself need not be specified. Typing M is therefore equivalent to M0. When defining macro 0 like this, a space must be left between the M and the text, otherwise a syntax error will result.

If you execute a macro which causes an error,

a message will appear, displaying the error and the macro number. If the error occurred in the main program which was called from a macro, then the error will be reported together with the current macro number. Programs executed in the normal way produce standard error messages.

Because this program has been designed as a program development aid, it is relatively crash resistant. Hitting the Run/Stop and Restore keys together have no effect on the extensions and the program can still recover the macro definitions even after a complete power reset — cold start SYS64738 or shorting pins 1 and 3 on the user port — with care! Just type

SYS49152

```
10 MCR *****
20 REM **
30 REM ** MACRO EDITOR EXTENSION **
40 REM ** (LOADER) G.HATTO '85 **
50 REM **
60 REM *****
70
80 READ ADDRESS
90
100 BEGIN = ADDRESS
110 MAXNUMBER = 196
120
130 DEF FN LINENUMBER(A) = PEEK(43)+PEEK(44)+256
140
150 PRINT "LOADING CODE INTO RAM - PLEASE WAIT."
160 PRINT
170 FOR COUNT=1 TO MAXNUMBER:GOSUB 400 (* READ A DATA
LINE *) READ CHECKSUM
180 IF SUMCHECKSUM THEN PRINT "CHECKSUM ERROR IN ",FN
LINENUMBER(10) DIV
190 L = FN LINENUMBER(0):PRINT L
200 IF ADDRESS(0)+8 THEN PRINT "LINE NUMBER",L," NOT
IN ORDER" END
210 NEXT COUNT
220
230
240 REM SAVE CODE TO DEVICE
250
260 REM DEVICE TAPE-1 DISK-2
270 DEVICE = 1
280
290 SYS 57312:EDITOR EXTENSION",DEVICE,1
300
310 POKE232,BEGIN+INT(BEGIN/256)+256
320 POKE253,INT(BEGIN/256)
330 POKE783,252
340 POKE781,ADDRESS-INT(ADDRESS/256)+256
350 POKE782,INT(ADDRESS/256)
360
370 SYS65496:SYS49152:END (* RUN EDITOR *)
380
390
400 SUM = 0
410 FOR I=1 TO 8:READ ENTRY:
420 GOSUB 400 (* CONVERT HEX BYTE *)
430 POKE ADDRESS,ENTRY
440 ADDRESS = ADDRESS+1:SUM = SUM+ENTRY
450 NEXT I
460 RETURN
470
480 IF LEN(ENTRY)>32 THEN 570
490 A1 = RIGHT(ENTRY,32):GOSUB 530:ENTRY = V
500 A1 = LEFT(ENTRY,32):GOSUB 530:ENTRY = ENTRY+V+16
510 RETURN
520
```

```
530 IF A1<"0" OR A1>"F" OR A1>"9" AND A1<"A" THEN 573
540 V = ASC(A1)-48+16*(ASC(A2)-48)
550 RETURN
560
570 PRINT "DATA ERROR IN ",FN LINENUMBER(10) DIV
580
590 DATA 49152
600
49152 DATA 00,50,A2,C1,8D,02,05,0E,900
49160 DATA 03,03,A9,1B,A0,C1,20,04,735
49168 DATA C1,20,21,00,20,10,C0,A9,1051
49176 DATA C0,20,90,FF,30,20,EC,C3,1139
49184 DATA 60,A9,00,20,90,FF,A9,03,873
49192 DATA 8D,87,C0,20,96,C0,90,15,1056
49200 DATA EE,87,C0,AD,87,C0,C9,13,1378
49208 DATA 00,F1,A9,1A,A0,C0,20,04,1016
49216 DATA C1,A9,00,3D,87,C0,20,B8,1105
49224 DATA C0,60,0D,20,20,4E,4F,20,554
49232 DATA 44,49,53,48,20,44,45,56,554
49240 DATA 49,43,45,20,46,4F,55,4E,553
49248 DATA 44,20,4F,4E,20,53,45,52,523
49256 DATA 49,41,4C,20,42,55,53,00,493
49264 DATA 00,0D,20,20,44,49,53,43,376
49272 DATA 20,53,55,50,50,4F,52,54,605
49280 DATA 20,41,55,54,4F,2D,53,45,542
49288 DATA 54,20,54,4F,20,44,45,56,534
49296 DATA 49,43,45,20,23,00,A9,0F,468
49304 DATA AE,B7,C0,A0,0F,20,B9,FF,1197
49312 DATA A9,03,A2,38,A0,C0,20,B0,1091
49320 DATA FF,20,C0,FF,08,F9,0F,20,958
49328 DATA C3,FF,20,CC,FF,20,63,08,1085
49336 DATA 55,49,20,A9,71,F0,C0,20,867
49344 DATA 04,C1,AE,37,C0,F9,03,20,947
49352 DATA CD,BD,A9,0D,20,12,F7,60,1169
49360 DATA AD,1B,C6,30,16,EE,1B,C6,1091
49368 DATA A9,09,3D,1C,C6,EE,1B,C6,1088
49376 DATA 20,7A,C3,20,A6,C3,C2,1C,976
49384 DATA C6,10,75,60,90,EB,A3,1A,905
49392 DATA A2,C1,3D,00,03,EE,01,03,645
49400 DATA 60,A9,3B,A2,E3,ED,03,03,937
49408 DATA 8E,01,33,60,85,35,84,36,614
49416 DATA A0,00,B1,35,F0,EB,23,D2,883
```

```
49424 DATA FF,E6,35,30,F3,E6,36,D8,1481
49432 DATA EF,60,BA,30,0F,AD,1C,C6,935
49440 DATA 10,0A,A9,2F,A0,C1,20,04,631
49448 DATA C1,20,41,C1,4C,EB,E3,00,938
49456 DATA 3F,45,52,52,4F,52,20,49,562
49464 DATA 4E,20,AD,41,43,52,4F,20,512
49472 DATA 00,40,00,40,AD,4C,C6,23,722
49480 DATA 7F,AA,A9,00,20,CD,B0,A9,1061
49488 DATA 20,20,D2,FF,6B,FA,6B,60,1003
49496 DATA A9,00,8D,1C,C6,20,60,A5,029
49504 DATA 86,7A,34,7B,20,73,03,AA,828
49512 DATA F0,EE,38,A2,00,20,73,00,001
49520 DATA DD,99,C1,00,0E,C9,43,F0,1294
49528 DATA 13,00,31,31,7A,F0,0D,C9,933
49536 DATA 38,90,39,E8,E0,66,D3,E5,1111
49544 DATA 20,4C,90,A4,28,ED,97,C1,1005
49552 DATA 48,BD,45,C1,48,20,73,00,838
49560 DATA 60,4F,4D,4C,40,24,51,C4,705
49568 DATA C2,C3,C4,C5,14,FA,B0,1424
49576 DATA 6B,C3,E9,93,0D,20,23,42,825
49584 DATA 41,53,49,43,20,4D,41,43,529
49592 DATA 52,4F,20,45,44,49,54,4F,566
49600 DATA 52,20,45,50,54,45,41,53,585
49608 DATA 49,4F,4E,20,20,47,43,27,476
49616 DATA 30,35,0D,20,20,2D,20,20,321
49624 DATA 2D,2D,2D,2D,2D,2D,2D,2D,368
49632 DATA 2D,2D,2D,2D,2D,2D,2D,2D,368
49640 DATA 2D,2D,2D,2D,2D,2D,2D,2D,368
49648 DATA 2D,2D,2D,2D,2D,2D,2D,2D,368
49656 DATA 0D,0D,20,20,45,44,49,54,384
49664 DATA 4F,52,20,43,4F,4D,40,41,550
49672 DATA 4E,44,53,20,4E,4F,57,20,537
49680 DATA 41,56,41,49,4C,41,42,40,572
49688 DATA 45,3A,2D,0D,0D,20,20,20,294
49696 DATA 20,20,4F,20,2E,2E,2E,2E,359
49704 DATA 2E,2E,2E,2E,2E,2E,2E,2E,387
49712 DATA 4C,44,3D,20,20,20,20,20,317
49720 DATA 4D,20,5A,2E,54,45,53,54,560
49728 DATA 2E,2E,2E,2E,20,44,45,46,423
49736 DATA 49,4E,45,20,42,41,53,49,539
```


MACRO EDITOR

to recover extensions.

The macro definitions are located in the \$C000 block — as is the program — which has no effect on Basic. The macros are actually executed in this block and the only way to corrupt them is to poke into this area.

Typing the letter O followed by return runs an Old command. This recovers Basic text from the current start of Basic. The text can then be treated in the normal way. This is useful after a complete power reset or after typing New. This command, and typing New, have no effect on the macro definitions.

For disc owners, DOS support is provided. When the program is initialised, it scans the serial bus for a disc drive and assigns a matching device number to the program. If no drive is found, a device #8 is assumed — in case you've left the disc drive off! Command strings are sent preceded by the symbol @. Typing just the symbol @ followed by Return displays the current disc error channel. The demonstration disc provided with the drive contains something similar to this.

A screen directory is provided using an \$ command which lists the directory contents to the screen instead of the memory, it also shows the number of displayed files listed to the screen.

The command can be issued in the form of a string, i.e.

\$:L*=SEQ

would display all files beginning with L that are sequential. See disc drive operating manual for more details on command strings.

The program does not affect the speed of Basic program operation, as it is only active in direct mode. Should you require to load yet another one of the many programs that seem to end up in \$C000 then the Q command is provided which turns off the extensions. If you do this by mistake the macros will still be in memory — just re-enter the program.

To get a copy of this program on tape or disc — change line 270 as appropriate — type in the program listed and save it. Now place a blank cassette in the cassette deck or disc in the disc drive and type Run. If all is well, then the program will have saved an executable copy of the program on tape — or disc. If not, then the

reported errors in the Data statements must be corrected and the listing re-saved ready for another attempt.

The program may be reloaded and run when required by typing:

LOAD "EDITOR EXTENSION",1,1 for tape,
LOAD "EDITOR EXTENSION",8,1 for disc,
Execute with

SYS49152

followed by Return. Type New if no Basic program exists, or use the Old command — the letter O and Return — to recover any resident program.

To finish with, here are a few examples of macro definitions to show you how they can be used.

M LIST 2300 — 2450

lists the current set of lines of interest when developing a section of program, in this case from 2300 to 2450.

M1 CLR:PINT FRE(0) — (FRE(0) < 0) * 65536;
BYTES FREE;

prints the correct number of free bytes available for a program.

M2 FS="PROGRAMNAME"+STR\$(PEEK(252));

SAVE FS,1:POKE252,(peek(252)+1)AND255
saves the current Basic program called "Programname" to tape with an updated version number. Location 252 contains the current version number.

M3 GOSUB 10: PRINT "VARIABLE 'A' SET TO 'A"

If the End statement in the main program is replaced with a Return statement then the whole program can be treated as a subroutine by a macro, in this case displaying the final value of a variable A when the main program starting at line 10 has ended.

M4 OPEN#4:CMD4:LIST

M5 PRINT #4:CLOSE4

These two definitions when executed can be used to print a program to a Commodore printer, the second one is used after the printer has stopped, to close the printer channel.

```
49744 DATA 43,20,4D,41,43,52,4F,0E,482
49752 DATA 20,20,20,20,23,4D,20,5E,357
49760 DATA 2E,2E,2E,2E,2E,2E,2E,363
49768 DATA 2E,20,45,50,45,43,55,54,543
49776 DATA 45,20,4D,41,43,52,4F,0D,484
49784 DATA 20,20,20,20,23,4C,20,5E,355
49792 DATA 2E,2E,2E,2E,2E,2E,2E,363
49800 DATA 2E,20,4C,49,53,54,20,4D,503
49808 DATA 41,43,52,4F,0D,20,20,20,402
49816 DATA 20,20,40,23,59,54,52,49,402
49824 DATA 4E,47,2E,2E,2E,2E,2E,44,433
49832 DATA 49,53,4B,20,43,4F,4D,4D,563
49840 DATA 41,4E,44,53,0D,20,20,20,403
49848 DATA 20,20,20,20,54,52,49,454
49856 DATA 4E,47,2E,2E,2E,2E,2E,44,433
49864 DATA 49,52,45,43,54,4F,52,59,625
49872 DATA 0D,20,20,20,20,20,51,20,200
49880 DATA 2E,2E,2E,2E,2E,2E,2E,368
49888 DATA 2E,2E,20,51,55,49,54,0D,460
49896 DATA 0D,00,20,73,00,00,07,20,381
49904 DATA F3,BC,20,AA,B1,60,A2,0B,1079
49912 DATA 4C,3A,F4,0B,A2,00,0E,1C,638
49920 DATA C6,20,F0,32,B9,10,C5,30,969
49928 DATA 90,51,20,0F,0D,1C,C6,20,600
49936 DATA 73,00,F0,1E,90,45,A0,04,762
49944 DATA A6,7A,20,79,A5,20,7F,C3,955
49952 DATA B9,00,E2,91,35,F0,05,C0,830
49960 DATA C0,FC,50,F4,23,A6,C5,4C,1301
49968 DATA 74,A4,FD,1C,C5,2C,A5,00,892
49976 DATA 09,00,ED,1C,C5,A9,0E,85,934
49984 DATA 9D,A0,FF,05,9A,20,7F,C3,1121
49992 DATA 38,A5,C5,E9,01,85,7F,A5,928
50000 DATA 3E,E9,00,85,73,20,E1,A7,967
50008 DATA 4C,74,F4,A9,67,A0,C3,20,1015
50016 DATA 04,C1,F2,0E,4C,1A,C1,0D,681
50024 DATA 3F,4D,41,43,52,4F,20,44,533
50032 DATA 45,46,49,4E,43,54,45,4F,599
50040 DATA 4C,00,C0,00,03,05,05,36,620
50048 DATA AD,1C,C6,29,77,A0,FE,10,991
50056 DATA 18,A5,35,69,53,85,35,A5,773
50064 DATA 36,69,60,85,35,80,DE,F0,930
```

```
50072 DATA :8,A9,1D,65,35,85,35,A9,731
50080 DATA C6,65,36,85,36,60,A9,00,805
50088 DATA A2,04,51,35,C0,CA,DE,FA,1224
50096 DATA 60,00,F2,03,0E,1C,C6,20,674
50104 DATA F0,10,E0,53,C9,30,90,4C,981
50112 DATA 29,0F,ED,1C,C6,20,73,00,570
50120 DATA 10,45,A9,F3,A0,C3,20,04,1005
50128 DATA C1,20,41,C1,A9,08,A2,C4,1016
50136 DATA 20,04,C1,20,41,C1,A5,01,609
50144 DATA 85,0F,00,00,84,49,84,14,665
50152 DATA 84,15,20,7A,C3,A5,35,A6,806
50160 DATA 36,85,5F,85,60,4C,03,A7,758
50168 DATA 0D,4D,41,43,52,4F,20,4C,491
50176 DATA 49,53,54,43,4E,47,20,00,494
50184 DATA 0D,0D,4D,00,A9,0B,2C,A9,496
50192 DATA 0E,AA,4C,1A,C1,A6,2C,A5,854
50200 DATA 2D,05,2D,0C,2C,D0,02,C6,009
50208 DATA 2E,C6,2E,A9,02,00,02,91,767
50216 DATA 2D,20,4E,C4,A0,00,20,54,627
50224 DATA C4,B1,2D,D0,F7,C8,B1,2D,1295
50232 DATA D0,EF,C8,B1,2D,D0,EF,20,1343
50240 DATA 51,C4,20,54,C4,20,33,A5,837
50248 DATA 20,59,A6,4C,74,A4,20,51,755
50256 DATA C4,20,54,C4,E3,2D,D0,02,993
50264 DATA E6,2E,A5,2E,C5,38,DE,04,952
50272 DATA A5,2D,C5,37,B3,01,66,A2,897
50280 DATA 10,4C,37,A4,F3,22,4E,AD,838
50288 DATA 37,C0,20,B1,F7,A9,6F,20,1151
50296 DATA 93,FF,69,60,85,7C,66,20,1050
50304 DATA A0,FF,20,73,03,C9,00,D0,973
50312 DATA F6,20,AE,FF,A9,C3,07,7C,1334
50320 DATA 20,9C,C4,D0,03,4C,74,A4,953
50328 DATA 20,0E,FF,4C,74,A4,A5,00,1016
50336 DATA 85,90,AD,B7,C3,20,B4,FF,1292
50344 DATA 20,37,FF,D0,15,A9,6F,20,1012
50352 DATA 96,FF,20,A5,FF,24,90,70,1149
50360 DATA 05,20,12,FF,D3,F4,20,AB,1157
50368 DATA FF,A9,00,60,A5,7H,CA,86,1144
50376 DATA 3B,A6,7B,06,BC,C9,00,F0,1239
50384 DATA 07,20,73,00,C9,00,D0,F9,812
50392 DATA 3B,A9,FE,85,9E,A5,7A,E5,1236
```

```
50400 DATA EB,85,B7,A9,0E,AE,B7,C0,1234
50408 DATA F0,00,23,BA,FF,A5,B7,A6,1147
50416 DATA EB,A4,BC,20,B0,FF,20,C0,1239
50424 DATA FF,B0,57,A2,0D,20,C6,FF,1170
50432 DATA E0,50,20,CF,FF,20,CF,FF,1244
50440 DATA 20,CC,FF,A9,B1,A0,C5,20,1226
50448 DATA E4,C1,A5,D6,C9,10,D0,05,1014
50456 DATA AD,0D,02,F0,07,20,5D,C5,805
50464 DATA A5,90,D0,09,20,E1,FF,D0,1245
50472 DATA E9,E6,9E,18,A9,0D,20,C3,1054
50480 DATA FF,20,CC,FF,A9,C6,A0,C5,1470
50488 DATA 20,04,C1,A6,9E,E0,C8,90,1121
50496 DATA 02,A2,00,A9,00,20,CD,BD,759
50504 DATA A9,D5,A0,C5,20,04,C1,4C,1044
50512 DATA 74,A4,40,A9,0D,20,C3,FF,1016
50520 DATA 68,38,4C,F9,E0,A2,0D,20,916
50528 DATA C6,FF,20,A3,C5,20,A3,C5,1237
50536 DATA E6,9E,A9,20,20,D2,FF,20,1118
50544 DATA 12,FF,20,D2,FF,20,D2,FF,1459
50552 DATA 20,F3,C5,05,63,2E,A3,C5,1010
50560 DATA 85,62,20,D1,BD,A5,20,20,894
50568 DATA 12,FF,20,A3,C5,A2,01,86,1154
50576 DATA 14,C9,00,F3,06,20,D2,FF,1156
50584 DATA 4C,0A,C5,23,CC,FF,A9,0D,1084
50592 DATA 4C,D2,FF,23,CF,FF,A6,90,1345
50600 DATA 10,01,60,63,68,18,4C,2C,657
50608 DATA C5,0D,20,23,53,53,45,20,543
50616 DATA 53,40,49,45,54,20,4B,45,558
50624 DATA 59,20,2D,0D,0D,0D,0D,20,237
50632 DATA 20,20,20,54,4F,54,41,4C,484
50640 DATA 20,4F,46,23,00,20,46,49,308
50648 DATA 4C,45,20,53,29,20,44,49,482
50656 DATA 53,50,4C,41,59,45,44,2E,576
50664 DATA 0D,00,09,03,02,04,0D,02,702
50672 DATA 03,0E,03,03,10,20,EC,C0,635
50680 DATA A9,02,A0,C5,20,04,C1,4C,834
50688 DATA 74,A4,ED,45,44,49,54,4F,666
50696 DATA 52,20,45,53,54,45,4E,53,505
50704 DATA 49,4F,4E,53,20,4F,46,46,564
50712 DATA 2E,0D,00,03,00,00,00,00,59
```


RE: 290
SHEET: 1

```

4010 CLS:H
4020 LOCATE 1,2:PRINT#2,"SWMP OVER"
4030 RESTORE 4000:FOR K=1 TO 4:READ N:FOR F=0 TO 5:G
4040 2 F,N*(2/F)*105,2,0:NEXT:NEXT
4050 DATA 350,370,420,470
4060 IF 50(4)<X THEN 4040 ELSE RETURN
4070 FOR I=1 TO 20:GOTO 4080
4080 CLS:H
4090 WINDOW SWAP 0.1
4100 PRINT:PRINT TAB(15):CHR$(164):" CT '85"
4110 PRINT:PRINT
4120 PRINT " Hello Arnold the Anarchist find me
Last bomb before it blows him up"
4130 PRINT:PRINT:PRINT:PRINT:PRINT
4140 RESTORE 5070
4150 FOR V=1 TO 6:READ X:PRINT TAB(5):X:NEXT
4160 DATA " Up"," Down & Bonus"," Left"," Right"
4170 "A Slide Left","5 Slide Right"
4180 PRINT:PRINT:PRINT TAB(12):"Space Bar To Start"
4190 WINDOW SWAP 0.1
4200 WHILE INKEY(47)=-1:WEND
4210 RETURN
4220 FOR W=0 UNTIL 100:PRINT#1,
4230 FOR V=1 TO 20:LOCATE#1,1,1:PRINT#1,CHR$(1):NEXT
4240 V:PRINT#1,
4250 FOR V=1 TO 39 STEP 2:LOCATE#1,V,19:PRINT#1,CHR$(
4260 FOR C=1 TO 20:LOCATE#1,V,20:PRINT#1,CHR$(210):CHR$(21
1):NEXT
4270 V:PRINT#1,
4280 W=1+INT(WND*20)*2-1
4290 LOCATE#1,1,19:PRINT#1,CHR$(204):CHR$(205):LOCATE
#1,20:PRINT#1,CHR$(226):CHR$(207)
4300 IF W=1:GOTO 4310
4310 LOCATE #1,V:PRINT#1,CHR$(200):CHR$(201):LOCATE#1
1,V+1:PRINT#1,CHR$(202):CHR$(203)
4320 IF W=22:GOTO 4310 THEN 4300
4330 IF W=V:W
4340 W=2+1 IF W=4 THEN 4310 W=2+V:2 IF W=19 THEN LOCATE
#1,15,10:PRINT#1,"TOO LATE!!" :GOTO 4,100,0,10,1,1,M:1
LE 50(2)<4:WEND:RETURN
4350 LOCATE #1,V:PRINT#1," " :LOCATE#1,N,V+1:PR
INT#1," "
4360 GOTO 4050
4370 END
4380 LOCATE #1,1:PRINT#1,CHR$(200):CHR$(201):LOCATE#1
1,1:PRINT#1,CHR$(202):CHR$(203)
4390 CALL 500,1
4400 IF V=1:IF K=2 THEN LOCATE #1,K,V:PRINT#1," " :G
OTO 4300
4410 IF W=0 THEN LOCATE #1,15,10:PRINT#1,"BONUS POINTS
" :GOTO 1400:25*25+(17-V)*LOCATE #1,24:PRINT USING"
#####:S0.50,2,402,0,15,1,2:WHILE 50(2)<4:WEND:R

```

[illegible]

```

9130 SYMBOL 211,192,192,3,63,192,192,63,3
9140 SYMBOL 212,8,15,24,48,112,112,116,116
9150 SYMBOL 215,8,6,222,6,2,2,2,2
9160 SYMBOL 214,116,116,112,192,127,127,47,0
9170 SYMBOL 215,2,2,130,6,252,243,240,0
9180 SYMBOL 216,56,124,36,114,254,254,40,108
9190 SYMBOL 217,0,0,0,40,201,10,4,0
9200 SYMBOL 218,0,0,0,96,153,6,0,0
9210 SYMBOL 219,0,16,60,0,164,94,0,0
9220 RESTORE 9320;FOR K=0 TO 160:READ n:Poke 19999,K,n
NEXT K
9230 DATA 221,126,2,50,161,144,221,126,3,50
9240 DATA 162,144,221,126,6,254,1,202,26,144
9250 DATA 254,3,707,87,144,201,6,8,177,17
9260 DATA 163,144,42,161,144,1,2,0,237,176
9270 DATA 237,91,161,144,42,161,144,1,2,6
9280 DATA 9,1,70,0,237,176,237,91,161,144
9290 DATA 23,78,0,75,75,33,163,144,1,2
9300 DATA 0,237,176,42,161,144,1,0,8,9
9310 DATA 34,161,144,163,16,190,201,6,197
9320 DATA 17,163,144,42,161,144,1,78,8,9
9330 DATA 1,2,8,237,176,42,161,144,1,178
9340 DATA 8,1,2,8,237,176,42,161,144
9350 DATA 17,77,6,25,225,42,161,144,1,77
9360 DATA 0,9,5,237,181,237,91,161,144,33
9370 DATA 163,144,1,2,0,237,176,42,161,144
9380 DATA 1,0,8,9,34,161,144,175,16,185
9390 DATA 201
9400 MODE 3
9410 :END
=====
9500 JNDOWN #1,140,2,21
9505 JNDOWN#2,15,26,12,14
9510 INK 0,0;INK 1,24;INK 2,6;INK 3,11
9520 BORDER 0
9530 PAPER 0,PEN 1
9535 PAPER #1,3;PEN #1,0
9537 PAPER#2,0;PEN#2,1
9540 CLS;CLS#
9545 LOCATE 33,1;PRINT "THE B O M B"
9550 LOCATE 5,24;PRINT"SCORE1:";USING"#####";@1;PRINT
HIGH SCORE:";USING"#####";@1;LOCATE 33,25;PRINT"SH
EE1: 0"
9560 FOR b=1 TO 181
2610 FOR v=1 TO 10:11=b*15+CHR$(712)+CHR$(121);NEXT
2620 FOR v=1 TO 70:11=b*15+CHR$(214)+CHR$(121);NEXT
2630 ENT -1,10,4,1,-1-20,1
2710 ENT 1,15,-1,0
2720 ENT -2,13,-5,1,30,1
2725 ENT 2,15,-1,7
2730 RETURN

```


COMMODORE 64, BBC AND SPECTRUM

5 REM HEX LOADER FOR CBM 64 FIG.1
6 REM

```
10 FOR I=680 TO 727:READA:POKEI,A:T=T+A
20 NEXT I:IF T=6/16 THEN GOTO 100
30 PRINT "ERROR IN DATA":T=6/16:END
40 DATA 169,1,133,186,169,1,133,184
50 DATA 133,185,169,8,133,183,169,208
60 DATA 133,187,169,2,133,188,169,56
70 DATA 133,251,169,199,133,252,169,251
80 DATA 162,231,160,206,32,216,255,96
90 DATA 60,79,87,78,76,79,60,68
100 SA=51000:LA=52855
110 INPUT "START ADDRESS":A
120 IF (ACSA) OR (ALA) THEN GOTO 140
130 IF A/8=INT(A/8) THEN GOTO 150
140 PRINT "ADDRESS ERROR":GOTO 110
150 T=(A-32768)AND255:PRINTA:INPUTD#
160 IF D#="END" THEN GOTO 300
170 IF LEN(D#)=20 THEN GOTO 190
180 PRINT "WRONG LENGTH":GOTO 150
190 FOR B=0 TO 7:B#MID$(D#,2*B+1,2)
200 GOSUB 300:IF E=1 THEN GOTO 280
```

```
210 POKE A+E,D:T=T+D:NEXT
220 B#MID$(D#,18,3):GOSUB 300
230 IF E=1 THEN GOTO 280
240 IF T=D THEN GOTO 260
250 PRINT "CHECKSUM ERROR":GOTO 150
260 A=A+B:IF A&16 THEN GOTO 150
270 GOTO 800
280 PRINT TAB(8+2*B+1);D#;"?"
290 B=B+1:NEXT GOTO 150
300 E=0:D=0:FOR N=1 TO LEN(B#)
310 C#MID$(B#,N,1):GOSUB 400
320 IF E=1 THEN D=N:N=4:NEXT:RETURN
330 D=D+J#*X:NEXT:RETURN
400 X=ASC(C#)-48:IF X<0 THEN E=1:RETURN
410 IF X<10 THEN RETURN
420 X=X-7:IF X<10 THEN E=1:RETURN
430 IF X<15 THEN E=1
440 RETURN
500 H#="0123456789ABCDEF"
510 FOR A=SA TO LA STEP 8
520 PRINT A;" ";T:(A-32768)AND255
530 FOR B=0 TO 7:X=PEEK(A+B):GOSUB 600
540 T=T+X:NEXT:PRINT" ";
550 Y=INT(T/256):PRINT MID$(H#,Y+1,1)
560 Y=Y-255 AND 1:GOSUB 600:PRINT
570 X=X+255 AND 1:GOSUB 600:PRINT
580 NEXT GOTO 500
600 PRINT MID$(H#,INT(X/16)+1,1);
610 PRINT MID$(H#,1+(XAND15),1):RETURN
```

THE PROGRAMS given here will enable Spectrum, BBC, and CBM-64 owners to download via Your Computer's Telsoft service. Each month for each machine we transmit at least one — and usually two — of the main programs appearing in the current issue. Also available is the full user to user communications program, Dialsoft.

So far OE LTD's Telemod 2 and the VTX 5000 modems have been tested with the BBC and Spectrum but the service also works with

```
800 SYS 680:C#CHR$(34)
810 PRINT PRINT "TO RELOAD CODE:"
815 PRINT PRINT "LOAD" C# "DOWNLOAD"
820 PRINT C#;"1,1 (RETURN)"
825 PRINT PRINT "THEN TYPE NEW"
830 PRINT " (RETURN)"
835 PRINT PRINT "TO RUN THE PROGRAM"
840 PRINT "SYS 51000 (RETURN)"
900 PRINT PRINT "1 ENTER DATA"
910 PRINT PRINT "2 PRINT DATA"
920 PRINT PRINT "3 SAVE DATA"
930 INPUT Z:ON Z GOTO 100,500,800
```

```
51000 ? A9068D21D80D00D2=3E2
51008 ? A90F0D860D2A90E20=2E4
51016 ? D2FFA9008D15D3A9=4D3
51024 ? F58D8A02BA8E92CE=510
51032 ? 20C0C920C7C20F8=4D5
51040 ? C8AD80CEC931F23=532
51048 ? C935F014C936D006=43F
51056 ? 208EC74C5BC7A914=410
51064 ? 20D2FF202FC3D0D8=52E
51072 ? 203FC8A92020D2FF=461
51080 ? 4C93C94C4AC82063=411
51088 ? CC2022CDA95F85FD=4F1
51096 ? A90CE65F2028CDA0=547
51104 ? 002295CC202FCBC9=404
51112 ? 44F00BC954D0ED20=4E1
51120 ? D2FFA901D00F944=4EF
51128 ? 20D2FFA90085BA20=4B9
51136 ? 25CDA903204BC3A9=4A3
51144 ? B085F0A9C0D85FEA=6A0
51152 ? 002095CC2025C120=383
51160 ? 95CC9848A0048C63=4CC
51168 ? CE2018C968A02025=4C4
51176 ? CD2095CC3843A926=4C0
51184 ? 8D30CE20D8C9AD7=5E3
51192 ? CE85FAD8ACE85FC=6EA
51200 ? 68A82060CB9A01E5=38A
51208 ? B865F598A293A0CE=539
51216 ? 20B0FFA9A3CEACRA=567
51224 ? CEED00A1C02025CJ=479
51232 ? A9F320D8FF20F1C3=597
51240 ? 602095CC0C0D00E1=3FE
51248 ? A90685C7A92020D2=3E3
51256 ? FFA90D20D2FF63A9=4E7
51264 ? 002029C8A90D2012=306
51272 ? FF602063C0A00A9=43F
51280 ? FF9993CEC810FA20=5FB
51288 ? D2CB90FE20D2CB80=5ED
51296 ? FB8D72CE9A0080C=400
51304 ? CE8C7DCE202ECCAD=4D4
51312 ? 72CE29F0C980D0E4=506
51320 ? 20D2CEB01A9573CE=599
51328 ? C8207ECC000000F3=4EB
51336 ? A000AD76CE2980D0=492
51344 ? 3FA52B85F318A52C=3D8
51352 ? 6D75CE85FC4C9AC2=5E7
51360 ? AD79CE25FAD79CE=607
51368 ? 85FC20D2CB80A920=55E
51376 ? D9CC20D2FFC820D9=607
51384 ? CC202ECC0A000CA=528
51392 ? A92020D2FFAD75CE=56A
51400 ? 202ECCD2D2CB8087=4D7
51408 ? C17DCEFA00BA95820=503
51416 ? D2FF20303843708=52C
51424 ? 20D2C9B0F8C7DCE=65D
51432 ? D0E8AD75CEA8B933=687
51440 ? CE800E2030C8A991=4EC
51448 ? 20T2FF4C7EUC94C57=51F
51456 ? C8A000C07CUE807D=447
51464 ? CE20D2CB80F091FB=58F
51472 ? 202ECC0C0C77CED0=4D3
51480 ? F020D2CB80E0D7C=59E
51488 ? CEF008A95820D2FF=4D8
51496 ? 4C57C820D2CB80CE=4CE
51504 ? C07DCEFA0034C23C=473
51512 ? 20AC032030C8AD75=409
51520 ? CERBA9009993CEAD=506
51528 ? 84CEC902D02520EC=436
51536 ? CB9C820F3CB9955=558
51544 ? 2016CDA9520F3C3=432
51552 ? 20C7CBAC73CEC888=54F
51560 ? B993CE002398D0F7=5D4
51568 ? 4C510C7F9552016D=3D0
51576 ? 20F1CB4C6C309A77=4EF
51584 ? CE20D2CB80D0FA20=57D
51592 ? D2CB20D2CB4C47C9=53C
51600 ? 4C5CC0A932B85FA5=4F5
51608 ? 2085FCAD00E1F1A9=52A
51616 ? 2200C8B1FB8523F0=4CE
51624 ? 0BA52285F0D2385=447
51632 ? FC4C91C9:8A5FB69=57D
51640 ? 0285D2852F8531F5=57B
51648 ? FC6900852E853085=412
51656 ? 32602053C0A9280=3E1
51664 ? 34CEA90B80202E60=4A3
51672 ? 8E81CE8C82CEA200=533
51680 ? A9098D0DCE202FCE=414
51688 ? C914F016C90DF051=4E2
51696 ? C924D01920D2FF0D=544
51704 ? C3CE84CE5C9E000=648
51712 ? D0E3E000F0F20D2=554
51720 ? FFCAC45C9C93090=554
51728 ? D4C93A901548AD3=444
51736 ? CEC924F004634CE5=460
51744 ? C95AC94190BFC947=4BA
51752 ? B03B20D2FF38E900=4D5
51760 ? C90A9002E907E005=56A
51768 ? F0PB91C3CE84CE5=61A
51776 ? C9E000F0A0E001D3=52A
51784 ? 07AD0C3CEC924F095=4FF
51792 ? A92020D2FFA9FF9D=54F
51800 ? C3CEA2008ECFC8E=544
51808 ? D0CE8E11CE8E12CE=659
51816 ? FDC3CEC924D005A9=512
51824 ? 0F8DCECE83D3CE=5D0
51832 ? C9FF001D200CB00=5B2
51840 ? 3418D3CE6DCECE=524
51848 ? 8D0CFEAS006DD0CE=564
51856 ? 81D0CEB020E34C75=536
51864 ? C9AD0CE8C83CE99=642
51872 ? A3CEC8AD00CE99A3=660
51880 ? CEC0180C83CEAC82=561
51888 ? CEAE81CE6A2025C0=4ED
51896 ? 02000D41CE921F3=530
51904 ? 0720D2FF6885D468=53F
51912 ? 4CDEC9ADCE8DCE=65F
51920 ? CEADCFCE8D11CEAD=6C1
51928 ? D0CE8D0D2CE18AD1=635
51936 ? CE6DCE8D0DCEAD=58F
51944 ? D2CE6D0DCE8D0DCE=68E
51952 ? B035CECECE8D0E6A0=625
51960 ? 2063C0A9F0D8602=414
51968 ? A95185FDF9C185FE=575
51976 ? A000209D0C2025C0=343
51984 ? 209D0C209D0C209D=3D0
51992 ? CC2022CDA9520F3C=411
52000 ? 95CC2022CDA9520F3C=411
52008 ? 202FCB20D2FF608E=421
52016 ? 81CFC8C2CE2069C0=4B2
52024 ? 20ECC020C0C0C0C0=48F
52032 ? D00D20F0C0C0C0C0=4F0
52040 ? 062001C04C35C38D=314
52048 ? 00CEAE81CEPC02CE=597
52056 ? 60AE52CE9A4C5BC7=4CE
52064 ? 2022CDA92285FAD9=465
52072 ? CE85FEA000A2095C=4D8
52080 ? 2025CDA900FA9209=393
52088 ? 93CE88D0F08193CE=619
52096 ? 202FCB20D2FF608E=421
52104 ? 00F0F0F0F0F0F0F0=58F
52112 ? 209993CE4C800BC9=50A
52120 ? 0DF00B20D2FF608E=421
52128 ? CEC8C010D0D0D0D0=579
52136 ? 20D2FF60A52020D2=4B4
52144 ? FFA94F20D2FFA94B=58C
52152 ? 20D2FF60A9138D00=452
52160 ? DEA9:20D00DE6A9=4C1
52168 ? 536D00DEA9528100=40E
52176 ? DE60A996186D87CE=547
52184 ? 8C82CEAC92CE2034=4D4
52192 ? CC20ECC0CE07CE00=677
52200 ? 02386920FDCB00E=509
52208 ? 60A9FA8C82CEA820=597
52216 ? 04C086D0FAAC82CF=61C
52224 ? 602004C0C8A9208C=3EE
52232 ? D0F0A92069C06020=454
52240 ? 25CDA90220A0C020=364
52248 ? 95CCAD8FCE2012FF=573
52256 ? A92020D2FFA90320=3A5
52264 ? ABC020D3C9504D7D=48A
52272 ? CE8D7DCEA208AD7D=4AA
52280 ? CE2A2010HD7DCE49=411
52288 ? 088D7DCEAD7DCE49=460
52296 ? 188D7DCE2E7DCE2E=3D5
52304 ? 7DCEC9D0E160A000=516
52312 ? A9009900D0A0000=40E
52320 ? D0F60A99320D2FF=5B3
52328 ? 6048A9A2290FD01F=37E
52336 ? A5144A8A5E22910F0=491
52344 ? 05A9A44C80C0A920=42B
52352 ? 20D2FFA90085D4A9=51C
52360 ? 9D20D2FF6885D468=53F
52368 ? 6020D2FF6885D468=53F
52376 ? 21D0F6C8602025C0=4B9
52384 ? A90C20A0C02095C0=46D
52392 ? 60A9058E31CEAA9=4E6
52400 ? 2020D2FFC0D0FAE=603
52408 ? 81CE60C914F008C9=505
52416 ? 7FF00160F91460A9=456
52424 ? 7F6020E4FFC9C190=5D4
52432 ? 07C9D8BA0330E96A=48F
52440 ? 50C941900EC95B90=494
52448 ? 08C9619006C97BB0=490
52456 ? 02492060488A4800=215
52464 ? 20F1FFD0034C59C0=533
52472 ? 2868AA68600D03DE=485
52480 ? 49015A9003A90060=250
52488 ? A701D0E0480000CE=3C7
52496 ? 49026A6A686020C0=223
52504 ? CDB0FB8101E20EC=508
52512 ? CC602025C0D2020D=373
52520 ? A90D20D2FF60A829=3A0
52528 ? F06A6A6A6A6A6A6A=3C8
52536 ? 3A30031869072012=21F
52544 ? FF6820F0A930C93A=31B
52552 ? 300318690720D2FF=2F4
52560 ? 60444F574E4C4F41=204
52568 ? 44204D454E552131=243
52576 ? 2020202020202020=228
52584 ? 564521352202045=1FE
52592 ? 58455420544F2042=289
52600 ? 4153494321362020=22F
52608 ? 2053415645204259=28A
52616 ? 5445532:20205553=285
52624 ? 4520122053544F50=26D
52632 ? 209220544F205245=204
52640 ? 5455524E20544F20=2CC
52648 ? 4D454E5520292145=28C
52656 ? 4E544552204554D=2F9
52664 ? 4245522021454620=281
52672 ? 414445245535320=256
52680 ? 495320494E204845=268
52688 ? 582C119D979D9D9D=476
52696 ? 9D979D9D9D9D9D9D=5C0
52704 ? 20979D9D9D9D9D9D=481
52712 ? 4958205749544820=305
52720 ? 2421535441525420=2E3
52728 ? 414445245535320=31E
52736 ? 464F522041524541=22E
52744 ? 202146494E414C20=1D3
52752 ? 414445245535320=206
52760 ? 464F522041524541=238
52768 ? 202150524F475241=22C
52776 ? 4D205449544C4520=237
52784 ? 284D415820313620=1E5
52792 ? 4048415227532920=219
52800 ? 21124E4F52405641=21B
52808 ? 4C49449220205452=2A5
52816 ? 5920414741494E20=249
52824 ? 3A20214449534320=216
52832 ? 4F52205441504520=26B
52840 ? 2820442:54202920=1E0
52848 ? 3F21000000000000=0D0
```


TELSoft



A reminder of how to use the Telsoft service.

a number of other makes. For the CBM-64 it will initially only be available with the OEL Comms pack together with the Telemond 2 or similar modem; later we hope to adapt the service to work with Commodore's modem.

To enter the download program first type in the hexloader for your machine — figure 1 — and then enter the machine code — figure 2. Once the program has been saved you can run it by entering CALL 6000 on the BBC, SYS 51000 on the CBM 64, RANDOMIZE USR

60000 on the Spectrum.

To find out what is available and how to receive software dial up Colchester (0206) 8068. This audio recorded information line will also advise you which telephone numbers to ring for the 300 and 1200 bit/s services.

When a program you want to download is on line, make sure your modem is set up and dial the number appropriate to its speed. As soon as you hear the modem tones switch the modem to line and replace the receiver. Select

Option 1 from the menu — Receive. After a block of data is received you will see "OK" printed if there are no errors, otherwise the program will wait for the blocks to come round again. When the "Program loaded OK" message appears return to the Telsoft menu and select Option 5. You can now save and run the program.

Note that CBM-64 owners will need to use Option 6 if machine code is to be saved.

Figure 1. BBC.

```
10 REM BBC HEX CODE LOADER
15 HIMEM=60000
20 CLS:PRINT
30 INPUT "START ADDRESS (Hex):" AS
40 A=VAL("&"+A$)
50 IF A>65535 THEN 200
60 IF A<2048 OR A>65535 THEN 200
```

```
70 PRINT "A:";A
80 INPUT "B:";B,C$
90 IF LEN(B$)>16 THEN 50
100 T=0
110 FOR N=A TO B
120 X$=MID$(B$,2*N+1,1):GOSUB 300
130 IF E=1 THEN 260
140 X$=MID$(B$,2*N+2,1):GOSUB 300
150 IF E=1 THEN 260
```

```
160 B=EVAL("&"+MID$(B$,2*N+1,2))
170 ?A=B:A=A+1:T=T+B
180 NEXT N
190 FOR M=1 TO LEN(C$)
200 X$=MID$(C$,M,1):GOSUB 300
210 IF E=1 THEN A=A+1:GOTO 260
220 NEXT M
230 IF T=EVAL("&"+C$) THEN 50
240 PRINT "CHECKSUM ERROR!"
```

```
250 A=A-B:GOTO 30
260 PRINT "TYPING ERROR!"
270 A=B:(A DIV 8):GOTO 30
280 ?"SAVE 'DOWNLOAD' 6000 6587"
290 END
300 E=0:IF ASC(X$)<48 THEN E=1:RETURN
310 IF ASC(X$)<58 THEN RETURN
320 IF ASC(X$)<65 THEN E=1:RETURN
330 IF ASC(X$)>71 THEN E=1
340 RETURN
```

Figure 2. BBC.

```
6000 :A9C8A8FEA20120F4,4C6
6001 :FF206,6C2348DC9,38A
6002 :31F000C93AF0E9C9,4CE
6003 :35F00041C6A6C47,200
6004 :6A98022E3FFA9E8,482
6005 :A00BA2F20FAFFA5,4F0
6006 :03A2020F4FFA902,363
6007 :A20220FAFFA90A0,4C0
6008 :FEA2020F4FFA90A,4B0
6009 :0C20E3FF20F76BA9,439
6010 :15A20120FAFFA80A,3E0
6011 :A9FFB99956D0FA,5E7
6012 :A915A20120FAFFA20,35A
6013 :0C0C90FE2006CE0,34B
6014 :F0A0000A77B178E4,416
6015 :79847A07B057020,38B
6016 :1356145702F0C790,489
6017 :00E2200C6C80B99,45B
6018 :1700C23D56DC09,36A
6019 :D0F6A000A5742939,422
6020 :D000A51C0A5718A5,35A
6021 :1D65738577200C6,209
6022 :000020E3FFC20D5,32A
6023 :6DC01000F0A57320,435
6024 :B26D200C6C80A0C5,3CC
6025 :7A000BA995A0E3FF,47B
6026 :D0F7FAC620FA200C,37F
6027 :6C000CD57F000A9,40C
6028 :106570F3F0E7FF4C,4AC
6029 :076A0C73A099A56F,43E
6030 :000E20E7FFA90B20,38B
6031 :E3FF4C036A4C676A,469
6032 :A000A7A81B700C,2C9
```

```
6000 :6C00F2917620D54D,477
6001 :C0C475D0F1200C6C,45A
6002 :000C357AF00BA95B,4CE
6003 :20E3FF20E7FF4C67,40B
6004 :6A200C6C80CFC57B,3C1
6005 :F000A95B20E3FF4C,447
6006 :67A20C76B80E7FF,429
6007 :A573A0K0007056F,3FA
6008 :A5EAC902005B2E07,419
6009 :6BA9C820556CA55,38B
6010 :2006EA950E20556C,29B
6011 :A915A20120FAFFA20,35A
6012 :F70A471C000B905,50D
6013 :6F00519000F7A90C,4A4
6014 :20E3FF20E56DA75A,437
6015 :B532A96F050A907,3D7
6016 :20006E20F000A0A,20B
6017 :6DA90520006EAF00,2DA
6018 :20E3FF20E6DA9D2,502
6019 :20E0FF4C0C6A955,38F
6020 :2006EA950E20556C,29B
6021 :4C6A6BA475200C6C,2D2
6022 :D000A200C6C200C,310
6023 :6C4C4B6A4C6A0A9,336
6024 :20E3FF20E7FF4C67,40B
6025 :FFA29620FAFF00A9,253
6026 :9CA000A6A0E00D0,41E
6027 :00A21320FAFFA212,307
6028 :20FAFF6A0A2120FA,40B
6029 :FFA29620FAFF00A9,253
6030 :9CA000A6A0E00D0,41E
6031 :EBA25320FAFFA252,4E7
6032 :20FAFF6A0A2120FA,40B
6033 :3F047EA9710A0020,33D
6034 :F4FFB000C007D005,44B
6035 :6B684C0C6A47E20,2D4
```

```
6020 :496CC63F00023860,37A
6021 :A50AC92D00062079,369
6022 :6E00C60A991A201,447
6023 :20FAFF00A47E00DF,35C
6024 :600AA202CAE0C0A0,50A
6025 :F0A000A9000A7EAB,45B
6026 :20A96C8000FA47E,449
6027 :60A9E0000A2FF20,452
6028 :FAFFA90000AA90C,460
6029 :20E3FF20E6DA9D2,502
6030 :2006EA950E20556C,29B
6031 :6F00519000F7A90C,4A4
6032 :20E3FF20E56DA75A,437
6033 :B532A96F050A907,3D7
6034 :20006E20F000A0A,20B
6035 :6DA90520006EAF00,2DA
6036 :20E3FF20E6DA9D2,502
6037 :20E0FF4C0C6A955,38F
6038 :2006EA950E20556C,29B
6039 :4C6A6BA475200C6C,2D2
6040 :D000A200C6C200C,310
6041 :6C4C4B6A4C6A0A9,336
6042 :20E3FF20E7FF4C67,40B
6043 :FFA29620FAFF00A9,253
6044 :9CA000A6A0E00D0,41E
6045 :00A21320FAFFA212,307
6046 :20FAFF6A0A2120FA,40B
6047 :FFA29620FAFF00A9,253
6048 :9CA000A6A0E00D0,41E
6049 :EBA25320FAFFA252,4E7
6050 :20FAFF6A0A2120FA,40B
6051 :3F047EA9710A0020,33D
6052 :F4FFB000C007D005,44B
6053 :6B684C0C6A47E20,2D4
6054 :496CC63F00023860,37A
6055 :A50AC92D00062079,369
6056 :6E00C60A991A201,447
6057 :20FAFF00A47E00DF,35C
6058 :600AA202CAE0C0A0,50A
6059 :F0A000A9000A7EAB,45B
6060 :20A96C8000FA47E,449
6061 :60A9E0000A2FF20,452
6062 :FAFFA90000AA90C,460
6063 :20E3FF20E6DA9D2,502
6064 :2006EA950E20556C,29B
6065 :6F00519000F7A90C,4A4
6066 :20E3FF20E56DA75A,437
6067 :B532A96F050A907,3D7
6068 :20006E20F000A0A,20B
6069 :6DA90520006EAF00,2DA
6070 :20E3FF20E6DA9D2,502
6071 :20E0FF4C0C6A955,38F
6072 :2006EA950E20556C,29B
6073 :4C6A6BA475200C6C,2D2
6074 :D000A200C6C200C,310
6075 :6C4C4B6A4C6A0A9,336
6076 :20E3FF20E7FF4C67,40B
6077 :FFA29620FAFF00A9,253
6078 :9CA000A6A0E00D0,41E
6079 :00A21320FAFFA212,307
6080 :20FAFF6A0A2120FA,40B
6081 :FFA29620FAFF00A9,253
6082 :9CA000A6A0E00D0,41E
6083 :EBA25320FAFFA252,4E7
6084 :20FAFF6A0A2120FA,40B
6085 :3F047EA9710A0020,33D
6086 :F4FFB000C007D005,44B
6087 :6B684C0C6A47E20,2D4
6088 :496CC63F00023860,37A
6089 :A50AC92D00062079,369
6090 :6E00C60A991A201,447
6091 :20FAFF00A47E00DF,35C
6092 :600AA202CAE0C0A0,50A
6093 :F0A000A9000A7EAB,45B
6094 :20A96C8000FA47E,449
6095 :60A9E0000A2FF20,452
6096 :FAFFA90000AA90C,460
6097 :20E3FF20E6DA9D2,502
6098 :2006EA950E20556C,29B
6099 :6F00519000F7A90C,4A4
6100 :20E3FF20E56DA75A,437
6101 :B532A96F050A907,3D7
6102 :20006E20F000A0A,20B
6103 :6DA90520006EAF00,2DA
6104 :20E3FF20E6DA9D2,502
6105 :20E0FF4C0C6A955,38F
6106 :2006EA950E20556C,29B
6107 :4C6A6BA475200C6C,2D2
6108 :D000A200C6C200C,310
6109 :6C4C4B6A4C6A0A9,336
6110 :20E3FF20E7FF4C67,40B
6111 :FFA29620FAFF00A9,253
6112 :9CA000A6A0E00D0,41E
6113 :00A21320FAFFA212,307
6114 :20FAFF6A0A2120FA,40B
6115 :FFA29620FAFF00A9,253
6116 :9CA000A6A0E00D0,41E
6117 :EBA25320FAFFA252,4E7
6118 :20FAFF6A0A2120FA,40B
6119 :3F047EA9710A0020,33D
6120 :F4FFB000C007D005,44B
6121 :6B684C0C6A47E20,2D4
6122 :496CC63F00023860,37A
6123 :A50AC92D00062079,369
6124 :6E00C60A991A201,447
6125 :20FAFF00A47E00DF,35C
6126 :600AA202CAE0C0A0,50A
6127 :F0A000A9000A7EAB,45B
6128 :20A96C8000FA47E,449
6129 :60A9E0000A2FF20,452
6130 :FAFFA90000AA90C,460
6131 :20E3FF20E6DA9D2,502
6132 :2006EA950E20556C,29B
6133 :6F00519000F7A90C,4A4
6134 :20E3FF20E56DA75A,437
6135 :B532A96F050A907,3D7
6136 :20006E20F000A0A,20B
6137 :6DA90520006EAF00,2DA
6138 :20E3FF20E6DA9D2,502
6139 :20E0FF4C0C6A955,38F
6140 :2006EA950E20556C,29B
6141 :4C6A6BA475200C6C,2D2
6142 :D000A200C6C200C,310
6143 :6C4C4B6A4C6A0A9,336
6144 :20E3FF20E7FF4C67,40B
6145 :FFA29620FAFF00A9,253
6146 :9CA000A6A0E00D0,41E
6147 :00A21320FAFFA212,307
6148 :20FAFF6A0A2120FA,40B
6149 :FFA29620FAFF00A9,253
6150 :9CA000A6A0E00D0,41E
6151 :EBA25320FAFFA252,4E7
6152 :20FAFF6A0A2120FA,40B
6153 :3F047EA9710A0020,33D
6154 :F4FFB000C007D005,44B
6155 :6B684C0C6A47E20,2D4
6156 :496CC63F00023860,37A
6157 :A50AC92D00062079,369
6158 :6E00C60A991A201,447
6159 :20FAFF00A47E00DF,35C
6160 :600AA202CAE0C0A0,50A
6161 :F0A000A9000A7EAB,45B
6162 :20A96C8000FA47E,449
6163 :60A9E0000A2FF20,452
6164 :FAFFA90000AA90C,460
6165 :20E3FF20E6DA9D2,502
6166 :2006EA950E20556C,29B
6167 :6F00519000F7A90C,4A4
6168 :20E3FF20E56DA75A,437
6169 :B532A96F050A907,3D7
6170 :20006E20F000A0A,20B
6171 :6DA90520006EAF00,2DA
6172 :20E3FF20E6DA9D2,502
6173 :20E0FF4C0C6A955,38F
6174 :2006EA950E20556C,29B
6175 :4C6A6BA475200C6C,2D2
6176 :D000A200C6C200C,310
6177 :6C4C4B6A4C6A0A9,336
6178 :20E3FF20E7FF4C67,40B
6179 :FFA29620FAFF00A9,253
6180 :9CA000A6A0E00D0,41E
6181 :00A21320FAFFA212,307
6182 :20FAFF6A0A2120FA,40B
6183 :FFA29620FAFF00A9,253
6184 :9CA000A6A0E00D0,41E
6185 :EBA25320FAFFA252,4E7
6186 :20FAFF6A0A2120FA,40B
6187 :3F047EA9710A0020,33D
6188 :F4FFB000C007D005,44B
6189 :6B684C0C6A47E20,2D4
6190 :496CC63F00023860,37A
6191 :A50AC92D00062079,369
6192 :6E00C60A991A201,447
6193 :20FAFF00A47E00DF,35C
6194 :600AA202CAE0C0A0,50A
6195 :F0A000A9000A7EAB,45B
6196 :20A96C8000FA47E,449
6197 :60A9E0000A2FF20,452
6198 :FAFFA90000AA90C,460
6199 :20E3FF20E6DA9D2,502
6200 :2006EA950E20556C,29B
```

```
240 PRINT "Checksum Error"
250 LET A=A-B:GO TO 50
260 PRINT "Typing Error"
270 LET A=B:(A DIV 8):GO TO 50
280 SAVE "download"CODE 6000,1136
290 POKE 23650,0:STOP
300 LET A=0:LET X=CODE X0-40-7*(X0-9)
310 IF X<0 OR X>15 THEN LET A=1
320 RETURN
```

Figure 1. Spectrum.

```
5 REM SPECTRUM 48k
10 REM Hex Code Loader
15 CLEAR 50000
20 POKE 23650,0:CLS:PRINT
30 INPUT "Start Address:" AS
40 IF A>65535 THEN GO TO 200
50 IF A<2048 THEN GO TO 20
60 PRINT A
```

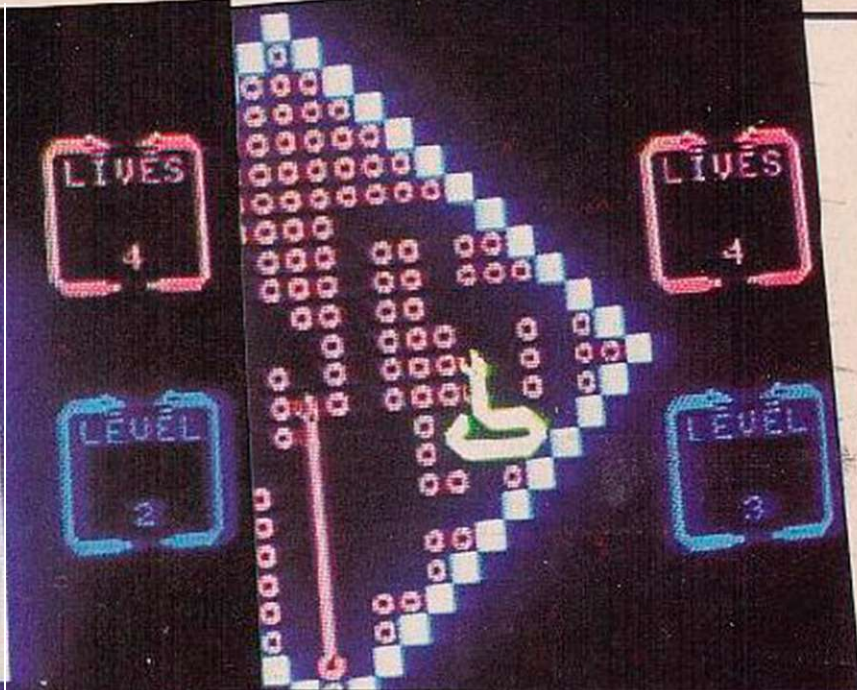
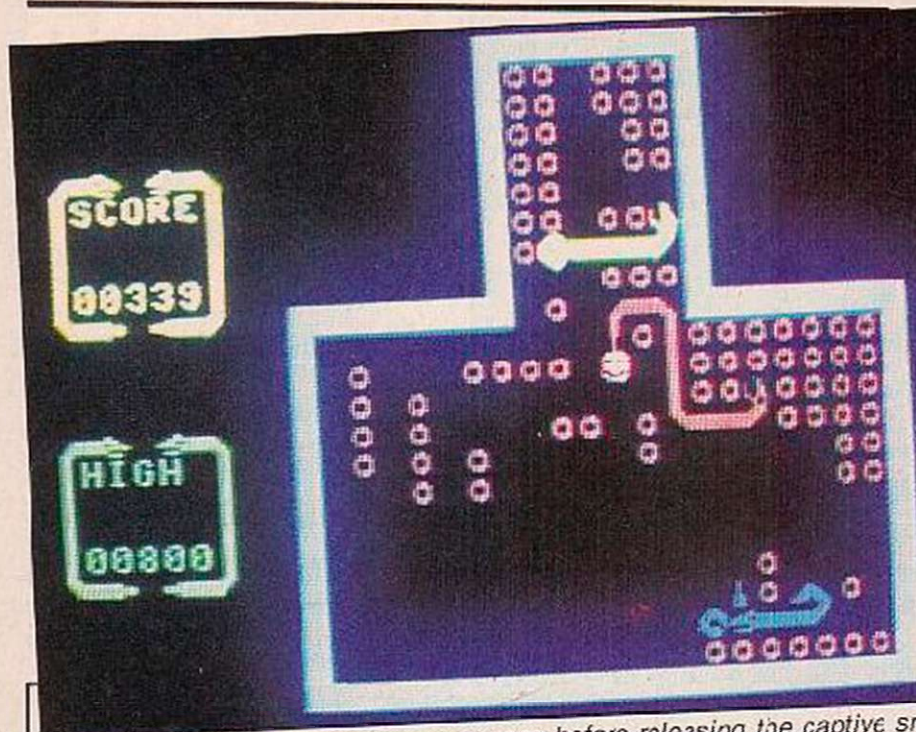
```
80 INPUT "B:";B,C$
90 IF LEN(B$)>16 THEN GO TO 200
100 LET T=256*INT (A/256)
110 FOR N=A TO B
120 LET X$=MID$(B$,2*N+1,1)
130 IF E=1 THEN GO TO 260
140 LET X$=MID$(B$,2*N+2,1)
150 GO SUB 300:LET Y$=MID$(C$,M,1)
```

```
160 IF E=1 THEN GO TO 260
170 POKE A,Y:LET A=A+1
180 LET T=T+Y:NEXT N:LET Y=0
190 FOR M=1 TO 3
200 LET X$=MID$(C$,M,1)
210 IF E=1 THEN LET A=A+1:GO TO 260
220 NEXT M
230 IF T=INT (T/256)*256 THEN PRINT "":B$=B$+GO TO 50
```

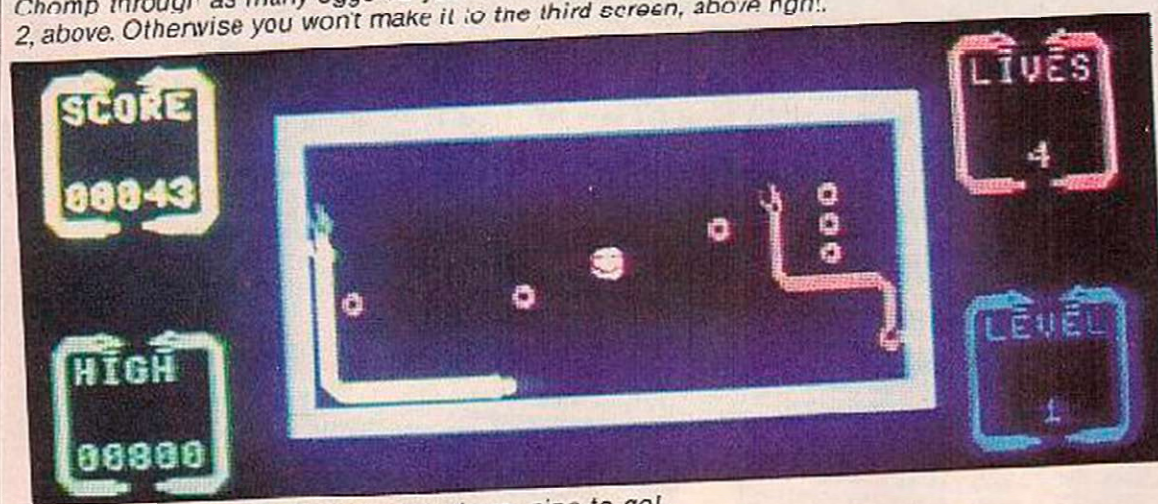
```
240 PRINT "Checksum Error"
250 LET A=A-B:GO TO 50
260 PRINT "Typing Error"
270 LET A=B:(A DIV 8):GO TO 50
280 SAVE "download"CODE 6000,1136
290 POKE 23650,0:STOP
300 LET A=0:LET X=CODE X0-40-7*(X0-9)
310 IF X<0 OR X>15 THEN LET A=1
320 RETURN
```

Figure 2. Spectrum.

```
60000 :CD150C307E2CD15,4C7
60001 :F0C036ECCD66EDCD,631
60002 :50EDCD47EE30FB0C,3AF
60003 :80EDFE31CA9EAFE,69A
60004 :35C6B7EAC36EACD,50B
60005 :15ED3EACD84EDD,5FD
60006 :15ED3EACD84EDD,5FD
60007 :15ED3EACD84EDD,5FD
60008 :15ED3EACD84EDD,5FD
60009 :15ED3EACD84EDD,5FD
60010 :15ED3EACD84EDD,5FD
60011 :15ED3EACD84EDD,5FD
60012 :15ED3EACD84EDD,5FD
60013 :15ED3EACD84EDD,5FD
60014 :15ED3EACD84EDD,5FD
60015 :15ED3EACD84EDD,5FD
60016 :15ED3EACD84EDD,5FD
60017 :15ED3EACD84EDD,5FD
60018 :15ED3EACD84EDD,5FD
60019 :15ED3EACD84EDD,5FD
60020 :15ED3EACD84EDD,5FD
60021 :15ED3EACD84EDD,5FD
60022 :15ED3EACD84EDD,5FD
60023 :15ED3EACD84EDD,5FD
60024 :15ED3EACD84EDD,5FD
60025 :15ED3EACD84EDD,5FD
60026 :15ED3EACD84EDD,5FD
60027 :15ED3EACD84EDD,5FD
60028 :15ED3EACD84EDD,5FD
60029 :15ED3EACD84EDD,5FD
60030 :15ED3EACD84EDD,5FD
60031 :15ED3EACD84EDD,5FD
60032 :15ED3EACD84EDD,5FD
60033 :15ED3EACD84EDD,5FD
60034 :15ED3EACD84EDD,5FD
60035 :15ED3EACD84EDD,5FD
60036 :15ED3EACD84EDD,5FD
60037 :15ED3EACD84EDD,5FD
60038 :15ED3EACD84EDD,5FD
60039 :15ED3EACD84EDD,5FD
60040 :15ED3EACD84EDD,5FD
60041 :15ED3EACD84EDD,5FD
60042 :15ED3EACD84EDD,5FD
60043 :15ED3EACD84EDD,5FD
60044 :15ED3EACD84EDD,5FD
60045 :15ED3EACD84EDD,5FD
60046 :15ED3EACD84EDD,5FD
60047 :15ED3EACD84EDD,5FD
60048 :15ED3EACD84EDD,5FD
60049 :15ED3EACD84EDD,5FD
60050 :15ED3EACD84EDD,5FD
60051 :15ED3EACD84EDD,5FD
60052 :15ED3EACD84EDD,5FD
60053 :15ED3EACD84EDD,5FD
60054 :15ED3EACD84EDD,5FD
60055 :15ED3EACD84EDD,5FD
60056 :15ED3EACD84EDD,5FD
60057 :15ED3EACD84EDD,5FD
60058 :15ED3EACD84EDD,5FD
60059 :15ED3EACD84EDD,5FD
60060 :15ED3EACD84EDD,5FD
60061 :15ED3EACD84EDD,5FD
60062 :15ED3EACD84EDD,5FD
60063 :15ED3EACD84EDD,5FD
60064 :15ED3EACD84EDD,5FD
60065 :15ED3EACD84EDD,5FD
60066 :15ED3EACD84EDD,5FD
60067 :15ED3EACD84EDD,5FD
60068 :15ED3EACD84EDD,5FD
60069 :15ED3EACD84EDD,5FD
60070 :15ED3EACD84EDD,5FD
60071 :15ED3EACD84EDD,5FD
60072 :15ED3EACD84EDD,5FD
60073 :15ED3EACD84EDD,5FD
60074 :15ED3EACD84EDD,5FD
60075 :15ED3EACD84EDD,5FD
60076 :15ED3EACD84EDD,5FD
60077 :15ED3EACD84EDD,5FD
60078 :15ED3EACD84EDD,5FD
60079 :15ED3EACD84EDD,5FD
60080 :15ED3EACD84EDD,5FD
60081 :15ED3EACD84EDD,5FD
60082 :15ED3EACD84EDD,5FD
60083 :15ED3EACD84EDD,5FD
60084 :15ED3EACD84EDD,5FD
60085 :15ED3EACD84EDD,5FD
60086 :15ED3EACD84EDD,5FD
60087 :15ED3EACD84EDD,5FD
60088 :15ED3EACD84EDD,5FD
60089 :15ED3EACD84EDD,5FD
60090 :15ED3EACD84EDD,5FD
60091 :15ED3EACD84EDD,5FD
60092 :15ED3EACD84EDD,5FD
60093 :15ED3EACD84EDD,5FD
60094 :15ED3EACD84EDD,5FD
60095 :15ED3EACD84EDD,5FD
60096 :15ED3EACD84EDD,5FD
60097 :15ED3EACD84EDD,5FD
60098 :15ED3EACD84EDD,5FD
60099 :15ED3EACD84EDD,5FD
60100 :15ED3EACD84EDD,5FD
60101 :15ED3EACD84EDD,5FD
60102 :15ED3EACD84EDD,5FD
60103 :15ED3EACD84EDD,5FD
60104 :15ED3EACD84EDD,5FD
60105 :15ED3EACD84EDD,5FD
60106 :15ED3EACD84EDD,5FD
60107 :15ED3EACD84EDD,5FD
60108 :15ED3EACD84EDD,5FD
60109 :15ED3EACD84EDD,5FD
60110 :15ED3EACD84EDD,5FD
60111 :15ED3EACD84EDD,5FD
60112 :15ED3EACD84EDD,5FD
60113 :15ED3EACD84EDD,5FD
60114 :15ED3EACD84EDD,5FD
60115 :15ED3EACD84EDD,5FD
60116 :15ED3EACD84EDD,5FD
60117 :15ED3EACD84EDD,5FD
60118 :15ED3EACD84EDD,5FD
60119 :15ED3EACD84EDD,5FD
60120 :15ED3EACD84EDD,5FD
60121 :15ED3EACD84EDD,5FD
60122 :15ED3EACD84EDD,5FD
60123 :15ED3EACD84EDD,5FD
60124 :15ED3EACD84EDD,5FD
60125 :15ED3EACD84EDD,5FD
60126 :15ED3EACD84EDD,5FD
60127 :15ED3EACD84EDD,5FD
60128 :15ED3EACD84EDD,5FD
60129 :15ED3EACD84EDD,5FD
60130 :15ED3EACD84EDD,5FD
60131 :15ED3EACD84EDD,5FD
60132 :15ED3EACD84EDD,5FD
60133 :15ED3EACD84EDD,5FD
60134 :15ED3EACD84EDD,5FD
60135 :15ED3EACD84EDD,5FD
60136 :15ED3EACD84EDD,5FD
60137 :15ED3EACD84EDD,5FD
60138 :15ED3EACD84EDD,5FD
60139 :15ED3EACD84EDD,5FD
60140 :15ED3EACD84EDD,5FD
60141 :15ED3EACD84EDD,5FD
60142 :15ED3EACD84EDD,5FD
60143 :15ED3EACD84EDD,5FD
60144 :15ED3EACD84EDD,5FD
60145 :15ED3EACD84EDD,5FD
60146 :15ED3EACD84EDD,5FD
60147 :15ED3EACD84EDD,5FD
60148 :15ED3EACD84EDD,5FD
60149 :15ED3EACD84EDD,5FD
60150 :15ED3EACD84EDD,5FD
60151 :15ED3EACD84EDD,5FD
60152 :15ED3EACD84EDD,5FD
60153 :15ED3EACD84EDD,5FD
60154 :15ED3EACD84EDD,5FD
60155 :15ED3EACD84EDD,5FD
60156 :15ED3EACD84EDD,5FD
60157 :15ED3EACD84EDD,5FD
60158 :15ED3EACD84EDD,5FD
60159 :15ED3EACD84EDD,5FD
60160 :15ED3EACD84EDD,5FD
60161 :15ED3EACD84EDD,5FD
60162 :15ED3EACD84EDD,5FD
60163 :15ED3EACD84EDD,5FD
60164 :15ED3EACD84EDD,5FD
60165 :15ED3EACD84EDD,5FD
60166 :15ED3EACD84EDD,5FD
60167 :15ED3EACD84EDD,5FD
60168 :15ED3EACD84EDD,5FD
60169 :15ED3EACD84EDD,5FD
60170 :15ED3EACD84EDD,5FD
60171 :15ED3EACD84EDD,5FD
60172 :15ED3EACD84EDD,5FD
60173 :15ED3EACD84EDD,5FD
60174 :15ED3EACD84EDD,5FD
60175 :15ED3EACD84EDD,5FD
60176 :15ED3EACD84EDD,5FD
60177 :15ED3EACD84EDD,5FD
60178 :15ED3EACD84EDD,5FD
60179 :15ED3EACD84EDD,5FD
60180 :15ED3EACD84EDD,5FD
60181 :15ED3EACD84EDD,5FD
60182 :15ED3EACD84EDD,5FD
60183 :15ED3EACD84EDD,5FD
60184 :15ED3EACD84EDD,5FD
60185 :15ED3EACD84EDD,5FD
60186 :15ED3EACD84EDD,5FD
60187 :15ED3EAC
```

Chomp through as many eggs as you can before releasing the captive snakes in screen 2, above. Otherwise you won't make it to the third screen, above right.



The opening screen above — one down, nine to go!

Listing 1. The hex loader.

```
10 PRINT "SNAKES 64 H"
EX LOADER"
20 INPUT "START ADDRESS";SA
25 PRINT
30 FORAD=SATO20992STEP10
40 CH=A:PRINTAD:INPUT"Y";HS
43 IFHS="S"THEN170
45 IFLEN(HS)<20THEN40
50 FORI=0TO9
60 X=ASC(MID$(HS,I*2+1,1))
70 Y=ASC(MID$(HS,I*2+2,1))
80 X=X-48:IFX>9THENX=X-7
90 Y=Y-48:IFY>9THENY=Y-7
100 POKEAD+I,X*16+Y:CH=CH-X*16+Y
110 NEXTI
120 PRINTTAB(29)"DCH":INPUTC
130 IFCH=CTHEN160
140 PRINT "CHECKSUM ERROR! TRY A"
    GAIN."
150 GOTO40
160 NEXTAD
170 INPUT "FILE NAME";FS
180 FORI=1TOLEN(FS):POKE39999+I,
    ASC(MID$(FS,I,1)):NEXT
190 POKE700,1:POKE781,1:POKE782,
    1
200 SYS65466
210 POKE780,LEN(FS):POKE701,64
220 POKE782,156:SYS65468
230 POKE252,136:POKE253,54:POKE7
    30,252
240 POKE781,0:POKE782,82:SYS6543
    8
```

Listing 2. The code.

```
13960 EDED0200209BA5000000 CH: 828
13970 08423BA5008100008100 CH: 652
13980 000000000F0003003300 CH: 117
13990 33003300330033000000 CH: 204
14000 0000FFFFFFFFFF3FFF001D CH: 1367
14010 FFFFFFFF00FF000000 CH: 1333
14020 00000100020304050607 CH: 28
14030 1A0B1B0F1B0C1B0D1A0D CH: 193
```

```
14040 1A0C1A0B1A0A1B0C1B0D CH: 192
14050 1A0D1A0C0A0B0A0B0A0B CH: 381
14060 0E0C0E0D0D0D0D0D0D0D CH: 128
14070 0E0B0E0C0E0C0E0C0E0C CH: 129
14080 00FF0C120D120D130D14 CH: 381
14090 0C140C130C120D120D13 CH: 156
14100 0D140C140C1300FF1304 CH: 374
14110 14041405140613061305 CH: 124
14120 13041404140514061306 CH: 123
14130 1305040F1H121E121B13 CH: 414
14140 1B141A1A1A1A1A1A1A1A CH: 227
14150 1B131B141A1A1A1A1A1A CH: 439
14160 0B0B0C0E0C0C0C0C0D0D CH: 118
14170 0B0C0B0B0C0B0C0C0C0D CH: 117
14180 0B0D0B0C00FF13041404 CH: 349
14190 14051406130613051304 CH: 123
14200 14041405140613061305 CH: 124
14210 00FF1B0B1C0B1C0C1C0D CH: 413
14220 1B0D1B0C1B0B1C0B1C0C CH: 196
14230 1C0D1B0D1B0C00FF1312 CH: 412
14240 14121413141413141313 CH: 194
14250 13121412141314141314 CH: 193
14260 131300FF0E050F050F06 CH: 353
14270 0F070E070E060E050F05 CH: 182
14280 0F050F070E070E060F0F CH: 339
14290 19051A051A051A071907 CH: 158
14300 190619051A051A061907 CH: 157
14310 1907190600FF0E110F11 CH: 381
14320 0F120F130E130E120E11 CH: 163
14330 0F110F120F130E130E12 CH: 164
14340 00FF19111A111A121A13 CH: 429
14350 1913191219111A111A12 CH: 216
14360 1A131913191200FF0B05 CH: 403
14370 0C050C060C070B070B06 CH: 89
14380 0E050C050C060C070B07 CH: 88
14390 0B0600FF100B110B110C CH: 356
14400 110D100D100C100B110B CH: 142
14410 110C110D100D100C00FF CH: 371
14420 170B180B180C180D170D CH: 178
14430 170C170B180B180C180D CH: 177
14440 170D170C00FF0B110C11 CH: 383
14450 0C120C130B130B120B11 CH: 148
14460 0C110C120C130B130B12 CH: 149
14470 00FF0D0C0C0E0B100A12 CH: 361
14480 0A120914091409140B16 CH: 145
14490 0B160816081608160914 CH: 149
14500 0C140D140D120D120D10 CH: 141
14510 0C0E0D0C0D070E070E08 CH: 114
14520 0E090D090D080D070E07 CH: 107
14530 0E080E090D090D0800FF CH: 343
14540 13031403140414051305 CH: 118
14550 13041303140314041405 CH: 117
```

```
14560 1305130400FF19071A07 CH: 367
14570 1A081A0519E319081907 CH: 168
14580 1A071A061A0519031908 CH: 169
14590 00FF190F1A0F1A101A11 CH: 421
14600 15111310190F1A0F1A10 CH: 206
14610 1F111911191000FF1313 CH: 419
14620 14131414141513151314 CH: 199
14630 13131413141414151315 CH: 198
14640 131400FF0D0F0E0F0E10 CH: 381
14650 0E110D110D100D0F0E0F CH: 147
14660 0E100E110D110D1000FF CH: 375
14670 0E030C030C040C050305 CH: 78
14680 0E040B030C030C040C05 CH: 77
14690 0B050B04030F110031403 CH: 331
14700 14041405130513041303 CH: 118
14710 14031404140513051304 CH: 119
14720 00FF1B031C031C041C05 CH: 381
14730 1A051B041B031C031C04 CH: 156
14740 10051B051B0400FF030B CH: 373
14750 000B0C0C0C000B0D030C CH: 119
14760 0B0B0C0B0C0C0C0D030D CH: 118
14770 0B0C03FF1B0B1C0B1C0C CH: 395
14780 100D1B0D1B0C1B0B1C0B CH: 197
14790 100C120D1B0D1B0C00FF CH: 415
14800 0B130C130C140C150B15 CH: 158
14810 0B140B130C130C140C15 CH: 157
14820 0B150B140B130C130C15 CH: 395
14830 14141415131513141313 CH: 198
14840 14131414141513151314 CH: 199
14850 00FF1B131C131C141C15 CH: 445
14860 1B151B141B131C131C14 CH: 236
14870 1C151B151B1400FF08142 CH: 594
14880 5911119D9D9D9D9D9D9D CH: 1222
14890 9D9D9D9D9D9D9D9D9D CH: 1076
14900 20204755535441465353 CH: 688
14910 4F4E0D11111D1D1D1D1D CH: 388
14920 41542354484520454747 CH: 649
14930 53204259205341535349 CH: 686
14940 4E47234F564552205448 CH: 685
14950 454D220D1D1D1D425554 CH: 525
14960 2041554F494420544845 CH: 660
14970 20444541444C5920534E CH: 660
14980 414845532E205748454E CH: 676
14990 0D1D1D1D1D1D44845524520 CH: 508
15000 415245204E4F20454747 CH: 648
15010 53204C4546542C20534F CH: 658
15020 552043414E0D1D1D1D1D CH: 496
15030 41542054484520534E41 CH: 664
15040 4845532E20424F4E5553 CH: 696
15050 204C4946452045564552 CH: 658
15060 593D1D1D1D1D30303020 CH: 414
15070 504F494E45432E111111 CH: 574
15080 9D9D9D9D9D9E46312820 CH: 1120
15090 53544152542047414D45 CH: 712
15100 0D111D1D1D1D1D1D1D1D CH: 262
15110 1D1D4633202047414D45 CH: 525
15120 2053584545443A0D111D CH: 518
15130 1D1D1D1D1D1D1D1D1D46 CH: 331
15140 3520204D55534943204F CH: 613
15150 4E2F4F46460D1111011D CH: 549
15160 1D1D1D1D1D1D1D1D5055 CH: 597
15170 5420484F59535449424D CH: 740
15180 20494E20504F52542032 CH: 622
15190 9E534C4F5720203E4D43 CH: 851
15200 4449554D9E4641535420 CH: 795
15210 204C472D9D1151459E9D CH: 363
15220 114948545454545D9E9D CH: 969
15230 9D11542020549D9D9D9D CH: 1034
15240 11542020549D9D9D9D11 CH: 894
15250 5454545446444E1D5044 CH: 729
15260 47191A51191A51191A51 CH: 800
15270 119D45119D9D9D9D9D9D CH: 1202
15280 9D4944421D4444489F9D CH: 911
15290 9D9D9D9D9D9D9D9D9D9D CH: 1370
15300 919D45919D459E53434F CH: 1129
15310 52459D9D9D9D9D9D111111 CH: 987
15320 1E484947499D9D9D9D11 CH: 260
15330 11111C4C495645539D9D CH: 763
15340 9D9D9D1111111F4C4556 CH: 784
```


SNAKES is a machine-code program for the CBM-64 and joystick. When you run it, you'll first be shown the title page and hear some music. After you have chosen your game speed, the game starts. On each screen there will be an area filled with eggs, and also a varying number of snakes. Only one of these, the red one, can eat eggs. This means that the other snakes are trapped until you or the red one let them out.

The object of the game is to eat all the eggs without being killed. When there are no eggs left, you can eat the snakes by crossing their tails, but you must still avoid their heads. And when the snakes are gone, the next screen is waiting for you. There are nine different screens available.

If you want to play the game, first type in the hex loader in listing 1. Run it, and input the start address. You can now enter the code, 10 bytes — no spaces — and a checksum each time. If there are any checksum errors, the program will

SNAKES

tell you. You can save the code to tape at any time by typing S. When you have entered the code and saved it, you can hopefully run the program with

SYS 16384

If you think it's too much work to type the code in, I can supply you with a copy of the program on a cassette. Please send £3, name and address to Anders Gustafsson, Krokelyckan 52, 421 70 V. Frolunda, Sweden.

Nine screens of snakes coiled up inside your CBM-64. Serpents and eggs are on this unusual menu from Anders Gustafsson — eat them before they lunch you.

15350	454C9D9D9D111119D00	CH: 824	16150	A5A41A9A41A9A41A69	CH: 1178	16940	E245A20188D0F0C0D3FA	CH: 1715
15360	4341A0000000004341	CH: 346	16160	A41A6A41A6A41A5A4	CH: 1036	16950	A0D980C90D0E320ED48	CH: 1495
15370	4A00000000004341A00	CH: 288	16170	1A5A41A4A41A4A41A	CH: 826	16960	EED580EED80ADDE83C9	CH: 1891
15380	000000004341A000008	CH: 222	16180	46A41A41A41A41A41540	CH: 829	16970	0FD012A9018DDE90A02F	CH: 1117
15390	00004341A0000000000	CH: 214	16190	54000050001FA4006A	CH: 580	16980	4238E9201000A931802F	CH: 765
15400	4341A0000000004341	CH: 346	16200	9006A901A96F41F96A4	CH: 1144	16990	424C041A9122002FFA9	CH: 1236
15410	4A00000000004341A00	CH: 288	16210	1A41A41A41A41A41A41A	CH: 791	17000	0E8D1A81AC1A81200342	CH: 858
15420	000000004341A000008	CH: 222	16220	41A41A41A41A55A41A	CH: 935	17010	AD1A8118591A8D1A81C9	CH: 980
15430	00004341A0000000000	CH: 214	16230	A41A8A41A8A41A55A4	CH: 1159	17020	DE0ED580004C000F088	CH: 1712
15440	0000000000000001813	CH: 588	16240	1A41A41A41A41A41A41A	CH: 791	17030	D0FA6084F7A90035FEA0	CH: 1649
15450	18183C3C3C3C3C3C3C3C	CH: 780	16250	41A41A41A41A55A41A	CH: 595	17040	8084F8C884FFA000B1F7	CH: 1679
15460	FF00000000000000000	CH: 780	16260	41A41A41A41A55A41A	CH: 845	17050	91FEC0C01AD0F7358FAD	CH: 1721
15470	1818000000000000000	CH: 1068	16270	901A5A401A50401F6A40	CH: 790	17060	1081358EC9000042380	CH: 1129
15480	3C3C3C3C3C3C3C3C3C3C	CH: 480	16280	1A9001A9001A9A001A	CH: 605	17070	4260E1781AC16313320	CH: 899
15490	03070F1F3E3C3C3C3C3C	CH: 594	16290	A4001A9001A9001A6A	CH: 686	17080	CF48B1FE290F8D3602AD	CH: 1211
15500	F0F87C3C3C3C3C3C3C3C	CH: 1760	16300	401A6A401A5A901A5A90	CH: 780	17090	1FD4C9FA000C00A0322	CH: 1506
15510	0000000000000000000	CH: 178	16310	1A46A41A46A415415400	CH: 690	17100	CSBA002B4C08433D1881	CH: 1003
15520	3C7E8FC7E7FF7E3C3C7A	CH: 1430	16320	1555541A8A41A8A41A	CH: 936	17110	858EAD1301658F190328	CH: 1103
15530	F7E7E7E7E7E7E7E7E7E7	CH: 1822	16330	AA41A55541A4001A40	CH: 709	17120	E58E8E8A9003858F85	CH: 1376
15540	E3FD7E3C3C7E7E7E7E7E	CH: 1808	16340	001A55001A9001A900	CH: 301	17130	0F4C004C0D1081358FAD	CH: 1069
15550	5E3C0E0E0E3E7F0C000	CH: 1259	16350	1A55001A40001A4001A	CH: 317	17140	1901858E4C0343AD1881	CH: 906
15560	606E7B39391918030007	CH: 519	16360	40001A40001A4001A55	CH: 355	17150	858FAD1931858E4C0D42	CH: 1241
15570	1F7CFF03E001013989C	CH: 820	16370	541A8A41A8A41A8A41A	CH: 1164	17160	AD178118558FAAD1681	CH: 1087
15580	9C1E763E7E7E7E7E7E7E	CH: 1783	16380	155554000A888F0C936	CH: 1103	17170	18558E88323C48B1FE	CH: 1228
15590	C37E7E7E7E7E7E7E7E7E	CH: 1755	16390	85FA9D78A9578D1433A9	CH: 1701	17180	290F85F8D8502F008C9	CH: 1233
15600	FFFFFFFFFFF7F000C	CH: 2100	16400	I1FC21FEC80C19D07A9	CH: 1869	17190	00F025C93AF32A4CC142	CH: 1114
15610	7E66667E3C003D11210	CH: 767	16410	018502858A90383CA9	CH: 1019	17200	AD178118558FAAD1681	CH: 1087
15620	0000000000000000000	CH: 390	16420	3D858D78A9578D1433A9	CH: 1060	17210	18558E881820CA48B1FE	CH: 1196
15630	04108721104736031F15	CH: 341	16430	518D1503A50123FB3501	CH: 838	17220	C995D00F204E434C5743	CH: 980
15640	108721104736031F1510	CH: 353	16440	F00084FC83085FD19D0	CH: 1524	17230	CED800D003CED80060A9	CH: 1581
15650	7707360721108385100C	CH: 543	16450	85FA9D78A9578D1433A9	CH: 1700	17240	FE95FE930857F70002D1	CH: 1660
15660	07104705087211047360	CH: 482	16460	F9E6FE6FFC0D0F2A501	CH: 2035	17250	FE888891FEC8C8C8C01A	CH: 1743
15670	104706081F273832A10	CH: 491	16470	0904850158A00384FC9	CH: 948	17260	D0F3A8E8D1881186D1FE	CH: 1205
15680	47060887211083851061	CH: 573	16480	3485FD05085FEA93C85	CH: 1436	17270	013D16818A8020CA48B1FE	CH: 1196
15690	08103E2A10473603A51F	CH: 425	16490	FF81FE91F0C838000F7	CH: 2106	17280	18558E881820CA48B1FE	CH: 802
15700	10A22510E90730872110	CH: 703	16500	A9A185FC93603FD0A00	CH: 1484	17290	F0FFAD1881C900F00EC9	CH: 1477
15710	610810470610470508D1	CH: 508	16510	84FE9D005FFB1FCC9FF	CH: 2036	17300	01F005A9504CAF43A94E	CH: 1060
15720	1210000008EF13031F15	CH: 360	16520	F00291FEC8C02D0F3A0	CH: 1689	17310	4C9F43AD1981C901F005	CH: 1092
15730	10300410872110470608	CH: 353	16530	FE8CF8073CFD07C88CF2	CH: 1635	17320	A95140CAF43A94F20D2FF	CH: 1313
15740	1F15108721104706081F	CH: 368	16540	07C88CF8073CFD07C88CF2	CH: 1402	17330	AC1481AE15811820F0FF	CH: 1196
15750	15107707388721108385	CH: 560	16550	8CFC07A9418D2F42A993	CH: 1203	17340	AD1281CD1681D0034C24	CH: 999
15760	100C0710470508311C10	CH: 228	16560	30D3FFA205A0131020F0	CH: 1139	17350	448D1381CD1781D0034C	CH: 1033
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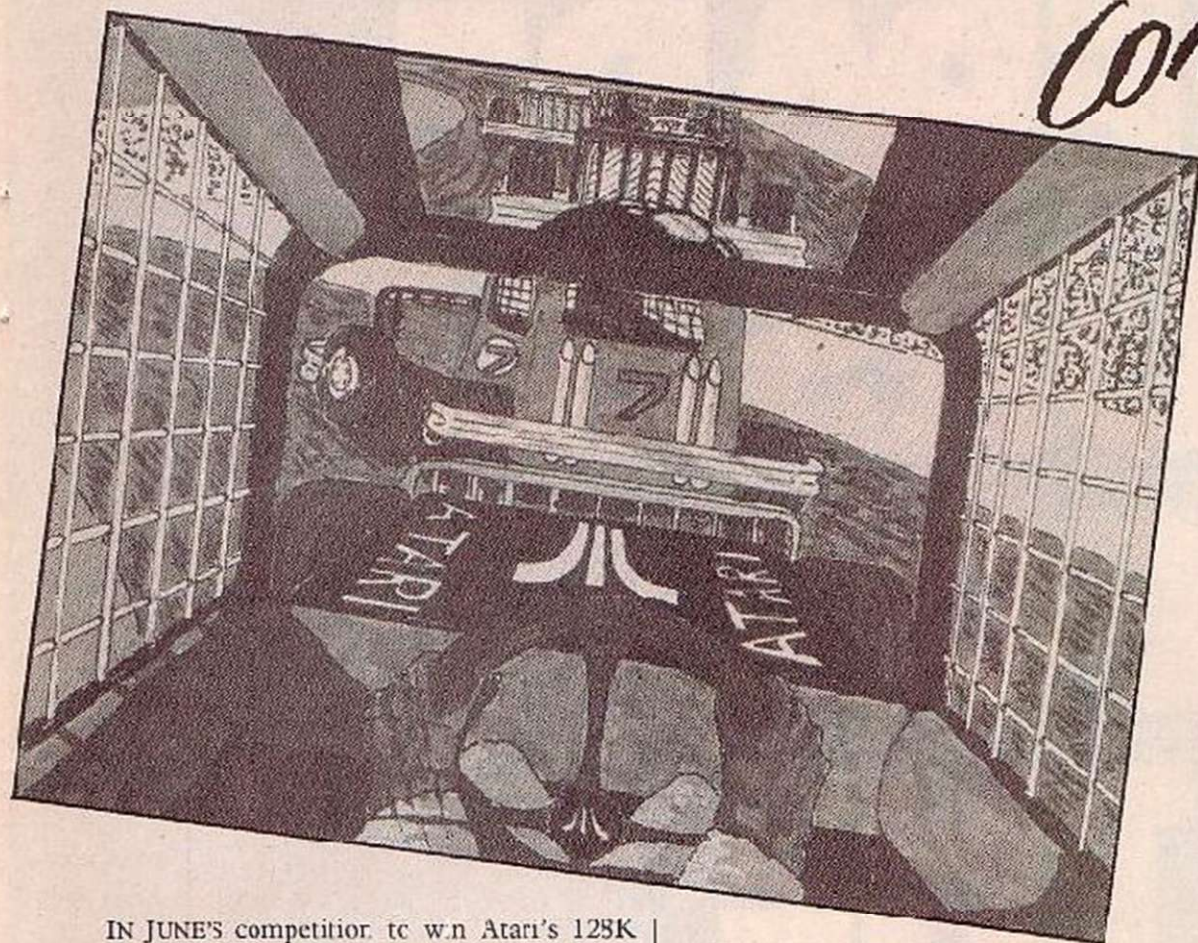
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WIN AN ATARI 130XE

Competition

RESULTS



IN JUNE'S competition to win Atari's 128K computer, the 130XE, you were asked first to write a plot for a game which could take advantage of the Atari's extra memory, then to name the five worst programs you ever paid money for. As a prize for the runners-up we offered copies of Firebird's Don't Buy This tape, a compilation of the five worst programs ever sent in for evaluation.

When we set the competition we thought we would be able to draw up a definitive list of the great software disasters of our time. As it turned out, there was almost no consensus on what is good and what is bad. No two entries agreed on more than one title. Some people even nominated such chart-toppers as Ghostbusters, Harrier Attack, and Jeff Minter's Gridrunner — in our book, one of the all-time greats. The moral seems to be that, as far as games are concerned, one man's meat is another man's poison, or as the Romans put it: *De gustibus non disputandum est*.

If there was one game that qualified for the title of worst-ever it was Legend's The Great Space Race — probably because it was so overhyped and, at £14, over-priced. Among the other games that received at least three nominations apiece were: Alcatraz Harry, Blue Thunder, Flight Path 737, Mad Martha, Airwolf, Micro Olympics, Johnny Reb, Gulpman, Winged Avengers, Pedro, Zip Zap, JCB Digger, Schizoids, Ah Diddums.

You may be surprised to learn that the last three came from Imagine, a company responsible for some of the best games of 1983/84. But they date from the time when Imagine's production line was churning out programs at a rate of almost one a week.

No doubt some of these titles do not deserve their place on the list. People are often unduly severe on a game if it has been hyped up and

J Stone's Battle of the Chevrolets.

then falls short of expectations. It is probably also unfair to compare games written in 1982 with today's software. Winged Avengers and Gulpman, for example, were produced when the Spectrum was in its infancy.

Admittedly, Winged Avengers — a monochrome shoot-em-up from a long-forgotten company called Workforce — was truly bad; but, for its time, Gulpman was one of the best Pacman games around. It is surprising nobody nominated Specman, Jega's version of Pacman on the Spectrum.

There were also scores of games that received only one nomination. Most of them have long since passed out of circulation. Who remembers Cosmic Piracy, Fred's Fan Factory, Astro Blast,

or Carnival Massacre?

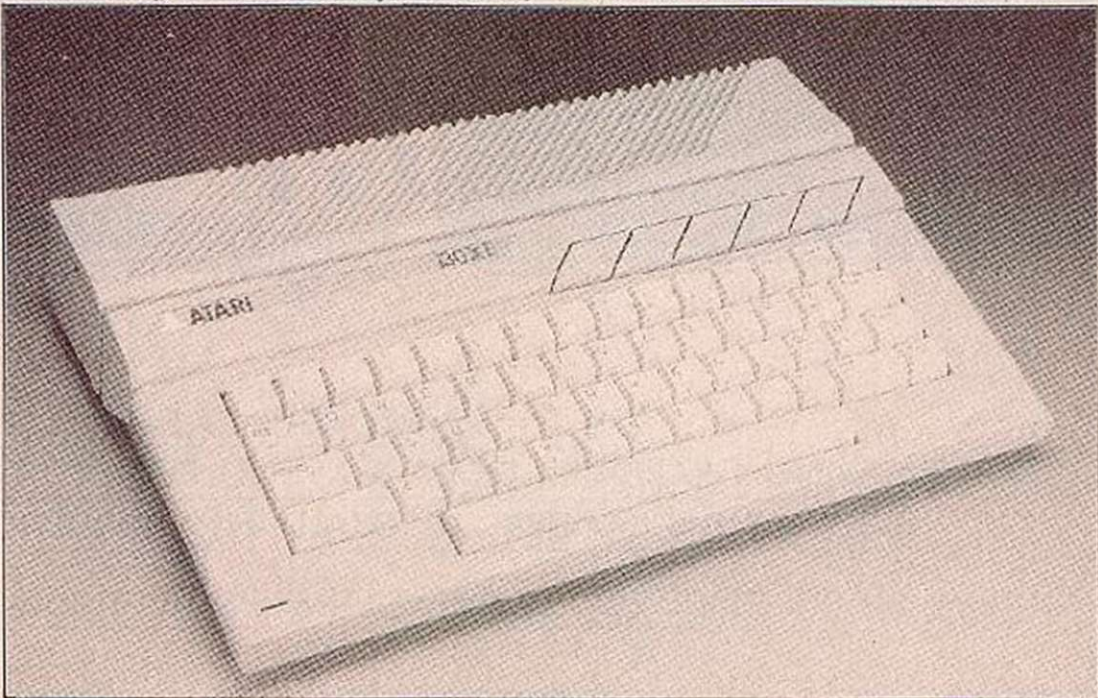
When it came to describing your ideal game for 128K, most of the entries were uninspired. In fact the bank-switched 64K is less of an advantage than you might think. It is unlikely that many software houses will write games which fully exploit the Atari's 128K. If they do use the extra memory it will be to store text and screen data rather than the game code itself.

This was the direction that most of the entries took: they wanted to see adventures with more locations and more graphics, and platform games with yet more screens. M. Topping suggested a follow-up to Elite with an adventure game element, in which you leave your ship and explore space stations. N. Sraith thought that 128K would be sufficient to stage a text and graphics version of Lord of the Rings.

Rather different was S. Patel's idea for a game called Father. In this, a boy has lost his father and has to find him by asking the computer questions about three possible candidates. The program needs 128K since it chooses the three men from a database of 100 characters, on each of whom there is an extensive dossier. J. Stones' Battle of Chevrolets was equally novel — a stock car racing game where instead of dodging other cars you have to collide with them.

All those mentioned above receive a runners-up prize, along with M. Simon, K. Etheridge, R. Drukker, C. Pearson, A. Bennet, A. Ahmad. We awarded the first prize to J. Davison, 44 West St, Great Garsden, Sandy, Beds. SG19 3AU. His ideal game, Zone, is not especially original but it is conceived on an epic scale. You have to retrieve a stolen reactor from the Zone.

The reactor has been broken up and its parts are scattered over a vast network of underground passages and caverns, with unpeeped, different levels and hundreds of creatures.



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(continued from previous page)

than Basic.

Pascal demands a rigid program layout in which variables and procedures must be defined at the outset. It encourages disciplined programming with the emphasis on advanced planning and a structured approach. For this reason it is regarded as a sound language with which to teach programming.

If you are looking for a job as a programmer a knowledge of C will stand you in better stead than fluency in Basic. It is currently the most fashionable language around. Most new operating systems are now partly written in

C, as are many successful application programs. At the same time as being highly structured, C allows you to get at the guts of a machine in a similar way to assembly language.

These languages are available on most home micros; although, in some cases, they are stripped-down versions such as Small C or Tiny Pascal. Other languages include Basic compilers, Lisp, BCPL, Comal, Prolog, and Cobol.

Each has its strengths and weaknesses; over the next few months we will be telling you what they are, as First Bytes takes a closer look at some of the more important languages.

Chris Lam.

BEGINNERS

first bytes

Happiness is a thoroughly haywire program!

BEFORE SAVING enough pennies to buy my first computer — and like many other would-be micro owners, I suspect — I enjoyed a sort of voyeuristic love affair with the sylphs of silica city by reading *Your Computer* every month, eventually buying a couple of those early teach-yourself-Basic titles which looked as if they'd come from under the counter in an Old Compton Street bookshop and dealt with their subject just as predictably.

Not much was to be found in them about how to write a Pacman program or devise a neat database utility — instead, chapters on using your computer to work out acreages of carpeting or rivers of paint, or interesting exercises in calculating the fifteenth decimal point of Pi.

If those Puritan-severe tutorials did venture beyond the realm of numbing numeracy, it was only to remind the reader that structured programming was the Right Path Through Life. In other words, any and every program you wrote was bound to be interpreted as an algorithm in the form of program steps presented in strict chronological order of execution, branching or non-execution. Further, that even sparing

use of subroutines was not only a sign of a swivelling surrender to convenience on the part of the programmer but was guaranteed to ensure that, worse, he would never be taken seriously by anyone who knew better.

Such counsel was enough either to send you rushing out to buy one of those plastic templates full of skewiff geometric shapes or force you into becoming a closet algorithmic anarchist — joyously peppering your programs with Gotos and Gosubs no matter what the consequences. In fact, such apparently irresponsible behaviour is but a sign that, programming-wise, you've grown up.

I'd like to find the guy who dreamt up the phrase 'structured programming' because he has much to answer for. Not least, for the souls who have fallen at the wayside endeavouring to follow his cretinous creed, because trying to structure a computer program is like attempting to water-ski on blanchage — it's possible to do it but decidedly less invigorating than the alternative.

While professional programmers find that it's not a bad idea to scribble down their first thoughts on paper and to con-

ceive of their implementation as a series of modules, from there on in it's usually a case of keyboard creation — with the finished program actually building or screen before their eyes and with not a plastic template in sight.

One of the arguments made in favour of the structured approach is that it makes it easy for anyone — including the author, even months later — to fathom out how the program works. So whatever happened to Rems? I bung a Rem in practically every other line of any program I'm developing, and Save a 'library' copy of it with them intact.

I may knock them out to gain a little more speed and memory in the working copy — but even that's not necessary if one intends to produce a compiled version, because utilities such as the excellent Jetpack from Dataview Wordcraft automatically ignore all Rems anyway.

Another so-called advantage of the SP approach is that it makes for tidier programs. Are you tidy? Is Bob Geldof? Is the molecular structure of the Taj Mahal? Next question.

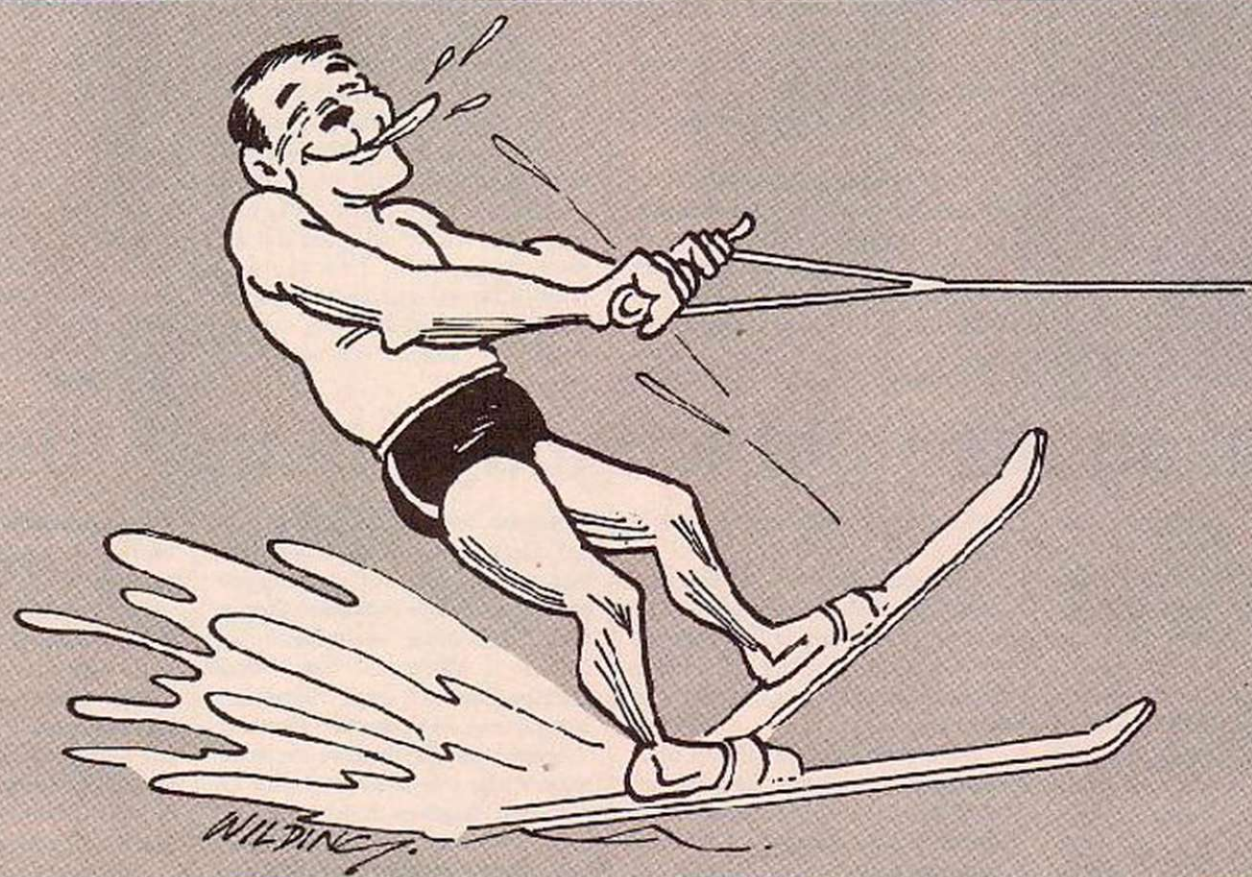
The algorithmics also lose hands down when it comes to usually the most important of all considerations — pro-

gram execution speed. Particularly in games writing, you need to keep to the absolute minimum the number of lines contained within the primary loop; that used to test for keyboard or joystick inputs. Avoid preceding that loop with a chunk of program to set up, for example, the game's playfield design, user-defined characters and/or sprites and go instead for a single Gosub to a module beginning at a much higher line number.

This is because any Return or Goto usually forces a laborious count beginning at the very first line used all the way up to that which the Return logic or Goto dictates is the next to be executed.

Thus you should aim at starting the 'active' part of your program at the lowest line number possible and at keeping the loop itself short and sweet. Delaying the first and prolonging the second, as the structuralists would have you do, will result in a program that runs as fast as a concrete rabbit. Psst! Anyone wanna buy a programmer's template with a possible secondary application in cutting out marzipan shapes for *petit fours*?

John Ransley.



TOP TIPS

SCREEN FLIPPER

This is a machine code routine for the 48K Spectrum that creates a flipped mirror image of any screen, taking into consideration the colour attributes.

First type in the Basic program and run it. If you get the message "LOADING IS OK" then save the routine by typing

SAVE"FLIP"CODE 30000140

Now the routine is ready to work, all you have to do is to load any screen and then type RANDOMISE USR 30000.

Hany Kilany.

```

100 LET COUNT=0
110 FOR N=00000 TO 20135
120 READ A:POKE N,A
130 LET COUNT=COUNT+A
140 NEXT N
150 IF COUNT/255=8 THEN GO TO
160 100
170 CLS:PRINT AT 10,7:FLASH
180 "ERROR IN DATA" BEEP 1,20:G
190 100
200 CLS:PRINT AT 10,2:PAPER
210 "IN" FLASH:LOADING OK
220 PRINT AT 12,4:PAPER:G:IN
230 RUN
240 PRINT AT 14,5:FLASH:INV
250 "RANDOMISE USR 30000"
260 NEXT N
270 DATA 33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,149,150,151,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,167,168,169,170,171,172,173,174,175,176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255,256,257,258,259,260,261,262,263,264,265,266,267,268,269,270,271,272,273,274,275,276,277,278,279,280,281,282,283,284,285,286,287,288,289,290,291,292,293,294,295,296,297,298,299,300,301,302,303,304,305,306,307,308,309,310,311,312,313,314,315,316,317,318,319,320,321,322,323,324,325,326,327,328,329,330,331,332,333,334,335,336,337,338,339,340,341,342,343,344,345,346,347,348,349,350,351,352,353,354,355,356,357,358,359,360,361,362,363,364,365,366,367,368,369,370,371,372,373,374,375,376,377,378,379,380,381,382,383,384,385,386,387,388,389,390,391,392,393,394,395,396,397,398,399,400,401,402,403,404,405,406,407,408,409,410,411,412,413,414,415,416,417,418,419,420,421,422,423,424,425,426,427,428,429,430,431,432,433,434,435,436,437,438,439,440,441,442,443,444,445,446,447,448,449,450,451,452,453,454,455,456,457,458,459,460,461,462,463,464,465,466,467,468,469,470,471,472,473,474,475,476,477,478,479,480,481,482,483,484,485,486,487,488,489,490,491,492,493,494,495,496,497,498,499,500,501,502,503,504,505,506,507,508,509,510,511,512,513,514,515,516,517,518,519,520,521,522,523,524,525,526,527,528,529,530,531,532,533,534,535,536,537,538,539,540,541,542,543,544,545,546,547,548,549,550,551,552,553,554,555,556,557,558,559,560,561,562,563,564,565,566,567,568,569,570,571,572,573,574,575,576,577,578,579,580,581,582,583,584,585,586,587,588,589,590,591,592,593,594,595,596,597,598,599,600,601,602,603,604,605,606,607,608,609,610,611,612,613,614,615,616,617,618,619,620,621,622,623,624,625,626,627,628,629,630,631,632,633,634,635,636,637,638,639,640,641,642,643,644,645,646,647,648,649,650,651,652,653,654,655,656,657,658,659,660,661,662,663,664,665,666,667,668,669,670,671,672,673,674,675,676,677,678,679,680,681,682,683,684,685,686,687,688,689,690,691,692,693,694,695,696,697,698,699,700,701,702,703,704,705,706,707,708,709,710,711,712,713,714,715,716,717,718,719,720,721,722,723,724,725,726,727,728,729,730,731,732,733,734,735,736,737,738,739,740,741,742,743,744,745,746,747,748,749,750,751,752,753,754,755,756,757,758,759,760,761,762,763,764,765,766,767,768,769,770,771,772,773,774,775,776,777,778,779,780,781,782,783,784,785,786,787,788,789,790,791,792,793,794,795,796,797,798,799,800,801,802,803,804,805,806,807,808,809,810,811,812,813,814,815,816,817,818,819,820,821,822,823,824,825,826,827,828,829,830,831,832,833,834,835,836,837,838,839,840,841,842,843,844,845,846,847,848,849,850,851,852,853,854,855,856,857,858,859,860,861,862,863,864,865,866,867,868,869,870,871,872,873,874,875,876,877,878,879,880,881,882,883,884,885,886,887,888,889,890,891,892,893,894,895,896,897,898,899,900,901,902,903,904,905,906,907,908,909,910,911,912,913,914,915,916,917,918,919,920,921,922,923,924,925,926,927,928,929,930,931,932,933,934,935,936,937,938,939,940,941,942,943,944,945,946,947,948,949,950,951,952,953,954,955,956,957,958,959,960,961,962,963,964,965,966,967,968,969,970,971,972,973,974,975,976,977,978,979,980,981,982,983,984,985,986,987,988,989,990,991,992,993,994,995,996,997,998,999,1000,1001,1002,1003,1004,1005,1006,1007,1008,1009,1010,1011,1012,1013,1014,1015,1016,1017,1018,1019,1020,1021,1022,1023,1024,1025,1026,1027,1028,1029,1030,1031,1032,1033,1034,1035,1036,1037,1038,1039,1040,1041,1042,1043,1044,1045,1046,1047,1048,1049,1050,1051,1052,1053,1054,1055,1056,1057,1058,1059,1060,1061,1062,1063,1064,1065,1066,1067,1068,1069,1070,1071,1072,1073,1074,1075,1076,1077,1078,1079,1080,1081,1082,1083,1084,1085,1086,1087,1088,1089,1090,1091,1092,1093,1094,1095,1096,1097,1098,1099,1100,1101,1102,1103,1104,1105,1106,1107,1108,1109,1110,1111,1112,1113,1114,1115,1116,1117,1118,1119,1120,1121,1122,1123,1124,1125,1126,1127,1128,1129,1130,1131,1132,1133,1134,1135,1136,1137,1138,1139,1140,1141,1142,1143,1144,1145,1146,1147,1148,1149,1150,1151,1152,1153,1154,1155,1156,1157,1158,1159,1160,1161,1162,1163,1164,1165,1166,1167,1168,1169,1170,1171,1172,1173,1174,1175,1176,1177,1178,1179,1180,1181,1182,1183,1184,1185,1186,1187,1188,1189,1190,1191,1192,1193,1194,1195,1196,1197,1198,1199,1200,1201,1202,1203,1204,1205,1206,1207,1208,1209,1210,1211,1212,1213,1214,1215,1216,1217,1218,1219,1220,1221,1222,1223,1224,1225,1226,1227,1228,1229,1230,1231,1232,1233,1234,1235,1236,1237,1238,1239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SOFTWARE

File

Programs for Software File should be fairly compact and sent on a cassette. Please include clear instructions and say what computer it's for. We pay between £6 and £36 for programs published. They must be double-checked and submitted

Klondike

Brian Fitton,
Bradford,
West Yorkshire.

Spectrum

THIS IS the story of Klondike Bill — you take his part. Bill has arrived in the small town of Fittsville in the Middle West in response to stories of a Gold Strike. He finds himself a plot of land that he can prospect on.

You move him about with the cursor keys 5, 6, 7, 8 and when you decide which square to mine press S. The program will respond by telling you whether there is gold there or not; if there is you have a choice, mining it or not. The screen then changes to show the level indicators which show your current status and at the bottom of the screen a pointer which traverses left and right by means of the cursor keys 5 and 8 and points to a type of icon instead

of the more usual menu.

You must ensure that the Energy level is kept high, the fatigue level low, the Food level high, and the hunger level low.

You may convert gold to cash any time, and you may also buy food providing you have enough cash to do so.

The variables for the initial levels are held in line 35 and can be altered as you wish, they are a=Fatigue, b=Food, c=Cash, d=Energy, e=Gold, f=Hunger.

The graphic characters are as follows:

LINE 75 "AC" "BD" "EG" "FH". LINE 365 Each one is shifted graphic three times. LINE 450 is "N". LINE 475 is "K" "I" "J" "L" "M" "O". Line 480 is shifted Graphic 8. LINE 690 are unshifted Graphic 3 eight times, shifted Graphic 5, unshifted Graphic 5 and shifted Graphic 3 eight times. LINE 710 is the same +1 LINE 900 is "AC" "BD" "EG" "FO". LINE 910 is "AC" "BD" "EG" "PH".

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10 REM © Brian Fitton 13/4/85
11 LYNFIELD DRIVE
12 HAUORTH ROAD
13 BRADFORD BD9 4FY
14 55365, POKE 20658,3
15 FOR Z=0 TO 100: PRINT AT Z,8: INK 2
16 NEXT Z: INK 1: BEEP .05: INK 2
17 NEXT Z: FOR Z=7 TO 14: PRINT
18 AT Z,9: INK 3: BRIGHT 1: STOP TH
19 TAPE: BEEP .05: INK 2: NEXT Z
20 OR Z=15 TO 21: PRINT AT Z,8: INK
21 2: "K L O N D I K E": BEEP .05:
30 NEXT Z
31 FOR Z=0 TO 300: NEXT Z: CLS
32 PRINT AT 10,1: "DO YOU WANT IN
33 STRUCTIONS (Y/N)?" PAUSE 0
34 IF INKEYS="Y" THEN GO TO 5
35 IF INKEYS="N" THEN GO TO 17
36 CLS: LET US=
37 TRUCTIONS": GO SUB 790: PLOT 78,
187: DRAW 100,0: FOR Z=0 TO 200:
NEXT Z: CLS
38 LET US=" This is the story
39 of Klondike Bill. You take the
40 part of he. Bill has arrived i
41 n the small town of Fittsville
42 in the middle west in res
43 pons to tales of a gold st
44 rike, and finds himself a pl
45 ot of land that he can prospe
46 ct on." GO SUB 790
47 LET US=" You have Kl
48 ondi. Bill around
49 by the cursor keys 5,6,7 & 8 a
50 nd select a square which you t
51 hink may be worth mining. The
52 n press S. The program will
53 t respond by telling you whether
54 their is gold there or not, you
55 then have a choice of mining o
56 r not. You are then presen
57 ted with the level indicators
58 which show your current sta
59 tus and at the bottom of t
60 he screen a type of icon in pla
61 ce of a menu." GO SUB 790
62 PRINT AT 10,1: Press any key
63 to continue." PAUSE 0
64 CLS: LET US=" Follow the I
65 nstructions given at the bottom o
66 f the screen i.e. use key 5 to
67 move the pointer to the left
68 and key 8 to the right, 'S' a
69 gain selects your choice.
70 You must ens
71 ure that the Energy level is kep
72 t high, the Fatigue level is kep
73 t low, the Food level is kep
74 t high, and the Hunger level
75 is kept low. The other lev
76 els are Gold and Cash. Yo
77 u may convert any Gold you fin
78 d into cash at any time. You a
79 re also able to buy food providi
80 ng you have enough cash to do s
81 o." GO SUB 790
82 10 LET US="
83 GOOD LUCK!" GO SUB
84 790: PRINT AT 20,3: "PRESS ANY K
85 EY TO BEGIN OR 'S' TO READ INS
86 TRUCTIONS AGAIN" PAUSE 0: IF IN
87 KEYS="S" THEN GO TO 5
88 18 RESTORE FOR J=USR "S" TO
89 USR "S": REFD X: POKE Y,X: NEX
90 T J
91 19 DATA 127,255,225,152,155,13
92 0,217,201,193,129,128,64,57,65,3
93 2,30,254,255,135,3,57,65,155,147
94 ,131,129,1,2,124,130,4,6
95 ,30,108,13,129,151,161,16,
96 1,51,50,127,12,63,60,60,50,28,1
97 ,62,193,129,133,133,133,138,13
98 ,254,254,252,60,60,60,55,128
99 ,254,254,171,251,35,35,33,3
100 ,35,128,100,224,254,254,130,130
101 ,0,95,112,68,124,100,100,30,72,1
102 ,6,108,130,185,152,155,130,124,6
103 ,30,124,8,15,40,68,63,63,40,24
104 ,15,55,124,254,124,58,58,252,
105 ,252,63,126,0,0,0,63,63,30,126,
106 ,0,0,0
107 35 LET aa=6: LET bb=10: LET cc=
108 0: LET dd=10: LET ee=25: LET ff=120
109 : LET gg=0: LET hh=0: LET ii=19: L
110 ET aa=10
111 40 LET j=aa: LET k=bb: LET l=cc:
112 LET m=dd: LET n=ee: LET o=ff
113 45 BORDER 3: PAPER 6: INK 0: B
114 RIGHT 1: CLS
115 50 PLOT 0,0: DRAW 0,175: DRAW
116 255,0: DRAW 0,-175
117 55 PRINT INK 1: INVERSE 1: AT 2
118 0,3: "*****"
119 : INVERSE 0: BRIGHT 3: AT 20,28
120 :
121 50 PRINT INK 1: INVERSE 1: AT 2
122 1,3: "Cursor keys Move-S selects
123 : INVERSE 0: BRIGHT 3: AT 21,28
124 :
125 55 FOR Z=0 TO 19: PRINT AT Z,2
126 3: BRIGHT 2: NEXT Z
127 70 LET q=0: FOR q=0 TO 200 STE
128 P 32: FOR p=175 TO 32 STEP -32:
129 PLOT q,p: DRAW q,-32: DRAW 32,q:
130 DRAW -32,q: DRAW q,32: DRAW 32,
131 q: DRAW q,-32: NEXT q: NEXT p
132 75 PRINT INK 2: AT aa,bb: "AC" A
133 T aa+1,bb: "BD" INK 8: AT aa+2,bb
134 : INK 1: H: aa+3,bb: "EG"
135 78 GO SUB 900: FOR Z=0 TO 5: N
136 EXT Z: GO SUB 910
137 80 IF INKEYS="S" THEN GO SUB 9
138 00: GO SUB 910: LET aa=aa-4: PRI
139 NT AT aa,bb+4: AT aa+1,bb+4
140 : AT aa+2,bb+4: AT aa+3,bb+4
141 : IF bb=1 THEN LET
142 bb=1
143 85 IF INKEYS="S" THEN GO SUB 9
144 00: GO SUB 910: LET aa=aa-4: PRI
145 NT AT aa+4,bb: AT aa+5,bb:
146 : AT aa+6,bb: AT aa+7,bb:
147 : IF aa=10 THEN LET aa=0
148 95 IF INKEYS="S" THEN GO SUB 9
149 00: GO SUB 910: LET aa=aa+4: PRI

```

```

NT AT aa-1,bb: AT aa-2,bb:
AT aa-3,bb: AT aa-4,bb:
IF aa=10 THEN LET aa=0
100 IF INKEYS="S" THEN GO TO 11
0
105 GO TO 75
110 CLS: FOR Z=0 TO 9: PRINT P
111 HPER 0
112 NEXT Z: INK 3: LET 0$
113 = "S E A R C H I N G"
114 GO SUB 790
115 BORDER 3: PAPER 6: INK 0: C
116 LS: PRINT INK 3: INVERSE 1: FLA
117 SH 1: AT 10,0: "S E A R C H
118 I N G"
119 120 PAUSE 100: GO SUB 585
120 125 IF cc=15 THEN LET cc=0: LET
121 l=7
122 130 BORDER 6: CLS: LET f=f+1
123 135 IF aa=0 THEN LET aa=1
124 140 IF aa=0 THEN LET j=9
125 145 IF f=0 THEN LET f=1
126 150 IF d=0 THEN LET n=10
127 155 IF b=10 THEN LET k=10
128 160 IF c=15 THEN LET l=10
129 165 IF c=90 THEN LET n=1
130 170 IF c=10 THEN LET n=10
131 175 IF f=1 THEN LET c=0
132 180 IF aa=10 THEN LET j=2
133 185 IF b=10 THEN LET f=2
134 190 IF c=140 THEN LET l=3
135 195 IF d=80 THEN LET m=8
136 200 IF e=30 THEN LET n=8
137 205 IF f=0 THEN LET c=7
138 210 IF aa=30 THEN LET j=4
139 215 IF b=6 THEN LET f=6
140 220 IF c=300 THEN LET l=8
141 225 IF d=80 THEN LET m=5
142 230 IF e=80 THEN LET n=7
143 235 IF f=5 THEN LET o=5
144 240 IF aa=0 THEN LET j=5
145 245 IF b=4 THEN LET k=5
146 250 IF c=500 THEN LET l=5
147 255 IF d=80 THEN LET m=4
148 260 IF e=90 THEN LET n=4
149 265 IF f=6 THEN LET o=3
150 270 IF b=2 THEN LET k=1
151 275 IF d=10 THEN LET m=9
152 280 IF aa=150 THEN LET j=1
153 285 IF c=500 THEN LET n=1
154 290 IF c=500 THEN LET l=1
155 295 IF b=0 THEN LET 0$="YOU HA
156 VE RUN SHORT OF FOOD!" GO S
157 UB 790: FOR Z=0 TO 200: NEXT Z:
158 GO TO 75
159 300 PRINT AT 0,1: "E" AT 1,1: "N"
160 AT 2,1: "E" AT 3,1: "R" AT 4,1: "G
161 AT 5,1: "U" AT 6,1: "E"
162 305 PRINT AT 0,5: "F" AT 1,6: "A"
163 AT 2,0: "T" AT 3,0: "I" AT 4,0: "G
164 AT 5,6: "U" AT 6,6: "E"
165 310 PRINT AT 0,11: "G" AT 1,11:
166 "O" AT 2,11: "L" AT 3,11: "C"
167 315 PRINT AT 0,16: "C" AT 1,16:
168 "A" AT 2,16: "S" AT 3,16: "F"
169 320 PRINT AT 0,21: "F" AT 1,21:
170 "O" AT 2,21: "O" AT 3,21: "C"

```

```

325 PRINT AT 0,26: "H" AT 1,26: "
171 U" AT 2,26: "N" AT 3,26: "G" AT 4,
172 26: "H" 0,26: "K"
173 330 PRINT OVER 1: AT 11,2: AT 1
174 1,7: AT 11,11: INT e: AT 11,16: c:
175 AT 11,22: b: AT 11,28: f
176 335 PLOT 6,78: DRAW 0,96
177 340 PLOT 46,78: DRAW 0,96
178 345 PLOT 86,78: DRAW 2,96
179 350 PLOT 126,78: DRAW 0,96
180 355 PLOT 166,78: DRAW 0,96
181 360 PLOT 206,78: DRAW 0,96
182 365 PRINT INK 1: AT m,3: "IN
183 K 2: AT j,8: "IN K 4: AT n,13:
184 "IN K 0: AT l,18: "IN K 5: A
185 T k,23: "IN K 3: AT 0,28: "IN
186 370 PLOT 6,78: DRAW 240,0: DRAW
187 0,96
188 375 IF l=0 THEN CLS: FOR Z=0
189 TO 10: PRINT PAPER 6: NEXT Z
190 380 IF aa=100 THEN PAUSE 100: C
191 LS: PRINT: PRINT: PRINT: LE
192 T 0$="YOU ARE TOO FATIGUED TO CON
193 TINUE" GO SUB 790: FOR Z=0 TO 2
194 00: NEXT Z: GO TO 735
195 385 IF d=0 THEN PAUSE 100: CLS
196 : PRINT: PRINT: PRINT: LET 0
197 $="YOU HAVE NO ENERGY TO CONTIN
198 UE" GO SUB 790: FOR Z=0 TO 200
199 : NEXT Z: GO TO 735
200 390 IF c=9999 THEN PAUSE 100:
201 CLS: PRINT: PRINT: PRINT: LE
202 T 0$="YOU HAVE MORE THAN ENOUGH
203 GOLD LET SOMEONE ELSE HAVE A
204 GO" GO SUB 790: FOR Z=0 TO 200
205 : NEXT Z: GO TO 735
206 395 IF c=9999 THEN PAUSE 100:
207 CLS: PRINT: PRINT: PRINT: LE
208 T 0$="YOU HAVE MORE THAN ENOUGH
209 CASH LET SOMEONE ELSE HAVE A
210 GO" GO SUB 790: FOR Z=0 TO 200
211 : NEXT Z: GO TO 735
212 400 IF f=10 THEN PAUSE 100: CL
213 S: PRINT: PRINT: PRINT: LET
214 0$="YOU HAVE ALLOWED YOUR HUNGE
215 R TO REACH TOO HIGH A LEVEL"
216 : GO SUB 790: FOR Z=0 TO 20
217 0: NEXT Z: GO TO 735
218 405 PRINT INK 1: BRIGHT 1: INVE
219 RSE 1: AT 13,1: "L E V E L I N D
220 I C A T O R S"
221 410 PRINT AT 15,1: "Mine" AT 15,
222 6: "Eat" AT 15,11: "Rest" AT 15,16
223 : "Buy" AT 15,21: "G-C" AT 15,26:
224 "Etc"
225 415 PRINT INK 3: AT 21,0: "S
226 3" Selects 8>>>"
227 420 PLOT 5,41: DRAW 32,0: DRAW
228 -15,-15: DRAW -15,15
229 425 PLOT 45,41: DRAW 30,0: DRAW
230 -15,-15: DRAW -15,15
231 430 PLOT 85,41: DRAW 30,0: DRAW
232 -15,-15: DRAW -15,15

```


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```

7510 PRINT "YOU WANT TO BE
A CHAMPION DO YOU?"
7515 PRINT "IF SO THEN THIS IS
THE GAME FOR YOU"
7524 PRINT "WHICH OPPONENT DO
YOU WISH TO FIGHT
FIRST?"
7530 FOR F=1 TO 10: READ A$: PRINT F$
: IF F=10 THEN PRINT "END"
7535 PRINT A$: IF F=10 THEN GOTO 7540
7540 INPUT X: IF X<1 OR X>10 THEN
PRINT "WRONG"
7545 S=(11-X)/12
7546 K2=10+X*INT(RND(1)*6): K1=1
6-X*INT(RND(1)*10)
7550 B=LEFT$(B$(X),6)
7560 PRINT "YOUR OPPONENT WILL BE:"
7562 PRINT "EACH FIGHT YOU FIGHT
IS ONLY 3 ROUNDS"
7564 PRINT "MOVE ABOUT THE RING
WITH X Z AND C"
7566 PRINT "LEFT HAND"
7568 PRINT "NOTE THAT YOU CAN MOVE
AND PUNCH AT THE SAME TIME"
7570 PRINT "ONLY PUNCHES TO THE
HEAD SCORE"
7575 GOSUB 9000
7580 PRINT "PRESS ANY KEY TO START
THE FIGHT"
7590 GET X: IF X="X" THEN GOTO 7595
7595 RETURN
8500 REM * END OF ROUND *
8505 PRINT "NEXT ROUND"
8510 POKES0+4,21
8520 POKES0+19,19: POKES0+19,19
8530 FORT=170500: NEXT POKES0+4,2
8540 X=X+4*(X/22): Y=Y+4*(Y/60): F
=F+4*(F/224): G=G+4*(G/220)
8550 POKES0+X,POKES0+Y
8560 POKES0+2,F: POKES0+3,G
8565 POKES0+19,19: POKES0+19,19
8570 IF X<32 AND Y<60 AND F=224 AND
G=220 THEN GOTO 8580
8575 GOTO 8540
8580 ROUND=ROUND+1: IF ROUND=4 THEN
ROUND=3: GOTO 8560
8590 POKES0+15,19: FORT=170500: POK
ES0+4,21
8595 PRINT "NEXT ROUND"
8600 PRINT "NEXT ROUND"
8605 FORT=170500: NEXT ROUND
8610 NEXT
8620 GOTO 8540
9000 REM * READ IN SPRITE DATA HERE *
9010 FORT=0: READ A$: POKES0+6,
4+1: A=NEXT
9100 POKES0+19,19: POKES0+19,19
9105 POKES0+19,19: POKES0+19,19
9110 RETURN
9500 REM * DRAW THE RING *
9510 A$="X": B$="Z": C$="C"
9520 FORT=170500: A$=A$+"X": B$=
B$+"Z": C$="C"
9530 PRINT "DRAW THE RING"
9540 PRINT "DRAW THE RING"
9550 PRINT "DRAW THE RING"
9560 PRINT "DRAW THE RING"
9570 PRINT "DRAW THE RING"
9580 PRINT "DRAW THE RING"
9590 PRINT "DRAW THE RING"
9600 PRINT "DRAW THE RING"
9610 PRINT "DRAW THE RING"
9620 PRINT "DRAW THE RING"
9630 PRINT "DRAW THE RING"
9640 PRINT "DRAW THE RING"
9650 PRINT "DRAW THE RING"
9660 PRINT "DRAW THE RING"
9670 PRINT "DRAW THE RING"
9680 PRINT "DRAW THE RING"
9690 PRINT "DRAW THE RING"
9700 PRINT "DRAW THE RING"
9710 PRINT "DRAW THE RING"
9720 PRINT "DRAW THE RING"
9730 PRINT "DRAW THE RING"
9740 PRINT "DRAW THE RING"
9750 PRINT "DRAW THE RING"
9760 PRINT "DRAW THE RING"
9770 PRINT "DRAW THE RING"
9780 PRINT "DRAW THE RING"
9790 PRINT "DRAW THE RING"
9800 PRINT "DRAW THE RING"
9810 PRINT "DRAW THE RING"
9820 PRINT "DRAW THE RING"
9830 PRINT "DRAW THE RING"
9840 PRINT "DRAW THE RING"
9850 PRINT "DRAW THE RING"
9860 PRINT "DRAW THE RING"
9870 PRINT "DRAW THE RING"
9880 PRINT "DRAW THE RING"
9890 PRINT "DRAW THE RING"
9900 PRINT "DRAW THE RING"
9910 PRINT "DRAW THE RING"
9920 PRINT "DRAW THE RING"
9930 PRINT "DRAW THE RING"
9940 PRINT "DRAW THE RING"
9950 PRINT "DRAW THE RING"
9960 PRINT "DRAW THE RING"
9970 PRINT "DRAW THE RING"
9980 PRINT "DRAW THE RING"
9990 PRINT "DRAW THE RING"

```

Possessed

Guy Rowland,
Hextable,
Kent.

ZX-81

POSSESSED is a game for the 16K ZX-81 written entirely in machine code. The game itself occupies under 1K, but uses the full display file which unfortunately means the Rampack has to be firmly placed on the back of the machine for the game to run. The idea of the game is loosely based on Robotron: you are a megabeing — or a 0 — running around shooting the robots — or Xs — and the highly technical idea behind it is to zap as many robots as possible before the last of your five lives deserts you. The game includes on screen scoring and a border indicating how many lives you have left.

The code is held in three Rem statements which should be the first three lines of the program. To begin, put the computer in fast mode, then type:

1 REM.....439 FULL STOPS OR ANY OTHER CHARACTERS.....

and then slow. When entered, Peek 16953 should give 118 if you have done this correctly. It gives another number, add or delete characters as necessary. Next enter the short hex loader program in figure 1. This is the same as any normal hex loader, with two important additions:

- totals are entered at the start of each line of hex, and
- the END address is entered, so the computer stops automatically

If an error is made in entering any line of hex, instead of displaying the total, it will print E, and you must enter the total and hex again. So now enter the hex numbers and total in figure 2.

When you have finished this, alter the loader program so line 10 reads:

LET A=16959

and line 20 reads

LET D=17301

Next, type in a Rem statement at line 2, 343 characters long — which should return a value of 118 when 17302 is Peeked — and enter the hex in figure 3.

The final Rem statement is only 72 characters long, and should be line 3 of your program. Peek 17380 should give 118, and lines 10 and 20 of the loader should have the values 17308 and 17379. Enter the hex in figure 4, save the whole lot a couple of times just to make sure no mistakes have crept in, and type:

RAND USR 17303

Border will flash

After pressing Newline, a border will flash, several Xs and an 0 will appear, the screen will go dark for a second and the game will commence. If you are not touching any of the keys, you will start firing and moving up, and before long one of the robots will get you. To move your megabeing around, use the following control:

any key from Q to T for up
any key from Z to V for down
any key from A to G for left, and
any key from H to L for right

I find it easiest to use Q, Z, G and H, although you may prefer others. Since you fire automatically in the direction you are moving, there is no fire button, and diagonal movement is possible by pressing two keys at once.

When a whole screen of robots is cleared, a screen with more robots should appear. On average, each screen should have two or three

more robots than the last, although occasionally you may find a higher sector has less than the one before.

If the game does not run correctly or crashes at some stage, reload the program from tape and enter the program in figure 4 substituting values for A and D depending on which Rem statement you are checking. When a screen is full of hex, press Cont to carry on where you left off. To alter the value of a byte, Poke the address with the correct value in decimal as a direct command. A hex/decimal conversion table is given in the Sinclair manual on page 181.

The game is available direct from the author for those who find the hex listing too hard. Please send £1.50 and a sae to Guy Rowland, Stonyacres, College Road, Hextable, Kent, BR8 7LT.

Figure 1.

```

5 REM HEXLOADER
10 PRINT "START ADDRESS"
20 INPUT S
30 PRINT "FINISH ADDRESS"
40 INPUT F
50 FOR N=S TO F STEP 6
60 LET T=0
70 PRINT N: " "
80 INPUT A$
90 PRINT A$: " "
100 INPUT TOT
110 PRINT TOT
115 IF PEEK 16422=2 THEN SCROLL

120 LET Z=0
130 FOR K=1 TO LEN A$ STEP 2
140 LET C=CODE A$(K)-28)*16+CODE
A$(K+1)-28
150 LET T=T+C
160 POKES0+Z,C
170 LET Z=Z+1
180 NEXT K
190 IF TOT=T THEN GOTO 220
200 PRINT "ERROR - PLEASE INPUT
AGAIN"
205 IF PEEK 16442=2 THEN SCROLL

210 GOTO 60
220 NEXT N

```


(continued from previous page)

Figure 2.

```

16514: 2A00400035400515 = 564
16522: 111F00233771977 = 381
16530: 10F4E30516237710 = 503
16538: F00905143E800500 = 1071
16546: 8240C130E3A20F5 = 1117
16554: 10F23A9931008240 = 981
16562: 3032A98119850521 = 1066
16570: 32405350E991929 = 438
16578: 2919ED5E34401922 = 500
16586: 32407002E1092A90 = 202
16594: 40112300193A851 = 464
16602: 4F1515051E380000 = 411
16610: B740913002330023 = 590
16618: 10F3232333152000 = 600
16626: 0905182A2040237E = 510
16634: FE76280526307713 = 885
16642: F510F3099A004011 = 840
16650: 900119351400F340 = 800
16658: 0EFFF067D10F8020 = 710
16666: F90CF340300DB802 = 130
16674: 70FEFF230332A051 = 990
16682: 3A0C61473A9A6157 = 815
16690: 3A0A615F26000B51 = 711
16698: 200A7BFE21280510 = 494
16706: 78D621470B492007 = 763
16714: 7AFE02232215050B = 646
16722: 41200A75FE152805 = 551
16730: 10780621470B7120 = 798
16738: 077AFE1F30021404 = 402
16746: 7A32A9517B32A951 = 882
16754: 7832A951092A9040 = 758
16762: 3A0A61473A9A6157 = 758
16770: A5514711E1001910 = 430
16778: F0090E1B0D77413A = 946
16786: A0515F1500FEC838 = 897

```

```

16794: 0216FF19066410FE = 680
16802: 7EFE302813FEBD28 = 980
16810: 18FE2800037218EB = 801
16818: 7EFE18C000E0018D4 = 844
16826: 38B00E0000E34118 = 778
16834: 0B38000C900774135 = 901
16842: 000D11411C77417E = 816
16850: FE3D0A764135343A = 884
16858: AD51FE000C8D8041 = 1134
16866: 030A0004011140019 = 381
16874: 7EFE18C000E0018D4 = 844
16882: 9C2818F40077410E = 870
16890: 0A3834E500F34021 = 1082
16898: 3880E500F340E120 = 1222
16906: 20EF38000E07B7B10 = 672
16914: 093A381FE042031 = 821
16922: AF3C32A951FE023A = 1030
16930: 0F480A38048FE003A = 940
16938: 07480A38048FE003A = 1255
16946: 9C9C9C9C9C9C9C9C

```

Figure 3.

```

16950: 2152422288422A0C = 469
16958: 4011F503193A9A61 = 678
16966: 3D18285F78B6D036 = 791
16974: 00E5231836216E42 = 551
16982: 2286422A004021FE = 514
16990: 02193A9A61180F5F = 467
16998: 798AD03600EED511 = 1028
17006: 210019D11815570E = 410
17014: 15061E7FE3C0006E = 810
17022: 488D1077808E8000 = 514
17030: 20EFC097FE3D2810 = 969
17038: FE340CF6413F3440 = 983
17046: 0B4728043630E109 = 859
17054: 51350000570E0000 = 548
17062: 007EFE3D00F54223 = 952
17070: 0478FE1E20F32323 = 753

```

```

17087: 230073FE1320E809 = 909
17095: 210A422288422A0C = 651
17103: 4011F503193A9A61 = 468
17111: 3D18285F78B6D036 = 966
17119: 00E5231836216E42 = 815
17127: 2286422A004021FE = 450
17135: 00193A9A61180F5F = 651
17143: 798AD03600EED511 = 1036
17151: 2100ED52D128802A = 767
17159: 0C40117801190608 = 853
17167: 0E01160805112100 = 1011
17175: 05772340F07771900 = 778
17183: 20FBC104000C5772B = 851
17191: 10FC77E08800520FA = 1001
17199: 01040025F1520FD = 792
17207: 011520D809E0737E = 1154
17215: 400D9C402A0C4011 = 824
17223: 0A00185450210040 = 440
17231: 010000E0800C0040 = 904
17239: 0D0541C00541C010 = 968
17247: 4278FE3D23F52188 = 958
17255: 435450B9A0040010A = 373
17263: 0009010000E0803E = 498
17271: 880005430E880006 = 815
17279: 43AF000543090643 = 791
17287: 09888A38487A994 = 1070
17295: 9C9C9C9C9C9C9C9C

```

Figure 4.

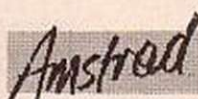
```

17308: 215F43060435902C = 498
17316: 10FB21A881030223 = 656
17324: 0031000040030040 = 1035
17332: FE7628151803CDD8 = 891
17340: 430D65430D5443FE = 1050
17348: 78380621A8610418 = 538
17356: ED3A951FE910C0D = 1376
17364: 6543180621A86136 = 760
17372: 10233600E335FE0C = 658

```

Amsnake

P R King,
Ipswich,
Suffolk.



NOTHING UNUSUAL about this — just another

snake game. Except for the fact that this game is fast, is entirely in Basic, becomes increasingly more difficult and the snake looks something like a snake. Seriously though folks, it should appeal to all levels of dexterity as it does start off fairly easy and becomes gradually more difficult.

The object of the game is to guide your snake around the screen, eating rats and avoiding mushrooms, the walls and of course — the snake. Your score increases with the length of the snake and so far my record is: 21,420 points, so type it in and have fun.

```

10 *****
20 *****
30 ***** Amsnake *****
40 *****
50 ***** P. King *****
60 ***** 1985 *****
70 *****
80 *****
90 GOSUB 150: 'def chars & set up
100 GOSUB 300: 'title & start
110 GOSUB 530: 'screen
120 GOSUB 730: 'play game
130 GOSUB 960: 'end game
140 GOTO 110
150 ***** def chars & setup *****
160 mm=HIMEM:MEMORY 30000
170 DEF FN point(a,b)=TEST((a*16)-6,(406-b*16))
180 INK 3,6:INK 0,23:INK 1,9:INK 2,0
190 SYMBOL 240,&24,&18,&3C,&3C,&7E,&DB,&DB,&7E
200 SYMBOL 241,&7E,&DB,&DB,&7E,&3C,&3C,&18,&24
210 SYMBOL 242,&6,&F,&B9,&7F,&7F,&B9,&F,&6
220 SYMBOL 243,&60,&F0,&9D,&FE,&FE,&9D,&F0,&60
230 SYMBOL 244,&24,&3A,&BD,&66,&6E,&7F,&7F,&5A,&3C
240 SYMBOL 245,&3C,&5A,&99,&E7,&66,&BD,&5A,&24
250 SYMBOL 246,&2C,&5A,&B9,&67,&67,&B9,&5A,&2C
260 SYMBOL 247,&34,&5A,&7D,&C6,&C6,&9D,&5A,&34
270 SYMBOL 248,&3C,&66,&5A,&66,&24,&3C,&18,&18
280 SYMBOL 249,&18,&18,&3C,&24,&66,&5A,&66,&3C
290 SYMBOL 250,&0,&70,&3C,&A7,&A7,&DC,&70,&0
300 SYMBOL 251,&0,&E,&3B,&D5,&D5,&3B,&E,&0
310 SYMBOL 252,&0,&4,&2E,&5F,&FF,&2,&1C
320 SYMBOL 253,&0,&3C,&42,&81,&BD,&5A,&18,&3C
330 SYMBOL 254,&24,&3C,&FF,&66,&66,&FF,&3C,&24
340 SYMBOL 255,&E7,&A5,&FF,&24,&24,&FF,&A5,&E7
350 ENV 1,1,15,1,15,-1,3
360 ENI 1,10,-5,1,10,5,1
370 ENV 2,5,3,2,15,-1,15
380 RETURN
390 ***** title & start *****
400 CLS:BORDER 23
410 PEN 1:LOCATE 6,2:PRINT"***** AMSNAKE *****"
420 PEN 3:LOCATE 6,6:PRINT"The object of the game is to
  o guide"
430 PRINT:PRINT"your snake around the screen using the"
440 PRINT:PRINT"keys shown below. eating the black rats"

```

```

450 PRINT:PRINT"but avoiding the mushrooms. For each"
460 PRINT:PRINT"rat you eat your snake will grow longer"
470 PRINT:PRINT"and the longer the snake is the greater"
480 PRINT:PRINT"your score will be."
490 PRINT:PRINT:PRINT"A = UP Z = DOWN / = LEFT \ = RIGHT"
500 PEN 1:LOCATE 8,24:PRINT"PRESS ANY KEY TO CONTINUE"
510 Z$=INKEY$:IF Z$="" GOTO 510
520 RETURN
530 ***** draw screen *****
540 MODE 1:PAPER 0:BORDER 23:CLS:PEN 3
550 FOR z=1 TO 40:LOCATE z,1:PRINT CHR$(255):LOCATE z,23:PRINT CHR$(255):NEXT z
560 FOR z=2 TO 22:LOCATE 1,z:PRINT CHR$(255):LOCATE 40,z:PRINT CHR$(255):NEXT z
570 PEN 1:LOCATE 8,13:PRINT CHR$(251):CHR$(247):CHR$(243)
580 ea=30001:eb=30002:ec=30003:fa=30007:fb=30008:fc=30009
590 POKE ea,8:POKE eb,13:POKE ec,4:POKE 30004,9:POKE 30005,13:POKE 30006,4:POKE fa,10:POKE fb,13:POKE fc,4
600 FOR z=1 TO 3
610 c=INT(RND*38)+2
620 d=INT(RND*21)+2
630 IF FN point(c,d)<>0 GOTO 610
640 PEN 1:LOCATE c,d:PRINT CHR$(253)
650 c=INT(RND*38)+2
660 d=INT(RND*21)+2
670 IF FN point(c,d)<>0 GOTO 650
680 PEN 2:LOCATE c,d:PRINT CHR$(252)
690 NEXT z
700 LOCATE 3,25:PEN 2:PRINT"score: ";STR$(sc):LOCATE 24,25:PRINT"hi score: ";STR$(hi)
710 length=3
720 RETURN
730 ***** play game *****
740 PEN 1:sc=0
750 z$=INKEY$
760 IF z$="a" OR z$="A" THEN dir=1
770 IF z$="z" OR z$="Z" THEN dir=2
780 IF z$="/" OR z$="?" THEN dir=3
790 IF z$="\ " OR z$=" " THEN dir=4
800 a=PEEK(fa):b=PEEK(fb)

```



```

810 IF dir=0 THEN dir=4
820 IF dir=1 THEN b=b+1
830 IF dir=2 THEN b=b+1
840 IF dir=3 THEN a=a+1
850 IF dir=4 THEN a=a+1
860 p=FN point(a,b):IF p=0 OR p=2 GOTO 880
870 IF p=1 OR p=3 THEN RETURN
880 LOCATE a,b:PRINT CHR$(239+dir):LOCATE PEEK(ea),PEEK(eb):PRINT
890 LOCATE PEEK(fa),PEEK(fb):PRINT CHR$(243+PEEK(fc))
900 LOCATE PEEK(ea+3),PEEK(eb+3):PRINT CHR$(247+PEEK(ec+3))
910 fa=fa+3:fb=fb+3:fc=fc+3:IF p=2 GOTO 920 ELSE ea=ea+3:eb=eb+3:ec=ec+3
920 POKE fa,a:POKE fb,b:POKE fc,c:dir
930 IF p=2 THEN GOSUB 1050
940 GOTO 750
950 RETURN
960 ***** end game *****
970 SOUND 4,0,0,0,2,0,15
980 FOR Z=0 TO 26:INK 0,Z:BORDER Z:FOR Y=1 TO 50:NEXT Y,Z

```

```

990 INK 0,23:BORDER 23
1000 DIR=0:SC=0:LENGTH=7
1010 Z$=""
1020 LOCATE 5,12:PEN 2:PRINT"PRESS SPACE BAR FOR ANOTHER GAME"
1030 z$=INKEY$:IF z$<>" " GOTO 1020
1040 RETURN
1050 ***** score *****
1060 SOUND 4,60,0,0,1,1
1070 c=INT(RND*38)+2
1080 d=INT(RND*21)+2
1090 IF FN point(c,d)<>0 GOTO 1070
1100 LOCATE c,d:PEN 1:PRINT CHR$(253)
1110 c=INT(RND*38)+2
1120 d=INT(RND*21)+2
1130 IF FN point(c,d)<>0 GOTO 1110
1140 LOCATE c,d:PEN 2:PRINT CHR$(252)
1150 sc=sc+length*10:length=length+1
1160 IF sc>hi THEN hi=sc
1170 sc$=STR$(sc):LOCATE 9,25:PEN 2:PRINT sc$
1180 hi$=STR$(hi):LOCATE 34,25:PRINT hi$
1190 PEN 1:SOUND 132,0:RETURN

```

Disc utility

Matthew Desmond,
Cholmsford,
Essex.

CBM-64

THIS IS A program for a Commodore 64 plus 1541 Disc drive. The program enables the user to enter disc commands without the need for the open statement. The facilities are:

Directory, Format, Scratch, Re-name, Initialise, Validate and Copy. Disc Utility is menu drive, fully "nug trapped" and disk status is shown after every operation.

Line Description.

10-1140 Main Set Up
1150-1210 Wait for a Key Press
1220-1290 Read Error From Disk
1300-1510 Main Menu
1520-1550 End Program Routine

1570-1700 Directory Routine
1710-1850 Format Routine
1860-1980 Scratch Routine
1990-2160 Re-name Routine
2170-2290 Initialise Routine
2300-2420 Validate Routine
2430-2840 Copy Routine
2850-3010 Machine Code Disassembly

The machine code reads a character from the disc for the directory.

```

1000 REM*****
*****
1010 REM          DISK UTILITY
1020 REM  BY MATTHEW DESMOND (C)
1030 REM  1984
1040 REM*****
*****
1050 DIM N$(10):NF=8
1060 FORA=1TO9:READ N$(A):NEXT A
1070 DATA DIRECTORY,FORMAT,SCRATCH
1080 DATA NAME,INITIALISE,VALIDATE
1090 DATA COPY,END
1100 FORA=5000TO50020
1110 READ:POKEA,8:NEXTA
1120 DATA 162,3,32,198,255,32,207
1130 DATA 255,32,210,255,208,248,169
1140 DATA 13,32,210,255,76,204,255
1150 GOTO 1300
1160 REM*****
*****
1170 REM***** WAIT FOR A KEY PRESS *****
1180 REM*****
*****
1190 PRINTTAB(13)"* PRESS A KEY *"  
1200 POKE198,0
1210 GETA:IFAS=""THEN1200
1220 RETURN
1230 REM*****
*****
1240 REM***** READ ERROR FROM DISK *****
*****
1250 OPEN15,8,15
1260 INPUT15,A,B$,C,D
1270 CLOSE15
1280 PRINT"DISK STATUS  :",A,B$,C,D
1290 RETURN
1300 REM*****
*****
1310 REM***** MENU *****
*****
1320 REM*****

```

```

*****
1330 POKE53280,8:POKE53281,1
1340 PRINT"U";
1350 PRINTTAB(14)"U"
1360 PRINTTAB(14)"DISK UTILITY"
1370 PRINT"U";
1380 PRINTTAB(16)"*****"
1390 PRINTTAB(16)"* MENU *"
1400 PRINTTAB(16)"*****"
1410 PRINT
1420 FORA=1TO9
1430 PRINT"U",A,"U";"U";N$(A)
1440 NEXTA
1450 PRINT"WHICH FUNCTION DO YOU REQUIRE? "
1460 GOSUB1130:A=VAL(A$)
1470 IFAC10ORA>NFTHENGOTO1460
1480 PRINT"U",A;"U"
1490 GNA GOTO1570,1710,1860,1990,2170
1500 GNA GOTO2300,2430,2850
1510 GOTO1460
1520 REM*****
*****
1530 REM***** END *****
*****
1540 REM*****
*****
1550 PRINT"U000000VC,U"
1560 END
1570 REM*****
*****
1580 REM***** DIRECTORY *****
*****
1590 REM*****
*****
1600 PRINT"U";PR=0
1610 PRINT"U"
1620 PRINT"U"
1630 PRINT"U"
1640 OPEN3,8,0:"U":GETH3,A$,B$
1650 GETH3,A$,B$,B$,B$
1660 IFAS=""THENCLOSE3:GOTO1700
1670 BLS=BLS+CHR$(0):BHS=BHS+CHR$(0)
1680 PRINT256*ASC(BHS)+ASC(BLS),
1690 SYS50000:GOTO1650
1700 GOSUB1150:GOTO1300
1710 REM*****
*****

```

```

1720 REM***** FORMAT *****
*****
1730 REM*****
*****
1740 PRINT"U";IDS=""DNS=""
1750 PRINT"U"
1760 PRINT"U"
1770 PRINT"U"
1780 INPUT"DISK NAME";DNS
1790 IFDNS=""ORDNS=""ORDNS=""$IT
1800 INPUT"DISK ID";IDS
1810 IFIDS=""THENDNS=DNS+" "+IDS
1820 OPEN1,8,15,"NO"+DNS:CLOSE1
1830 GOSUB1220
1840 GOSUB1150
1850 GOTO 1300
1860 REM*****
*****
1870 REM***** SCRATCH *****
*****
1880 REM*****
*****
1890 PRINT"U";
1900 PRINT"U"
1910 PRINT"U"
1920 PRINT"U"
1930 PRINT"U"
1940 INPUTPNS:IFPNS=""THEN1960
1950 OPEN2,8,15,"S0"+PNS:CLOSE2
1960 GOSUB1220
1970 GOSUB1150
1980 GOTO1300
1990 REM*****
*****
2000 REM***** RE-NAME *****
*****
2010 REM*****
*****
2020 PRINT"U";
2030 PRINT"U"
2040 PRINT"U"
2050 PRINT"U"
2060 PRINT"U"

```

(continued on next page)

(continued from previous page)

```

2070 INPUTNNS
2080 IFNNS=""ORNNS=""$ORNNS=""$T
HEN1990
2090 PRINT"OLD NAME";
2100 INPUTOLS
2110 IFOLS=""OROLS=""$OROLS=""$T
HEN1990
2120 OPEN4,8,15,"R0:"NNS+"="+OL
$
2130 CLOSE4
2140 GOSUB1220
2150 GOSUB1150
2160 GOTO1300
2170 REM*****
*****
2180 REM***** INITIALISE. **
*****
2190 REM*****
*****
2200 PRINT"L";
2210 PRINT" ";
2220 PRINT"INITIALISE:";
2230 PRINT"PLEASE LOAD DISK":GO
SUB1150
2240 PRINT" ";
2250 PRINT"INITIALISING DISK DR
IVE"
2260 OPEN5,8,15,"INITIALISE":CLO
SE5
2270 GOSUB1220
2280 GOSUB1150
2290 GOTO1300
2300 REM*****
*****
2310 REM***** VALIDATE. **
*****
2320 REM*****
*****
2330 PRINT"L";
2340 PRINT" ";
2350 PRINT"VALIDATE:";

```

```

2360 PRINT"PLEASE LOAD DISK":GO
SUB1150
2370 PRINT" ";
2380 PRINT"VALIDATING DISK"
2390 OPEN6,8,15,"VALIDATE":CLOSE
6
2400 GOSUB1220
2410 GOSUB1150
2420 GOTO1300
2430 REM*****
*****
2440 REM***** COPY. ****
*****
2450 REM*****
*****
2460 PRINT"L";
2470 PRINT" ";
2480 PRINT"COPY:";
2490 PRINT"PLEASE LOAD DISK":GO
SUB1150
2500 PRINT"COPY OR MERGE ? ";
2510 GOSUB1190
2520 IFAS=""M"THENPRINT"M":GOTO26
20
2530 IFAS<>"C"THEN2510
2540 PRINT"C":PRINT"ORIGINAL NAM
E:";
2550 INPUTOOS
2560 IFOOS=""OROOS=""$OROOS=""$T
HEN2430
2570 PRINT"NEW NAME:";
2580 INPUTNNS
2590 IFNNS=""ORNNS=""$ORNNS=""$T
HEN2430
2600 FF$="COPY0:"NNS+"="+OOS
2610 GOTO2810
2620 PRINT"HOW MANY FILES (2-4)?
";
2630 GOSUB1190:A=VAL(AS)
2640 IFAC20AND4THENGOTO2330
2650 PRINTAS" ";
2660 NMS(1)=""NMS(2)=""
2670 NMS(3)=""NMS(4)=""
2680 FORB=1TOA

```

```

2690 PRINT"FILENAME H";MID$(STR
$(B),2);
2700 PRINT" ";
2710 PRINT" ";
2720 INPUTNMS(B):TS=NMS(B)
2730 IFT$=""ORT$=""ORT$=""$THEN
2690
2740 IFB<1THENNMS(B)=""0:"MMS(
B)
2750 NEXTE:PRINT" ";
2760 PRINT"NEW FILENAME:";
2770 INPUTNMS
2780 IFNMS=""ORNMS=""$ORNMS=""$T
HEN2760
2790 FF$="COPY0:"MMS+"="+MMS(
1)+MMS(2)
2800 FF$=FF$+MMS(3)+MMS(4)
2810 OPEN7,8,15:PRINTH7,FF$:CLOS
E7
2820 GOSUB1220
2830 GOSUB1150
2840 GOTO1300
2850 REM*****
*****
2860 REM*****
*****
2870 REM*** MACHINE CODE LISTIN
G. ****
2880 REM*****
*****
2890 REM*****
*****
2900 :
2910 :
2920 ,C000 32 03 LDX #503
2930 ,C002 20 06 FF JSR $FFC6
2940 ,C005 20 0F FF JSR $FFCF
2950 ,C008 20 02 FF JSR $FFD2
2960 ,C00B 00 F8 BNE $C005
2970 ,C00D 30 00 LDA #500
2980 ,C00F 20 02 FF JSR $FFD2
2990 ,C012 4C 00 FF JMP $FFC0
3000 :
3010 :

```

Data moving routine

Wai Kei Ho,
Aston,
Oxfordshire.

Amstrad

THIS PROGRAM is written for people who have got disc drives and want to store binary file directly from the disc into the locations occupied by the disc operating system. All addresses entered are decimal values, otherwise '&' must be added in front of those hexadecimal addresses.

The data moving routine must not be in the locations of the moved file or the destination. If the file moved does not overlap the destination file, the file will be moved from the beginning, otherwise from the end.

If moved file is stored on tape, firstly load the

file into where it does not overlap the DOS; the sum of the start address and the length must be less than 42619. The store it onto disc. To run this routine, the file must first be loaded into the computer with the data moved from the start address which is calculated by yourself.

If you do not bother to calculate the routine starting point and file moved starting points, then delete the following lines:

190, 200, 250, 260, 290, 340, 350 and 550

And add the following lines:

250 RS=42615-LM-22:MS=42615-LM:

MT=MT+LM

260 HL=&2B:DE=&1B:bytea=&77:

hbytea=&A6

But attention must be paid that the file moved start address now indicates where to start loading data into the main memory, not where to commence moving the data. It is because you

do not know the start address without calculation, so that this address must be shown. Here is an example:

File	Start address	Length	Entry point
a	4900	24576	0
b	31448	12288	32768

Hence the informations entered may be as follows:

Routine starting point	29800
Data moved starting point	30000
Length	12288
Destination	31448
Executed point	32768
Title move	

After that, use a simple program to link these three programs stored on the same disc.

```

10 MEMORY 4899
20 LOAD "a":Load "Move"
30 LOAD "b":30000
40 Call 29800

```

```

100 REM *****
110 REM ** data moving routine **
120 REM ** for **
130 REM ** AMSTRAD CPC 464 **
140 REM *****
150 MODE 1:INK 3,16,25:SPEED INK 30,50
170 PEN 3:PRINT TAB(9)"* DATA MOVING ROUTINE *"
180 LOCATE 1,6:PEN 2:PRINT"Enter the following items :
":PRINT:PRINT:PRINT
190 PEN 1:INPUT"Routine starting point : ".rs:PRINT
200 INPUT"File moved starting point : ".ms:PRINT
210 INPUT"Length of data moved : ".lm:PRINT
220 INPUT"Address of destination : ".mt:PRINT
230 INPUT"Executed address : ".ea
240 IF rs>65536 OR ms>65536 OR lm>65536 THEN PRINT CHR
$(7):GOTO 100

```

```

250 IF ms+lm>mt THEN mf$="END" ELSE mf$="BEGINNING"
260 IF mf$="END" THEN ms=ms+lm:mt=mt+lm
270 ms$=HEX$(ms):mt$=HEX$(mt):lm$=HEX$(lm):ea$=HEX$(ea)
280 REM ** convert addresses to hi and low bytes data
**
290 lbytea=VAL("&"+RIGHT$(ms$,2)):hbytea=VAL("&"+LEFT$(
ms$,2))
300 lbyteb=VAL("&"+RIGHT$(mt$,2)):hbyteb=VAL("&"+LEFT$(
mt$,2))
310 lbytec=VAL("&"+RIGHT$(lm$,2)):hbytec=VAL("&"+LEFT$(
lm$,LEN(lm$)-2))
320 IF ea$="" THEN er=&C9:ro=19:GOTO 350 ELSE er=&CD
:ro=21:GOTO 330
330 lbyted=VAL("&"+RIGHT$(ea$,2)):hbyted=VAL("&"+LEFT$(
ea$,LEN(lm$)-2))
340 REM ** increment / decrement those registers **

```



```

350 IF MF$="END" THEN HL=&2B:DE=&1B ELSE HL=&23:DE=&13
360 REM ** poke start,destination and length into reg
    isters respectively **
370 POKE rs,&21:POKE rs+1,1bytea:POKE rs+2,hbytea:POKE
    rs+3,&11:POKE rs+4,1byteb:POKE rs+5,hbyteb:POKE rs+6,
    &1:POKE rs+7,1bytec:POKE rs+8,hbytec
380 POKE rs+9,&7E:POKE rs+10,&12:POKE rs+11,HL:POKE rs
    +12,DE:POKE rs+13,&8:POKE rs+14,&7B:POKE rs+15,&B1
390 POKE rs+16,&20:POKE rs+17,&F7:POKE rs+18,er:POKE r
    s+19,1bytea:POKE rs+20,hbytea
400 REM ** data checking **
410 CLS
420 PEN 3:PRINT TAB(12)"> FINAL RESULT *":PRINT:PRINT:
    PEN 1
430 ct=0:PRINT HEX$(rs)";":
440 FOR i=rs TO rs+ro-1
450 pn$=HEX$(PEEK(i)):ct=ct+1
460 IF LEN(pn$)=1 THEN pn$="0"+pn$
470 PRINT pn$+" ";
480 IF ct>7 THEN ct=0:PRINT:PRINT HEX$(i)";":

```

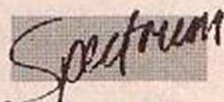
```

490 NEXT i
500 LOCATE 1,7:PRINT"routine starting point :":rs;" =&
    ":PEN 3:PRINT HEX$(rs):PRINT
510 PEN 1:PRINT"Data moved start address :":ms;" =&":P
    EN 3:PRINT MF$:PRINT
520 PEN 1:PRINT"Length of data :":LM;" =&":PEN 3:PRIN
    T LM$:PRINT
530 PEN 1:PRINT"Store data into :":MT;" =&":PEN 3:PR
    INT MT$:PRINT
540 IF EA<>0 THEN PEN 1:PRINT"Executed address :":EA;"
    =&":PEN 3:PRINT EA$:PRINT
550 PEN 1:PRINT"Start moving from :":PEN 3:PRINT MF$
560 LOCATE 14,22:PRINT"CORRECT ?(Y/N)"
570 fa$=INKEY$:fa$=UPPER$(fa$):IF fa$="Y" THEN GO TO
    600
580 IF fa$="N" THEN RUN
590 GO TO 570
600 LOCATE 14,22:PRINT"
610 INPUT"Title ":title$
620 SAVE title$.b.rs.ro
630 NEW

```

Compact

K Feary,
Wendover,
Buckinghamshire.



COMPACT IS A set of three routines for the 16/48K Spectrum that will allow you to reduce the size of a program and make it faster.

The first routine replaces the digits of a number with a decimal point. Since the interpreter tests for "." before Bin and numeric characters, the number is found sooner. However, once this has been done you will have to retype the digits if you edit a line with numbers in, so

it's best to use this routine only when the program is fully debugged. Alternatively, you can protect digits by adding Rem to the beginning of a line.

The second routine reduces long variable names to two characters. The new names will be A0, B0, C0...ZZ in the order the variables are used in the program.

The final routine will join as many lines together as possible while ensuring that the program still works and is not made slower. The line numbers in Gotos etc. must be constants, but no check is made for List, LLst, or Save ""Line, so these lines may "disappear"

All the routines, especially delete digits, can take some time to compact a large program. Clearing the variables will reduce this slightly.

Type in and Run the listed program. You will be asked for the start address, any high value will do as long as the program doesn't go beyond P Ramil. For instance, to put Compact just below the UDGs enter 32108 or 64876 depending on Ram size. When all the Data has been Poked the address of each routine will be printed and the code Saved. To Load the code use:

CLEAR start:LOAD ""CODE

The routines can then be called in the usual way, i.e.: RAND USR address of routine

```

1 REM *****
2 REM COMPACT © K.FERRY.1984.
3 REM *****
4 REM
5 DATA 205,427+start,254,46,4
6 DATA 205,427+start,254,46,4
7 DATA 205,427+start,254,46,4
8 DATA 205,427+start,254,46,4
9 DATA 205,427+start,254,46,4
10 DATA 205,427+start,254,46,4
11 DATA 205,427+start,254,46,4
12 DATA 254,19,19,213,84,93,35

```

```

35,78,35,70,35,197,205,229,25,4
3,54,58,193,225,94,35,86,235,9,2
35,114,43,115,43,43,24,186,126,2
30,192,200,42,83,92
13 DATA 126,230,192,194,176,27
220,205,360+start,200,254,225,2
05,184,25,235,24,237,205,110,25
126,230,192,192,205,360+start,20
0,190,201,35,35,35,195,171,40,12
6,230,192
14 DATA 192,50,71,92,86,35,94
237,83,69,92,35,229,221,225,94,3
5,86,34,93,92,25,35,34,85,92,237
98,217,201,205,221,25,197,196,2
32,25,217,193,9,217
15 DATA 201,126,205,182,24,254
34,34,93,92,192,35,71,237,177,2
4,240,42,83,92,205,360+start,194
176,27,231,253,52,13,254,206,32
9,35,205,411+start,254,41,32
16 DATA 248,35,205,411+start,2
54,50,40,202,254,200,40,228,254,
234,40,3,254,13,192,217,221,94,0
221,86,1,205,237,82,221,117,0,2
21,116,1,42,85,92,24,194
20 INPUT "start address?";star
t
30 IF start+491>PEEK 23732+256
*PEEK 23733 THEN GO TO 20
40 RANDOMIZE start: CLEAR star
t-1: LET sta=t-PEEK 23670+256*PE
EK 23671
50 FOR a=0 TO 491: READ b: IF
b>255 THEN RANDOMIZE b: POKE sta
rt+a,PEEK 23670: LET a=a+1: POKE
sta+rt+a,PEEK 23671: GO TO 70
60 POKE start-a,b
70 NEXT a
80 PRINT "Delete digits :- ";s
tart;"Shorten var names :- ";sta
rt+46;"Join lines :- ";start+136

```


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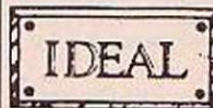
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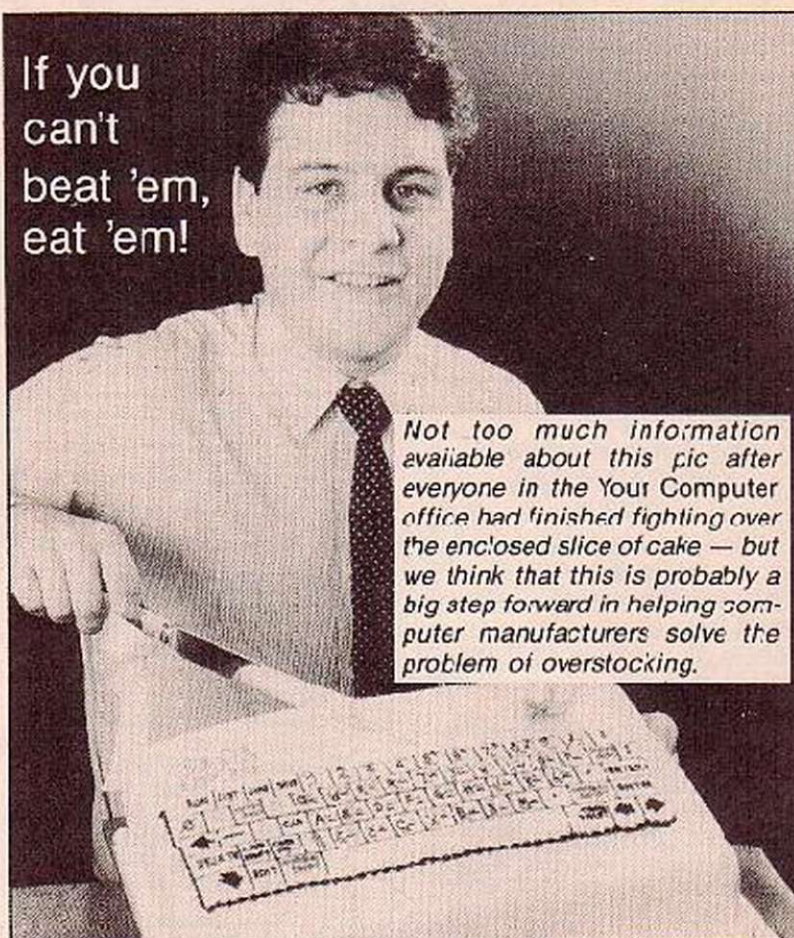
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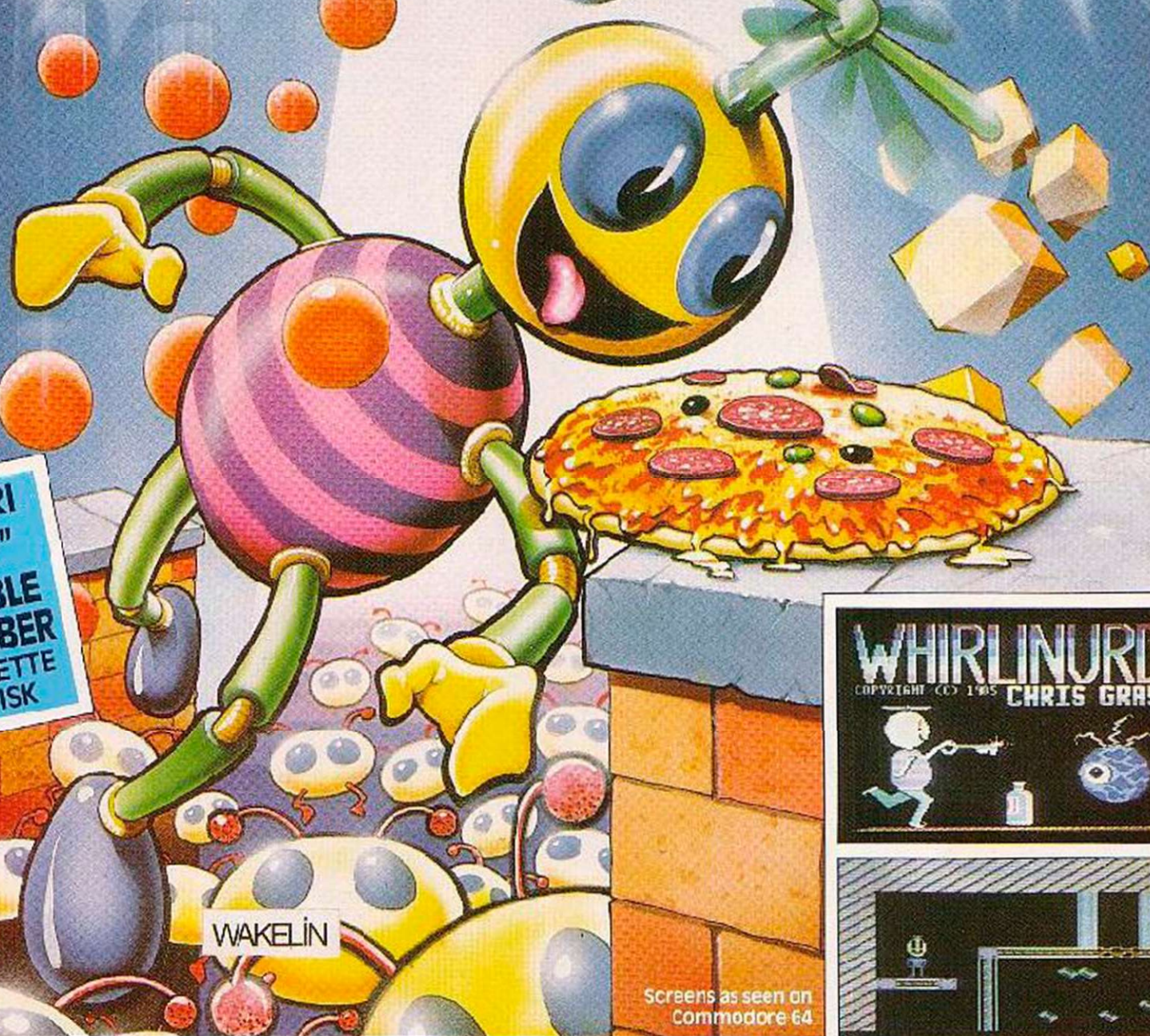
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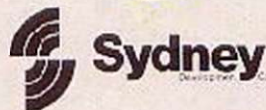
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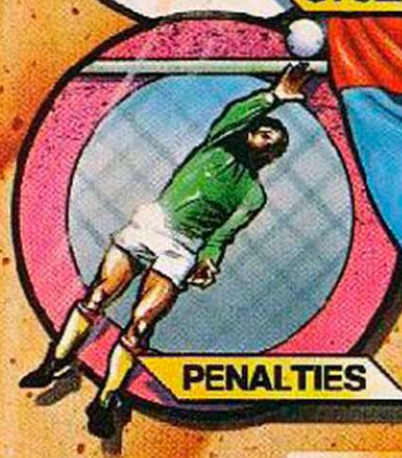
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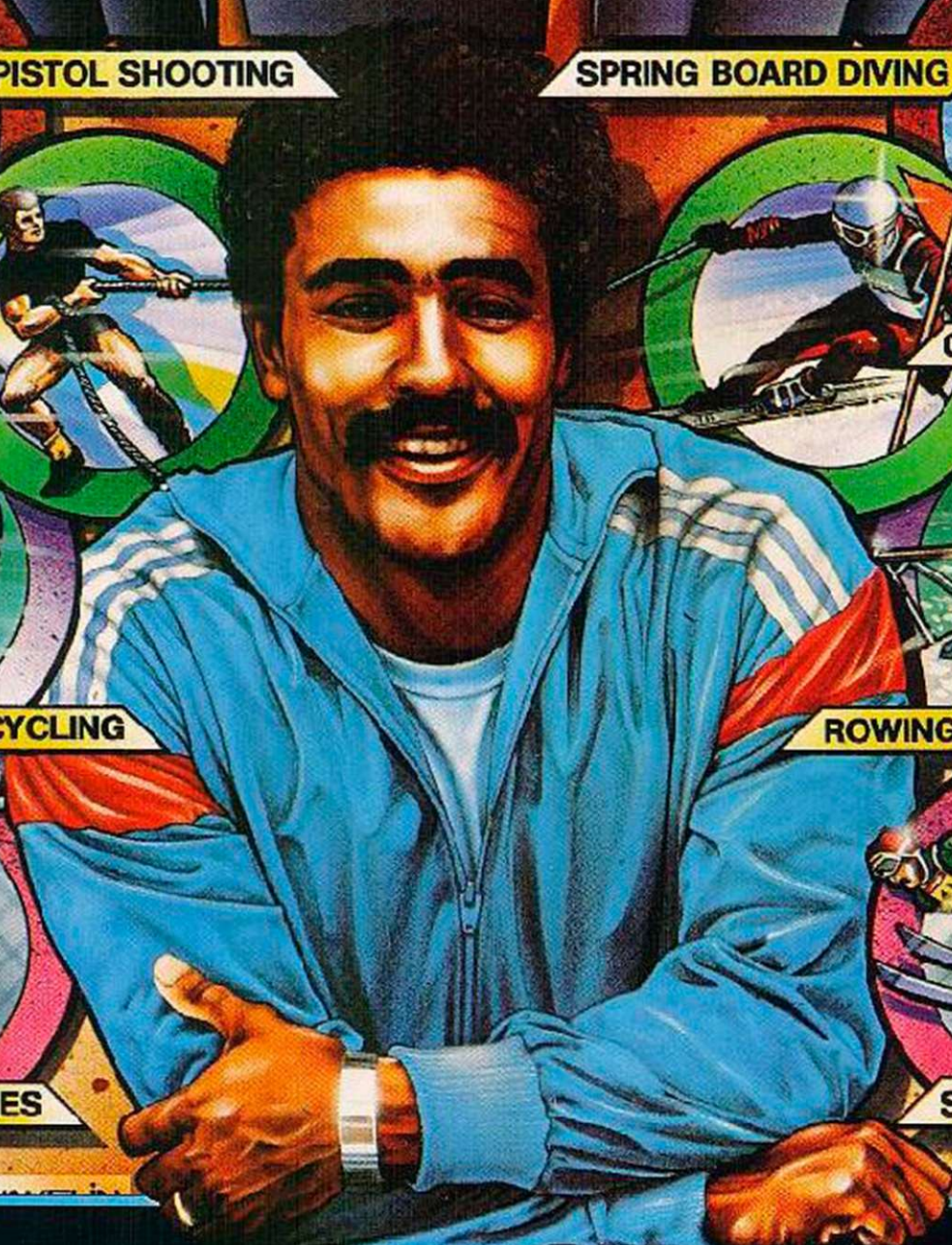
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