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COMPUTER

SEPTEMBER 1985

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Vol. 5 No. 9

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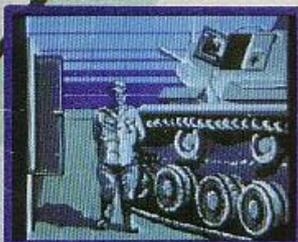
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secrets**

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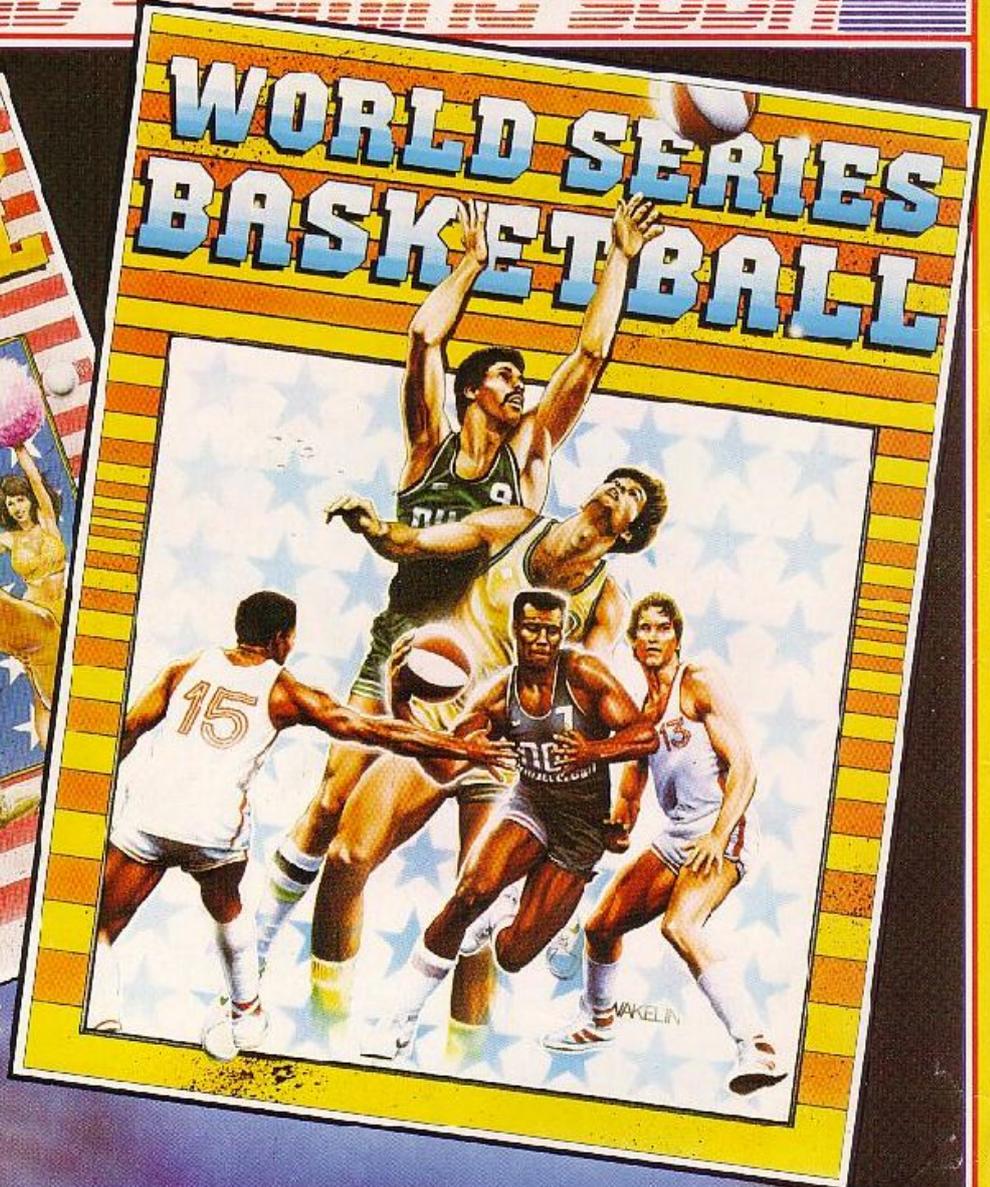
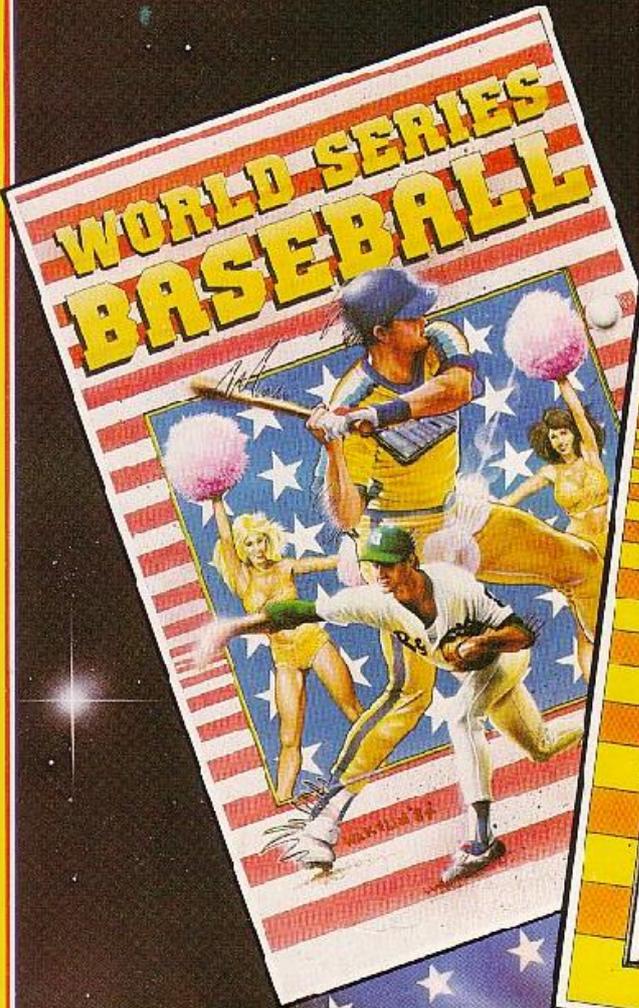


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24 SPECTRUM 16:25

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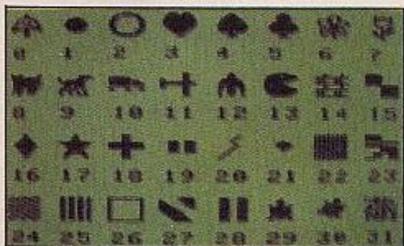
YOUR COMPUTER

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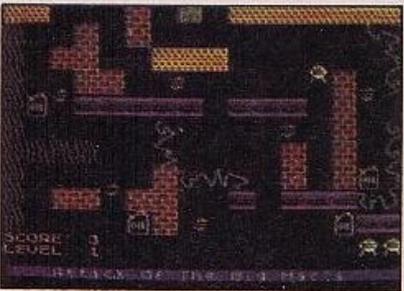
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Mad Caverns: page 64.

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 Gustafson 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; fur-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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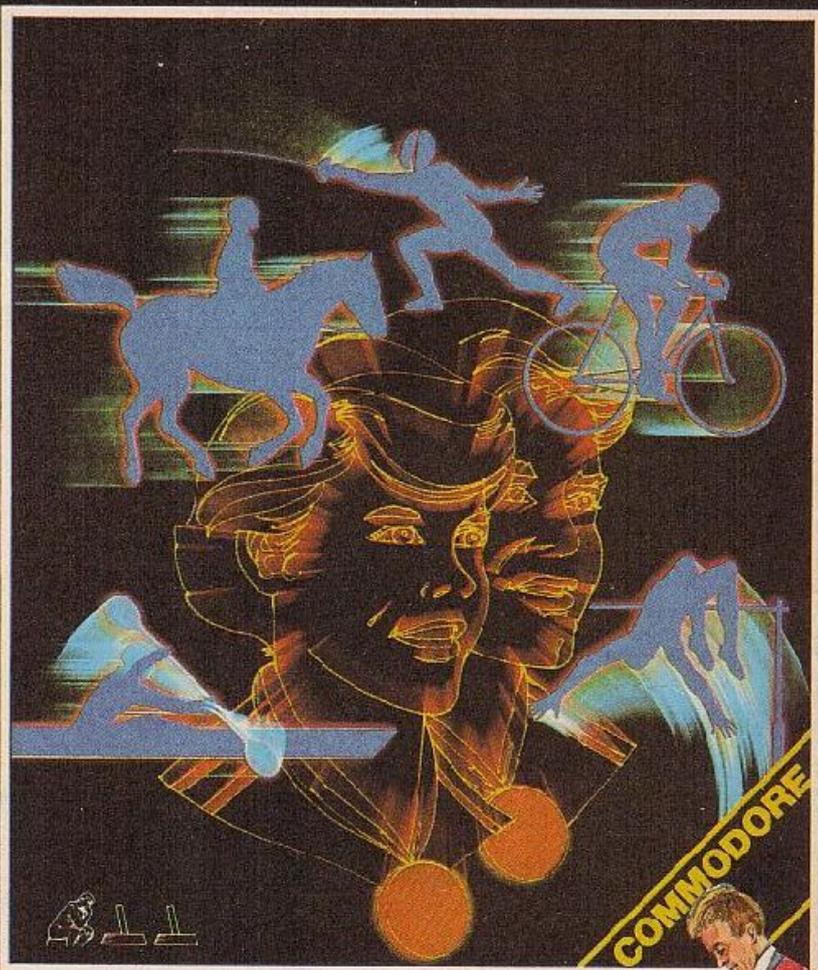
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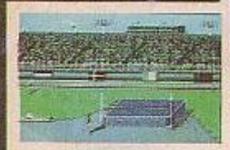
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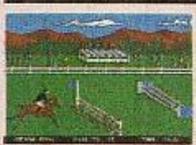
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PROSECUTING SOFTLIFTERS

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.

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"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

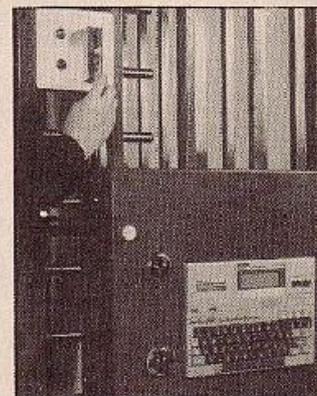
aims to hammer all illegal copying of computer software for gain. Summary offences like selling, possessing or exhibiting illegal copies can be hit with fines up to £2,000 or two months' imprisonment or both. Indictable offences can carry up to two years' prison and unlimited fines.

Late kick-off

DESPITE ALL ASSUMANCES 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.

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 Metacompo — 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 chips are 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

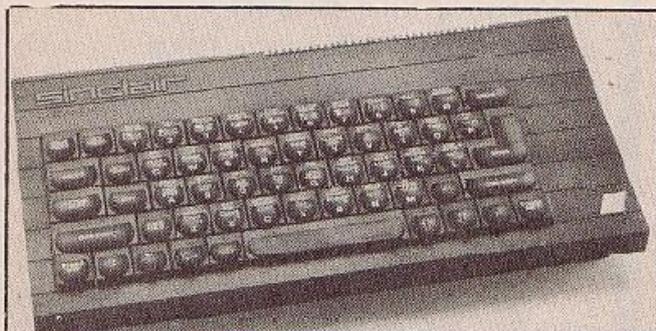


Enter the Amiga.

a 380K 3.5in. disc drive, 128K Rom and 255K 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.

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."

Robcom's CBM-64 cartridge speed up

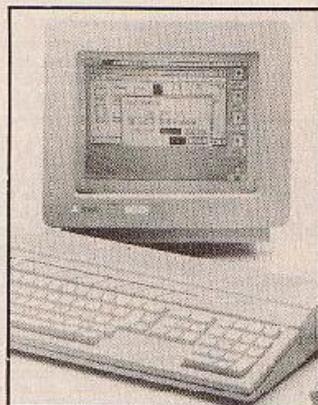
BUY A COMMODORE! On yer bike. Look, you've got to buy a Centronics interface, extra basic, a tape turbo loader and a new disk filing system, I mean, that lot'll set you back nearly as much as the machine itself.

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.



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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. Fortunately 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 Uboldi helping out temporarily pushing Hermann Hauser and Chris Curry yet further down the pecking order behind Chairman Alex Reid. Briar 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



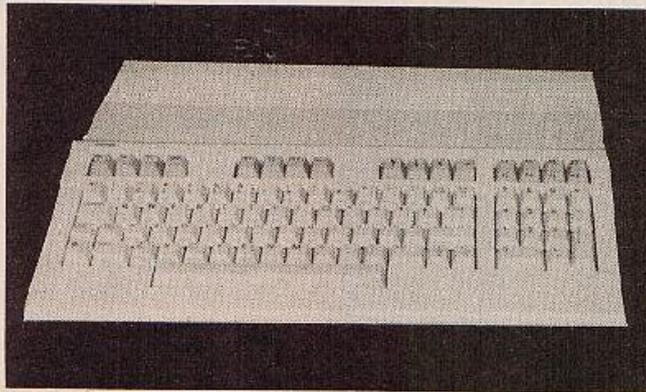
Workstation launch shows Acorn is back in business.

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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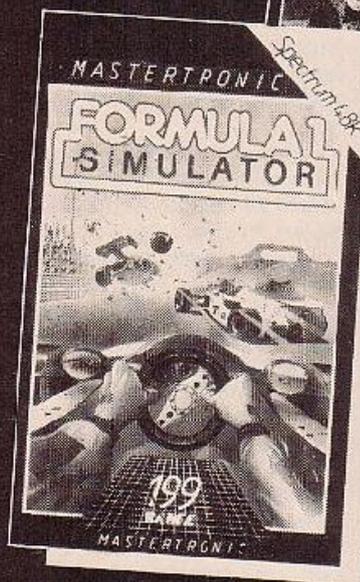
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(Original letters available for inspection.)

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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 Softaic 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 pizzazz 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 *Arnhem* 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.

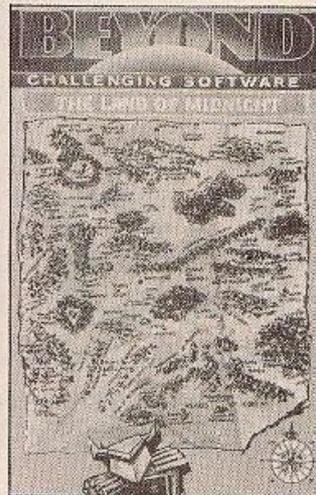
IRON HEROES

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 Tolkienesque *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.

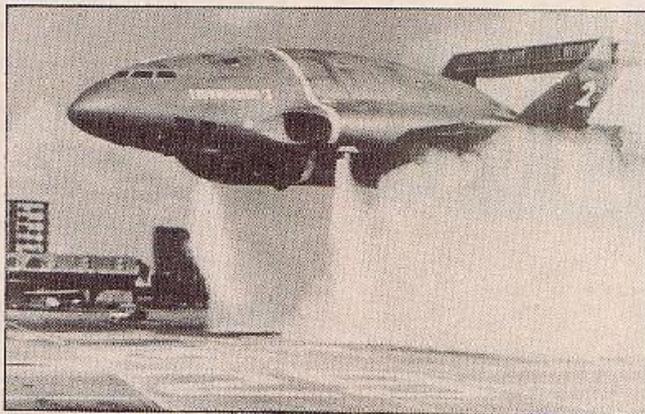
Liverpool trendsetters Denton are also working on a futuristic — and violent — sports game for Beyond, tentatively called *Iron Heroes*. "Rather than take a sport and turn it into a computer game, we took a computer game and

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 it's 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 payability.

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

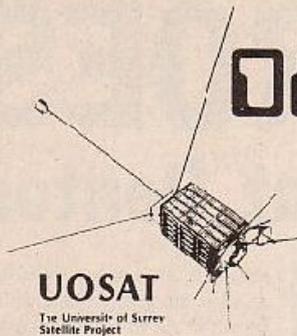
favourite, too", says Gerry Anderson, creator not only of *Thunderbirds*, but *Stingray*, *Supercar*, *Fireball XL5* and, currently, *Terrahawks*. CRL computerised the latter in a small way — "but this is the first major one".

Filmation II the Ultimate sensation

SKELETONS with rotting flesh waiting, prowling — not Saturday night in Milton Keynes but the village of Nightshade, location of Ultimate's new "Advanced Home Compute: 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 latest-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 Sprts	Imagine	Sp
2	Shadow Fire	Beyond	Sp/64
3	Dur Durach	Gargoyle	Sp
4	Way of the Exploding Fist	Melbourne House	64
5	Don't buy this	Firebird	Sp
6	Cauldron	Palace	Sp
7	Graid National	Elite	Sp
8	Soffald	Ethiopia Appeal	Sp
9	Rocxy	Firebird	Sp
10	Arnhem	CCS	Sp
11	Desert Burner	Sparklers	Sp
12	Graham Gocche's Test Cricket	Audlogenic	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	Gremlin	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 Sprts	Imagine	Sp
3	Fencers Keepers	M. Tronic	Sp
1	Rep-on	Superior Software	Bc
2	Lode Runner	Projects Acorn	Bc
3	Revs		Bc
1	Alewolf	Elite	At
2	Drop Zone	US Gold	At
3	Brudee Lee	US Gold	At
1	Sword of Destiny	Gremlin	16
2	BMX Racers	M. Tronic	*16
3	Alewolf	Elite	16
1	Rep-on	Superior	Ei
2	Overdrive	Superior	Ei
3	Football Manager	Addictive	Ei
1	Mordons Quest	Melbourne House	Am
2	Dun Durach	Gargoyle	Am
3	Rocxy Horror Show	Computer Rentals	Am
1	Fencers Keepers	M. Tronic	Ms
2	Chiller	M. Tronic	Ms
3	Crazy Golf	Mi Micro	Ms

Source: Wahlers Software
Vc = Vic 20; 64 = CBM 64;
Sp = Spectrum; Bc = BBC;
At = Atari; 16 = CBM 15;
Ei = 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
Rcm 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 12K of Rom space! However in the BBC 3 you loose two 16K Rom slots for the Basic and O.S. Roms leaving you with only 48K of Rom space. In the BBC B+ you loose 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 Arms,
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 Telsat 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 Telsat. 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 packer 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



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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 use: 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

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.

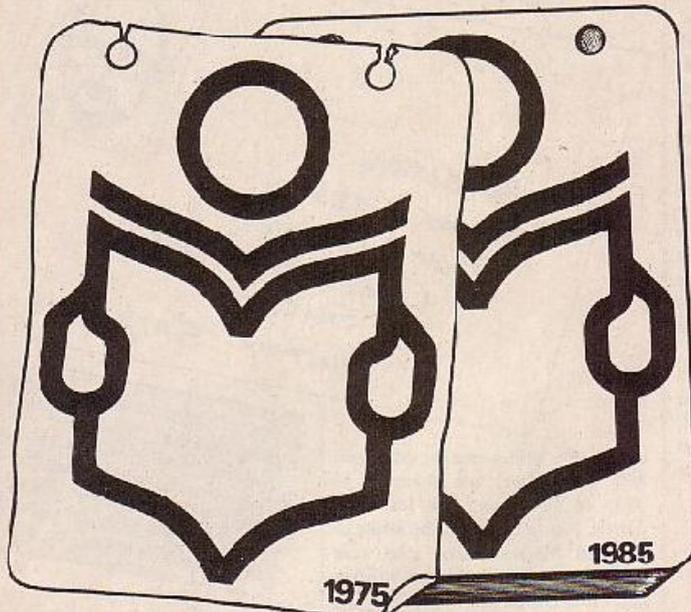
In the Atari review, she says in the Opposition box: "Adequate software". "Adding a black and white monitor and 512K Ram expansion takes you up to £800". "On that basis, not worth thinking about".

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! OX, 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)

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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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(continued from page 19)

8-biters 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 Letters

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.*

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 Frog as:	Change to
3060	255	191
3065	251	187
3090	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.*

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 + 1:IF I <= N 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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The book also includes a fully annotated, complete arcade game listing.

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:

**Interface Publications Ltd., Dept YC,
9-11 Kensington High Street,
London W8 5NP**

(Trade only: WHSD Leicester)



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

★★★★★

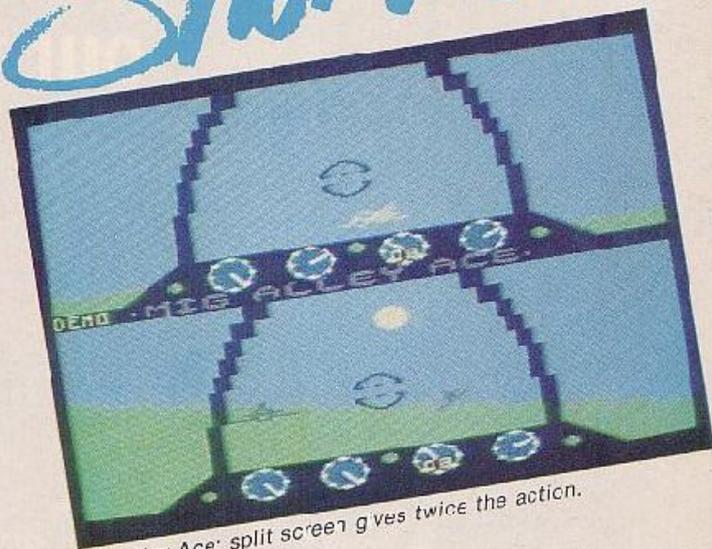
THERE'S ONLY one thing better than blowing away a computer-controlled plane and that's blowing away a plane controlled by a human opponent. Introduce the element of competition in a computer game, and you're on to a winner. No more arguments about high scores made at one in the morning after five hours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

Shortlist



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 Helicat 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 hid!" 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

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

SOFTWARE

Shortlist



Beach-head II — return of the evil Dictator.

with hard 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



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 download 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 Farou 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.

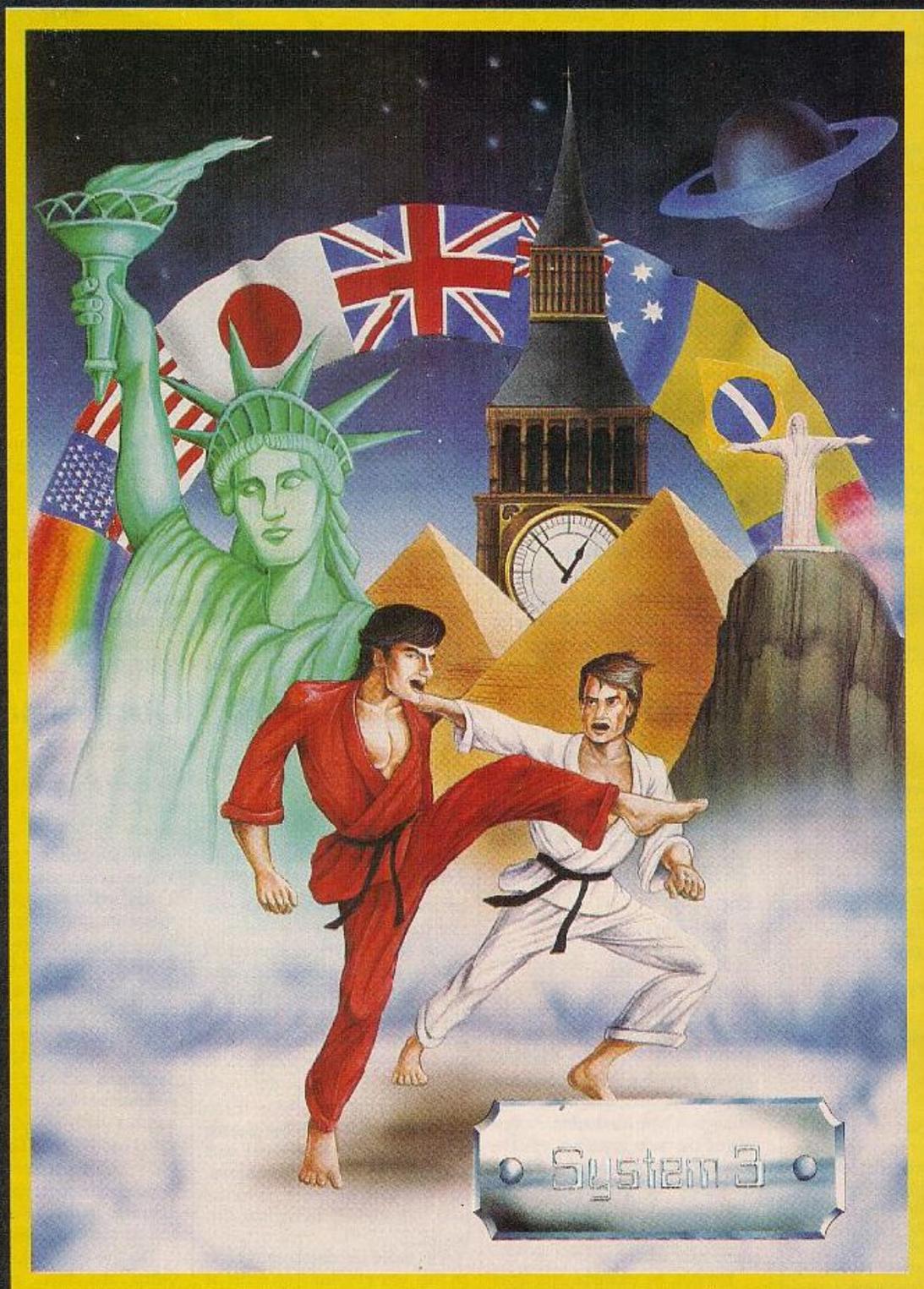
The entry screen is divided into two sections — driving information at the top and five icons at the bottom. The driving display has dashboard data like fuel, speed, distance travelled and time elapsed, together with a stylised steering wheel and joystick. There are some traffic lights represented here, 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 Dynamic 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
■ £8.95

YOU CAN DUCK, dodge left, dodge right as well as larding 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.

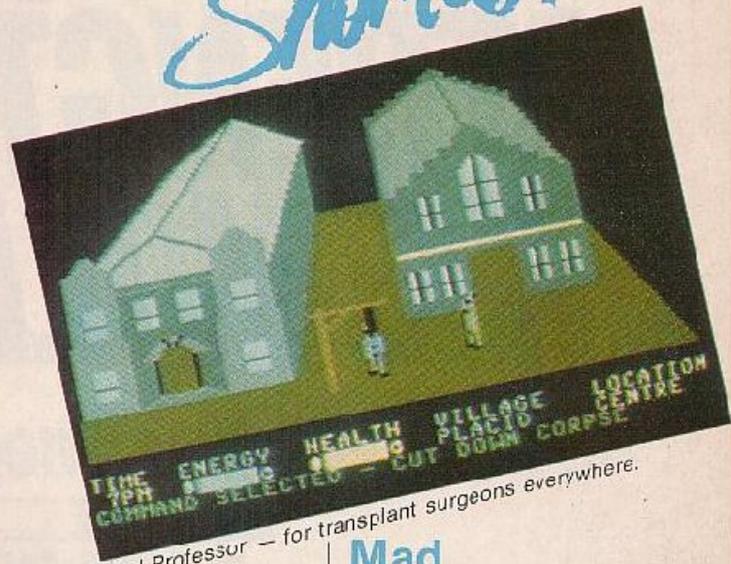
All of which makes Frank Bruno's boxing technically a more sophisticated game than Rocco, the other contender in the boxing stakes this month. If you win the bout you get a secret code which enables you to go on and load in the next boxer. You have to take on

Frank Bruno: Well, Harry...



SOFTWARE

Shortlist



Mad Professor — for transplant surgeons everywhere.

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)

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

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Star chart

Confidential

Spectrum
Radar Games
£6.95

Another Quillod 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 scullery 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 have 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 Bona

Mad Prof: a little home surgery.



Thing On A Spring

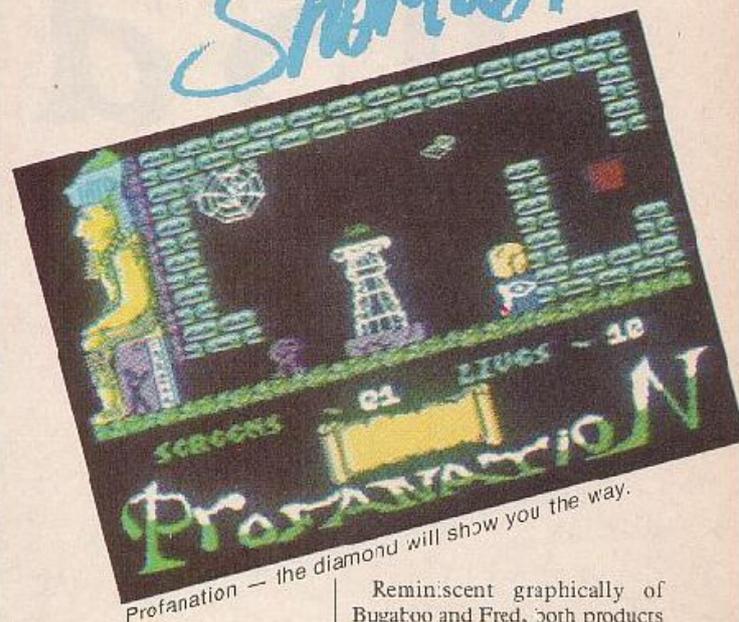
■ CBM-64
■ Gremlin Graphics
■ Arcade adventure
■ £7.95

A REALLY PROMISING program from Gremlin Graphics, showing that with or without Tony Crewther 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

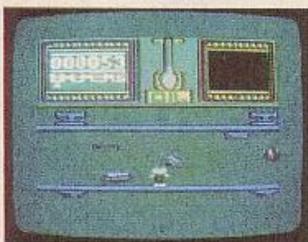
Shortlist



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 afore-said 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 Bugatoo and Fred, both products of those immortal Spaniards Paco and Paco, and with names like Victor Ruiz, Florentine Petrejo, Santiago, Morga B and Snacho on the credit's 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.

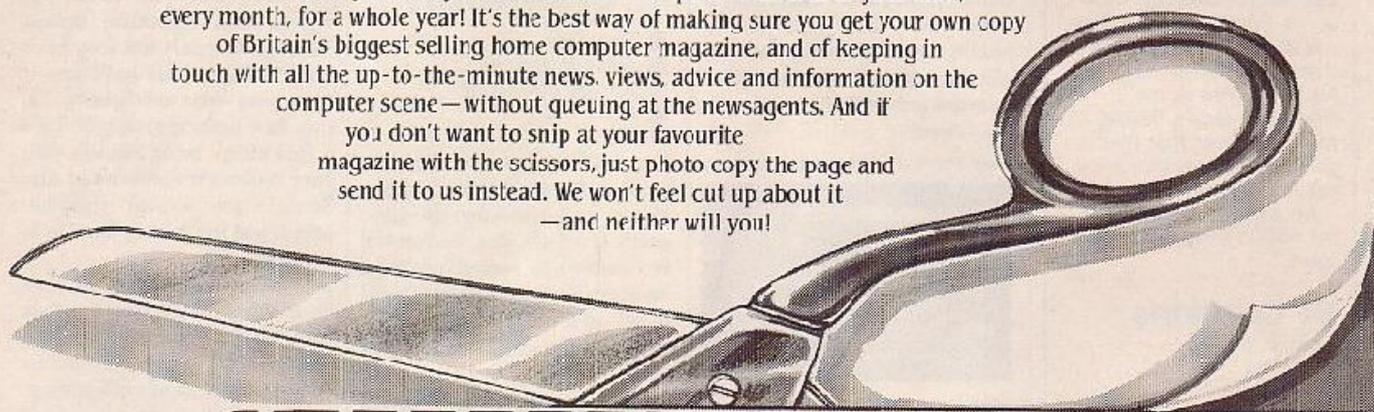
Graphics are pleasantly executed — as you yourself are from time to time — and the purple blob which is Johnny Jones has a whimsical way of looking around and grinning while waiting for the next move. Could be a distant relative of Roland Rat. All in all, one of the best gems I've ever had to work in.

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
Quicksilva
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, clear, 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

Rupert and the Toy-maker's Party

■ CBM-64 and Spectrum
■ Quicksilva
■ 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.

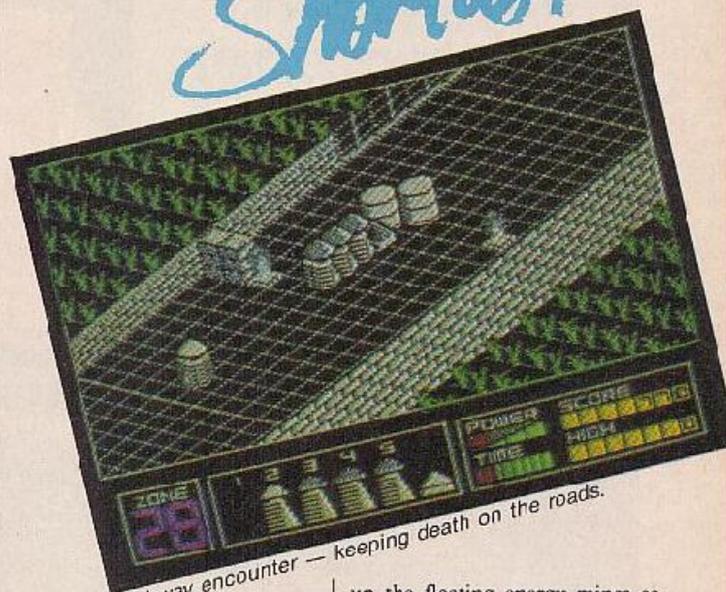
You have to manoeuvre the geriatric Rupert through seven screens of great graphics to what are presumably his sixty-fifth birthday celebrations. Rupert's first computer escapade is played out in and around the toymaker's castle.

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

SOFTWARE

Shortlist



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

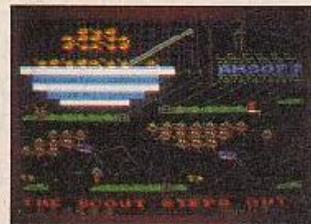
The Scout Steps Out

■ Amstrad
■ Amsoft
■ Platform
■ £8.95

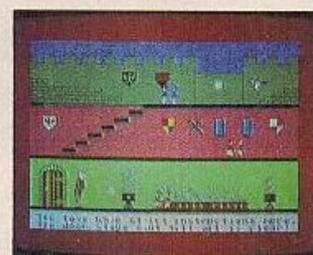
★ ★ ★

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)



Rupert gate-crashes a wild party.

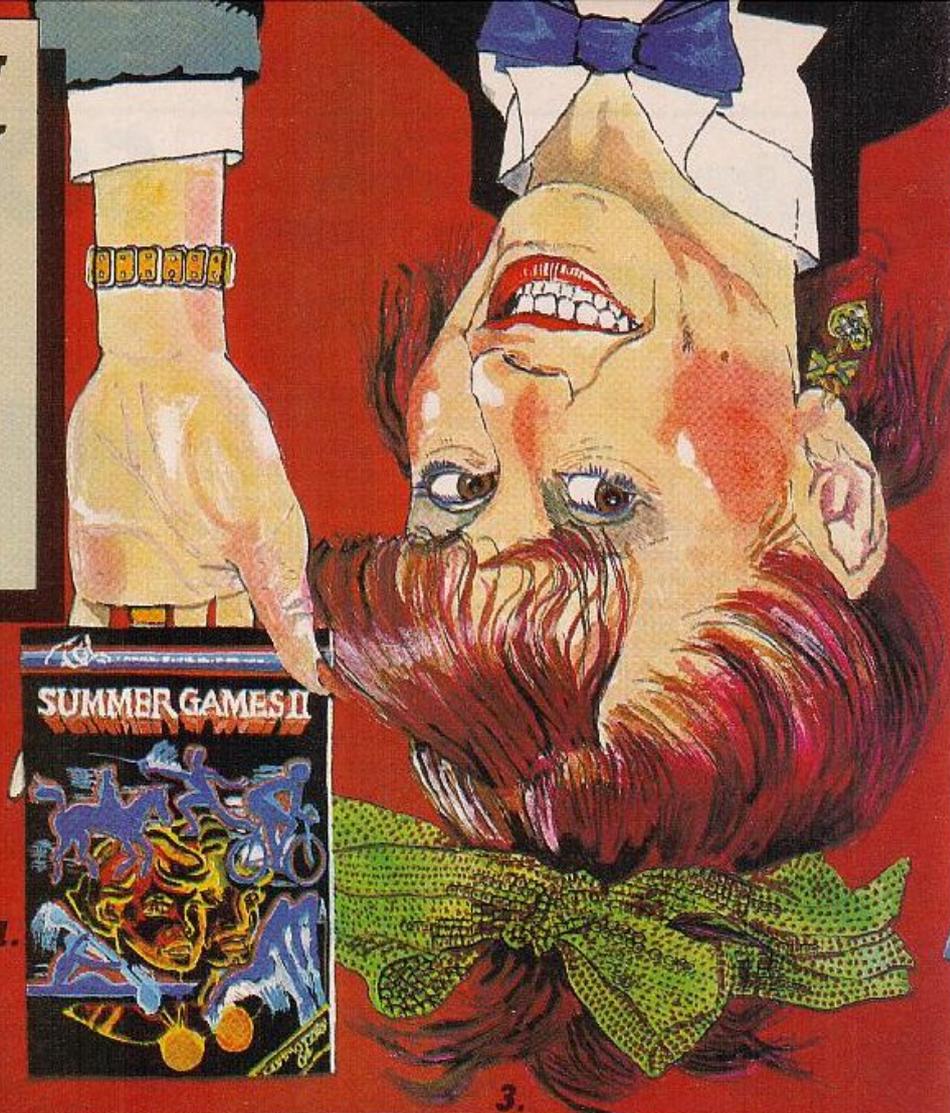
game with the action viewed from the side. You have to get Rupert to collect the party invitations pinned to the walls to progress to the booze and buns.

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 Wolfe

**After picking
14 of the new
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 Manclith

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?

Commodore 64

£9.95

TERRORMOLINOS

by Melbourne House

This is the Costa Blanca gone stark staring
bonkers. To survive the disasters of this
utterly ugh family holiday you have to enter a
saucy postcard world. To escape, you have to
look snappy – literally – by bringing back
10 photos that prove you were there!

Versions for most machines

£7.95

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International Micro Software Division

Something for you armchair athletes

TOUR DE FRANCE

by Activision

After 16 grueling Stages round scenic France, you may never face a saddle or a yellow jersey again. If you're certain your joystick skills are 'formidable' - get pedaling!
Commodore 64 £9.95

INTERNATIONAL BASKETBALL

by Elite

Are you ready to jump, block and steal? Twist in mid-air? Go for basket after basket against 3 opponents through 9 skill levels from the utterly pathetic to Harlem Globetrotter? You are?

Spectrum and Amstrad £5.99

SPOT THE BALL

by Creative Sparks

Two sports classics in one pack, but you only play one at a time, right? There's soccer and snooker, there's shooting and potting. Both need skill and timing plus a joystick plus 32K ram. Now go spot the ball!

Atari 32K £8.95

SUMMER GAMES II

by US Gold

Stage your own Olympics! With 1-8 players and eight events, practice sessions *before* the real thing, then Ceremonies, National Anthems - the lot! You'll be as flakers as me after cycling, fencing, kyaking, high and triple-jumping, rowing, javelin and riding. Really, really good.

Commodore 64 £9.95

It's 'bats-out-of-hell' time!

RED ARROWS

RAF pilots helped write this program.

For most micros.
Cassette £8.95
Disk versions £11.95 and £12.95

by Database

They call this flight simulation - *stimulation* more like! You get 3D on the graphics and 6G on the aerobatics.

For most micros.

Cassette £8.95
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ARNHEM

by CCS

This is actually more risky than a Harrods Sale - really. Just like 1944 in the second world war, you're in a tactical wargame, parachuting behind enemy lines to snaffle vital bridges and let the Allied Forces through. 1 or 2 can play.

Spectrum 48K + £8.95
Amstrad version £9.95

Super plays for rainy days!

SOUTHERN BELLE

by Lewson Consultants

Bet you can't get your steam train through 24 stations with enough water and coal left to get you to Brighton on time. What with signals, tunnels and other snags, by the time you arrive you'll be steaming!

Spectrum ZX 48K £7.95

Trivia

by Anirog

This is a quiz! The computer rolls the dice and asks the questions in 6 categories - one or two of which even bone-heads can answer. Nearly 2000 questions and most of them really silly.

Versions for most machines £9.95

Win

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Last month's
Mystery
Microgame
was
Kenny
Everett
10 prizes
are on the
way



Kya?'

JUGGERNAUT

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

SPARKLERS SPECIAL

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 leap over various obstacles whilst keeping an eye on the various things flying around crucking 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 Blitzel (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 paterman in his odyssey, plenty of ugly insects, acrobatic hydrae and other nasties assail him.

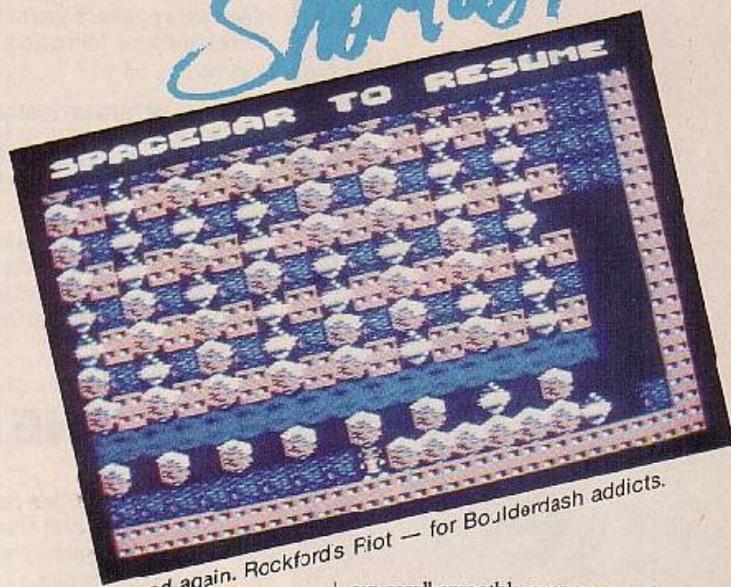
You should also beware of attacks of negative buoyancy — Dan can't swim — warning beeps indicate imminent starvation.

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

Save the word with Dynamite Dan: Mirrorsoft's explosive action.



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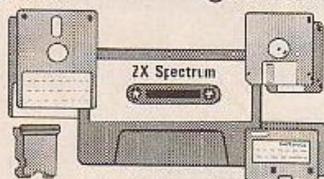
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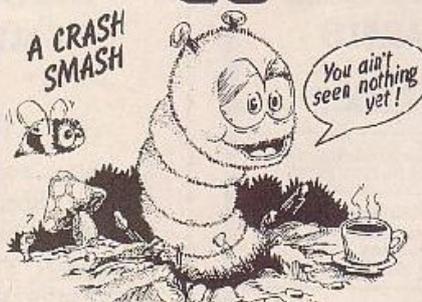
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Hot on the heels of the DK Tronics unit reviewed in June, this is the "official" version. As it uses the same chip, and most of the commands do similar things, there isn't a great deal to choose between the two.

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.

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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 80K 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?
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■ 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 BART 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
■ £179.95 — or £239.95
bundled with Logotron
Logo. There is a discount
for schools

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.

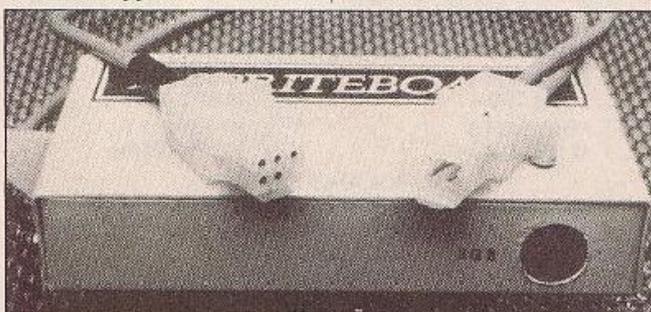
40 and 80 column modes are available, and the various commands are displayed optionally at the bottom of the screen. File transfer uses the X-modem format of Commstar. The software supports X-on X-off

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 Paadon



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-Acom disc interface. And the computers I tried wouldn't always power-up correctly with the board connected. Check before you buy.
Richard Lambley

HISOFT

High Quality Microcomputer Software

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 dump; and letter writing on Epson compatibles or the DMP1.

DEVFAC 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 Pernell, who has a great deal of experience on the QL. It is similar in style to the well-known MON 'front panel' in DEVFAC and includes additions like job control and multi-tasking support. It also catches system exceptions and includes fixes for QDOS.

ULTRAKIT is the most powerful interactive toolkit yet for ZX BASIC. All the features you will ever need:

AUTO BREAK COPY DELETE EDIT FIND CRAB HIDE INFORM JOIN KEY LOSE MOVE NUMBER ONERROR PUT QSEPARATE RAMTOP SUBSTITUTE TRACE UPDATE VARIABLES WARN CRUNCH1 CRUNCH2 ZENKIL PACKER MAP UCASE LCASE CTIME ATIME ALARM PRINTER KMODE RESET and much more. It comes with a FREE tape header reader.

Product Price Table

	Pascal £	DEVFAC £	C £	ULTRAKIT £	FONT 464 £
ZX Spectrum	25-00	14-00	25-00	9-45	
Amstrad CPC464	29-95	21-95			7-95
MSX	29-95	19-95			
CP/M-80	39-95	39-95			
Sharp	39-95	25-00			
Sinclair QL		19-95 [MONQL]			

All prices are for cassette versions (except CP/M and QL) and include VAT and p&p in the UK. Please contact us for expert orders, disc formats or detailed technical information packs. All products are available by mail order; please send a cheque or Postal Order. Sorry, we do not accept credit cards.

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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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(Trade only: WHSD Leicester)

Interface

NEWS
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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 Cerlesa, 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
 HTST 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:
 Fortuallis won't open?
 TELU MAYB UREH TBUR
 Can't get out of the whale?
 HTOO TEHT GNIT TECE
 FOFE BDOO WTFI RDTH
 GIL

Yours against ghosts and gremlins,
 Hugo North.

QUEST

Carner

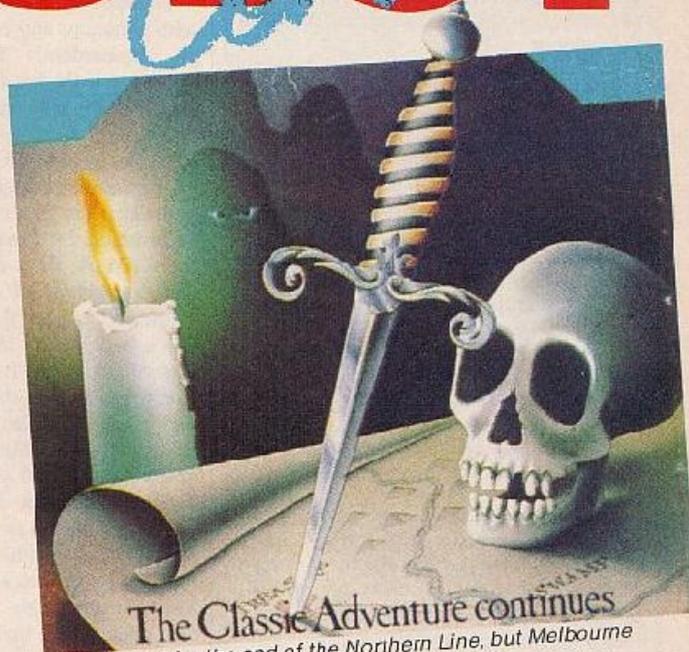
Our man with the brass lamp and the key to a thousand mysteries sheds light on new adventure programs. Lost? Never fear, Hugo North is here.

Mordon's Quest

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

FROM JOHN JONES-SEELE, 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-compressor 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

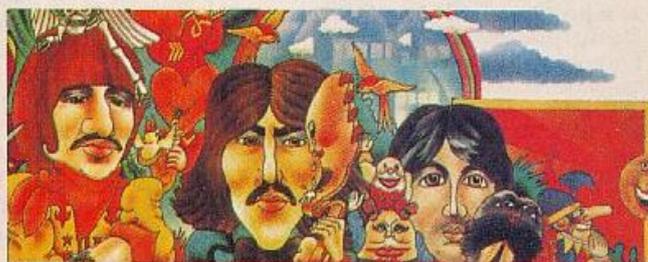
- CBM-64
- Number 9 Software
- £9.95

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 Kobert.

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.

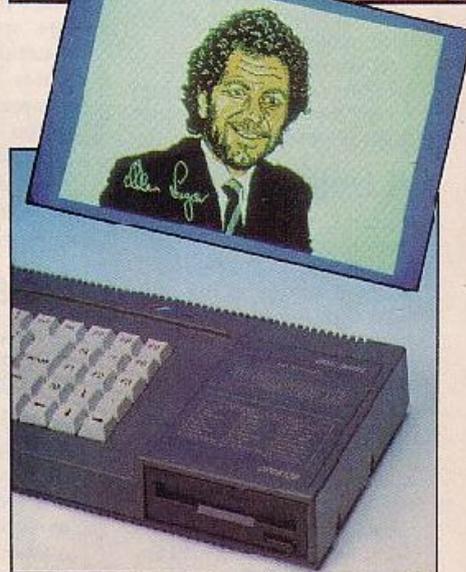
Apart from the addition of CP/M Plus and another 64K Ram the machine's specification is the same as the 664's. Based around a Z-80A processor running at 4MHz, it carries 128K Ram and 48K Rom. The Basic interpreter and the operating system are held in 32K of the Rom, while the remaining 16K contains Amsdos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

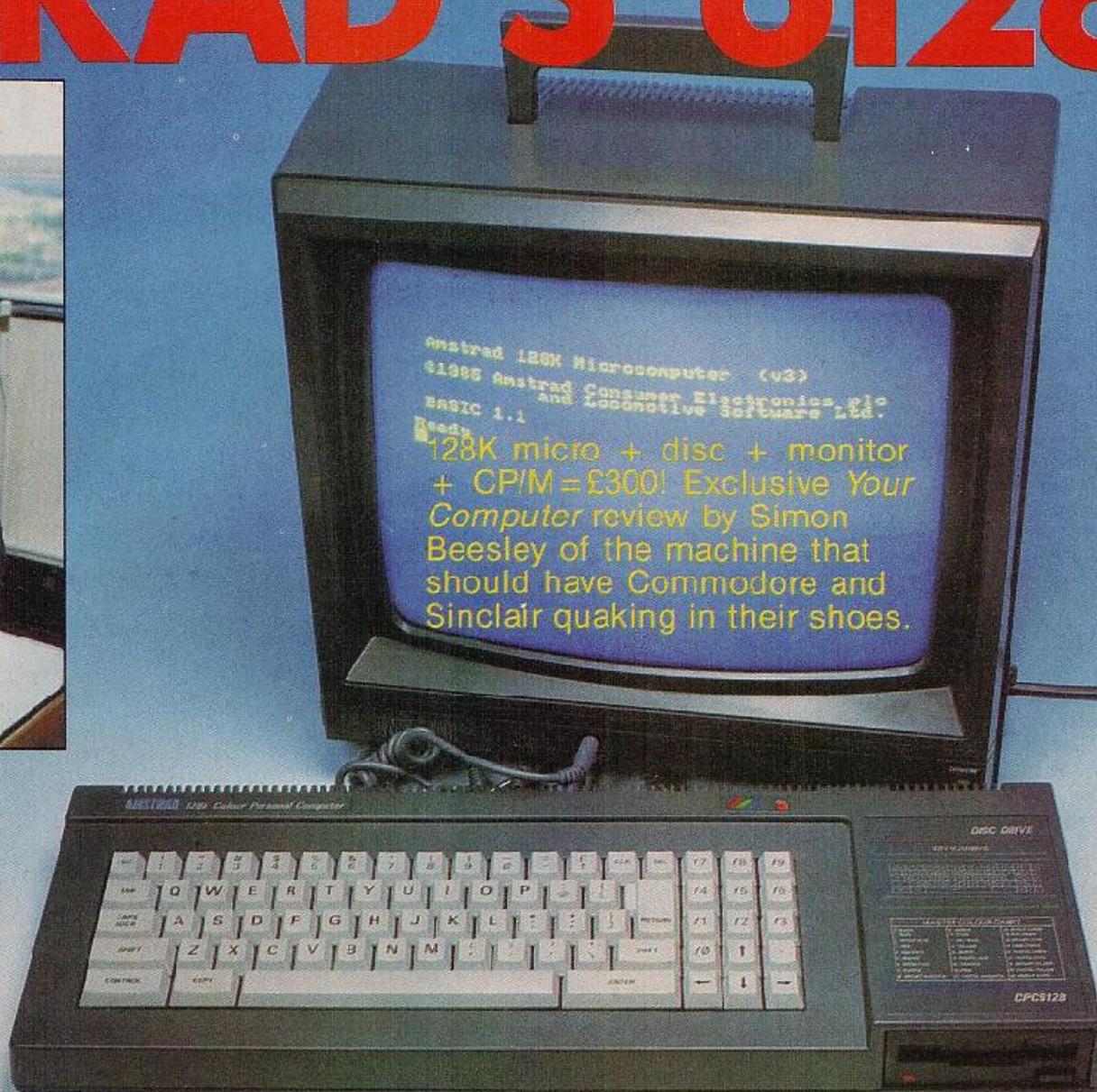


load or save Basic programs. If you are using Amsdos you need to run CP/M to format discs, back up and copy files; otherwise you can ignore it.

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 5.25in. 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.

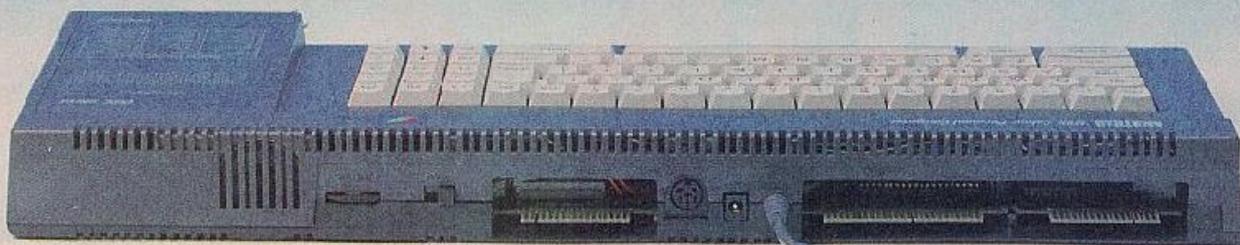
Another of the disc programs, Bank Manager, demonstrates some extra Basic commands which make use of the spare 64K Ram. As an 8-bit microprocessor the Z-80A can only address 54K of memory. So the 128K Ram is not organised as one block of contiguous memory, but as two banks of 64K, only one of which can 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.

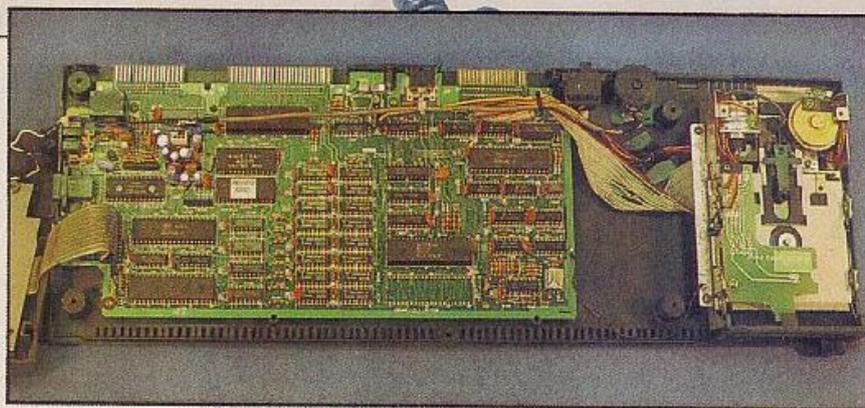
CP/M Plus takes up around 21K and represents a substantial improvement on the earlier 8K version. Not only is it faster in loading and saving to disc, but it is also easier to work with. Thus you can give it multiple commands on a line, recall previous commands, and edit lines. Along with a number of 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.

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.

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.

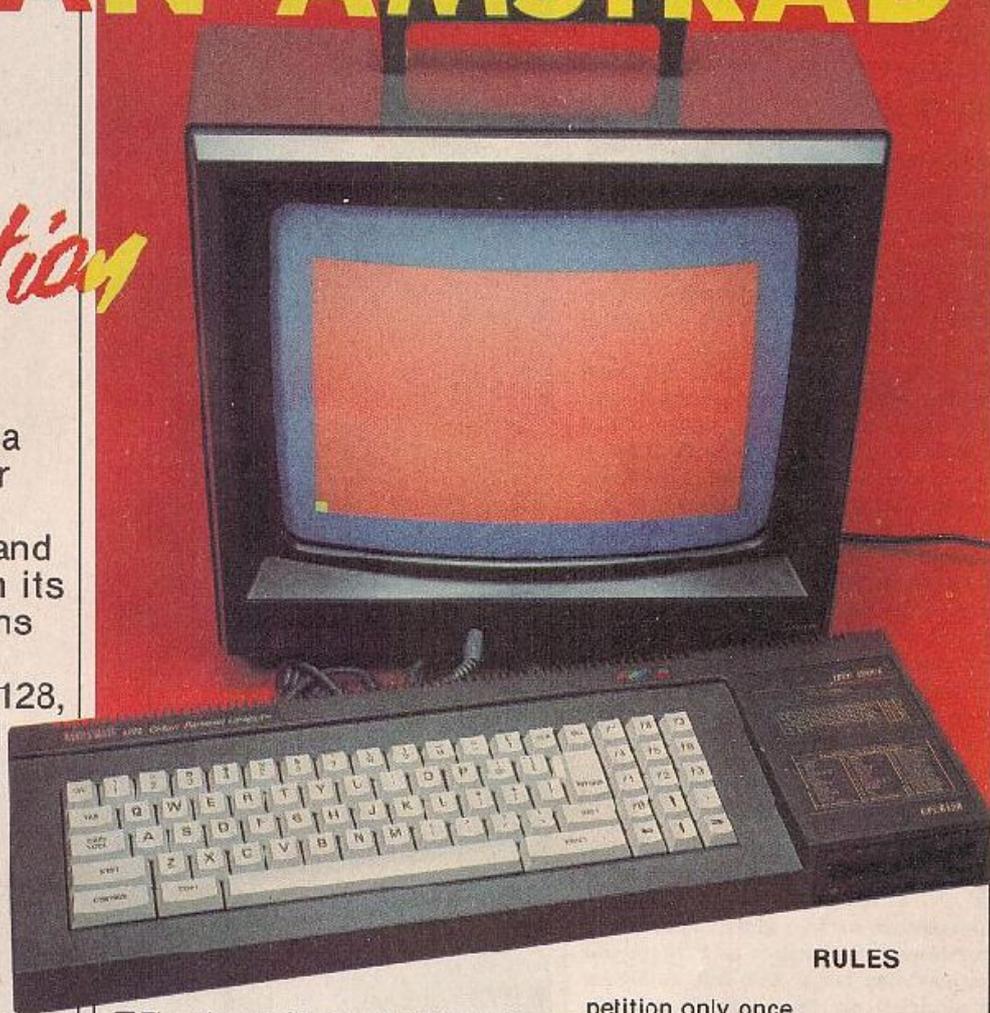
■ CP/M Plus together with 128K Ram give the 6128 an important advantage over the 664: It can run the entire range of 8-bit CP/M software.

■ 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

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.

YOUR COMPUTER 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 card and password, instructions and 30 credits, enough for three hours. After that, it's 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 lass

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 MUD 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."

UNGE

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.

MUD COMPETITION

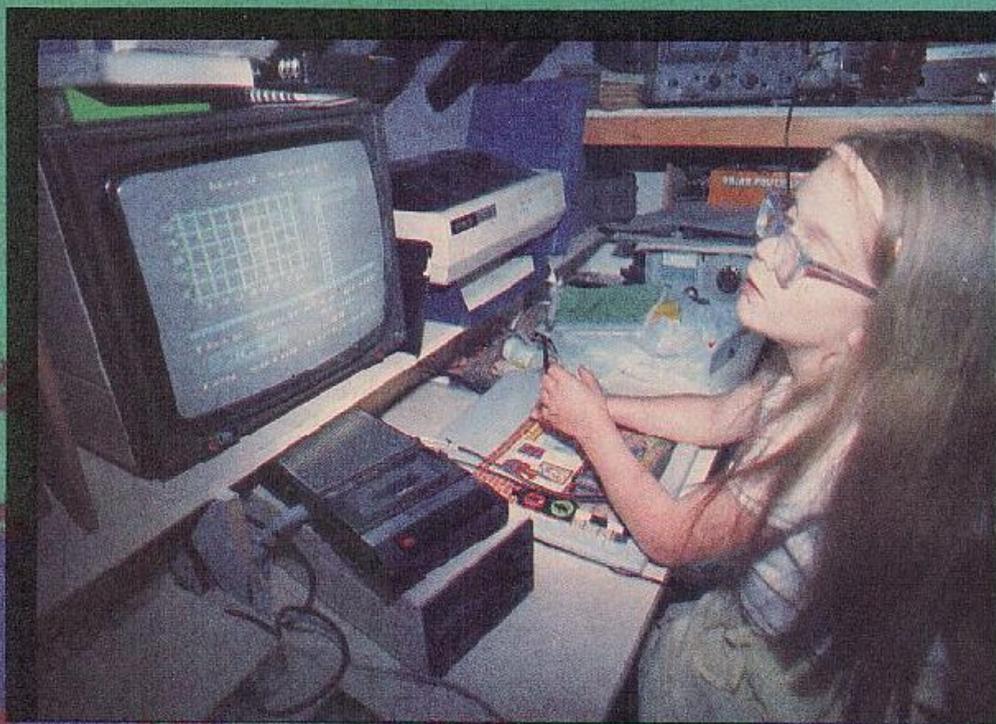
This month's prize is a MUD pack, plus on-line tuition from an arch Wizard on the arcane mysteries of the game. Thus equipped, you will be ready to take on nine other champions at the first MUD spectacular on an all expenses paid trip to the London Dungeon on November 5. Once there, the system will be 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.



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 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-copter 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-copter, 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, RCH-FORD, 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 92513/6

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.

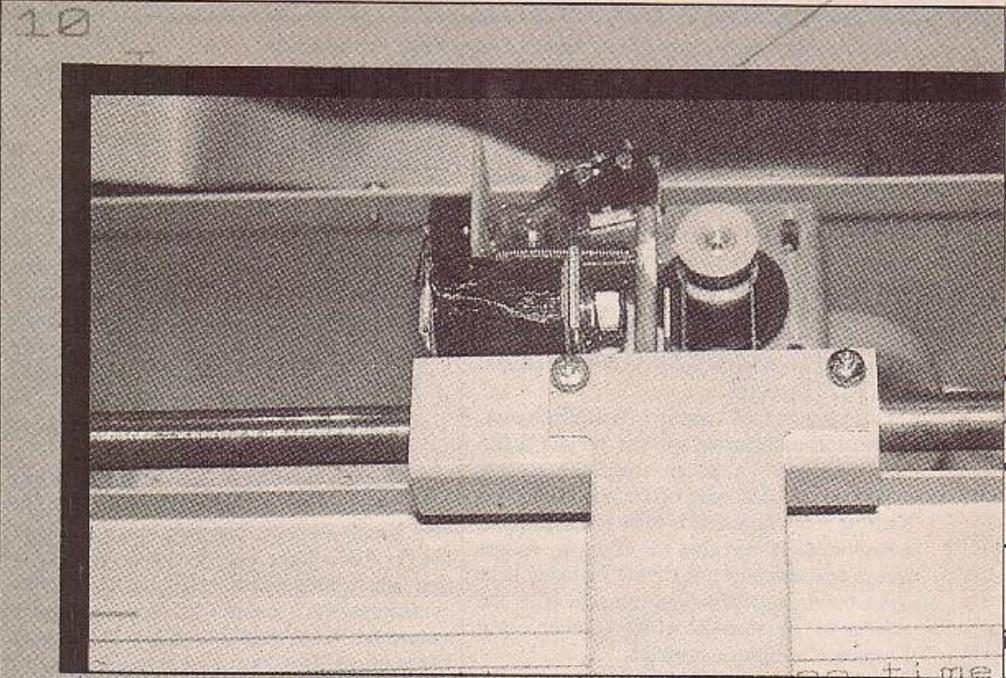
Well made unit

A light pen is a device which detects when the spot of light or 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 BBC 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.

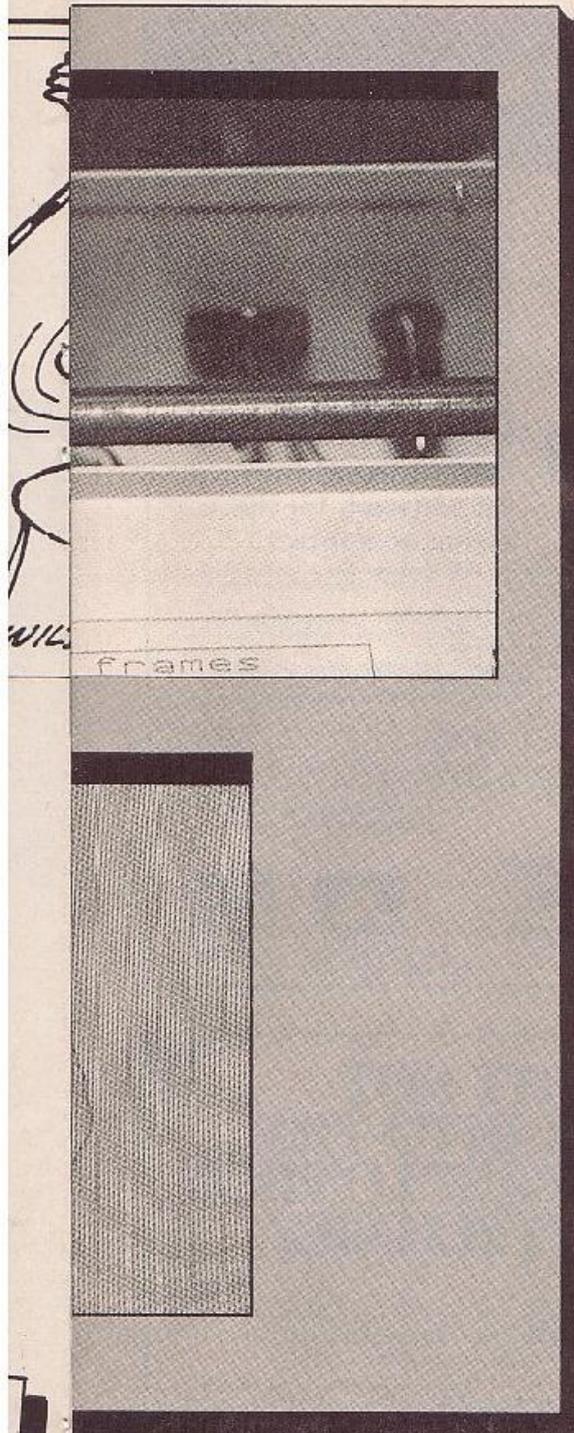
Multiple screens can be linked together to produce a diagram four screens wide by two screens high and up to 640 different symbols can be used in the course of preparing a diagram. Cirkwik is really rather like a graphics

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-



side down plotting, setting the plotter or pin 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.PLTMATE

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 Acornsoft 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 right-angle changes. Leonardo will work with the keyboard alone or any of the popular Spectrum joysticks.

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-

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.

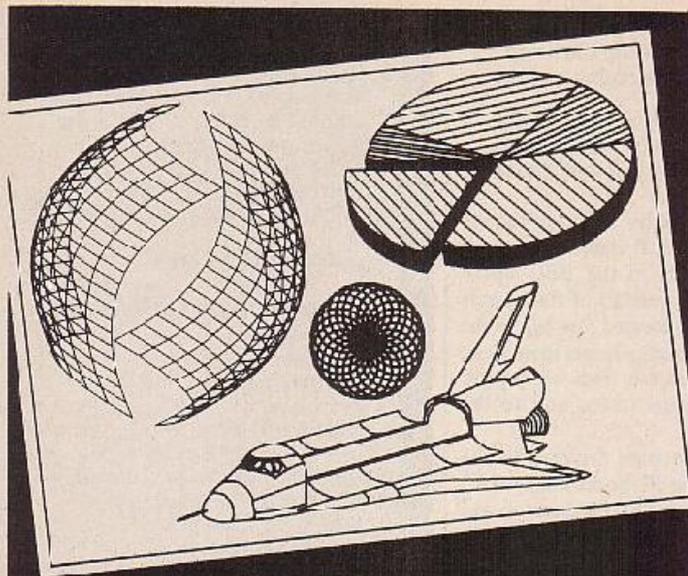
- Graphics tablets or pads have been available for some time for minicomputers and big, serious jobs. Until recently they came with big, serious prices attached to them so the Graphpad, Touchmaster and Bmap are all good value for money as peripherals.

- 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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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 child(er) 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.

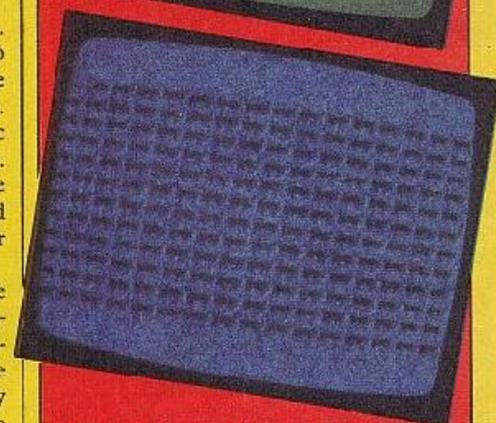
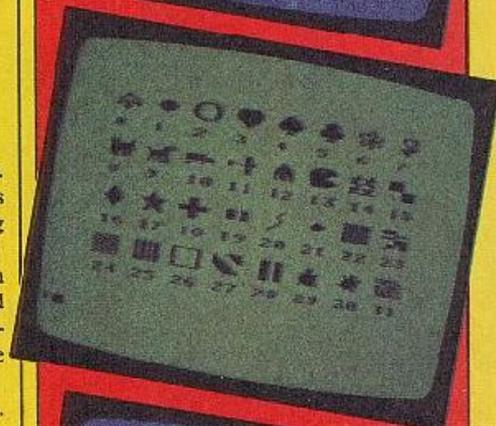
But the situation has improved, dramatically. Over the past year or so, teachers and suppliers have got together to develop some very exciting applications.

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 Fearleaf 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

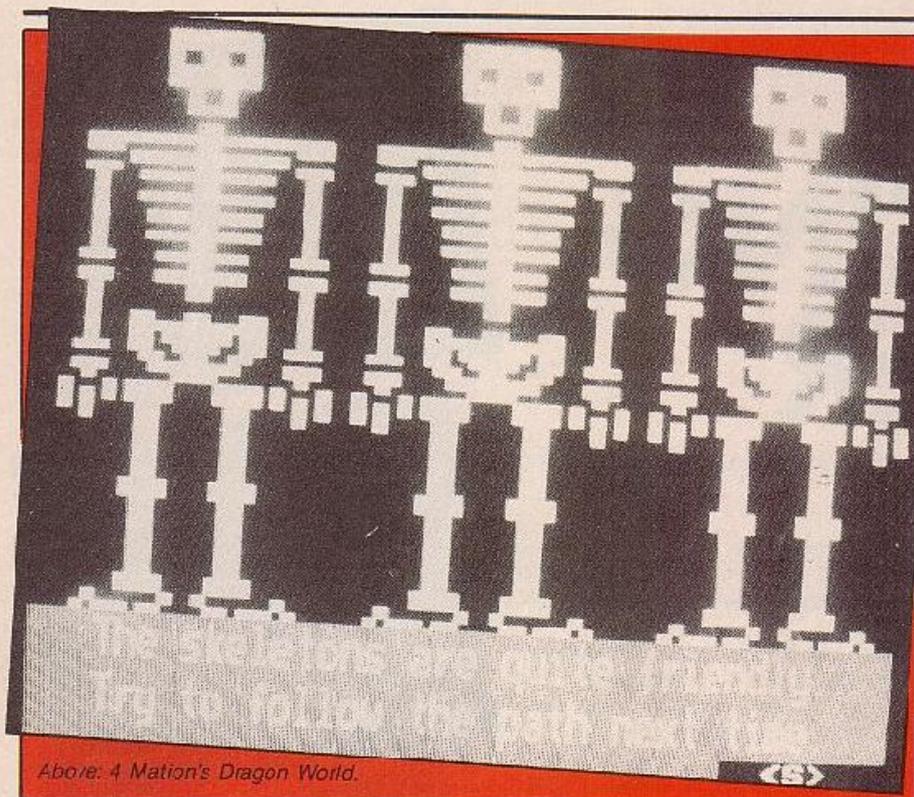
working life, whatever you choose to do.

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: 4Mation'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 Logotom 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 Bourne 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 viewdata 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

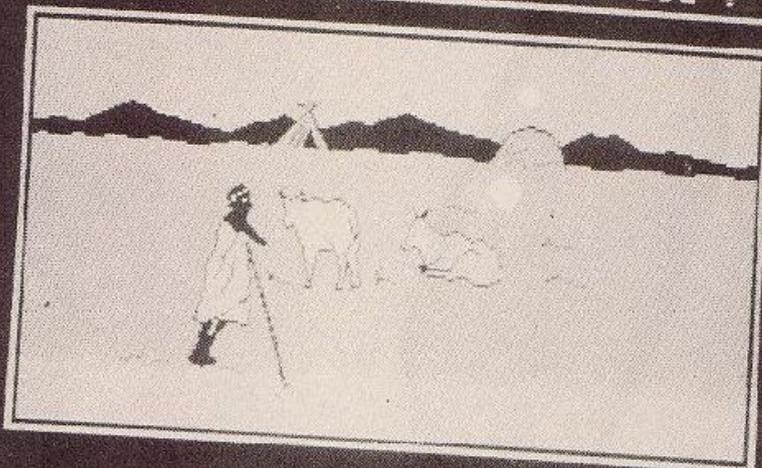
Quest (QuestC), AUCBE, Endymion Road, Hatfield, Herts. AL10 380 Z and 480-Z, £10 disc
inform, Nottinghamshire Computer

Education Centre, Eaton Hall, Retford, Notts. BBC micro, £15 (check) disc
Flowers of Crystal, 4Mation Educational Resources, Lindon 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
Bcdyworks, Genesis Producers 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

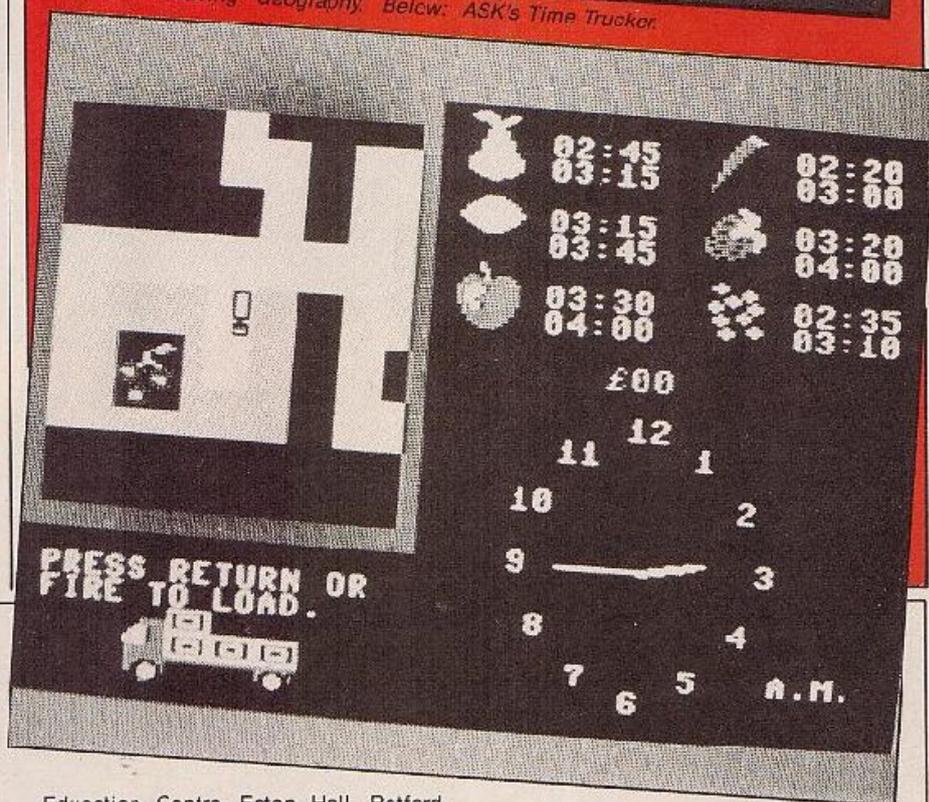
Can you keep your cattle alive in the Sahel of West Africa ?



(c) AUCBE 1984

British Broadcasting Corporation
 Press SPACE for explanation

Above: *Introducing Geography*. Below: *ASK's Time Trucker*.



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



· THE NEW AMSTRAD CPC 664 ·

· AVAILABLE AT BOOTS · COMET · CURRYS · DIXONS · GREENS · JOHN MENZIES · RUMBELOWS

THE LOW COST COMPUTER FOR HOME AND BUSINESS ·

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

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.



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



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

will be recorded on your personal club card, which entitles members to various privileges and offers.



Wordprocessing with Amsword can improve the productivity of everyone from unskilled typist to trained secretary. Around £23.95.



Please send me more information

Name _____
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Amstrad CPC 664

Amstrad, P.O. Box 462, Brentwood, Essex CM14 4EF
 YC/664/4

*CP/M is a trademark of Digital Research Inc.

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.

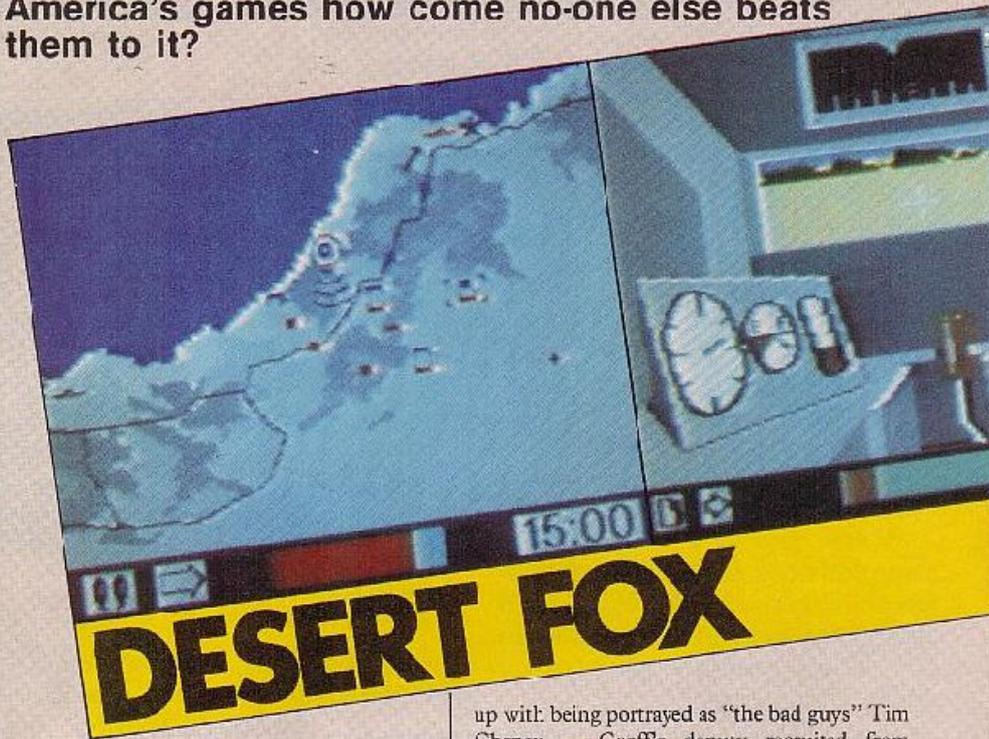
The Atari 400/800 which Geoff still believes was a "brilliant machine way ahead of its time" never sold well over here because much of the software was only available on disc and usually cost £35 a time. No-one doubted that games like Pole Position and Zaxxon were the best on any micro but people were 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 imaginative 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.

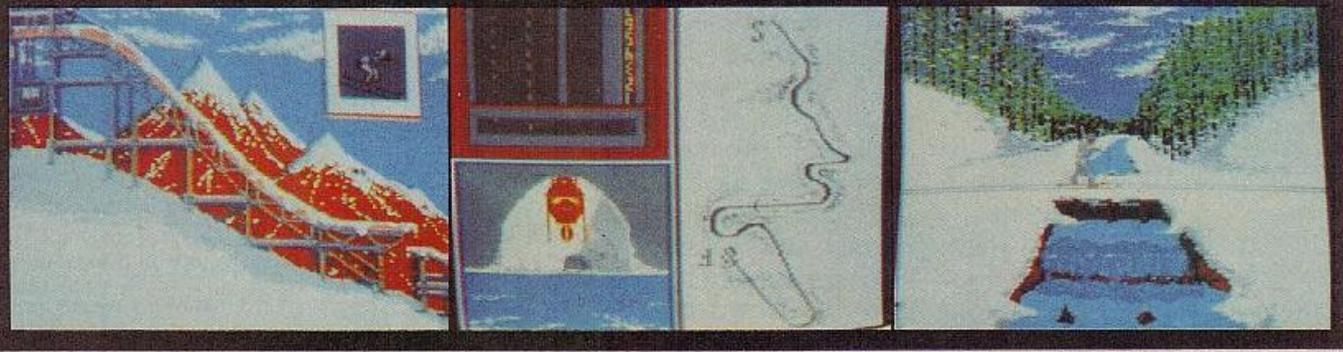
Ocean are almost part of the family as is Gremlin Graphics which Tim calls a "boutique-type company" — literally downstairs from U.S. Gold and controlled by the Browns. But Geoff also admires Beyond and Ultimate, "a

WINTER GAMES

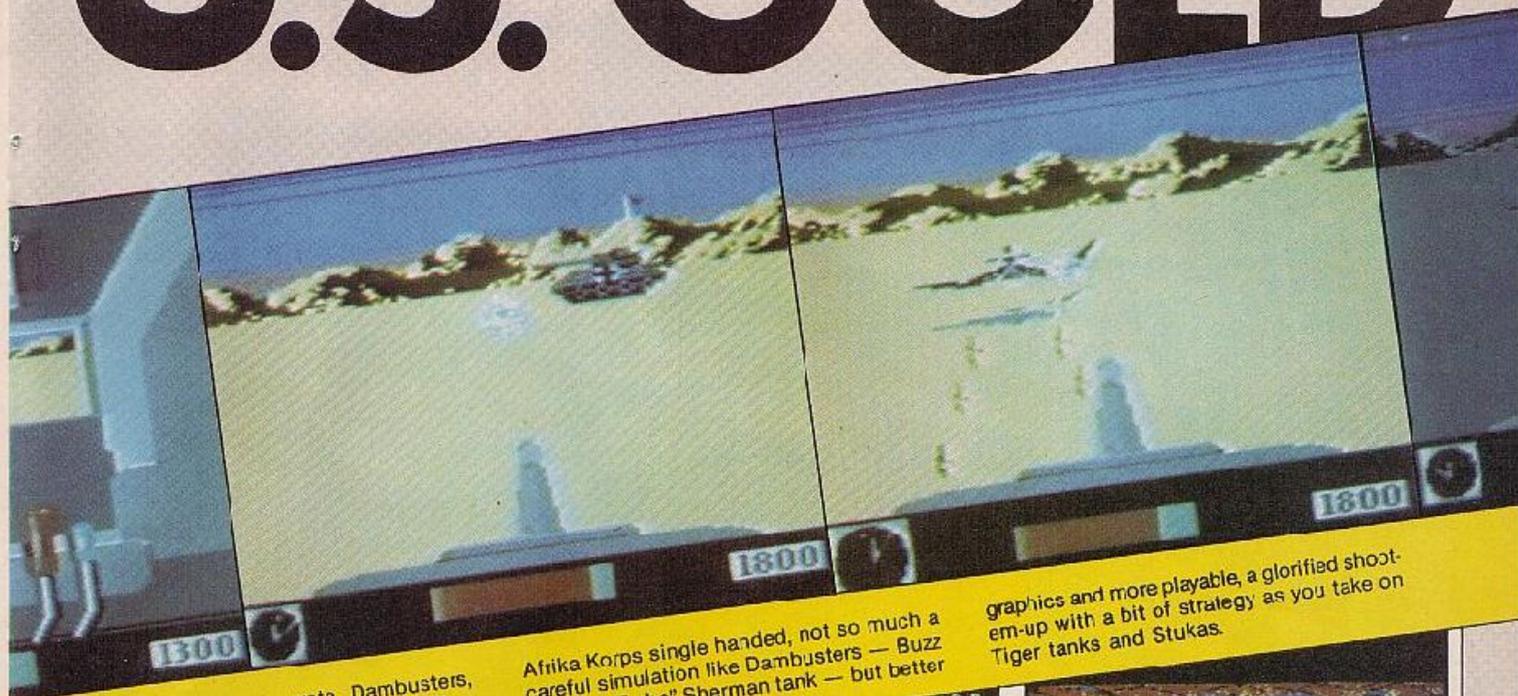
With Summer Games II already on the starting blocks US Gold's counting on Epyx's

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.

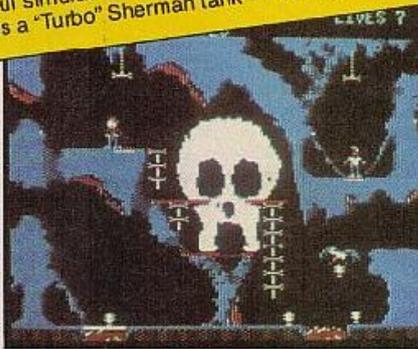
fantastic company but they're in a different part of the market — they concentrate on arcade adventures and keeps an eye on the sleepers — middle-ranking software houses with big corporations behind them — like Robert Maxwell's Mirrorsoft and British Telecom's Firebird.

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.

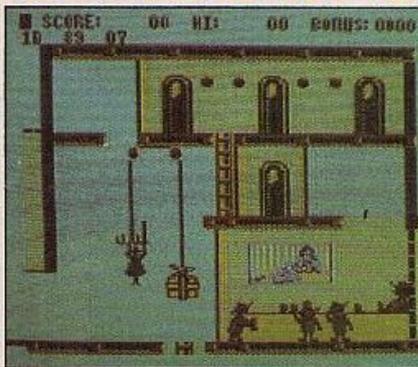
Naturally Geoff still hankers after old Atari classics and Tim prefers the Commodore 64. He believes that programmers have stretched the capabilities of the 64 to the limit now "but you can still get new tunes from an old violin".

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 Paracise 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 Drown hopes it will be this year's Ghostbusters.

ZORRO

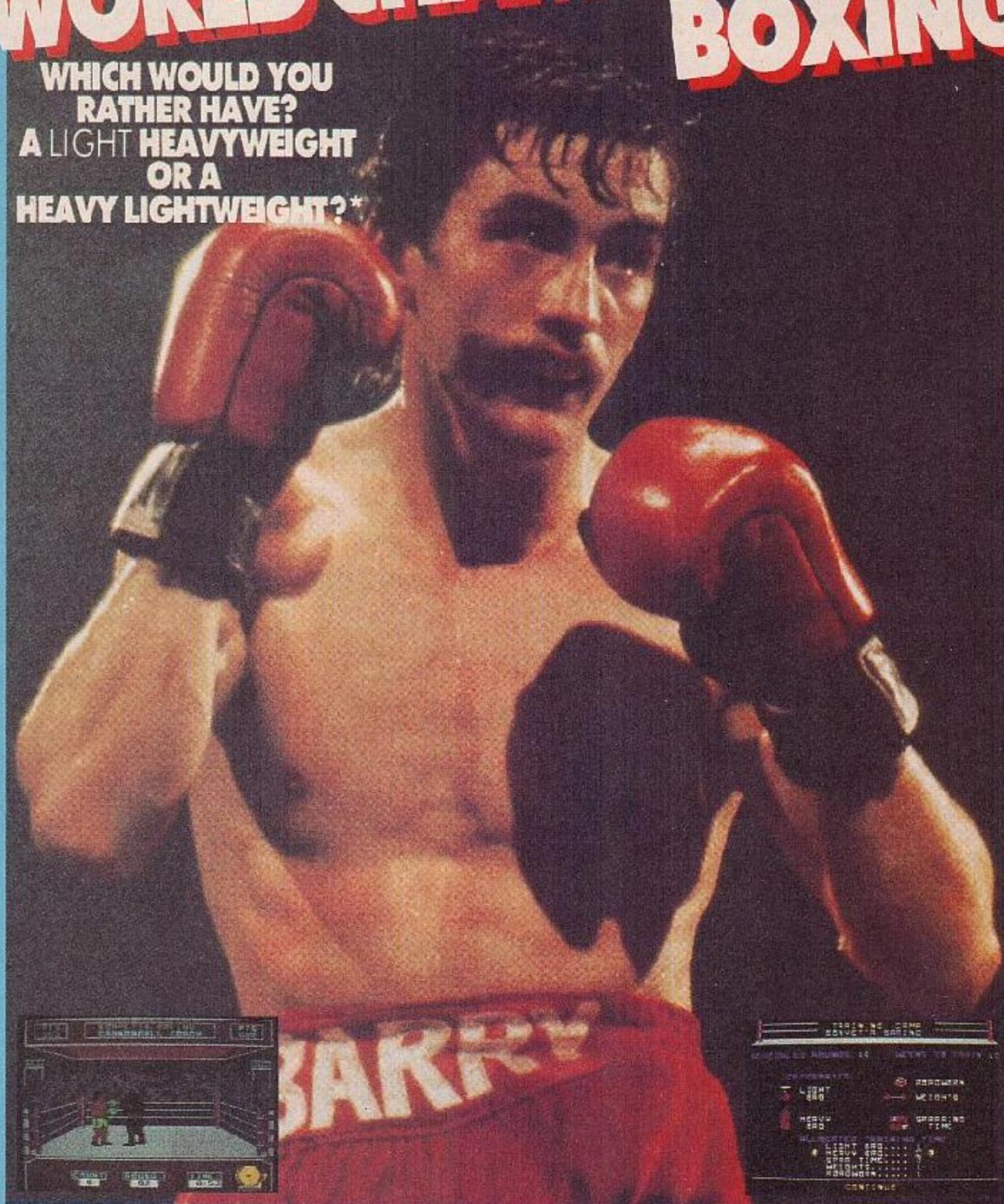
Zorro lets you swashbuckle like Douglas Fairbanks Senior. As champion of the common people you swordfight your way across screen after screen of oppressors.



You are at the Guild's entrance
Do you wish to...
Have all curses removed
from your weapons?
Join our Guild
save
Your coins in copper 129

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 —

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

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.

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 nth record of a file of 100 records called "data" in which each record is 24 bytes long. The new nth record is in the string n\$.

```

9000REM Alter a record (Sinclair
r 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).

```

9000REM Alter a Record (MIRA)
9010OPEN#5;"m":1;"data" : RND#5
9020POINT#5;.25*(n-1) : PRINT#5;
n*
9030RESTORE#5
9040RETURN
  
```

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
  
```

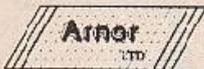
Point followed by a stream identifier and a numeric expression separated by a comma (e.g. Point: #5, n) moves the internal pointer of the file attached to the given stream to the nth byte of the file, where the next Input#, Print#, or Inkey\$# will take place, provided that the file has been opened with 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 f(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 "read" 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			
0	2	"output" routine			
2	2	"input" routine	42	2	
4	1	channel specifier "M"	44	10	unused (see text)
5	2	shadow Rom output			10 bytes of cartridge name
7	2	shadow Rom input	54	1	header checksum
9	2	length of this Chans area (595)	5	12	12 bytes of data pre-ambule
11	2	current buffer position (0-512)	67	1	bit 0—reset—not a header
13	1	position of record in file (0-255)			bit 1—reset—not end of file
14	10	10 bytes of filename			set—end of file
24	1	bit 0—reset—"read" file set—"write" file			bit 2—reset—a Print file
25	1	bits 1-7—unused (all reset)			set—not a Print file
26	2	drive number (1-8)			file
28	12	drive map location			bits 3-7 unused (all reset)
		12 bytes of header pre-ambule	68	1	record number (0-255)
40	1	bit 0—set to signal header	69	2	number of bytes in record (0-512)
		bits 1-7—unused	71	10	10 bytes of filename
41	1	sector number (0-255)	81	1	checksum
			82	5*2	buffer data
			594	1	data checksum



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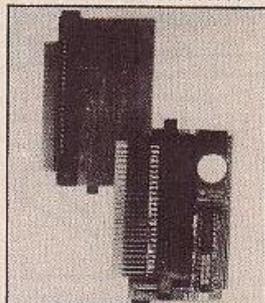
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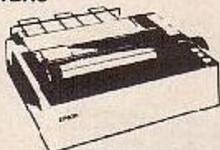
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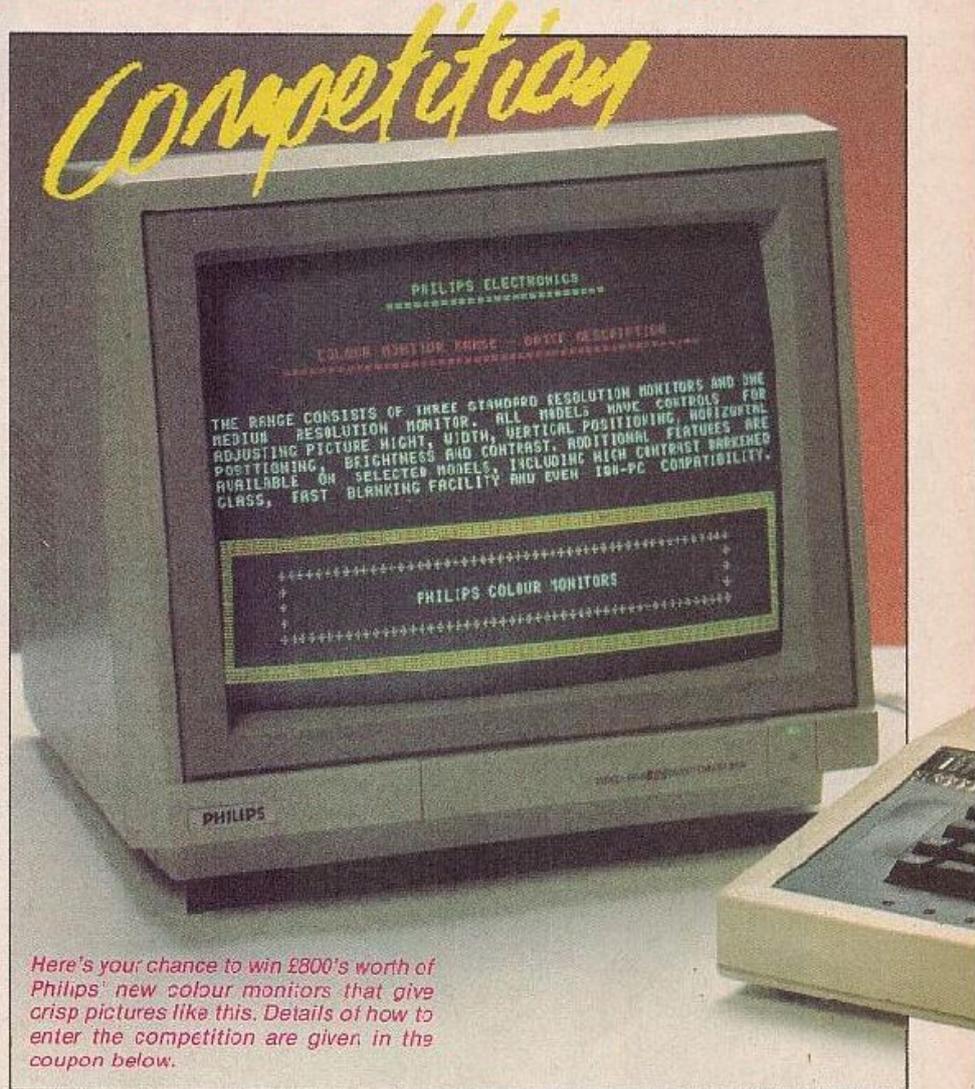
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a second egg is introduced. My first major problem was to find a workable algorithm for the movement of the egg. I ended up partly pinching an idea I had seen in a friend of mine's game "Monsters" which he wrote some time ago on the Atom. The basic 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 Freda — 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#4E:LDY#0:.D LDA(&A5),Y:AND#15:STA(&A0),Y:INY:CPY#16:BNE D:.E LDA(&A6),Y:AND#15:STA(&4D),Y:INY:CPY#32:BNEE: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 LDA(&4D),Y:STA(&A6),Y:INY:CPY#32:BNEG:RTS
280.LADDR JSRf1oor:CPX#&FF:BNESS:LDA#76:CMF#A3:.SS BEQend:LDA#&FF:STA#A5:LDA#A3:CMF#75:EMInoup:JSRdown:JMP NDw:.noup JSRup:.NDw:RTS
290.up SEC:LDA#A0:SBC#&40:STA#4D:LDA#A1:SBC#1:STA#4C: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:LDA#A1:ADC#3:STA#4E:JSRcheck:CPX#&FF:BEQend:DEC#A3:CLC:LDA#A0:ADC#&40:STA#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.floor LDA#A3:.ID CMF#0:BEQon:SEC:SBC#7:CMF#22:BP off:JMPD:.off LDX#0:RTS:.on LDX#&FF:RTS
340.SAME LDX#0:LDA#D58:CMF#0:BEQa1:RTS:.a1 LDX#&FF:RTS
350.I% LDY#0:.AaA LDA#D70,Y:STA#A0,Y:INY:CPY#8:BNEAaA:JSRrout:LDY#0:.BbB LDA#A0,Y:STA#D70,Y:INY:CPY#8:BNEbbB

```

```

360LDA#BA:CMF#0:BEQRWR:
370LDY#0:.CcC LDA#D78,Y:STA#A0,Y:INY:CPY#8:BNECcC:JS Rrcut:LDY#0:.DdD LDA#A0,Y:STA#D7B,Y:INY:CPY#8:BNEdD:. RWR RTS
380: NEXT
390MODE4
400PRINTTAB(14,2):"Burger King!"
410PRINT:"You (GORDON BLUE the chef) must go round the 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 trying 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 gets progressively harder as you slowly loose your advantages over FREDa,your advantage being the ability to drop one level without killing yourself,drop any further and it's bye bye."
440PRINTTAB(5):"The controls for Gordon are :-"
441PRINT:
450PRINT'Z - Left , X - Right , * - UP , / - DOWN"
460VDU2B,0,31,39,28,17,129,17,0,12
470CHAIN"

```

```

290JSRSEE:CPX#&FF:BNEgs:LDA#&FF:STA#D04:INC#D05:DEC#76:JSRdrop:JMPHY:gs LDA#D05:CMF#8:BMiHe:RTS:.he LDA#0:STA#D04:STA#D05:.hy
300LDA#D59:CMF#&FF:BEQYs:LDA#D58:CMF#0:BNELYS:JSRsee:.uYS
310LDA#D04:CMF#&FF:BNEHYs:JMPno1e:.HYS
320LDA#D02:CMF#38:BEQnor1:LDA#&B1:LDX#&BD:LDY#&FF:JSR#FFF4:CPY#&FF:BNEori:JSRrub:LDA#D03:CMF#0:BEQrig:LDA#M1 MOD256:STA#70:LDA#M1 DIV256:STA#71:LDA#0:STA#60:LDA#0:STA#D03:.rig
330JSRani:INC#D02:CLC:LDA#72:ADC#8:STA#72:LDA#73:ADC#0:STA#73:JSRread
340.nor LDA#D02:CMF#0:BEQno1e:LDA#&B1:LDX#&9E:LDY#&FF:JSR#FFF4:CPY#&FF:BNEori:JSRrub:LDA#D03:CMF#1:BEQ1e:f1:LDA#M2 MOD256:STA#70:LDA#M2 DIV256:STA#71:LDA#0:STA#60:LDA#1:STA#D03:.1e1
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:JSR#FFF4:CPY#&FF:BNEnoup:JSRCEH:CPX#&FF:BNEonup: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:JSR#FFF4:CPY#&FF:BNEnoup:JSRcheck:CPX#&FF:BNEncow:DEC#76:JSRrub:LDA#D03:CMF#2:BEQow:LDA#M3 MOD256:STA#70:LDA#M3 DIV256:STA#71:LDA#0:STA#60:LDA#2:STA#D03:.ow
390JSRani:CLC:LDA#72:ADC#&40:STA#72:LDA#73:ADC#1:STA

```

```

&73:JSRread
400.noup
410LDA#D58:CMF#8:BNERz:RTS:.Rz JMPstart
420.rub LDY#0:.A LDATemp,Y:STA(&72),Y:INY:CPY#16:BNEA:CLC:LDA#72:ADC#&30:STA#4D:LDA#73:ADC#1:STA#4E:.A1 LDATemp,Y:STA(&4D),Y:INY:CPY#32:BNEA1:RTS
430.ani LDX#50 MOD256:LDY#50 DIV256:LDA#7:JSR#FFF1:LDA#60:CMF#1:BEQB:CLC: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:LDA#0:STA#60:RTS
450.delay LDX#80:.D LDY#90:.E DEY:BNEE:DEX:BNEB: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 LDA(&4D),Y:STATemp,Y:INY:CPY#32:BNEB: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:RTS
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#4E: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:BN C:CLC:LDA#72:ADC#&30:STA#4D:LDA#73:ADC#1:STA#4E:.b LDA(&70),Y:STA(&4D),Y:INY:CPY#32:BNEb

```

(continued on page 71)

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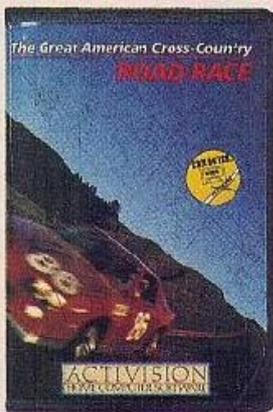


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(continued from page 69)

```

520RTS
530.scr01 J9R8CORE: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
:INY:STA (&4D),Y:DEY:DEY:CPY#FF:BNE:LDY#0:TYA:STA (&4D
),Y:LDA#4D:STA#6D:LDA#4F:STA#6E:CLC:LDA#4D:AUC#&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:CMF#0:BEQ#W:JSR#scr01:JSR#W
ER:.qw RTS
570.WHER LDY#0:LDA#18:CMF#D02:BPLover:LDY#4:.over LD
A#21:.OV STA#4D:LDA#76:CMF#4D:BEQ#oun:INY:SEC:LDA#4D:S
BC#7:CMF#249:BNE#V:RTS
580.foun LDA#D50,Y:STA#4D:AND#240:CLC:LSRA:LSRA:LSRA
:LSRA:TXA:INX:TYA:CLC:ASLA:ASLA:ASLA:ASLA:STA#4E:LDA#4
D:AND#15:ORA#4E:STA#D50,Y:RTS
590.BURG CPY#3:BEQ#ew:CPY#7:BEQ#ew:TYA:TXA:INX:LDA#D
50,Y:AND#15:STA#A0K,X:.rew TYA:PHA:LDA#D50,Y:STA#4D:_D
X#2:LDA#18:CMF#D02:BPLove:LX#15
600.OVE LDA#D50,Y:AND#15:STA#D50,Y:CPY#0:BEQ#1:CPY#4
:BEQ#1:CPY#1:RFO#2:CPY#5:BEQ#2:CPY#2:BEQ#3:CPY#6:BEQ#4
: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
620S1X#90:STY#91:JSR#f11:PLA:TYA:STY#92
630.print LDA#D50,Y:AND#15:CMF#0:BEQ#1:CMF#1:BEQ#2:C
MP#2:BEQ#3:CMF#3:BEQ#4
640.h1 LDA#130:STA#950: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#138:STA#962:LDA#2:STA#4D:LDA#12
8:STA#4E:.b5 LDA#17:JSR#FFEE:LDA#4D:JSR#FFEE:LDA#17:JS
R#FFEE:LDA#4E:JSR#FFEE
660LDA#31:JSR#FFEE:LDA#90:JSR#FFEE:LDA#91:JSR#FFEE: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
40VDU23,145,0,255,255,255,255,31,15
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
50MODE3:VDU23;B202;0;0;0;0;19,1,4,0;
60DMA#(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:1:lives=3:SCX=0:FORT=0TC4:?"&B0=0:NE
XT
100RESTORE70:FORTX=0T03:READD:COLOURD:PRINTTAB(8,TX+
14);A#(TX);:NEXT
110FORG=0T01000:NEXT:SOUND0,1,4,4
111VDJ5:GCOLOR,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=0T01000:NEXT:CLS
140FORTX=0T03:TX?(GX-224)=0:NEXT
150FORTX=0T07:AX=TX:IF AX>3 AX=(AX-4)
160TX?&D50-AX:TX?&A50-AX:NEXT
170FORTX=0T03:TX?(GX+224)=0:NEXT:FORTX=1T03:VDU19,T
X,0;0;:NEXT
180COLOUR1:FORTX=3T024STEP7: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);" "
210FORTX=1T09:PRINTTAB(1,TX);CHR#129TAB(7,TX);CHR#12
9TAB(18,TX);CHR#129:NEXT
220FORTX=8T016:PRINTTAB(5,TX);CHR#129:IF SCX<4 THEN
PRINTTAB(13,TX);CHR#129
230NEXT
240FORTX=15T023:PRINTTAB(1,TX);CHR#129TAB(7,TX);CHR#
129TAB(18,TX);CHR#129;:NEXT
250IF SCX=0 AND SCX<4 THEN FORTX=8T016:PRINTTAB(7,TX
);CHR#129:NEXT
260IF SCX>3 THEN FORTX=1T09:PRINTTAB(13,TX);CHR#129
:NEXT
270RESTORE70:FORTX=3T024STEP7: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);l
ives:COLOUR2:PRINTTAB(8,29);"Score"
300RESTORE318:FORTX=1T03:READD:VDU19,TX,D:0;SOUND#1
1,1,TX#70,5;FORG=0T01000:NEXT
310DATA4,3,7
320CALLJX
330*FX15,0
340IF ?&D5B=0 THEN 390
350COLOUR128:SOUND0,1,255,255

```

```

DY#0:.resY LDA#960,Y:JSR#FFEE:INX:CPY#3:BNE:resY:INL#D5
8:RTS
670.3rUB LDA#17:JSR#FFEE:LDA#128:JSR#FFEE:LDA#31:JSR
#FFEE:TXA:JSR#FFEE:INX:TYA:JSR#FFEE:LDA#32:JSR#FFEE:JS
R#FFEE:JMP#FTCC
680.MOBJ LDX#90:LDY#91:DEY:JSR#UB:LDY#92:INC#91:JSR
print:JSR#OT:LDA#D58:CMF#4:BNE#5a:JSR#EE3:.h5a LDA#D58
:CMF#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:CMF#FF:BNE#S:INC#92:_DY#92:LDA#D50
,Y:ORA#96:STA#D50,Y:LDA#0:STA#D59:JMP#out:.h6 LDY#0:.jh
LDA#D50,Y:AND#240:ORA#A50,Y:STA#D50,Y:INX:CPY#8:BNE#j
h:RTS
700.see3 LDA#31:JSR#FFEE:LDA#90:JSR#FFEE:LDA#91:INX:
TXA:JSR#FFEE:LDA#135:JCR#FFF4:CPX#128:BEQ#z:LDA#8FF:ST
A#D59:STA#D5A:.qz RTS
710.BOT LDA#25:CMF#91:BPLTY:STA#31:JSR#FFEE:LDA#90:
JSR#FFEE:LDY#91:INX:TYA:JSR#FFEE:LDA#136:JCR#FFF4:CPX#
32:BEQ#YS:LDA#7:STA#D58:INC#D5B:JSR#SCORE:JSR#SCORE:JSR#
CORE:JSR#SCORE:.tYS RTS
720.fi11 LDA#D5A:CMF#FF:BEQ#z:LDA#17:JSR#FFEE:LDA#1
28:JSR#FFEE:LDA#17:JSR#FFEE:LDA#1:JSR#FFEE:LDA#31:JSR#
FFEE:TXA:JSR#FFEE:TYA:JSR#FFEE:LDA#128:JSR#FFEE:JSR#FF
EE:JSR#FFEE:.az LDA#0:STA#D5A:INC#91:RTS
730.sou LDA#7:INX#502:MOD256:LDY#502:DIV256:JMP#FFF1
740.florr LDA#A2:CMF#D02:BNE#A1:LDA#A3:CMF#76:BNE#A1
:LDX#FF:RTS:.aA1 LDY#A2:INX:CPY#D02:BNE#S:LDA#A3:CMF#
76:BNE#S:LDX#FF:RTS:.iS DEY:DEY:CPY#D02:BNE#S:LDA#A3:
CMF#76:BNE#S:LDX#FF:RTS:.sI RTS
750.SCORE LDA#17:JSR#FFEE:LDA#3:JSR#FFEE:CLC:LDA#B0:
ADC#5:STA#B0:CMF#10:BNE#SHOW:LDA#0:STA#B0:INC#B1:DA#B1
:CMF#10:BNE#SHOW:LDA#0:STA#B1:INC#B2:LDA#B2:CMF#10:BNE#
HOW:LDA#0:STA#B2:INC#B3:LDA#B3:CMF#10:BNE#SHOW:LDA#0:ST
A#B3:INC#B4
760.SHOW LDY#0:LDX#12:.vinc LDA#31:JSR#FFEE:TXA:JSR#
FFEE:LDA#31:JSR#FFEE:LDA#B0,Y:CLC:ADC#48:JSR#FFEE:INX:
DEY:CPY#5:BNE#vinc:RTS
770:NEXT:CHAIN"

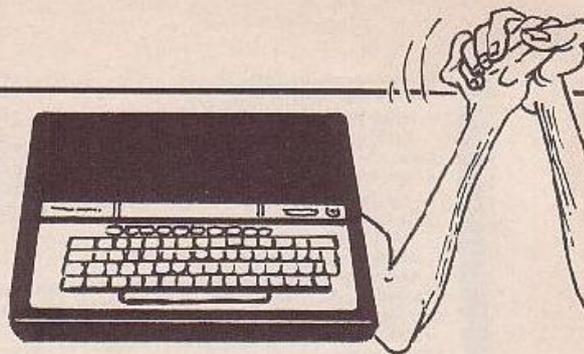
```

```

360FORTX=0T0:FORG=0T030:NEXT:VDU19,0,1;0;:SOUND#1
2,3,0,20:FORG=0T030:NEXT:VDU19,0,0;0;:NEXT:*FX#1,5
370lives=lives*-1:IF lives=-1 THEN 420
380COLOUR128:CLS:GOTO150
390FORTX=0T0255STEP5:SOUND1,1,TX,1:NEXT
400SCX=SCX+1:VDU28,0,31,19,25:FORTX=1T08:PRINTTAB(0,
0);CHR#11;:SOUND#11,1,TX*20,15:NEXT:VDU26:*FX#21,5
410CLS:GOTO100
420CLS:COLOUR2:PRINTTAB(5,16);SIRING$(10,CHR#133);:A
#="GAME OVER":COLOUR1:FORTX=1T0LENA#
430PRINTTAB(TX+4,16);MID$(A#,TX,1)
440SOUND#11,2,TX+25,6:FORG=0T0203: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,
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=844:?"&D74=0:?"&D72=1:?"&D02=
39
550FORTX=0T05000:NEXT
560FORTX=0T017:CALLJX
570SOUND#11,1,25,10
580FORG=0T050:NEXT,
590FORTX=0T0700:NEXT:COLOUR2:FORTX=0T010
600PRINTTAB(0,TX);A#(0)
610FORTX=0T060:NEXT:SOUND#11,2,TX*20,10
620PRINTTAB(8,TX);" ";:NEXT
630PRINTTAB(8,TX);A#(0):COLOUR3:PRINTTAB(7,10);"\'TA
B(4,9);"AHH"
640FORTX=0T013000:NEXT
650CLS:RESTORE70:FORTX=0T03:RFADD: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);"DROM"
670FORTX=0T027:PRINTTAB(0,0);CHR#11:SOUND#11,1,TX#8,
1:FORG=0T050:NEXT,
680PRINTTAB(9,31):SOUND0,-15,5:FORG=0T090:NEXT
690PRINTTAB(0,0);CHR#11:SOUND0,-15,5:FORG=0T090:NE
XT
700FORG=0T0100:NEXT:A#=#"IN BRIAN LEWIS'S":B#=#"ALL NE
W!":C#=#"BURGER KING!"
710FORTX=1T0LENA#*PRINTTAB(1+TX,10);MID$(A#,TX,1);:S
OUND#11,2,TX*20,1:FORG=0T090:NEXT,
720COLOUR2:FORTX=1T0LENA#*PRINTTAB(5+TX,12);MID$(B#,
TX,1);:SOUND#11,2,TX*20,1:FORG=0T060:NEXT,
730COLOUR3:FORTX=1T0LENA#*PRINTTAB(3+TX,14);MID$(C#,
TX,1);:SOUND#11,2,TX*20,1:FORG=0T060: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 adventured 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 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 — JMZ — This is a conditional jump instruction which takes two arguments, making its format JMZ 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 JMZ.

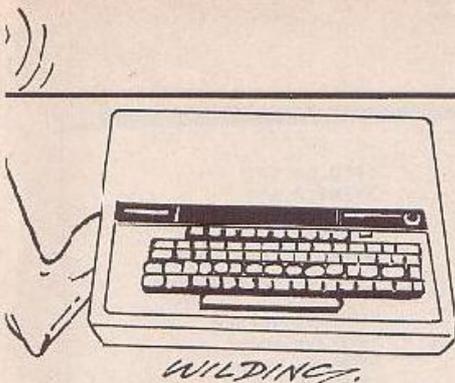
6 — JMG — As above, except that a jump occurs if the contents of location b is greater than zero.

7 — DJZ — Takes two arguments, making

```

100N ERROR RESTORE:VDU 170LDA &72          410LDA PC:CLC
26:CLS:CFAR:RIN        180RCL A:STA &72          420ADC argL,X
20DIM code 1000.table 190LDA &73          430STA argL,X
17,arg B,PC(1),IN$(B),B#( 200RCL A          440LDA PC+1
1)                    210STA &73          450ADC argH,X
30DIM mode 1.gover 0,a 220CLC          460STA argH,X
rgL 1,argH 1,mask 1,data 230LDA #base MOD 256 470ISE sizeck
i,PC 1                240ADC &72          480PLA:TAY
40current=&74:mask=15 250STA &72          490RTE
:mask?1=240           260LLA &73          500.getbyte LDA data
50DIM row 0,col 0,flag 270ADC #base DIV 256 510STA &70
0                    280STA &73          520LDA data+1
50DIM base 11999,p$(1, 290RTS          530STA &71
100),E(1),ad(1)       300.get LDA (current),Y 540LDY #2
70FUR LL=0 IU 2 STEP 2 310BIA argL,X 550LDA (&70),Y
30P%=code            320TVA:PHA          560STA data
90I OPT LL           330LDY #3          570INY
100.convert LDA &70   340LDA (current),Y 580LDA (&70),Y
110CLC:ROL A          350AND mask,X        590STA data+1
120STA &72            360CPX #1          600RTS
130LDA &71            370BNE .rae         610.start LDA PC
140ROL A              380CLC:ROR A:ROR A 620STA &70
150STA &73            390ROR A:ROR A      630LDA #0
160CLC:DEY            400.trans STA argH,X 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.

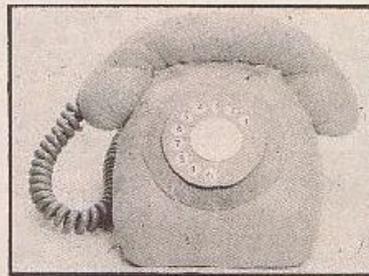
The instruction therefore moves the data 0 locations beyond the instruction — i.e. the instruction itself — to a position 1 location beyond the instruction i.e. in the next location. Incidentally, this is an example of a complete one-line program — when the instruction has been executed, the computer 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 — Ralcode 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          890BNE n11          1130LDA argH,X
660LDA PC+1          900LDA #1            1140STA &71
670STA &71           910.n11 STA mode+1  1150JSR convert
680JSR convert       920LDA (current).Y   1160LDA &72
690LDA &72           930AND #15           1170BIA cata
700STA current       940CMP #1            1180LDA &73
710LDA &73           950BCC end2          1190STA data+1
720STA current+1     960CMP #5            1200JSR getbyte
730LDY #0            970BCS end2          1210LDA data
740LDA #48           980LDX #0            1220CLD
750AND (current),Y  990LDY #1            1230ADC PC
760CMP #32           1000.rep LDA mode.X  1240STA argL,X
770BNE n0            1010CMP #1           1250LDA data+1
780LDA #2            1020BNE n0           1260ADC PC+1
790.n0 CMP #15       1030JSR get           1270STA argH,X
800BNE n1            1040JMP finish      1280JSR sizeck
810LDA #1            1050.end2 LDA #1    1290.finish CFX #1
820.n1 STA mode      1060STA qover        1300BED exec
830LDA #192          1070RTS              1310LDY #2
840AND (current),Y  1080.nd CMP #2       1320INX
850CMP #128          1090BNE irm          1330JMP rep
860BNE n11           1100JSR get           1340.imm LDA.(current),Y
870LDA #2            1110LDA argL.X       1350STA argL,X
880.n01 CMP #54      1120STA &70          1360TYA:PHA

```

(continued on next page)

(continued from previous 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.getaro 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 &73
2170STA &77
2180RTS
2190.mov LDA mode
2200BEQ immd
2210LDX #0
2220JSR zp
2230INX
2240JSR zp
2250LDY #0
2260.agn2 LDA (&74),Y
2270STA (&75),Y
2280INY
2290CPY #4
2300BNE agn2
2310JSR inc
2320INC flag
2330RTS
2340.immd LDX #1
2350JSR zp
2360LDY #0
2370TYA
2380.agn3 SIA (&76),Y
2390INY
2400CPY #2
2410BNE agn3
2420LDA argL
2430STA (&76),Y
2440INY
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
2670INY
2680LDA argH
2690STA (&76),Y
2700JSR .nc
2710INC flag
2720RTS
2730.sub LDX #0
2740JSR getarg
2750LDX #1
2760JSR zp
2770JSR getarg
2780SEC
2790LDA argL+1
2800RRC argL
2810STA argL
2820LDA argH+1
2830SEC argH
2840STA argH:LDX #0
2850JSR sizeck1
2860JMP thn
2870.sizeck1 LDA argH,X
2880CMP #11
2890BCC 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.jmz 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
3300LDA argH+1
3310SBC #0
3320STA argH+1
3330JSR sizeck1:LDY #2
3340LDA argL+1
3350STA (&72),Y
3360INY
3370LDA argH+1
3380STA (&72),Y
3390LDA &72
3400STA &76
3410.LDA &73
3420STA &77
3430JMF in
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
3620LDA col
3630LDA #(HIMEM+160) MOD 256
3640STA &80
3650LDA #(HIMEM+160) DIV 256
3660STA &81
3670LIY #0
3680.agn LDA #150
3690STA (&80),Y
3700JSR .inc1
3710LDA #255
3720STA (&80),Y
3730LDA col
3740LDA row
3750CMP #19
3760BEQ rrow
3770CLC
3780ADC #1
3790STA col
3800JMP agn
3810.rrow LDA #0
3820STA col
3830.LDA row
3840CMP #18
3850BCC 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.inc1 LDA &80
3980CLC
3990ADC #1
4000STA &80
4010LDA &81
4020ADC #0
4030STA &81
4040RTS
4050JNEXT LL
4060PROCinit
```

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 £63.96, 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 (XLC 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.

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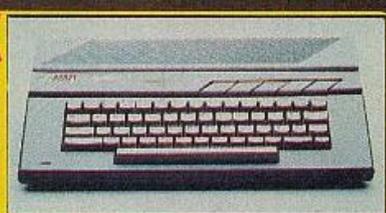
ATARI 800XL + DISK DRIVE PACK	
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FALL

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.

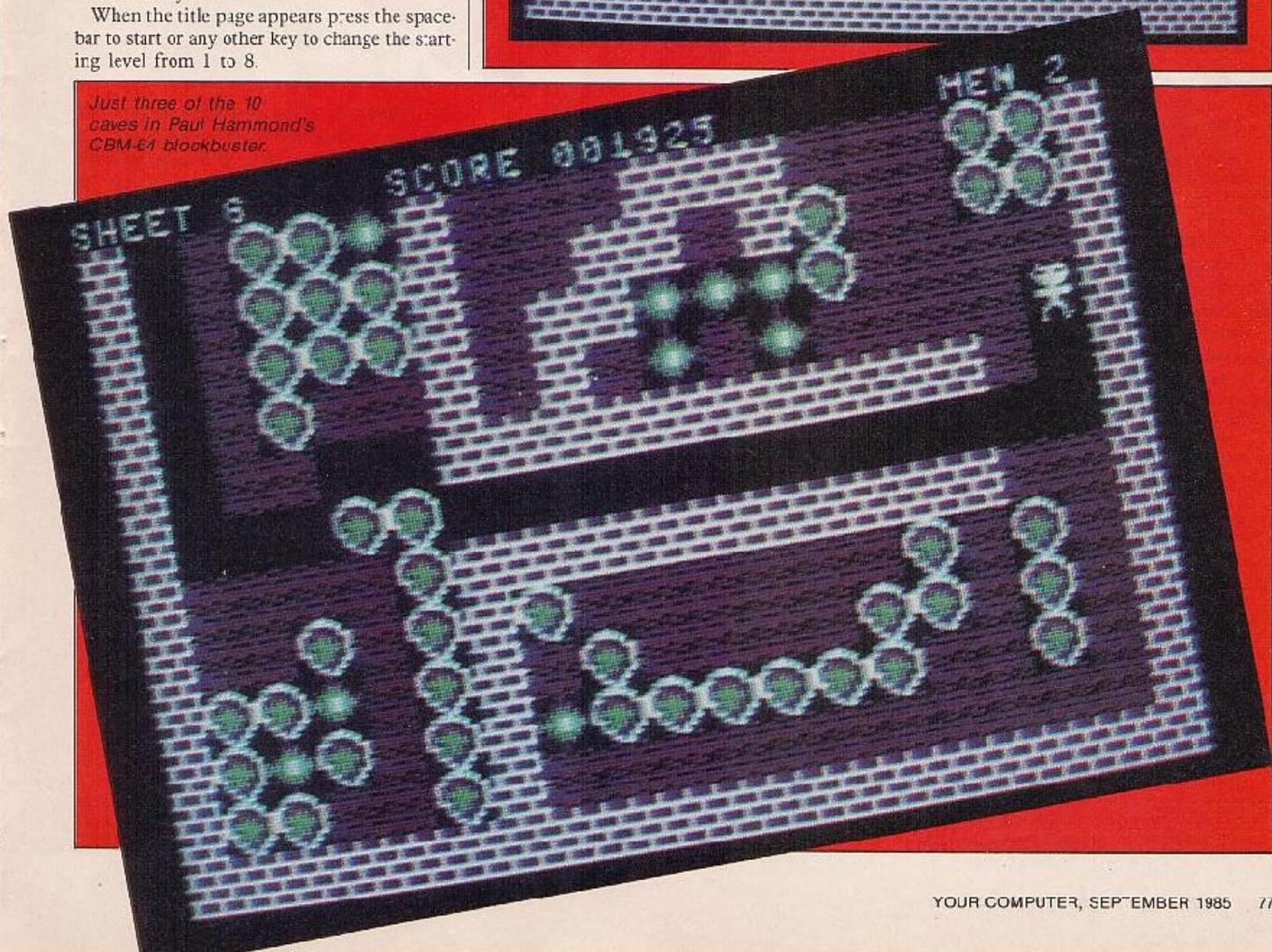
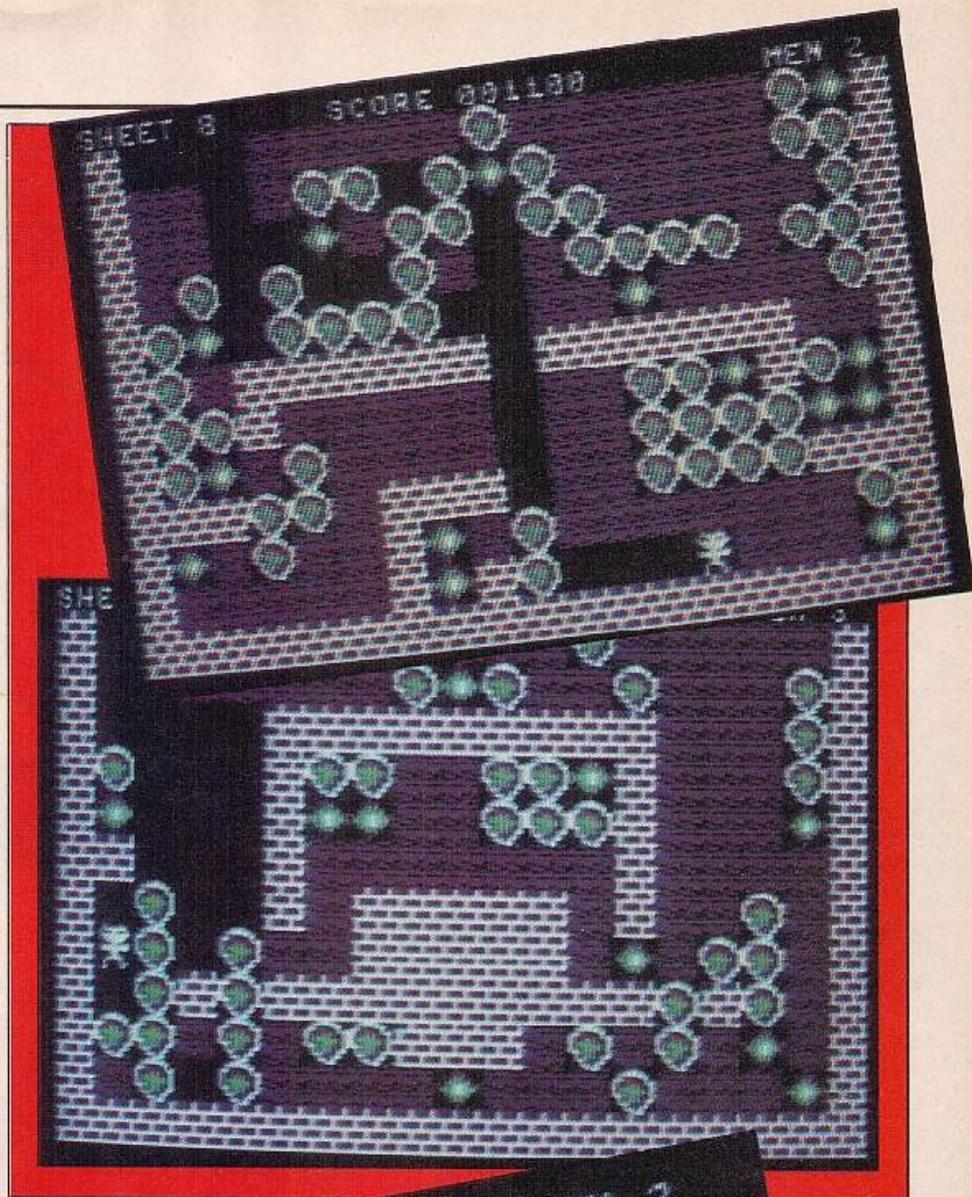
The game is keyboard only and the following keys should be used:

S = Up
X = Down
, = Left
; = Right
F1 = Dig

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.

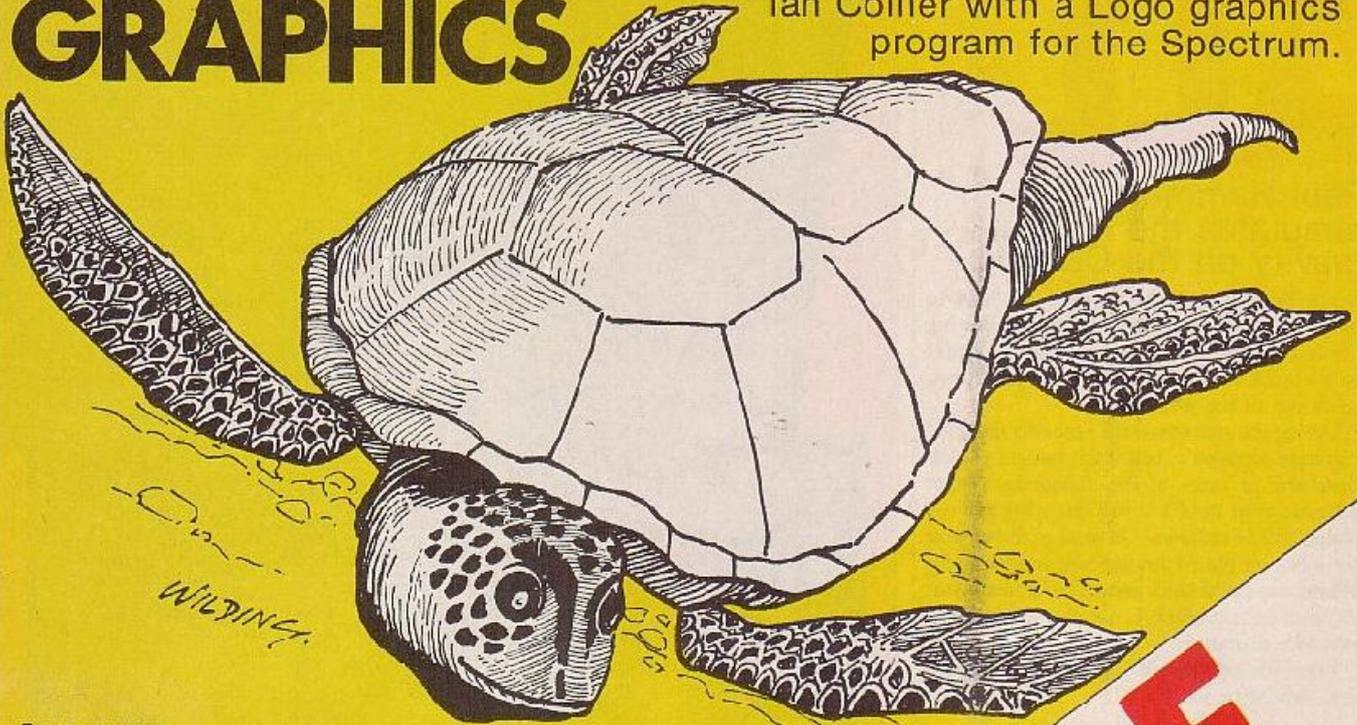
When the title page appears press the spacebar to start or any other key to change the starting level from 1 to 8.

*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"dir0:mov127.87:rep90:for45-
rep/2:rot30:end
30"for44:rot90:for10:fill125.85
.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:pol6.1
40.60
80 LET a=20:"mov130.87:dir5:st
a:fill140.100.2
90"bor2:inf4:cir60
100 INPUT ""
110"mov8.B:dir0:ink6:rep4:rep30
-10*(rep=1 OR rep=3):for4:iun4: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 (x,y).

Data loader.

```
10 DEF FN d(a#)=CODE a#-48-(32
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
f225f5c21d77ae52a535c2b1e22e44A1
d384be7fe2e2819237ecdb618fe0d2Ee
bfe2220032318e4fe3a20ec23fe2e20e
```

722545c0603d1e7"

```
110 DATA "6965cbaf121310f9e7eb7
3237223e5cb7ecdb618fe0d20be23fe2
220f37efe3a28b4fe0d20ea18aee13c0
021d675225d5ccdb2283817233600233
60023224a752334"
```

```
120 DATA "5418002336022a5f5c225
d5cc92a4b55ce500010800cd5516e3224
b5cc12336b22336652336f018ce52455
03a595d11cc75d53a3a5cfe0b2013cd1
576210313cd3025"
```

```
130 DATA "7056200421cf12e5c3761
be13a3a5cfd3e00fcd302528043cc31
3132a5d5c225f5c225b5cc3bd12f3760
0ff2a3d5ce5e5ed733d5c1cd3275e12
22d5cfdcb007ec0"
```

```
140 DATA "670618c7df2b7efe22c28
a1c225d5cc30252807cd4d0df43656f
8off110677e50c03e7cbeaf4f1ab922061
310f5c11870e1225d5c13131310fd1
a5720e1e7fe20"
```

```
150 DATA "57551ecd3025063a29070
622237ecdb618fe222807fe0d2803b82
0f0225d5c183dcd302520c0603dfefe0
```

dca8a1ce710f7182b:1d77ae50603cba
f4f1ab9200713e7"

```
160 DATA "742910f5c1180fe1225d5
c13131310fd1aa720e2cf18eb4e23460
3cd407a1812e71ad5cdf57fe1235e235
6ebcd3025c42c16cd541fd27b1bdfefe0
dc8fe3aca4976fe"
```

```
170 DATA "616622c28a1ce7c9a7c84
7c5cd821cfe2c2001e7c110f4c944495
2017c78434952019e78424f5802c8784
64f52010279424f5201942246494c036
677504f4c032379"
```

```
180 DATA "5401494e4b01f6794a554
d01fe79524f5401177a444f56022f7a5
04c4f02377a53435202517a524550016
f7a454e4400807a43414c013d7a3e10d
7cd452dd7cd0723"
```

```
190 DATA "704311010121fe00cd2d7
87cfa203051e60ffe033061cd6678798
34cd08/B28e/cbb5c0at935f814f7a8
047cd0878280a79834fcd087820f818c
a21ff079934fcd"
```

```
200 DATA "873708782016cd2d787cf
e1038f8c5d5af92573047cd7377d1c11
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#>
"9")
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=L TO 3
40 READ a#: LET tot=VAL a#( TO
4): LET a#=a#(5 TO )
50 LET l=FN h(a#): LET h=FN h(
a#(3 TO 4))
60 IF NOT l AND NOT h THEN GO
TO E0
70 LET to=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
c75dd75e87525764b76a276ca76d276e
d760a77107716771c7728772e7734773
a77407746774c77"
110 DATA "5728527758775e7764777
7785778b779b77a377a077b577c477d
877f177fa77067828783378507887789
978067914792479"
120 DATA "568627795a79717981798
b799c79ae79bd79c379d179da79e079e
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 a=0: FOR x=1 TO LEN a#:
LET a=a+1: IF a=4 THEN PRINT "
":
50 IF a#(x)="-:" THEN PRINT TAB
12: 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 : "mov128.00:d:r0
145 LET xx=FN x( )
150 LET a=x1
160 "cal:
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).
- FLO, 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.

```

377c1e1c17ce60f67cb85188ec5e5d57
88247af935f814f"
210 DATA "8383cd08787b20f821fe0
0cd7377d1e1c17ce6f067cbcdc373777
93c281b3d281878a72814faaf2810e5c
5cdaa2247047e0710fde601c1e1c9cd6
678af3cc9c5c578"
220 DATA "91828247cd087887f5adc
b4f280124e6fd6ff1b56f87f6fba56fd
1c1c5d5789247cd0878f5adcb4728047
cc610677de6fe6ff1b56fd1c1c9c5d5e
5cdaa2247043e01"
230 DATA "67930f10fdb677cddb0be
1d1c1c9efa3043440b0005a053811b97
acde033ef3120011f020230010a00eb1
1b7aadb0c93a7d5cccd282def01383a7
e3ccd282def0138"
240 DATA "74982a7d5ce53a8f5c5f5r
d2d23f1328f5ce1227d5cfd3656f8c9e
fd102383a7d5cccd282def03e1383a7e5
ccd282def0338cd0723c50600=delta24c
1c50e00c0ba24c:"
250 DATA "7596c5af9257af935f0b0
0c0ba24c10e00c3ba24ef3:3821be7ac

```

```

dc033ed53655cef04013821c37acdc03
3ed53655cef0430c3b72421b97a11c07
a010f00edb0efc4"
260 DATA "638302c502382a7d5ce57
cd2824e17dcd282defc3342c00035e0
301e403010524e3e50337a3a30f040f3
811b97acdc033efe5e438cd0723c5ef3
120011f020238eb"
270 DATA "698411be7a010a00edb0c
12a7d5c7d91c5e5dcf179cd282de1c17
c90dcf179cd282def31040131040f280
238eb11af7acdc033ef31a30105310f3
10f0233eb11b47a"
280 DATA "8030ccc033cdd52d47c5e
f3158e21af7acdc033cd0279ef31313
E010a00a7ebcd42eb21b47aadb0ef0f3
E11b97acdc033cd8c78c110d221c87a1
1b97a010f00edb0"
290 DATA "8672c92f3c2effc93e10d
7cdc52dd7c94d3556ff21915c7e5c9c
6b6c402794f32915f4d3656f8c9efa
3043440b0005a053138eb21b97acdc03
3ef0f38c38678cd"
300 DATA "74730723ed437d5cc9cd0

```

```

723c3e522cda22d2a5d5ce50bed435d5
ccd4976e1225d5cc93e10d7cdd52dd73
e11d7cdd52dd73a8f5c2100581101580
1b02777eds0c9cd"
310 DATA "9265d52d2ada75772a5d5
ce3f511841dc5e9e1c178fe1d2804c5e
5c-f00f:3ded5bda75122809d1d545c5e
d535d5ce9d1c17afe1d2009f1f5d5ed5
bja7512e9d5e985"
320 DATA "50813b46736a81060a91c
1377bad2dbd07c1c5aed7e31d0f5498
77bad2dbd07c1c5aed7e31d0f549414
101e50000000000000000000000000
0000000000000000"
330 DATA "355r000000000000000000
000000000000000000000000000000
000000007c0db228da2e1c235e2356e01
77e2323225f5c2uf002806cd32:6233
62de1e5237ef022"
340 DATA "72072806cd5216233622e
1e523cda7112a545c225b5ce1e5225d5
cfdcb30a6f0cb01becd49762a5b5c225
d5cfdcb01fe2a5:5c2b2bd1a7ed52eb4
44d722b730c900"

```

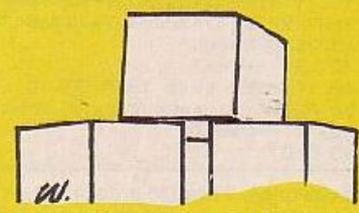
BASIC

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



This program is available on Telsoft.

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



P R O G R A M

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.

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/Swap 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

```

23 REM *****
23 REM ** MACRO EDITOR EXTENSION **
23 REM ** (L)ADER G.HATTO '85 **
23 REM **
23 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 460 (* READ A DATA
LINE *) : READ CHECKSUM
180 IF SUMO CHECKSUM THEN PRINT "CHECKSUM ERROR IN "FN
LINENUMBER(A) : END
190 L = FN LINENUMBER(A) : PRINT L
200 IF ADDRESSOL+8 THEN PRINT "LINE NUMBER "L": NOT
IN ORDER" : END
210 NEXT COUNT
220
230 REM SAVE CODE TO DEVICE
240
250 REM DEVICE TARD=1 DISK=2
270 DEVICE = 1
280
290 S$="SYS7912"EDITOR EXTENSION":DEVICE,1
300
310 POKE232,PEEK1+INT(BEGIN/256)+256
320 POKE253,INT(BEGIN/256)
330 POKE783,252
340 POKE781,ADDRESS-INT(ADDRESS/256)+256
350 POKE782,INT(ADDRESS/256)
360
370 S$="SYS6496"SYS49152:END (* RUN EDITOR *)
380
390
400 SUM = 3
410 FOR I=1 TO 8:READ ENTRY1
420 GOSUB 480 (* CONVERT HEX BYTE *)
430 POKE ADDRESS,ENTRY
440 ADDRESS = ADDRESS+1 : SUM = SUM+ENTRY
450 NEXT I
460 RETURN
470
480 IF LEN(ENTRY1) < 2 THEN 570
490 A1 = RIGHT$(ENTRY1,2):GOSUB 530:ENTRY = V
500 A1 = LEFT$(ENTRY1,2):GOSUB 530:ENTRY = ENTRY+A1
510 RETURN
520
530 IF ASC(B) OR ASC(F) OR ASC(S) AND ASC(M) THEN 573
540 V = ASC(AB)-48*(ASC(S)-5)
550 RETURN
560
570 PRINT "DATA ERROR IN "FN LINENUMBER(A) : END
580
590 DATA 49152
600
49152 DATA 00,50,A2,C1,8D,82,83,8E,90B
49160 DATA 83,83,A9,3B,A0,C1,20,04,735
49168 DATA C1,20,21,C0,20,10,C0,A9,1851
49176 DATA C0,20,90,FF,30,20,EC,C9,1139
49184 DATA 60,A9,80,20,90,FF,A9,03,873
49192 DATA 8D,87,C0,20,96,C0,90,15,1856
49200 DATA EE,87,C0,AD,87,C0,C9,13,1378
49208 DATA 90,F1,A9,4A,A0,C0,20,04,1816
49216 DATA C1,A9,80,3D,87,C0,20,8B,1105
49224 DATA C0,60,8D,20,20,4E,4F,29,554
49232 DATA 44,49,53,4B,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 60,8D,20,20,44,49,53,43,376
49272 DATA 20,53,55,50,50,4F,52,54,645
49280 DATA 20,41,55,54,4F,2D,53,45,542
49288 DATA 54,20,54,4F,28,44,45,56,534
49296 DATA 49,43,45,20,23,60,A9,0F,468
49304 DATA AE,87,C0,A0,8F,28,8A,FF,1197
49312 DATA A9,83,A2,38,A0,C0,28,00,1091
49320 DATA FF,20,C0,FF,88,A9,0F,28,958
49328 DATA C3,FF,20,C0,FF,28,6A,08,1085
49336 DATA 55,49,2B,A9,71,F0,C0,20,867
49344 DATA 04,C1,4E,37,C0,A9,03,20,947
49352 DATA CD,BD,A9,0D,20,12,F,80,1169
49360 DATA AD,1B,C6,30,16,EE,18,C6,1091
49368 DATA A9,89,3D,1C,C6,EE,18,C6,1088
49376 DATA 20,7A,C3,20,A6,C0,CE,10,976
49384 DATA C6,10,75,60,90,EB,A9,1A,985
49392 DATA A2,C1,3D,00,83,EE,01,03,645
49400 DATA 60,A9,3B,A2,E3,ED,03,03,937
49408 DATA 8E,01,33,60,85,34,36,614
49416 DATA A8,00,B1,35,F0,EB,23,D2,883
49424 DATA FF,E6,35,30,F3,E6,36,D8,1481
49432 DATA EF,60,8A,30,8F,FD,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 00,40,0A,40,AD,1C,C6,23,722
49480 DATA 7F,A9,A9,80,20,CD,B0,A9,1861
49488 DATA 20,20,D2,FF,68,FA,6B,60,1003
49496 DATA A9,80,8D,1C,C6,20,68,A5,829
49504 DATA 86,7A,34,7B,20,73,03,AA,828
49512 DATA F0,EE,38,A2,00,20,79,00,081
49520 DATA DD,99,C1,30,8E,C9,43,F0,1294
49528 DATA 10,00,31,31,7A,F0,8D,C0,933
49536 DATA 3B,90,39,E8,00,66,D3,E5,111
49544 DATA 28,AC,90,A4,20,ED,9F,C1,1805
49552 DATA 48,8D,45,C1,48,20,73,00,838
49560 DATA 60,4F,4D,4C,40,24,51,C4,785
49568 DATA C2,C3,C4,C5,14,FA,B0,1424
49576 DATA 6B,C3,E9,93,8D,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 52,20,45,58,54,45,41,58,585
49608 DATA 49,4F,4E,20,20,47,43,27,474
49616 DATA 3B,35,8D,20,2D,2D,2D,321
49624 DATA 2D,2D,2D,2D,2D,2D,2D,368
49632 DATA 2D,2D,2D,2D,2D,2D,2D,368
49640 DATA 2D,2D,2D,2D,2D,2D,2D,368
49648 DATA 2D,2D,2D,2D,2D,2D,2D,368
49656 DATA 8D,8D,20,20,45,44,49,54,384
49664 DATA 4F,52,20,43,4F,4D,4D,41,558
49672 DATA 4E,44,53,20,4E,4F,52,20,537
49680 DATA 41,56,41,49,4C,41,42,40,572
49688 DATA 45,3A,2D,8D,0E,20,2D,29,294
49696 DATA 20,28,4F,20,2E,2E,2E,359
49704 DATA 2E,2E,2E,2E,2E,2E,2E,387
49712 DATA 4C,44,3D,20,20,20,23,20,317
49720 DATA 4D,2A,38,2E,54,45,53,54,569
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:PRINT FRE(0)-(FRE(0)<0)*65536;"
BYTES FREE"
```

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

```
M2 F$="PROGRAMNAME"+STR$(PEEK
(252)):
```

```
SAVE F$,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 OPEN4,4: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,0D,482
49752 DATA 20,20,20,20,20,4D,20,58,357
49760 DATA 2E,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 20,20,20,20,20,4C,20,5E,355
49792 DATA 2E,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 20,20,40,32,53,5,53,49,402
49824 DATA 4E,47,2E,2E,2E,2E,2E,44,433
49832 DATA 49,53,4B,23,43,4F,4D,4D,563
49840 DATA 41,4E,44,53,0D,20,2E,20,403
49848 DATA 20,20,24,20,53,5,52,49,454
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,20,50,20,20,51,20,200
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,02,00,0E,1C,638
49920 DATA 0E,20,F0,32,00,10,C5,30,969
49928 DATA 70,51,29,0F,0F,1C,C6,20,680
49936 DATA 73,00,F0,1E,98,45,A6,04,762
49944 DATA A6,7A,20,73,A5,20,7F,C3,955
49952 DATA B9,00,02,91,35,F0,05,C8,830
49960 DATA 0B,FC,50,F4,23,A6,C5,4C,1381
49968 DATA 74,A4,FD,1C,C6,20,A5,00,892
49976 DATA 09,00,ED,1C,C5,A9,0E,05,934
49984 DATA 70,A0,FF,05,3A,20,7F,C3,1121
49992 DATA 30,A5,C5,E9,01,85,7F,A5,928
50000 DATA 3E,E9,00,00,05,35,C5,36,620
50008 DATA 4C,74,F4,A9,67,AB,C5,20,1015
50016 DATA 04,C1,62,0E,4C,1A,C1,0D,681
50024 DATA 3F,4D,41,43,52,4F,20,44,533
50032 DATA 45,46,49,4E,49,54,45,4F,599
50040 DATA 4C,00,00,00,05,35,C5,36,620
50048 DATA AD,C,C6,29,7F,AB,FE,10,991
50056 DATA 18,A5,35,69,53,85,35,A5,779
50064 DATA 36,69,60,85,35,80,DE,F0,930
```

```
50072 DATA :0,69,1D,65,35,85,35,A9,731
50080 DATA 06,65,66,85,36,60,A9,00,805
50088 DATA 02,04,51,05,C0,CA,0E,FA,1224
50096 DATA 60,00,F2,03,0E,1C,C6,20,674
50104 DATA F0,10,E0,53,C9,30,9E,4C,981
50112 DATA 29,0F,ED,1C,C6,20,73,00,570
50120 DATA 30,45,A9,F3,A0,C3,2E,04,1005
50128 DATA C1,20,41,C1,A9,00,AE,C4,1016
50136 DATA 20,04,C1,20,41,C1,A5,01,689
50144 DATA 05,0F,F0,00,04,49,04,14,665
50152 DATA 04,15,20,7A,C0,A5,35,A6,886
50160 DATA 36,85,5F,85,68,4C,03,A7,750
50168 DATA 0D,4D,41,43,52,4F,2E,4C,491
50176 DATA 49,53,54,43,4E,47,2E,00,494
50184 DATA 0D,0D,4D,00,A9,00,2C,A9,496
50192 DATA 0E,AA,4C,1A,C1,A6,32,A5,854
50200 DATA 2D,05,ED,0E,2C,D0,0E,C6,809
50208 DATA 2E,C6,2D,A9,02,AA,02,91,767
50216 DATA 2D,20,4E,C4,A0,00,2E,54,627
50224 DATA C4,B1,2D,D0,F7,C0,B1,2D,1295
50232 DATA D0,EF,C0,B1,2D,D0,EF,20,1343
50240 DATA 51,C4,20,54,C4,20,35,A5,837
50248 DATA 20,59,A6,4C,74,A4,2E,51,755
50256 DATA C4,20,54,C4,E5,2D,0E,02,993
50264 DATA E6,2E,A5,2E,C5,38,DE,04,952
50272 DATA A5,2D,C5,37,B3,0C,66,A2,897
50280 DATA 10,4C,37,A4,F3,22,4E,AD,830
50288 DATA 37,C0,20,B1,FF,A9,6F,20,1151
50296 DATA 93,FF,A9,60,85,7C,6E,20,1050
50304 DATA A0,FF,20,73,03,C9,0E,00,979
50312 DATA F6,20,AE,FF,A9,C9,07,7C,1334
50320 DATA 20,9E,C4,D0,03,4C,74,A4,953
50328 DATA 20,CC,FF,4C,74,A4,A5,00,1816
50336 DATA 85,90,AD,B7,C3,20,B4,FF,1297
50344 DATA 20,37,FF,D0,15,A9,6F,20,1012
50352 DATA 96,FF,20,A5,FF,24,90,70,1149
50360 DATA 85,20,I2,FF,D3,F4,20,AB,1157
50368 DATA FF,A9,00,60,A5,7A,CA,0E,1144
50376 DATA 3B,A6,7B,86,BC,C9,00,FE,1239
50384 DATA 07,20,73,00,C9,00,D0,F5,812
50392 DATA 03,A9,FE,85,9E,A5,7A,E5,1236
```

```
50400 DATA EB,85,B7,A9,01,AE,B7,C0,1234
50408 DATA F0,00,20,BA,FF,A5,B7,A6,1147
50416 DATA EB,AA,BC,20,0D,FF,20,C0,1239
50424 DATA FF,00,57,A2,0D,20,C6,FF,1178
50432 DATA E0,50,20,CF,FF,20,CF,FF,1244
50440 DATA 20,CC,FF,A9,01,A0,C5,20,1226
50448 DATA 04,C1,A5,D6,C9,18,D0,05,1014
50456 DATA AD,0D,02,F0,07,20,5D,C5,805
50464 DATA F5,90,D0,00,20,E1,FF,D0,1245
50472 DATA E9,E6,9E,10,A9,0D,20,C3,1054
50480 DATA FF,20,CC,FF,A9,C6,AB,C5,1478
50488 DATA 20,04,C1,A6,9E,0E,C8,90,1121
50496 DATA 02,A2,00,A9,00,20,CD,0D,759
50504 DATA A9,D5,AB,C5,20,04,C1,4C,1044
50512 DATA 74,A4,48,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,2E,D2,FF,1459
50552 DATA 20,A3,C5,05,69,2E,A3,C5,1016
50560 DATA 85,62,20,D1,BD,A5,20,20,894
50568 DATA 12,FF,20,A3,C5,A2,01,36,1154
50576 DATA 34,C9,00,F3,06,2E,D2,FF,1156
50584 DATA 4C,0A,C5,23,CC,FF,A9,D0,1084
50592 DATA 4C,12,FF,23,CF,FF,A6,90,1345
50600 DATA 90,01,60,63,68,10,4C,2C,657
50608 DATA C5,0D,20,23,35,35,43,20,343
50616 DATA 53,48,49,45,54,20,4E,45,558
50624 DATA 59,20,2D,0D,00,00,0D,20,237
50632 DATA 20,20,20,54,4F,54,41,4C,484
50640 DATA 20,4F,46,23,00,20,46,49,388
50648 DATA 4C,45,28,53,29,20,44,49,482
50656 DATA 53,50,4C,41,59,45,44,2E,576
50664 DATA 0D,00,00,03,A2,A4,0D,02,702
50672 DATA 03,0E,03,03,18,20,EC,C8,635
50680 DATA A9,02,00,C5,20,04,C1,4C,034
50688 DATA 74,A4,0E,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,00,03,00,00,0E,00,59
```


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=6716 THEN GOTO 100
30 PRINT"ERROR IN DATA":T=6716:END
40 DATA 169,1,133,186,169,1,133,84
50 DATA 133,185,169,8,133,183,169,208
60 DATA 133,187,169,2,133,188,169,56
70 DATA 133,251,169,199,133,252,69,251
80 DATA 162,231,168,206,32,216,255,96
90 DATA 68,79,87,78,6,79,60,68
100 SA=51000:LA=52655
110 INPUT"START ADDRESS";A
120 IF (ACSA) OR (ADLA) THEN GOTO 140
130 IF H/B=(INT(A/8)) THEN GOTO 150
140 PRINT"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 130
180 PRINT"WRONG LENGTH" GOTO 150
190 FOR B=0 TO 7:B#=(D#(B,24B+1,2)
200 GOSUB 300:IF E=1 THEN GOTO 280

```

```

210 POKE A+E,D:T=T+D:NEXT
220 B#=(D#(B,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<LA THEN GOTO 150
270 GOTO 300
280 PRINT TFB(8+2*B+D)C4"??"
290 B=B:NEXT GOTO 150
300 E=0:D=0:FOR N=1 TO LEN(C#)
310 C#=(MID$(C#,N,1)):GOSUB 400
320 IF E=1 THEN D=N:N=4:NEXT RETURN
330 D=D*16+Y:NEXT RETURN
400 X=ASC(C#)-48:IF X<0 THEN E=1:RETURN
410 IF X<15 THEN E=1
420 X=X-7:IF X<10 THEN E=1:RETURN
430 IF X<15 THEN E=1
440 RETURN
500 H#="0123456789ABCDEF"
510 FOR A=5F TO LA STEP 8
520 PRINT A:"?":T=(A-32768)AND255
530 FOR B=0 TO 7:X=PEEK(A+B):GOSUB 600
540 T=T+X:NEXT PRINT"="
550 Y=(INT(T/256)*PI*INT(PI*(H#(X,Y+1,1)
570 X=255 AND T:GOSUB 600:PRINT
580 NEXT GOTO 500
600 PRINT MID$(H#,INT(X/16)+1,1)
610 PRINT MID$(H#,1+(X&15),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 500D modems have been tested with the BBC and Spectrum but the service also works with

```

800 SYS 630:C#=(CHR$(3#)
810 PRINT PRINT TO RELOAD CODE "
815 PRINT PRINT LOAN" 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 PRINT1 ENTER DATA
910 PRINT PRINT2 PRINT DATA
920 PRINT PRINT3 SAVE DATA
930 INPUT Z:ON Z GOTO 100,500,800

```

51000 ? A9068D1D88D0D0E=3E2	51456 ? C8A000C07C0E607D=447	51920 ? CEAD0CFE8D11CEAD=6C1	52364 ? A9020A0D0C20950C=46D
51008 ? A9068D0602A90E20=2E4	51464 ? CE20D20B0F091FB=58F	51928 ? D0CE8D02C18ALDI=635	52392 ? 60A9058E31CEAA9=4E6
51016 ? D2FFA9008D15D0A9=4D3	51472 ? 202E0CC80C77C0D=4D2	51936 ? D2CE6D0CE8D0CE=68E	52400 ? 2020D0FFC0D0FAE=603
51024 ? F5D0A02BA8E920E=510	51480 ? F020D20B8A0C070=59E	51944 ? D2CE6D0CE8D0CE=68E	52408 ? 810C60C914F0A0C9=505
51032 ? 20C0A920C70B20F8=4D5	51488 ? CEF008A95920D0FF=4D8	51952 ? B0350C2CE8D0CE=68E	52416 ? 7FF00160F91460B9=456
51040 ? C0AD00CE931F623=532	51496 ? 4C57C820D2C0B0CE=4CE	51960 ? 20330C0A90F0D8602=414	52424 ? 7F000160F91460B9=456
51048 ? C935F014C956006=43F	51504 ? D07DCE00934023C9=473	51968 ? A95185DF9C185FE=575	52432 ? 07C0D0B00300E9=49F
51056 ? 208EC74C50C7A914=418	51512 ? 20AC032030C0AD75=409	51976 ? A00209D0C2025C0D=343	52440 ? 30C9419006C97B00=49C
51064 ? 20M2FF202F03D0D8=52E	51520 ? CER8A9009993CEAD=506	51984 ? 209DCC20A0C00050=30F	52448 ? 02492000480A480E=215
51072 ? 4033C94C4C8206F3=411	51528 ? 84CEC90202520E0C=436	51992 ? 95C0202C0D20950C=411	52456 ? 20E1FF0034059C=533
51080 ? CC022C0D9A9585FT=4F1	51536 ? C0A9C820F30B9A55=558	52000 ? 202FCB20D20FF00E=421	52464 ? 20E68A6660A0D0D=485
51088 ? A0C65FE2228D0A0=547	51544 ? 2015C0A9520F3C3=432	52008 ? 802FCB20D20FF00E=421	52472 ? 49015A9003090050=250
51096 ? 002022C0D9A9585FT=4F1	51552 ? 207C7B0C730CE889=54F	52016 ? 81CF8C20E2069C0=483	52480 ? A7015A9003090050=250
51104 ? 002022C0D9A9585FT=4F1	51560 ? B993CE02398D007=5D4	52024 ? 2020C0C20E2069C0=483	52488 ? C100D020FF9993=4E0
51112 ? 44F00B0C954D0E20=4E1	51568 ? C05E07F95E20161D=3D0	52032 ? D00D020F0C0C931F0=4F0	52496 ? 00C9619006C97B00=49C
51120 ? D2FFA901D007F944=4EF	51576 ? 20F1C0A663C9077=4E7	52040 ? 062001C04C03030D=314	52504 ? 02492000480A480E=215
51128 ? 20D2FFA9008D15D0A9=4D3	51584 ? CE20D20B800F020=57D	52048 ? 80C0E81CEFC0820E=597	52512 ? C100D020FF9993=4E0
51136 ? 25D0A90320A0C7A9=4A3	51592 ? D2C820D2C0A0470=53C	52056 ? 60A9E520E9A4C5B0=74CE	52520 ? C602025C0D20950C=411
51144 ? B085D0A9C0D85FCA0E=9A9	51600 ? 4C5C0A920285F8A5=435	52064 ? CE35FE00A020950C=40A	52528 ? F06A666A0A0930C9=30A
51152 ? 002022C0D9A9585FT=4F1	51608 ? 2085FC0E00E1F899=52A	52072 ? 930CE800F8193CE=619	52536 ? FF6820044F20524=204
51160 ? 95C0C984A0024C20=383	51616 ? 2200C8B1F8852370=45E	52080 ? 202FCB20D20FF00E=421	52544 ? 30A318690720D2FF=274
51168 ? CE2010C96A82025=4C4	51624 ? 08A52285F0032385=447	52088 ? 002FCB20D20FF00E=421	52552 ? 60444F374E4C4F=204
51176 ? CD20950C2022C0D9=4C4	51632 ? FC0C910C9:8A5FB69=57D	52096 ? 202FCB20D20FF00E=421	52560 ? 4420D454E55513:243
51184 ? 8D30C220D0C9AD7=5E3	51640 ? D28520852F8531F5=67B	52104 ? 002FCB20D20FF00E=421	52568 ? 2020202545434549=228
51192 ? CE85FAD8A920C0E=6EA	51648 ? FC690085E2E8530A5=412	52112 ? 2099330CE4C080C0C9=50A	52576 ? 5645213520202045=1FE
51200 ? 60A82060C0B801E5F=38A	51656 ? 376020950C2022C0D9=4C4	52120 ? D0F00B20D20FF9993=4E0	52584 ? 415349432136202022F
51208 ? 20B0FFA9008D15D0A9=4D3	51664 ? 34CEA90B8020E0=493	52128 ? CEC80010D0ADF970=579	52592 ? 545553012020202020=20C
51216 ? CE85FAD8A920C0E=6EA	51672 ? 8E81CE8082CE200=533	52136 ? 002FCB20D20FF00E=421	52600 ? 4E5445520292145=28F
51224 ? A9F8D001C820F0C=479	51680 ? A9098D0C0E2020E=414	52144 ? FFA94F20D2FFA94F=580	52608 ? 20920544F20524=204
51232 ? 6020A0C0C0D00E=3FE	51688 ? C014F016C09D0F51=4E2	52152 ? 20D2FF60A9138000=452	52616 ? 5455530120202020=20C
51240 ? A9085C7A92020D2=3E2	51696 ? C924D01920D2F0D=544	52160 ? DE9A:28000E69A9=4C1	52624 ? 4D4545520292145=28F
51248 ? FF9993CEC810F20=5FB	51704 ? C3CE84CE5C9E900=554	52168 ? 536D00E8A9520100=40E	52632 ? 20920544F20524=204
51256 ? FF9993CEC810F20=5FB	51712 ? D0E3E00A0F0720D2=64C	52176 ? D660A996186D87CE=547	52640 ? 5455530120202020=20C
51264 ? 002022C0D9A9585FT=4F1	51720 ? FFC44CE5C9C93090=554	52184 ? 80C2CEAC02CE2034=4D4	52648 ? 4D4545520292145=28F
51272 ? 002022C0D9A9585FT=4F1	51728 ? D4C9A901548AD0C3=444	52192 ? C020E0C0C0E0CE00=677	52656 ? 4E5445520292145=28F
51280 ? 002022C0D9A9585FT=4F1	51736 ? C9C924F004634CE5=460	52200 ? 02386020F0C0B0E=509	52664 ? 42455202145455=20E
51288 ? 002022C0D9A9585FT=4F1	51744 ? C95AC74130B1C947=48A	52208 ? 60A9F80C82CEA820=597	52672 ? 4144452453320=21E
51296 ? 002022C0D9A9585FT=4F1	51752 ? B03B20D2FF38E930=4D5	52216 ? 04C086D0FA0C820F=61C	52680 ? 495320494E204845=208
51304 ? 002022C0D9A9585FT=4F1	51760 ? C90A9002E907E005=36A	52224 ? 6020A0C0C0D00E=3FE	52688 ? 5820119D9709D0=476
51312 ? 72CE29F0C980D0E4=506	51768 ? F0F891C3CE84CE5=61A	52232 ? D0F00B20D20FF9993=4E0	52696 ? 9D9D9D9D9D9D9D9D=5C0
51320 ? 2012CEB01A9573CE=599	51776 ? C9E0A0F0A0001D3=52A	52240 ? 25C0A90220A0B0C0=364	52704 ? 209D9D9D9D9D9D9D=5C0
51328 ? C820E0C0C0E0CE00=677	51784 ? 07A0C3CE924F095=4FF	52248 ? 95C0AD0E020E202F=573	52712 ? 4958205749544920=305
51336 ? 002022C0D9A9585FT=4F1	51792 ? A92020D2FFA9FF9=54F	52256 ? F92020D2FFA99320=3A5	52720 ? 24215354415254020=31E
51344 ? 002022C0D9A9585FT=4F1	51800 ? C3CEA20080CFCE8E=544	52264 ? ABC020D3C950407D=48A	52728 ? 4144452453320=21E
51352 ? 6D75CE85FC18A520=310	51808 ? D0CE8E11CE8E12CE=659	52272 ? CE8D?DCEA208A7D=4AA	52736 ? 464F522041524541=22E
51360 ? AD78CE85F:AD079CE=607	51816 ? FDC3CE924D005A9=512	52280 ? CE2A00190D7DCE49=411	52744 ? 202146494E414C20=1D3
51368 ? 65FC20D2C0B0820=55E	51824 ? 0F8D?DCE883DC0E=570	52288 ? 088D?DCEAD70CE49=460	52752 ? 464F522041524541=22E
51376 ? D9CC20D2FF38E930=4D5	51832 ? C9FF001D200C0A00=5B2	52296 ? 168D?DCE2E70CE2E=3D5	52760 ? 464F522041524541=22E
51384 ? 002022C0D9A9585FT=4F1	51840 ? 3418D0C3CE0D0CE=524	52304 ? 7DCEC0D0E169A000=516	52768 ? 4D205449544F2524=208
51392 ? 002022C0D9A9585FT=4F1	51848 ? 8D0CFE85006D0CE=566	52312 ? A90099004C80C18=40E	52776 ? 284D415820313620=1E5
51400 ? 002022C0D9A9585FT=4F1	51856 ? 8D0CFE85006D0CE=566	52320 ? D0F660A99320D2FF=583	52784 ? 1048415227532920=219
51408 ? 002022C0D9A9585FT=4F1	51864 ? A0C0C0E0C0C0E0CE00=677	52328 ? 60A9A9A2290F001F=37E	52792 ? 4C94449220205452=205
51416 ? 002022C0D9A9585FT=4F1	51872 ? C3CEA20080CFCE8E=544	52336 ? 05A9A44C80C0D920=42B	52800 ? 5920414741494E20=249
51424 ? 002022C0D9A9585FT=4F1	51880 ? CE8188C83CEAC2E=561	52344 ? 002022C0D9A9585FT=4F1	52808 ? 4F52205415045320=216
51432 ? 002022C0D9A9585FT=4F1	51888 ? CE8E1CE6E12025C0D=561	52352 ? 002022C0D9A9585FT=4F1	52816 ? 202044254202320=1E0
51440 ? 002022C0D9A9585FT=4F1	51896 ? 0200D041CE0921F3=530	52360 ? 6020A0C0C0D00E=3FE	52824 ? 3F21000000000000=000
51448 ? 002022C0D9A9585FT=4F1	51904 ? 0720D2FE84C3AC0=570	52368 ? 21D0F6C8602025C0D=483	
51456 ? 002022C0D9A9585FT=4F1	51912 ? 4C0CE9AD0CE8DCE=65F		

TELSoft



A reminder of how to use the Telsoft service.

a number of other maces. 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 (0266) 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=>7FF
20 CLEI:PRINT
30 INPUT "START ADDRESS (Hex)";A#
40 A=EVAL("0x"+A#)
50 IF A>4FFF THEN 200
60 IF A<2000 OR A>6FE7 THEN 20
```

Figure 2 BBC.

```
6000 :A9C8A9FEA20120FA,4C6
6001 :FF20616C22A86DC9,3BA
6002 :131F00C734F0E9C9,4CE
6003 :35F00A13C6A9C47,200
6004 :6A9820E33FA9E8,492
6005 :6A9820E33FA9E8,492
6006 :A00A2FF20FA9C0,363
6007 :A00A2FF20FA9C0,363
6008 :A00A2FF20FA9C0,363
6009 :A00A2FF20FA9C0,363
6010 :A00A2FF20FA9C0,363
6011 :A00A2FF20FA9C0,363
6012 :A00A2FF20FA9C0,363
6013 :A00A2FF20FA9C0,363
6014 :A00A2FF20FA9C0,363
6015 :A00A2FF20FA9C0,363
6016 :A00A2FF20FA9C0,363
6017 :A00A2FF20FA9C0,363
6018 :A00A2FF20FA9C0,363
6019 :A00A2FF20FA9C0,363
6020 :A00A2FF20FA9C0,363
```

```
70 PRINT "A" ; "1
80 INPUT " " ; B#;C#
90 IF LEN(B#) <> 16 THEN 50
100 T=0
110 FOR N=0 TO 7
120 Y# = 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
```

```
6020 :496C63F7D023B6A,374
6021 :A58A922D0062879,369
6022 :6E80E6A991A201,447
6023 :20E3FF22E7FFAC07,400
6024 :16A290C6B0CF57B,3C1
6025 :1F00A92B20C3FF4C,447
6026 :67A227A0E8B9F56,429
6027 :A5738A9009056F,429
6028 :A5E4C982D05B2E07,419
6029 :16A9C820556CA755,380
6030 :12B06E4952E0536C,298
6031 :A915A78120FAFF20,394
6032 :1F76A471C888B985,500
6033 :16F0819800FA798C,444
6034 :20C3FF20A56DA75A,437
6035 :18532A96F058A907,307
6036 :2000A62E0F802000,20B
6037 :16DA98520086E998,20A
6038 :20E3FF20F6DA9D2,562
6039 :20E0FF40C6A6955,30F
6040 :20386A9475200C6,202
6041 :60A6A3A775200C6,202
6042 :18B00FA280C6200C,316
6043 :16C4C48684C6A5AF,336
6044 :20E3FF20F6DA9D2,562
6045 :1FA9A620E33FA9E8,51E
6046 :15C888A8A8E00206,41E
6047 :15C888A8A8E00206,41E
6048 :15C888A8A8E00206,41E
6049 :15C888A8A8E00206,41E
6050 :15C888A8A8E00206,41E
6051 :15C888A8A8E00206,41E
6052 :15C888A8A8E00206,41E
6053 :15C888A8A8E00206,41E
6054 :15C888A8A8E00206,41E
6055 :15C888A8A8E00206,41E
6056 :15C888A8A8E00206,41E
6057 :15C888A8A8E00206,41E
6058 :15C888A8A8E00206,41E
6059 :15C888A8A8E00206,41E
6060 :15C888A8A8E00206,41E
```

```
160 B= EVAL("0x"+MID$(B#,2*N+1,2))
170 ?A=B+A+1;T=T+B
180 NEXT I
190 FOR M = 1 TO LEN (C#)
200 X# = MID$(C#,M,1); GOSUB 300
210 IF E = 1 THEN A=A+1; GOTO 240
220 NEXT I
230 IF T = EVAL("0x"+C#) THEN 50
240 PRINT "CHECKSUM ERROR !"
```

```
6061 :496C63F7D023B6A,374
6062 :A58A922D0062879,369
6063 :6E80E6A991A201,447
6064 :20E3FF22E7FFAC07,400
6065 :16A290C6B0CF57B,3C1
6066 :1F00A92B20C3FF4C,447
6067 :67A227A0E8B9F56,429
6068 :A5738A9009056F,429
6069 :A5E4C982D05B2E07,419
6070 :16A9C820556CA755,380
6071 :12B06E4952E0536C,298
6072 :A915A78120FAFF20,394
6073 :1F76A471C888B985,500
6074 :16F0819800FA798C,444
6075 :20C3FF20A56DA75A,437
6076 :18532A96F058A907,307
6077 :2000A62E0F802000,20B
6078 :16DA98520086E998,20A
6079 :20E3FF20F6DA9D2,562
6080 :20E0FF40C6A6955,30F
6081 :20386A9475200C6,202
6082 :60A6A3A775200C6,202
6083 :18B00FA280C6200C,316
6084 :16C4C48684C6A5AF,336
6085 :20E3FF20F6DA9D2,562
6086 :1FA9A620E33FA9E8,51E
6087 :15C888A8A8E00206,41E
6088 :15C888A8A8E00206,41E
6089 :15C888A8A8E00206,41E
6090 :15C888A8A8E00206,41E
6091 :15C888A8A8E00206,41E
6092 :15C888A8A8E00206,41E
6093 :15C888A8A8E00206,41E
6094 :15C888A8A8E00206,41E
6095 :15C888A8A8E00206,41E
6096 :15C888A8A8E00206,41E
6097 :15C888A8A8E00206,41E
6098 :15C888A8A8E00206,41E
6099 :15C888A8A8E00206,41E
6100 :15C888A8A8E00206,41E
```

```
250 A# = B1GOTO 50
260 PRINT "TYPING ERROR !"
270 A# = A DIV 8 : GOTO 30
280 ?A# = "DOWNLOAD" & B# & C#
290 END
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:RETURN
340 RETURN
```

```
6091 :073E00D7F1E1D1C1,640
6092 :1073E00D7F1E1D1C1,640
6093 :1073E00D7F1E1D1C1,640
6094 :1073E00D7F1E1D1C1,640
6095 :1073E00D7F1E1D1C1,640
6096 :1073E00D7F1E1D1C1,640
6097 :1073E00D7F1E1D1C1,640
6098 :1073E00D7F1E1D1C1,640
6099 :1073E00D7F1E1D1C1,640
6100 :1073E00D7F1E1D1C1,640
6101 :1073E00D7F1E1D1C1,640
6102 :1073E00D7F1E1D1C1,640
6103 :1073E00D7F1E1D1C1,640
6104 :1073E00D7F1E1D1C1,640
6105 :1073E00D7F1E1D1C1,640
6106 :1073E00D7F1E1D1C1,640
6107 :1073E00D7F1E1D1C1,640
6108 :1073E00D7F1E1D1C1,640
6109 :1073E00D7F1E1D1C1,640
6110 :1073E00D7F1E1D1C1,640
6111 :1073E00D7F1E1D1C1,640
6112 :1073E00D7F1E1D1C1,640
6113 :1073E00D7F1E1D1C1,640
6114 :1073E00D7F1E1D1C1,640
6115 :1073E00D7F1E1D1C1,640
6116 :1073E00D7F1E1D1C1,640
6117 :1073E00D7F1E1D1C1,640
6118 :1073E00D7F1E1D1C1,640
6119 :1073E00D7F1E1D1C1,640
6120 :1073E00D7F1E1D1C1,640
```

Figure 1. Spectrum.

```
5 REM SPECTRUM 48K
10 REM Hex Code Loader
15 CLEAR 50000
20 POKE 23450,B1:CLS:PRINT
30 INPUT "Start Address";A
40 IF >61135 THEN GOTO 200
50 IF <60000 THEN GOTO 200
70 PRINT A
```

```
80 INPUT " " ; B#
85 IF B#="END" THEN GOTO 200
90 IF LEN B# < 20 THEN GOTO 200
100 LET t# = 256*INT (A/256)
110 FOR N=0 TO 7
120 LET Y# = B#(2*N+1)
130 GOSUB 300:LET Y# =
140 LET X# = B#(2*N+2)
150 GOSUB 300:LET Y# = B#
```

```
170 POKE A,Y1:LET A=A+1
180 LET t# = t# + Y1:NEXT N:LET Y# = 0
190 FOR M = 1 TO 3
200 LET X# = B#(17*M + 17*M)
205 BC SUB 300:LET Y# = A#
210 IF E=1 THEN LET A=A+1:GOTO 240
220 NEXT A
230 IF t# THEN PRINT " " ; B# : GOTO 50
```

```
240 PRINT "Checksum Error"
250 LET A=A-8:GOTO 50
260 PRINT "Typing Error"
270 LET A# = INT (A/8) : GOTO 30
280 ?A# = "download" & B# & C#
290 POKE 23450,B1:STOP
300 LET A# = INT (A/8) : GOTO 30
310 IF X# OR Y# THEN LET A# = 1
320 RETURN
```

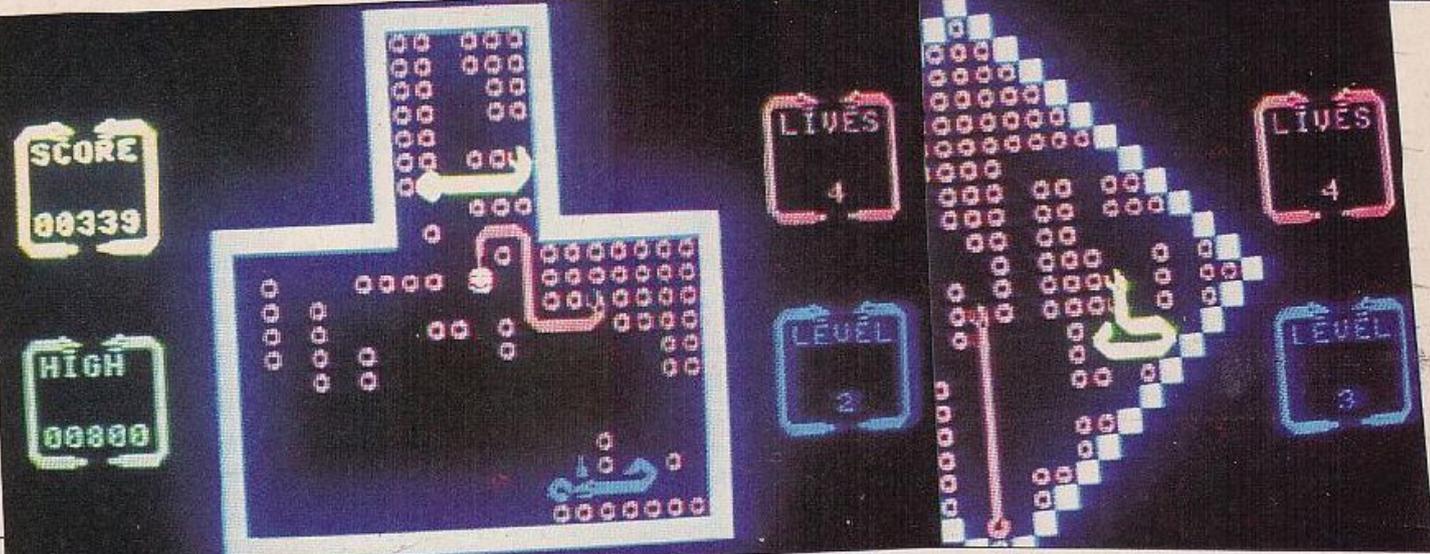
Figure 2. Spectrum.

```
60000 :ED15EDC387ECCD15,4C7
60001 :FDCD36CCD66ECCD,631
60002 :58E0D07EE38FBCD,30F
60003 :1B8EFD31CA9A9FE,61A
60004 :35C6A7EAC3A6EACD,500
60005 :15E03FEACD84EDC,500
60006 :15E03FEACD84EDC,500
60007 :15E03FEACD84EDC,500
60008 :15E03FEACD84EDC,500
60009 :15E03FEACD84EDC,500
60010 :15E03FEACD84EDC,500
60011 :15E03FEACD84EDC,500
60012 :15E03FEACD84EDC,500
60013 :15E03FEACD84EDC,500
60014 :15E03FEACD84EDC,500
60015 :15E03FEACD84EDC,500
60016 :15E03FEACD84EDC,500
60017 :15E03FEACD84EDC,500
60018 :15E03FEACD84EDC,500
60019 :15E03FEACD84EDC,500
60020 :15E03FEACD84EDC,500
```

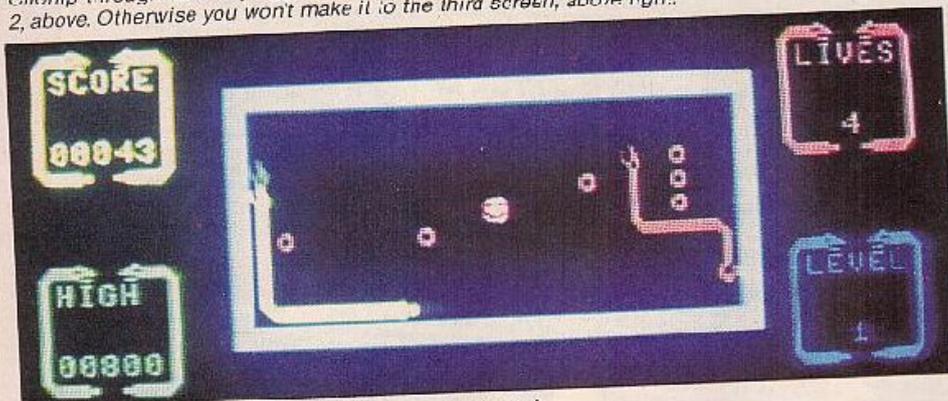
```
60200 :1E0E12133E0012CD,340
60201 :D7ECCDA4ECC3AAEA,6B1
60202 :1C0FEDDAAEA2178,51B
60203 :1E0E12133E0012CD,340
60204 :1E0E12133E0012CD,340
60205 :1E0E12133E0012CD,340
60206 :1E0E12133E0012CD,340
60207 :1E0E12133E0012CD,340
60208 :1E0E12133E0012CD,340
60209 :1E0E12133E0012CD,340
60210 :1E0E12133E0012CD,340
60211 :1E0E12133E0012CD,340
60212 :1E0E12133E0012CD,340
60213 :1E0E12133E0012CD,340
60214 :1E0E12133E0012CD,340
60215 :1E0E12133E0012CD,340
60216 :1E0E12133E0012CD,340
60217 :1E0E12133E0012CD,340
60218 :1E0E12133E0012CD,340
60219 :1E0E12133E0012CD,340
60220 :1E0E12133E0012CD,340
```

```
60440 :31D3FF3E0F320F5C,395
60441 :320D9C324B5C301,250
60442 :033F71915C099F9F,56F
60443 :1C050E366EACD15,520
60444 :1E0E12133E0012CD,340
60445 :1E0E12133E0012CD,340
60446 :1E0E12133E0012CD,340
60447 :1E0E12133E0012CD,340
60448 :1E0E12133E0012CD,340
60449 :1E0E12133E0012CD,340
60450 :1E0E12133E0012CD,340
60451 :1E0E12133E0012CD,340
60452 :1E0E12133E0012CD,340
60453 :1E0E12133E0012CD,340
60454 :1E0E12133E0012CD,340
60455 :1E0E12133E0012CD,340
60456 :1E0E12133E0012CD,340
60457 :1E0E12133E0012CD,340
60458 :1E0E12133E0012CD,340
60459 :1E0E12133E0012CD,340
60460 :1E0E12133E0012CD,340
```

```
60894 :073E00D7F1E1D1C1,640
60895 :1073E00D7F1E1D1C1,640
60896 :1073E00D7F1E1D1C1,640
60897 :1073E00D7F1E1D1C1,640
60898 :1073E00D7F1E1D1C1,640
60899 :1073E00D7F1E1D1C1,640
60900 :1073E00D7F1E1D1C1,640
60901 :1073E00D7F1E1D1C1,640
60902 :1073E00D7F1E1D1C1,640
60903 :1073E00D7F1E1D1C1,640
60904 :1073E00D7F1E1D1C1,640
60905 :1073E00D7F1E1D1C1,640
60906 :1073E00D7F1E1D1C1,640
60907 :1073E00D7F1E1D1C1,640
60908 :1073E00D7F1E1D1C1,640
60909 :1073E00D7F1E1D1C1,640
60910 :1073E00D7F1E1D1C1,640
60911 :1073E00D7F1E1D1C1,640
60912 :1073E00D7F1E1D1C1,640
60913 :1073E00D7F1E1D1C1,640
60914 :1073E00D7F1E1D1C1,640
60915 :1073E00D7F1E1D1C1,640
60916 :1073E00D7F1E1D1C1,640
60917 :1073E00D7F1E1D1C1,640
60918 :1073E00D7F1E1D1C1,640
60919 :1073E00D7F1E1D1C1,640
60920 :1073E00D7F1E1D1C1,640
```



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"LO          SNAKES 64 H
EX LOADER!"
20 INPUT"START ADDRESS";SA
25 PRINT
30 FORAD=SATO20992STEP10
40 CH=A:PRINTAD:INPUT"BI":H#
43 IFH#="S"THENL#0
45 IFLEN(H#) < 20 THEN#40
50 FORI=0TO9
60 X=ASC(MID$(H#,I*2+1,1))
70 Y=ASC(MID$(H#,I*2+2,1))
80 X=X-48:IFX>9THENX=X-7
90 Y=Y-48:IFY>9THENY=Y-7
100 PCKEAD+I,X*16+Y:CH=CH-X*16+Y
110 NEXTI
120 PRINTTAB(29)"DCH":INPUTC
130 IFCH=CTHENL#0
140 PRINT"CHECKSUM ERROR! TRY A
DRM."
150 GOTO40
160 NEXTAD
170 INPUT"Q FILE NAME";F#
180 FORI=1TOLEN(F#):POKE39999+I,
ASC(MID$(F#,I,1)):NEXT
190 POKE700,1:POKE781,1:POKE782,
1
200 SYS65466
210 POKE780,LEN(F#):POKE701,64
220 POKE782,156:SYS65466
230 POKE252,136:POKE253,54:POKE7
30,252
240 POKE781,0:POKE782,82:SYS6549
6

```

Listing 2. The ccde.

```

13960 EDE100200209BA5000000 CH: 828
13970 08423BA5008100908100 CH: 652
13980 00000000000000000000 CH: 117
13990 33003300330033000000 CH: 204
14000 0000FFFFFFFFFF3FFF001D CH: 1367
14010 FFFFFFF3F00FFFF0000000 CH: 1333
14020 00000100020304050607 LH: 28
14030 1A0B1B0E1BEC1BDD1A0D CH: 193

```

```

14040 1F0C1A0E1B0E1B0C1B0D CH: 192
14050 1A0D1A0C0A0F0A0E0A0B CH: 381
14060 0E0C0E0D0D0D0D0A0C0D0E CH: 128
14070 0E0B0E0C0E0D0D0D0D0C0E CH: 129
14080 00FF0C120D120D130D14 CH: 381
14090 0C140C130C120D120D13 CH: 196
14100 0D140C140C1300FF1304 CH: 374
14110 14041405140613061305 CH: 124
14120 13041404140514061306 CH: 123
14130 13050404050504040504 CH: 414
14140 1B141A141A1A1A1A1A1A1A CH: 227
14150 1B131B141A1A1A1A1A1A1A CH: 439
14160 0B0B0C0E0C0C0C0C0D0E0D CH: 118
14170 0B0C0B0C0C0C0C0C0C0D CH: 117
14180 0B0D0B0C00FF13041404 CH: 349
14190 14051406130613051304 CH: 123
14200 14041405140613061305 CH: 124
14210 00FF1B0E1C0B1C0C1C0D CH: 413
14220 1B0D1B0C1B0B1C0B1C0C CH: 196
14230 1C0D1B0D1D0C00FF1312 CH: 412
14240 14121413141413141313 CH: 194
14250 13121412141314141314 CH: 193
14260 131300FF0E050F350F06 CH: 353
14270 0F070E070E050F350F05 CH: 102
14280 0F050F070E070E050F05 CH: 359
14290 19051A051A051A071907 CH: 158
14300 190619051A051A061907 CH: 157
14310 1907190600FF0E110F11 CH: 381
14320 0F120F130E130E120E11 CH: 163
14330 0F110F120F130E130E12 CH: 164
14340 00FF19111A111A121913 CH: 429
14350 1913191219111A111A12 CH: 216
14360 1A131913191200FF0805 CH: 403
14370 0C050C060C070B070805 CH: 89
14380 0B050C050C060C070807 CH: 88
14390 0B0600FF190B110B110C CH: 356
14400 110D100D100C100E110B CH: 142
14410 110C110D100D100C00FF CH: 371
14420 170B180B180C180D170D CH: 178
14430 170C170B180B180C180D CH: 177
14440 170D170C00FF0E110C11 CH: 383
14450 0C120C130B130B130B11 CH: 148
14460 0A110C120A130A130A17 CH: 149
14470 00FF0B0C0C0E0B100912 CH: 361
14480 0A120914091409140B16 CH: 145
14490 0B150816081608160914 CH: 149
14500 0C140914091200120010 CH: 141
14510 0C0E0D0C0C0D070E0708 CH: 114
14520 0E090D090D080D070E07 CH: 107
14530 0E0B0E090D090D0800FF CH: 343
14540 13031403140414051305 CH: 118
14550 13041303140314041405 CH: 117

```

```

14560 1305130400FF19071A07 CH: 367
14570 1A081A0519E919081907 CH: 168
14580 1A071A0E1A071A031908 CH: 169
14590 00FF190F1A0F1A101A11 CH: 421
14600 15111910190F1A0F1A10 CH: 206
14610 1F111911191000FF1313 CH: 419
14620 14131414141513151314 CH: 199
14630 13131413141414151315 CH: 198
14640 131400FF0D0F0E0F0E10 CH: 381
14650 0E110D110D1000FF0E0F CH: 147
14660 0E100E110D110D1000FF CH: 375
14670 0B030C030C040C050305 CH: 78
14680 0B040B030C030C040C05 CH: 77
14690 0B050B04030F11031403 CH: 331
14700 14041405130513041303 CH: 118
14710 14031404140513051304 CH: 119
14720 00FF1B031C031C041C05 CH: 381
14730 1A051B041B031C031C04 CH: 156
14740 1C051B051B0400FF030E CH: 373
14750 0C0B0C0C0C0D0B0D030C CH: 119
14760 0B0B0C0B0C0C0C0D030D CH: 118
14770 0B0C00FF1B0B1C0B1C0C CH: 395
14780 1C0D1B0D1B0C1B0E1C0E CH: 197
14790 1C0C1C0D1B0D1B0C00FF CH: 415
14800 0B130C130C140C150215 CH: 158
14810 0B140B130C130C140C15 CH: 157
14820 0B150B140B13131413 CH: 395
14830 14141415131513141313 CH: 198
14840 14131414141513151314 CH: 199
14850 00FF1B131C131C141C15 CH: 445
14860 1B151B141B131C131C14 CH: 236
14870 1C151B151B1400FF8:42 CH: 594
14880 5911130D9D9D9D9D9D9D CH: 1222
14890 9D9D9D9D9D9D9D9D9D9D CH: 1072
14900 20204755535441465353 CH: 680
14910 4F4E0011111D1D1C45 CH: 398
14920 41542354484520454747 CH: 649
14930 53204259205941935949 CH: 686
14940 4E47234F56455220544E CH: 685
14950 45422C0D1D131D485554 CH: 325
14960 2041554F49420544945 CH: 660
14970 204445414445920534E CH: 660
14980 414B4532E205748454E CH: 676
14990 0D1E1D1D448484524520 CH: 508
15000 415245204E4F20454747 CH: 648
15010 53204C454542C20594F CH: 658
15020 552043414E031D1D1D45 CH: 496
15030 41542054484520534E41 CH: 664
15040 4B4532E20424F4E5553 CH: 696
15050 204C4946452045564552 CH: 658
15060 593D1D1D1D3:20009020 CH: 414
15070 504F494E4532E1111111 CH: 574
15080 9D9D9D9D9D9E46312820 CH: 1120
15090 53544152542047414045 CH: 712
15100 0D11D1D1D1D1D1D1D1D1 CH: 262
15110 1D1D4633202047414045 CH: 525
15120 2033584545443A0D111D CH: 518
15130 1D1D1D1D1D1D1D1D1D46 CH: 331
15140 3520204D55534943204F CH: 613
15150 4E2F4F46460D1111011D CH: 549
15160 1D1D1D1D1D1D1D1D0555 CH: 397
15170 5420484F59535449424E CH: 740
15180 20494E20504F52542032 CH: 622
15190 9E534C4F5720203E4D45 CH: 851
15200 4449554D964641553420 CH: 795
15210 2046472D9D1131409D9D CH: 368
15220 114948545454545D9D9D CH: 969
15230 9D115420205:9D9D919D CH: 1034
15240 11542020549D9D9D9111 CH: 894
15250 5454545464644E1D5E44 CH: 729
15260 47:194511945111945 CH: 800
15270 11945119451194511945 CH: 1202
15280 9D49442D1A4844489F9D CH: 911
15290 9D9D9D9D9D914591D45 CH: 1370
15300 919D4591D459E53434F CH: 1129
15310 5E459D9D9D9D9D111111 CH: 987
15320 1E484947489D9D9D9D11 CH: 960
15330 11111C4C495645539D9D CH: 763
15340 9D9D9D11111111F4C4556 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 62, 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	454C9D9D1111119D00	CH: 824	16150	A5A41A9A41A9A41A69	CH: 1178	16940	E245A20188D0FDCAD3FA	CH: 1715
15360	43414A000000004341	CH: 346	16160	A41A6AA41A6AA41A5AA	CH: 1036	16950	A1D98C9A0D0E320ED48	CH: 1495
15370	4A000000000043414A00	CH: 288	16170	1A5AA41A46A41A46A41A	CH: 826	16960	EED580EDE80ADDE83C9	CH: 1891
15380	0000000043414A000000	CH: 222	16180	46A41A41A41A41A41540	CH: 829	16970	0FD012A9018DDE89A02F	CH: 1117
15390	000043414A0000000000	CH: 214	16190	540000500001FA4E06AA	CH: 588	16980	4238E920100CA931902F	CH: 763
15400	43414A00000000004341	CH: 346	16200	9066AA901A9CF41F96AA	CH: 1144	16990	424CB041A9122002F7A9	CH: 1236
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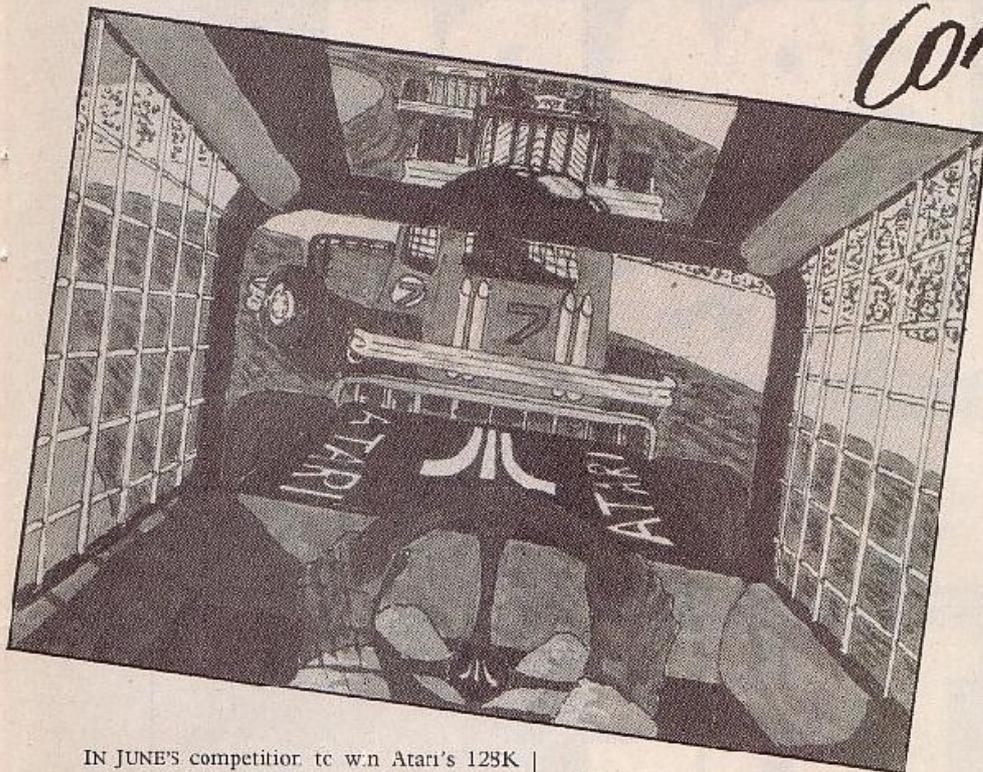
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18260	A90085FC0A91585FBA900	CH: 1207	19350	F1A20B00181820F0FF20	CH: 1196	20450	8000055420D2FFA213	CH: 1203
18270	85FEA6F3A00F1820F0FF	CH: 1520	19360	BD48A99820D2FFA212F0	CH: 1419	20460	D2FFA95220D2FF88D0FA	CH: 1810
18280	0A90031FC0C1D091DA92A	CH: 1260	19370	131820F0FF20D48A991F	CH: 1273	20470	A9A9A20D2FFA95420D2F	CH: 1570
18290	20D2FF20D2FF20D2FFA9	CH: 1626	19380	8DD80A9008D0B8A950	CH: 1393	20480	60A95420D2FF88D0FA0F	CH: 1536
18300	F885FEA5FC05FFA0D602	CH: 1732	19390	85FC93785FD0A9048D19	CH: 1526	20490	A93E20D2FFA205A00018	CH: 1175
18310	85FA0C8C4C9C4720D2FF	CH: 1583	19400	80A90085FEA90085FF0F	CH: 1529	20500	20F0FFA213A0096A9320	CH: 1311
18320	C8B1FC20D2FF0381FC20	CH: 1767	19410	00B1FC91FE0C800D0F7	CH: 1779	20510	B7A8A91E0D03FFA20A0E0	CH: 1287
18330	D2FFA92020D2FF20D2FF	CH: 1660	19420	60A201A00A1820F0FFA0	CH: 1140	20520	001820F0FF20B0D48A91	CH: 1341
18340	CA99301871FC20D2FFC8	CH: 1503	19430	0A200150A91D20D2FFA0	CH: 978	20530	20D2FFA205A0211820F0	CH: 1153
18350	CA080A0F3EE3602C6FA9	CH: 1643	19440	0A200150A20286FFA6FF	CH: 1097	20540	FE20D48A91F20D2FFA213	CH: 1407
18360	081855F285FC0950D09E	CH: 1417	19450	A00B1820F0FFA00820E4	CH: 1149	20550	0E00211820F0FF20B0D48	CH: 1251
18370	AF5E390D00334C6548A5	CH: 1245	19460	4F01D20D2FFA20820E4	CH: 1202	20560	E0A0A95220D2FF20E0A0	CH: 1506
18380	FF85FC93C35F0A6FE18	CH: 1699	19470	4FE6FFA6FF0E17D0E10	CH: 1825	20570	011820F0FFA20E0FC0A9	CH: 1259
18390	20CA9A909A90120E0F47	CH: 993	19480	0A1820F0FFA00A200150	CH: 844	20580	3B20B74820E530F9920	CH: 1332
18400	E5FC0220E4F78E0C820	CH: 1738	19490	A91320D2FFA00A200150	CH: 978	20590	D2FFA207A0011820F0FF	CH: 1254
18410	EF474C654891FE84FA0	CH: 1513	19500	A20B0141820F0FFA954	CH: 1154	20600	A20CA062A9320B748A9	CH: 1234
18420	00DCC97BF01AC977F02B	CH: 1413	19510	20D2FFA210A0:41820F0	CH: 1151	20610	4885FEA93855FE1FC91	CH: 1408
18430	C95FF03C20E44320A04E	CH: 1112	19520	FFA95420D2FFA20886FF	CH: 1565	20620	301871FE20D2FFC8C005	CH: 1333
18440	A040CA0D0F08D0F0A4FA	CH: 1895	19530	A00A1820F0FFA01320FA	CH: 116A	20630	D0F3A206A0221820F0FF	CH: 1364
18450	D0DFB1FEA0C8A8C900D0	CH: 1781	19540	0E86FFA0001820F0FFA0	CH: 1281	20640	20E0A0E4A9320B74820	CH: 1111
18460	D2A92EC92D002A91A91	CH: 1013	19550	06200150A00720E44FA6	CH: 785	20650	3851A9220D2FFA20FA0	CH: 1286
18470	FED009B1FEA9E38A91313	CH: 1878	19560	0C200150C0FFA06FF009C	CH: 1203	20660	221820F0FFA20D0F0A9	CH: 1331
18480	I002A920C92FD0302901	CH: 1053	19570	0E3A20CA00A1820F0FF	CH: 1330	20670	3B20B748201231E20CA	CH: 811
18490	51FED0C4B1FE032E008	CH: 1724	19580	A005A20CA00A1820F0FF	CH: 1458	20680	148E0800E07801820F0	CH: 1285
18500	16A94A0A0A1F20A448	CH: 986	19590	A005A91D20D2FF88D0FA	CH: 1458	20690	FFA95420D2FFA91C20D2	CH: 1500
18510	20A04A0A40CA0D0F0D0D0	CH: 1495	19600	4005A920D2FF88D0FA	CH: 1458	20700	FFA95220D2FFA95209A0	CH: 1430
18520	FAD00DCC95FF0E3B4FA	CH: 1844	19610	4005A920D2FF88D0FA	CH: 1458	20710	011820F0FFA95220D2FF	CH: 1364
18530	B1FE602004482A9043A0	CH: 1127	19620	49230D0A80A9018DD80	CH: 1354	20720	A99E20D2FFA95685F0A9	CH: 1576
18540	50C0D0E08D0FA0D090D0	CH: 1730	19630	491220D2FFA205A01918	CH: 1870	20730	D085FC0000A9301871FC	CH: 1359
18550	C96FD0E08D00D0C92FD0	CH: 1684	19640	20F0FFA20CA062A9320	CH: 1228	20740	20D2FFC8C000D0F3A912	CH: 1532
18560	F94C7440A9D985FA0000	CH: 1432	19650	8748A99120D2FFA205A0	CH: 1377	20750	20D2FF60A000E1580C9	CH: 1468
18570	84F7B1F7A9E88A91F7E5	CH: 1965	19660	0E1820F0FF20B0D48A99	CH: 1180	20760	0A9007C838E90A0C1751	CH: 840
18580	F7DF3565F8A93FC90CD0	CH: 2220	19670	20D2FFA211A00E1820F0	CH: 1146	20770	A998186930C38D002A9	CH: 1127
18590	ED60A90095F7A9D085F3	CH: 1640	19680	FF20BD48A99C20D2FFA2	CH: 1532</			

WIN AN ATARI 130XE

Competition

RESULTS



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. Tepping 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. Stone's *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 unpeopled, different levels and hundreds of creatures.

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 treat 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 over-hyped 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*, *Padro*, *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.

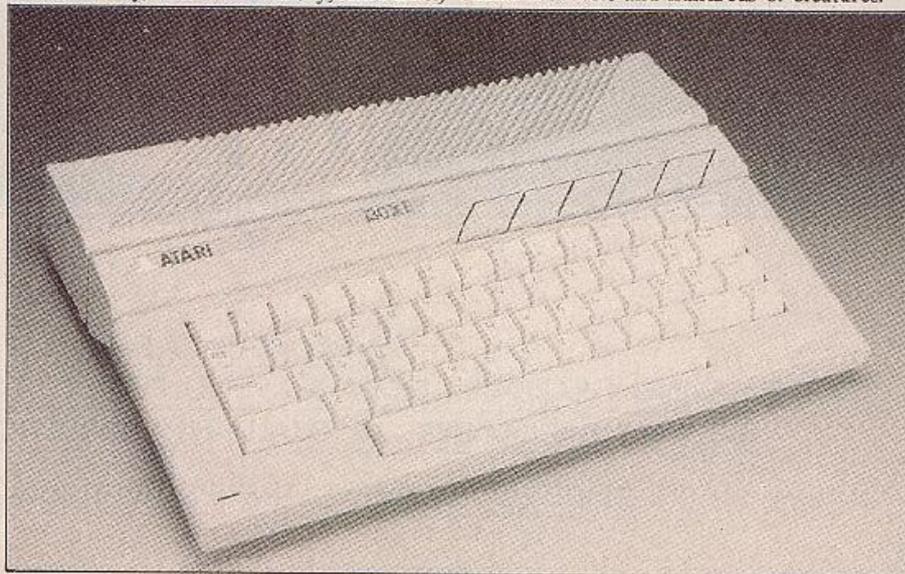
No doubt some of these titles do not deserve their place on the list. People are often unduly severe on a game if it has been hyped up and

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 *Kosmic Piracy*, *Fred's Fan Factory*, *Astro Blast*,



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I could do that...

Never mind the text books — bolt-on programming is here to stay according to John Ransley, and here's your chance to prove that the unstructured approach can be effective, if not always particularly elegant, and earn yourself this month's First Bytes £15 program prize.

We want you to devise a short program that combines a loop and several uses of Gotos and/or Gosubs; the targets of which can be simple one-line statements rather than elaborate modules. Your purpose should be simply to effectively demonstrate some of the principles touched upon in John Ransley's article rather than produce a spectacular screen show.

In July we set readers the task of creating an animated display by Poking to screen memory. The £15 prize goes to Martin Wright, 2 Rye Lane, Halifax, HX2 0QD. Apart from demonstrating the complexities of the Spectrum's display file, the program also shows that Poking to the screen is usually slower than printing.

```

10 DATA 98,34,61,65,255,42,0,0
20 GOTO 255,14,0,0
30 FOR N=1 TO 10:PRINT N:GOTO 255,14,0,0
40 NEXT N
50 PRINT "END"
60 GOTO 255,14,0,0
70 END

```

BEGINNERS

First Bytes

Starting out in home computing? First Bytes is for you. Just write to

Your Computer with any hardware or software problems, no matter how small or simple.

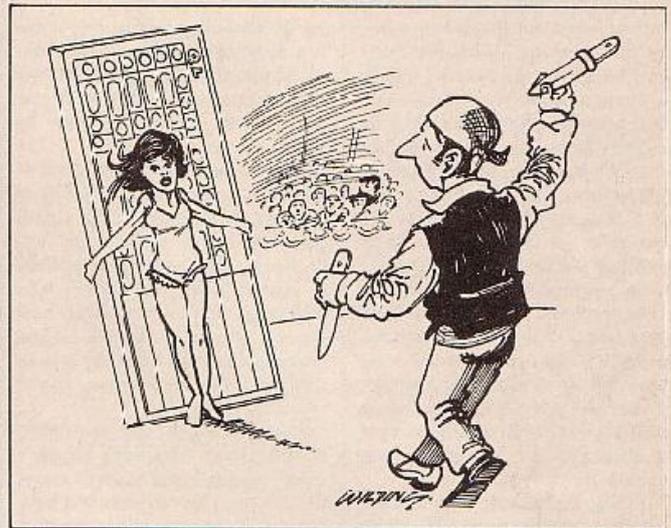
A bluffers' guide to micros

OF COURSE, there is always a danger that you will fall prey to the belief which prevails amongst outsiders to the computer fraternity that there is actually some reason for having a home micro. The half-hearted justification for originally buying a micro range from "it's important to keep abreast of new technology" to "it's important for the kids — computers are so important in education now!"

These original excuses might be followed by a desire to make the micro of some use in the real world — hence the plethora of books which purport to show you how you can calculate the amount of wallpaper needed for the living room, shopping lists, telephone directories, television directories(!), freezer stock lists, calendars, bank statements, measurement conversion programs, car maintenance file, gas and electricity bills, VAT.

No-one in their right mind believes that switching a computer on, plugging it into the telly, loading a cassette or a disc and then accessing a file is any quicker than doing the calculation on the back of a bubblegum packet in the traditional way.

It just looks more efficient, and the hopelessly crazed user probably derives some tactile satisfaction from the use of the micro. Some people may regard this as unduly cynical — and as software for household book-keeping becomes more sensible and user-friendly perhaps people really will start filing bills on



their home computer instead of in the wastepaper basket. But it is still camouflage, designed to disguise the fact that the home micro dwells in a realm of sublime abstraction.

The other good piece of camouflage is word processing. Rather like food processing, this is something that enables you to combine formerly discrete and interesting items into a bland tasteless mush. Everyone knows that word-processing makes it really easy to change paragraphs around in what you have written. You can just play with the text on the screen. You just scroll through the text, mark the paragraph you want to shift, scroll back, mark where you want it shifted to and give the order to shift it. Then you check through the text and find that because you forgot to mark the end of the paragraph you wanted copied nothing happens.

So you go back and mark the paragraph properly. The text is moved successfully. But don't forget to scroll back through the text and delete the marks relating to moving the paragraph about or the computer will get very confused. So far so good. Now all you have to do is print it out — that is, set the parameters on the printer, make sure you cleared the buffer if you've just been printing something out, maybe tell it to number the pages, and untangle the printout when it jams in the printer.

We are told that this is easier than buying a cheap typewriter and some Tippex, but realise that word processing serves two purposes. One, it disguises the abstract nature of the computer, and, two, it makes the writing process more interesting by substituting a whole new order of mistakes to make under the guise of dealing with human error.

Paul Bord

Speaking the right language is half the battle

IT IS ONLY fairly recently that computer manufacturers started to supply micros with a resident Basic. Many business micros only provide Basic on disc; while Apple's Macintosh comes without any high-level language, Basic or otherwise.

For home computer owners there is clearly an advantage to having Basic in Rom — it is instantly available as soon as the machine is turned on. But it also has its drawbacks. Unless you can switch the Basic Rom out — as on the BBC and the Amstrad — it takes up

memory space even when it is not in use.

This means that other language interpreters or compilers must load into the area normally reserved for programs. More generally, resident Basic makes owners less likely to consider trying other languages.

There is much to be said for using an alternative language to Basic. For one thing, if it is a compiled language it will run much faster. Almost all home computers use Basic interpreters which take

a program line at a time, translate it, and then execute it. Compilers, by contrast, translate high-level language programs into machine code before they are run. The resulting "object code" may not be as efficient as hand-crafted machine code but it is still substantially quicker than an interpreted program.

Apart from speed, there are other reasons why you should consider an alternative language. It is a matter of horses for courses: for particular applications some languages are more suit-

able and easier to write in than Basic. Forth, for example, would be a good language to choose if you wanted to write a program to control a robot arm. It was originally designed for control applications.

Logo supporters will tell you the language is capable of much more than just turtle graphics, and is well suited for list processing or writing database programs. They will even argue that a full version of Logo is more powerful

(continued on next page)

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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 sylpts 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 strict and 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 blancmange — 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 creator — 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 Run 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 Geldo? Is the molecular structure of the Taj Mahal? Next question.

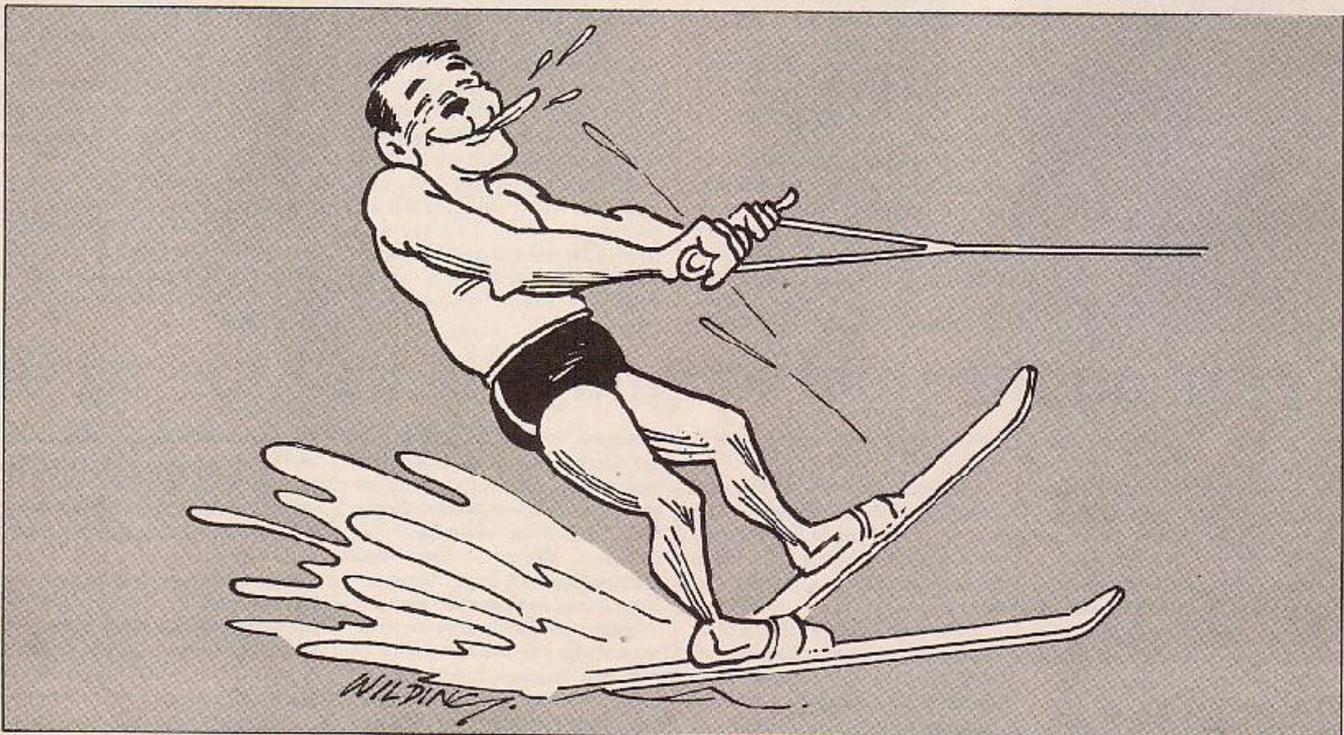
The algorithmics also lose hands down when it comes to usually the most important of all considerations — pro-

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.

```

10000 LET COUNT=0
10001 FOR I=0 TO 255
10002   LET COUNT=COUNT+1
10003 NEXT I
10004 PRINT "COUNT: 255"
10005 THEN GO TO
10006 10000
10007
10008 FOR I=0 TO 255
10009   LET COUNT=COUNT+1
10010   PRINT AT 0,7:FLASH
10011   ERROR IN DATA: BEEP 1,2K:5"
10012 NEXT I
10013
10014 PRINT AT 0,3:PEEP
10015 THEN GO TO 10014
10016
10017 PRINT AT 1,4:PAPER 5:INK
10018 THEN GO TO 10017
10019
10020 PRINT AT 1,5:FLASH 1:INK
10021 THEN GO TO 10020
10022
10023 RANDOMISE USR 30000
10024
10025 NEXT I
10026
10027 DATA 0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63,64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79,80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95,96,97,98,99,100,101,102,103,104,105,106,107,108,109,110,111,112,113,114,115,116,117,118,119,120,121,122,123,124,125,126,127,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,144,145,146,147,148,149,150,151,152,153,154,155,156,157,158,159,160,161,162,163,164,165,166,167,168,169,170,171,172,173,174,175,176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,193,194,195,196,197,198,199,200,201,202,203,204,205,206,207,208,209,210,211,212,213,214,215,216,217,218,219,220,221,222,223,224,225,226,227,228,229,230,231,232,233,234,235,236,237,238,239,240,241,242,243,244,245,246,247,248,249,250,251,252,253,254,255

```

SOUND OFF

This is a short program written on a BBC 1.2 O.S which is extremely useful when playing games late at night. Load beforehand and then press @ to disable the sound or P to bring it back — even when the game is in progress. It works on Planetoid, Killer Gorilla, Snapper, Hopper and hopefully all games not using &A00-&AFF.

Type in the program. Run it to assemble then "Save" name" A00 A41. To use "Load, CALL &A00 then load your game as normal. Press @ when your mother tells you to turn it off and P when she's gone back to sleep.

T. J. Powell.

```

10000 *A00
201
3000 LDA#7:JSRAFFEE
4000 LDA#2:LDA#14:JSRAFFEE
5000 LDA#19:STA#22K:LD#50A:STA#22I
6000 RTS BRK CLD
7000 TXA PHA:TYA:PHA:PH
8000 P#64:BNE SAZD
9000 LDA#9:LDY#7:LDA#8D2:JSEBFF4
10000 P#80:BNE KA3A
11000 LDA#1:LDY#1:LDA#8D2:JSRAFFEE
12000 PLA:TAY:PLA:TAY:PLA:RTS
1301

```

RESPONSE

Frame

IS ACE OK?

I have recently been offered a secondhand Jupiter Ace for £25. Should I buy it? I would like to learn Forth and this seems as good a way as any to make a start. Is it possible to still buy software and peripherals for the Ace?

L. Quintan,
London E9.

IT IS MUCH more convenient to use the Ace than to have to load in a Forth from tape every time you wish to work with the language, so it seems a worthwhile purchase in order to help you learn Forth.

A L Rogers informs me that Boldfield Computing Ltd., Sussex House, Hobson Street, Cambridge — telephone Romsey (0487) 840740 — currently sell the Ace, and have produced 11 original software packages for it. They also sell the original 16K pack, and also a 48K Ram as well as an add on keyboard.

RANDOM NUMBERS

Could you please tell me how to simulate a random number function in machine code on my Commodore computer?

Hans-Erik Foyyl,
Flipstad,
Sweden.

THIS IS far from simple to do. You could call the random number routine in the Basic Rom when you need a number, or store a set of random numbers — called from the Rom routine — and then access them as you need them. Another way, which would be a bit of a "fudge" but will work well in practice, is to get the random numbers you need while you are still in Basic, before you go into machine code.

That is, you set up a table of random numbers — as many as you will need in the program — and then Poke them into memory, before executing the SYS command to go into machine code. These numbers can then be accessed as and when they are required during the running of the program.

GAME CHALLENGE

I own a Vic-20 with 16K expansion. I like adventure programs, but have found little challenge in most of those I have tried. Those I own include Dungeons, the Dark Dungeons, Mysterious Island and The Curse of the Werewolf. This last one was the only game which I found hard to do, and it took me several weeks to get in and around the castle. Could you please recommend another adventure game which is harder to crack than most others, and keeps you wanting more. I do not mind if it is text or graphics?

M. Butterworth,
Bacup,
Lancashire.

Do you have a problem related to your micro? Tim Hartnell will do his best to help. Please include only one question per letter and mark it "Response Frame". Alternatively, perhaps you have an idea you'd like to pass on to others. Why not write to us with your top tips?

THE SCOTT ADAMS adventures, such as the very tricky *Voodoo Castle*, have proved very popular. They are difficult programs to solve. They also have the advantage of having "skill levels" printed on the packaging, so you can choose programs of a difficulty level which suits you.

8-BIT MICROS

Most home computers use an 8-bit processor, yet many of these have 64K memories, which would demand 'it seems to me' 16 bits — two raised to the 16th power equals 64K. How can an 8-bit computer address this amount of memory?

I.C. Bishop,
El,
Cardiff.

AN 8-BIT computer transfers data 8 bits at a time. This has nothing to do with how much memory the computer can address. The addressable memory is limited by the address bus which, on an 8-bit computer, is 16 bits wide, thus allowing it to address 64K.

CORRUPTION

I very often design my own title pages for programs listed in computer books, but I am experiencing a little problem. To brighten up the display, I use:

POKE 645,RND(1)*6

to produce a flashing effect. But when I use this with a program which contains sprites and graphics, the program works but the graphics are corrupted. Could you possibly suggest a way I could overcome this problem?

J A Quintin,
Norwich.

THE POKE YOU are using simply changes the colour of the cursor — and therefore changes, character by character, the colour of the material you're printing in text on the screen. However, I cannot see how Poking this address could possibly "corrupt" other graphics.

The best way to isolate the problem would be to do your random colour changes by having the colour controls within a string, a section of which is

selected at random — using Mid\$ — and print it before each character is printed. If your corruption still occurs, it could well be a machine fault.

KEY TO ACCESS

I would like to know how to access more than one key at a time on the Commodore 64. I am writing a machine-code polyphonic organ program, and I cannot find any literature which will enable me to play chords. Can you help?

L. Meek,
Garrowhill,
Glasgow.

UNFORTUNATELY, if you press two keys at once on the 64, the computer will only read the one with the highest priority. There are only three keys which return values at the same time as other keys are being read. These are the Control, Shift and Commodore keys. The state of these keys is held in location 653.

If Shift is pressed
PEEK(653) AND 1

will return 1 — 0 if not pressed. If Control is pressed

PEEK(653) AND 2

will return 2; and if the Commodore key is held down

PEEK(653) AND 4

will return 4.

PEEK(653) AND 7

will test all three.

MORE RAM ROOM

I have a BBC Micro with a disc interface attached. I have written several programs which just about cause it to run out of memory. I am afraid that if I try to develop them further, I definitely will run out of Ram. Is there a way of "disconnecting" the interface, using software, to free up the most possible room for my programs?

David Johnson,
London W4.

If you type in:

PAGE=&1200

you'll find you get an additional 1.75K. Although you can still use your disc system, your cannot open disc files — that is, you cannot use the Openin command.


```

7510 PRINT"
PEE CO NO S3 HE TA P"
7515 PRINT"      B O X
I N G"
7520 PRINT"  SO YOU WANT TO BE
A CHAMPION DO YOU?"
7522 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 8 READ A:PRINT F
": IF C=10 THEN PRINT":
7535 PRINT A:BS(F)=A:NEXT F
7540 INPUT X:IF X<1 OR X>10 THEN PR
INT"
:GOTO 7530
7545 BS=(11-X)/2
7546 K2=10+X*INT(RND(1)*6):K1=1
6-X*INT(RND(1)*10)
7550 BS=LEFT$(BS:XX),6)
7560 PRINT"  "PRINT"  VERY W
ELL, YOUR OPPONENT WILL BE":PRIN
T TAB(14)BS(XX)
7562 PRINT"  EACH FOUT YOU FIGH
T IS ONLY 3 ROUNDS"
7564 PRINT"  MOVE ABOUT THE RING
WITH X Z AND C)"
7566 PRINT"  "PRINT"  (LEFT HAND
) SHIFT (RIGHT HAND)"
7568 PRINT"  NOTE THAT YOU CAN MO
VE AND PUNCH AT THE":PRINT"  SAM
E TIME"
7570 PRINT"  ONLY PUNCHES TO THE
HEAD SCORE":PRINT"  "KNOCK-OUTS
ARE POSSIBLE"
7575 BSUB9999
7580 PRINT"  PRESS ANY KEY TO ST
ART THIS BOUT"
7590 GET X:IF X="" THEN GOTO 7580
7595 RETURN
8500 REM * END OF ROUND *
8505 PRINT"  "TAB(29)" 0 : 0
0 "
8510 POKES0+4,21
8520 POKES0+8,192-POKES0+1,195
8530 FORT=LTO500:NEXT:POKES0+4,2
0
8540 X=X+*(K224):Y=Y+*(K160):F
F=4*(K224):6=6+4*(K220)
8550 POKES0+1,POKES0+1,Y
8560 POKES0+2,F:POKES0+3,6
8565 POKES0+4,192-POKES0+1,195
8570 IF X<32 AND Y<60 AND F=22 AND
6>=20 THEN BSUB9999
8575 GOTO 8540
8580 ROUND=ROUND+1:IF ROUND=4 THEN
ROUND=3:GOTO 8520
8590 POKES0+15,19 FORT=LTO10:POK
ES0+4,21
8595 PRINT"  "TAB(7)"PRE
PARE TO FIGHT":PRINT TAB(7)"THE
NEXT ROUND"
8595 FORDL=LTO200:NEXTDL:POKES0+
4,20
8600 PRINT"  "TAB(7)"
":PRINT TAB(7)"
"
8605 FORDL=LTO200:NEXTDL
8610 NEXTT
8620 GOTO 862
9000 REM READ IN SPRITE DATA HER
E*
9010 FORT=0T05LL:READ A:POKE192*6
4+T,A:NEXTT
9100 POKES0+4,192-POKES0+1,195 P
OKES0+39,0-POKES0+4,7
9400 RETURN
9500 REM * DRAW THE RING *
9510 AAS="X"-BS+FA9
9520 FORT=LTO2Y:AFS=AAS+X"-BS+
BS+"":NEXTT
9530 PRINT"  "TAB(6)"POINTS"TAB(1
6)"POINTS"TAB(32)"TIME"
9535 AAS=AAS+"":BS=BS+"X"
9540 PRINT"  "AAS:FORT=0T022:PRIN
T BS:NEXT:PRINT AFS
9550 PRINT"  "SPC(152)"TIME"SPC(1
95)"ROUND"SPC(193)"POINTS"SPC(25
)LEFT$(C6,6)
9555 PRINT"  "TAB(32)LEFT$(RS(
XX),6)
9560 RETURN
23010 REM *** SPRITE BOXER-LEFT
***
23012 DATA 0,56,0,0,127,252,0,127
,254,0,167,2
23013 DATA 0,127,2,0,56,63,0,0,12
7,0,0,127
20014 DATA 0,0,33,0,0,63,0,0,0,0,
0,0
20015 DATA 0,0,65,0,0,99,0,0,127,
0,56,127
20016 DATA 0,127,63,0,127,2,0,127
,254,0,127,252
20017 DATA 0,56,0,0
20018 REM *** SPRITE LEFT-PUNCH **
**
20021 DATA 112,0,0,255,255,252,25
5,255,254,254,0,2
20023 DATA 254,0,18,112,0,62,0,0,
127,0,0,99
20024 DATA 0,65,0,0,65,0,0,1,0,
0,65
20025 DATA 0,65,0,0,95,0,0,126,
0,56,62
20026 DATA 127,18,0,127,2,0,127
,254,0,127,252
20027 DATA 0,56,0,0
20030 REM *** SPRITE LEFT-PUNCH .EF
T**
20032 DATA 0,56,0,0,127,252,0,127
,254,0,127,2
20033 DATA 0,127,18,0,56,62,0,3,1
27,0,0,99
20034 DATA 0,65,0,0,65,0,0,1,0,
0,65
20035 DATA 0,65,0,0,95,0,0,127,
112,0,62
20036 DATA 254,0,18,254,0,2,255,2
55,254,255,255,252
20037 DATA 112,0,0,0
20100 REM *** SPRITE BOXER RIGHT **
*
20102 DATA 0,56,0,63,252,0,127,25
2,0,65,252,0
20103 DATA 73,252,0,124,56,0,126,
0,0,198,0,0
20104 DATA 131,0,0,131,0,0,129,0,
0,131,0,0
20105 DATA 171,0,0,138,0,0,254,0,
0,124,56,0
20106 DATA 73,252,0,65,252,0,127,
252,0,63,252,0
20107 DATA 0,56,0,0
20110 REM *** SPRITE RIGHT-R PUNCH **
*
20112 DATA 0,28,0,63,254,0,127,25

```

Possessed

Guy Rowland,
Hextable,
Kent.



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 C — 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 you: 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. If 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, Stony-acres, 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 8
60 LET T=0
70 PRINT N:" ";
80 INPUT A#
90 PRINT A#:" = ";
100 INPUT TOT
110 PRINT TOT
115 IF PEEK 16+22=2 THEN SCROLL

120 LET Z=0
130 FOR K=1 TO LEN A# STEP 2
140 LET C=CODE A#(K)-28)*26+CO
DE A#(K+1)-28
150 LET T=T+C
160 POKE N+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 16+42=2 THEN SCROLL

210 GOTO 60
220 NEXT A

```


SOFTWARE *File*

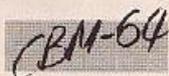
```

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$(239+dir):LOCATE PEEK(ea),PEEK
K(eb):PRINT
890 LOCATE PEEK(fa),PEEK(fb):PRINT CHR$(243+PEEK(fc))
900 LOCATE PEEK(ea+3),PEEK(eb+3):PRINT CHR$(247+PEEK(e
c+3))
910 fa=fa+3:fb=fb+3:fc=fc+3:IF p=2 GOTO 920 ELSE ea=ea
+3:eb=eb+3:ec=ec+3
920 POKE fa,a:POKE fb,h:POKE fc,dir
930 IF p=2 THEN GOSUB 1050
940 GOTO 750
950 RETURN
960 ***** end game *****
970 SOUND 4,0,0,2,0,15
980 FOR Z=0 TO 26:INK 0,Z:BORDER Z:FOR Y=1 TO 50:NEXT
Y,Z
990 INK 0,23:BORDER 23
1000 DIR=0,30-0,LENGTH=3
1010 Z$=""
1020 LOCATE 5,12:PEN 2:PRINT"PRESS SPACE BAR FOR ANOTH
ER 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:SCUND 132,0:RETURN

```

Disc utility

Matthew Desmond,
Cholmsford,
Essex.



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
- 1520-1560 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*****
*****
1040 DIM N$(10):NF=0
1050 FORA=1TO3:READ N$(A):NEXT
A
1060 DATADIRECTORY,FORMAT,SCRATCH
H
1070 DATAKL-NAME,INITIALISE,VALID
DATE
1080 DATACOPY,END
1090 FORA=5000TO50020
1100 READ:POKEA,B:NEXTA
1110 DATA 162,3,32,198,255,32,20
7
1120 DATA 255,32,210,255,208,248
,169
1130 DATA 13,32,210,255,76,204,2
55
1140 GOTO 1300
1150 REM*****
*****
1160 PFM*** WAIT FOR A KEY PRE
SS ***
1170 REM*****
*****
1180 PRINTTAB(13)"** PRESS A KE
Y **"
1190 POKE198,3
1200 GETA$:IF A$=""THEN1200
1210 RETURN
1220 REM*****
*****
1230 REM*** READ ERROR FROM DI
SK ****
1240 REM*****
*****
1250 OPEN15,8,15
1260 INPUT#15,A,B$,C,D
1270 CLOSE15
1280 PRINT"DISK STATUS  :",A,
B$,C:D
1290 RETURN
1300 REM*****
*****
1310 REM***** MENU. ****
*****
1320 REM*****
*****
1330 POKE53280,6:POKE53281,1
1340 PRINT" ";
1350 PRINTTAB(14)" "
1360 PRINTTAB(14)"DISK UTILITY"
1370 PRINT" "
1380 PRINTTAB(16)"*****"
1390 PRINTTAB(16)"** MENU **"
1400 PRINTTAB(16)"*****"
1410 PRINT
1420 FORA=1TO3
1430 PRINT,"(A)",(B)";";N$(
A)
1440 NEXTA
1450 PRINT"WHICH FUNCTION DO
YOU REQUIRE? ";
1460 GOSUB1130:A=VAL(A$)
1470 IF A<1OR A>3THENGOTO1460
1480 PRINT" ";A$;" "
1490 GNA GOTO1570,1710,1860,199
0,2170
1500 GNA=5GOTO2300,2430,1520
1510 GOTO1460
1520 REM*****
*****
1530 REM***** END ****
*****
1540 REM*****
*****
1550 PRINT"00000000."
1560 END
1570 REM*****
*****
1580 REM***** DIRECTORY ***
*****
1590 REM*****
*****
1600 PRINT" ";:PR=0
1610 PRINT" "
1620 PRINT"DISK UTILITY"
1630 PRINT"PLEASE LOAD DISK":GO
SUB1150
1640 OPEN3,8,0:"S0":GET#3,A$,A$
1650 GET#3,A$,A$:BL5,BH$
1660 IF A$=""THENCLOSE3:GOTO1700
1670 BL$=BL$+CHR$(0):BH$=BH$+CHR
$(0)
1680 PRINT256*ASC(BH$)+ASC(BL$),
1690 SYS50000:GOTO1650
1700 GOSUB1150:GOTO1300
1710 REM*****
*****
1720 REM***** FORMAT. ****
*****
1730 REM*****
*****
1740 PRINT" ";:ID$="" :DN$=""
1750 PRINT" "
1760 PRINT"FORMAT:"
1770 PRINT"PLEASE LOAD DISK":GO
SUB1150
1780 INPUT"DISK NAME":DN$
1790 IF DN$=""OR DN$=""OR DN$=""T
HEN1710
1800 INPUT"DISK ID":ID$
1810 IF ID$<>""THENDN$=DN$+" "+ID
$
1820 OPEN1,8,15,"N0":+DN$:CLOSE1
1830 GOSUB1220
1840 GOSUB1150
1850 GOTO 1300
1860 REM*****
*****
1870 REM***** SCRATCH ***
*****
1880 REM*****
*****
1890 PRINT" ";
1900 PRINT" "
1910 PRINT"SCRATCH:"
1920 PRINT"PLEASE LOAD DISK":GO
SUB1150
1930 PRINT"NAME OF PROGRAM TO BE
SCRATCHED"
1940 INPUTPN$:IF PN$=""THEN1900
1950 OPEN2,8,15,"S0":+PN$:CLOSE2
1960 GOSUB1220
1970 GOSUB1150
1980 GOTO1300
1990 REM*****
*****
2000 REM***** RE-NAME ****
*****
2010 REM*****
*****
2020 PRINT" ";
2030 PRINT" "
2040 PRINT"RE-NAME:"
2050 PRINT"PLEASE LOAD DISK":GO
SUB1150
2060 PRINT"NEW NAME";

```

(continued on next page)

(continued from previous page)

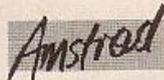
```

2070 INPUTNNS
2080 IFNNS=""ORNNS=""$"ORNNS=""*T
HEN1990
2090 PRINT"OLD NAME";
2100 INPUTOLS
2110 IFOLS=""OROL$=""$"OROL$=""*T
HEN1990
2120 OPEN4,8,15,"R0:"+NNS+"="+DL
$
2130 CLOSE4
2140 GOSUB1220
2150 GOSUB1150
2160 GOTO 1300
2170 REM*****
*****
2180 REM***** INITIALISE **
*****
2190 REM*****
*****
2200 PRINT"L";
2210 PRINT"2";
2220 PRINT"INITIALISE:";
2230 PRINT"PLEASE LOAD DISK":GO
SUB1150
2240 PRINT"OLD
"
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"2";
2350 PRINT"VALIDATE:";
2360 PRINT"PLEASE LOAD DISK":GO
SUB1150
2370 PRINT"NEW
"
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"2";
2480 PRINT"COPY:";
2490 PRINT"PLEASE LOAD DISK":GO
SUB1150
2500 PRINT"COPY OR MERGE ? ";
2510 GOSUB1190
2520 IFAS=""*THENPRINT" ":GOTO26
20
2530 IFAS<>"*THEN2510
2540 PRINT"C":PRINT"ORIGINAL NAM
E:";
2550 INPUTOOS
2560 IFOOS=""OROO$=""$"OROO$=""*T
HEN2430
2570 PRINT"NEW NAME:";
2580 INPUTNNS
2590 IFNNS=""ORNNS=""$"ORNNS=""*T
HEN2430
2600 FFS="COPY:"+NNS+"="0:"+OOS
2610 GOTO2810
2620 PRINT"HOW MANY FILES (2-4)?"
";
2630 GOSUB1190 A=VAL(A$)
2640 IFAC2ORAC4THENGOTO2930
2650 PRINTAS"OLD"
2660 NMS(1)=""MMS(2)=""
2670 NMS(3)=""MMS(4)=""
2680 FORB=1TOA
2690 PRINT"FILENAME #";MID$(STR
$(B),2);
2700 PRINT" ";
2710 PRINT"!!!!!!!!!!!!!!!!!!!!!!";
2720 INPUTMMS(B):IS=MMS(B)
2730 IFTS=""*ORTS=""$"ORTS=""$*THEN
2690
2740 IFB<>1THENMMS(B)=""0:"+MMS(
B)
2750 NEXTB:PRINT" ";
2760 PRINT"NEW FILENAME:";
2770 INPUTMMS
2780 IFMMS=""ORMF$=""*"ORMF$=""$*T
HEN2760
2790 FFS="COPY:"+MMS+"="0:"+MMS(
1)+MMS(2)
2800 FFS=FFS+MMS(3)+MMS(4)
2810 OPEN7,8,15:PRINTH7,FFS:CLCS
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 02 03 LDX #03
2930 ,C002 20 C6 FF JSR $FFC6
2940 ,C005 20 CF FF JSR $FFCF
2950 ,C008 20 D2 FF JSR $FFD2
2960 ,C00B 00 F8 BNE $C005
2970 ,C00D 00 00 LDA #00
2980 ,C00F 20 D2 FF JSR $FFD2
2990 ,C012 4C 00 FF JMP $FFC0
3000 :
3010 :

```

Data moving routine

Wai Kei Ho,
Aston,
Oxfordshire.



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:1bytea=&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
c	31448	12288	32/68

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 "Movs"
- 30 LOAD "b":30000
- 40 Call 29800

```

100 REM *****
110 REM ** data moving routine **
120 K=M ** 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 MT>65536 THEN PRINT CHR
$(7):GOTO 100

250 IF MS+LM>MT THEN MF$="END" ELSE MF$="BEGINNING"
260 IF MF$="END" THEN MS=MS+LM:MT=MT+LM
270 IS#<HEX$(MC):MT#<HEX$(MT):LM#<HEX$(LM):EA#<HEX$(EA
)
280 REM ** convert addresses to hi and low bytes data
**
290 1bytea=VAL("&"+RIGHT$(MS#,2)):hbytea=VAL("&"+LEFT$(
MS#,2))
300 1byteb=VAL("&"+RIGHT$(MT#,2)):hbyteb=VAL("&"+LEFT$(
MT#,2))
310 1bytec=VAL("&"+RIGHT$(LM#,2)):hbytec=VAL("&"+LEFT$(
LM#,LEN(LM#)-2))
320 IF EA#="0" THEN er=&D9:ro=19:GOTO 350 ELSE er=&CD
:ro=21:GOTO 330
330 1bytee=VAL("&"+RIGHT$(EA#,2)):hbytee=VAL("&"+LEFT$(
EA#,LEN(LM#)-2))
340 REM ** increment / decrement those registers **

```

SOFTWARE *File*

```

350 IF MF#="END" THEN HL=&2B:DE=&1B ELSE HL=&23:DE=&13
360 REM ** poke start,destination and length into registers respectively **
370 POKE rs,&21:POKE rs+1,1:bytea:POKE rs+2,hbytea:POKE rs+3,&11:POKE rs+4,1:byteb:POKE rs+5,hbyteb:POKE rs+6,&1:POKE rs+7,1:bytec: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,&81
390 POKE rs+16,&20:POKE rs+17,&F7:POKE rs+18,er:POKE rs+19,1:byte4:POKE rs+20,hbyte4
400 REM ** data checking **
410 CLS
420 PEN 3:PRINT TAB(12)"> FINAL RESULT *":PRINT:PRINT:
PEN 1
430 ct=0:PRINT HEX$(rs)";":
440 FOR i=rs TO rstr-1
450 pn#=HEX$(PEEK(i)):ct=ct+1
460 IF I/PN(pn#)=1 THEN pn#="0"+pn#
470 PRINT pn#";":
480 IF ct>7 THEN ct=0:PRINT:PRINT HEX$(i+1)";":

```

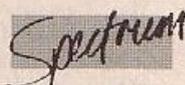
```

490 NEXT i
500 LOCATE 1,7:PRINT"routine starting point :":rs;" =>
":PEN 3:PRINT HEX$(rs):PRINT
510 PEN 1:PRINT"Data moved start address :":ms;" =>":PEN 3:PRINT MR#:PRINT
520 PEN 1:PRINT"Length of data :":LM#;" =>":PEN 3:PRINT LM#:PRINT
530 PEN 1:PRINT"Store data into :":MT;" =>":PEN 3:PRINT MT#:PRINT
540 IF EA<>0 THEN PEN 1:PRINT"Executed address :":EA;" =>":PEN 3:PRINT EA#:PRINT
550 PEN 1:PRINT"Start moving from :":PEN 3:PRINT MF#
560 LOCATE 14,22:PRINT"CORRECT ?(Y/N)"
570 fa#=INKEY$:fa#=UPPER$(fa#):IF fa#="Y" THEN GOTO 600
580 IF fa#="N" THEN RUN
590 GOTO 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 "0" 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 AD, 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, LL.st, 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 Kamil. For instance, to put Compact just below the UDGs enter 32108 or 64876 depending on the 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-1:LOAD ""CODE

The routines can then be called in the usual way, i.e.: RANDUSR address of routine

```

1 REM *****
2 REM COMPACT © K. FEARY, 1984.
3 REM *****
4 REM *****
5
6 DATA 004,10,10,213,04,00,05
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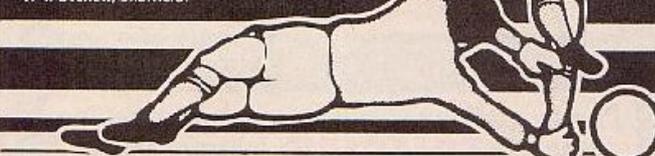
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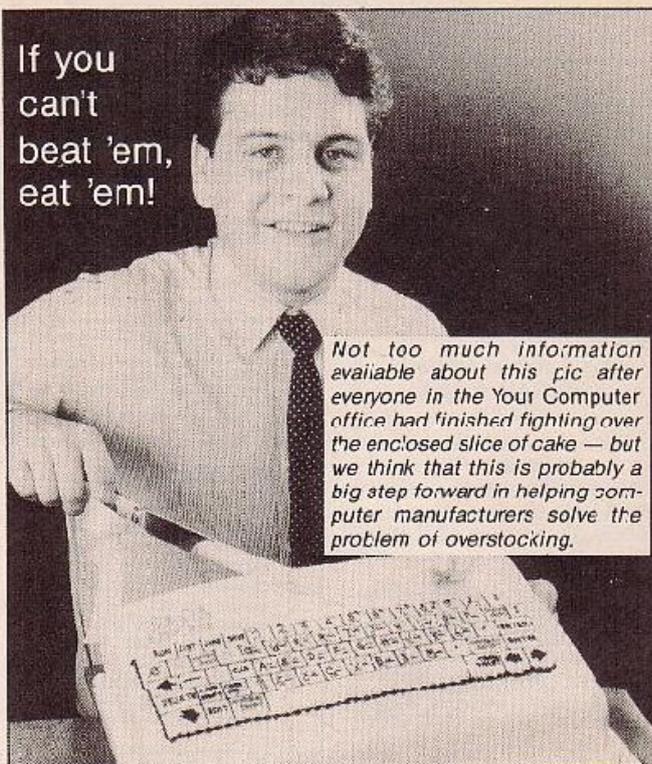
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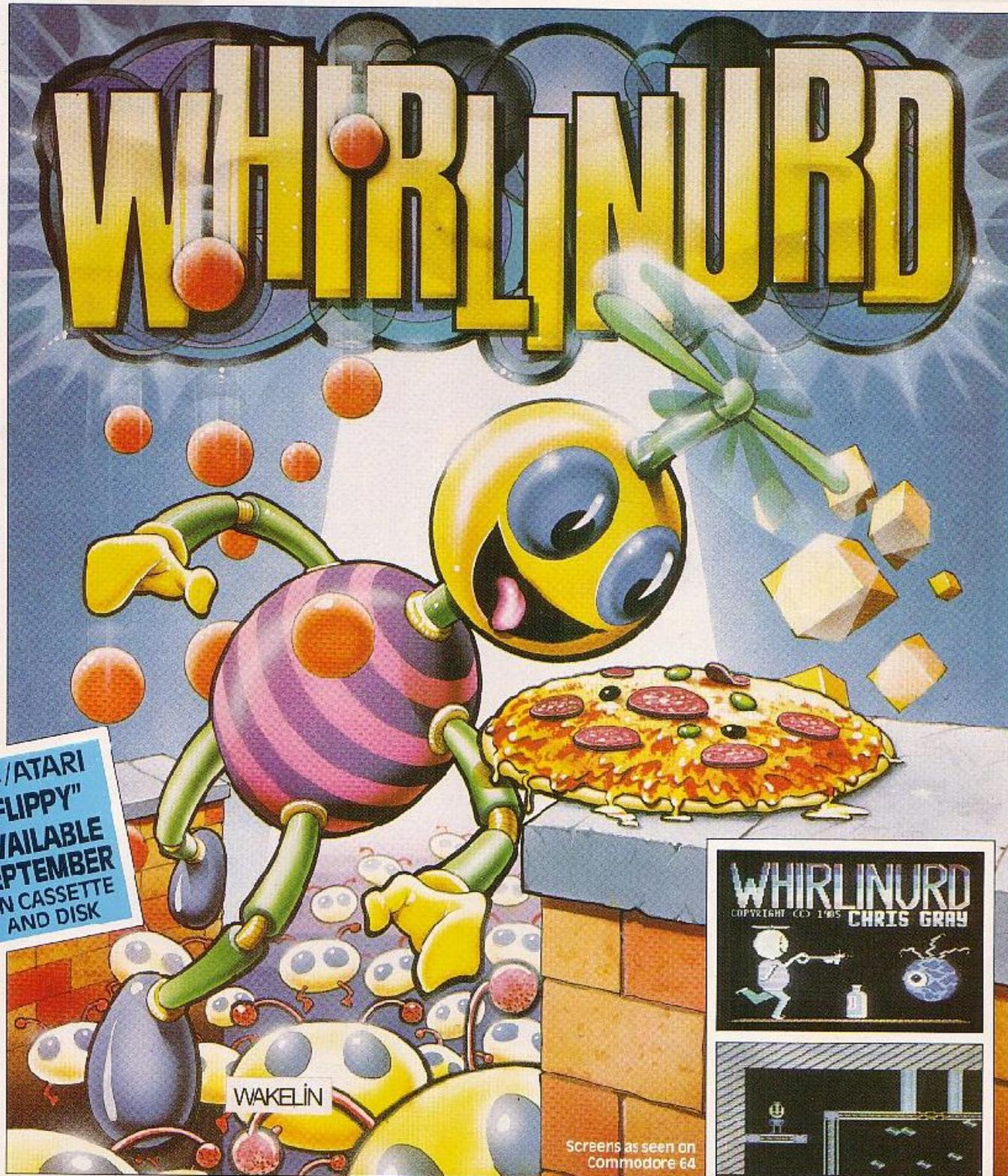
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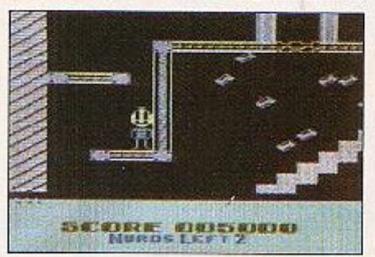
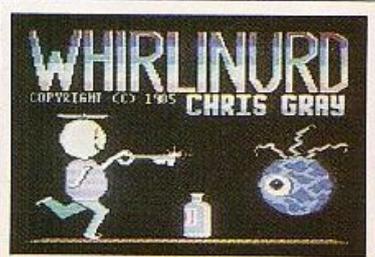
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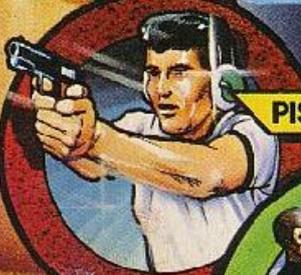
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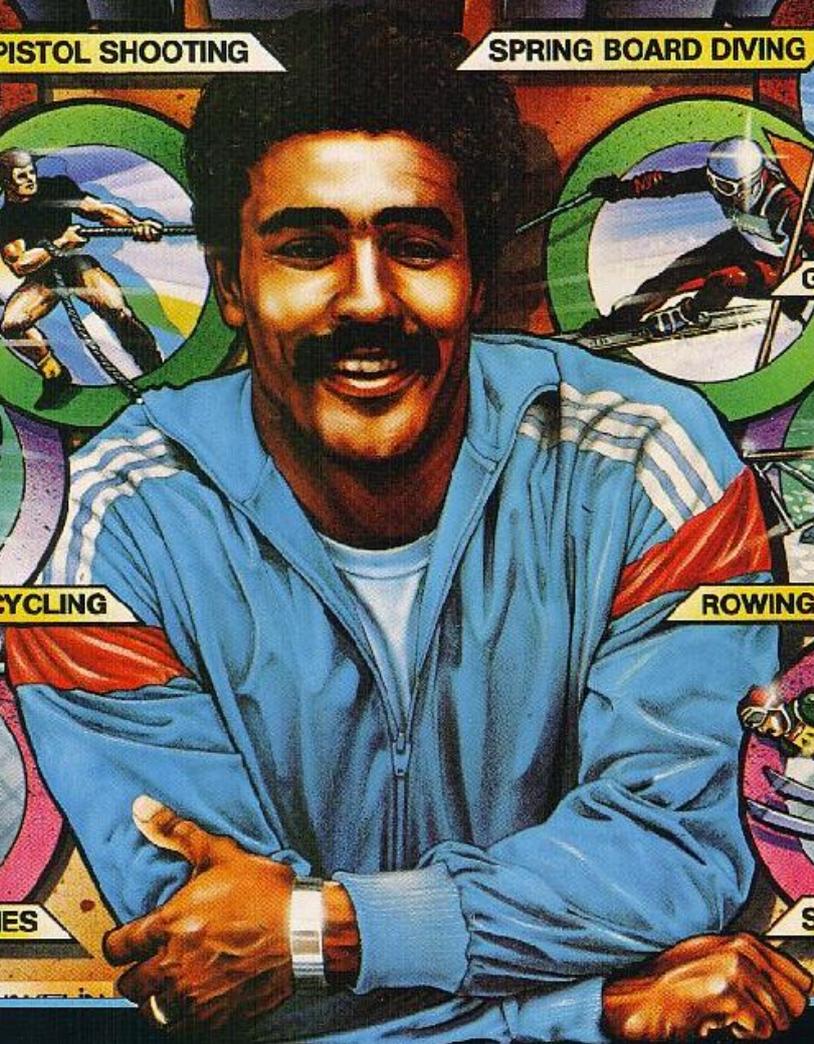
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