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COMPUTER

JULY 1985

BRITAIN'S BIGGEST-SELLING HOME COMPUTER MAGAZINE

Vol. 5 No. 7

HOW BRITISH ADVENTURE WRITERS BEAT THE YANKS AT THEIR OWN GAME



**ATARI ST V.
APRICOT F1E
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64

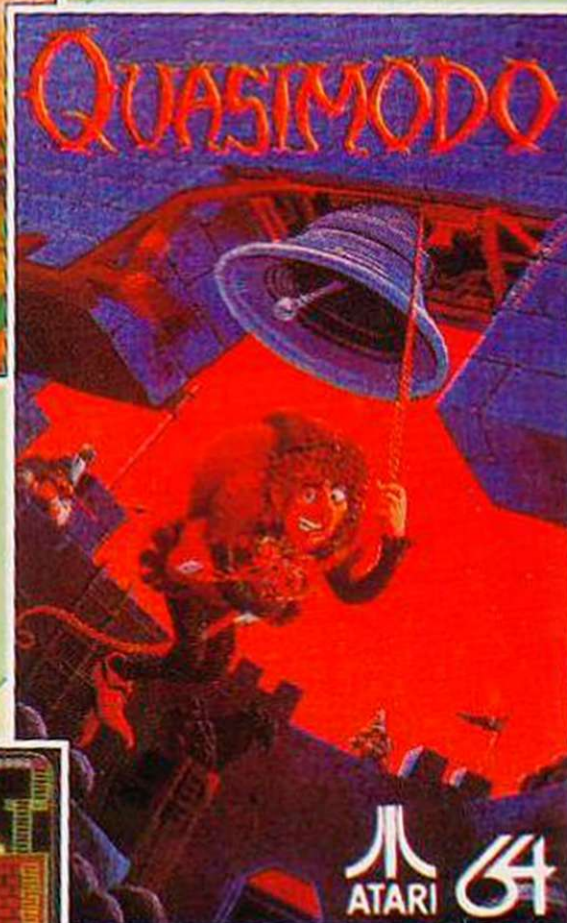
Quasimodo likes bells. They make him feel good – they make him happy – they are his friends. All Quasi wants is to be left alone, but those nasty soldiers think that he stole the royal jewels. Quasi didn't steal them! Quasi wants the soldiers to leave him alone. They fire arrows at him. Quasi doesn't want to, but Quasi will throw big rocks at the soldiers. Quasi knows a secret! Quasi knows where the jewels have been hidden in the castle and only Quasi can climb there! Now the noise has stirred up the bats in the belfry. Quasi better jump away from those bats! Quasi think he got up on the wrong side of bed today.



ocean

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ATARI 64

YOUR COMPUTER

Contents

JULY 1985



Atari 520ST review: page 40.



ACT FIE: page 47 for review and page 85 for competition.



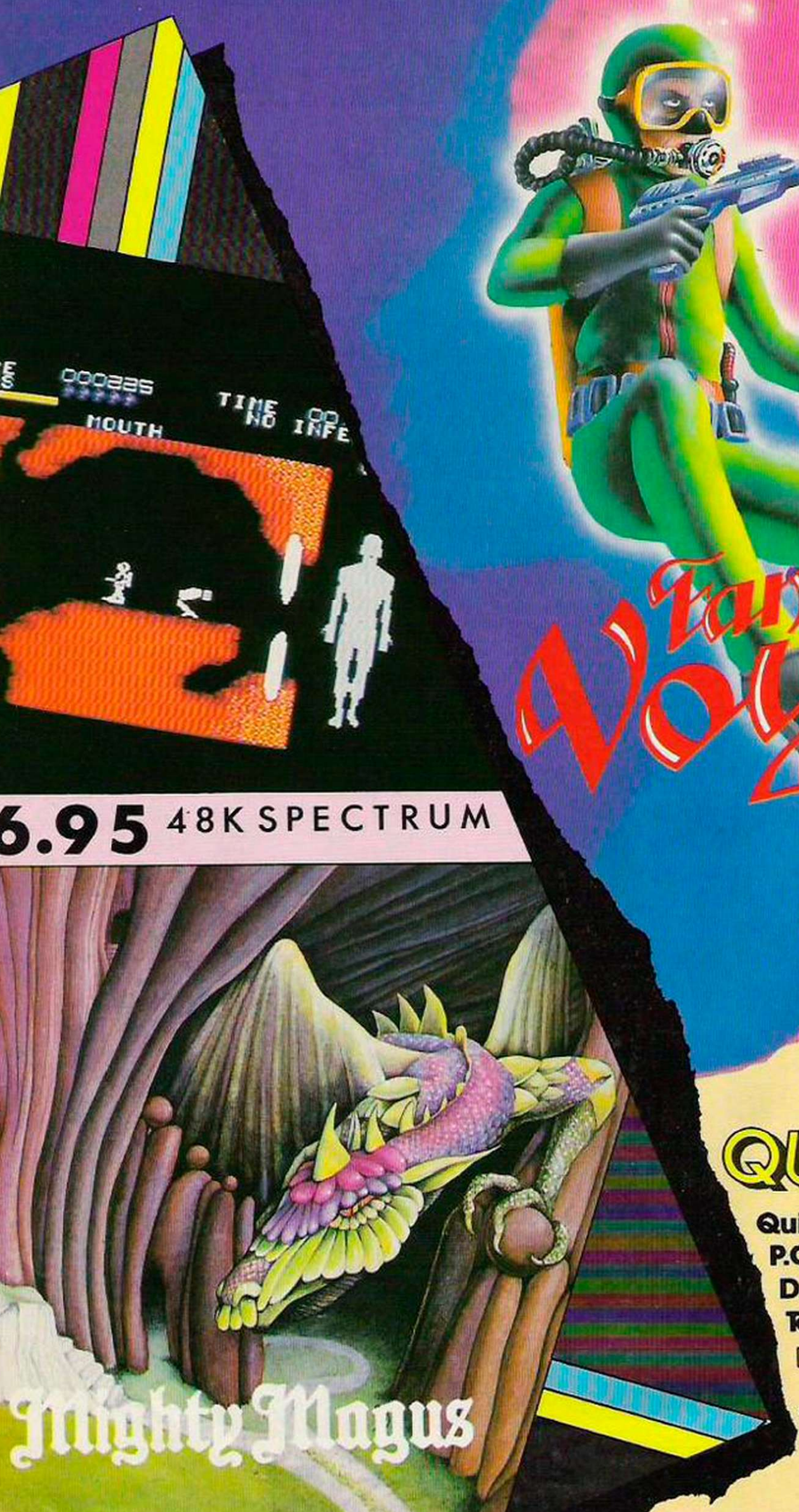
Jump Jet Assault: page 52.



Cover shot — Brits beat Yanks in adventure writing: page 36.

- 12 NEWS:** MSX II; Oric rescue; Sinclair latest. **17 LETTERS:** Maxam vindicated; A headmaster writes; Hackers.
- 21 FIRST BYTES:** Handy peeks and pokes to get beginners animated; stuff you need to know to get into the modem mode; programing snobbery.
- 25 HARDWARE HITLIST:** As real live tortoises get more and more expensive why not get a turtle? We coax Valiant out of its shell. Also Star printers.
- 27 SOFTWARE SHORTLIST:** Programs for softies; with the flower fairies in Elidon, chewing chocolate with Charlie, and the cut-price clockwork toy massacre.
- 35 QUEST CORNER:** Keys of Hope Tyrann and Mindshadow. New adventure releases reviewed by Hugo North.
- 36 HOW BRITISH ADVENTURE WRITERS BEAT THE YANKS AT THEIR OWN GAME:** James Hartley flies the flag for British software houses.
- 40 BATTLE OF THE SUPERMICROS:** Kathleen Peel unmasks the Atari 520 ST. This year's model or a computer for a generation?
- 47 FIRST BITE OF THE APRICOT:** The Apricot F-1E; dinosaur or dream machine? Elsie Dee assesses the fruits of experience.
- 48 TELEVISION MONITORS:** Square-eyed Luke Theodossiou adjusts his horizontal hold and tunes in to find out which monitors will cut your Optrex bills
- 50 COMPETITION RESULTS:** Who won the Atari competition. **52 BBC/ELECTRON, JUMP JET ASSAULT:** A viff with Brian Lewis.
- 56 SPECTRUM BACKBOOGIE:** This little number by Timothy Closs will repeatedly play a piece of music without interfering with the running of your own programs.
- 58 BBC BEEBSKI BEAT:** Fintan Culwin produces simple interrupt driven tunes to accompany your games. Part of a series.
- 64 AMSTRAD CPC-464 SPACE EGGS:** A colourful asteroidesque game which gives a whole range of colours and provides mode 0 size text by Christopher Leigh.
- 68 SPECTRUM RAMDISC:** Ro Richardson lets you load and save program and code very fast without any extra hardware.
- 70 BBC DATABASES:** John Dawson disseminates information. **72 SPECTRUM TO THE TOP:** Julian Wood and the smooth-scrolling graphics.
- 76 COMMODORE 64 DEATH TRAP:** The seconds are ticking away. Can you defuse the suspect devices? A real nerve-tingler from Richard Hamer.
- 81 SPECTRUM WAVES:** Timothy Closs waves. **82 CBM-64 MOVE SCREEN:** Rae West does some screen shifting.
- 85 YOUR COMPUTER GRAND £2500 COMPETITION:** First prize Apricot F-1E with colour monitor, second F1E with monochrome monitor, third — an F-1E.
- 88 ZX-81 PONGY:** You are a penguin. Ice-blocks make you nervous. You have just typed in Miquel van Smoorenburg's program. Have an ice day.
- 92 TELSOFT:** Your Computer software down the phone. This month: CBM-64 Deathtrap, Spectrum Backboogie and Spectrum To The Top and BBC Jump Jet Assault.
- 95 CBM-64 SPACE JUNK:** You are a space junkie. You have been typing this code in for five months. Now the mission draws to a close. A nation mourns.
- 96 AMSTRAD BACKUP:** K R Laslett's program for honest readers. **99 RESPONSE FRAME:** Tim Hartnell answers readers questions.
- 101 SOFTWARE FILE:** Ten pages of software for most micros. **122 DATABASE:** Paul Bond rounds up forthcoming computer events.

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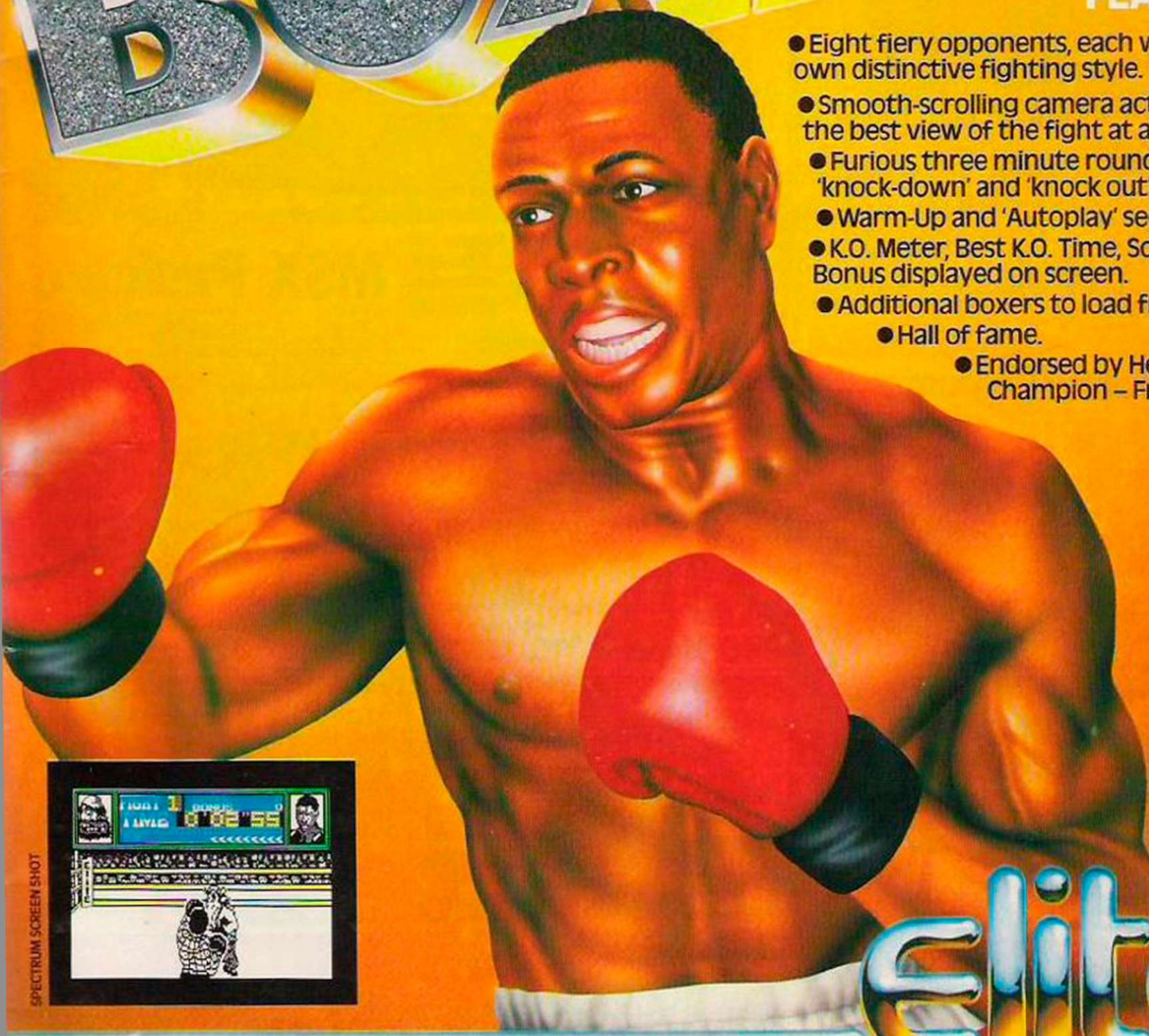
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White Lion Str. Tel: (0603) 612537
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Grosvenor Centre. Tel: (0604) 37031

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CROYDON Vision Technology Ltd., 53/59
High Street Tel: (01) 681 3022
EPSOM The Micro Workshop, 12 Station
Approach Tel: (03727) 21533
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53 Woodcote Rd. Tel: (01) 647 5636
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don Rd. Tel: (04446) 41381
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Commercial St. Tel: (0633) 67378
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puter Centre, 17/19 Litchfield St. Tel: (0902)
29907

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ZX Spectrum 48K	£99.00	Single without PSU		Defend or Die	£7.95	£7.15	£8.95
ZX Spectrum plus 48K (+ £50 free software)	£129.00	5401 100K 40T	£118.00	Basic Tutorial 1	£19.95	£17.95	£19.95
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Commodore 64 (+ £40 free software)	£179.00	5802 400K 40/80T DS	£180.00	Compleat O.S.	£24.95	£22.50	£24.95
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Amstrad CPC664 (Green with disk drive)	£329.00	Twin drives with PSU		Microopen (disk)	£49.95	£44.95	£49.95
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Brother EP44	£235.00	3.5" Hewlett Packard double	£5.50	Happy Writing	£8.95	£8.05	£8.95
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Juki Sheet Feeder	£220.00	BBC Cassette Recorder	£2.99	World Wise	£8.95	£8.05	£8.95
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Mannesman Tally MT80 plus (Centronics)	£199.00	Vic 20/64	£2.99	Lords of Midnight	£24.95	£22.50	£24.95
Shinwa CP80 (Centronics)	£199.00	Dragon 32/64	£3.99	Mr Robot	£24.95	£22.50	£24.95
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Epson RS232 Interface with 2K buffer	£65.00	Canon PW1080A	£4.80	Emulator	£6.99	£6.30	£6.99
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Juki RS232 Interface	£10.00	Shinwa CP80	£4.30	Quizzer	£6.99	£6.30	£6.99
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Tasman Interface (cass) centronics interface	£29.95	Apple IIe	£4.50	Twin Kingdom Valley	£9.50	£8.50	£9.50
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Microvitec 1451 MQ	£250.00	Sure Shot (C16)	£15.00	Moon Cresta	£6.95	£6.25	£6.95
Microvitec 1451 AP MS4	£345.00	Zip Stick (C16)	£14.95	Azimuth	£8.95	£8.05	£8.95
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Commodore 1702	£210.00</						

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COMMODORE 64

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Basic Lightning	£19.95	£17.95	Heathrow	£7.95	£7.15	Micro Olympics	£5.95	£5.35
Basic Lightning (Disk)	£29.95	£26.95	Bert Boot	£7.95	£7.15	Mini Office	£5.95	£5.35
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"NEVER DID TRUST THAT SINCLAIR"

THE SINCLAIR CYNICS have turned full circle. They sneered at his first sub-£100 ZX-80 five years ago, and now they're back rubbing their hands in glee at the first major financial crisis to face him in five years' home computing.

Between the early black box days and the blacker months of early 1985 they jostled to talk to him and listened avidly to his Cromwellian views on *Question Time*. Now they seem to have conveniently forgotten that it was Sinclair who turned the U.K. into the most sophisticated computer market in Europe.

Of course the delayed-delivery and reliability problems that have beset all his machines have left a mark in people's minds, but his achievement in giving Britain more computers per capita than any other country mustn't be played down.

The disasters that have hit other home computer companies — Acorn, Oric and Dragon — have made his search for £10 million to £15 million for "financial reconstruction" particularly difficult; and the C-5 electric bidet hasn't done much to help. Despite the politicians' and the City's often confessed undying love for new technology, they run a mile when faced with the real thing. They'd rather invest in cabbages than computers.

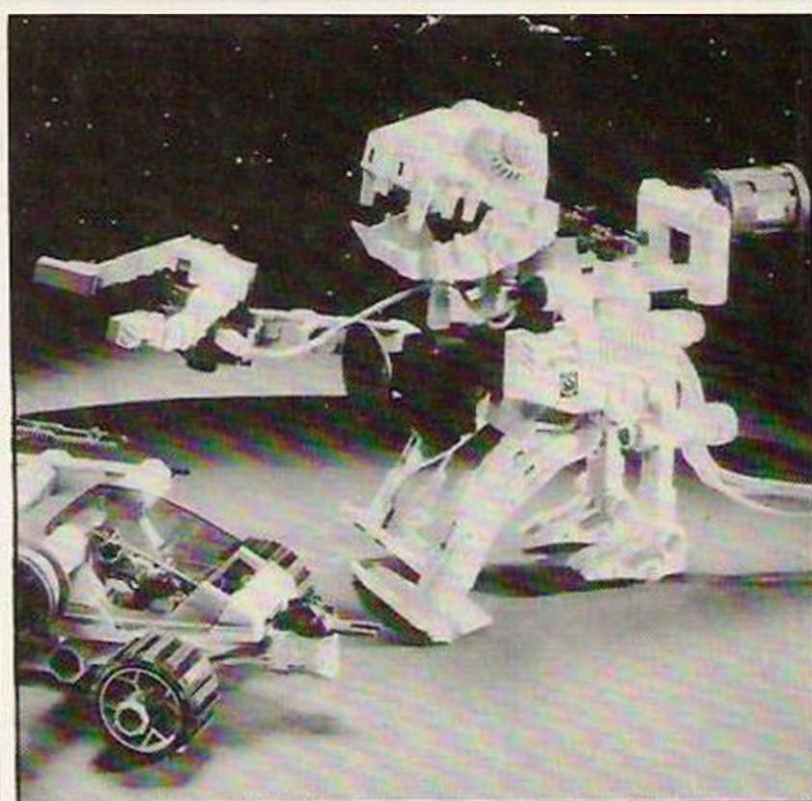
Behind Sinclair's cash crisis lie many reasons, some common to all computer manufacturers, others unforeseeable. Christmas was bad everyone agrees, but nobody thought it was as bad as the £30 million of unsold Sinclair stocks seem to show.

The main obstacle between Sinclair and a flow of new funds is the understandable fear that he has become a one-product company — the Spectrum. And many believe that even that machine is well past its money-making heyday as it celebrates its third birthday in a quiet summer.

Sinclair's hopes are pinned on summer pocket TV sales balancing up the computer market's lopsided Christmas booms. He still believes the QL will make its long-awaited impact — he's planning to give a September release to a half megabyte wafer-scale technology disc drive for it.

Apart from red faces in the highest places in the land, Sinclair's difficulties may at least show that new technology is perhaps not such an easy solution for rebuilding the nation's wealth.

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"Take me to your teacher."

CHALKIE ROBOTIX

ACTION MAN lookalike Gaxon Graves is teaching Welsh 10-year-olds Logo with the help of his control vehicle Robotix.

Robotix is a £60 construction kit including four motors, five channel control and 100 parts which kids can use to construct 10 different vehicles and robot arms. In America, where Milton Bradley has been selling Robotix

for a year, it is already available with an Apple interface and software. Now David Wharry of the Micro Electronics Programme and Patrick Drewett, a teacher at Coed Eva Junior School, Cwmbran, are experimenting with Robotix kits linked through a Deltronics controller to BBCs to teach the principles of problem solving, control and technology.

MSeXtra res

PRIVATELY MSX computer makers are showing off the new extended specification MSX-E micros with 512x192 resolution, 80-column text display, 256 colours and nine-voice sound which will go on sale in Japan this autumn. Publicly in Britain the likes of Sony, Toshiba and Mitsubishi insist that they will be selling only the existing under-specified over-priced MSX machines until after Christmas.

Toshiba, which has sold more MSXs than anyone else in Britain, unveiled its MSX-E, HX-23 and HX-22 micros at the consumer electronics trade shows in London last month. The 23 has 80K of video Ram and can inter-

face to a video disc player. JVC also showed their current MSX hooked up to a video disc running a demonstration golf game. As promised at the MSX launch, MSX-E retains upwards compatibility — it will run all existing MSX software — although, of course, new programs written to take advantage of the expanded MSX-E graphics and sound capabilities will not be downwards compatible.

In Japan MSX-E machines will start at around £350 — although some will include a built-in disc controller. Others may go further — Spectravideo is building in a complete disc drive.

EUREKA FOR ORIC

Normans conquer Atmos

EUREKA INFORMATIQUE, which distributes British computers in France, has bought Oric for several hundred thousand pounds and will move production of Atmoses to its computer peripheral plant in Normandy later this month.

Oric, which announced its Spectrum-bashing 16 and 48K Oric 1 at the end of 1982 suffered repeated financial crises and uncertainty which prevented it from competing successfully with Sinclair in Britain, although as Jean-Claude Talar, Eureka President points out it "enjoyed a good reputation in France".

Earlier this year Oric had to finally call in the receiver who has sold all rights to Oric's future plans for home micros including the Stratos and a 68000 based machine, as well as substantial stocks of components, half-built, and completed Atmoses to Eureka. Oric's other assets, including chip designs for an ultra low-cost IBM compatible will be sold elsewhere. Initially Eureka intends to assemble Orics in Normandy, until the stockpile of



Stillborn Stratos.

components runs out, and sell them in France.

In August or September, Eureka will decide whether to go ahead with Stratos, a 64/128K micro with a built-in disc interface and perhaps modem, and whether

to go back into the British market.

British Oric owners lost their warranties when the company crashed but Eureka will be announcing details of a new support service for software, repairs and peripherals next.

Atari 520 not out CPC 128 declared

YORKIE MAN Alan Sugar sold us a dummy last month when he launched his disc-based CPC 664 without the extra Ram we'd predicted. But now the Amstrad 128 has appeared — in Chicago at the Consumer Electronics Show.

Enterprise, meanwhile, has named the price for its 128K micro which has 113K user memory and is 30 percent faster than, yet compatible with, its 64K cousin. Companies like U.S. Gold, Ocean, and Domark with its new James Bond game, are now writing Enterprise versions. The 128K micro will cost £250 while the 64 drops to £180 — that for a machine with 672x512 resolution.

Down in Slough, Atari's first batch of STs — only 520 of them oddly enough — are now with software houses and the like. First consumer deliveries should be through Atari loyalists Silica shop in Sidcup.

WE'RE ALL GOING ON A CBM HOLIDAY

COMMODORE ENGINEERS from Britain and Europe flown to California to see the Amiga are impressed with the graphics. CBM's new 68000-based micro will hit the U.K. in 1986 and its £1,200 price includes a 3.5in Sony disc drive and a two-button mouse.

But the graphics chips will appear in future Commodore home computers. Resolution is better than TV quality — up to 1024x800, and 4096 colours all available through a GEM-like operating system. You can have five windows on screen with 16 colours in each. Amiga also has a built-in synthesiser to sound the battle cry against Tramiel's "Saint".

Commodore is also offering free trips to anyone who will take a CBM-64 off their hands this



Chicago price tag for 128 was \$300.

summer. For £199 you will get a 64, C2N Data Recorder, a brilliant game — International Soccer — and three days free accommodation at one of 250 hotels in Britain and Europe. A Commodore front man was able

to reassure the unduly cynical that you would have some choice "the hotels are not all in Sutton or Albania". The Plus 4 is being packaged with a 1541 disc drive, MPS 801 printer and Inpec business software for £450.

Remember Harold in 1066 Maggie

NOW THAT Halley's Comet is almost within range for amateur astronomers, Eclipse Software's £7 prediction program for the Spectrum can show you where in the sky to find it — for any time, date and latitude — important because many comet watchers may flee south to Australia for the best view of the giant snowball as it becomes visible to the naked eye late this year and early in 1986.

Gooch out for 64

ENGLAND V AUSTRALIA without having to worry about the mortal remains of Lord Darnley's stump. Gooch's Cricket, £10 from Audio-genic, puts batsmen and bowlers alike at the mercy of your joystick.

MICRO-EXPORT

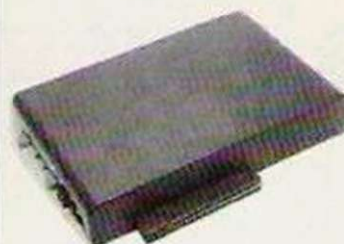
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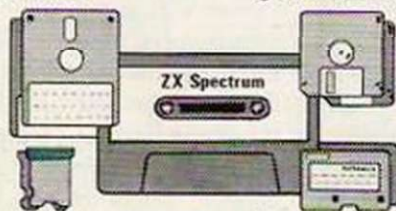
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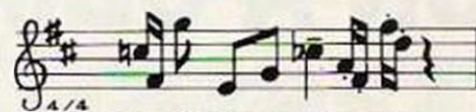
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DIARY

IF YOU ARE privileged enough to walk around Acorn's corridors of power and hear a cry of Alex Uboldi, it is probably not a comment about worried looking Chairman Alex Reid's rapidly thinning hair. Alex has much to worry about, what with the share price at an all time low of 9p, rumours of disaffection from Chris Curry, and PR firm Quentin Bell ditching Acorn because the company had so little to publicise. Olivetti has now put in an Italian, Alex Uboldi, as Managing Director of Acorn.

TRAMIEL still managed to surprise Chicago by launching the 260ST after all, at the Consumer Electronics Show. 256K Ram with a built-in 500K Sony drive and a black and white monitor will cost \$500.

STILL AT CES, rival British software houses seen dragging bags full of cash around as they try to gazump each other bidding for U.S. blockbusters. Wary of disappearing British companies, the Americans are demanding, and getting, six-figure royalties for their games with up to \$50,000 up front.

SOMEONE AT ULTRATEC has just discovered rude words and for some reason has decided to fill the loader program of the AMSDISK tape to disc utility which they sell, with abuse.

We heard about it from J. Shaw, whose 11-year-old daughter was given Amsdisk on her birthday. She called him in after listing 70 lines of abuse which include the line "I've left Basic unprotected to let people see these f***ing comments". Now Shaw, who tells us that his occupation allows him "access to computer files" and that he has "given the tape to my superiors for a decision to be made regarding prosecuting" has sent a copy of the offending lines to the Trading Standards Office.

We cannot guarantee that anyone who sends money to Ultratec will now be sent anything in return while an investigation is carried out into the legality of sending obscene listings through the post.

Elsie Dee

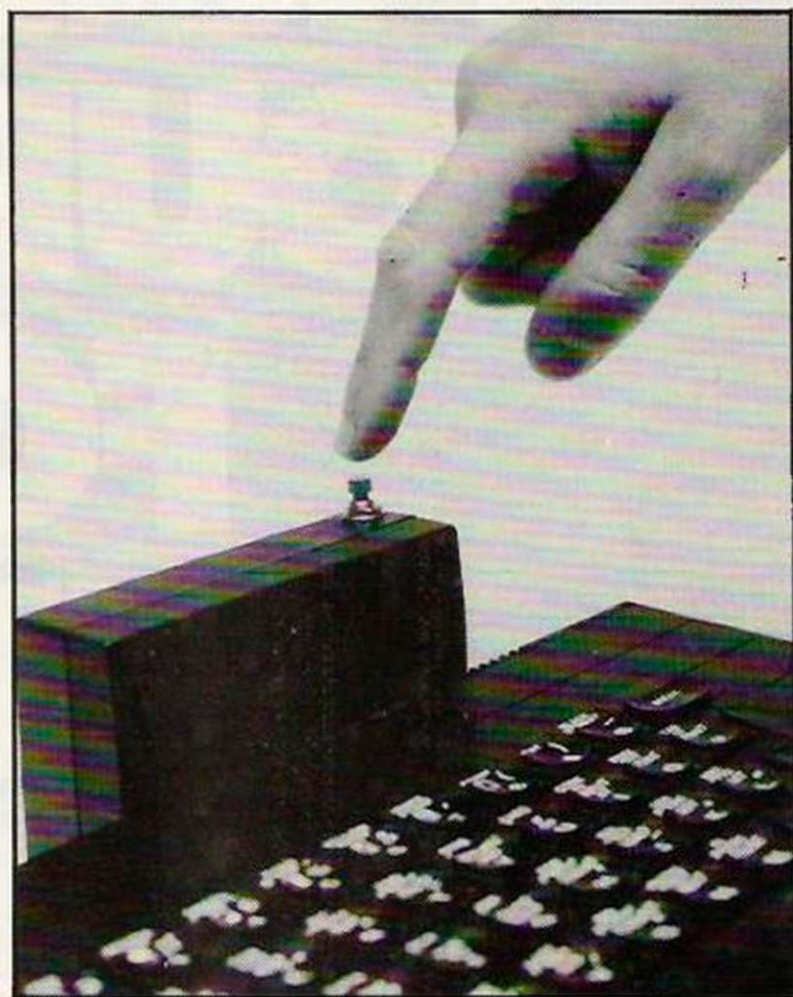
DON'T TOUCH

Software industry at risk

"DON'T TOUCH" is the advice Tim Langdell of the Guild of Software Houses is giving to anyone tempted to use Evesham Micros Interface III to copy software tapes. One touch of the button once you have loaded the program and the Interface III dumps the whole contents of a Spectrum's memory onto micro-drive, evading all the protection devices so far developed for commercial software.

Evesham advertises the unit for making back-up tapes but Roger Tuckett of the Federation against Software Theft points out that the William Powell Computer Copyright Bill should become law this month and then making back-ups other than for research and private study — which is narrowly defined will be a breach of copyright. Selling copies is punishable by fines and imprisonment. Tuckett condemns "companies like Evesham Micros which sell machines under the guise of making back-ups."

Longdell does not believe that there is any such thing as an innocent copy. "I have never found the need for a back-up — you have to do something extreme to a tape, like dropping it near a magnet or letting the dog chew it." If a program does not load as easily on the 1,000th occasion as it did on the first, GOSH believes



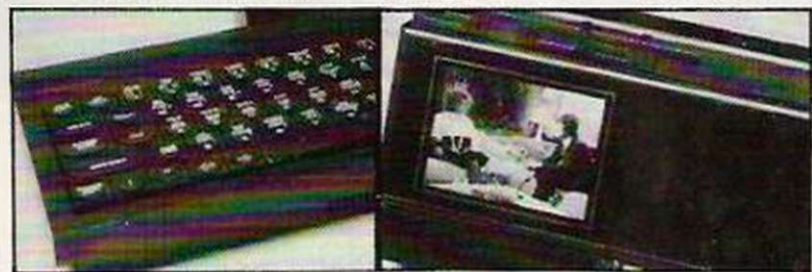
A crime is about to be committed.

that the software house should replace it.

Up until Interface III, better software protection had made it more difficult to break into

programs while speed loaders had reduced tape to tape copying. A new wave of piracy could be the last straw for ailing software houses.

PLUS, TV AND PRINTER £200



Sinclair tries to wake up Spectrum sales.

SINCLAIR IS BUNDLING up a Spectrum, flat screen TV, ZX Printer and software including Vu 3D, Chess and four other games for £199 in a summer offer through Dixons. Although you cannot use the £100 miniature

screen with your micro — it has no aerial socket — Sinclair's reasoning is that a go-anywhere TV is the sort of product that will appeal in the summer when computer sales are otherwise at their lowest.

Brussels spurs cards

IN THE WAKE of the Brussels European Cup soccer disaster, football clubs are starting to take Sperry's idea for providing computer identity cards for fans to curb hooliganism seriously. Chelsea is signing up and Stockport, Bournemouth and Reading, amongst others are considering similar systems. Although the scheme has been written off as unworkable by Ted Croker of the FA and Chief Constable Anderton of Manchester, small First Division clubs like Luton and Oxford which plan to ban all away fans from league matches might find the Sperry Systemsolve plan effective.

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POP★ TOPS

TOP 20

1	World Series Baseball	Imagine	Sp
2	Booty	Firebird	Sp
3	Softaid	Ethiopia Appeal	Sp
4	Wild Bunch	Firebird	Sp
5	Shadow Fire	Beyond	Sp
6	Brian Jacks Challenge	Martech	Sp
7	Grand National	Elite	Sp
8	Dragon Torc	Hewson Consultants	Sp
9	Gyron	Firebird	Sp
10	Everyones a Wally	Microgen	Sp
11	Match Day	Ocean	Sp
12	Arnhem	CCS	Sp
13	Starstrike	Realtime Software	Sp
14	Gremlins	Adv International	Sp
15	Death Star Interceptor	System 3	Sp
16	Minder	D.K'Tronics	Sp
17	Jonah Barringtons Squash	New Generation Software	Sp
18	Overdrive	Superior Software	EI
19	Bumper Bundle	Alligata	EI
20	Alien 8	Ultimate	Sp

Sp = Spectrum EI = Electron
Source = WH Smiths.

TOP 3 BY MACHINE

1	R.I.P.	M. Tronic	Vc
2	Rockman	M. Tronic	Vc
3	Mickey the Brick	Firebird	Vc
1	Basketball	CBM	64
2	Gates of Dawn	Virgin	64
3	Chiller	M. Tronic	64
1	Starion	Mel. House	Sp
2	Booty	Firebird	Sp
3	Bruce Lee	US Gold	Sp
1	Football Manager	Addictive	Bc
2	Wizardore	Imagine	Bc
3	Elite	Acornsoft	Bc
1	Bruce Lee	US Gold	At
2	Spitfire Ace	US Gold	At
3	Fort Apocalypse	US Gold	At
1	BMX Racers	M. Tronic	16
2	Exorcist	CBM	16
3	Wizard & The Princess	Mel. House	16
1	Overdrive	Superior Soft	EI
2	Elite	Acornsoft	EI
3	Football Manager	Addictive	EI
1	Ghost-busters	Activision	Am
2	Combat Lynx	Durell	Am
3	Decathlon	Ocean	Am
1	Ghost-busters	Activision	Ms
2	Crazy Golf	Mr Micro	Ms
3	Jet Set Willy	S. Projects	Ms

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

MAXAM IS VINDICATED

MAY I reply to Nick Godwin's attack on our products printed in June's Letters Page.

Our policy is simple. We find it morally unacceptable to market software knowing that it does not perform to the advertised specification. We are grateful to any customer who can substantiate their claim that a program contains a bug. In such instances, or where tape duplication is faulty, we replace it without quibble. As features have been added to MAXAM upgrades have been offered to old customers.

Now to Mr. Godwin's two-pronged attack. He wrote to us in March praising the product and with a request to 'borrow' a Rom version, after mentioning a couple of mythical bugs. These bugs do not and have never existed — even in the earliest production copies. Bugs as serious as those reported by Mr. Godwin would have been spotted months ago by the 5 in-depth magazine reviewers, the dozen or more leading software houses and the 500 plus owners of the various versions of MAXAM!

His second, rather more insidious attack on my marketing strategy, together with his pontificating on the merits of a Rom-based utility at all, show an alarming degree of general ignorance for a man in charge of a user-club newsletter! Our marketing strategy is based on factual information, and in support I can refer you to the June edition of *Amstrad Computer User*, containing a detailed article written by someone rather more clued in than Mr. Godwin.

David Fisk,
Arnor Limited.
London SE25.

Editorial comment: We find David Fisk's reply wholly convincing. A number of readers have confirmed that Arnor's cassette-based assembler is bug-free, and, indeed, an excellent program. As for the Maxam Rom we stand by the judgement of our May review that "this looks like a product no serious Amstrad user can afford to be without."

SLOPPY PROGRAMS

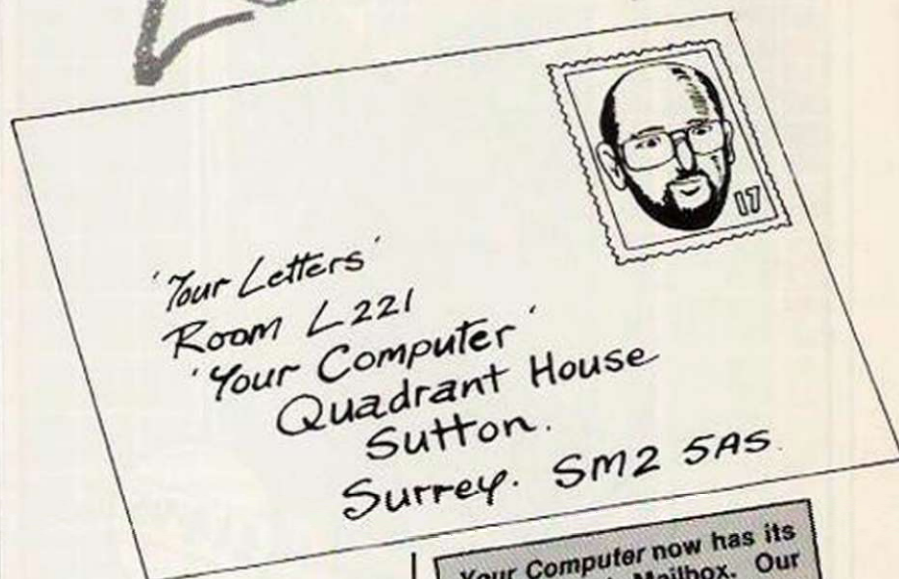
I REALLY CAN'T let you get away with your article in May's First Bytes, entitled *Elegant Programming*. I cannot fault the third or the first program — in either version — but two out of six is not enough for programs of this size.

The first thing that a beginner must learn about loops is that you should not jump out of them. Some Basics are more tolerant of this than others, and with all of them it will be forgiven in a very short program, but it is surely something that any programmer must discipline himself to avoid. Program 2 gives the game away. Line 20 reads:

```
20 IF L=7 THEN ?"SEVEN":  
L=10:GOTO40
```

The whole point is that by making L=10 you do not need the Goto. The

YOUR Letters



program will leave the loop naturally — and more quickly. In program 5 IF DS="ORANGES" THEN60 should be changed to THEN L=5 for the same reason.

Program 4 has no semicolon between "Countdown" and CD. I am aware that you don't need one on the Apple, but most computers would crash here.

Program 6 is more spectacular with two jumps out of a loop, an error in line 50 that would produce the opposite statement to that required if it ever got there. On most computers it is unlikely to do so, as the Mid\$ will have to read beyond the end of the string. Line 30 should be FOR L=1 TO LEN(AS) - 2 and line 50 should start IF L=LEN(AS) - 2 if we must do it that way. Better to omit line 50 and add 65 ?"NO MATCH":END

I took Program 1 to heart. I am sloppy. Whether you put Next or Next D is a matter of style. The former saves space and is quicker, the latter

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

is more readable. I did not think one was wrong and the other right. But I have taken the message to heart, and decided that I would rather be sloppy than elegant.

Geoffrey Childs,
Winchcombe,
Gloucestershire.

SPECTRUM TIPS

SPECTRUM owners may like to use some of my routines.

POKE 23659,0

makes the Spectrum crash if anything is printed in bottom part of the screen. e.g. error messages or breaks. (To disable this routine use Poke 23659,2)

PRINT USR 0

Completely clears the memory. (New only clears the Basic)

(continued on page 19)

'AMSTRAD CPC 664 IS OK'

MAY I be so bold as to suggest that Mr Lee Paddon takes a driving lesson or two before he tries to rev up another computer.

I noticed in the review he did of the Amstrad CPC-664 several unfortunate mistakes. These errors could I suppose influence potential purchasers of this fine machine into looking elsewhere.

For a start the 3in. discs have when formatted for a CPM system disc 169k, or as a Data disc i.e. no CPM 178k or in IBM format 154k. Additional to the free space is a 2k directory on each side. A renumber command is included in the Basic.

With regard to the Warm Reset, what point is there in a warm reset if you have very good On Break Gosub protection. And if one were to read the manual it details how to define a function key to reset the mode and colours etc.

All in all I suppose it was a reasonable review but for the fact of the above errors.

S. Potter,
Brinsley,
Nottinghamshire.

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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.

Telsoft

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

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You can get messages to us in two ways. Either use the Prestel Telex Link to 892084 BISPRES G or you can use our very own modem, day or night on 01-661 8978. The modem is V21, 300 baud, even parity, 10 bits per character. You simply transmit in upper case "YRC" — our address code, and wait for the acceptance code "+ + + STF GO". Then off you go. Don't forget to tell us who it's for. Sign off with "NNNN" — again in upper case.

(continued from page 17)

```
9000 FOR f=1 TO LEN a$:PRINT
AS(f);BEEP .05;0:NEXT f:RETURN
prints text newflash style. It is meant
to be used as a sub routine. To activate
use LET a$="message to be
printed.", then set the printing
variables. For example:
```

```
PRINT AT x,y;
```

and

```
GOSUB 9000
```

I have noticed that the Spectrum has a facility to convert binary numbers to decimal but it doesn't have anything to convert decimal numbers to binary, so I have written a routine to serve this purpose. Poke the decimal number that you want to convert into location 16384, then run this routine:

```
1 LET a$="":FOR f=0 TO 7:LET
a$=a$+STR$(POINT(f,175):NEXT
f:PRINT a$:STOP
```

Neil Braganza,
Nailsea,
Avon.

SPRITES BUG

I HAVE just discovered a bug in the listing for my Sprite Basic article in the June issue which prevents the two commands !Break On and !Break Off from operating correctly. However, the bug can simply be cured by loading the machine code, and then running this program:

```
10 FOR J=62780 TO 62650 STEP
-1
20 POKE J+21,PEEK J:NEXT J
30 FOR J=62650 TO 62670
40 READ N:POKE J,N:NEXT J
50 DATA 7,98,114,101,97,107,114,
110,166,237
60 DATA 8,98,114,101,97,107,111,
102,102,175,237
70 POKE 60136,208
80 SAVE "SPBASCOD" CODE
60000,2800
```

Robert Newman,
Oundle,
Peterborough.

HACKERS BAD

THE DEFENCE of electronic shoplifters — hackers — in your May Leader was quite touching, implying that all they are interested in is helping big business to tighten up the security of its

YOUR LETTERS

computer systems.

If an intruder was apprehended in your office in front of your safe, which he had just opened, and he claimed that he was not really interested in the contents at all, but that all he was trying to do was to demonstrate to you that your security was lax, would you really just thank him kindly and send him on his way, perhaps with a reward for the kindness he had done you?

I think the naivety of your leader writer is surpassed only by that of the author of the *Hacker's Handbook* if he really believes what he wrote in the quotation you give from his book on page 49.

I. Howard Wright,
Sauchie,
Clackmannanshire.

SNAKES ALIVE TIP

THANK YOU for publishing my corrections for the game Snakes Alive! last month. I am pleased to say that it is now enterable, and should work straight away.

For those that are still having problems though, a couple of large checksums might help locate the source of your error. These are 417 851 for listing 3 and 377 062 for listing 2. Just write a loop to add up all the contents from 28384 to 32767 inclusive, and these two numbers should be returned for their respective listings.

For those that have successfully typed in all the code, congratulations!!

If you are having problems guiding the snake around all 48 locations, here are a couple of "cheating" Pokes that

should (only for a while!) make things easier:

POKE 25803, any number from 1 to 256 (poked as 0). This is the initial SPEED value. Note that it is actually a two byte variable, and large values will be very slow — avoid them! The first byte, at 25802 should only be POKEd with caution — it must always be a multiple of four. Normal value for the second byte is seven.

POKE 25797, any number corresponding to a character from 1-9 (ie 49-57). This is the initial number of LIVES.

These POKEs should be typed after loading in the finalised code.

These should make things easier for those weak souled people who can't stand the challenge. (Or those like me that just aren't fast enough!)

To cater for those who have bought cassettes off me, the same two effects are achieved by holding down keys D and A while the last block of the normal load version loads. You will then be prompted.

D.R. Aspinall,
Brentwood,
Essex.

BITS 'N' BOBS

Line 2510 in June's Amstrad program, Engelbert, is unclear. The last statement should read:

```
PRINT "#@!!";
```

The Spectrum and CBM 64 listings in June's Top Tips managed to get themselves mixed up. And on top of this D. Rockley's listing — for the Spectrum — contains an error in line 50. The USR address should read 64721, not 64271.

Lastly, line 65480, Listing 2 of June's Spectrum program Wizard's Den, reads:
65480: 003C424242423C00 = 384

ARE WE UNDERMINING THE ORGANISATION?

MAY I, as a headmaster of a large comprehensive school whose library accepts your magazine *Your Computer*, complain in the

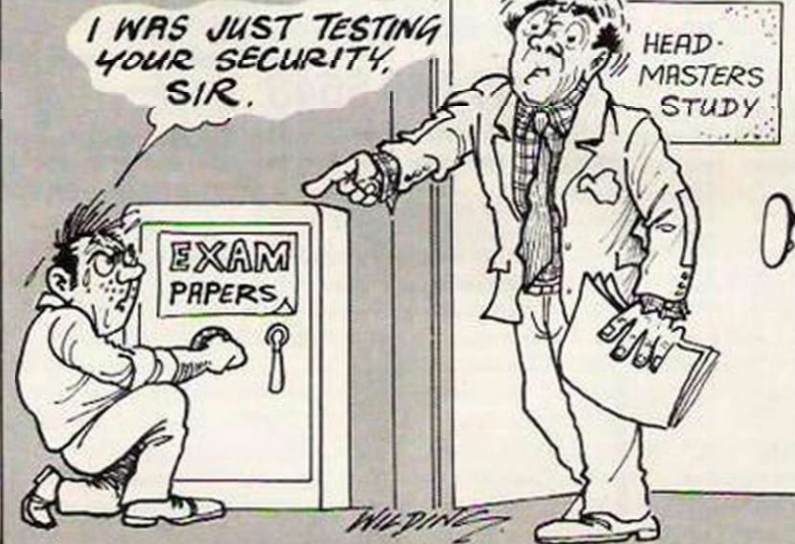
strongest possible way about the June edition.

On page 51, where in the bottom left hand corner you claim no responsibility for what you print, you make two comments which are obviously aimed to undermine the organisation of both schools and examination boards:

- (i) "... which might help you break into the computers that store examination records".
- (ii) "when you send your idea, ... for cheating in an exam or pulling off a scam ...".

We feel very strongly at this school that your magazine should not be allowed to be on display in our library if such comments are to be repeated in future editions.

JW Barrett,
The Lindsey School,
Cleethorpes.



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I could do that...

You're a novice programmer and Peeks and Pokes make you nervous. But you've just read John Ransley's First Bytes piece and he has made the whole business seem absurdly simple.

So why not have a crack at this month's competition and Peek and Poke your way to a £15 prize? Write a short, or shortish, program which creates an animated display by Poking to the screen memory.

Spectrum and Amstrad owners will be at a disadvantage here since John Ransley does not talk about bit-mapped displays; the program he gives as an example will only work on micros whose screen memory operates on character codes.

By contrast, the Spectrum's screen memory controls individual pixels not characters. Nonetheless many of the same principles apply but you might need to study your manual first.

Marc Kavanagh, 13 Barber Street, Padfield, via Hyde, Cheshire SK14 7EG, wins May's competition. He neatly illustrates the use of nested loops with a program to print out three, four and five letter word anagrams.

The program can be easily expanded to cope with larger anagrams by altering line 80 and adding more loops. It is written for the Spectrum but will run on most other micros with minor alterations.

```

10 INPUT "ENTER THE ANAGRAM";A$
20 LET L=LEN A$:IF L<3 OR L>5 THEN GO TO 10
30 FOR A=1 TO L
40 FOR B=1 TO L
50 FOR C=1 TO L
60 FOR D=INT(L/4) TO L AND L>=4
70 FOR E=INT(L/5) TO L AND L>=5
80 IF A=B OR A=C OR A=D AND L>3 OR A=B AND L>3 OR B=C OR B=D AND L>3 OR B=C OR D-E AND L>3 THEN GOTO 120
90 IF L=3 THEN PRINT A$(A)A$(B)A$(C)
100 IF L=4 THEN PRINT A$(A)A$(B)A$(C)A$(D)
110 IF L=5 THEN PRINT A$(A)A$(B)A$(C)A$(D)A$(E)
120 NEXT E
130 NEXT D
140 NEXT C
150 NEXT B
160 NEXT A

```

BEGINNERS

First Bytes

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

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A bluffers' guide to micros

GUARANTEED 100 per cent pure machine code — this sort of crazed statement is made on the backs of obscure cheap-rate software packages which seem to be trying to foist themselves as some sort of silicon potcheen — guaranteed to blow your mind. You don't see it as much as you used to, but nevertheless the term "machine code" has a powerful aura for micro users familiar only with high-level language words like Load or Run.

Those are the sort of words that these wets have to know in order to play their favourite game, i.e. Ghostbusters or Moon Cresta. These people do not have the right stuff as far as real tough he-man programmers are concerned, even if they have a hi-score that looks like Terry Wogan's salary.

A high-level language is one that has human words in it, and it has an interpreter inside it which translates what you type into stuff the computer understands. This takes time, so it slows down programs, which is why machine-code hackers sneer at Basic programs — Basic is a high-level language. To be a real mainline programmer, you've got to speak to the machine in its own language.

You can fudge it by using a compiler — this is a separate program that will translate your whole program into machine code, so you feed the whole translation in instead. But it's like going to Spain on a package tour — you don't really get to know the natives. Anyway, compilers take up a lot of room in a home computer's memory, bashing elbows with the original Basic program and the resulting machine code. Most hardcore hackers take pride in being able to optimise code better than any "dumb compiler."

You can compromise by writing in assembly language using a special program called an assembler, that translates assembly language into machine code. This uses mnemonics which are a bit more comprehensible than machine code but not as easy to

```

29625: 00182424 00 REM HEX "START"
29633: 0010 00 PRINT "START"
29641: 0018 100 INPUT S "FINISH ADDR"
29649: 00380 110 PRINT "FINISH ADDR"
29657: 00202 120 INPUT F "STEP"
29665: 003C20 130 FOR N=5 TO F STEP
29673: 001820 140 LET T=0
29681: 003C04 150 PRINT N: " - ";
29689: 001824 160 INPUT A$: " = ";
29697: 001824 170 PRINT A$: " = ";
29705: 1F644/3 180 INPUT TOT
29713: F806 190 INPUT TOT
29721: 810 200 PRINT TOT
29729: 81 210 LET Z=0
29737: FF 220 FOR K=1 TO LEN
29745: 0 230 LET C=(CODE A$
29753: 370 PRINT "ERROR"
29761: 380 INPUT S "MINE"
29769: 390 IFLS<0 OR L>=L
29777: 400 REM TAKES "MINE"
29785: L=L-LS:IF L=0
29793: 410 REM TAKES "MINE"

```

understand as Basic. Thus the Basic word Return comes out in Z-80 assembler as RTS and in machine code as 201.

The number system favoured by machine-code programmers is, however, nothing so mundane as good old base 10 numbers like 201. So crazed are they that they make life "simpler" for themselves by using a base 16 notation called hexadecimal. This is called "hex" for short, thus making a close linguistic link with the old Pennsylvania German dialect word meaning to practice witchcraft. The desire for supernatural control of events which all machine-code programmers harbour is thus clearly exposed — hence the use of terms like "machine-code wizards".

The 16 hexadecimal digits are usually represented by 0-9, A-F. So 10 in hexadecimal is A, written as OA for typographical reasons. And 201 becomes C9. Hex maniacs are very plausible. They will explain to those of the uninitiated who can be kept awake long enough that hex is "more convenient". You see, old chap, every single byte number between 0 and 255 can be expressed as two digits.

Hex allows you to see "at a glance"

the value of the top four and bottom four bits in each byte. The left digit stands for the top four and the right digit for the bottom four bits. If they are really far gone, they may use the generic term for four bits — a "nibble". Why do they need to see all this? Because the machine-code programmer often has to "set" or "clear" individual bits, i.e. fiddle desperately with some relatively unimportant part of the program in a last-ditch attempt to fit it into the computer's memory.

Many would-be programmers are daunted by all this gobbledygook. Some, believe it or not, become disheartened by the prospect of typing in long columns of "meaningless" letters and numbers and spending hours hunting for "bugs", as well as entertaining all their friends for hours on end by explaining the problem.

If this is how you feel, fear not. This is a rational reaction, even though you are interested in computers you need not feel ashamed of it. In closing, let me leave you with this thought: is a bit on the side really a euphemism for extra-marital hex?

Paul Bond.

(continued on page 23)

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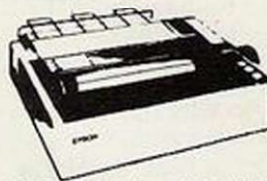
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Scaling new peeks

PEEK AND Poke are — like Burke and Hare or Heffer and Skinner — names guaranteed to strike terror into the hearts of most God fearin' folk and certainly all novice programmers.

After all, when you've only just got the hang of making your screen display look something like the way you meant, after hours of juggling Print and Tab statements and a contagion of semi-colons, it's hardly surprising that you'd rather leave the mysteries of memory addresses alone.

But you'll have to tackle Peek and Poke some day, and there's no better way to start than by experimenting with the chunk of memory that controls your micro's screen display.

First, let's remind ourselves what the statements Peek and Poke really mean. Although every micro has a total memory expressed as 16K — that is, 16,000 bytes — 32K, 64K or whatever, some of that memory is gobbled up by the computer's operating system — including the Basic that makes it easy to write programs — so that in the Commodore 64, for example, just over 39K of Ram is left for your own Basic use.

Check out your micro's manual and you should be able to discover what chunk of Ram is swallowed up by the screen — and, possibly, colour — memory. The 64, for instance, offers a screen display "crossword" of 40 characters across and 25 down — a total of 1000 squares. Each square needs a byte to itself, and so its screen memory occupies the 1000 addresses from 1024 to 2023. Unlike some micros, the 64 needs a separate colour memory for each of those 1000 squares, and this squats at addresses 55296 to 56295. In the Commodore 16 and Plus/4 screen and colour memory run from 3072 to 4071 and 2048 to 3047 respectively. The Spectrum QL screen uses addresses 131072 to 163839, and the Amstrad CPC-464's screen memory occupies 49152 to 65535.

In the demos and program which follow, we'll cut down on finger fatigue by first declaring a variable equal to the first screen/colour memory address. For the Commodore 64, you'd need a line like this:

```
10 SM = 1024:CM = 55296
```

You can think of a block of addresses as a huge rack of cubby holes, such as you might see in a mail sorting office; all have glass doors so that you can see — or Peek — what is inside — but only some of them can be opened so that you may Place — or Poke — something into an empty one, or replace the existing contents with something else.

That "something else" is a different value in the range 0 to 255. In the case of a Poke to screen memory, you'll be using a value chosen from the ASCII — pronounced askey — or machine-specific table of screen codes representing the usual alphanumeric keyboard set as well as the special graphic symbols available on some micros.

Again, there should be a list of these in your manual; but be clear that



ASCII and screen codes are different again from the table of CHR\$ values for the same characters. ASCII screen codes commonly run from 0 to 127 — with the alphabet beginning at 1 — with screen codes 128 to 255 usually producing the same character set in reverse field form. Now add these lines:

```
20 FOR L = 0 TO 9
40 POKE SM + L, L
50 NEXT L
```

These lines, as you'll see when you Run them, will serve to Poke the letter A into the first 10 screen memory addresses. They all now hold, of course, the value 1. Prove it:

```
60 PRINT:PRINT
70 FOR L = 0 TO 19
80 PRINT (PEEK(SM + L));
90 NEXT L
```

Run the whole program again, and after the As have appeared, the three new lines will cause the figure 1 to be

BEGINNERS

first bytes

printed the same number of times, and then you'll see 10 zeros. That's because the next 10 addresses in screen memory — in common with all the remainder — hold no value at all. Now alter line 40 to:

```
40 POKE SM + L, L
```

for a different result. Finally, enter in direct mode:

```
POKE SM + 5, 32
```

and notice how this wipes the character held there, as a direct mode PRINT (PEEK(SM + L))

will confirm.

To introduce a little colour into the proceedings, set your prime variables in 10 line as before and then type:

```
20 FOR L = 1 TO 10
30 POKE CM + L, L
40 POKE SM + L, L
50 NEXT L
```

Colour codes are usually separately numbered from 0 to 15 or higher, so line 30 simply prints out the first 10 characters in the first 10 colours available. Incidentally, it's better to Poke colour before screen memory, otherwise you'll often get an untidy double image as each character appears; swop lines 30 and 40 to see this effect.

Using Pokes, this next routine pro-

duces a quite mesmerising, ever-changing kaleidoscopic display of all the characters and colours your keyboard can generate. It's also ideal for automatically generating sleeve designs for the Eurythmics: Line 20 declares the correct variables for a Commodore 64.

SC should equal your micro's maximum number of character-producing ASCII screen codes, CC the number of colour codes available, SL the total screen locations, and NC the maximum number of characters to a line; alter these variables as necessary to the equivalents on your micro:

```
10 PRINT (CLEAR SCREEN)
20 SM = 1024:CM = 55296:
   SC = 255:CC = 15:SL = 1000:
   NC = 40
30 F1 = INT(RND(1)*SC) + 1
40 F2 = INT(RND(1)*10) + 1
50 F3 = INT(RND(1)*NC*2) + 1
60 F4 = INT(RND(1)*CC)*1
70 FOR L = 1 TO SL STEP F3
80 POKE CM + F2 + L, F4
90 POKE SM + F2 + L, F1
100 NEXT L
110 GOTO 30
```

You'll find that the best effect is achieved by adding to line 10 your own micro's commands for setting the screen and border colour to white.

John Ransley.

Modems — the whys and wherefores

A MODEM IS one of the most worthwhile add-ons you can have for your computer. And with prices starting now at just a few tens of pounds, it can also be one of the cheapest.

With a modem you can exchange software with friends over the phone, dial up commercial mega-databases such as Prestel or Knowledge Index, or explore the expanding network of privately-run computer bulletin boards.

"Modem" is simply a contraction of modulator-demodulator: it's a two-way converter which translates data in your computer into audible tones suitable for sending along a telephone line — and vice versa.

In the phone line, each bit is represented by a high or low tone, depending on whether it's a 0 or a 1. Since only one bit can be sent at a time, data must be offered to the modem in serial

form. So you can't plug in to an ordinary modem unless your computer has a serial port. However, for many popular computers you can get special interfaces or communications packs which take care of the problem.

Among the cheapest modems are the sort known as acoustic couplers. These have rubber cups into which you press your telephone handset when you hear the distant computer answer your call.

Unfortunately, acoustic couplers tend to pick up room noise, which can corrupt the data. So unless portability matters, you may prefer the more reliable direct-connect modem, which plugs into a standard telephone socket. If you haven't got these at home, British Telecom can fit them.

In choosing a modem, decide first which services you're interested in. Several different signalling standards

— or tone combinations — are in use; and you can either pick a modem to match or pay more to have a multi-standard modem.

Perhaps the commonest standard now is the viewdata format used by Prestel, which sends data to you at 1200 baud and expects your replies at 75 baud. The figures denote the speed of transmission: in this context, you can take them to mean bits per second.

Each byte you send has to be giff-wrapped with start and stop bits, making up 10 bits or so altogether. So even 75 baud works out a lot faster than you can type!

Some bulletin boards today accept 1200/75 tones, but more usual is the 300/300 baud standard — often referred to in technical jargon as V.21; the viewdata standard is V.23.

To use a modem, you need communications software. Its basic function is to re-route the data paths in your computer: characters from the keyboard must be diverted to the serial port, characters received from the modem must be sent to the screen.

Details of viewdata packages for a wide range of home and business micros are available from Micronet 800, Durrant House, 8 Herbal Hill, London EC1R 5EJ, telephone 01-278 3143.

Richard Lambley.



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Pacesetters

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Spectrum
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Nidd Valley Micro

Two joystick interfaces are available, one which uses the Kempston protocol, and, for ten pounds more, a software programmable interface. Both these devices incorporate the company's patented "slomo" slow motion device, which allows you to play game at any speed.

The Connection

Printer interface
Commodore
£79.95
Tymac

Rather on the steep side, this interface plugs into the serial port, and allows the Commodore to be interfaced with any parallel computer. Different versions are available to cope with the graphics commands of various printers. The company claims that the interface is compatible with all software that expects a Commodore printer to be connected. Tel 021 327 6637.

Tape care kit

Global software
Various
£9.95

Two parts to this kit, azimuth alignment and head cleaner/demagnetizer. The azimuth tape constantly monitors the number of errors detected while the tape is running, so alignment occurs when you get fewest errors. Cleaner is of the usual fabric type. A promising start from this new software company. Tel 01-228 6730.

Azimuth head alignment

Interceptor
Amstrad 464
£8.99

Following up their successful alignment tape for the C64, Interceptor are going for the Amstrad. An invaluable device, as so many "faulty" commercial tapes turn out to merely have alignment problems.

HARDWARE

nut nut

Dot Matrix Printers

■ Star
■ £259 upwards

SAY THE WORD "printer" to the average home computer user, and the chances are he'll think of Epson, for so long the dominant force in the printer market. With this new range of printers, Star hope to make some kind of inroad into this market.

The range consists of three dot matrix printers aimed at the home user; the SG10 at £259, the SD10 at £389 and the SG15 also at £389. They are either Epson or IBM compatible, and offer an attractive near letter quality font and a removable tractor unit. The DIP switches for selecting character sets etc. are easy to get at, usually on the left hand side, a major improvement over Epson's hiding them away inside. In the software, Star have come up with a neat idea, you can define a printer macro, once you define a series of often used commands, you can execute them by just sending the macro command. Perhaps this might have been more useful if several macros could have been defined. The SG and SD10 printers are both eighty columns with speeds of 120 and 160 cps respectively and 2k (just over half a page) buffers as standard, expandable to 6k. The SG15 is 136 columns, at



Star printers.

120 cps and has a 16k buffer as standard. The SD10 uses a ribbon cartridge, the SG's, typewriter style ribbons.

So how do they compare? Well, in use, they seem rugged and reliable. Noise levels were reasonable, the paper feed reliable and precise. The only

slight quibbles are that the paper guides are a bit clumsy and the paper tear off is a long way from the print head, which means after doing a form feed after printing your document, you've still got to move the paper by hand before tearing it off. Certainly anyone looking at a printer in this sort of price range should carefully consider this bunch.

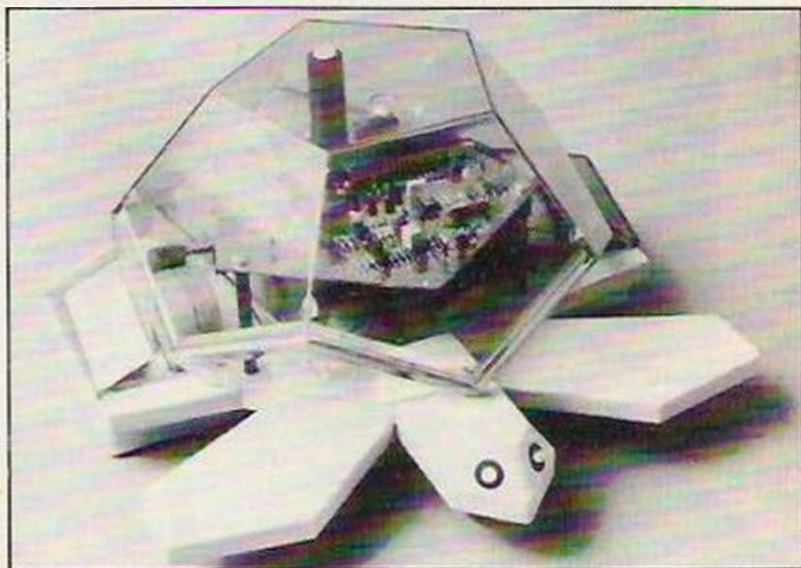
Valiant Turtle

■ Spectrum/BBC/CBM 64
■ Valiant Designs
■ £215 for home users, £201 for schools

THERE ARE at least half a dozen different makes of turtle on the market but Valiant Design's product has already established itself as a rather superior turtle. Primarily intended for use in schools, it has two features that make it especially attractive to children. First it looks more turtle-like than most of its competitors. As well as legs, a shell, and a head, it even has a pair of red LEDs for eyes.

Second, it is not hampered by wires and cables but can roam free under the remote control of an infra-red transmitter. This device connects to your micro by either a serial or parallel lead, and gives the turtle a range of up to six metres. Power is provided by nickel cadmium batteries.

On top of this the turtle appears to be both robust and accurate; sufficiently accurate in fact to double up as a simple plotter. Its main use, however, will be to create turtle graphics in conjunction with Logo. Although the turtle pack does not include Logo it supports most versions of the language currently available. For more details ring Valiant Designs Ltd, 01 720 3947/627 1351.



Valiant turtle.

Interface III

■ Spectrum
■ Evesham Micro
■ £39.95

IT HAD TO come, the ultimate copier against which there seems little possibility of protection. But of course, you would only use it for copying your own software to Microdrive wouldn't you?

Hardly elegant, this unit uses the sledgehammer approach to cracking the nut of software protection. After

you have loaded in the game, you simply hit a button on the unit, which plugs into the back of the Spectrum, and it simply dumps the entire contents of Ram out the cassette port.

It also gives you the option of loading the screen display (important if machine code has been hidden in the screen area). Skipping this will mean that the program will take up about 5 sectors, so you can get two games onto one cartridge. The obvious disadvantage is that no matter how short the program is it will take up about the same amount of space.



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Star★ chart

On-Court Tennis

CBM-64
Activision
Tennis simulation
£10.99

★★★
Good quality simulation — as with the quarter backs in this company's football game, the tennis players have individual personalities, so Ivan Messier has a great serve and plenty of endurance, but Jimmy Orr sometimes wears a bit thin.

Didn't actually throw his racket at anyone while I was playing. You can select surfaces to play on.

On-Field Football

CBM-64
Activision
US football simulation
£10.99

★★★
At first glance this looks like a game of table football — same overhead view. But this game has all the jargon and complexity of the real thing, without the popcorn and the cheerleaders. You choose your starting quarterback, wide receiver, and tight end to fine tune your offensive strategy. You can even bring in substitutes. If you don't understand what all this means, then buy this game and catch up with Nicky Horne.

Quackshot

Spectrum
Creative Sparks
Arcade adventure
£2.95

★★★
No prizes for innovation, but value for money at the Sparklers economy price. A Tutankhamunesque maze game in which you, nightwatchman in the Acme Clockwork Toy Factory, are confronted by rampaging clockwork ducks. Armed with duckbuster bombs and stun gun you must fight them and the green snakes off. As with Tutankhamun you have to collect keys to move between levels.

SOFTWARE

Shortcuts

The Artist

■ Spectrum
■ Softek
■ Graphics utility
■ £12.95

★★★★★

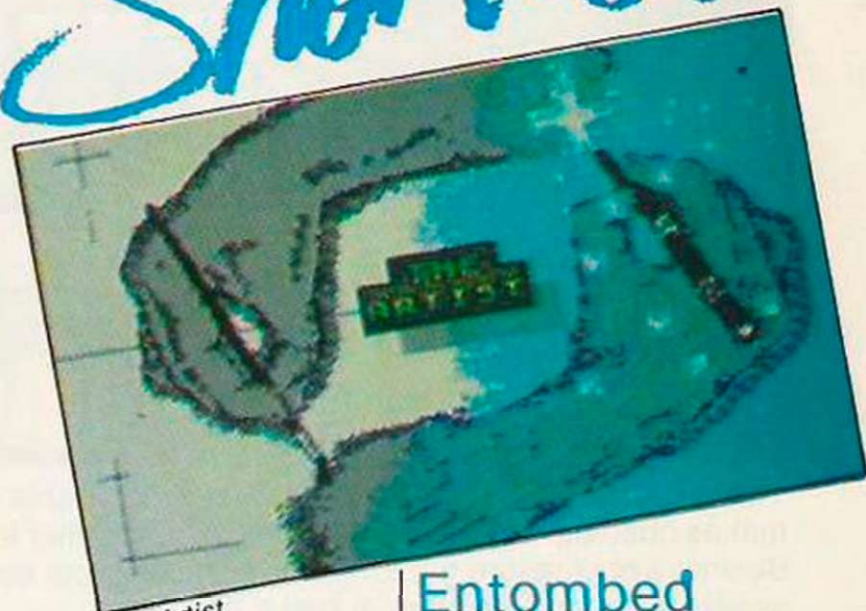
SELL YOUR Macintosh. That's what ex-Volvo assembly line worker turned full-time programmer Bo Langeborg suggests people will be able to do once they've loaded his new program into a Spectrum.

There are even plans afoot to market this program with a mouse for the Spectrum. But at the moment you have to get by with five fingers to move the cursor. When the program has loaded you are confronted with an empty screen and two flashing cursors, one square, one cross-shaped.

You can get straight into some sort of Mac type painting by selecting a paint-brush and a brush pattern. At the base of the screen you have a choice of eight special commands — apart from brush and brush pattern these include a text option, a view command which shows you the whole screen without the commands, a move option which enables you to raise the screen so you can work on the base of the picture but still see the commands, a clear-screen option, a storage and a character creation option.

The reason you need five fingers is that apart from the directional controls of the brush you need to keep your thumb on the C key which sets the pixels on the screen.

By pressing the symbol shift key you can move between two sets of other commands, pixel setting commands and colour setting commands. The pixel command section has some very powerful commands. You can enlarge



The Artist.



Entombed.

sections of the screen. You have instantaneous box and circle commands.

This section also has an overlay command which is comparable to placing a plastic sheet on top of a picture and copying it.

The colour commands open up a window around the cursor and the cross. Inside it ink, paper brightness and flash can be set separately.

Paul Bond

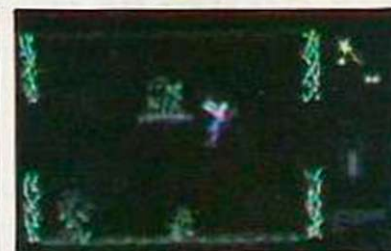
Elidon

■ CBM-64
■ Orpheus
■ Arcade adventure
■ £7.99

★★★★★

PLENTY OF whimsy in the software market this month. We are treated to a trip to fairyland in Elidon. The beautiful graphics depict a hapless flower fairy as she tries to collect seven bottles of magic potion followed by pouring the bottles on to magic flowers in order to revive the magic garland to its former glory.

On her way she is hindered by tree-spirits, flames, strange bundles of energy and eerie darkened rooms peopled by things with glowing eyes. A fir cone, a leaf, a crabapple — any of these will help her ward off the unwelcome attentions of the evil spirits. There are also lucky horse shoes to be found for bonus points. But do not pick up the ones which are upside



Elidon.

down, for of course all the luck will have drained out of them and they will kill you.

It's possible to pick up a torch to guide the fairy through the darkened rooms and she needs all the help she can get for her V/STOL capability is easily upset by the slightest bump. It is possible to get her to hover by judicious use of the fire button.

There are also forcefields which can only be penetrated by the aid of a horn or a set of pan pipes.

And in this exciting Ultimatesque game, your little fairy is going to need all the angel dust she can get.

Paul Bond

Entombed

■ C64
■ Ultimate
■ Arcade
■ £7.95

★★

THERE IS ALWAYS a buzz of expectation whenever a new Ultimate title comes along. With a string of hits like Knightlore, Underwulde and Alien 8 under their belt, we've come to expect something rather special from them. Entombed is set in Egypt, where our intrepid explorer, Sir Arthur Pendragon, is entombed beneath the Sphinx, searching for the scrolls which will help him get out of this tricky spot.

The screen display shows a Scarab on the wall's view of Sir Arthur wandering about the corridors. There are two varieties of screens, scrolling, maze-like corridors and rooms where the various objects of your quest lie. The walls of the corridors are nicely done, covered in hieroglyphics. Apart from the scrolls, there are two objects you collect of more immediate value, a whip and a torch.

The problem is, the whole thing is rather sterile and predictable. In the corridors, you are constantly being irritated by things materialising and attacking you as you try to map out the maze. The rooms are too small to pose an interesting challenge like Manic Miner and clones, and the solution is normally irritatingly trivial. Nothing constructive in the way of hidden clues is done with the hieroglyphics, the nasties in the corridor are just plain irritating and time consuming.

A pity, but not really up to the high standards we have come to expect. This game was actually written by a bunch called ACS and marketed under the Ultimate label, they would do better to stick to the Spectrum and their in-house programmers.

Lee Paddon.

(continued on page 29)



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Star★ chart

Flip!

BBC
Strategy word game
Icon
£7.95

★ ★ ★

J S Bach meets Ghost-busters; Mozart clashes with Teddy-bears' Picnic. In Icon's Pelmanism-cum-word game, classical compositions mix with modern classics and classy graphics.

To score points you have to flip over the boxes to reveal matching pairs of graphics — Pac-Man, a Space Invader and a teddy-bear to name but three of the 15-odd characters on the 4-by-10 grid.

As each box flips over you see the animated graphic and hear a snatch of its theme tune; find its partner and you hear the rest of the musical phrase. Behind the correctly paired boxes are fragments of letters which go together to spell a word. That's the second part of the game.

It's a race to identify the hidden word. But in the two-player game rash guesses made too early only give points to your opponent.

Ghettoblaster

CBM-64
Virgin
Arcade adventure
£8.95

★ ★ ★

Rockin' Rodney — no relation to Rankin' Rodney in Taskset's Jammin' — has to shop for batteries and search for a tape to put in his FBR (frightfully big radio).

Then press F5 and you will hear the beat. The aim of the game is to successfully deliver 10 tapes to Interdisc Records. Meantime he can press the firebutton and fire notes at people to make them liven up.

A good game with some humour — street names like Electric Avenue get in, as do hippy anomalies like the Doors' Moonlight Drive and Love Street. Bob Dylan gets most streets into this game.

(continued from page 27)

Charlie and the Chocolate Factory

■ Spectrum
■ Hill MacGibbon
■ Arcade adventure
■ £9.95

★ ★ ★

JUST IMAGINE that! A whole day inside an enormous chocolate factory! And not just any old enormous chocolate factory! No, it's Wonka's Factory, where they make marshmallows that taste of violets, and chewing gum that never loses its flavour.

This is the prize that Charlie Bucket wins when he finds a golden ticket in a Wonka's chocolate bar. And this is the plot of Roald Dahl's scrumptious book, *Charlie and the Chocolate Factory*. Now those lovely people at Hill MacGibbon have turned it into a yummy computer game.

The primary game is split into four sections based on the plight of individuals who fall foul of the Chocolate Factory in the best moralistic way. Augustus Gloop whose face is like a monstrous ball of dough with two tiny currant eyes peeping out, becomes a purple blob in one of the sweet machines. Depicted in a maze of pipelines on the Spectrum screen, you must move Charlie backwards and forwards at the base of the screen, twisting pipes until Augustus is safely decanted into a flask. Otherwise he emerges from an open pipe as a sticky cloud.

The next section has Violet Beauregarde menaced by bouncing blueberries. Basically a breakout-style format you use keys 6, 7, 8 and 9 to move Violet around and get her shield to fend off the ferocious fruit. The idea is to bounce berries into a juicer, or else.

The fourth section confronts television addict Mike Teavee with TV cameras. Their deadly rays can only be counteracted by eating Wonka bars.

In the third section Veruca Salt has enraged the squirrels in the nut room. They want to chuck her out with all the other rubbish. She tries to leave poison nuts in their path, but these fade away quickly.

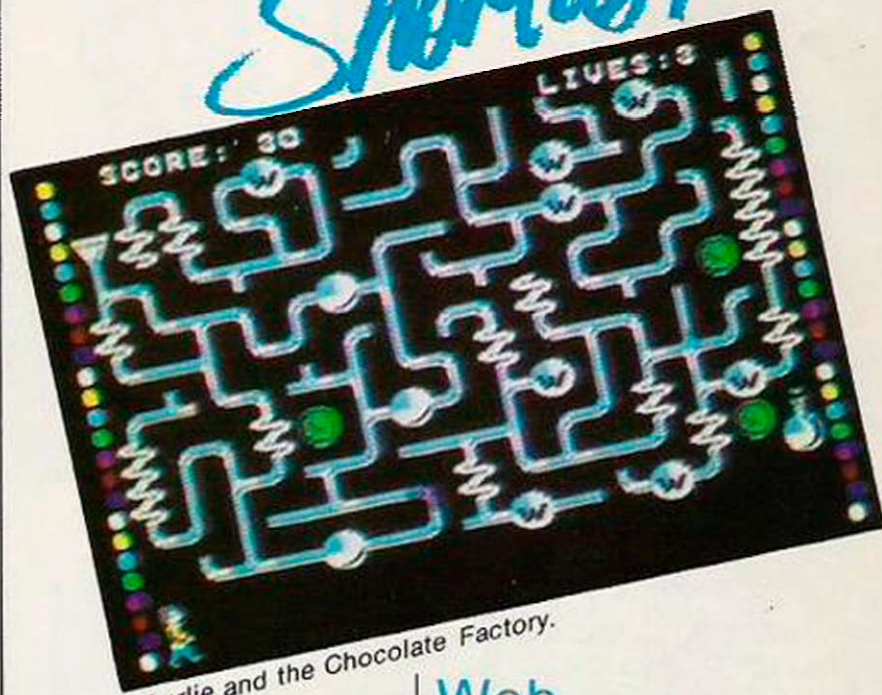
A nice touch is that you can practice each section without having to play the whole game, but if you rescue Charlie's companions in the primary game, then you will be given the code you need to help Charlie find the six gold keys in the chocolate factory.

And this leads you to a whole new game on the flip-side of the cassette. This would seem to be a game in the style of Manic Miner, with 43 challenging rooms to explore, in order that Charlie can enter the Great Glass Lift.

Paul Bond.

SOFTWARE

Shortlist



Charlie and the Chocolate Factory.



Jonah Barrington's Squash.

Jonah Barrington's Squash

■ Spectrum
■ Simulation
■ New Generation Software
■ £7.95

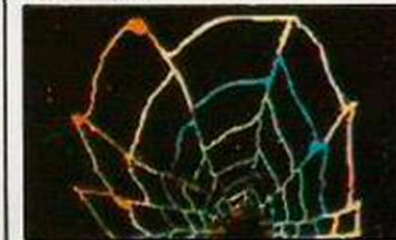
★ ★ ★

JONAH BARRINGTON'S (he is a famous squash player) Squash can be played against another human, or against the computer.

There are four difficulty levels, just as there are four ball spot colours in squash, ranging from red (easy) to yellow (difficult). The screen display is split in two sections with a three-dimensional representation of the game on the left hand side of the screen.

Hitting the fire button makes your player do a forehand or a backhand stroke, depending on the position of the ball when the button is pressed. So by careful timing you can alter the angle at which the ball leaves the racquet.

Paul Bond



Web Dimension.

Web Dimension

■ Commodore 64
■ Ecological game
■ £10.99

★ ★ ★

THE SCREEN DISPLAY shows a complex section of a web. Life-forms drift aimlessly about the web. Pressing the fire button you must move your sprite — a musical note — along the webways, being careful not to touch the glowing ones.

Using the music you can freeze the life-forms at the nodes of the web. Once they are all frozen, the second stage starts.

In this stage you must stabilise the creatures, which are in the form of coruscating stars at the transitional phase. Then you see the next stage of evolution.

Paul Bond.

A View To A Kill

■ CBM-64
■ Arcade adventure
■ Domark
■ £10.99

★ ★ ★

THE GAME attempts to faithfully replicate three major action sequences from the movie.

The top half of the screen gives you a three-dimensional view a la *Monster Maze* of the streets. The lower half is an over head map view of Paris. A tracking bleeper indicate proximity of target.

Next, Bond's girlfriend who has the unlikely name of Stacy is trapped in a lift. Zorin has torched the building.

Essentially a platform game, the programmers have included a rather ingenious lockdown facility in the third stage.

Paul Bond

(continued on page 31)

ULTIMATE PLAY THE GAME

48K SINCLAIR SPECTRUM
AMSTRAD
BBC MODEL B



48K SINCLAIR SPECTRUM
BBC MODEL B



48K SINCLAIR SPECTRUM
BBC MODEL B



48K SINCLAIR SPECTRUM
AMSTRAD
BBC MODEL B



COMMODORE 64



COMMODORE 64



48K SINCLAIR SPECTRUM



AMSTRAD CPC 464



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Star★ chart

Beeline

BBC
Robico
£5.50
Maze game

★ ★ ★

Hank is a blue bee who explodes when he gets angry or tired. Your mission is to guide him to his beehive. Watch out for energy-sapping toadstools, spiders, faces, insecticide cans and the lizard's tongue.

Meanwhile, collect pollen grains, flowers, apples, honey pots and bowls of water.

Bulge

Spectrum/CBM-64
Lothlorien/ASP
£9.99
Wargame

★ ★

After the bouquets last month for Arnhem from CCS, it's time for the brickbats. To say that this is an improvement on Lothlorien's previous effort, Panzer Attack, would be true but would be no recommendation. It is in real time, and as the German commander, you simply haven't got time to issue all the orders you need to. As the game progresses and units get spread far and wide, you spend most of your time chasing round the map after errant units. Any bulge game which doesn't feature roads is doomed to failure.

Wetzone

BBC
Everiss Software
£6.95
Shoot 'em-up

★

An engaging little whimsy from the house set up by Imagine renegade Bruce Everiss. Lots of different things to shoot at and every so often a UFO whizzes across the screen. If you hit it you score extra points. Sounds familiar? It did to us. We conclude that Bruce is re-examining his roots rather like Eric Clapton returning to the blues, or Working Week re-assessing jazz.

(continued from page 29)

Contraption

■ BBC
■ Platform
■ Icon Software
■ £8.95

★ ★ ★ ★

GAMES programmers — or designers as they now like to be called — sometimes complain that reviewers do not play their games long enough to do them justice. Helen and David Mann, the authors of Icon's Contraption, need have no such fears: between them *Your Computer's* games reviewers have racked up hours of playing time on this one. The game has inspired seasoned reviewers — veterans of scores of platform campaigns — to rise from their desks clamouring to be let at the keyboard.

As far as the plot is concerned the game is fairly conventional. You have to jump, bounce and scramble your way through 10 screens, picking up apples and avoiding such perils as floating bombs and toxic plants. But the course in each screen is particularly well constructed, and pitched at just about the right level of difficulty. At first sight it seems that you will never reach that vital ledge, or catch a lift from that floating coffee table. But once completed each screen is plain sailing the next time round.

However what really marks this platform game out as special is the superb use it makes of Mode 1 graphics. Adopting the Frak technique of outlining figures in black allows the designers to show all sorts of pleasingly inventive details which make most Mode 2 games look distinctly crude in comparison. Pipes actually look three-dimensional, bouncing valves gleam, and your little man is a real character study — a benign balding old timer clad in red Mao jacket which admirably sets off his tuft of ginger hair. *Simon Beesley.*

Combat Leader

■ CBM-64
■ Wargame
■ U.S. Gold
■ £9.95/£14.95

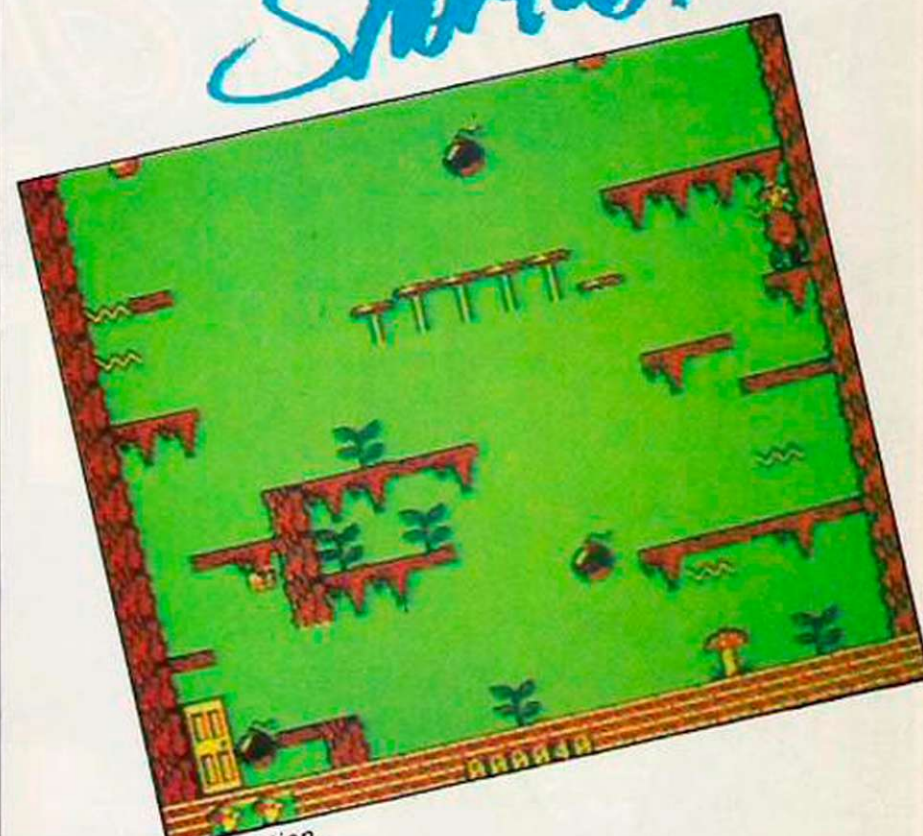
★ ★ ★

COMPUTER wargames are big news in the states, and SSI are the big name. This offering from them, via US Gold, puts you in command of a company of mixed tanks and infantry, against a similar force commanded by the computer. There are seven different scenarios available, giving you a range of objectives, or you can choose a roll-your-own option where you can pick the forces you and the computer will control and the objectives. This option also allows you to specify the characteristics the vehicles will have, and to help you, some historical data is provided to allow you to pit Shermans against Tigers, or even, if you have a taste for the bizarre, Matildas against Sheridans.

There are eight different mixes of terrain, most thickly wooded, with the

SOFTWARE

Shortlist



Contraption.



Combat Leader.

Chopper.

odd hill. A river with a bridge might have been nice, but you can't have everything.

The game plays quite smoothly. You issue orders to units by a combination of keyboard and joystick. The unit's response is then displayed. Units report their position, and that of any enemy units they see.

The game seems rather weighted against the poor bloody infantry, whom you would expect to do pretty well in this sort of terrain. Despite being equipped with anti-tank weapons, they tend to come off second best.

Tactics are minimal, advance under cover until you find the enemy, then fire like mad until one of you is dead. However, interest is maintained by the wide variety of missions you can try and you can have different mixes of forces, and different types.

Certainly a lot less trouble than setting up a miniatures game.

A good first attempt in a difficult field where everybody has their own theory about what constitutes "realism" and historical accuracy. *Lee Paddon.*

Chopper

■ Creative Sparks
■ CBM-64
■ Scramble-type
■ £2.50

★ ★ ★

WORTH every penny of £2.50 this is another example of the Sparklers philosophy: "if you can't beat 'em, undercut 'em".

Instead of a spacecraft you fly a helicopter against oncoming hordes of hostile rotorcraft. The angry buzzing of a massed helicopter squadron is faithfully replicated by the 64 and is guaranteed to make the neighbours think you are shooting the sequel to *Apocalypse Now* in your living room. The drawback is that you are fixed to the right hand side of the screen and can only move up and down. You can't shoot when you're moving and vice versa.

On the second screen, which you achieve after a tricky refuelling sequence in which you have to rendez-

(continued on page 33)

Now after the glory of gold enter

Daley Thompson's SUPER-TEST



PISTOL SHOOTING

SPRING BOARD DIVING



TUG O' WAR



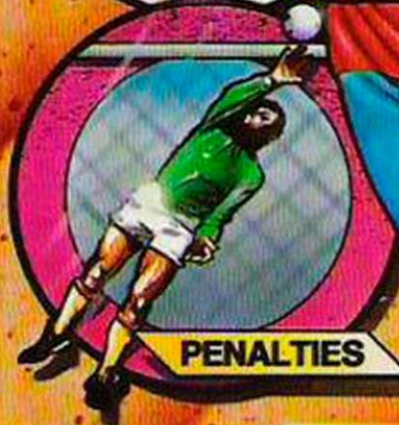
GIANT SLALOM



CYCLING



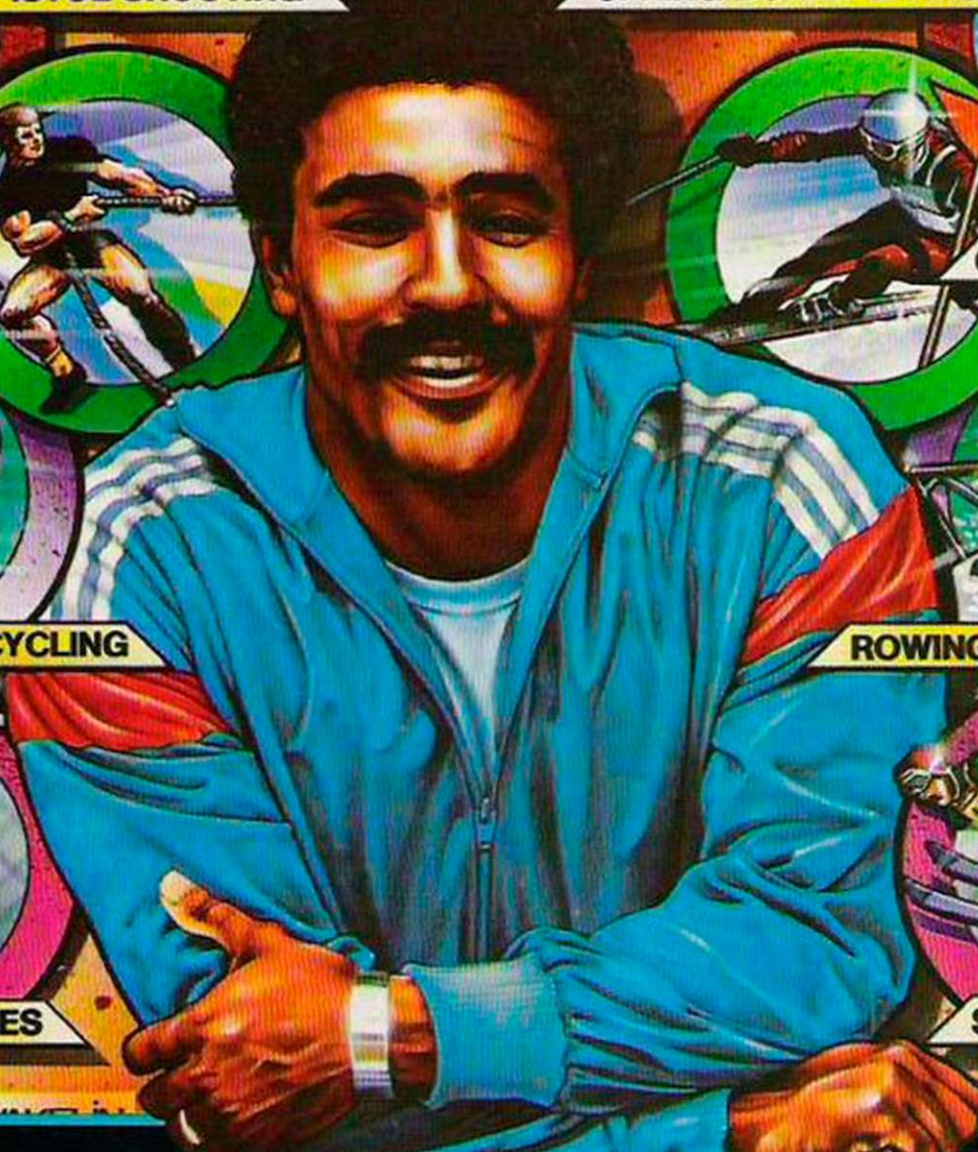
ROWING



PENALTIES



SKI JUMP



SPECTRUM 48k


COMMODORE 64

AMSTRAD

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Star chart

Baseball

C64
Activision
Sport
£10.99

★ ★

A poor copy of the Imagine Baseball game reviewed a couple of months ago. You get to field and bat, when fielding you choose the ball you pitch and manipulate the fielders. As batsman, you choose when, and if, to swipe the ball. Only one view is given, from the perspective of the spectator, with none of the nice touches which made the Imagine version bareable, mind you, at least we are spared the ra-ra girls at half-time.

Chicane

BBC
Kempston
£7.95
Racing game

★ ★

With absolutely phenomenal timing, Kempston launch a racing game hot on the heels of Acornsoft's "Revs". Unfortunately, this game is rather left in the pits with a dead engine compared to Revs. As a game, it is quite good, but a simulation it isn't. Steering, throttle, break and gear changes are all included. There are six different circuits to race round.

Theatre Europe

PSS
C64
£9.95
Wargame

★ ★ ★

Following on from their Midway game, this is set in the near future, when the treacherous Russians come charging over the North German Plain, bent on bringing the peace-loving west under their ruthless iron heel.

Behind this distasteful scenario is an even more distasteful game. Technically very well executed, the conventional battle is a dull slugging match.

(continued from page 31)

vous with a stratotanker, you are plunged headlong into the usual surreal mixture of balloons, ducks and what-have-you so beloved of the true sprite graphic craftsman. The ducks fly past in strict formation — the more ducks pass, the more points you get. But you will probably bend your rotors on an airship first.

If you survive to screen three, you will discover the purpose of your mission, which is to chuck bombs down horizontal airshafts to destroy the enemy base in the time-honoured way. The enemy whirlybirds contrive to get in your way and are practically invulnerable on this screen. If you like clenching your teeth and screaming, then this is the game for you.

Paul Bond.

Taskmaster

■ CBM-64
■ Shoot-'em-adventure
■ Creative Sparks
■ £2.50

★ ★ ★

WITH excellent three-dimensional graphics and seven screens, this looks like the sort of game that US Gold was marketing for £14.95 a year ago. Maybe the programmers could have done a little more with the sound facility, but for £2.50 this example of the new Sparklers range from Creative Sparks is good value.

As the sun goes down on the first screen, the valley in front of the castle darkens and the zombies troop on like football supporters aimlessly wandering about and treading on you if you get in their way. Your man is armed with darts and you must keep blasting if you hope to see the second screen. This is the wizard of Dabbit Wood who appears at random and launches heat-seeking spells at you. Getting through this screen is more a matter of luck than good judgement — then you find yourself outside a cave in Vampire Mountain. You have to pick up four sacred statues and since your man is getting a big tired now he seems to walk more slowly and weave about. This is not good because bloodsucking bats issue forth from the mouth of the cave.

On the next screen our man is evidently getting into ancient history, as we find him by a stone circle. But the guardians of this creepy cromlech are the Devil Worshippers of the Temple of Demons — a bunch of trigger-happy mad monks. Undeterred — our hero winds up in the cemetery being assailed by ghouls. By this time I was so shellshocked I forgot to notice what the screens were actually called.

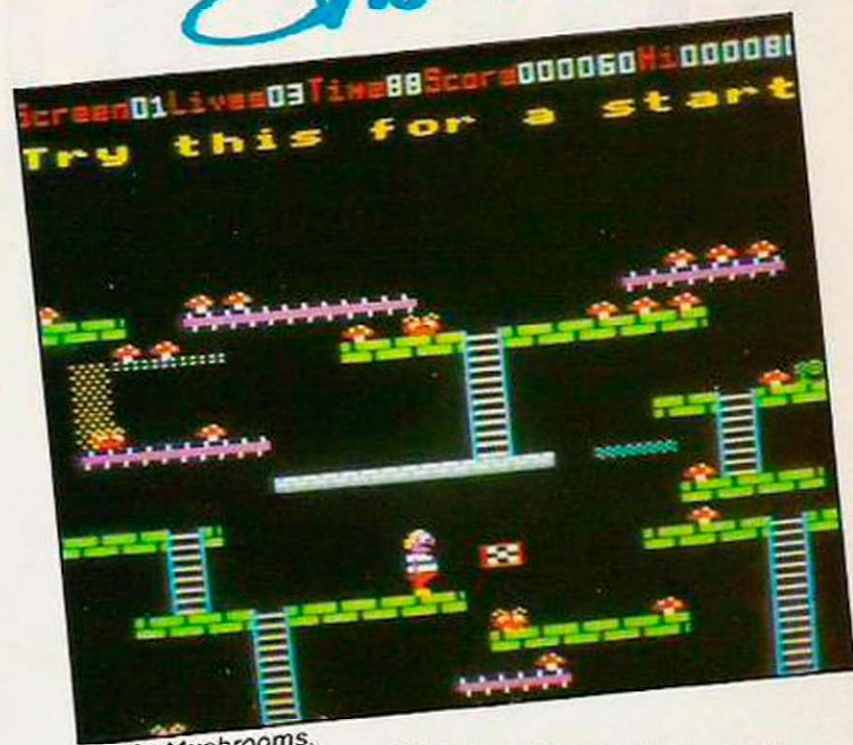
Paul Bond.



Taskmaster.

SOFTWARE

Shortlist



Magic Mushrooms.

Magic Mushrooms

■ BBC
■ Platform game
■ Acornsoft
■ £12.95

★ ★ ★

IF YOUR HEART sinks and a drowsy numbness steals over you at the mention of platform games Magic Mushrooms might be the antidote. It is a game in two parts, both a standard issue nine screen platformer and DIY platform construction kit. The hallucinatory fungi in question are what you have to pick up along the way.

The ready-made screens are frustratingly difficult if not impossible; but at the point at which you are about to give up in despair you can press

Gyron

■ Spectrum 48K
■ Firebird
■ Maze
■ £9.95

★ ★ ★ ★

AT FIRST YOU might look on this game as a maze game crossed with a shoot-'em-up, with some nice graphics. But this would be to dismiss a game which gradually grows on you. It is more reminiscent of Rubik's Cube than a run of the mill maze game.

The first thing that strikes you is the graphics. You pilot a ball, or Hedron, around a maze. The maze scrolls smoothly past you as you move down the three dimensional trenches. Control is achieved with cursor keys or joystick. Moving the joystick to one side or the other will move the Hedron across the trench, and, if opposite the

Escape — whereupon you move to the Edit screen. Along the top there is a menu of 15 items, among them escalators, monsters, crumbling and firm platforms, trampolines, and slides — all the items, in fact, that you would expect to find in a well stocked platform game.

It is now a simple matter to take out a troublesome monster or add a new stairway. Alternatively, you can give your imagination free rein by scrubbing one of the ready-made screens and building a new one. Either way, you can then save your creation.

If you are the one setting the traps and obstacles they probably will not present you with much of a challenge, although they may to others. But the real interest lies simply in designing new screens, an activity which turns out to be even more compelling than playing the game itself.

Peter Connor.



Gyron.

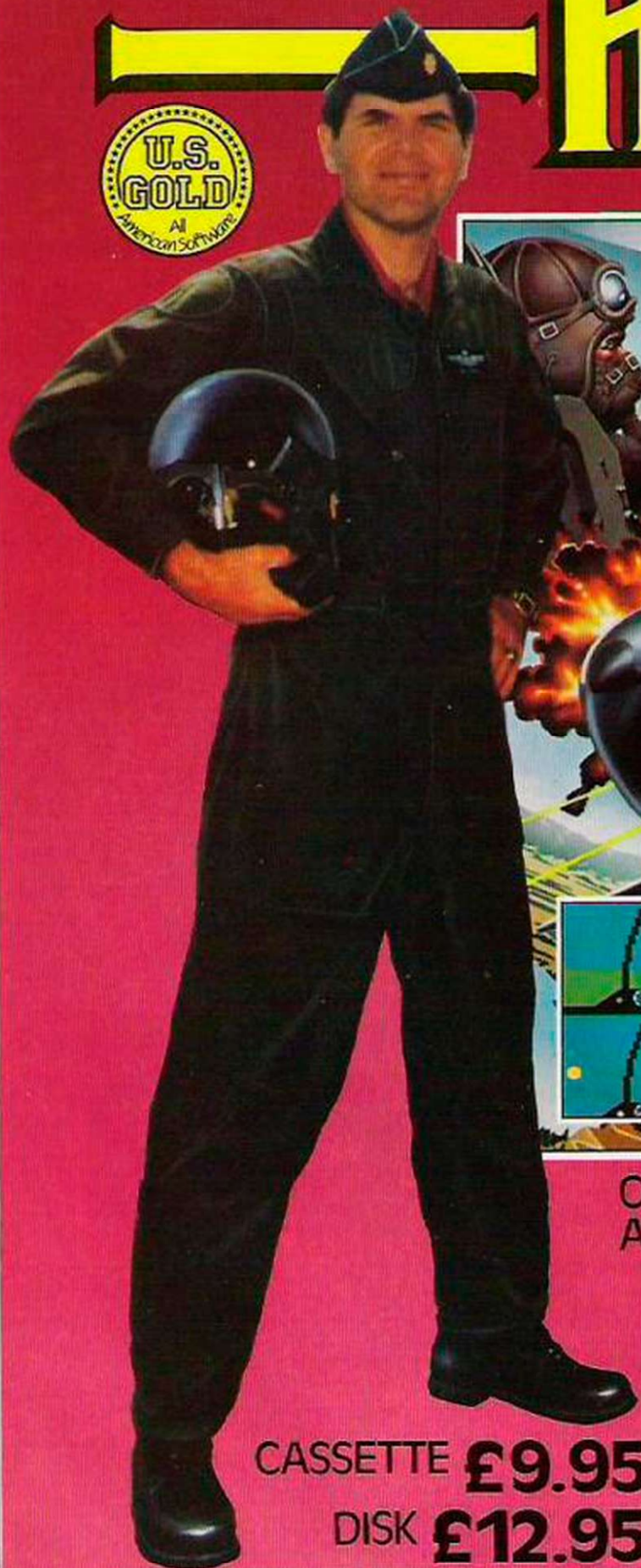
opening of a side trench, the Gyron will turn the corner.

There are a number of spheres rolling around the place according to predetermined patterns. These, needless to say are deadly. Then there are the towers, these are a different kettle of fish all together. These are orientated in a particular direction, which you get from a small radar map of the neighbourhood. If you roll in front of these, you get shot.

Lee Paddon.

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NEWS
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The crystal ball

Incentive Software have released their popular Ket trilogy (Mountains of Ket, Temple of Vran and Final Mission) for Dragon owners. It comes on one cassette and costs £9.95.

Bored Of The Rings is an excellent parody adventure available on Microdrive or cassette for Spectrum owners. Mail order only from Delta 4 Software (04893 5800).

A helping hand

Fulvao Cerlesa of Rome is a great fan of English adventures. He had a spot of trouble with two of Scott Adams'.

In Spider-man:

Can't get the bio-gem
 LLAH MORF MEGO IBTA
 BEWT OOHS

Electro a shocking
 problem?

ORTC ELEG NITT IHER
 OFEB SMRA S'KC OROT
 CODB ARG

In Sorcerer of Claymorgue
 Castle:

Can't open the book?

TFOL EHTM ORFT IPOR D
 Battlement tin-can elusive?
 KCIR BWOR HTNE HTLL
 EPSN AEDT SAC

Gary Blunden of Ongar
 can't shift the bear in
 Adventureland:

RAEB EHTT ALLE YTSU J
 In Sutton Coldfield, M.

Poynton is wrestling with
 Zork 1:

In the dark in the Drafty
 Room?

MOOR TFAH SMOR FTEK
 SABN ISTC EJBO REWO L

From Warrington, Andrew
 Parker is adrift in Zork 2.

What goes on the stands
 on the Wizard's
 workbench?

SERE HPSS SALG DERU
 OLOC EHTY RT

Yours in adventure
 adversity,
 Hugo North

QUEST

Corner

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.

Key of Hope

■ Spectrum 48K
 ■ Games Workshop
 ■ £7.95

FOLLOWING ON from the excellent Tower of Despair comes this latest atmospheric two-part text and graphics adventure from Games Workshop.

The adventure features over 400 locations — though only some are illustrated — and has beautifully designed manuscript-style text.

The White Goddess of Truth has requested your aid in the battle against the evil Malnor. You must collect the scattered pieces of the Key of Hope to defeat the Demonlord.

You begin, confused, at the ruins of Castle Argent. Nearby is a plain ring, a spirited, snow-white stallion and a glittering sunsteel sword. It's all too easy to get lost when you start to roam around but with luck you should find a talisman. Pity it's too hot to pick up, though.

You must find water quickly else your bones may soon lie bleaching in the sun and the search for the key over before it has barely begun. Your quest is definitely not going to be easy.

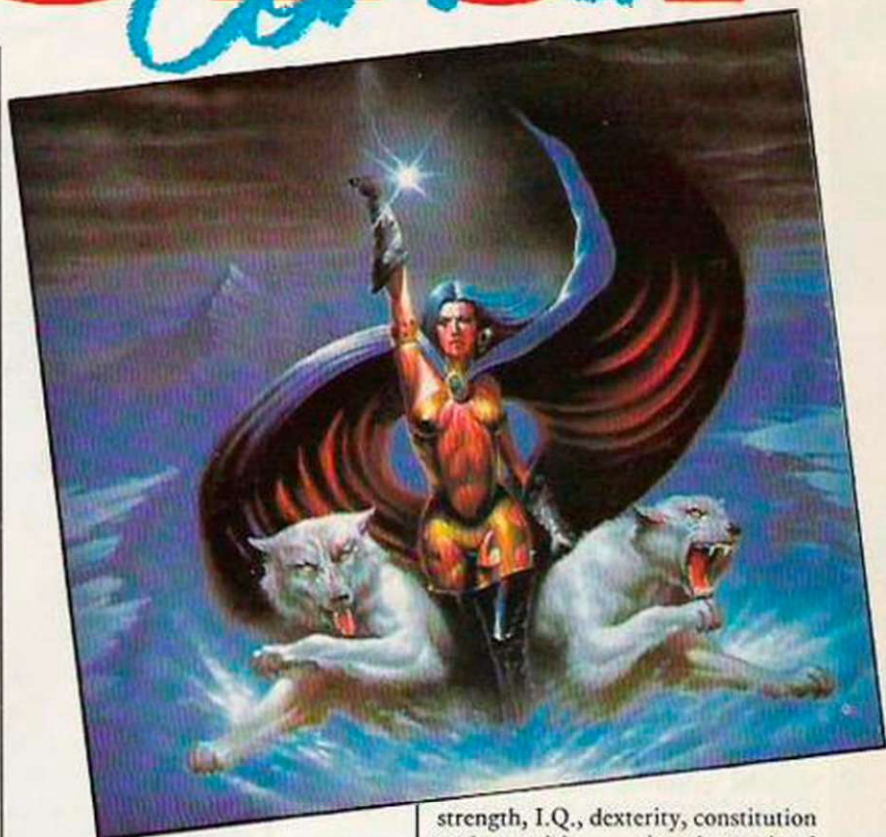
As before, a rich plot, plenty of locations and puzzles and fulsome prose. Highly recommended.

Mindshadow

■ Commodore 64
 ■ Activision
 ■ £19.99 — disc only

IN MINDSHADOW, your aim is to find out your lost identity by working your way through a series of situations. The game sports some pretty impressive graphics of the locations but the adventure itself turns out to be a little on the dull side.

The early part of the game is set on a desert island. A little exploring soon uncovers such things as an



abandoned hut, a wrecked boat, a cave and plenty of quicksand. As you quickly find, the only way to get off the island is to hitch a lift on a passing ship. Unless you've got a suitable bribe, the captain won't take you.

The adventure has a sophisticated command analyser and a wide vocabulary. Help is available by calling on a giant condor (I can't think why) who may assist you up to three times.

Not bad but at the price I can't see many people buying it.

Tyrann

■ Oric/Atmos
 ■ No Man's Land

CONFIRMING THE popularity of the Oric/Atmos with the French, here comes a Dungeons and Dragons type adventure imported from across the Channel.

Don't fret that you'll need GCE 'O' Level French to play the game — apart from a few system messages like "Un instant svp" and "Chargement en course" — Loading in progress, I presume — all text is in English.

The aim of the game is to guide a band of six characters through a large, monster-inhabited labyrinth. Your ultimate mission is left unstated. At the start of the game, you select and name your group from six types: each character can be a warrior, magician, thief or druid. Their quality of their abilities —

strength, I.Q., dexterity, constitution and wealth — is determined randomly by the program.

Before you enter the labyrinth and whenever you return from the depths, you may visit the Emporium. Provided you have sufficient money, you can equip your party with various items such as weapons, armour, phials, parchments and spell books. Included in the list of 25 objects on offer are a white mouse and a baby dragon!

While above ground, you may also sell, swap or leave items and pay a visit to the Great Alchemist — who is excellent at First Aid.

Once in the maze, the display shows a stylised 3D view of the path ahead. Nothing visually exciting about this, just the usual perspective line drawings of walls and doors. As you move left, right or forward, the picture is updated.

The party may elect to camp and in so doing you can choose to catch 40 winks or inspect the current status of any member.

Apart from strolling round the maze, the only other activity is fighting. When you meet a group of monsters — they mostly come in groups and are only shown by name, not pictures — each character is given the option of parrying, fighting, casting a spell or running for their life. Each round of the battle is then described. When all your band is killed, the game is over — but you can bring all of them back to life and start again.

Use of sound and graphics is minimal and the game content and format is hardly original.

BEATING THE YANKS AT THEIR OWN GAME

Mark Shepherd, in beer swilling T-shirt,
and Mike Redman of SCR adventures.

James Hartley discovers that the British are doing well in the latest software war against the U.S.A.

THERE'S A MAN dressed up as a werewolf in one of Infocom's latest adventures. You might bump into him in the kitchen, or find him sidling up to you by the fireplace in the living-room for a chat. If he does, you might discover that he is married to that charming lady you met only a few minutes earlier at this high-society fancy dress ball. That lady is now lying dead in one of the adjoining rooms, strangled by the lariat from *your* costume and victim of a hideous crime in which you are the prime suspect.

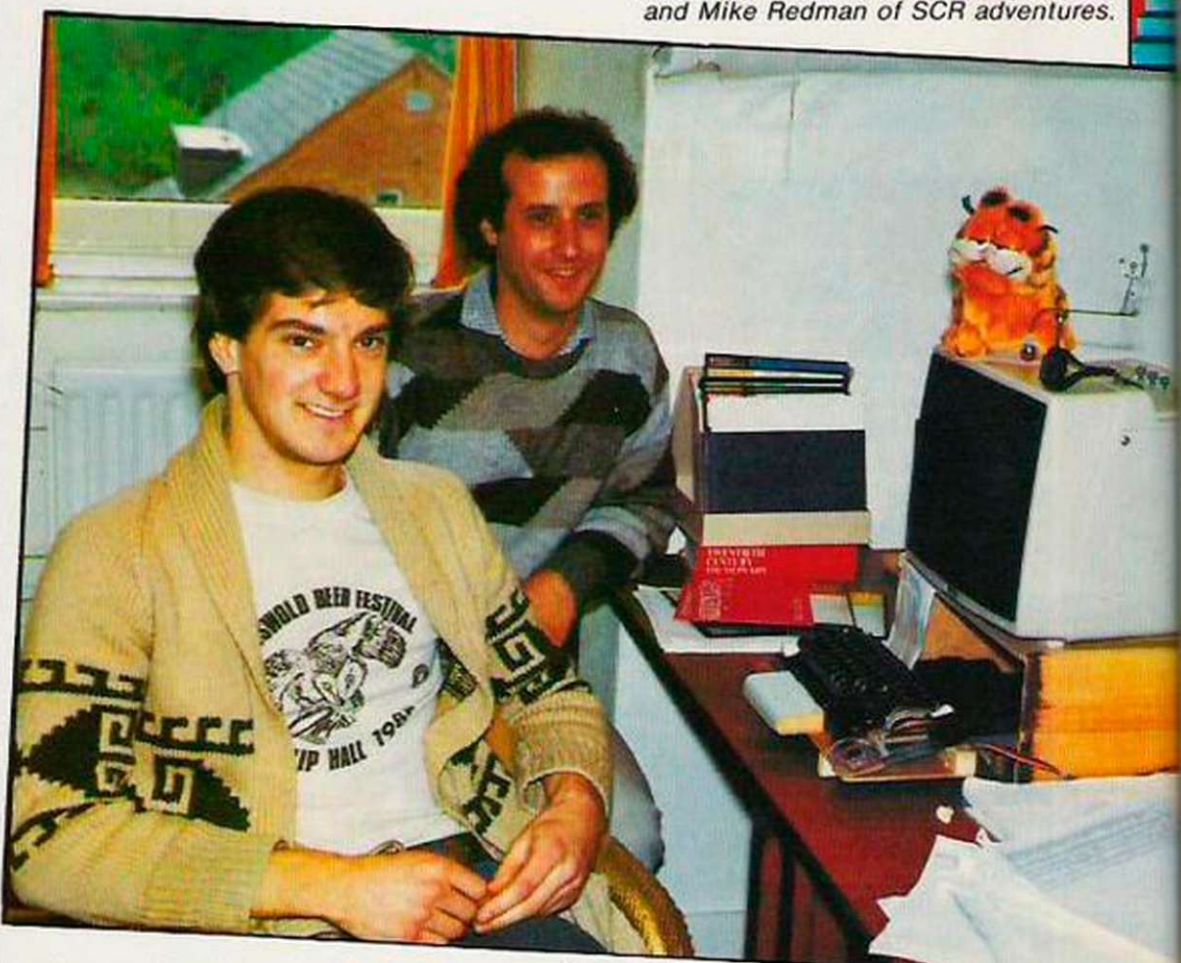
Suspect, as the game is called, boasts a whole crowd of characters like the werewolf, most of whom you can communicate with in one way or another, and all of whom seem quite capable of going about their business quite independently of you, the player. The game is typical of a whole new generation of text-only adventures that are beginning to make some of our British adventures look pretty silly. If you've been introduced to Infocom — and it'll cost you upwards of £40 plus the disc drive to run the program on — then you'll understand immediately why Douglas Adams worked with Infocom on his excellent computer version of *Hitch-Hiker's Guide to the Galaxy*.

Different in a year or two

The reasons why Adams worked with Infocom are fairly obvious — a top-class software house working in an enormous domestic market — but in a year or two things will be quite different. British adventure programmers are fighting back and are now racing to develop new game systems that could end up making even Infocom look pale by comparison.

The main problem to date has been the hardware. Here in Britain hardly anybody has disc drives that can provide the sort of data storage needed for really complex games, and, unlike in the U.S.A., machines with larger memories, like the IBM, are scarcely thought of as *personal* computers. But, paradoxically, it's limitations like these that are now providing the basis for a new push forward in British adventure software.

"It's been very frustrating", says Pete Austin of Level 9 — generally reckoned to be Britain's leading adventure software house, "but over-



coming machine limitations has become a way of life for British programmers, and it's helped us to develop techniques that could be very important when we have machines with discs and larger memories."

Pete's brother, Michael, is hard at work — with yet another brother, Nick — developing an entirely new adventure system that looks like giving the competition a good run for its money. In fact, he's already reached the point where he's no longer that impressed with Infocom.

"At the low programming level their games really aren't that clever. Their compression routines are virtually non-existent and I'm not at all impressed by the speed — especially on the Commodore. Our market here may be about two years behind, but as soon as discs become available, we'll be ready to make a huge leap forward."

Host of advanced features

The system that's being developed by Level 9 boasts a whole host of advanced features. First, a new compression system that uses a combination of stored dictionaries and character encoding — based on the frequency of different characters — makes possible a vocabulary of between one and two thousand words. Previously, adventurers have had to struggle with game with anything from 200

down to as little as 20 or 30 words.

Objects that you can manipulate during the game will no longer just be things you can pick up or drop — you'll be able to look inside them, or use them as containers to carry other objects from place to place, and of course there'll be plenty of characters to meet on the way.

"I'm trying to work towards a soap-opera type of game," says Pete, who tends to be responsible for the design of Level 9's games, "and I'm aiming to develop characters with whom the player can get emotionally involved. As memories get larger, there's no point in just adding more puzzles — you don't want people slaving away for more than a few weeks to solve a game. You're better off using the space for entertainment, and characters are a good way of doing it."

Although future Level 9 products will tend to get more and more sophisticated, the company is ensuring that programs don't become too slow and cumbersome. On the new Spectrum system that it is working with at the moment, the player can carry on entering commands while the graphics draw simultaneously. And where graphics are concerned, Pete sees new machines — like the new Atari range — as providing tremendous potential for the use of landscaping techniques, somewhat

similar to those pioneered by Mike Singleton in the very successful Lords of Midnight series.

Level 9 is perhaps the best known British adventure house, but it's not the only one to be hard at work on developing more powerful systems. One small company, which to date has produced only one game — Castle Blackstar, distributed by CDS — looks set to become a household name over the next couple of years with an adventure system that will certainly rival that of Infocom and could force Level 9 to look to its laurels. SCR Adventures is the brainchild of Mark Sheppard and Mike Redman, two enterprising 24-year-olds who graduated in Computer Engineering from the City University in London and are now hard at work on an adventure development system of truly epic proportions.

"Text is best"

"It's been so frustrating, having good ideas but not having the memory or the discs to produce them on," complains Mark Sheppard. "The computers in this country just haven't been up to it, but as soon as this country goes to disc we'll be ready to jump in." SCR's system has been developed using the language C, running under Unix, and although it's still early days, it already outperforms the system used by Infocom in the notorious Zork trilogy. Highly efficient compression systems and a very complex parser to interpret the users inputs both work together in a framework that can cope with multiple interactive characters, container objects, and even moving vehicles for the player to drive from one location to another in!

Unlike Level 9 and like Infocom, SCR is aiming at the text-only market. "Most adventure graphics just use the same basic forms over and over again," says Mark, "and what's the point of seeing the same tree in every location, even if it is a different size and in a different place. With text, you can have a different tree in each place." Always provided, of course, that the text can live up to what's expected of it but, judging from Castle Blackstar, its first release, SCR is quite capable of wielding the pen effectively, although both Mark and Mike seem rather hesitant to talk about Blackstar: "It's very dated now, and I don't like to be reminded of it," says Mark, although others obviously disagree — the game was recently voted one of the top 10 best adventures.

Some surprises

There are some surprises, too, to be found where new adventure systems are concerned. One company that isn't usually associated with adventures and which is keeping things very hush-hush is Mastertronics. It is hard at work on a system that comprises two basic modules, a database input/management system and control module to access the data and provide higher level game-play routines. Interestingly, the system has been developed using the Forth language.

Stephen Kirk of Mastertronics has nothing but praise for Forth: "We can have a library of primitives that access records, provide input/output, parsing, and so on. It's an extendable language and gives us a five-times saving in time over using assembly language." What's more, it enables them to develop software and



produce it simultaneously over a wide range of machines — essential in the British market where there are still substantial user-bases for what might normally be considered minority machines.

Adventure fans will doubtless be excited to learn that Mastertronic's new game is being designed by Sue Gazzard, who designed the very popular Lords of Time adventure for Level 9. It's also working, in conjunction with Roy Carnell, known to many adventurers as the man behind The Wrath of Magra, on an epic game that has been marketed by Mastertronics under the Mastervision label following the collapse of Carnell Software.

Mastertronics, however, is being careful not to leave cassette users behind in its search for bigger games. The company reckons that its system will be able to produce 250 location games plus graphics to run in Ram without discs, using only two separate loads from cassette — Wrath of Magra needed four separate loads.

Stephen Kirk reckons that their system will "just grow and grow. It'll give us a far greater diversity of input for our games, so we will be able to branch out into whole new areas, for example adapting ideas from books, films, and video, and accepting scripts from well-known writers" — like Douglas Adams, perhaps.

But the best news for the adventure player is yet to come. Although all the systems mentioned above will be used exclusively by the companies concerned to develop their own products — though perhaps from your ideas — there are also powerful programs to be released over the next year that will enable you to challenge Infocom at its own game!

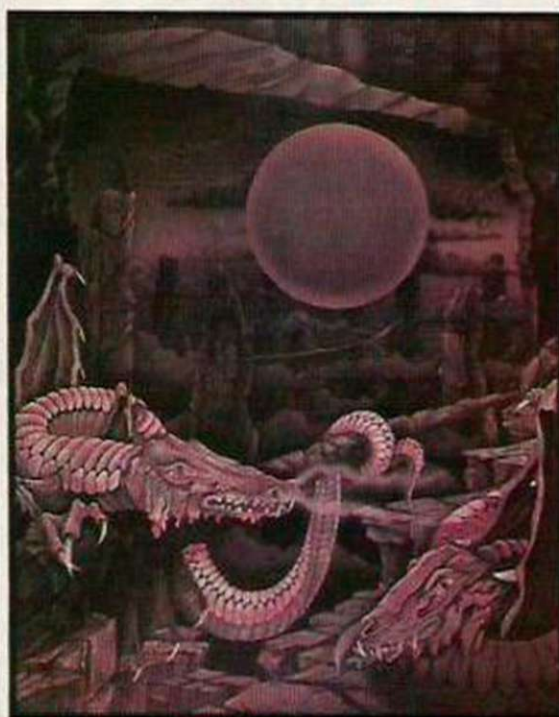
"It's more complex"

You may well be familiar with the popular *Exploring Adventures* series of books, published by Duckworth for a wide range of machines. The system in these books was concerned with simple two-word, verb-noun, Basic adventure programming, but now author Peter Gerrard is at work on an enhanced version which will, he hopes, be ready for release in September of this year.

"It's much more complex than the old system," says Peter, "and the majority of it is in machine code rather than Basic. The command parser is far more sophisticated and the location descriptions can be heavily compressed so you can fit more in." Peter also sees interactive characters as being very important to a good game: "If they work, they make it impossible to play the same game twice", he says, and he's currently working on
(continued on next page)



Red Moon



Level 9 Computing



Red Moon is Level 9's new release but don't read too much into the title even if Level 9 does share High Wycombe with a USAF bunker.

Last, but not least, there's the famous, or infamous, Quill. Produced by Gilsoft, this adventure development system has already introduced thousands to the enjoyable art of adventure programming, and it now seems very likely that an enhanced version of the program could become available in the not-too-distant future. "We are interested in producing a more advanced Quill", says Tim Gilbert of Gilsoft. "So far I've definitely felt frustrated — people have relied far too much on cassettes but now, at last, disc systems are becoming more widespread, and with machines like the QL we can have networked games and multi-user adventures, though I have my doubts about the QL's speed capabilities for more than about three fully-interactive characters."

Developing the Quill and the Illustrator graphics program for different machines is taking up a lot of Tim Gilbert's time at the moment, and he's understandably cagey about his plans for the future but, like Peter Gerrard, when he does come up with the goods, you can be sure that he won't be keeping it to himself.

(continued from previous page)

a game in conjunction with his brother Mike that has got him very excited: "The results have been better than either of us could have done on our own," and with any luck, using

Peter's new system, adventurers all across the country will soon be able to join in the fun. "After all," says Peter, "it seems silly to develop a system and then keep it all to yourself." If only everyone else felt the same way.

HISOFT

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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 dumps and letter writing on Epson compatibles or the DMP1.

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

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much more. It comes with a FREE tape
header reader.

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

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

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

Product Price Table

	Pascal £	DEVPAC £	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 (MON QL)			

All prices are for cassette versions (except CP/M and QL) and include VAT and p&p in the UK. Please contact us for export 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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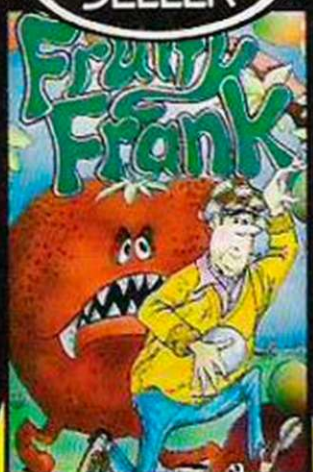
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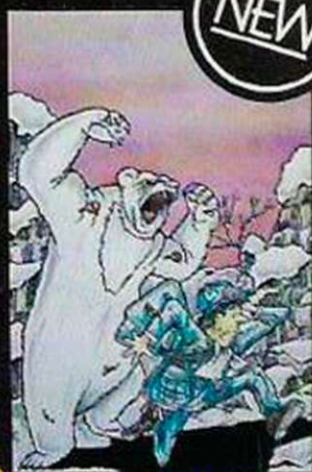
Galaxia



Fruity Frank



Star Avenger

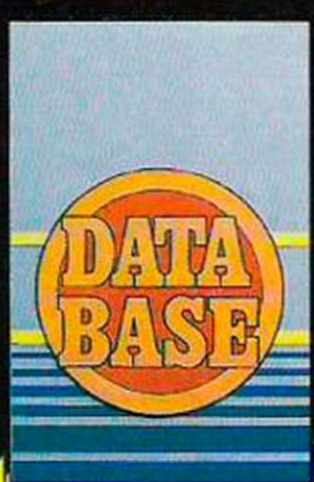


Shadow of the Bear

NEW



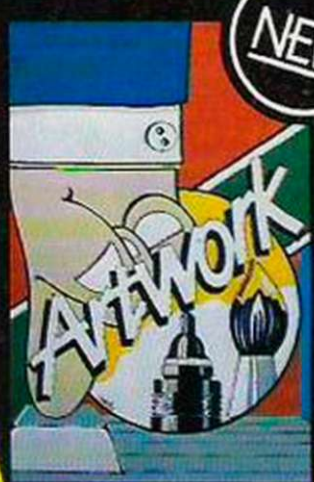
Home Budget



Database



Zen Assembler



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NEW

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The Amstrad CPC 464 Explored
by John Braga

This superb book is designed to let every CPC 464 user, at whatever level, get the most from his computer. After an introductory section on the special Basic features, the book looks in depth at the excellent sound and graphic facilities.

NEW

ZEN and the Amstrad CPC 464
by Ian R. Sinclair

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SUPERMICROS

FEW COMPUTERS HAVE generated as much interest as Atari's ST range, first announced in January. The 130ST, in particular, promised most of the features the average home computer owner would want to see in an ideal machine: 128K Ram, a powerful 16-bit processor, tremendous high-res graphics, an extensive array of ports, a high capacity disc drive, a Midi interface, and a mouse — at an unprecedentedly low price; not much more than the cost of a BBC. And to clinch the matter the ST computers run Gem, Digital Research's Graphics Environment Manager.

Gem is an operating system which gives the STs all the capabilities of Apple's Macintosh — icons, windows and pull-down menus under the control of a mouse. Unlike the Macintosh system, Gem has the advantage of being able to use colour and is already running on a number of other computers such as the IBM PC and the Apricot. Software written for other machines can be converted to the Atari fairly easily.

For the moment, however, the 130ST will not be sold in this country, and the machine we looked at, the 520ST, will cost somewhere between £750 and £800. This price may seem to be way outside the budget of most home users but it includes a 500K 3.5in. disc drive, a high-res monochrome monitor, 512K Ram, and a mouse. Along with the hardware there is an impressive list of software: TOS — the Tramiel disc Operating System, Gem, Gem Desktop, Gem Write, Gem Paint, DR Logo and DR Personal Basic.

With the exception of Tos these programs have been bought under license from Digital Research. But the problem of tailoring them to fit the ST seems to be taking longer than Atari anticipated. DR Basic, for example, which is being converted to give the user access to Gem's graphics, is not yet running. On the review unit the software was loaded in from disc. When the 520ST appears in the shops in September the software will be held in 192K Rom.

The computer and the peripherals have a common styling which looks businesslike, but tends to take up a lot of desk space. The keyboard unit is large — the price you have to pay for a nicely-spaced keyboard layout. The quality of construction of the computer and peripherals is good with no signs of patching.

Inside, the processor is a Motorola MC-68000 running at 8MHz and capable of addressing 16Mbytes of contiguous Ram. This is perhaps the best of the 16-bit devices, but do not make the mistake of thinking that 512K Ram is equivalent to 512K in an eight-bit processor environment. Code is stored as a minimum of two bytes — a word — and invariably a lot more memory space will be used. The overall effect will be to gobble up memory, and there is no means of externally extending the 512K Ram. For those readers used to eight-bit machine-code programming, a ratio of 75 percent seems about the effective memory for comparable programs.

The Atari ST contains the following peripheral support chips: a 6301 which scans

the keyboard, mouse and joystick ports, buffering the data in the keyboard queue; an MC-68901 which services communications and interrupts; a FD1772, floppy-disc controller supporting up to two drives; and the YA-2149, Yamaha's equivalent of the Texas AY-3812 sound chip. An MC-6580 provides the interface for the Midi functions and another MC-6580 provides the RS-232 interface.

In addition there are four special Atari ULAs which function as memory management, DMA, ancillary functions and graphics. There is no hardware character generator — it is all done in software. The memory chips consist of 16 256K Ram devices and six 32K Eproms.

The U.K. keyboard sports an extra key compared to the American computer. The left-



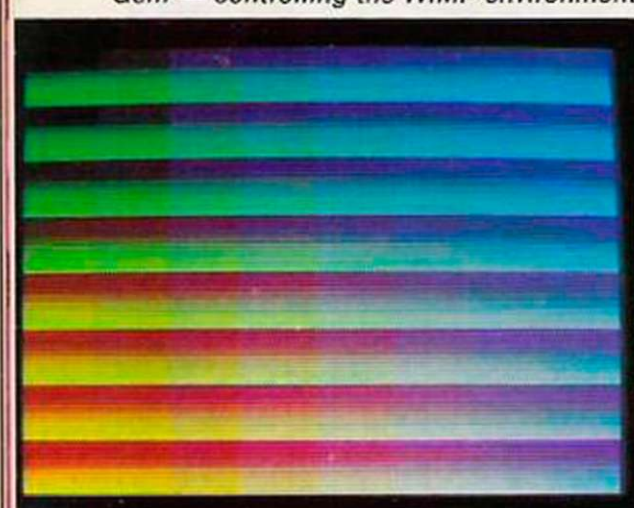
DR Logo will be built in on Rom.



A cat for the mouse — hi-res graphics.



Gem — controlling the WIMP environment.

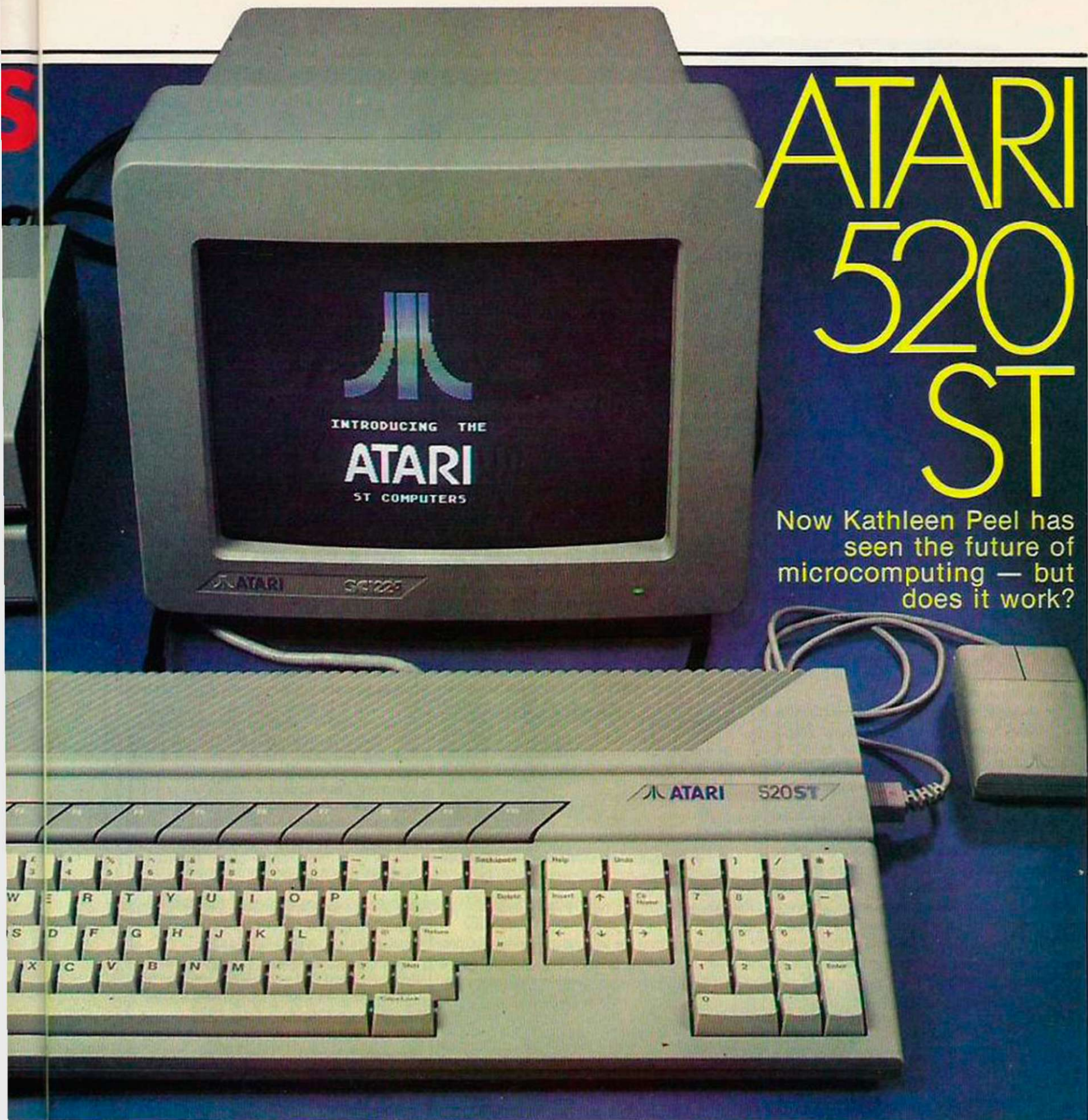


Op Art on the ST and below Logo graphics.



ATARI 520 ST

Now Kathleen Peel has seen the future of microcomputing — but does it work?



hand shift key has been split in two, to allow the £ sign to be shift.4 and hash to be repositioned. The keyboard consists of a 60-key typewriter-style portion, an eight-key cursor control, portion, an 18-key numeric keypad and 10 function keys. The keyboard feel is uniform, consistent and eminently suitable for word processing activities.

There is no internal speaker and the sound is reproduced from the attached display unit speaker. Nor is there a battery back up to the internal clock which must be set at switch on to provide accurate data/time stamps to files.

The external connections are numerous and will meet most requirements, the only notable omission being the inability to add on more memory externally.

The peripheral ports include two joystick ports on the right-hand side, one configured for a mouse. On the back are a reset button, on/off button and power supply socket, Midi in, Midi out five-way Din sockets, TV, monitor — composite and RGB — 25-way RS-232 socket, Centronics which also functions as an eight-bit bi-directional port, floppy disc controller, a 19-way D-shell direct memory access port that can be used for the attachment of a hard disc and a Rom expansion port on the side.

The Midi interface acts as a sequencer and can be used to perform step, time, note and trigger data entry. The Midi interface can also be used as a network link — as can the bi-directional Centronics port, the RS-232 and the hard disc port.

There are a number of high-level languages available — DR Logo, Forth, C, Assembler — but unfortunately the one I wanted to see was unavailable — DR personal Basic.

It seems strange to offer Logo at this level. Presumably Atari wants to attract educational users. My own view is that this and most other high-level languages are irrelevant to the real world: academics may favour the language but being an experienced Logo programmer will not earn you any credit with employers. Basic, by contrast, is a language that is likely to survive, and provides a useful general programming background; Cobol and Fortran are, likewise, still relevant for commercial and engineering applications; while C is the language

(continued on next page)

(continued from previous page)

for the future — most software tools, including Gem and CP/M 68K, seem to have been written in it.

The other software supplied with the ST includes Gem, Digital Research's integrated operating system. Gem provides an initial interface between the operator and the machine through icons, pictorial representations of facilities or devices the operator wishes to use. Move the cursor over a symbol of a dustbin to indicate that the current document is rubbish and no longer required, press the mouse trigger and its gone! Well it saves typing New.

Mouse action smooth

The Mouse action appears smooth and is placed over the icon and the trigger pressed to select an activity.

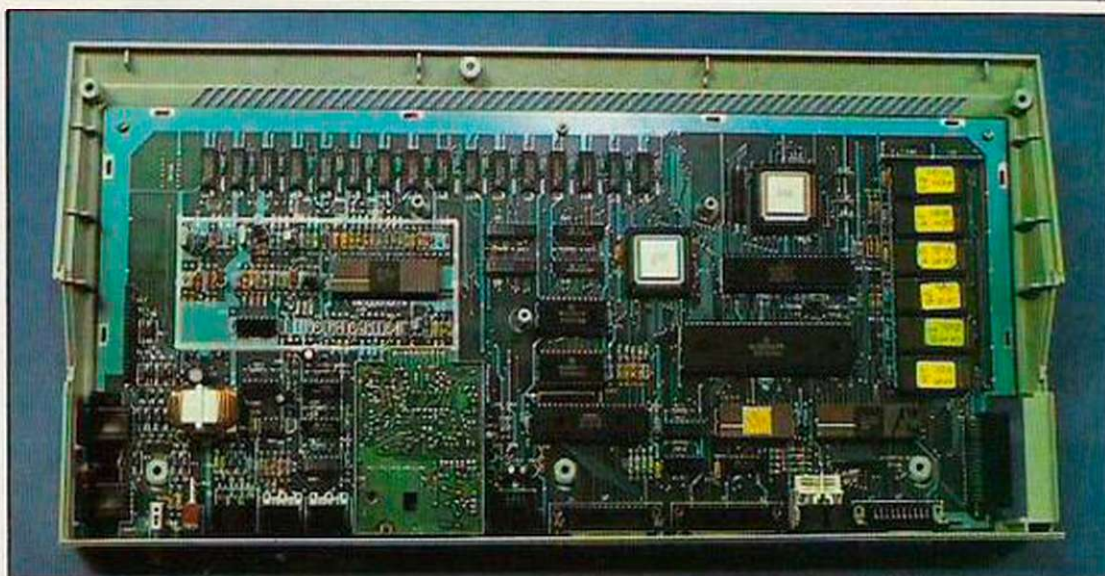
Gem Desktop provides the working shell that allows loading, copying and general house-keeping. Gem Write is a word processor based on Volkswriter and Gem Paint, is a similar program to Macdraw.

There are three graphics modes, 320x200 in 16 colours, 640x200 in four colours, both from a palette of 512 colours and 640x400 monochrome. Although the windows and their contents were capable of being moved virtually instantaneously using the menu data buffer, there were times when listing text seemed relatively slow. This is probably caused by making calls serviced through multiple layers of operating systems.

The sound generator has one noise channel and three tone channels. Easy Basic access through a macro language similar to MSX machines, one of the few parts of the MSX specification that I like, is not available.

50 titles being developed

The number of applications that currently run under Gem is very small, but there are well over 50 titles being developed by U.K. software houses alone. Atari intends to keep software prices under \$100 for a single piece of software and hopes that \$50 will be nearer the norm. A Telex emulator is being developed and



The Opposition

QL, the QL has 128K RAM, costs £400 and comes complete with adequate software. Adding a b/w monitor and enough memory to reach 512K and takes you up to £800. On that basis, it's not worth thinking about. The only reason for buying a QL is the £400 entry price if you already have a monitor or TV and the 48-hour software support that comes with the machine, a very important item not to be underestimated. All software is likely to run in the 128K, and some good packages are beginning to appear.

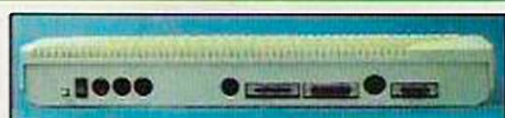
Apple's Macintosh, at about twice the price and limited to black and white, is the



Take your pick: .5Mbyte or 1Mbyte.

should soon provide the ST with yet another use.

Documentation for software developers from Digital Research appears to be comprehensive



Spot the Midi — a DIN's eye-view.

machine on the business side that the Atari ST is most likely to challenge.

IBM PC. The Atari ST has the ability to run in PC mode and use some PC data files. It is unlikely that PC DOS programs will run on the Atari.

Act Apricot F1E, at its current price of £600 for a 16-bit 8086 computer, with 128K RAM, CP/M 86, Basic and a 315K formatted 3.5in. Sony disc, does seem rather good value when you consider the wealth of software available. The Apricot F1 is available for about £1,000 and has the considerable advantage of also running MS-DOS, 256K Ram, a 1Mbyte unformatted disc and a substantial set of software packages. Not quite as good a hardware specification.

Commodore's Amiga is the cloud on the ST's horizon and on a technical level, the only other reasonable alternative besides the Apricot.

and of high technical quality, hopefully forming a good platform on which to base the Atari manuals.

The Atari discs are 3.5in. Epson floppy drives. The SF354 gives 500K and the SF314, 1Mbyte unformatted storage. To load the TOS image file of 200K took approximately 35 seconds which is a very reasonable figure for low-cost drives.

Monitor display good

The monitor display quality was good, but was limited to 640x200 maximum by a protection circuit which is employed to prevent phosphor "burn-up" in low and medium resolution monitors caused by the higher frame rate used in high-resolution mode. One of the ST's unusual features is that it checks to see what sort of monitor is attached — RGB or composite video. It then selects the graphics mode appropriate to the monitor's resolution.

Gem provides an integrated operating system approach which is very successful in providing a simple entry to computing for the uninitiated. But at this level, it is the application packages that provide the user-friendly aspects of the program, the operating system shell ensuring a common approach. PC-DOS compatibility is really limited to data files only, it is unlikely that programs will actually run. ■

CONCLUSIONS

■ The software problems will be fixed as the computer is systematically debugged and there is no inherent problem with the hardware. All comments relate to Rom details but what should not be underestimated is the time it will take to fully debug the amount of software provided. It is not a three-month exercise as the cause of every obscure fault must be diagnosed and the cure tested to ensure that it does not have any effect on associated code.

■ The current market has been filled by products that were used either to:

- Teach someone about computing.
- An upgrade.
- For a specific applications games, or business packages. Further market penetration is

becoming increasingly more difficult for new products as they vie for new market sectors. Obviously there is a huge market out there that I believe is extremely price-sensitive, and £800 is getting very close to the limit for a budget-priced serious micro.

■ The 520ST is technically excellent. I understand why the 520ST was the first device to appear in the States where disposable income is higher, but in the U.K., the machine that I feel could have made Atari a fortune is the 130ST, provided it ever makes an appearance and at its launch price.

■ The 520ST hardware is the new standard by which others will be judged. Do not worry too much about the software problems. They may take time to debug but when they have been, this will be a very good computer.

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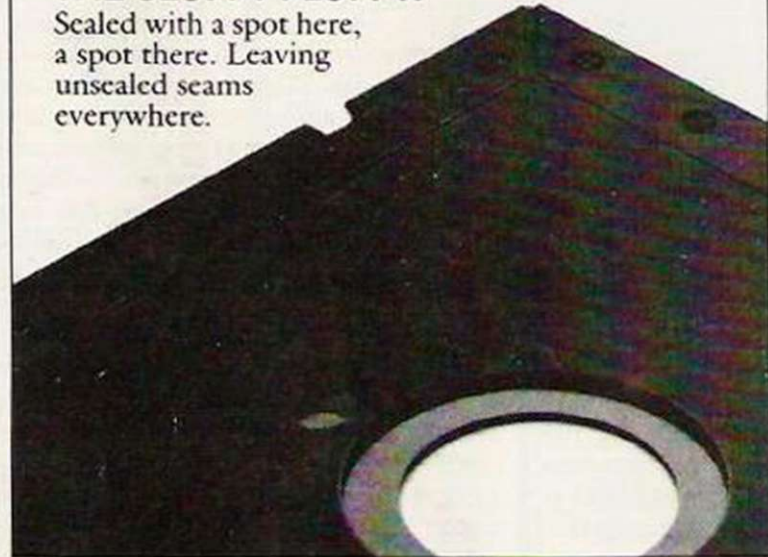
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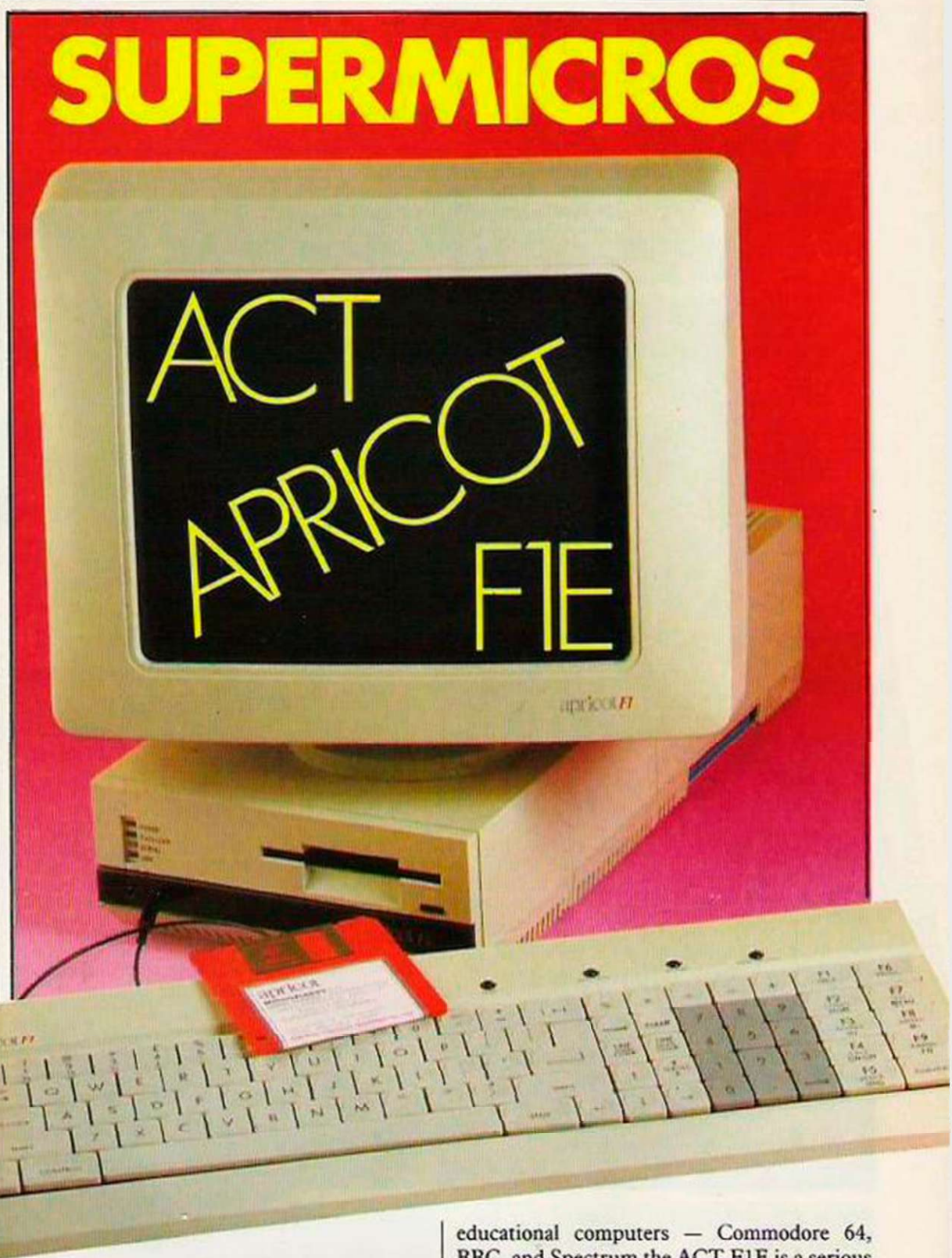
Elsie Dee takes a byte or two out of the new Apricot F1E and likes what she tastes.

ACT DOES NOT MAKE home computers. But the latest price cut on the Apricot F1E has sent it storming down into BBC territory with a specification of 128K Ram, 16-bit 8086 central processor and built in 320K Sony 3.5 in. disc drive for £685 including VAT. And just in case Acorn does not get the message ACT is also launching a £30 B-Tran program which will allow the F1E to run most BBC Basic programs.

Unlike the expanded home micros usually found in this price range the F1E is a cut down version of the F1 business micro which uses a mouse and icons as a user-friendly alternative to the keyboard. You can expand the E up to F1 spec including a mouse but even in standard form the E comes with a full colour icon display. The machine looks professional with its separate keyboard and slimline shoebox sized processor unit cum disc drive which doubles up as a base for the monitor, although it also has a video output to an ordinary TV.

The battery-powered keyboard is a little too like the QL's with the keys cut from a single slice of plastic rather than individually moulded. Batteries are needed because the F1E has a "look no strings" TV-remote-controller style infra red link to the main processor box. This has the advantage over the usual curly telephone cable connection that you don't feel like an elastic band is trying to tug the keyboard out of your hands, but the disadvantage is that unless you keep it lined up with the processor you can lose keystrokes. As an afterthought to try to overcome this ACT has added a light pipe which restores the physical connection between keyboard and shoebox — unfortunately the pipe is not as well made as the rest of the machine and ours broke in normal use.

The F1E comes with ACT's own icon-driven interface called Activity. Getting started couldn't be simpler — you just switch on and feed in the demonstration disc which introduces you to icons. These are a series of diagrammatic representations along the bottom of the screen labelled Activity, Files, Utilities, Disk, Help, and Exit. You just use the cursor keys to position an on-screen arrow over your choice



and then use the Enter and Return keys to call it up.

This Apricot also comes with MS-Dos the IBM PC style operating system used in most business micros — although the F1E is not IBM compatible. Also supplied on disc with the F1E is GW-Basic, Diary and Sketch programs.

Unlike the second generation home and

educational computers — Commodore 64, BBC, and Spectrum the ACT F1E is a serious 16-bit micro designed to upgrade into a full hard disc-based business system if necessary.

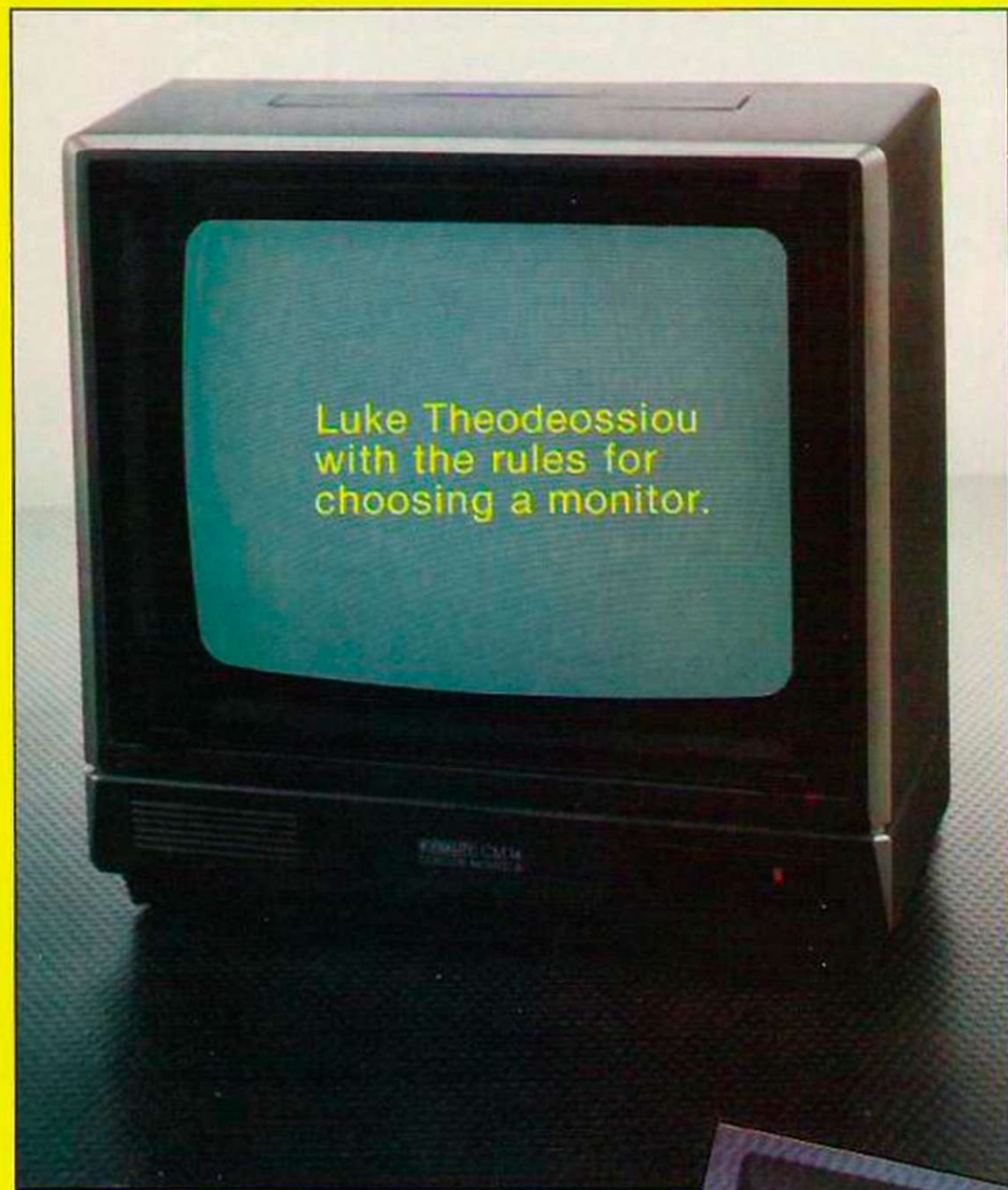
Unlike the QL the Apricot has a reliable built-in mass storage system and software already developed for serious use on its larger cousins in the ACT range.

Although the F1E can display four out of 16 colours in up to 640 by 256 resolution it does not pretend to be a games machine. Programs like Infocom's Hitchhikers guide to the Galaxy are available but the Apricot's strength is the range of business software which its operating system makes available to it which paradoxically may increase its chances in the educational market. Brian Androlia, managing director of ACT claims that students "need the experience of using serious industry standard software which normally will not run on 8 bit micros."

It may be next year before new generation micros like the Atari 520 ST and Commodore Amiga are on sale with the range of software the ACT already has, so for the moment the F1E wins the battle of the supermicros. ■



PICKING THE TV MONITOR



ing but watch out. It's likely to be several years old and its display quality is not going to be as good as that achieved by modern sets, even if you found one which was in absolutely perfect condition.

Another mine field is making the right choice, not just what make but also which model and most important of all judging its condition. Unless you are a TV engineer you could end up wasting quite a bit of money on junk. Even if you found a good one, it's very much more likely to go wrong and repairs are expensive. All in all, the risks are just too high.

The other problem which is common to all TV sets, old and new alike, is the display quality when used in conjunction with a computer. Colours lack contrast, they are noisy, there are crawling interference patterns on the screen, etc. All this makes any serious work such as text processing or program compiling virtually impossible with eye fatigue into the bargain.

The reason for this is that the computer generates three distinct signals — Red, Green and Blue — at TTL level. These signals are the cleanest possible and are used to drive RGB monitors. In order to enable owners to use their domestic TV sets, two further stages of processing are necessary. The first is to combine the three signals, together with the synchronising signal — Sync — to produce a composite video signal. This is done for a particular broadcasting system standard — for example, most of Europe, including the UK, uses a colour encoding system known as PAL.

This signal is then passed to a modulator which converts it to a radio frequency — RF — signal which is just like the signal picked up by your TV aerial. All this additional processing very nearly wrecks the quality of the

Left: Fidelity CTM 1400 colour TV monitor. Below: Ferguson TX.

WHEN WE LOOKED at monitors — see *Your Computer* December 1984, page 84 — we made it clear that in our opinion dedicated standard resolution monitors did not provide good value for money. We therefore suggested that anyone in the market for a monitor should first of all determine the primary use the equipment is to be used for before even starting to look at what's available.

If you are currently using your domestic TV set as your VDU, then you are likely to be suffering from two main problems. The first is conflict of interests — you are interested in using your computer, whilst the rest of the family is interested in watching TV. The result — conflict! One possible solution to this is to buy a second-hand colour TV. Current prices range from around £75 to over £200. The other possibility on similar lines is to buy a new 12in. monochrome portable TV for about £55.

Neither is particularly satisfactory. A black and white TV is really quite useless for games and is just as bad — from a display quality point of view — even if all you ever do is text processing. The best advice here is — forget it. A second-hand colour set is perhaps more tempt-



MONITOR FOR YOU

A few basic rules will help clarify any grey areas.

1. Remember, all current TV-monitors are standard resolution only. If you require higher resolution, then a dedicated medium or high resolution monitor is the only answer.
2. If you connect your computer via the aerial socket, the results will be identical to an ordinary TV. Monitor performance is only possible when using "direct" connections via the SCART socket.
3. Beware of monitor-look TVs which are not necessarily TV-monitors. This is easily checked but do make sure.

4. Before buying, check that your computer has RGB outputs, or at least a composite video output. If you have both always choose the RGB output for best results.

5. Sound can also be connected directly via the SCART socket but it's hardly worth it except for music programs or similar.
6. Although TV-monitors come in a variety of sizes, the larger sizes are best suited for use with video recorders. The optimum size for home computer applications is 14in.

7. FST (Flat Square Tube) equipped TV-

monitors are becoming available but the choice is limited and prices higher. FST does have some advantages over conventional tubes as well as being more pleasing on the eye but in our opinion it's not good value for money yet.

8. Think about your future display requirements before choosing your VDU. As always the best advice is to insist on a demonstration before buying. Happy viewing!

original RGB signals. The job is finished off by your TV set which has to convert the aerial signal back to separate RGB signals!

The sensible approach of course is to bypass all this encoding and decoding. This is where the TV-monitor comes in. Essentially, all it is is an ordinary TV set equipped with additional input sockets to enable direct connection from the computer to the appropriate point inside the set. Of course it's a little more complicated than that.

Amplifiers and impedance converters are used to ensure correct conditions for the signals; the TV signal has to be switched off; and the chassis has to have complete mains isolation. Although converting an existing TV for RGB operation is a theoretical possibility, the hustle, the expense and the safety risks involved make this proposition a definite non-starter.

For little more than the cost of a standard model, you get first class RGB monitor performance for your computer; a much better picture from your video recorder — by using the composite video input — and of course a TV set as well!



Right: Philips CT 2007 receiver monitor.

The buyers guide below is a fairly comprehensive chart of small screen TV-monitors currently available from high street retail shops. Most manufacturers also offer large screen sizes but these have been omitted from our chart. Some computer retailers have in the past offered other makes, mainly far eastern imports, but the trend now is to

stay with well known brands. Shopping around may secure some savings but at best these will be very modest. Our rating system — from 1 to 10 — is a personal assessment and takes into account price, availability, ease of use, general performance, etc. It is intended as a guide only and we strongly suggest that you view before you buy.

Brand name	Model	Size	FST	R/C	Price	Connecting leads	Remarks	Rating
Ferguson	TX MC01	14in.	—	—	£229	Included	Auto source switching Recommended	8
Fidelity	CTM1400	14in.	—	—	£219	—	Good value	7
Finlux	1014RGB	14in.	—	—	£275	Optional	Pricy	4
Grundig	P40-125	36cm	Yes	—	£269.95	—	Good but pricey	5
Grundig	P40-145	36cm	Yes	Yes	£299.95	—	Good but expensive	4
Mitsubishi	CT1501BM	36cm	Yes	Yes	£299	—	Good but expensive	4
Philips	1120	9in.	Yes	—	£300	Optional	Good but expensive	3
Philips	2007	14in.	—	—	£239	Optional	DIN socket	6
Tatung	TN1441	14in.	—	—	£199	—	Very good value; recommended	8

Key: FST = Flat Square Tube
R/C = Remote control

ATARI SYSTEMS

Competition RESULTS

APRIL'S COMPETITION to win a complete Atari system attracted one of the largest entries in living memory. Probably the prize was the main draw but contestants also appeared to relish the challenge we set — to write an Atari-related limerick.

Unfortunately many entries took a broad view of what a limerick is. Thus we had odes to Atari, sonnets, rhyming couplets, 100 line verse epics, blank verse, ditties and numerous other verse forms. But, good though they were, we had to disqualify them: if it doesn't have five lines it is not a limerick.

It was also probably a mistake to end one of your lines with the word Atari. As there are only a limited number of rhymes with Atari most entries of this type tended to sound the same. They usually involved young men on safari, driving Ferraris, and sipping Camparis. One of the best of these was V. Skinner's: A compulsive eater called Marie Likes to nibble while drinking Campari Between liquid sips She's mad about chips And gets far better bytes from Atari.

In the same line B. Axelford almost clinched it but stretched the rhymes too far: Charles and Diana's son Harry

Was given a brand new Atari
But Prince William was mad
Cos just a Spectrum he had
So he threw the Atari At-ari.

Perhaps M. Eaton had the right idea with his succinct:

Atari Atari Atari
Atari Atari Atari
Atari Atari
Atari Atari
Atari Atari Atari

J. Outram likewise came up with something different:

A computer fanatic from Rhodes
Wrote a program for making up odes
The Atari possessed him
But his Spectrum outguessed him
By producing last lines much longer than
any of the others and with no apparent
rhyme.

Among the other contenders were a number of highly competent entries from abroad. In fact E. Teler's from Jerusalem was one of the few which caught the true spirit of Edward Lear: A man known to me and to you

Runs Atari (ran Commodore too)
He thinks it is nice
To fight elephants with mice
I think he should open a zoo.

D. Williams' limerick also struck the right nonsensical note although it goes astray in the last line:

Listen to Jumping Jack Tramm
He's cutting the prices like ham
His methods are sound
XLs for the pound
You get more for your Pacs from this man.

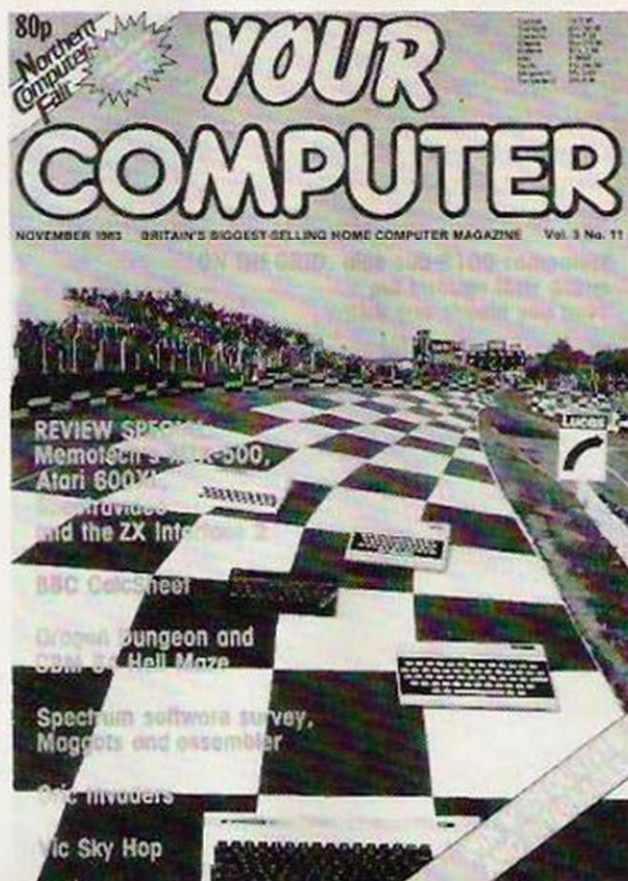
All these were in the running but after much deliberation we awarded the prize to Marie McNally, 8 Raglan Gardens, Caversham, Reading, Berkshire, for:

Mixing up Singapore and Djakarta
Jack Tramiel would call corrupt data
But it's nothing so sinister
Just the lady Prime Minister
We should swap for an Atari — it's smarter.

The mix up referred to was made by Mrs. T. on her recent visit to the Far East.

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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 have a wide range of ROM cartridges available including arcade favourites such as Asteroids, Centipede, Missile Command, Popeye, Q*Bert, Star Raiders, Super Cobra for only £9.95 each! The 600XL is a programmable home computer with the Basic Programming Language built in and if you later add a 1010 Program Recorder (XLP 1010 - £34), a range of hundreds of cassette programs will become available to you. The Atari 600XL is recommended as a first class games machine.

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ATARI 600XL ENTERTAINMENT PACK	
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PACKAGE PRICE (XLC 1600)	£69.00

£69

ATARI 800XL AND RECORDER PACK

The 64K 800XL is packaged here with the 1010 recorder, an economical storage and retrieval unit, a smash hit arcade game and programming aid, all for a package price of only £129 (ref: XLC 1010), a saving of £65.96 off the RRP's of the individual items which total £194.96. The game included in this pack is Pole Position. Now on cassette from Atari, Pole Position is an accurate reproduction of Atari's own highly successful arcade driving game which has all the thrills and spills of the grand-prix racetrack. On the reverse of this cassette is a demonstration program of Atari's amazing sound and graphics capabilities giving an example of the high quality performance of the Atari 800XL. Also included is an Invitation to Programming 1 cassette which takes you step by step through the first stages of programming in Atari Basic using Atari's unique soundthrough facility which allows pre-recorded human speech to be played through your TV speaker. All you need is a joystick (ATJ 0400 - £7.99 for Pole Position), to be up and running with this package. The Atari 800XL in this pack comes with a Silica two year guarantee.

ATARI PACKS - POWER WITHOUT THE PRICE!



ATARI 800XL + PROG. RECORDER PACK	
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Less Discount (approx 33.8%)	£65.96
PACKAGE PRICE (XLC 1010)	£129.00

£129

ATARI 800XL AND DISK DRIVE PACK

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ATARI PACKS - POWER WITHOUT THE PRICE!



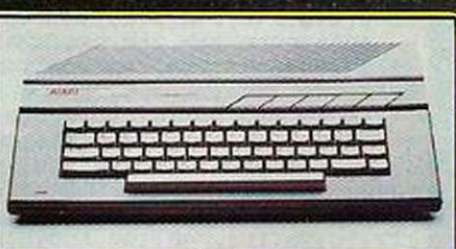
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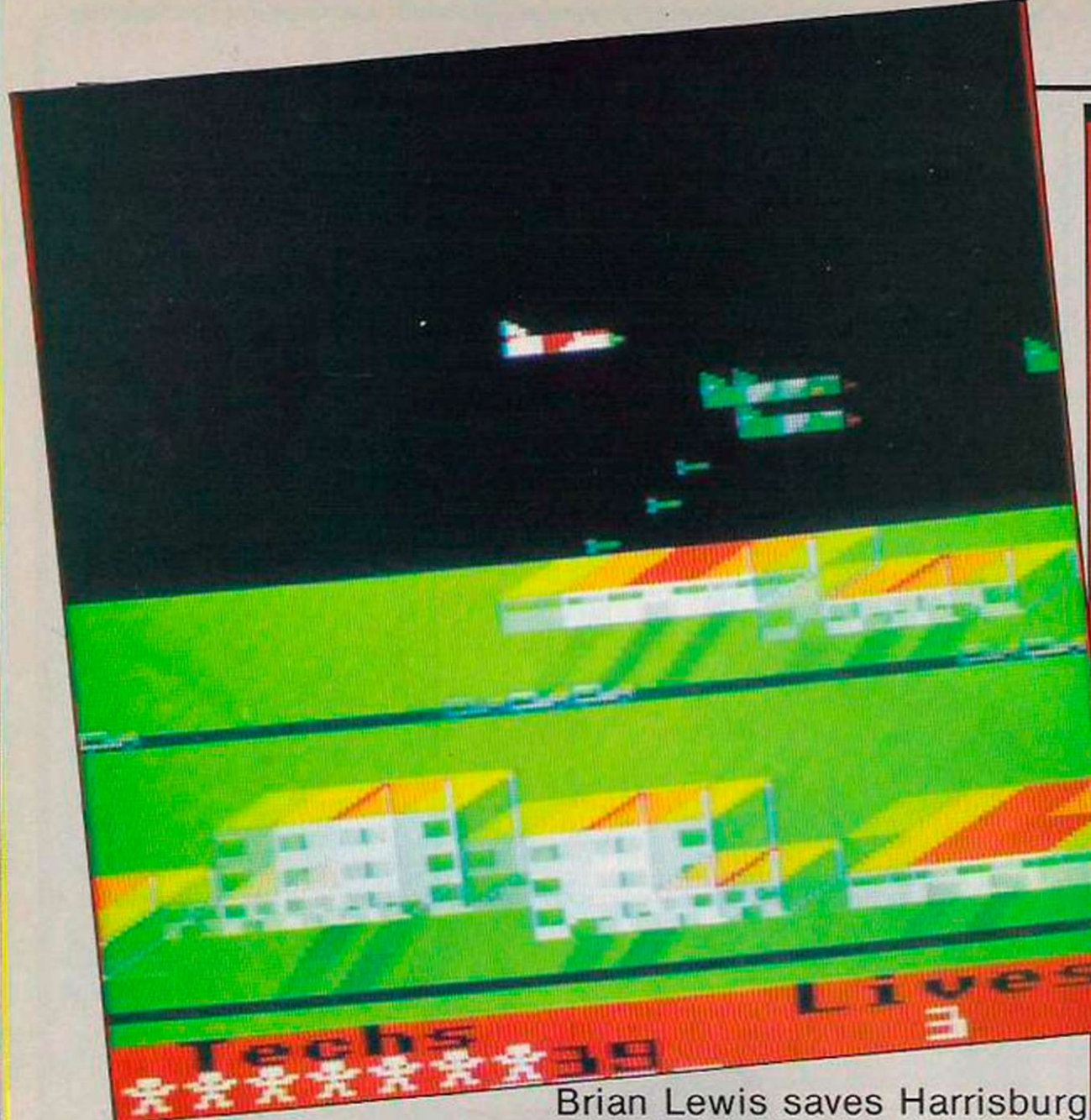
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0VDU23,150,28,28,107,62,8,28,20,54,23,151,36,90,16
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90.setup LDA#20:STA#70:LDA#6C:STA#71:LDA#10:STA#
72:LDA#6C:STA#73:LDA#10:STA#74:LDA#6D:STA#75:RTS
100.right JSRsetup
110LDX#0:.a LDY#0:.A LDA(&70),Y:STATEMP,Y:IN:CPY#16
:BNEA
120LDY#16:.b LDA(&70),Y:STA(&72),Y:IN:CPY#0:BNEb:
130LDY#0:.c LDATemp,Y:STA(&74),Y:IN:CPY#16:BNEc
140CLC:LDA#70:ADC#40:STA#70:LDA#71:ADC#1:STA#71
150CLC:LDA#72:ADC#40:STA#72:LDA#73:ADC#1:STA#73
160CLC:LDA#74:ADC#40:STA#74:LDA#75:ADC#1:STA#75
170INX:CPX#12:BNEa
180RTS
190.left JSRsetup
200LDX#0:.a1 LDY#0:.A1 LDA(&74),Y:STATEMP,Y:IN:CPY#
16:BNEA1

```

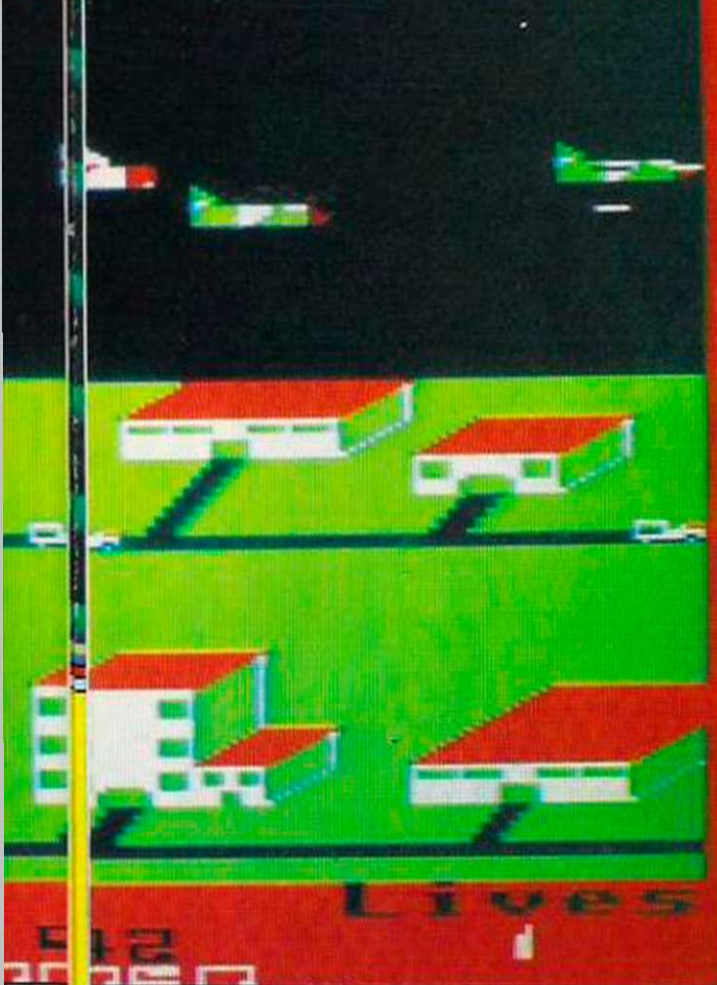
```

210LDY#&FF:.b1 LDA(&72),Y:STA(&70),Y:DEY:CPY#15:BNEb
1
220LDY#0:.c1 LDATemp,Y:STA(&70),Y:IN:CPY#16:BNEc1
230CLC:LDA#70:ADC#40:STA#70:LDA#71:ADC#1:STA#71
240CLC:LDA#72:ADC#40:STA#72:LDA#73:ADC#1:STA#73
250CLC:LDA#74:ADC#40:STA#74:LDA#75:ADC#1:STA#75
260INX:CPX#12:BNEa1
270RTS
280.scroll LDA#&FF:STA#970:CPX#1:BEQii:JMPleft:.ii J
MPright
290.I% JSRreset:LDA#58:STA#60:LDA#6B:STA#61:LDY#0:
.A LDA#0:STA#95A,Y:IN:CPY#6:BNEA:STA#96F:STA#992:STA#
994:LDA#15:STA#94F:LDA#for MOD256:STA#62:LDA#for DIV 2
56:STA#63:LDA#63:STA#80:LDA#95:STA#81:JSRamo
291SEC:LDA#C2:SBC#5:STA#C2:JSRscore:LDA#0:STA#76:LDA
#5:STA#77:LDA#0:STA#78:STA#79:STA#7A
300.start JSRprint
310LDX#0:JSRbomb:CPX#&FF:BNEpp6:JSRtech:CPX#&FF:BNEp
p6:JMPatom:.pp6 JSRenemy:LDA#993:CMP#3:BMikis:JSRMISIL
:.kis LDY#0
320.Aa1 LDA(&60),Y:EOR(&62),Y:BNEbB1:CMP#240:BEQB1:
CMP(&62),Y:BEQB1:IN:CPY#32:BNEAa1:JMPcC1:.bB1 STX#9F
:JMPdead:.cC1
330LDX#1:.k LDA#95A,X:AND#1:CMP#0:BEQjJS:TXA:PHA:JSR
move:PLA:TXA:.jJS INX:CPX#6:BNEk
340LDA#970:CMP#&FF:BEQ001:JSRdelay:.001 LDA#0:STA#97
0
350LDA#94F:CMP#1:BEQhJ:LDA#81:LDA#8E:LDY#&FF:JSR&F
FF4:CPY#&FF:BNEhJ:JSRrub:DEC#94F:SEC:LDA#60:SBC#40:ST
A#60:LDA#61:SBC#1:STA#61:.hJ
360LDA#94F:CMP#15:BEQhJ:LDA#81:LDA#8E:LDY#&FF:JSR&
FFF4:CPY#&FF:BNEhJ:JSRrub:INC#94F:CLC:LDA#60:ADC#40:S
TA#60:LDA#61:ADC#1:STA#61:.Hj
370LDA#81:LDA#8E:LDY#&FF:JSR&FFF4:CPY#&FF:BNEuI:JS
Rfire:.uI
380LDA#81:CMP#255:BEQtS
390LDA#81:LDA#8E:LDY#&FF:JSR&FFF4:CPY#&FF:BNEtS:JS
RRIGHT:.tS
400LDA#81:LDA#8E:LDY#&FF:JSR&FFF4:CPY#&FF:BNEtS:JS
RLEFT:.tS
410LDA#96F:BEQki:CLC:LDA#60:ADC#40:STA#4D:LDA#61:AD
C#1:STA#4E:LDY#0:LDA(&4D),Y:CMP#240:BEQki:JMPdead:.ki
420LDA#96F:CMP#4:BNEaa6:JSR1lef:.aa6 LDA#96F:CMP#2:B

```

JET

ASSAULT



THIS IS A scrolling game written for the Acorn Electron and BBC in which you have to defend Three Mile Island from the onslaught of enemy aircraft. To defend against the invaders you are armed with a Harrier Jump Jet which has the air-to-air missile capacity of 50. Once you have fired all your missiles, or if at any time you want to reload, you simply land your Harrier on a building similar to the one you started from.

Your actual fighting area is eight times larger than the screen. However enemy planes have a wrap-around capacity which allows them to keep flying while you have run out of air space. You lose a life if you crash into the horizon, crash into an enemy plane or get hit by one of their bombs. However, as you are defending Three Mile Island there is a greater danger than losing your three lives, the danger of a nuclear explosion. On the main screen display you will see the word "Techs" and beneath it a number of small figures, if the enemy planes drop a bomb on your fuel dump building you lose a technician; lose all your techs and the resulting nuclear blast destroys everything including your remaining three lives.

To further the difficulty of the task set for you the enemy has invented a new heat seeking missile which unlike their attack planes can travel faster than you. This missile only appears after you have killed three enemy

planes without losing a life.

This is one of the few scrolling games written for the Electron — the lack of scrolling games is mainly due to the large size of the screen memory. BBC users can get over this problem by using the 6845 chip — not present in the Electron — to control full screen scrolling via registers 12 and 13. To counter this problem I have used a screen window of exactly 32 bytes wide, which enables fast and easy handling of the screen display since when displaying the contents of the window the computer does not have an X position number larger than 255 thus enabling a simply loop involving only one of the computers registers.

Pleasing screen displays

There are two listings to type in, check, save and then run. The first program is the main machine-code program containing most of the graphics, sound definitions and all the machine-code routines while the second handles setting up the screen display, keeping the score, storing the high score table etc., although quite long, the program is well worth typing in as the finished product gives some pleasing screen displays and presents a very playable game. If BBC users wish to play Jump Jet Assault then they merely have to increase the contents of the x and y registers in line 460 of program 1 to a suitable value found through experiment.

```
NEbb6:JSRrrig:.bb6
430LDA&96F:BNEop:LDA&94F:CMPI15:BNEop:CLC:LDA&60:ADC
#&40:STA&4D:LDA&61:ADC#1:STA&4E:LDY#7:LDA(&4D),Y:CMPI
5:BEOp:JMPdead:.op
440JSRSEE:LDX#0:LDY#0:.Aa5 LDA&9A4,Y:BNEBb5:INX:.Bb5
INY:INY:INY:INY:INY:CPY&99C:BNEAa5:CPX&993:BNECc5:JSR
reset:INC&993:CLC:LDA&99C:ADC#5:STA&99C:CMPI25:BNECc5:
LDA#20:STA&99C:LDA#5:STA&993:.Cc5
441LDA&94F:CMPI15:BNEyU7:LDA&B1:CMPI#00:BEQyU7:SED:CL
C:LDA&B1:ADC#1:STA&B1:CLD:JSRamo:JSRRISE:.yU7
450JMPstart
460.delay LDX#100:.a LDY#100:.b DEY:BNEb:DEX:BNEa:RT
S
470.rub LDY#0:.c LDA#240:STA(&60),Y:INY:CPY#32:BNEc:
RTS
480.fire LDA&96F:BEQend:LDA&B1:BEQend:LDX#1:.yyS LDA
&95A,X:CMPI#0:BEQjS:INX:CPX#6:BNEyyS:RTS:.jS JSRSOU:SED
:SEC:LDA&B1:SBC#1:STA&B1:CLD:JSRamo
490LDA&95A,X:ORA#1:ORA&96F:STA&95A,X:LDA#0:STA&960,X
500LDA&96F:CMPI4:BEQLEF:CLC:LDA&60:ADC#32:STA&950,X
:STA&4D:LDA&61:ADC#0:STA&955,X:STA&4E:JMPbulPRI:.LLEF
SEC:LDA&60:SBC#8:STA&950,X:STA&4D:LDA&61:SBC#0:STA&955
,X:STA&4E:JMPbulPRI:.end RTS
510.move LDA&950,X:STA&4D:LDA&955,X:STA&4E:JSRBULrub
:INC&960,X:LDA&960,X:CMPI7:BPLEND
520LDA&95A,X:AND#2:CMPI2:BEQRRIG:SEC:LDA&950,X:SBC#1
6:STA&950,X:STA&4D:LDA&955,X:SBC#0:STA&955,X:STA&4E:JM
PbulPRI:.end LDA#0:STA&95A,X:RTS
530.RRIG CLC:LDA&950,X:ADC#16:STA&950,X:STA&4D:LDA&9
55,X:ADC#0:STA&955,X:STA&4E:JMPbulPRI
540.bulPRI LDA#255:.kI LDY#5:STA(&4D),Y:RTS
550.BULrub LDA#240:JMPkI
560.print LDY#0:.B LDA(&62),Y:STA(&60),Y:INY:CPY#32:
BNEb:RTS
570.LEFT LDA&62:CMPI#J% MOD256:BEQone:LDA&62:CMPI#for
MOD256:BEQtwo:RTS
580JMPscroll
590.one INC&994:LDA&994:CMPI1:BNEcc6:LDA#0:STA&96F:S
TA&994:LDA#for MOD256:STA&62:LDA#for DIV256:STA&63:.cc
6 RTS
600.two LDA#lef MOD256:STA&62:LDA#lef DIV256:STA&63:
LDA#4:STA&96F:RTS
610.1lef LDX#0:JSRprint:DEC&80:DEC&80:DEC&81:DEC&81:
```

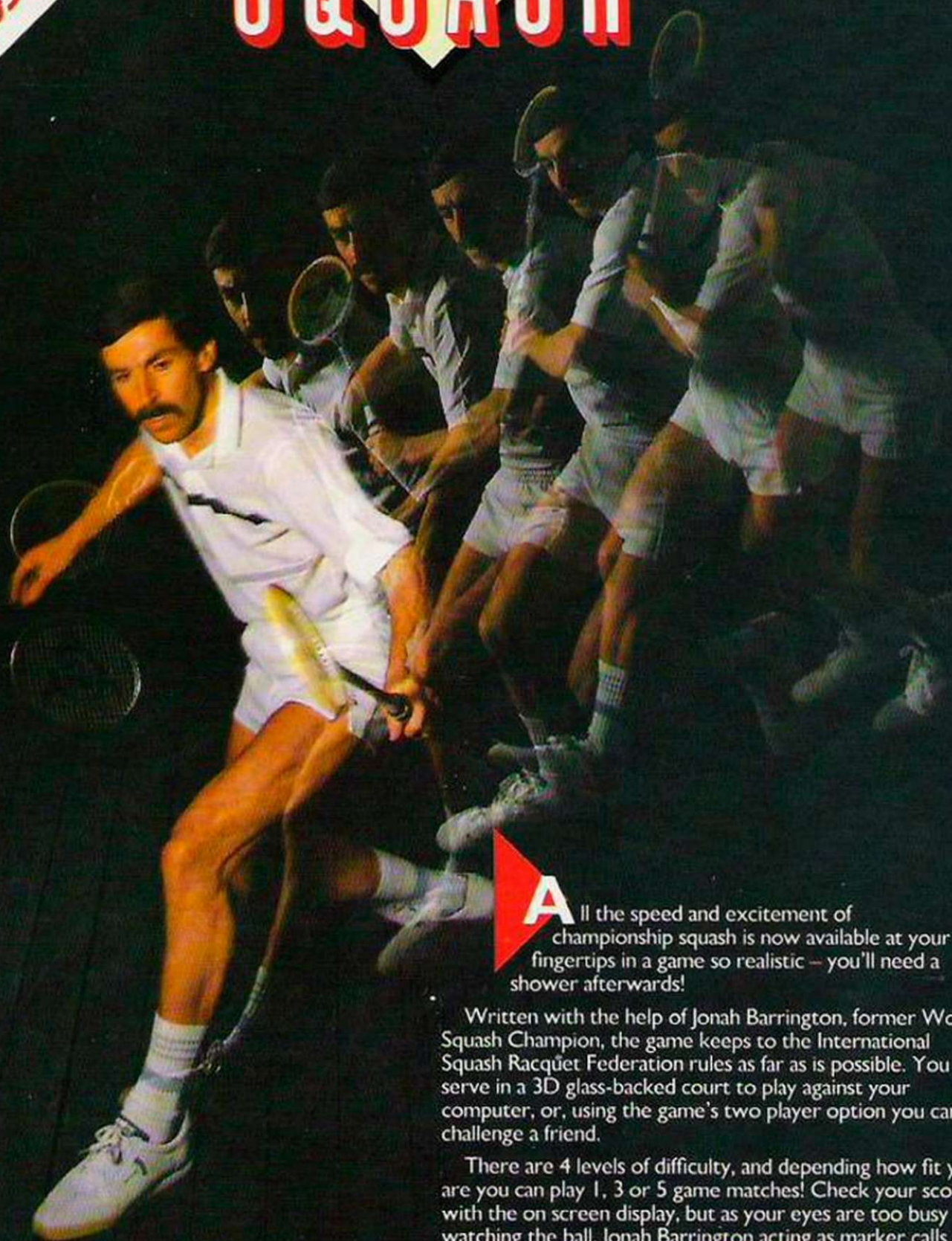
```
JSRcustom:LDA&78:BEQjka:JSRcuuss:.jka JMPscroll
620.RIGHT LDA&62:CMPI#lef MOD256:BEQone:LDA&62:CMPI#fo
r MOD256:BEQtwo:RTS
630.rrig LDX#1:JSRprint:INC&80:INC&81:INC&992:LDA&99
2:CMPI3:BNEnn:INC&81:INC&80:LDA#0:STA&992:.nn JMPscrol
1
640.TWO LDA#J% MOD256:STA&62:LDA#J% DIV256:STA&63:LD
A#2:STA&96F:RTS
650.ENEPRIT
660JSRfind:JSRplaneRUB:INC&82:JSRmove2:JSRfind
670JMPplanp
680.ENE LDA#&FF:STA&971:JSRin:CPX#0:BEQNDDE:JMPENEPR
IT:.NDEE LDA#0:STA&971:LDX#82:DEX:CPX#80:BNEjj:JSRfind
:JSRplaneRUB:.jj LDA&972:BNEmo:LDY#82:CPY#81:BEQloo:IN
Y:CPY#81:BEQloo
690INY:CPY#81:BEQloo:INY:CPY#81:BEQloo:.mo INC&82:LD
A#0:STA&972:RTS
700.loo LDA#&FF:STA&972:RTS
710.planp LDA&78:CMPI#&FF:BEQauu:LDY#0:.ua LDA(&4D),Y
:CMPI15:BEQdne:LDAEP,Y:STA(&4D),Y:INY:CPY#32:BNEua:.dn
e RTS:.au LDY#0:.uai LDA(&4D),Y:CMPI15:BEQdne:LDAmis,
Y:STA(&4D),Y:INY:CPY#32:BNEuai:RTS
720.find LDA#&20:STA&4D:LDA#&58:STA&4E:SEC:LDA&82:SB
C#80:TAX:LDY#0:.FG CPX#0:BEQHHS:CLC:LDA&4D:ADC#8:STA&4
D:LDA&4E:ADC#0:STA&4E:DEX:JMPFG:.HHS LDX#83:LDY#0:.gf
CPX#0:BEQHHS:CLC:LDA&4D:ADC#&40:STA&4D:LDA&4E:ADC#1:ST
A&4E:DEX:JMPgf:.hHS RTS
730LDA&9B4:STA&82:LDA&9B5:STA&83:JSRin:CPX#&FF:BNEkk
4:DEC&82:DEC&82:JSRfind:JSRBOMrub:.INC&82:INC&82:JSRfi
nd:JMPBOMpri:.Kk4 RTS
740.planeRUB LDA&78:CMPI#&FF:BNEiqw:SEC:LDA&4D:SBC#24
:STA&4D:LDA&4E:SBC#0:STA&4E:.iqw LDY#0:.UA LDA(&4D),Y:
CMPI15:BEQ01:LDA#240:STA(&4D),Y:.01 INY:CPY#72:BNEUA:L
DA&78:CMPI#&FF:BNEjo
741CLC:LDA&4D:ADC#24:STA&4D:LDA&4E:ADC#0:STA&4E:.jo
RTS
750.move2 LDA&78:CMPI#&FF:BEQmnu:LDA&82:CLC:ADC#16:CM
P#80:BMIf6:LDX#&FF:.ff6 LDA&85:CMPI4:BEQup:INC&83:CPX
#&FF:BNEhh6:LDA&83:CMPI94F:BNEhh6:DEC&83:.hh6 LDA&83:C
MPI12:BEQrev:RTS:.up DEC&83:CPX#&FF:BNEjj6:LDA&83:CMPI
94F:BNEjj6:INC&83
751.jj6 LDA&83:CMPI6:BEQrev:RTS
```

(continued on page 55)

·JONAH·
·BARRINGTON'S·

SQUASH

FEATURING
Reprosound



All the speed and excitement of championship squash is now available at your fingertips in a game so realistic – you'll need a shower afterwards!

Written with the help of Jonah Barrington, former World Squash Champion, the game keeps to the International Squash Racquet Federation rules as far as is possible. You serve in a 3D glass-backed court to play against your computer, or, using the game's two player option you can challenge a friend.

There are 4 levels of difficulty, and depending how fit you are you can play 1, 3 or 5 game matches! Check your score with the on screen display, but as your eyes are too busy watching the ball, Jonah Barrington acting as marker calls out the score for you. All this is due to a programming breakthrough that enables your computer to accurately reproduce the human voice without any hardware add-ons!

The game also incorporates a User Defined Joystick/Keys option which means that you can set your keyboard to suit you, or play with just about any make of joystick.

So get in training for this high-powered action game now.

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(continued from page 53)

```

760.rev LDA#85:EOR#12:STA#85:RTS
761.mnu LDA#7A:EOR#1:STA#7A:LDA#7A:CMF#0:BEQsik:LDA#
83:CMF#94F:BMIPu:DEC#83:RTS: pu INC#83: .sik RTS
780.SOU PHA:TYA:PHA:TXA:PHA:LDA#7:LDX#sou MOD256:LDY
#sou DIV256:JSR#FFF1:PLA:TAX:PLA:TAY:PLA:RTS
790.dead LDA#10:STAsou:LDA#2:STAsou+4:STAsou+6:JSRS
DU:LDA#11:STAsou:LDA#255:STAsou+4:LDA#5:STAsou+6:JSRM
ISIL
800LDA#94F:CMF#15:BEQD1:LDA#96F:CMF#2:BNEE1:JSRrrr
g:.eE1 LDA#96F:CMF#4:BNE116:JSR11ef:.116 JSRrub:CLC:LD
A#60:ADC#40:STA#60:LDA#61:ADC#1:STA#61:INC#94F:JSRpri
nt:JSRdelay:JMPdead:.dD1 RTS
810.custom LDY#0:.bb4 LDA#9A4,Y:BEQbb4:LDA#9A0,Y:STA
&82:LDA#9A1,Y:STA#83:TYA:PHA:JSRin:CPX#0:BEQAn:JSRCUST
DM:.An PLA:TAY:LDA#82:STA#9A0,Y:LDA#83:STA#9A1,Y:.bb4
INY:INY:INY:INY:INY:CPY#99C:BNEbb4
820LDA#9B4:STA#82:LDA#9B5:STA#83:DEC#82:DEC#82:JSRin
:CPX#FF:BNE114:JSRfind:JSRBOMrub:INC#82:INC#82:JSRfin
d:JMPBOMpri:.L14 RTS
830.in LDX#80:INX:CPX#82:BPLnde:LDX#81:INX:CPX#82:BM
Inde:LDX#FF:RTS:.nde LDX#0:RTS
840.enemy LDY#0:.Aa4 LDA#9A4,Y:BEQaa4:LDA#9A0,Y:STA#
82:LDA#9A1,Y:STA#83:LDA#9A2,Y:STA#85:LDA#9A3,Y:STA#972
:TYA:PHA:JSRENE:PLA:TAY:LDA#82:STA#9A0,Y:LDA#83:STA#9A
1,Y:LDA#85:STA#9A2,Y:LDA#972:STA#9A3,Y:.aa4 INY:INY:IN
Y:INY:CPY#99C:BNEAa4
850RTS
860.CUSTOM DEC#82:DEC#82:JSRfind:JSRplaneRUB:INC#82:
INC#82:JSRfind:JMPp1anp
870.reset LDA#0:STA#9A0:STA#9A3:STA#9A8:STA#9AD:STA#
9B2:LDA#13:STA#9A1:LDA#4:STA#9A2:LDA#10:STA#9A5:LDA#8:
STA#9A6:LDA#8:STA#9A7:LDA#1:STA#9A4:STA#9A9:STA#9AE:ST
A#9B3:LDA#15:STA#9AA:LDA#6:STA#9AB:LDA#8:STA#9AC
880LDA#20:STA#9AF:LDA#2:STA#9B0:LDA#8:STA#9B1:LDA#1:
STA#9B4:LDA#14:STA#9B5:LDA#0:STA#9B6:RTS
890.SEE LDY#0:.Cc4 LDA#9A4,Y:BEQcc4:LDA#9A0,Y:STA#82
:LDA#9A1,Y:STA#83:STY#7F:TYA:PHA:JSRsee:PLA:TAY:.cc4 I
NY:INY:INY:INY:CPY#99C:BNECc4:RTS
900.see JSRin:CPX#FF:BNEdd4:JSRfind:LDY#0:.Ee4 LDA(
&4D),Y:CMF#FF:BEQhit:INY:CPY#32:BNEE4:.Dd4 RTS:.hit
LDA#0:LDY#7F:STA#9A4,Y:JSRdive:JMPscore
910.bomb LDA#9B4:STA#82:LDA#9B5:STA#83:JSRin:CPX#FF
:BNEGq4:JSRfind:JSRBOMrub:LDA#83:CMF#15:BEQHh4:INC#83:
JSRfind:JSRBOMpri:LDA#82:STA#9B4:LDA#83:STA#9B5:.Jj4 R
TS:.Gg4 LDX#82:CPX#80:BEQnn6:LDX#82:DEX:CPX#80:BNEnn6
:.nn6 JSRfind:JSRBOMrub
911.nn6 LDA#9B5:CMF#15:BEQHh4:INC#9B5:RTS
920.Hh4 INC#83:JSRin:CPX#FF:BNEo6:JSRfind:LDY#5:LDA
(&4D),Y:BEQo6:LDX#FF:STX#9F:LDY#0:JMPdd6:.o6 LDY#0:ST
Y#9F:.dd6 LDA#9A4,Y:BNEee6:INY:INY:INY:INY:CPY#99C
:BNEdd6:.ee6 LDA#9A0,Y:TAX:INX:INX:STX#9B4:LDA#9A1,Y:T

```

```

AX:INX:STX#9B5:LDX#9F:RTS
930.BDMrub LDY#0:.dd4 LDA(&4D),Y:CMF#15:BEQee4:LDA#2
40:STA(&4D),Y:.ee4 INY:CPY#32:BNEdd4:RTS:.BOMpri LDY#4
:LDA(&4D),Y:CMF#15:BEQii4:LDA#248:STA(&4D),Y:INY:LDA#0
:STA(&4D),Y:INY:LDA#248:STA(&4D),Y:.Ii4 RTS
940.dive JSRfind:JSRPLAR:LDA#83:CMF#15:BEQn4:INC#83
:INC#82:JSRfind:JSRplanp:JSRdelay:JSRPLAP:JSRdelay:JMP
dive:.Nn4 LDA#9B4:STA#82:LDA#9B5:STA#83:JSRin:CPX#FF:
BNEkk6:JSRfind:JSRBOMrub:.kk6 RTS
950.FLAR LDY#0:.Oo4 LDA(&4D),Y:CMF#15:BEQpp4:LDA#240
:STA(&4D),Y:INY:CPY#48:BNEOo4:.Pp4 RTS:.PLAP LDY#0:.Oq
4 LDA(&4D),Y:CMF#15:BEQpp4:LDA#240:STA(&4D),Y:INY:CPY#
32:BNEQq4:RTS
951.atom LDA#17:JSR#FFEE:LDA#1:JSR#FFEE:LDA#7:LDX#ra
d MOD256:LDY#rad DIV256:JSR#FFF1:LDA#28:JSR#FFEE:LDA#2
:JSR#FFEE:LDA#15:JSR#FFEE:LDA#17:JSR#FFEE:LDA#1:JSR#FF
EE:LDA#17:JSR#FFEE:LDA#131:JSR#FFEE:LDA#12:JSR#FFEE
952LDX#6:LDY#5:JSRpmus:LDX#4:LDY#9:JSRpmus:LDX#3:LDY
#11:JSRpmus:LDX#3:LDY#11:JSRpmus:LDX#4:LDY#9:JSRpmus:L
DX#6:LDY#5:JSRpmus
953LDA#8:STA#9F:.We7 LDX#7:LDY#3:JSRpmus:DEC#9F:LDA#
9F:BNEW7:LDA#22:JMP#FFEE:RTS
954.tech LDA#17:JSR#FFEE:LDA#129:JSR#FFEE:LDA#31:JSR
#FFEE:LDX#B0:INX:INX:TXA:JSR#FFEE:LDA#30:JSR#FFEE:LDA#
32:JSR#FFEE:JSRamo:DEC#B0:LDA#B0:CMF#FF:BNEE7:LDA#8:F
F:RTS:.Er7 LDX#0:RTS
955.RX LDA#31:STA#9F:.Rt7 JSRleft:DEC#9F:LDA#9F:BNER
t7:LDA#32:STA#9F:.As7 JSRright:DEC#9F:LDA#9F:BNEAs7:RT
S
956.amo LDA#17:JSR#FFEE:LDA#2:JSR#FFEE:LDA#31:JSR#FF
EE:LDA#9:JSR#FFEE:LDA#30:JSR#FFEE:CLC:LDA#B1:LSRA:LSRA
:LSRA:LSRA:CLC:ADC#128:JSR#FFEE:LDA#B1:AND#15:CLC:ADC#
128:JMP#FFEE
957.score CLC:LDA#C2:ADC#5:STA#C2:CMF#10:BNEshow:LDA
#0:STA#C2:INC#C1:LDA#C1:CMF#10:BNEshow:LDA#0:STA#C1:IN
C#C0
958.show LDA#17:JSR#FFEE:LDA#3:JSR#FFEE:LDA#31:JSR#F
FEE:LDA#8:JSR#FFEE:LDA#31:JSR#FFEE:LDY#0:.uI7 CLC:LDA#
C0,Y:ADC#128:JSR#FFEE:INY:CPY#4:BNEuI7:RTS
959.pmus LDA#31:JSR#FFEE:TXA:JSR#FFEE:LDA#14:JSR#FFEE
:LDA#151:.Qw7 JSR#FFEE:DEY:BNEQw7:JSRdelay:LDA#10:JMP
#FFEE
960.RISE LDA#7:LDX#Wh MOD256:LDY#Wh DIV256:JSR#FFF1:
LDA#B1:STASu1+4:LDA#7:LDX#Su1 MOD256:LDY#Su1 DIV256:JM
P#FFF1
961.MISIL LDA#FF:STA#7B:LDA#76:STA#82:LDA#77:STA#83
:LDA#79:STA#972:JSRENE:LDA#82:STA#76:LDA#83:STA#77:LDA
&972:STA#79:LDA#0:STA#7B:INC#76:RTS
962.cuus LDA#FF:STA#7B:LDA#76:STA#82:LDA#77:STA#83
:JSRin:CPX#FF:BNEgtf:JSRfind:JSRCUSTOM:LDA#82:STA#76:
LDA#83:STA#77:.gtf LDA#0:STA#7B:RTS
969J:NEXT
970?&906=13:CHAIN"

```

```

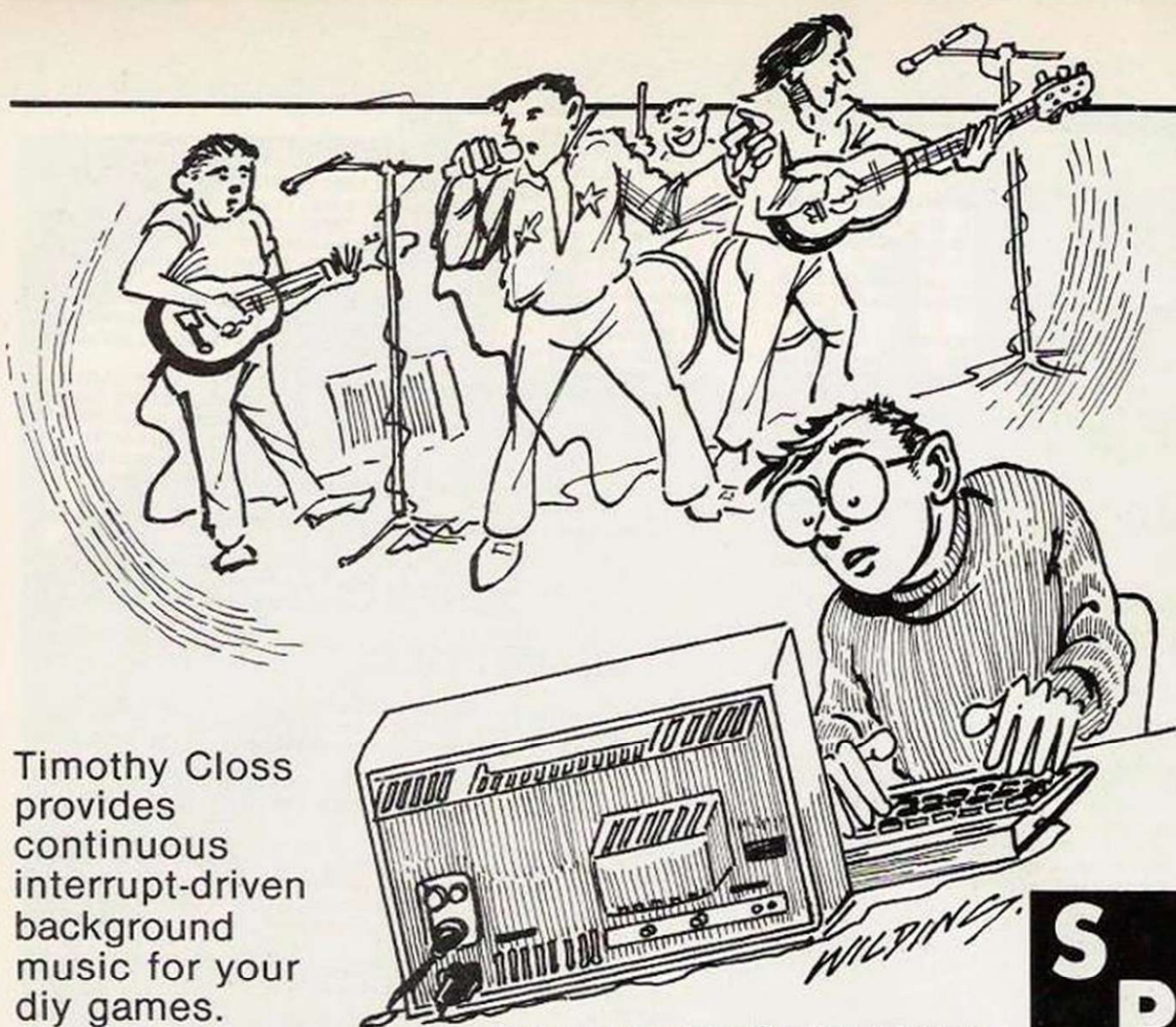
8#FX13.5
9VDU23,141,255,255,255,0,0,0,0
10#FX4.1
20GOSUB2000
30ENVLOPE1,1,-1,-12,1,1,20,10,126,0,0,-126,126,126
40DIMAS(4),HS(5),b10 4:FOR=1TOS:HS(T)="vin
ce....."HS(T)=150:NEXT
41#MDEE:VDU23:0202:0:0:19,0,2:0:19,2,0:0:7600-7:
FORT#0T5:17600-0:NEXT:76992-1:7699C-5:1ives=3:COLUR1
30:CLS:GOSUB2000:COLUR129:CLS:REPEAT
50VDU23,131,0,0,112,112,112,0,0,23,132,0,0,14,1
4,14,14,0
60VDU23,133,0,112,112,112,112,7,7,23,134,0,14,14
14,200,224,224,224
70VDU23,135,0,102,102,102,0,24,24,24
80VDU23,136,1,3,7,15,31,63,127,255
90VDU23,137,255,254,252,240,240,224,192,120
100VDU23,138,1,2,4,0,16,32,64,120,23,139,1,1,1,1,1
1,1,23,140,0,1,1,1,1,1,1,1
120VDU23,142,0,0,0,240,140,159,253,66
130VDU23,143,0,0,0,0,3,0,0,0,23,152,198,133,197,133,
190,56,40,40,23,153,190,132,135,5,07,00,00,112
150VDU20,2,15,17,1,17,130,12,26,20,2,20,17,16,17,120
12,24
160VDU23,120,0,123,123,0,0,0,0,23,129,0,195,195,0,
60,60,60,60,23,130,0,222,222,0,0,0,0,0
170COLOUR0:COLUR131:VDU31,0,17,120,129,130
180VDU31,12,26,120,129,130
190VDU31,12,16,133,134
200VDU31,3,23,131,132,31,3,24,131,132,31,3,25,133,13
4
210VDU31,7,24,131,132,31,7,25,131,132,31,7,26,133,13
4
220VDU31,2,25,135,31,9,26,135
230COLUR129:VDU31,9,16,32,32
240VDU31,17,17,32
250VDU31,4,22,32
260VDU31,0,23,32
270VDU31,14,24,32,32,31,15,25,32,32
280COLUR120:COLUR1:VDU31,0,16,136,31,11,16,137
290VDU31,12,17,136,31,14,17,137
300VDU31,3,22,136,31,5,22,137
310VDU31,7,23,136,31,9,23,137
320VDU31,13,24,136,31,12,23,136
330VDU31,16,24,137,31,15,23,137
340VDU31,2,24,136,31,9,25,136,137
350COLUR5:VDU31,11,17,138
360VDU31,14,10,138
370VDU31,5,25,138,31,5,24,139,31,5,23,139
380VDU31,10,26,138
390VDU31,15,26,138,31,16,25,138
400VDU31,9,24,139
410COLUR2:PRINTAB(2,20):STRING$(16,CHR$(41)):TAB(2,
20):STRING$(16,CHR$(14)):
420VDU5,10,0,3:MOVE704,511:VDU140
430MOVE896,479:VDU140
440MOVE320,319:VDU140
450MOVE576,287:VDU140
460MOVE640,223:VDU140
470MOVE1024,254:VDU140
480GCCL0,3:MOVE440,403:VDU142:GCCL0,1:MOVE440,403:VD
U143
490GCCL0,3:MOVE960,403:VDU142:GCCL0,1:MOVE960,403:VD
U143
500VDU4
510GCCL0,2:XX=596:FORTX=447T035 STEP-4
520MOVEXX,TX:DRAWXX+16,TX:XX=XX-4:NEXT
530XX=816:FORTX=415T035 STEP-4
540MOVEXX,TX:DRAWXX+24,TX:XX=XX-4:NEXT
550XX=240:FORTX=191T0127 STEP-4
560MOVEXX,TX:DRAWXX+24,TX:XX=XX-4:NEXT
570XX=500:FORTX=159T0127 STEP-4
580MOVEXX,TX:DRAWXX+24,TX:XX=XX-4:NEXT
590XX=852:FORTX=159T0127 STEP-4:MOVEXX,TX:DRAWXX+16,

```

```

TX:XX=XX-4:NEXT
591VDU23,120,0,254,130,130,134,134,134,134,254,23,129,0,
4,12,12,12,12,12
592VDU23,130,0,240,136,0,240,120,152,240,23,131,0,12
0,0,0,124,12,12,124
593VDU23,132,0,240,136,136,232,252,0,0,23,133,0,252,
100,120,252,12,140,252
594VDU23,134,0,240,136,120,240,136,152,240,23,135,0,
240,136,0,24,24,24,24
595VDU23,136,0,124,60,60,254,190,190,254,23,137,0,25
2,196,196,252,4,132,252
600VDU19,2,0:0:IF 1ives>3 THEN 61:ELSE:COLUR130:
COLUR1:PRINTAB(2,10):"Jump Jet Assault":CALLR0:FORT=
0T0100:NEXT:PRINTAB(2,10):SPC16
610VDU4,17,3,17,120,30
630ENVLOPE3,1,-1,-2,3,1,2,100,0,0,0,0,0
6407681=64:AS=CHR$(1ives+120)
650COLUR129:PRINTAB(2,30):STRING$(7600,CHR$(150)):TA
B(15,30):AS:COLUR2:PRINTAB(3,29):"Techs"TAB(15,29):"
1ives"CALLTX:1ives=1ives-1:UNTIL 1ives=0 OR 7680=255
660AS="":FORT#0T5:AS=AS+STR$(7600):NEXT:SC=VALAS
670#FX15.5
680IF 7680<255 THEN 770
690VDU19,3,0:0:19,1,0:0:
700#FX9.2
710#FX10.2
720FORT#0T50: SOUND1,4,(T MOD255),1:NEXT:SOUND0,-15,
4,5:COLUR131:CLS:FORT#0T90:NEXT:COLUR130:CLS:VDU19,
3,7:0:19,1,1:0:
730AS(0)="Status Report":AX=RND(6):AF(1)="Dead...."
STR#AZ="000,000":AX=RND(4):AS(2)="Wounded...."STR#AX=
"00,000":AF(3)="Cause....Melt Down":AF(4)="Island ...
DESTROYED"
740CL#0:FORT#0T4:LX=LENAS(T):X=(20-LX)/2:XX=XX-1:
FORTX=COLENAS(T):COLUR130:COLURcol:PRINTAB(XX+TX,
3+(T+3)):MID$(AS(T),TX,1):COLURcol+120:VDU32:SOUND#1
1,2,1:FORT#0T90:NEXT:COLUR130:VDU0,32:col=col+1:1
F,col=2,col=3
750PROCclick:NEXT
760COLUR1:PRINTAB(2,4):STRING$(15,CHR$(14)):FORD=0
TOS000:NEXT
770VDU19,3,7:0:
780#FX15.5
790COLUR130:CLS:PROCHigh:GOTO41
800COLUR3:PRINTAB(0,29):"PRESS THE SPACE BAR"
810AS=STRING$(20,"")+"Play,Jump Jet Assault.....
.....11.you.gave.....only.the.fastest.s
urvive.in.a.gam.of.courage.and.stamina.....JU
MP JET ASSAULT".a.gam.for.the.nuclear.age...where.a.m
stake.could.destroy.millions."
820COLUR1:PRINTAB(2,3):"JUMP JET ASSAULT":COLUR0:
PRINTAB(1,4):STRING$(10,CHR$(14)):
830COLUR3:PRINT""a gam of skill and determin
ation":COLUR1:PRINTAB(1,20):"WRITTEN BY B LEWIS"
840#FX15.6
850COLUR1
860TX=1
870PRINTTAB(0,15):MID$(AS,TX,20):
880IS=INKEY$(7):IF IS="" THEN 900
890TX=TX+1:IF TX=LENAS TX=1:GOTO 870 ELSE GOTO870
900#FX21.5
910FORT#0T100:NEXT:FORTX=1TOS:SOUND1,1,TX*51,2:NEXT
:RETURN
920DEFPROCHighIT=1
930IF SC=HS(T) THEN 960
940T=1:IF T<36 THEN 930
950GOTO1000
960IF T=5 THEN 980
970FORDX=STOT STEP-1:HS(GX)=HS(GX-1):HS#(GX)=HS#(GX-
1):NEXT
980HS(T)=SC:PROCname:HS(T)=AS
990AS=15-LENAS(T):HS#(T)=HS#(T)+STRING$(A,""):CLS
1000COLUR3:PRINTAB(1,3):STRING$(10,CHR$(14)):COLUR
1:PRINTAB(2,2)"High Score Table"
1010FORTX=1TOS:IF HS(TX)<950 THEN X=1 ELSE X=0

```



Timothy Closs provides continuous interrupt-driven background music for your diy games.

HOW MANY times have you wished you could boost your games programs with some background music as in Manic Miner, Automania and Gilligan's Gold? Well, now your wish has been granted with Backboogie!

Backboogie will repeatedly play a piece of music, short or long, without interfering with the running of your own programs!

The program itself is 100 per cent machine-code and uses the Spectrum's interrupt system to run it. As a lengthy discussion about the system is not needed here, I will just say that the Spectrum can be made to run a machine-code program stored at a certain memory address every 1/50th second — this process is known as an "interrupt".

The Basic program in listing 1 helps you

compose your pieces of music and also stores some necessary data in the memory.

Let me explain how the program works. The music you compose is stored as a series of numbers, each representing one note, i.e.:

- 0 for C
- 1 for C#
- 2 for D, etc.

The Spectrum's own program for converting these numbers into values the Sound Generation Rom Routine can accept is too slow, so I have developed a faster routine using the data stored by the Basic program.

Having calculated these values, Backboogie calls the Sound Generation Rom Routine to produce a short musical sound before returning to your game.

S
P
E
C
T
R
U
M

B
A
C
K
B
O
O
G
I
E

Listing 1.

```

1 LOAD ""CODE
2 REM ***BACKBOOGIE***
3 REM *****BY*****
4 REM ****TIM*CLOSS***
5 CLS
10 GO SUB 1000
500 LET G=60672
505 RESTORE 2000: FOR H=1 TO 21
: READ K$: PRINT AT H,0;K$;AT H,30;K$: NEXT H
510 LET A=2: LET B=21
512 PRINT AT B,A; PAPER 0; " "
513 IF INKEY$="7" AND B>1 THEN LET B=B-1

```

(continued opposite)

(listing 1 continued)

```

515 IF INKEY$="6" AND B<21 THEN
PRINT AT B,A; PAPER 7;" ": LET
B=B+1
516 IF INKEY$="1" AND A>2 THEN
LET G=G-8: LET A=A-1
520 IF INKEY$="0" THEN GO TO 53
5
525 IF INKEY$="E" THEN GO TO 56
0
530 GO TO 512
535 FOR H=G TO G+7: POKE H,22-B
: NEXT H: LET G=G+8
540 LET A=A+1: IF A=30 THEN LET
H=USR 60148: LET A=29
545 FOR J=21 TO B STEP -1: PRIN
T AT J,A; PAPER 0;" ": NEXT J
550 GO TO 512
560 LET O=G-60672-2: POKE 60250
,INT (O/256): POKE 60267,O-((INT

```

```

(O/256))*256)
570 STOP
1000 RESTORE 3000
1010 FOR H=0 TO 20
1020 READ J: POKE 60416+H*4,O: P
OKE 60417+H*4,(J/96)
1030 LET K=437500/J-30.125: POKE
60418+H*4,INT (K/256): POKE 604
19+H*4,K-((INT (K/256))*256)
1040 NEXT H
1050 RETURN
2000 DATA "G#","G","F#","F","E",
"D#","D","C#","C","B","A#","A",
"G#","G","F#","F","E","D#","D","C
#", "C"
3000 DATA 261.63,277.18,293.66,3
11.13,329.63,349.23,369.99,392.4
15.3,440,466.16,493.88,523.25,55
4.36,587.32,622.24,659.24,698.44
,739.97,783.97,830.58,879.97

```

The game then continues running until, 1/50th second later, it is necessary to produce another musical sound of the same frequency as before. When a series of short sounds is heard in quick succession like this they give the impression of a continuous musical note.

The composer allows any note within a range from middle C up to 20 semitones above to be entered. Use keys 6 and 7 to move the bar up and down until it is level with the desired pitch. Pressing 0 will now enter the note and the bar will move across one column. You can delete a note by pressing 1 — the bar will move back one column. Continue entering your notes until you have finished your composition.

Pressing E will add final specifications to the machine-code routine and then cause you to escape from the Basic composer program.

Your music can now be saved, together with all the other necessary data and routines by typing:
 SAVE "BACKBOOGIE" CODE 60180,0 + 500
 and loaded by typing:
 LOAD "" CODE

To "switch on" your music during a program, include:
 POKE 65534, 0: POKE 65535, 237: POKE
 65532, 0: POKE 65533, 0
 RANDOMIZE USR 60180

To "switch off" your music, include:
 RANDOMIZE USR 60190

First, enter the composer program in listing 1 and save it by typing:

SAVE "COMPOSER" LINE 1

Now New the program and type in listing 2. Run the program and enter the code in listing 3, working from left to right and from type to



bottom. When you have finished, the code will automatically be saved as Boogie.

If you do not wish to type in all the programs and code yourself, send a blank cassette, SAE and £1 to me at: 5 Western Drive, Shepperton, Middlesex TW17 8HJ.

Listing 2.

```

10 DEF FN H(H$)=16*(CODE H$(1)
-48-(7 AND H$(1)>"9"))+CODE H$(2
)-48-(7 AND H$(2)>"9")
40 FOR N=60148 TO 60288 STEP 8
50 LET T=0
60 PRINT N;" ";
70 INPUT H$: PRINT H$;
80 FOR B=0 TO LEN H$-1 STEP 2
90 LET Z=FN H(H$): LET T=T+Z
100 POKE N+B/2,Z
110 LET H$=H$(3 TO )
120 NEXT B
130 PRINT " = ";: INPUT Y: PRIN
T Y
140 IF Y<>T THEN PRINT "INPUT E
RROR - TRY AGAIN": GO TO 50
150 NEXT N

```

Listing 3.

```

60148 : 2102581103580616 = 259
60156 : C5061C1A77231310 = 446
60164 : FA23232323131313 = 447
60172 : 13C110ECC9000000 = 665
60180 : ED5E3E30ED47C900 = 950
60188 : 0000ED56C9000000 = 524
60196 : 0000000000000000 = 0
60204 : 00000000E5D5C5F5 = 884
60212 : 2AFEFF7ECB27CB27 = 1161
60220 : E56F26000100ECED = 852
60228 : 4A56235E2346234E = 507
60236 : 6069CDB503E12322 = 884
60244 : FEFF2AFCFF3E00BC = 1308
60252 : 280C2322FCFFF1C1 = 1062
60260 : D1E1FBC338003E26 = 1036
60268 : BD380218ED210000 = 541
60276 : 22FCFF2100ED22FE = 1099
60284 : FF18E30000000000 = 506

```

THIS STARTED off as a seemingly simple editor. What I wanted was a means of preparing a data file which could be used by an assembler program to produce an interrupt driven tune. Once the code produced by the assembler had been installed, the tune would repeat itself until it was deactivated or the Break key pressed.

The problem with preparing a musical data file is that there needs to be a method of specifying the pitch and duration of the notes. Standard musical notation turned out to be the most sensible system to produce the file. Although this editor is based upon musical notation it is not presented as a music processor. It has a limited range of notes and, in particular, no capacity for a rest. It is, however, capable of producing simple tunes for accompanying games etc.

To make full use of the BBC's sound capacity it is not only necessary to manipulate the Sound command but also the Envelope command. Consequently, an envelope editor has been added to the system. Provision for a screen dump was included to allow the editor to produce sheet script.

What started out as a supposedly simple editor to produce a small data file became a fairly sophisticated project in its own right. The editor can cope with up to 200 notes over a one and a half octave range. The envelope can be modified over its full range; and will be saved with any data file produced.

Piano type envelope

To use the system enter listing 1, Intload and listing 2, Inttune. Running Intload will define the characters needed for the main program and produce a default piano type envelope. The characters are printed as a check and the second program loaded. For disc users the name of the second program will have to be defined, for tape users a blank Chain "" statement will load the next program on the tape.

When loaded the editor presents the user with a blank page. To define a note its pitch and duration have to be selected. The pitch of the note is controlled by the cursor's position on the staff. The cursor can be moved up and down the staff using the up and down arrow keys. The left and right arrow keys move the cursor backwards and forwards through the tune.

The duration of the note is indicated by the symbol in the lower right hand corner. The duration can be increased with the f0 key and decreased with the f1 key. A note is entered at the current cursor position by pressing Return. If the cursor is in the middle of a tune all succeeding notes will be shifted along to

In this, the first part of his article, Fintan Culwin details a BBC editor with a simple background music facility.

make space for the note being inserted.

If a note needs to be deleted, pressing the Delete key will remove the note from underneath the current cursor position and move back any succeeding notes. There is space on a page for 20 notes. Moving before or beyond this automatically takes you onto the next page. If this is too pedestrian then keys f5 and f6 will move backward and forward one page at a time. Pressing f2 will play all the current tunes using the current envelope.

After coming to terms with the musical setting the envelope editor can be invoked by pressing the f7 key. To understand the screen it is necessary to consult the User Guide. Page 245 identifies the effects of the 13 parameters and labels them. These labels are reproduced on the screen, alongside the current value of the parameter. The currently selected parameter is highlighted in inverse video.

A table of 13 numbers is almost impossible to comprehend. Above the table the settings of the parameters are indicated by 12 bargraphs split into four clusters. They are grouped as the PI parameters, the PN parameters, the AA,AS & AR parameters and the ALA and ALD parameters. A description of the effects of changing these parameters is given in the User Guide.

A practical appreciation can be obtained by experimentation. A parameter to be changed is highlighted using the left and right arrow keys. The value is changed within its limits using the up and down arrow keys. Pressing the Return key will sound the envelope; when you are satisfied pressing the Escape key will return to the music editor. The current envelope specification will be saved and recalled with any tune.

Pressing f8 causes a printer dump to be performed. In the configuration given page 10 of memory — &A00 to &AFF — is assumed to be available for use. This is acceptable for disc users, tape users will have to use page 14 — &D00 to &DFF. Examining listing 2 shows a dummy RTS code has been inserted.

If you want to use this facility then the Remmed *Load command will have to be activated, to load into memory your own screen dump code; and the dummy RTS command removed. This can be omitted if screen dumps are not required. When you are ready to leave



BBC

the system f9 will cause an orderly return to Basic.

The basis of the editor is a list of note codes held in memory. Each note requires two bytes to define its duration and pitch. These are held in memory in the reserved byte array labelled tune%, defined and initialised within PROC prepare. The only obscure parts of the preparation are the definition of an Oword area which will be used to obtain character definitions for the double height plotting routine.

Retrieved from memory

There is no legitimate method to obtain an envelope definition within the operating system. Consequently the envelope parameters have to be retrieved from memory into the envelope% array using Peeks.

The first part of the main listing, as far as PROC MAIN contains various procedures concerned with screen operations. The most transportable procedure is PROC bigchar, whose parameter identifies a character to be plotted on a screen in double height. Using this procedure mollifies the effect of being forced to work in 20 column mode.

Listing 1.

```

10 REM INT LOAD
20 REM EDITOR LOADER
30 REM FINTAN CULWIN
40 REM APRIL '85
90 MODE4
100VDU23,240,16,20,18,16,104,120,120,48
110VDU23,241,48,120,120,104,16,18,20,16
120VDU23,242,16,20,18,16,104,121,120,48
130VDU23,243,48,120,121,104,16,18,20,16
140VDU23,244,16,16,16,16,104,120,120,48
150VDU23,245,48,120,120,104,16,16,16,16
160VDU23,246,16,16,16,16,104,121,120,48
170VDU23,247,48,120,121,104,16,16,16,16
180VDU23,248,16,16,16,16,104,88,72,48
190VDU23,249,48,72,88,104,16,16,16,16
200VDU23,250,16,16,16,16,104,89,72,48
210VDU23,251,48,72,89,104,16,16,16,16
220VDU23,252,0,0,0,56,60,72,112,0
230VDU23,253,0,0,0,56,68,73,112,0
240ENVELOPE4,3,0,0,0,0,0,121,-10,-5,
-2,120,120
250FOR line= 1 TO 10
260 FOR char = 240 TO 253
270 VDU char,32
280 NEXT char
290 VDU 13,10,10
300NEXT line
310FOR pitch = 97 TO 177 STEP 8
320 SOUND 1,4,pitch,5
330NEXT pitch
340 PAGE=&1900
350 *K.10 PA.=&1900:MO.:M
360 CHAIN ""

```

BEEBSKI BEAT



The procedure works by obtaining a character definition with an `OSWORD` call. The definition obtained is used to redefine character 254 twice using the `VDU 23` command; and sent to the screen.

The main routine is fairly straightforward; the key presses are trapped and used to select a routine from the second part of the program.

When loading a tune from disc or tape there is an option to load from the start of memory overwriting the tune in memory or appended to the end of the tune in memory. The envelope editor `PROC-envel` and associated procedures are extractable and can be used alone to investigate the envelope command.

As the program is reasonably structured, the routines are well Remmed and the variable names are sensibly chosen implementation should be fairly easy. I have not tested it but it should transfer directly to the Electron.

As mentioned at the beginning this was conceived as a simple editor that would be used to produce a file for an assembler program. The editor has grown into a more sophisticated system than I envisaged; but it still performs its intended function.

Keep hold of your data files, next month's program will use them as input to a system which will install the tunes into the micro. Consequently, the tune will repeat itself indefinitely until switched off or the machine is reset. This has obvious if rather tedious applications.

Listing 2.

```

100MODES
140PROC_PREPARE
150PROC_PAGE
160PROC_CURSOR(count)
170REPEAT
180PROC_MAIN
190UNTILend
200PROC_FINISH
210END
1000DEFFPROC_PREPARE
1040dump%=&A00
1050?dump%=&60
1060DIMnote$(7,1),pitch(12),len
f(7),envel%(13),envel$(13),min(1
2),max(12)
1070FORnote=0TO7
1080note$(note,0)=CHR$(240+note
*2)
1090note$(note,1)=CHR$(241+note
*2)
1100NEXTnote
1110note$(7,0)=CHR$(253)
1120note$(7,1)=CHR$(253)
1130note$(6,1)=CHR$(252)
1140FORnum=1TO12:READpitch(num)
:NEXT
1150FORnum=0TO7:READlenf(num):N
EXT
1160*FX 4,2
1170*FX 225,240,0
1180*FX 229,1,0
1190VDU23,0,10,96,0;0;0;
1200VDU19,1,7;0;
1210VDU19,2,3;0;
1220VDU19,3,11;0;
1230DIMtune%400
1240FORN%=tune%TOtune%+400:?N%=
0:NEXTN%
1250m:tune=tune%:ptr=tune%:coun
t=1
1260cpage=0:level=6:note=3
1270end=FALSE
1280OSWORD=&FFF1:DIMosword%8
1290X%=osword%MOD256:Y%=osword%
DIV256:AZ=&A
1300*FX 4,1
1310temp=&BF0:FORpar=0TO13:enve
l%(par)=temp?par:NEXTpar
1320FORpar=0TO12:READmin(par):N
EXT
1330FORpar=0TO12:READmax(par):N
EXT
1340FORpar=0TO12:IFmin(par)<0TH
ENenvel%(par)=FN_comp(envel%(par
))
1350NEXTpar
1360FORpar=0TO12:READenvel$(par
):NEXT
1370VDU24,400;956;860;1023;18,0
,130,5,16,
1380VDU18,0,0:temp$="IN'TUNE":F
ORloop=1TOLEN(temp$)
1390PLOT4,352+loop*64,1016:PROC
bigchar(MID$(temp$,loop,1)):NEX
Tloop
1400ENDPROC
1500DEFFPROC_FINISH
1510CALL!-4
1520ENDPROC
1900DEFFPROC_PAGE
1910VDU24,0;0;1279;868;18,0,128
,16
1920PROC_DISP
1930PROC_note(note)
1940GCOLOR,1:PLOT4,8,36:PRINT"FA
GE ";
1950GCOLOR,2:PLOT4,320,36:PRINTS
TR$(cpage+1)
1960PROC_fill(cpage)
1970count=1
1980ENDPROC
2000DEFFFN_comp(byte)
2010IF(byteAND&80)<>&80THEN=byt
e
2020IFbyte=0THEN=0ELSE=(byte-25
6)
2100DEFFPROC_DISP
2110VDU24,0;256;1279;920;
2120PROC_STAVE(1):PROC_STAVE(2)
2130ENDPROC
2200DEFFPROC_STAVE(num)
2210SCOLOR,1
2220IFnum=1THENnum=816ELSEnum=4
96
2230FORoffset=0TO4
2240pos=num-32*offset
2250PLOT4,64,pos:PLOT1,996,0
2260NEXToffset
2270GCOLOR,2
2280ENDPROC
2300DEFFPROC_note(num)
2310VDU24,1200;0;1279;72;18,0,1
30,16,26,
2320VDU18,0,0,25,4,1208;64::PRO
C_big(num,0)
2330VDU18,0,2:ENDPROC
2400DEFFPROC_CURSOR(cpos)
2410IFcpos>10THENypos=416:cpos=
cpos-10ELSEypos=736
2420ypos=ypos+(level-6)*16
2430xpos=cpos*96+16
2440VDU24,xpos;ypos;xpos+32;yp
os+32;18,3,131,16,18,0,2,26
2450ENDPROC
2500DEFFPROC_fill(page)
2510tcount=count:tptr=ptr
2520offset=40*page+tune%
2530IF?offset=0THENENDPROC
2540disp=1::count=1
2550REPEAT
2560PROC_onenote(count,?offset,
offset?1)
2570offset=offset+2:count=count
+1
2580UNTILcount=210R?offset=0
2590ENDPROC
2600DEFFPROC_onenote(num,pitch,d
uration)
2610GCOLOR,2
2620IFnum>10THENy=480:num=num-1
0ELSEy=800
2630x=32+num*96
2640yoff=(pitch-6)*16
2650PLOT4,x,y+yoff
2660IFpitch>8THENdir=1ELSEdir=0
2670PROC_big(duration-1,dir)
2680ENDPROC
2700DEFFPROC_big(note,dir)
2710IFnote>7THENENDPROC
2720char$=note$(note,dir)
2730IFdir=1THENPLOT0,0,-32
2740PROC_bigchar(char$)
2750ENDPROC
2800DEFFPROC_bigchar(char$)
2810?osword%=ASC(char$):CALLOSW
ORD
2820VDU23,254
2830FORkount=1TO4
2840VDUosword%?kount,osword%?ko
unt
2850NEXTkount
2860VDU254,10,8
2870VDU23,254
2880FORkount=5TO8
2890VDUosword%?kount,osword%?ko
unt
2900NEXTkount
2910VDU254
2920ENDPROC
3000DEFFPROC_MAIN
3010*FX 21,0
3020resp=GET

```

(continued on next page)

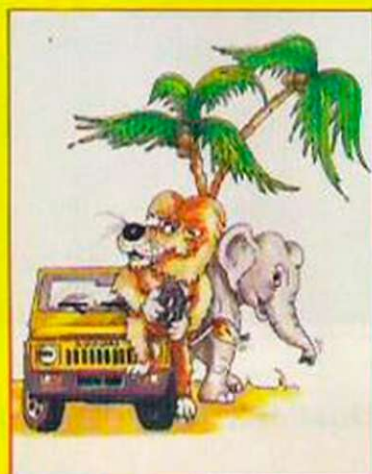
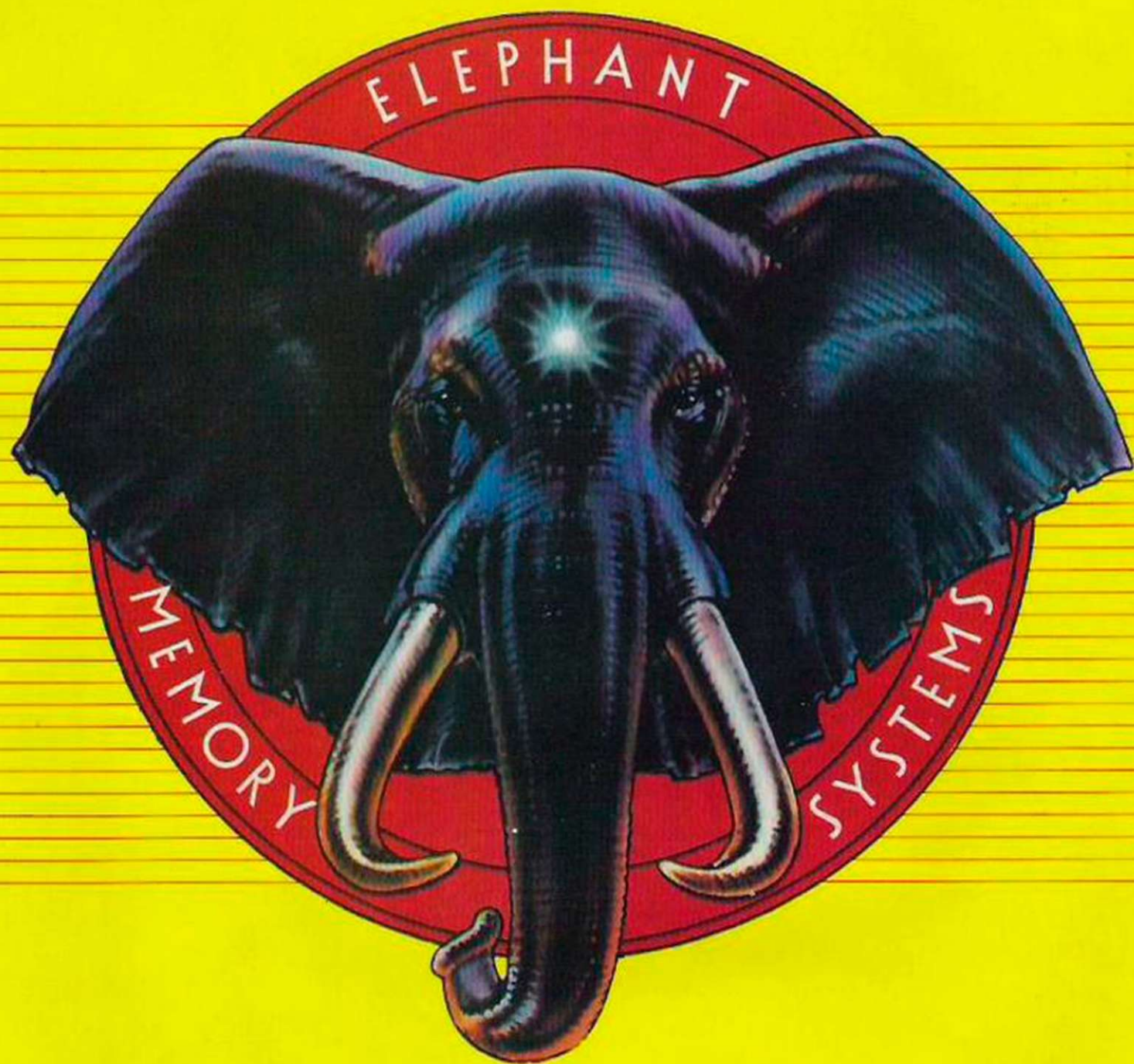
(continued from previous page)

```
3030IFresp=139THENPROC_UP(1)
3040IFresp=138THENPROC_UP(-1)
3050IFresp=240THENPROC_CHANGE(1)
)
3060IFresp=241THENPROC_CHANGE(-1)
)
3070IFresp=13THENPROC_enter
3080IFresp=137THENPROC_right(1)
3090IFresp=136THENPROC_right(-1)
)
3100IFresp=242THENPROC_play
3110IFresp=243THENPROC_save
3120IFresp=244THENPROC_load
3130IFresp=245THENPROC_mpage(-1)
)
3140IFresp=246THENPROC_mpage(1)
3150IFresp=247THENPROC_envel
3160IFresp=127THENPROC_del
3170IFresp=249THENPROC_quend
3180ENDPROC
3900DEFFPROC_quend
3910PROC_window
3920PRINT " End (Y/N) ? ":
3930REPEAT
3940quend=GETAND223
3950UNTILquend=78ORquend=89
3960IFquend=89THENend=TRUE
3970PROC_nowindow
3980ENDPROC
4100DEFFPROC_UP(dir)
4110IFlevel+dir>120Rlevel+dir<1
THENENDPROC
4120PROC_CURSOR(count)
4130level=level+dir
4140PROC_CURSOR(count)
4150ENDPROC
4200DEFFPROC_CHANGE(dir)
4210IFnote+dir>70Rnote+dir<0THE
NENDPROC
4220note=note+dir
4230PROC_note(note)
4240ENDPROC
4300DEFFPROC_enter
4310IFptr>mx:tuneORmx:tune=tune%+
400THENENDPROC
4320IFmx:tune=ptrTHENPROC_endELS
EPROC_mid
4330SOUND1,4,pitch(level),lenf(
note)
4340ENDPROC
4400DEFFPROC_end
4410?ptr=level:ptr?1=note+1
4420PROC_onenote(count,level,no
te+1)
4430PROC_right(1)
4440mx:tune=ptr
4450ENDPROC
4460DEFFPROC_mid
4470temp=mx:tune-2
4480REPEAT
4490?(temp+2)=?(temp):?(temp+3)
=? (temp+1)
4500temp=temp-2
4510UNTILtemp=ptr-2
4520?ptr=level:ptr?1=note+1
4530mx:tune=mx:tune+2
4540tcount=count:PROC_PAGE:count
t=tcount:PROC_CURSOR(count)
4550ENDPROC
4600DEFFPROC_right(rit)
4610IFptr=mx:tune+2ANDrit=1THENE
NDPROC
4620IFptr=tune%ANDrit=-1THENEND
PROC
4630PROC_CURSOR(count)
4640IFcount+rit<1ANDcpage>0cpag
e=cpage-1:PROC_PAGE:count=21
4650IFcount+rit>21ANDcpage<19cp
age=cpage+1:PROC_PAGE:count=1
4660count=count+rit
4670PROC_CURSOR(count)
4680ptr=ptr+rit*2
4690ENDPROC
4700DEFFPROC_play
4710temp=tune%
4720REPEAT
4730SOUND1,4,pitch(?temp),lenf
(?temp?1)-1)
4740temp=temp+2
4750UNTIL?temp=0
4760ENDPROC
```

```
4800DEFFPROC_del
4810IF?ptr=0THENENDPROC
4820FORtemp=ptrTOMx:tune+2STEP2
4830?temp=temp?2:temp?1=temp?3
4840NEXTtemp
4850mx:tune=mx:tune-2
4860PROC_CURSOR(count)
4870PROC_PAGE
4880count=tcount:ptr=ptr
4890PROC_CURSOR(count)
4900ENDPROC
5000DEFFPROC_save
5010IFtune%=mx:tuneTHENENDPROC
5020PROC_window
5030INPUT "Filename ",file#
5040IFLEN(file#)=0THENPROC_nowi
ndow:ENDPROC
5050channel=OPENOUTfile#
5060FORpar=0T012
5070BPUT#channel,envel%(par)
5080NEXTpar
5090FORloop=tune%TOMx:tune-2STEP
2
5100BPUT#channel,?loop
5110BPUT#channel,(loop?1)
5120NEXTloop
5130CLOSE#channel
5140PROC_nowindow
5150ENDPROC
5300DEFFPROC_load
5310over=FALSE
5320PROC_window
5330INPUT "Filename ",file#
5340IFLEN(file#)=0THENPROC_nowi
ndow:ENDPROC
5350IFmx:tune>tune%THENPROC_quer
y
5360IFover=FALSETHENloop=mx:tune
ELSEloop=tune%
5370channel=OPENUPfile#
5380FORpar=0T012
5390envel%(par)=BGET#channel
5400NEXTpar
5410REPEAT
5420?loop=BGET#channel
5430loop?1=BGET#channel
5440loop=loop+2
5450UNTILEOF#channelORloop=tune
%+400
5460IFloop<tune%+400THEN!loop=0
5470mx:tune=loop
5480PROC_nowindow
5490PROC_PAGE:count=tcount:PROC
_CURSOR(count)
5495ENVELOPE4,envel%(0),envel%(
1),envel%(2),envel%(3),envel%(4)
,envel%(5),envel%(6),envel%(7),e
nvel%(8),envel%(9),envel%(10),en
vel%(11),envel%(12)
5500ENDPROC
5600DEFFPROC_query
5610PRINT "overwrite (Y/N) ":
5620REPEAT:onse=GETAND223
5630UNTILonse=89ORonse=78
5640IFonse=89THENPRINT "yes"ELSE
PRINT "no"
5650IFonse=89THENover=TRUE
5660PRINT "Loading...."
5670ENDPROC
5700DEFFPROC_window
5710VDU24,0;128;1279;288;18,0,1
30,16,
5720VDU18,0,0,25,4,96;240;
5730ENDPROC
5750DEFFPROC_nowindow
5760VDU18,0,128,16,26
5770ENDPROC
5900DEFFPROC_mpage(dir)
5910IFcpage+dir<0ORcpage+dir>20
THENENDPROC
5920IFdir=1ANDptr+40>mx:tuneTHEN
ENDPROC
5930ptr=ptr+dir*40:cpage=cpage+
dir
5940PROC_PAGE
5950count=tcount:PROC_CURSOR(co
unt)
5960ENDPROC
6000DEFFPROC_envel
6010VDU24,0;0;1279;868;18,0,128
,16
6020FORpar=0T012STEP2
```

```
6030PLOT4,0,320-par*24:PRINTenv
el%(par)
6040PLOT4,300,320-par*24:PRINTS
TR#(envel%(par))
6050PLOT4,620,320-par*24:PRINTE
nvel%(par+1)
6060IFpar<>12THENPLOT4,920,320-
par*24:PRINTSTR#(envel%(par+1))
6070NEXTpar
6080FORpos=1T012:PROC_bar(pos):
NEXTpos
6090pos=5:PROC_hlt
6100REPEAT
6110*FX 21,0
6120resp=GET
6130IFresp=139THENPROC_inc(1)
6140IFresp=138THENPROC_inc(-1)
6150IFresp=137THENPROC_move(1)
6160IFresp=136THENPROC_move(-1)
6170IFresp=13THENPROC_sound
6180UNTILresp=27
6190PROC_PAGE:count=tcount
6195ENVELOPE4,envel%(0),envel%(
1),envel%(2),envel%(3),envel%(4)
,envel%(5),envel%(6),envel%(7),e
nvel%(8),envel%(9),envel%(10),en
vel%(11),envel%(12)
6200PROC_CURSOR(count)
6210ENDPROC
6400DEFFPROC_inc(dir)
6410IFenvel%(pos)+dir<min(pos)0
Renvel%(pos)+dir>max(pos)THENEND
PROC
6420envel%(pos)=envel%(pos)+dir
6430IFpos>0THENPROC_bar(pos)
6440IFposMOD2=0THENx=300ELSEx=9
20
6450y=294-((pos/2)MOD7)*48
6460VDU18,0,128,24,x;y;x+256;y+
32;16,26,18,0,1
6470PLOT4,x,y+32:PRINTSTR#(enve
l%(pos))
6480ENDPROC
6500DEFFPROC_sound
6510ENVELOPE4,envel%(0),envel%(
1),envel%(2),envel%(3),envel%(4)
,envel%(5),envel%(6),envel%(7),e
nvel%(8),envel%(9),envel%(10),en
vel%(11),envel%(12)
6520SOUND1,4,128,10
6530SOUND1,4,64,10
6540SOUND1,4,192,10
6550ENDPROC
6560DEFFPROC_hlt
6570IFposMOD2=0THENx=0ELSEx=620
6580y=294-((pos/2)MOD7)*48
6590VDU18,3,130,24,x;y;x+192;y+
32;16,18,0,127,26
6600ENDPROC
6700DEFFPROC_bar(pos)
6710IFpos<4THENoff=pos-1:x=40
6720IFpos>3ANDpos<7THENoff=pos-
4:x=340
6730IFpos>6ANDpos<11THENoff=pos-
7:x=640
6740IFpos>10THENoff=pos-11:x=10
00
6750VDU18,0,128,24,x+off*60;400
;x+40+off*60;788;16,18,0,130,
6760heit=526+envel%(pos)
6770IFheit>525THENVDU24,x+off*6
0;526;x+40+off*60;heit;16,
6780IFheit<526THENVDU24,x+off*6
0;heit;x+40+off*60;526;16,
6790GCOL0,128
6800ENDPROC
6900DEFFPROC_move(dir)
6910IFpos+dir<0ORpos+dir>12THEN
ENDPROC
6920PROC_hlt:pos=pos+dir:PROC_h
lt
6930ENDPROC
20000DATA 101,109,117,121,129,13
7,145,149,157,165,169,177
20010DATA 5,7,10,15,20,30,40,60
20012DATA 0,-128,-128,-128,-128,0,0,0
,-127,-127,-127,-127,0,0
20014DATA 255,127,127,127,255,25
5,255,127,127,0,0,126,126
20020DATA TIM,PI1,PI2,PI3,PN1,PN
2,PN3,AA,AD,AS,AR,ALA,ALD
>
```

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HERE'S A colourful asteroids-style game for the Amstrad CPC-464. While using Mode 1 it manages to give a whole range of colours and provides Mode 0 size text printing on the screen using a Rom indirection. Get yourself a high score by shooting the eggs and aliens but watch the bonus. Quick shots will score well but be slow and the bonus will turn against you!

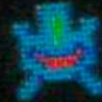
The game features 44 sprites of different sizes with up to 25 on the screen at any one time. These are controlled by a machine-code routine that can easily be adapted for your own purposes. In fact, most of the action is controlled by machine-code making the main Basic game loop very short and speedy.

The main program appears in listing 1 and may be typed in directly. It should be saved — with Goto 20000 — before running as any mistakes in the data may cause the system to crash. The machine-code is in five routines, three of which are listed so that you can use them in your own programs. The first one — listing 2 — is for wide printing mimicking mode 0 printing.

In fact, it will work in any mode with suitable changes to the final few bytes to reset the cursor position. It works by altering the high byte of the Rom indirection at &BDD5 using Poke so that instead of pointing to the Rom routine at &134A, it points to our routine at &A34A.

We can then use the usual Print command including the Print Using format. The colour of the printing is given by the pen mask — changing this can give striped writing or mixed colours. Note that the indirection supplies the screen position as a physical

PRESS Y FOR ANOTHER GO



MEN 1 BONUS 2445

AMSTRAD S

Listing 1.

```

10 REM *****
20 REM * SPACE EGGS *
30 REM * by *
40 REM * Christopher Leigh *
50 REM *****
100 GOTO 2000
200 LOCATE 12,25:PRINT "*****";LOCATE 10,25:POKE 58005,6A5:
PRINT USING "*****";score:POKE 58005,513:RETURN
1000 REM ** main loop **
1010 IF INKEY(27)=0 THEN head=(head-1)AND 7:IERASE,6A5
02:POKE 5A506,17:head=6A5:POKE 5A500,1
1020 IF INKEY(35)=0 THEN head=(head-1)AND 7:IERASE,6A5
00:POKE 5A506,17:head=6A5:POKE 5A500,1
1030 ON (head=5 OR head=6 OR head=7) (head=1 OR head=2
OR head=3):hx=(head=3 OR head=4 OR head=5) (head=7 OR
head=8 OR head=1)
1040 IF INKEY(60)=0 THEN POKE 5A503,(PEEK(5A503)+HX)AND
D 255:POKE 5A504,(PEEK(5A504)+HX)AND 255
1050 IF INKEY(47)=0 THEN SOUND 130,10,10,15,1,1:CALL 5
A803,0,1
1060 IF INKEY(63)=0 THEN FOR N=50 TO 10 STEP -2: SOUND 1
30,N,5,15,1,1:NEXT:IERASE,5A500:POKE 5A500,1:POKE 5A50
1,RND*79:POKE 5A502,RND*47
1070 FOR N=0 TO 9:NEXT:MOVE:bx=0:CALL 5A700,0,0,1
IF AX=0 THEN 1010 ELSE IF AX=4 THEN 2000
1080 IF AX=3 THEN SOUND 133,800,150,15,2,1:score=score
+20:GOTO 1010
1090 IF AX=2 THEN SOUND 133,10,100,15,2,1:score=score+
50:GOTO 1010
1100 IF AX=1 THEN SOUND 133,10,150,15,2,2,30:score=score
+100:IF AX=1 THEN 1010 ELSE score=score+50
1110 POKE 5A503,RND*3:POKE 5A504,RND*3:GOTO 4000
2000 REM ** 11 vms **
2010 BORDER 26: SOUND 135,100,150,15,2,2,15:FOR N=0 TO
10:NEXT: BORDER 0
2020 men=men-1:IF men=0 THEN DI:LOCATE 1,25:PRINT "MEN
":men:IERASE,5A500:POKE 5A500,1:POKE 5A501,39:POKE
5A502,24:GOTO 1000
2030 IF score>hi THEN hi=score
2040 POKE 5A501,39:POKE 5A502,24:POKE 5A503,0:POKE 5A5
04,0:POKE 5A504,6A5
2050 DI:PEN 3:LOCATE 1,5:PRINT "PRESS Y FOR ANOTHER GO
":PEN 2:EI
2060 IF INKEY(43)<>0 THEN 2060 ELSE head=0:men=3:score
=0:GOTO 4000
3000 REM ** start game **
3010 MODE 1:BORDER 1:INK 3,24:INK 2,21:INK 1,16:INK 0,
11:MEMORY 5A2FF
3020 FOR N=6A34A TO 5A37F:READ A$:POKE N,VAL("&"+A$):IN
EXT
3030 DATA e5,f5,cd,1a,bc,fi,eb,cd,a5,bb,06,07,4e,c5,d5
,06,04,af,cb,21,30,02,fb,cc,cb,21,30,02,fb,33,12,13,10
,ef,d1,e0,21,00,00,19,eb,e1,23,c1,10,de,e1,24,24,24,2c
,c3,75,d0
3040 PEN 3:LOCATE 2,2:POKE 58005,6A5:PRINT "SPACE EGGS
":POKE 58005,613:PRINT "by C.J.Leigh"
3050 PEN 2:PRINT "Due to a fault in your hyper
space generator you find yourself in an
uncharted region of space. Suddenly all your emergency sys
tems go wild and your sights are filled with strange e
ggs like"
3060 PRINT "creatures. Madly you fire your laser ca
non but hitting an egg merely releases two aliens and h
itting three produces even more seed eggs. And all
the time the void is filled with alien screams."
3070 PRINT "If you are not quick enough they will ge
t you and then you will scream as the sadness takes ov
er."
3080 GOSUB 10000
3090 PEN 1:LOCATE 1,20:PRINT " Use I & P for rotate l
eft and right; S for subspace thrusters;
X for hyperspace jump
Space for fire"
3100 IF INKEY(5)=0 THEN 3100

```

```

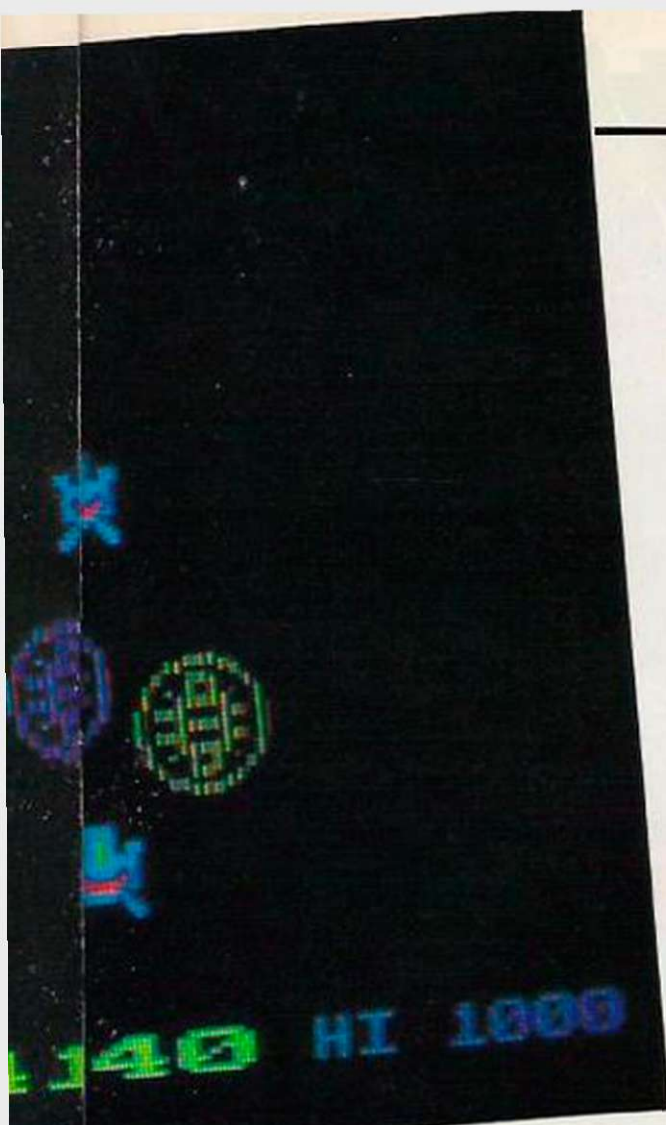
3110 IF INKEY(5)=0 THEN 3110
3120 AX=0:head=0:hi=1000:men=3:score=0
3130 ENV 1,15,-1,1:ENT -1,15,10,1,15,-10,1:ENV 2,15,-1
,10:ENT 2,15,10,10
3140 EVERY 50,2 GOSUB 200
4000 REM ** new screen **
4010 BORDER 0:INK 0,0:INK 1,11:INK 2,6:INK 3,10:MODE 1
:bx=3000:ax=16:POKE 5A802,0:IF score>4000 THEN px=0 EL
SE px=40
4020 DI:LOCATE 1,25:PEN 2:PRINT "MEN":men:"BONUS":bx:L
OCATE 10,25:POKE 58005,6A5:PRINT USING "*****";score:
:POKE 58005,513:PEN 1:PRINT " HI":hi:PEN 2:EI
4030 FOR N=100 TO 800 STEP 20: SOUND 7,N,10,15:NEXT
4040 FOR N=1 TO 0:POKE 5A500+N*9,0:NEXT
4050 FOR N=9 TO 12:POKE 5A500+N*9,1:NEXT
4060 FOR N=13 TO 36:POKE 5A500+N*9,0:NEXT
4070 GOTO 1000
10000 REM ** machine code **
10010 FOR N=5A400 TO 5A80F:READ A$:POKE N,VAL("&"+A$)
10020 NEXT:CALL 5A400:RETURN
10030 DATA 01,0e,a4,21,0a,a4,cd,d1,bc,c9,00,00,00,00,1
6,a4,c3,ec,a4,c3,20,a4,45,52,41,53,c5,4d,4f,56,c5,00
10040 DATA dd,21,00,a5,10,49,21,ca,a4,36,00,dd,7e,01,0
0,00,00,cd,79,a4,21,ca,a4,dd,7e,05,77,dd,7e,dd,dd,0a,0
4,f2,46,a4,c6,30,fe,30,30,02,66,30,dd,77,02
10050 DATA dd,7e,01,dd,00,03,f2,5a,a4,c6,50,fe,50,30,0
2,06,50,dd,77,01,dd,36,00,00,cd,79,a4,11,09,00,dd,19,d
0,7e,00,1f,30,b1,1f,30,f2,c9
10060 DATA f5,d0,50,ed,44,4f,dd,66,02,dd,5e,06,dd,56,0
7,1a,47,0f,13,ff
10070 DATA e5,f5,d5,11,00,00,45,7c,fe,30,30,02,d6,30,c
b,3f,30,02,10,20,0f,26,00,ff,d5,29,29,29,29,e5,d1,20,2
9,19,d1,19,16,c0,5f,19,d1
10080 DATA 3e,04,f5,c5,e5,1a,fe,00,20,0c,7e,fe,00,20,0
3,dd,77,00,1a,ee,ff,77,13,23,0d,20,0d,d5,af,11,50,00,e
d,52,d1,10,e0
10090 DATA e1,01,00,00,09,c1,ff,3d,20,d5,ff,e1,24,2d,2
0,a2,c9
10100 DATA 05,21,ca,a4,36,00,dd,e1,dd,36,00,00,dd,7e,0
1,c3,79,a4,00,00
10100 REM ** move data **
10110 " spaceship & bullets
10120 DATA 01,27,10,00,00,ff,65,a6,00
10130 DATA 00,00,00,00,ff,60,a6,00,00,00,00,00,ff
f,60,a6,00
10140 DATA 00,00,00,00,ff,60,a6,00,00,00,00,00,ff
f,60,a6,00
10150 DATA 00,00,00,00,ff,60,a6,00,00,00,00,00,ff
f,60,a6,00
10160 DATA 00,00,00,00,ff,60,a6,00,00,00,00,00,ff
f,60,a6,00
10170 " asteroids
10180 DATA 01,1f,0f,01,01,a5,ed,a6,00,01,31,0f,ff,01,f
a,ed,a6,00
10190 DATA 01,20,20,01,00,af,ed,a6,00,01,31,21,00,ff,d
7,ed,a6,00
10200 DATA 00,00,00,01,ff,ff,7e,a7,00,00,00,ff,ff,f
f,7e,a7,00
10210 DATA 00,00,00,00,ff,ff,7e,a7,00,00,00,ff,ff,f
f,7e,a7,00
10220 DATA 00,00,00,01,ff,ff,7e,a7,00,00,00,01,ff,f
f,7e,a7,00
10230 DATA 00,00,00,01,ff,ff,7e,a7,00,00,00,01,ff,f
f,7e,a7,00
10240 DATA 00,00,00,01,ff,ff,7e,a7,00,00,00,01,ff,f
f,7e,a7,00
10250 DATA 00,00,00,00,ff,ff,7e,a7,00,00,00,02,ff,f
0,ff,a7,00
10260 DATA 00,00,00,fe,00,a5,bf,a7,00,00,00,00,02,a
5,bf,a7,00
10270 DATA 00,00,00,02,02,ff,bf,a7,00,00,00,fe,02,f
fbf,a7,00
10280 DATA 00,00,00,02,00,ff,bf,a7,00,00,00,00,fe,5
fbf,a7,00
10290 DATA 00,00,00,fe,fe,5f,bf,a7,00,00,00,00,fe,f
5fbf,a7,00
10300 DATA 00,00,00,fe,fe,5f,bf,a7,00,00,00,00,fe,f
5fbf,a7,00
10310 DATA 00,00,00,fe,00,ab,bf,a7,00,00,00,00,02,0
a,bf,a7,00

```

```

11200 DATA 00,00,00,02,02,a5,bf,a7,00,00,00,00,fe,02,a
a,bf,a7,00
11210 DATA 00,00,00,02,00,fb,bf,a7,00,00,00,00,00,fe,0
fb,bf,a7,00
11220 " extra
11230 DATA 02,00,09,01,00,ff,11,a0,00,00,00,0a,01,01,f
f,16,a0,00
11240 DATA 02
12000 REM ** shape data **
12010 " bullet & spaceship
12020 DATA 01,00,66,66,00
12030 DATA 02,cc,00,33,00,cc,00,33,00,cc,00,33,00,cc,33,0
0,cc,00
12040 DATA 02,00,00,00,00,44,00,44,cc,22,33,22,00,f
f,00,33
12050 DATA 02,00,11,00,11,44,22,44,22,22,44,22,44,11,0
0,11,00
12060 DATA 02,11,00,11,00,22,00,22,00,44,33,44,cc,ff,0
0,cc,00
12070 DATA 02,00,33,00,cc,33,00,cc,00,cc,00,33,00,00,c
c,00,33
12080 DATA 02,cc,00,ff,00,44,cc,44,33,22,00,22,00,11,0
0,11,00
12090 DATA 02,11,00,11,00,22,44,22,44,44,22,44,22,00,1
1,00,11
12100 DATA 02,00,33,00,ff,33,22,cc,22,00,44,00,44,00,0
0,00,00
12110 " asteroids
12120 DATA 06,00,00,77,ee,00,00,00,33,ff,ff,cc,00,00,7
7,00,11,ee,00
12130 DATA 00,cc,33,cc,33,00,11,00,77,ee,11,00,33,00,6
6,00,00,cc
12140 DATA 66,22,66,66,44,66,66,11,ff,ff,00,66,66,11,f
f,ff,00,60
12150 DATA cc,ff,00,11,ff,33,cc,ff,00,11,ff,33,cc,11,f
f,ff,00,33
12160 DATA cc,11,ff,ff,00,33,cc,ff,00,11,ff,33,cc,ff,0
0,11,ff,33
12170 DATA 66,11,ff,ff,00,66,66,11,ff,ff,00,66,66,22,6
6,66,44,66
12180 DATA 33,00,66,66,00,cc,11,00,77,ee,11,00,00,cc,3
3,cc,33,00
12190 DATA 00,77,00,11,ee,00,33,ff,ff,cc,00,00,00,00,7
7,ee,00,00
12200 DATA 04,00,70,e0,00,00,70,e0,00,00,71,e0,00,e0,7
1,e0,70
12210 DATA e0,71,e0,70,70,ff,ff,e0,70,ff,ff,e0,01,ff,f
0,60
12220 DATA 41,70,e1,60,70,0f,0f,e0,70,0f,fe,e0,10,ff,f
0,00
12230 DATA 30,70,e0,c0,70,00,e0,e0,00,00,70,c0,00,0
0,30
12240 DATA 02,33,cc,77,ee,ff,ff,ff,ff,ff,ff,ff,ff,ff,77,e
e,33,cc
13000 REM ** check collision **
13010 DATA af,21,ca,a4,77,eb,77,dd,21,00,a5,11,09,00,0
e,04,dd,be,00,20,02,71,c9,dd,19,06,24,af,dd,be,00,20,1
e,3a,01,a5,dd,be,01,20,80,3c,dd,be,01,20,10,3a,02,a5,d
d,00,02,20,00,3c,dd,be,02,20,02,71,c9,dd,19,10,00
13020 DATA dd,21,09,a5,80,00,af,dd,be,00,c4,70,ab,dd,1
9,10,45
13030 DATA fe,21,75,a5,0d,06,04,3e,66,cd,49,ab,0a,00,0
d,cd,49,ab,06,10,0d,3e,66,dd,be,00,20,04,71,c3,70,ab,d
d,19,10,ff,c9
13040 DATA dd,be,00,20,21,71,00,cd,70,ab,fd,36,00,01,f
d,36,09,01,dd,7e,01,fd,77,01,fd,77,0a,dd,7e,02,fd,77,0
2,fd,77,00,ff,c9,fd,19,fd,19,dd,19,10,d2,c9
13050 DATA c5,d5,e5,cd,fd,44,a4,e1,d1,c1,c9
13060 REM ** fire bullets **
13070 DATA 00,dd,4e,00,dd,46,02,c5,3a,02,a0,c0,09,fe,4
0,28,01,af,32,02,a8,c4,09,5f,16,a5,d5,cd,ec,a4,e1,36,0
1,eb,13,c1,cb,20,cb,21,21,01,a5,7e,01,12,13,23,7e,00,1
2,13,23,7e,01,12,13,23,7e,00,12,c9
20000 SPEED WRITE 1:SAVE "space eggs"
20010 SPEED WRITE 0:SAVE "space eggs"
20020 PRINT CHR$(7)"Rewind the tape":CAT

```



PRESS Y FOR ANOTHER GO



Christopher Leigh presents a new version of a favourite shoot-'em-up using sprites in glorious colour.

The first byte of the shape data is the size of the sprite in quarters. The rest of the shape data comprises bytes made up in the same way as characters are plotted on the screen in Mode 1.

As already suggested, 1Move only needs to be called once a game cycle to move everything. Printing of score and bonus is done once a second by calling the routine at line 200. All that remains is to read the keys, produce sound effects, check for collisions and keep the bullets firing.

For the sake of speed the last two requirements are covered by two routines tailored for this game. Collision checking is done by reading the collision flags of each sprite and by checking for identical positioning. The latter is only needed for a stationary sprite.

Eight bullets are allowed on screen at any time so as each is fired the one eight back must be erased. Key checking is left in Basic so that you can easily change the program to suit your fingers, and the speed can be changed using p% in 1070 and 4010.

Note that your subspace thrusters always work in the direction you are pointing so that once moving you need to turn round in order to slow down. Remember your hyper space dive is kaput so using it could well land you in the middle of one of those eggs or in the firing line of your own bullets. The faster you shoot the aliens the larger the bonus — if you take too long your bonus will become negative having a disastrous effect on your score!

Should you wish to start firing immediately without typing in the lengthy data, you should send £3 for a tape to C.J. Leigh, 12 The Bassetts, Cashes Green, Stroud, Glos GL5 4SJ. Ask for Space Eggs and don't forget your name and address.

SPACE EGGS

position — top left = 0, 0 — whilst the cursor must be reset to the logical position — top left = 1, 1 — hence the extra increment instructions.

The second and third routines control the sprites and are called using Resident System Extension (RSX) commands. Move and Erase must be preceded by the elongated colon — shift @ — and 1Erase must be followed by a comma and its parameter which is the address of the first byte of the move data for the sprite.

The screen is 80 bytes wide and the sprite routines divide it into 50 half lines high, so that each sprite unit is a quarter of a Mode 1 character. These routines can cope with sprites of any size and — with slight alterations — of any shape. All our sprites will be set in a square sprite shape definition, but since zero bytes are not written to the screen — making the sprite transparent — the sprite can be any shape within that framework.

As written the procedure allows full wrap-around, adjusting for sprites being partly off a screen edge. Again fairly simple alterations will allow sprites to bounce.

1Erase simply erases a sprite and turns it

off. 1Move works by calculating the old sprite position and then writing it with an ink mask of zero to rub it out, then calculating the new position and writing with the ink mask given in the move data.

This ink mask can be set to produce pure colours or colour mixtures for a whole sprite. The new position is calculated by adding the speed components to the old position and then ensuring it is on the screen. The move data also includes the address of the shape data for a particular sprite and a collision byte. This collision byte is the last non zero byte read off the screen when writing the sprite. This allows us to know if it is on top of anything and also what it is n top of.

The move data consists of nine bytes formatted thus: on/off flag, right position, down position, right speed, down speed, ink mask, shape address low, shape address high, collision byte. 1Move will, in fact, move every sprite, whose on/off flag is one, in the block of move data and the routine is stopped by a value of two. The shape data address can be altered to change the shape of a sprite during the game as is done to rotate your space ship.

Listing 2.

```

ORIGIN A34A
E5 PUSH HL ;save cursor position
F5 PUSH AF ;save character code
CD1ABC CALL BC1A ;SCR_CHAR_POSITION
F1 POP AF
EB EX DE,HL ;screen address in DE
CDA5BB CALL BBA5 ;TXT_GET_MATRIX
0607 LD B,07 ;only top 7 rows
4E CHRROW LD C,(HL) ;character byte
C5 PUSH BC
D5 PUSH DE
0604 LD B,04 ;stretch to 4 bytes
AF BYTE XOR A
CB21 SLA C ;first pixel
3002 JRNC 02 ;pixel to screen byte
F6CC OR A,C ;mask pen 3
CB21 SLA C ;next pixel

```

(continued on page 67)

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(continued from page 65)

3002	JRNC 02		E1	POP HL	
F633	OR A,33	;other half of byte	23	INC HL	;next character byte
12	LD (DE),A	;byte to screen	C1	POP BC	;recover row count
13	INC DE	;next screen address	10DE	DJNZ CHRROW	;next character row
10EF	DJNZ BYTE	;back for next pixel	E1	POP HL	;recover cursor position
D1	POP DE	;screen address	24	INC H	
E5	PUSH HL	;save matrix address	24	INC H	
210000	LD HL,000		24	INC H	
19	ADD HL,DE	;next screen row	2C	INC L	;reposition cursor
EB	EX DE,HL	;back in DE	C375BB	JP BB75	;TXT_SET_CURSOR

Listing 3.

	ORIGIN A400		FE30	CP 30	;off screen bottom?
010EA4	LOGON	LD BC, JMPTAB	3002	JR C, 02	
210AA4		LD HL, BUFFER	D630	SUB 30	
CDD1BC		CALL BCD1	CB3F	SRL A	;divide by two
C9		RET	3002	JR NC, 02	
00000000	BUFFER	DEFS 4	1620	LD, 20	;middle of line
16A4	JMPTAB	DEFW NMETAB	6F	LD L, A	
C3ECA4		JP ERASE	2600	LD H, 00	;prepare to multiply
C320A4		JP MOVE	F1	POP AF	
4D524153		DEFM "ERAS"	D5	PUSH DE	
C5		DEFB "E"+80	29	ADD HL, HL	;times two
4D4F56		DEFM "MOV"	29	ADD HL, HL	
C5		DEFB "E"+80	29	ADD HL, HL	
00		NOP	E5	PUSH HL	;sixteen times
DD2100A5	MOVE	LD IX, A500	D1	POP DE	
1049		JR CHKEND	29	ADD HL, HL	
21CAA4	NEXSPR	LD HL, MASK+1	29	ADD HL, HL	;times sixty four
3600		LD (HL), 0	19	ADD HL, DE	;times eighty
DD7E01		LD A, (IX+1)	D1	POP DE	;half line offset
000000		DEFS 3	19	ADD HL, DE	
CD79A4		CALL WRISPR	16C0	LD D, C0	;start of screen
21CAA4		LD HL, MASK+1	5F	LD E, A	;right position
DD7E05		LD A, (IX+5)	19	ADD HL, DE	;screen address
77		LD (HL), A	D1	POP DE	;data address
DD7E02		LD A, (IX+2)	3E04	LD A, 04	;four lines a block
DD8604		ADD A, (IX+4)	F5	LINE	PUSH AF
F246A4		JP P, 02	C5	PUSH BC	;width parameters
C630		ADD 30	E5	PUSH HL	
FE30		CP 30	1A	BYTE	LD A, (DE)
3002		JR C, 02	FE00	CP 00	
D630		SUB 30	280C	JR Z, ZERO	;ignore zero bytes
DD7702		LD (IX+2), A	7E	LD A, (HL)	;screen byte
DD7E01		LD A, (IX+1)	FE00	CP 00	;check collision
DD8603		ADD A, (IX+3)	2803	JR Z, 03	
F25AA4		JP P, 02	DD7708	LD (IX+8), A	;collision flag
C650		ADD 50	1A	LD A, (DE)	;sprite byte
FE50		CP 50	E6FF	MASK	AND FF
3002		JR C, 02	77	LD (HL), A	;write screen
D650		SUB 50	13	ZERO	INC DE
DD7701		LD (IX+1), A	23	INC HL	;next data
DD360000		LD (IX+8), 00	00	DEC C	;next screen byte
CD79A4		CALL WRISPR	2008	JR NZ, ROOM	;room for sprite
110900	MOVEON	LD DE, 09	D5	PUSH DE	
DD19		ADD IX, DE	AF	XOR A	
DD7E00	CHKEND	LD A, (IX+0)	115000	LD DE, 0050	
1F		RRA	ED52	SBC HL, DE	;start of line
38B1		JR C, NEXSPR	D1	POP DE	
1F		RRA	10E0	ROOM	DJNZ BYTE
30F2		JR NC, MOVEON	E1	POP HL	;next width byte
C9		RET	010000	LD BC, 0800	
F5	WRISPR	PUSH AF	09	ADD HL, BC	;next screen line
D650		SUB 50	C1	POP BC	
ED44		NEG	F1	POP AF	
4F		LD C, A	3D	DEC A	;four lines
DD6602		LD H, (IX+2)	20D3	JRNZ, LINE	
DD5E06		LD E, (IX+6)	F1	POP AF	
DD5607		LD D, (IX+7)	E1	POP HL	
1A		LD A, (DE)	24	INC H	
47		LD B, A	2D	DEC L	
6F		LD L, A	20A2	JRNZ, VERT	;next vertical block
13		INC DE	C9	RET	
F1		POP AF	D5	ERASE	PUSH DE
E5	VERT	PUSH HL	21CAA4	LD HL, MASK+1	;data base address
F5		PUSH AF	3600	LD (HL), 00	;clear pen mask
D5		PUSH DE	DDE1	POP IX	
110000		LD DE, 0000	DD360000	LD (IX+8), 00	;turn sprite off
F5		PUSH AF	DD7E01	LD A, (IX+1)	
7C		LD A, H	C379A4	JP WRISPR	

```

1 REM *****
2 REM * SPECTRUM RAMDISK *
3 REM *****
4 REM Acknowledgements to Ric
hard Taylor YC March 1985 for th
e
5 REM method of redefining ba
sic words.
100 DATA "ff0df8f3ed4bb45ced5b3
85c2a7b5cd93e00d3fe3e3fed472ab2"
110 DATA "5c545d36002bbc20fad9e
d43b45ced53385c227b5cd9ed53b25c"
120 DATA "21003c22365ceb363e2bf
92b2b223d5c21b65c224f5c11af1501"
130 DATA "1500ebdb0eb2b22575c2
322535c224b5c36802322595c360d23"
140 DATA "36802322615c22635c226
55c3e07328d5c328f5c32485c212305"
150 DATA "22095cfd35c6f35ca21c
61511105c01e00edb0fcdcb01ccddf"
160 DATA "0efd363102fbcdb0daf1
11ff9cd0a0cfdcb02ee18198052414d"
170 DATA "444f53207f20526f20313
938358dfd363102cd9517cdeb016afcd"
180 DATA "0116cd2c0fcd94fafcdcb0
07e202cfe5c20163a3a5cfe0b200f21"
190 DATA "45f9e521ddfae5fd3600f
fc37dfbfcdb306628402a595ccda711"
200 DATA "fd3600ff18c42a595c225
d5ccdfb1970b1c242fadffe0d28a7fd"
210 DATA "cb3046c4af0dcd6e0d3e1
9fd964f328c5cfdcb01fedf3600ffd"
220 DATA "360a01cdf0fa76fcdcb01a
efdc304ec4cd0e3a3a5c3c5210000"
230 DATA "fd363702fd7426220b5c2
322165ccdb016fcdcb37aec6e0dfdc"
240 DATA "02eef147fe0a3802c607c
def153e20d778119113cd0a0caf1136"
250 DATA "15cd0a0ced4b455ccd1b1
a3e3ad7fd4e0d0600cd1b1acd97103a"
260 DATA "3a5c3c281dfe092804fe1
52003fd340d01030011705c21445cfd"
270 DATA "cb0a7e280109edb8fd360
afffdcb019ec33bf93e10010000c3bb"
280 DATA "f9ed34395c2a5d5ceb213
afae52a615c37ed52e56069cd6e1920"
290 DATA "06cdeb19cde819c1793db
02828c5030303032bed5b535cd5cd55"
300 DATA "16e122535cc1c5132a615
c2b2bedb82a495ceb1702b712b732b"
310 DATA "72f1c331f9fcdcb01becdf
b19affd770d3dfd77001801e7cddf16"
320 DATA "fd340dfa8alcd0600fe0
d2864fe3a28eb21ddfae54fe779fefa"
330 DATA "ca62fbfeaca19fbfee6c
a70f8fefdca2efffe2ac2441bc37dfb"
340 DATA "cd541fd27b1bfdcb0a7e2
06c2a425ccb7c281421feff22455c2a"
350 DATA "615c2bed5b595c1b3a445
c1834cd6e19fd7e0a281aa7c2ec1b47"
360 DATA "7ee6c078280fcfffc1cd3
025c82a555c3ec0a6c0affe01ce0056"
370 DATA "235eed53455c235e2356e
b192322555ceb225d5c571e00fd360a"
380 DATA "ff15fd720dca5fa14cd8
b192802cf16dffed28c0fe3acaa5fa"
390 DATA "c38alccd821cdfecbc28
alcc1cd30252809ef0238ebcde93438"
400 DATA "a0c3a5fadf0600fe73286
4fe6c285ffe6d2859fe642854fe7428"
410 DATA "4ffe632835fe78ca10fff
e66ca5dfdf65281cc38a1c00000000"
420 DATA "0000000000000000000000
0000000000000000000000e7cdee1b21"
430 DATA "6df8226ef8c9fd363a06e
7cdee1bcd3025c8011300f7d5dde1c3"
440 DATA "11fd0404040404fd703ae
7cd8c1ccd30252834012400f7d5dde1"
450 DATA "060b3e20121310fcd360
1ffcdf12b21f6ff0b0903300ffd7e3a"
460 DATA "a72002cf0e70b1280a010
a00dde5e123ebdb0fd7e3afe052021"
470 DATA "dfcdee1bed5b6ef8dd730
ddd720e214effafd773aed52dd750b"
480 DATA "dd740cebc31007dffea2
01ffd7e3afe03ca8alce7cdee1bdd36"
490 DATA "0b00dd360c1b210040dd7
50ddd740e184dfeaf204ffd7e3afe03"
500 DATA "ca8alce7cd4820200cfd7
e3aa7ca8alccde61c180fcd821cdfde"
510 DATA "2c200cfd7e3aa7ca8alcc
de61c1804e7cd821ccdee1bcd991edd"
520 DATA "710bdd700ccd991edd710
ddd700e6069dd3600031844fec2809"

```

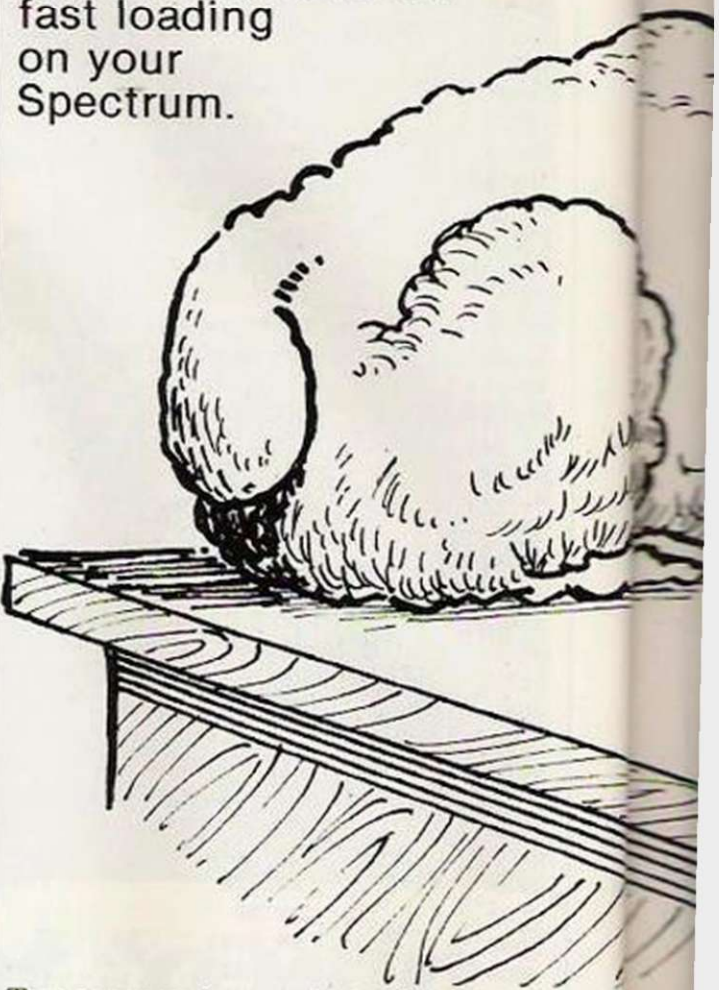
```

530 DATA "cdee1bdd360e801817fd7
e3aa7c28alce7cd021ccdee1bcd991e"
540 DATA "dd710ddd700edd3600002
a595ced5b535c37ed52dd750bdd740c"
550 DATA "2a4b5ced52dd750fdd741
0ebe5011100dd092a6ef8011100dde5"
560 DATA "d1edb0dd7511dd7412fd7
e3afe0620583efecd0116dd7e00fe04"
570 DATA "383a3e0dd72a6ef8ed4bb
25caff5ed42444dcd2b2dcde32d1151"
580 DATA "fdc3220c2042797465732
0667265658de7cdee1b3e02cd0116cd"
590 DATA "1a1f21ffff3f18d011c00
9cd0a0cde5d1060a131ad710fb1837"
600 DATA "0e80dd7e00ddbeef20020
ef6fe04380afd7e3aa7ca94feelcf07"
610 DATA "dde5d121f0ff19060a7e3
c200379804f131abe2320010c10f7cb"
620 DATA "792810dd460cdd4e0bdd6
e11dd661209c314fdfd7e3aa720272a"
630 DATA "6ef8dd5e0bdd560c19dd5
efadd56fb7ab32811ed52ed5bb25ced"
640 DATA "52dab1fecde4fec394fee
1c9e147fe04cae4fedd7e00fe032808"
650 DATA "783dca32fec3ccfee5dd6
efadd66fbd5e0bdd560c19dd5"
660 DATA "2006dd6e00dd660e424b5
45ddd6e11dd6612ed0c9dd5e0bdd56"
670 DATA "0ce5dd6efadd66fbeb37e
d52382911050019444dcd051fe1eb2a"
680 DATA "595c2bdd225f5cdd4e0bd
d460cc5cde519c1e5c5cd5516dd2a5f"
690 DATA "5c23dd4e0fdd461009224
b5cdd660e7ce6c0200add6e0d22425c"
700 DATA "fd360a00c1dd6e11dd661
2d1edb0c92a6ef8dd5efadd56fb7ab3"
710 DATA "caf3fdded52011100ed42e
d5bb25ced523002c0319ebdde5e137"
720 DATA "ed4223ed536ef8edb0dd4
efadd46fbedeb0c9dd4e0bdd460cc5"
730 DATA "03f73680c1d5dd6e11dd6
612edb0c3cd08dd5e11dd56121bdd6e"
740 DATA "0bdd660c19e5eb011100a
7ed42ed5b6ef8e52323ed52444de1d1"
750 DATA "edb81313ed536ef8c9cd7
91ccdee1bcd991e036069cd6e19e5cd"
760 DATA "991e6069cd6e19d1ebcde
519c9dfcdde1ccdee1bcd991e78b120"
770 DATA "04ed4bb25c2a6ef8a7ed4
2dab1fec3b71ec90000000000000000"
800 DATA 43367,45632,26003,2409
7,23479,45337,35906,39309,30286,
44616
802 DATA 50490,49745,36529,4480
4,31570,31130,26450,39055,40367,
36652
804 DATA 36384,44158,54794,6025
1,35216,35731,44085,29281,49845,
42930
806 DATA 42556,34171,17042,4965
4,40572,36841,41845,46800,48311,
38452
808 DATA 44963,46860,33246,4564
6,37411,37499,39522,42336,38070,
34530
810 DATA 48885,29610,36304,5057
6,50900,55095,44303,35093,45869,
32393
812 DATA 56766,46065,54500,4351
2,47049,46401,49525,27934
820 DATA 2774606
999 DEF FN v(x)=x-48-(39 AND x)
96)
1000 CLEAR 32000
1005 LET a=63597: DIM a(68): LET
f=0
1008 RESTORE 800: LET c=0: FOR i
=1 TO 68: READ a(i): LET c=c+a(i)
)
1012 NEXT i: READ v
1014 IF c(<>v) THEN PRINT "Error i
n check lines 800 to 820": STOP
1015 FOR i=100 TO 770 STEP 10
1020 PRINT AT 0,0;i: RESTORE i:
LET c=0: READ a#
1030 FOR n=1 TO 51 STEP 2: LET v
=FN v(CODE a#(n+1))+16*FN v(CODE
a#(n))
1035 LET c=c+v*(n+1)/2: POKE a,v
: LET a=a+1: NEXT n
1050 IF a(i/10-9)<>c THEN PRINT
"Error in line ";i: STOP
1060 NEXT i
1080 PRINT "No errors found"

```

RAM

Ro Richardson with a piece of software to allow fast loading on your Spectrum.



THIS PROGRAM lets you load and save programs and code very fast without any extra hardware. It does this by using Ram to make a Ramdisc and by defining new Basic commands to access the disc. The new commands are kept as similar to the Spectrum's as possible, though many have no direct counterpart in the tape system.

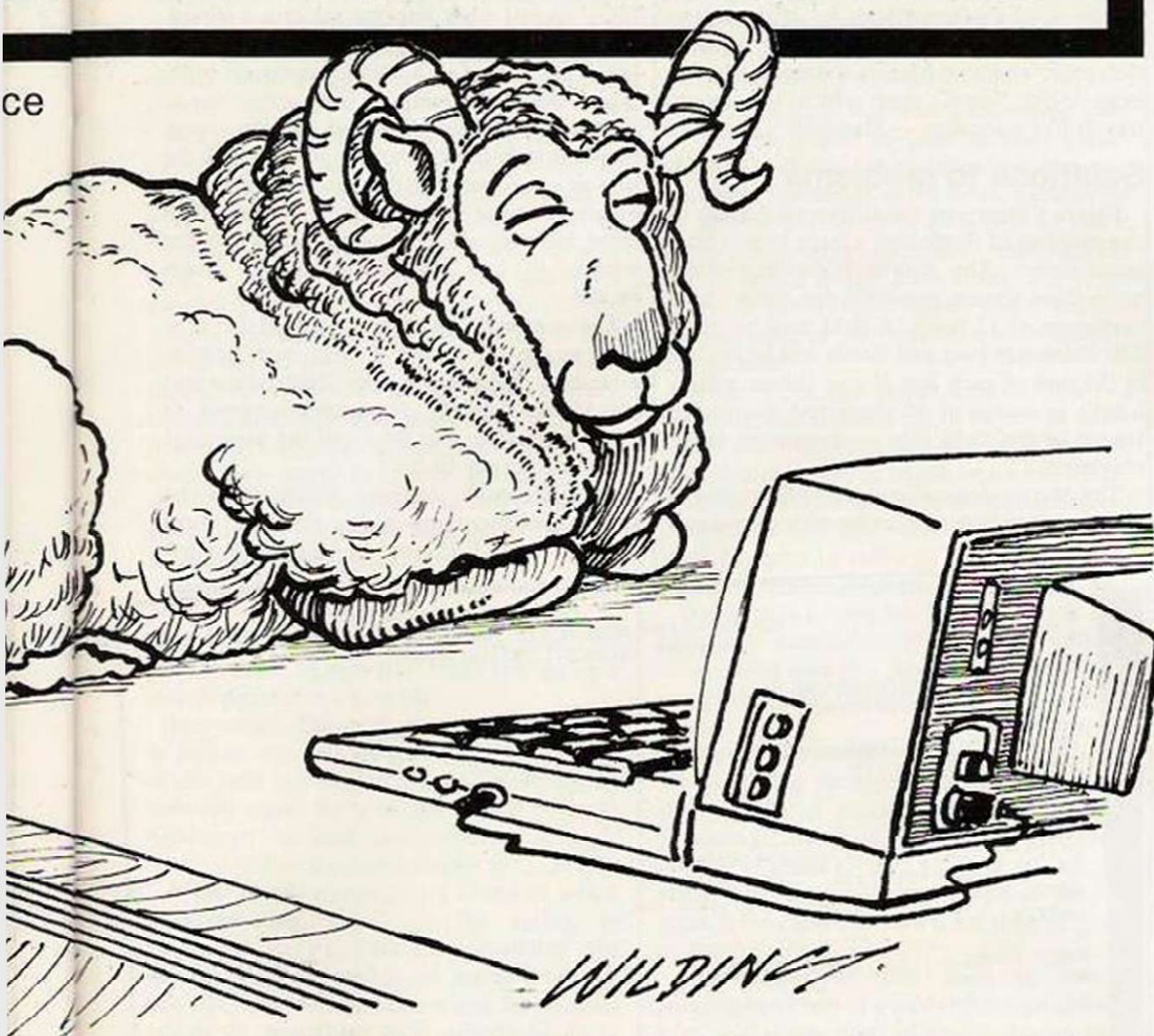
There is no limit to the number of files that can be saved on the disc, but there is a limit to the total size of stored files. The Ramdisc usually stores about 33K but this depends on where you put Ramtop — by Clearing. Each file is stored with a 17 byte header as in the tape system.

To use the Ramdisc, type in the hex loader — listing 1 — Save it on tape and Run it. The data has checksums so any errors should be spotted. Once it runs type

RANDOMIZEUSR 63600

to switch the new commands on. A Ramdos — Ramdisc operating system — logo should now appear on the bottom of the screen. The new commands are now active. You can use any Basic command without interfering with the Ramdos. As the whole system is above Ramtop, you can use New without losing the files

RAMDISC



stored. The easiest way to save code to tape is with the *t command — see later.

All commands consist of an asterisk followed by a lower case letter, possibly followed by parameters.

*l Load — must be followed by a file name as a string up to 10 characters. If file name is null (" ") then the most recently saved file of the correct type — program or code — will be loaded. Options Screen\$ and Code are provided and are exactly the same as the tape versions. Data is not available.

*s Save — must be followed by a file name. The name may not be null. Options Code, Screen\$ and Line are provided and are the same as the tape versions. Data is not supported, but programs are saved with their variables. When a file under the same name — and type — is already on the disc, it is overwritten. The file is also moved to the top of the disc.

*m Merge — only works with program files, works the same as the tape version.

*d Delete — must be followed by a file name. You must specify Code to delete a code file. If the file name is null then the most recently saved file is deleted.

*c Catalogue — has no parameters. It prints a list of all files on the disc in exactly the same way as Load prints file names for the cassette system. It also prints the number of available bytes on the Ramdisc.

*e Erase — erases the whole Ramdisc.

*t Tape — must be given a file name. It saves all the files on the Ramdisc and the Ramdisc operating system to tape as a standard code file. This means that you can save and load a whole environment in one chunk of code. To load the file from Basic,

```
CLEAR 30000
```

or whatever value you are using,

```
LOAD "" CODE
```

and then

```
RANDOMIZE USR 63600
```

to switch the new commands on.

*f Free — prints the number of bytes free in the Basic system, ie. below Ramtop. You may need this value when deciding where to place Ramtop. To get the total available space in the machine add this value and the value from catalogue (*c).

*x Block delete — deletes all Basic lines in the given range including the start and end lines. It is not strictly a Ramdos command,

but is a very short routine and should be useful.

In addition the New command has been redefined to print the new logo, and the Clear command now checks that the new value of Ramtop will not cause the Ramdisc to be overwritten. In cases where this would occur, the report "Out of memory" is given.

Error conditions and messages.

4 Out of memory — occurs when saving to the Ramdisc when there is not enough space for the new file. The area to be reclaimed if the file already exists is taken into account, so deleting the old copy will have no effect. Try moving Ramtop down by Clearing. If it occurs during loading or merging then there isn't enough space in the Basic area for the program.

8 End of file — occurs when loading, merging or deleting a file which does not exist — ie. the end of directly had been found without finding the file. Sometimes occurs because you leave out the Code when loading bytes.

The value of Ramtop splits the available Ram into space for Basic and space for Ramdisc. A value of 30000 gives Basic reasonable space and leaves 34K for the Ramdisc. If you Clear too low Basic will reject your Ramtop, and if you Clear too high you will get the "Out of memory" error.

The method used for redefining commands consists of two pieces. First, a copy of the kernel of the Rom is made in Ram. The idea is that control will stay in the Ram, just calling Rom routines when required. There is one snag, the Rom routine check-end IBEE throws away its return address. To overcome this some code is inserted in the error routine in case new commands fail the syntax check.

Once this is done it is easy to define new commands, and I have left 25 bytes free in the jump table in case you want to add some. Disassemble from 64381, and move the instruction at 64422 down to accommodate your commands. If you don't like the default colours of white on black,

```
POKE 63714
```

with the attributes you want.

The main use of this system will probably be for small Basic programs under development, and for keeping utility programs handy. It also enables you to load and save screens very quickly, although you are limited to about four screens. There are other not so obvious uses though.

After I had written the program I still had the problem of generating the hex dump data statements. It is easy to print what looks like a program listing, but then you can't edit or run it.

I wrote a Basic program to poke the Data statements together with line numbers, line lengths and trailing Enter bytes into unused memory — just above Ramtop — then saved this as a code file on Ramdisc, poked around with the header to change it to a program, then loaded the program.

If you want to have other machine code in the machine you could put it in the printer buffer or UDG area if it is small enough. If it is too big you could put it just above Ramtop, and keep a careful watch on your Ramdisc size, or save a dummy chunk of code to reserve an area in the Ramdisc. ■

ASES

margin. The result of the more flexible approach taken by the more expensive programs is that you can simulate an existing paper record, with which people may be familiar already.

Despite the simple input capability of the Acornsoft database it is effective and easy to use. When you remember the limitations of View in terms of using long fields as "macros", this database offers all you will need for storing names, addresses and other non-textual data.

Stardatabase treats the field with the lowest ASCII code as the keyfield. This means that a field identified by the field tag Address1 has a lower ASCII value than a field tag Name or Address2. Figures come before alpha characters — upper and lower case letters — in the ASCII table and you can force the program to treat the Name field tag as the keyfield by calling it Oname.

Using easily identifiable field names is important because Stardatabase expects you to know the field name — not the field title displayed on the screen — when you set up a search pattern or a sort list.

In contrast, Datagem permits you to search or sort on any field by specifying the number of the field in the search line. The following line will search for a named person "George Sanderson" in field number one:

F1 = "George Sanderson"

If one or more records are found in which "George Sanderson" is the string of characters in F1, markers identifying the records will be placed in the search level that you have selected. You can search for an exact match or something that approximates to what you are looking for in one or all the fields in the database using the search line:

F£ = "£ander£"

where the left hand F£ searches all the fields and the right hand expression will find the string "ander" in Mander, Sanderson, Anderson, Landerfield and so on. Datagem has the most powerful search facilities of all the databases I have examined and while Datagem is not the speediest database when it is actually calculating and computing, it gains heavily in terms of the time it will take you to formulate your search and carry it out.

Searching a record set

In other words the design of Datagem, far from perfect as it is, more than makes up for its comparatively leisurely performance in this area. Curiously, the Acornsoft database seems to me to be the next most useful program in terms of ease of searching a set of records. There is no multiple level search facility in the Acornsoft program but the fuzzy search facilities are a good match for those in Datagem. Sx makes you carry out serial searches, progressively refining a subset of records from the main database, until you arrive at the

specification that you require.

There is no real disadvantage in this method but Sx has been so precisely designed that the repeated operations become tedious. Remember that this is the database that I have chosen for routine use at work because it provides the optimum performance for the tasks that I wish to have done on the BBC computer.

I do wish, however, that the designer of Sx had studied the humans who use his program. In their sloppy way they want to simply find someone or something as quickly as possible with as few keystrokes as possible.

Having to go to the Search sub-menu, clear the current subset to zero records, decide which field the person or object will occur in, remember the names of the fields without being able to display them on screen — was it Key or Keywords or Keyword — carry out the search, return to the main menu and select browse or amend mode before finally displaying the required information is unnecessarily complicated.

Datagem can also export data to View and Wordwise but if you want to insert the name of a book, a sentence or some other information that may vary in length into a line of text I think you would have to spool the completed printout to disc and then load it back into View in order to reformat the text before it could be printed properly.

Datagem is a complete package which contains little information about the possibilities of accessing data in a database using any program other than the facilities in the program Rom.

The Merlin database has a sophisticated report writing package available on disc and this method of producing software — core program in Rom and utilities and extensions on disc — seems to offer a very good combination. The Report Writer section of the program is new and will take some time to access in depth.

Nevertheless, if you need to handle paragraphs of text in a card index type of database, and if you need to set up routine searches that lead to predetermined and complex reports then the Merlin database may be just what you are looking for. Certainly none of the others will fill these needs as well.

Sx has several attractive features. The program is supplied with information about a

large number of very useful procedures and "Star" calls for accessing the data in a Sx file. At the same time you should be aware that the Basic software supplied with the Sx chip is not error free.

If you try to add a page header to a report form from disc you are rewarded with a persistent error message. Other combinations of circumstances cause the utility software to hang up, but at least it is written in common or garden Basic and you can have a crack at correcting it, or modifying it to your particular needs.

Set against that, the Report Writer language for the Merlin package is compiled and enables you to produce a reporting program that cannot be easily deciphered by users who purchase a system from you.

Datagem has the best financial facilities of all the packages and Sx has potentially the worst because it handles all numbers as strings, rather than integers or real numbers, and, consequently, has no data validation. Additionally, Sx won't even search on the full six figures needed to describe a unique data in the twentieth century.

Data manipulation

You will need to read the Datagem manual carefully to appreciate the potential that it has for sophisticated numerical data manipulation. You will need to read the Datagem manual carefully to get much information from it. Written by the author of the program and one other person, it is a masterpiece of compact information leading to subtle confusion.

In all the discussion about the expensive systems it is very easy to overlook the cheap but capable Acornsoft package; probably for just that reason — it's cheap. If you can cope with seven letter field titles, a very slow sort function, the limitations of data export to View — shared with other database programs — and the obvious problems of swapping program and data discs if you have only one disc drive, then the Acornsoft program offers stunningly good value for money.

The data on a disc is organised in such a way as to make it accessible to Basic programs, the search facilities are good, the manual is far more helpful than those supplied with the View wordprocessor and it's a pleasant and effective package to use.

Figure 2. Datagem — Data input card.

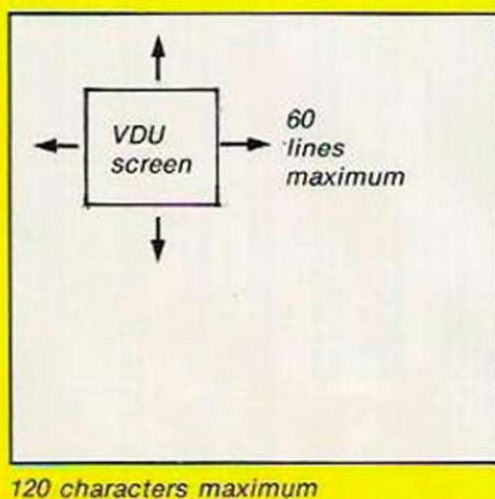
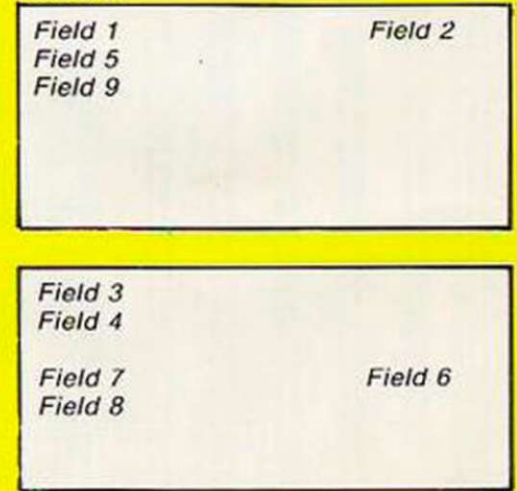


Figure 2a. Merlin DataScribe database. Multiple input screens with fields placed in the order of input most convenient to the user.

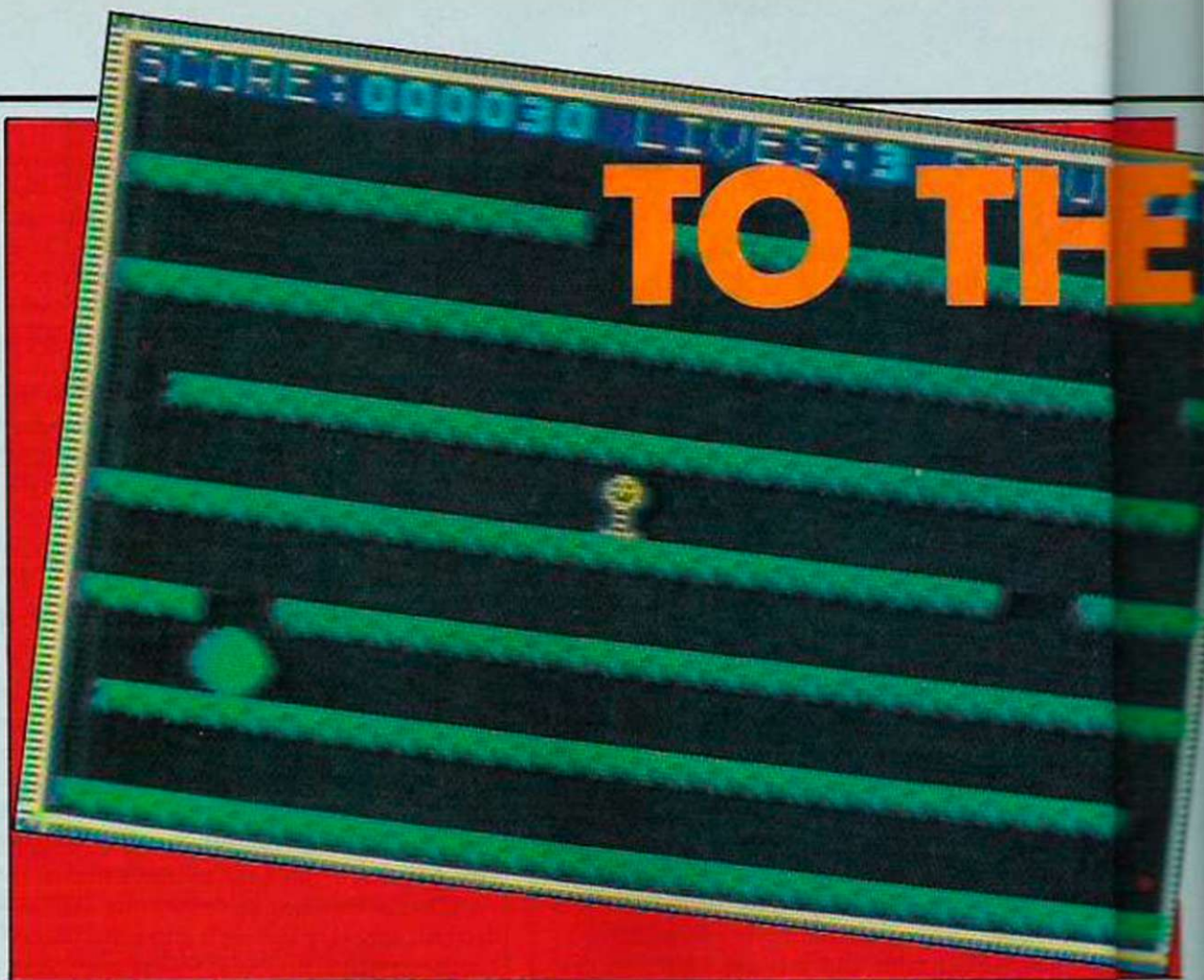


TO THE TOP is a game for the 48K Spectrum, featuring smooth animated sprite graphics, music, continuous sound, and a high score table. The object of the game is to move your man to the top-right hand side of the screen as quickly as possible, guiding him through the holes in the moving platforms which become faster the higher he gets.

However, he is not alone. To accompany him are various moving objects whose touch is lethal. On the first screen, there is only a rotating ball — which moves down the screen by falling through the platforms — to contend with but, on further levels, he is joined by several other characters, including a Pacman, a space invader and a beefburger in baps. These all move across the screen from left to right, gradually working their way down.

In order to speed you up a bit, there is a bonus which decreases as time passes. What is left of your bonus on completion of a screen is added to your score. If you can ever complete the first seven levels with your three lives — surely this isn't possible? — a congratulatory tune is played, you get an extra life, and the game goes back to the first screen, with faster moving platforms.

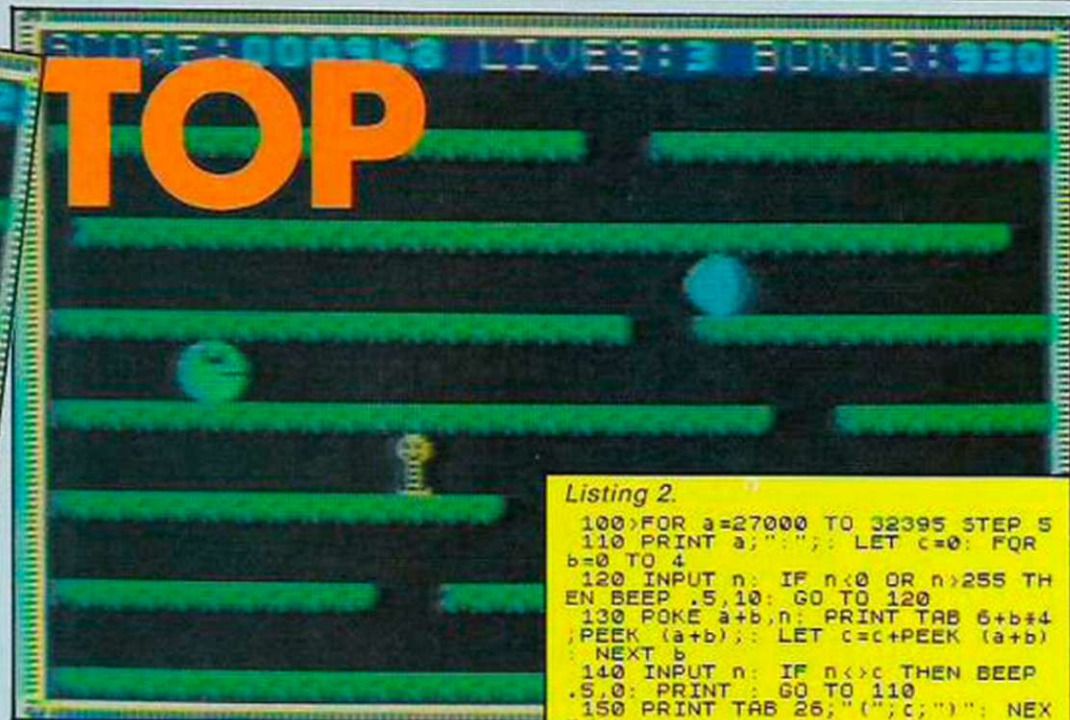
The control keys for the game are given in the instructions in the game, but note that, to



Listing 1.

07000	1	07355	01
07005	105	07360	01
07010	140	07365	01
07015	140	07370	01
07020	105	07375	01
07025	0	07380	01
07030	140	07385	01
07035	14	07390	01
07040	40	07395	01
07045	0	07400	01
07050	0	07405	01
07055	0	07410	01
07060	0	07415	01
07065	0	07420	01
07070	0	07425	01
07075	0	07430	01
07080	0	07435	01
07085	0	07440	01
07090	0	07445	01
07095	0	07450	01
07100	0	07455	01
07105	0	07460	01
07110	0	07465	01
07115	0	07470	01
07120	0	07475	01
07125	0	07480	01
07130	0	07485	01
07135	0	07490	01
07140	0	07495	01
07145	0	07500	01
07150	0	07505	01
07155	0	07510	01
07160	0	07515	01
07165	0	07520	01
07170	0	07525	01
07175	0	07530	01
07180	0	07535	01
07185	0	07540	01
07190	0	07545	01
07195	0	07550	01
07200	0	07555	01
07205	0	07560	01
07210	0	07565	01
07215	0	07570	01
07220	0	07575	01
07225	0	07580	01
07230	0	07585	01
07235	0	07590	01
07240	0	07595	01
07245	0	07600	01
07250	0	07605	01
07255	0	07610	01
07260	0	07615	01
07265	0	07620	01
07270	0	07625	01
07275	0	07630	01
07280	0	07635	01
07285	0	07640	01
07290	0	07645	01
07295	0	07650	01
07300	0	07655	01
07305	0	07660	01
07310	0	07665	01
07315	0	07670	01
07320	0	07675	01
07325	0	07680	01
07330	0	07685	01
07335	0	07690	01
07340	0	07695	01
07345	0	07700	01
07350	0	07705	01
07355	0	07710	01
07360	0	07715	01
07365	0	07720	01
07370	0	07725	01
07375	0	07730	01
07380	0	07735	01
07385	0	07740	01
07390	0	07745	01
07395	0	07750	01
07400	0	07755	01
07405	0	07760	01
07410	0	07765	01
07415	0	07770	01
07420	0	07775	01
07425	0	07780	01
07430	0	07785	01
07435	0	07790	01
07440	0	07795	01
07445	0	07800	01
07450	0	07805	01
07455	0	07810	01
07460	0	07815	01
07465	0	07820	01
07470	0	07825	01
07475	0	07830	01
07480	0	07835	01
07485	0	07840	01
07490	0	07845	01
07495	0	07850	01
07500	0	07855	01
07505	0	07860	01
07510	0	07865	01
07515	0	07870	01
07520	0	07875	01
07525	0	07880	01
07530	0	07885	01
07535	0	07890	01
07540	0	07895	01
07545	0	07900	01
07550	0	07905	01
07555	0	07910	01
07560	0	07915	01
07565	0	07920	01
07570	0	07925	01
07575	0	07930	01
07580	0	07935	01
07585	0	07940	01
07590	0	07945	01
07595	0	07950	01
07600	0	07955	01
07605	0	07960	01
07610	0	07965	01
07615	0	07970	01
07620	0	07975	01
07625	0	07980	01
07630	0	07985	01
07635	0	07990	01
07640	0	07995	01
07645	0	08000	01
07650	0	08005	01
07655	0	08010	01
07660	0	08015	01
07665	0	08020	01
07670	0	08025	01
07675	0	08030	01
07680	0	08035	01
07685	0	08040	01
07690	0	08045	01
07695	0	08050	01
07700	0	08055	01
07705	0	08060	01
07710	0	08065	01
07715	0	08070	01
07720	0	08075	01
07725	0	08080	01
07730	0	08085	01
07735	0	08090	01
07740	0	08095	01
07745	0	08100	01
07750	0	08105	01
07755	0	08110	01
07760	0	08115	01
07765	0	08120	01
07770	0	08125	01
07775	0	08130	01
07780	0	08135	01
07785	0	08140	01
07790	0	08145	01
07795	0	08150	01
07800	0	08155	01
07805	0	08160	01
07810	0	08165	01
07815	0	08170	01
07820	0	08175	01
07825	0	08180	01
07830	0	08185	01
07835	0	08190	01
07840	0	08195	01
07845	0	08200	01
07850	0	08205	01
07855	0	08210	01
07860	0	08215	01
07865	0	08220	01
07870	0	08225	01
07875	0	08230	01
07880	0	08235	01
07885	0	08240	01
07890	0	08245	01
07895	0	08250	01
07900	0	08255	01
07905	0	08260	01
07910	0	08265	01
07915	0	08270	01
07920	0	08275	01
07925	0	08280	01
07930	0	08285	01
07935	0	08290	01
07940	0	08295	01
07945	0	08300	01
07950	0	08305	01
07955	0	08310	01
07960	0	08315	01
07965	0	08320	01
07970	0	08325	01
07975	0	08330	01
07980	0	08335	01
07985	0	08340	01
07990	0	08345	01
07995	0	08350	01
08000	0	08355	01
08005	0	08360	01
08010	0	08365	01
08015	0	08370	01
08020	0	08375	01
08025	0	08380	01
08030	0	08385	01
08035	0	08390	01
08040	0	08395	01
08045	0	08400	01
08050	0	08405	01
08055	0	08410	01
08060	0	08415	01
08065	0	08420	01
08070	0	08425	01
08075	0	08430	01
08080	0	08435	01
08085	0	08440	01
08090	0	08445	01
08095	0	08450	01
08100	0	08455	01
08105	0	08460	01
08110	0	08465	01
08115	0	08470	01
08120	0	08475	01
08125	0	08480	01
08130	0	08485	01
08135	0	08490	01
08140	0	08495	01
08145	0	08500	01
08150	0	08505	01
08155	0	08510	01
08160	0	08515	01
08165	0	08520	01
08170	0	08525	01
08175	0	08530	01
08180	0	08535	01
08185	0	08540	01
08190	0	08545	01
08195	0	08550	01
08200	0	08555	01
08205	0	08560	01
08210	0	08565	01
08215	0	08570	01
08220	0	08575	01
08225	0	08580	01
08230	0	08585	01
08235	0	08590	01
08240	0	08595	01
08245	0	08600	01
08250	0	08605	01
08255	0	08610	01
08260	0	08615	01
08265	0	08620	01
08270	0	08625	01
08275	0	08630	01
08280	0	08635	01
08285	0	08640	01
08290	0	08645	01
08295	0	08650	01
08300	0	08655	01
08305	0	08660	01
08310	0	08665	01
08315	0	08670	01
08320	0	08675	01
08325	0	08680	01
08330	0	08685	01
08335	0	08690	01
08340	0	08695	01
08345	0	08700	01
08350	0	08705	01
08355	0	08710	01
08360	0	08715	01
08365	0	08720	01
08370	0	08725	01
08375	0	08730	01
08380	0	08735	01
08385	0	08740	01
08390	0	08745	01
08395	0	08750	01
08400	0	08755	01
08405	0	08760	01
08410	0	08765	01
08415	0	08770	01
08420	0	08775	01
08425	0	08780	01
08430	0	08785	01
08435	0	08790	01
08440	0	08795	01
08445	0	08800	01
08450	0	08805	01
08455	0	08810	01
08460	0	08815	01
08465	0	08820	01
08470	0	08825	01
08475	0	08830	01
08480	0	08835	01
08485	0	08840	01
08490	0	08845	01
08495	0	08850	01
08500	0	08855	01
08505	0	08860	01
08510	0	08865	01
08515	0	08870	01
08520	0	08875	01
08525	0	08880	01
08530	0	08885	01
08535	0	08890	01
08540	0	08895	01

THE TOP



Julian Wood climbs to success by avoiding invaders and a beefburger in baps.

Listing 2.

```
100>FOR a=27000 TO 32395 STEP 5
110 PRINT a;" "; LET c=0: FOR
b=0 TO 4
120 INPUT n: IF n<0 OR n>255 TH
EN BEEP .5,10: GO TO 120
130 POKE a+b,n: PRINT TAB 6+b*4
:PEEK (a+b): LET c=c+PEEK (a+b)
: NEXT b
140 INPUT n: IF n<>c THEN BEEP
.5,0: PRINT : GO TO 110
150 PRINT TAB 26;" (";c;")": NEX
T a
```

Listing 3.

```
10>PAPER 0: INK 0: BORDER 0: C
LEAR 25000: PRINT PAPER 1: INK 7
: BRIGHT 1: FLASH 1: AT 11,4;"TO
THE TOP" IS LOADING"
20 LOAD ""CODE": RANDOMIZE USR
29397
```

make things a little less impossible, your man has the advantage of a wrap-around screen.

To enter the game, first type in the machine-code loader in listing 23, with which you can enter all the machine code in listing 1. With listing 1, in the left-hand column are the memory address, and in the right hand column are the checksum values. Enter the five codes in between, and then the checksum value for that line.

If you have made a mistake in entering the line, a tone will sound, and you will have to enter that line again. If you enter a hopelessly wrong value for one of the machine-code bytes, a different tone will sound, and you just have to enter that byte again. Basically, all that is shown in listing 1 should tally with what is being printed onto the screen while you are entering the machine code.

When you have entered all the 5400 bytes of machine code, and are satisfied that all is correct, type New after entering

CLEAR 26999

to get rid of the Basic, whilst retaining the machine code. Then enter the program in listing 3, and save the two parts of the game using:

SAVE "TO THE TOP" LINE 0:
SAVE "C" CODE 27000,5400

Verify, and you are then ready to play.

280050	17	13	1	27	122	(180)	280411	5	50	102	91	(305)	280770	7	15	253	33	26	(337)	
280055	179	200	1	219	254	(935)	280416	50	102	91	(511)	280775	91	166	119	62	136	(574)		
280060	47	62	31	125	40	(473)	280421	16	16	167	(161)	280780	24	112	1	254	254	(645)		
280065	234	62	31	211	254	(762)	280426	16	16	167	(575)	280785	207	120	71	203	72	(703)		
280070	201	126	4	192	(774)	280431	16	16	167	(244)	280790	103	32	8	254	8	(425)			
280075	42	4	124	181	(442)	280436	11	11	104	(350)	280795	32	2	30	240	29	(333)			
280080	200	43	34	91	(372)	280441	11	11	104	(716)	280800	29	203	80	32	8	(352)			
280085	205	212	124	201	(770)	280446	11	11	104	(247)	280805	254	238	32	2	30	(556)			
280090	200	43	34	91	(372)	280451	11	11	104	(633)	280810	6	28	28	33	14	(109)			
280095	205	212	124	201	(770)	280456	11	11	104	(401)	280815	91	126	133	40	3	(443)			
280100	205	212	124	201	(770)	280461	11	11	104	(466)	280820	53	24	32	33	22	(164)			
280105	205	212	124	201	(770)	280466	11	11	104	(466)	280825	91	78	6	0	33	(208)			
280110	25	111	41	221	(234)	280471	11	11	104	(437)	280830	23	91	9	126	147	(401)			
280115	121	200	0	17	(500)	280476	11	11	104	(391)	280835	254	6	56	16	254	(588)			
280120	67	64	111	88	(210)	280481	11	11	104	(303)	280840	15	46	12	33	23	(132)			
280125	67	64	111	88	(210)	280486	11	11	104	(507)	280845	91	54	12	33	21	(211)			
280130	253	67	64	95	(661)	280491	11	11	104	(330)	280850	91	54	1	24	31	(201)			
280135	30	110	117	17	(306)	280496	11	11	104	(330)	280855	1	254	127	237	120	(739)			
280140	30	110	117	17	(306)	280501	11	11	104	(347)	280860	31	56	23	122	254	(486)			
280145	30	110	117	17	(306)	280506	11	11	104	(382)	280865	16	40	10	213	17	(304)			
280150	7	110	120	46	(574)	280511	11	11	104	(330)	280870	10	0	205	155	105	(475)			
280155	103	103	0	0	(203)	280516	11	11	104	(330)	280875	209	33	23	91	54	(410)			
280160	103	103	0	0	(203)	280521	11	11	104	(330)	280880	12	33	21	91	54	(211)			
280165	220	220	0	0	(300)	280526	11	11	104	(330)	280885	238	56	26	91	230	(660)			
280170	220	220	0	0	(300)	280531	11	11	104	(330)	280890	126	15	198	136	213	(689)			
280175	95	95	0	0	(694)	280536	11	11	104	(330)	280895	66	75	253	54	0	(448)			
280180	119	119	0	0	(316)	280541	11	11	104	(330)	280900	0	205	55	111	209	(590)			
280185	166	166	0	0	(917)	280546	11	11	104	(330)	280905	237	83	24	91	201	(636)			
280190	181	181	0	0	(310)	280551	11	11	104	(330)	280910	78	121	50	143	92	(484)			
280195	31	31	0	0	(611)	280556	11	11	104	(330)	280915	209	205	46	106	225	(611)			
280200	166	166	0	0	(679)	280561	11	11	104	(330)	280920	35	126	205	65	106	(537)			
280205	181	181	0	0	(611)	280566	11	11	104	(330)	280925	35	126	203	127	40	(531)			
280210	230	230	0	0	(679)	280571	11	11	104	(330)	280930	22	238	127	40	11	(430)			
280215	111	111	0	0	(464)	280576	11	11	104	(330)	280935	254	127	200	71	35	(667)			
280220	78	78	0	0	(574)	280581	11	11	104	(330)	280940	78	205	26	106	24	(439)			
280225	15	203	16	251	(464)	280586	11	11	104	(330)	280945	10	35	136	50	143	(364)			
280230	71	163	0	0	(459)	280591	11	11	104	(330)	280950	92	24	3	205	232	(556)			
280235	203	96	0	0	(640)	280596	11	11	104	(330)	280955	105	35	24	223	243	(630)			
280240	123	47	130	13	(400)	280601	11	11	104	(330)	280960	126	203	61	203	61	(653)			
280245	163	176	0	0	(634)	280606	11	11	104	(330)	280965	47	230	3	79	6	(365)			
280250	123	47	130	13	(634)	280611	11	11	104	(330)	280970	0	221	33	209	3	(466)			
280255	193	4	0	0	(634)	280616	11	11	104	(330)	280975	221	209	56	72	92	(452)			
280260	157	2	0	0	(463)	280621	11	11	104	(330)	280980	205	209	3	201	229	(847)			
280265	91	120	0	0	(463)	280626	11	11	104	(330)	280985	33	136	115	205	238	(727)			
280270	2	62	71	0	(342)	280631	11	11	104	(330)	280990	112	1	9	9	33	(160)			
280275	62	1	0	0	(153)	280636	11	11	104	(330)	280995	9	92	5	35	35	(226)			
280280	71	3	0	0	(750)	280641	11	11	104	(330)	290000	54	5	224	175	50	(509)			
280285	205	5	149	0	(370)	280646	11	11	104	(330)	290005	65	92	50	106	92	(405)			
280290	32	5	0	0	(261)	280651	11	11	104	(330)	290010	175	50	92	254	13	(363)			
280295	119	44	0	0	(453)	280656	11	11	104	(330)	290015	3	92	254	10	200	(567)			
280300	120	165	0	0	(453)	280661	11	11	104	(330)	290020	254	14	30	10	56	(368)			
280305	61	32	6	0	(453)	280666	11	11	104	(330)	290025	65	92	238	1	50	(446)			
280310	167	31	170	0	(647)	280671	11	11	104	(330)	290030	65	92	24	70	254	(505)			
280315	31	170	0	0	(779)	280676	11	11	104	(330)	290035	6	32	10	58	106	(212)			
280320	103	123	0	0	(155)	280681	11	11	104	(330)	290040	92	238	6	50	106	(494)			
280325	7	170	230	0	(439)	280686	11	11	104	(330)	290045	92	24	56	254	12	(438)			
280330	105	91	33	118	(617)	280691	11	11	104	(330)	290050	92	14	62	5	106	(296)			
280335	53	32	0	0	(647)	280696	11	11	104	(330)	290055	40	47	13	43	54	(197)			
280340	53	102	6	4	(617)	280701	11	11	104	(330)	290060	32	205	26	106	24	(393)			
280345	35	102	6	4	(617)	280706	11	11	104	(330)	290065	238	203	107	32	200	(590)			
280350	16	32	6	119	(640)	280711	11	11	104	(330)	290070	238	32	58	196	95	(633)			
280355	33	24	103	6	(169)	280716	11	11	104	(330)	290075	174	50	69	92	62	(444)			
280360	40	24	103	6	(240)	280721	11	11	104	(330)	290080	25	165	40	166	205	(641)			
280365	13	43	0	0	(473)	280726	11	11	104	(330)	290085	26	106	123	119	35	(409)			
280370	64	7	0	0	(583)	280731	11	11	104	(330)	290090	205	232	108	12	62	(616)			
280375	28	91	166	119	(583)	280736	11	11	104	(330)	290095	95	205	232	106	62	(699)			
280380	119	92	166	119	(330)	280741	11	11	104	(330)	291000	32	205	232	105	217	(791)			
280385	71	33	0	0	(464)	280746	11	11	104	(330)	291005	33	200	0	17	0	(250)			
280390	203	70	0	0	(464)	280751	11	11	104	(330)	291100	0	205	31	113	217	(556)			
280395	29	11	0	0	(607)	280756	11	11	104	(330)										
280400	4	260	0	0	(607)	280761	11	11	104	(330)										
280405	126	47	4	0	(607)	280766	11	11	104	(330)										
280410	160	32	7	22	(237)	280771	11	11	104	(330)										

(continued on next page)

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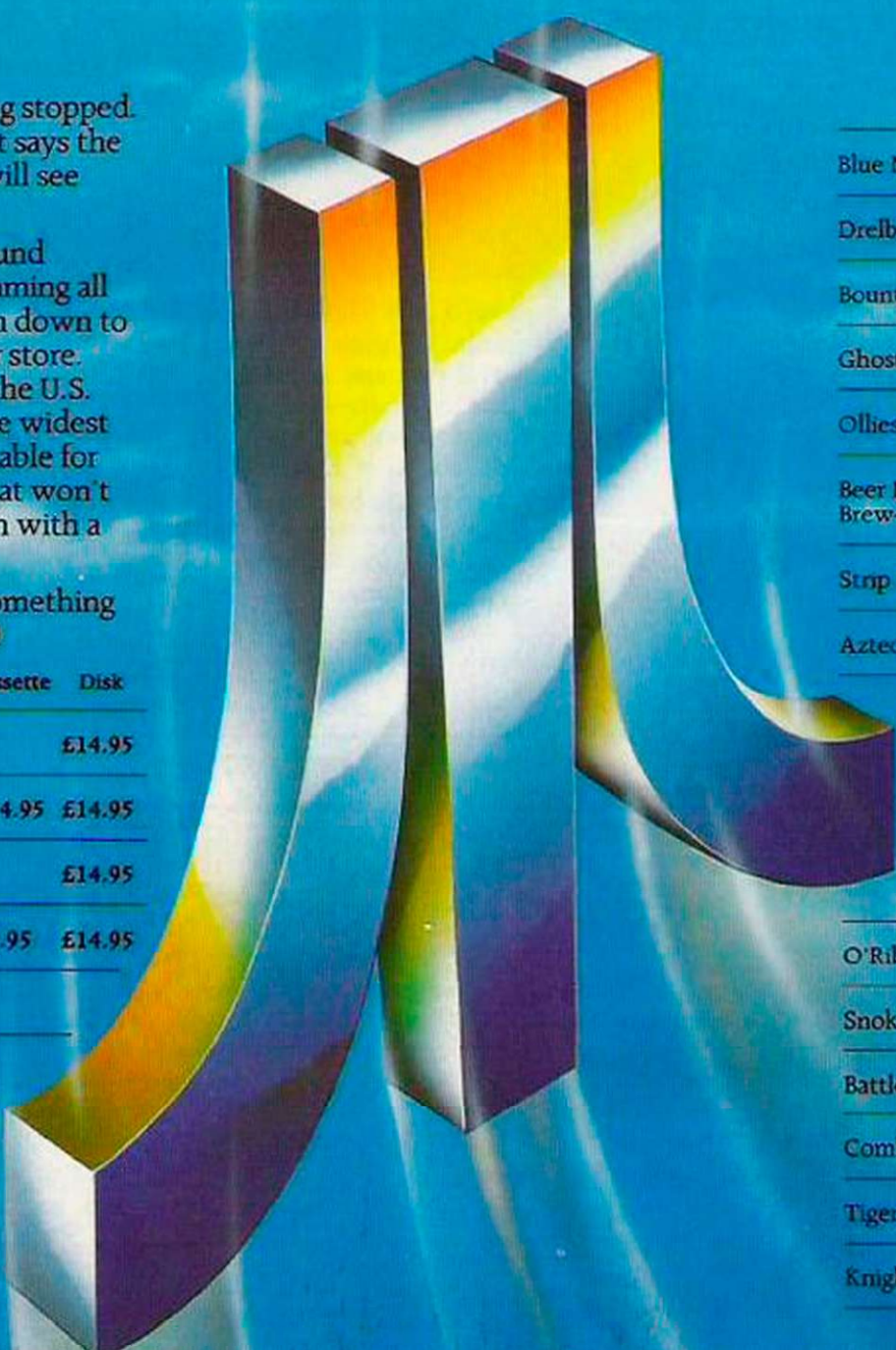
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Richard Hamer and his CBM-64 in a duel to the death with Gruesome Gandy.

THERE ARE six parts to Deathtrap 64, each of which must be typed in and saved — separately from each other. The first is a short program, which relocates the start of Basic to make room for the graphical data. The second is the data for the graphics themselves. The third is the data for the continuous music/IRQ routine. My thanks must go to Paul Marzetti for his 64 Bar Blues articles, published in the October 1984 issue of *Your Computer*.

The fourth part is the row scrolling routine, the fifth part the moving routine — this repositions the sprites and works out whether they should be on the right or left-hand side of the screen. The sixth part is the program itself. When you have typed all of this in, load the first part and run it — loading will continue automatically. When it has finished loading you will be presented with the options page.

Pressing 1 will start the game. Pressing 2 increases the time — decrease rate — the higher this is — maximum 4 — the slower the time runs out. Pressing 3 will increase the initial skill

DEATH TR

level which can be from 1 to 9 — the higher this number is, the harder the game is. Level 1 has one chaser, level 2 two, and so on, up to level 7, which has, like level 6, the maximum of six chasers. Pressing four will change the chasers' IQ: I = Intelligent, D = Dunce.

You can use either a joystick in port 2, or by keys which are as follows:

- Left — 2
- Right — X
- Up — I
- Down — J

Scroll row left — Shift and 2 together — or fire button and left with the joystick.
 Scroll row right — Shift and X — or fire button and right with joystick.
 Warp — Function key F1. There is no joystick equivalent.

Now for the game itself; You, Messy-Martin, must cross the dreaded squares which are inhabited by the even more dreaded Gruesome Gandy. Once you leave a square, it disappears, leaving a hole for you to fall through — if you do so you lose a life. You can cross from the far left side of the screen to the right side and vice versa — if you do this, the square you have

Program 1.

```
0 POKE198,7:POKE631,76:POKE632,111:POKE633,13:POKE634,82:POKE635,117:POKE636,13
10 POKE44,40:POKE40*256,0:CLR:NEW
```

Program 2.

```
0 DATA 15, 240, 0, 53, 92, 0, 213, 92, 0, 221, 119
1 DATA 0, 213, 87, 0, 213, 87, 0, 215, 87, 0, 221
2 DATA 87, 0, 221, 119, 0, 55, 220, 0, 53, 92, 0
3 DATA 13, 112, 0, 3, 192, 0, 0, 0, 0, 0, 0
4 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
6 DATA63, 252, 0,42,168, 0, 46, 184, 0, 42,168
7 DATA 0, 42, 232, 0, 43, 232, 0, 47, 168, 0, 59
8 DATA172, 58,172, 0, 14,176, 0, 14, 176, 0
9 DATA 3, 192, 0, 3, 192, 0, 0, 0, 0, 0, 0
10 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
11 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
12 DATA 0, 85, 42, 1, 85, 34, 1, 85, 40, 5, 85
13 DATA 98, 5, 245, 104, 21, 245, 64, 85, 85, 98, 85
14 DATA 85, 98, 5, 85, 98, 5, 125, 106, 7, 245, 64
15 DATA 7, 245, 106, 5, 85, 72, 5, 85, 72, 5, 85
16 DATA 0, 1, 85, 0, 1, 85, 0, 0, 84, 0, 1
17 DATA 84, 0, 1, 4, 0, 5, 20, 0, 0
18 DATA 1, 80, 170, 5, 84, 170, 10, 132, 130, 27, 228
19 DATA 130, 91, 233, 0, 82, 137, 42, 85, 86, 34, 21
20 DATA 85, 106, 21, 85, 98, 21, 85, 64, 21, 85, 106
21 DATA 31, 245, 98, 31, 245, 106, 5, 245, 104, 5, 85
22 DATA 98, 1, 85, 0, 0, 84, 42, 0, 80, 0, 1
23 DATA 84, 0, 1, 4, 0, 5, 20, 0, 0
24 DATA 15, 255, 194, 13, 85, 114, 53, 85, 122, 53, 86
25 DATA 90, 213, 90, 152, 213, 154, 184, 213, 170, 183, 214
26 DATA 169, 183, 214, 169, 183, 154, 181, 87, 154, 181, 87
27 DATA 170, 85, 87, 170, 85, 92, 169, 85, 92, 169, 85
28 DATA 92, 229, 85, 92, 37, 85, 112, 13, 85, 112, 3
29 DATA 85, 192, 0, 213, 192, 0, 255, 0, 0
30 DATA 60, 66, 165, 129, 102, 24, 36, 195, 0, 24, 36
31 DATA 36, 126, 66, 129, 0, 0, 192, 176, 136, 240, 136
32 DATA 176, 192, 0, 3, 12, 48, 64, 48, 12, 3
33 DATA 0, 192, 160, 144, 136, 144, 160, 192, 0, 224, 152
34 DATA 128, 224, 128, 152, 224, 0, 224, 152, 128, 224, 152
35 DATA 128, 128, 0, 30, 96, 128, 159, 66, 50, 14
36 DATA 68, 68, 130, 130, 254, 130, 130, 68, 68, 219, 24
37 DATA 24, 24, 24, 219, 60, 7, 56, 200, 0, 4, 2
38 DATA 2, 60, 0, 72, 72, 80, 112, 76, 67, 64
39 DATA 32, 32, 32, 64, 64, 67, 140, 240, 130, 198, 202
```

```
40 DATA 170, 146, 129, 129, 129, 129, 193, 162, 162, 146, 146
41 DATA 142, 130, 24, 36, 66, 129, 129, 66, 36, 24
42 DATA 224, 152, 132, 130, 254, 128, 128, 24, 36, 66
43 DATA 145, 187, 70, 38, 25, 252, 130, 129, 130, 252, 176
44 DATA 140, 131, 3, 12, 48, 192, 63, 12, 48, 192
45 DATA 15, 48, 200, 8, 4, 4, 2, 1, 66, 66, 66
46 DATA 66, 66, 66, 36, 24, 32, 33, 66, 68, 136, 144
47 DATA 160, 192, 129, 129, 129, 145, 145, 169, 169, 66, 66
48 DATA 65, 66, 36, 40, 16, 48, 72, 136, 33, 18, 10
49 DATA 4, 8, 16, 16, 32, 192, 48, 12, 3, 252, 48
50 DATA 12, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0
51 DATA,,,,,3,7,,,,,255,255,15,31,63,127,255,128,128,255,
255,253,249,242,228,
40
52 DATA48,224
54 DATA 0, 0, 0, 0, 0, 0, 0, 0, 3, 15, 53
55 DATA 243, 243, 53, 15, 3, 3, 15, 49, 245, 241, 55
56 DATA 15, 3, 3, 15, 49, 245, 241, 53, 15, 3
57 DATA 3, 15, 49, 251, 251, 49, 15, 3, 204, 202, 204
58 DATA 202, 204, 192, 202, 202, 255, 255, 195, 219, 219, 195
59 DATA 255, 255, 202, 206, 192, 206, 196, 196, 196, 192
60 DATA 31, 32, 44, 33, 41, 36, 19, 8, 248, 4, 52
61 DATA 132, 148, 36, 200, 16, 196, 55, 15, 3, 3, 12
62 DATA 48, 192, 35, 236, 240, 192, 192, 48, 12, 3
63 DATA 0, 0, 3, 15, 31, 63, 127, 127, 126, 129, 197
64 DATA 242, 248, 252, 254, 254, 253, 196, 109, 109, 63, 31
65 DATA 15, 3, 191, 163, 54, 182, 252, 248, 240, 192
66 DATA 24, 36, 70, 137, 145, 98, 36, 24, 8, 24, 40
67 DATA 8, 16, 16, 16, 120, 24, 100, 130, 130, 6, 12
68 DATA 48, 127, 12, 52, 196, 12, 20, 36, 4, 124
69 DATA 32, 32, 68, 68, 136, 240, 30, 32, 15, 24, 96
70 DATA 124, 2, 1, 1, 62, 8, 16, 32, 96, 152, 68
71 DATA 40, 16, 6, 10, 18, 36, 12, 8, 8, 16
72 DATA 24, 36, 66, 36, 24, 36, 36, 24, 8, 20, 36
73 DATA 100, 20, 12, 4, 4
100 FORT=0T04:FORM=0T063:READA:POKE2048+M+T*64,A:NEXTM,T
101 FORT=0T057:FORM=0T07:READA:POKE8192+M+T*8,A:NEXTM,T
102 POKE198,6:POKE631,76:POKE632,111:POKE633,13:POKE634,82:
POKE635,117:POKE636,1
```

just left is not destroyed. Your objective is to reach the bomb, collecting bonus flags on the way, so that you can defuse the bomb before its timer runs out, and it comes to get you.

If you run into Gruesome Gandy on the way your nose will immediately seize up and he will crush your head. All this is done behind a cloud.

If you do manage to defuse the bomb it will be replaced by another for you to defuse. After you have defused five bombs you move onto the bonus screen (qv).

While you guide Martin past Gandy, you must avoid the deadly Gandyish traps, the dreaded Ken-and-Shrimp bones. An added feature of this version is that you can — theoretically — scroll the row to your advantage. I say theoretically, because it takes quite a bit of practice. Remember, when scrolling, that squares are deadly, as are Ken-and-Shrimp bones to poor little Martin. Study the scrolling

pattern — ie. have a practice on level 1 — so that you learn how to scroll without killing yourself. Helpful keys are:

- F3 — Music on/off
- F5 — Pause/Unpause
- Shift F7 — Abort game and return to title screen.
- Commodore £ — Stop game, return character set to normal, turn off sprites — I used it when debugging my program, you may find it useful.

If you find yourself stuck, you can press the warp button. But beware — it may transport you to your death, since Martin's warp facility has been malfunctioning ever since Gandy met him on a hot summer's day. Your warp machine can only work for a certain number of times per level — this is shown as a yellow bar at the top of the screen. Your time is the red bar at the bottom. Once this has run out,

you are on your own until you complete that level.

When you have defused five bombs, you move onto the bonus screen, where you must try and get the flag — this is not always possible! Because sprites are used, you must aim towards the left of the flag — sometimes, you can lose your bonus because you are one pixel to the left.

Press a key to start and press it once again to start your descent. The quicker you do it, and the higher the level, the bigger the bonus you will receive. After this screen, the skill level is incremented, and you go back to the first screen.

Finally, if you don't/can't type this program in, but would like a copy of it on tape, send a cheque/postal order for £2.50 made out to R. Hamer to: Deathtrap 64 Offer, 26 St. Barnabas Road, Emmer Green, Reading RG4 8RA.

(program 5 and 6 on page 79)

RAP 64

Program 3.

```

0 L=L+1:IFL=2THENLOAD
1 IFL=3THEN715
19 DATA173,238,2,240,3,76,49,234,206,239,2,208,248,173,240,2
20 DATA141,239,2,174,2,,189,48,192,201,255,240,70,141,1,212
30 DATA189,92,193,141,,212,189,136,194,141,0,212,189,180,195,141
40 DATA7,212,189,224,196,141,15,212,189,12,190,141,14,212,232,234
50 DATA142,2,,169,,141,4,212,141,11,212,141,18,212,173,241
60 DATA2,141,4,212,173,242,2,141,11,212,173,243,2,141,18,212
70 DATA76,49,234,169,,141,2,,76,69,199
80 FORD=51000T051106:READA:POKEA:R:NEXT
90 DIMHT(20),LT(20),HM(20),LM(20),HB(20),LB(20)
100 FORA=0T020:READHT(A),LT(A):HMA(A)=HT(A):LMA(A)=LT(A):HBA(A)=HT(A):LBA(A)=LT(A):H
EXT
130 DATA,,14,24,16,195,10,209,11,40,9,104,21,31,22,96,25,30,20,49,33,135,31,165
140 DATA37,162,42,62,44,193,58,60,63,75,0,97,10,143,12,143,235,235
200 POKE49800,0:POKE50100,0:POKE50400,0:POKE50700,0:POKE50701,0
201 FORA=0T0123:READB:POKE49200+A,HT(B):POKE49500+A,LT(B):POKE49800+A,0
202 POKE50100+A,0:POKE50401+A,HB(B):POKE50701+A,LB(B):NEXT
203 POKE49924,0:POKE50224,0:POKE50524,0:POKE50824,0:POKE50825,0
204 FORA=124T0224:READB:POKE49200+A,HT(B):POKE49500+A,LT(B):POKE49800+A,HB(B)
205 POKE50100+A,HB(B):POKE50400+A,HB(B):POKE50700+A,LB(B):NEXT
300 DATA3,2,3,1,4,1,5,5,5,3,2,3,1,4,1,5,5,5
310 DATA3,6,7,6,7,3,6,3,6,2,3,1,4,1,5,5,5
311 DATA3,2,3,1,4,1,5,5,5,3,6,7,6,7,3,6,3,6,2,6,3,7,9,10,10,10
312 DATA10,11,10,8,6,8,2,2,2,10,11,10,8,6,8,2,2,2
313 DATA10,12,13,12,13,10,12,10,12,11,10,8,6,8,2,2,2
314 DATA10,11,10,8,6,8,2,2,2,10,12,13,12,13,10,12,10,12,11,12,10,13,15,16,16,16
315 DATA16,20,20
320 DATA,,17,17,17,18,19,2,2,2,1,1,1,1,1,4,19,1,19,19,19,19,19,19,19,17,17
321 DATA17,18,19,19,19,5,5,5,5,5,18,18,4,18,5,17,17,17,17,17,17,17,17,17,17
322 DATA18,19,2,2,2,1,1,1,1,1,4,19,1,19,19,19,19,19,19,19,19,17,17,18,19,19
323 DATA19,19,19,5,5,5,5,5,18,4,18,5,17,17,17,,20,20
499 S=34272
500 POKES+24,31:POKES+22,128:POKES+23,244:POKES+5,0:POKES+6,240
505 POKES+12,85
530 POKES+13,133:POKES+19,10:POKES+20,197:POKE753,17:POKE754,65:POKES+10,8
540 POKE755,33:POKE752,8:POKE788,56:POKE789,199
600 POKE2,125:POKE51100,125
714 POKE750,1:LOAD
715 POKE198,6:POKE631,76:POKE632,111:POKE633,13:POKE634,92:POKE635,117:POKE636,1
3

```



Program 4.

```

0 DATAA9,FF,8D,20,CB,A0,4D,B1
10 DATAFB,C8,C8,91,FB,88,88,88
20 DATACC,20,CB,D0,F2,EA,EA,EA
30 DATAEA,EA,EA,EA,EA,EA,EA,18
40 DATAA9,08,E5,FC,30,3A,18,EA
50 DATAA9,D4,65,FC,4C,54,C8,A9
60 DATA0E,A0,00,91,FB,C8,91,FB
70 DATAA0,28,91,FB,C8,91,FB,A9
80 DATA1F,91,FD,A9,1E,88,91,FD
90 DATAA0,00,A9,1C,91,FD,C8,A9
100 DATA1D,91,FD,60,85,FC,4C,00
110 DATAC8,EA,EA,EA,EA,EA,EA,EA
120 DATAA9,D4,18,65,FE,85,FC,4C
130 DATA2F,C8,00,00,02,02,00,00
140 DATAA9,50,8D,20,CB,A0,02,B1
150 DATAFB,88,88,91,FB,C8,C8,C8
160 DATACC,20,CB,D0,F2,EA,EA,EA

```

```

170 DATAEA,EA,EA,EA,EA,EA,EA,18
180 DATAA9,08,E5,FC,30,3A,18,EA
190 DATAA9,D4,65,FC,4C,C4,C8,A9
200 DATA0E,A0,26,91,FB,C8,91,FB
210 DATAA0,4E,91,FB,C8,91,FB,A9
220 DATA1F,91,FD,A9,1E,88,91,FD
230 DATAA0,26,A9,1C,91,FD,C8,A9
240 DATA1D,91,FD,60,85,FC,4C,70
250 DATAC8,EA,EA,EA,EA,EA,EA,EA
260 DATAA9,D4,18,65,FE,85,FC,4C,9F,C8
500 FORT=0T0217:READA$:L$=LEFT$(A$,1):
R$=RIGHT$(A$,1):L=ASC(L$):R=ASC(R$)
510 IFL>64THENL=L-55:GOTO530
520 L=L-48
530 IFR>64THENR=R-55:GOTO550
540 R=R-48
550 X=(L*16)+R:POKE51200+T,X:NEXT
1000 LOAD

```

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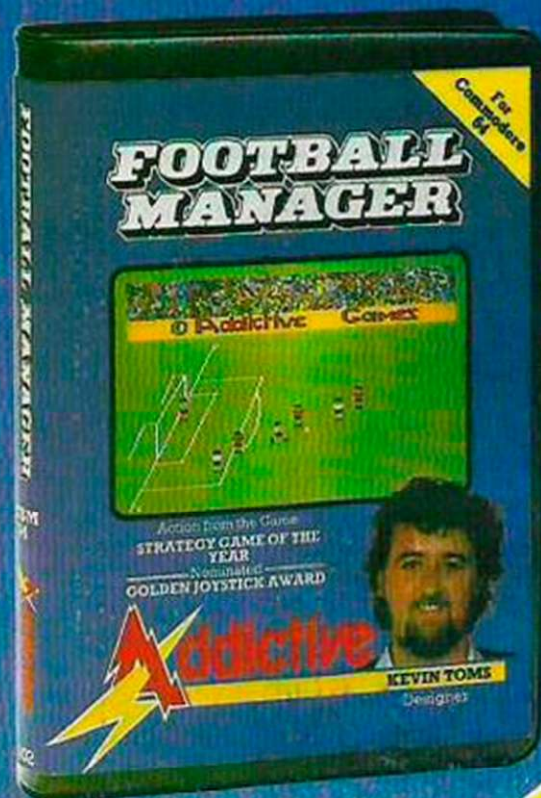
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Listing 1.

```

1 LOAD "CODE" CLS
2 CLS : REM "WAVES" BY TIM+CLO
3 POKE 65500,0: POKE 65501,12
4 PRINT "PRESS L TO LOAD FR
AMES": PRINT "PRINT "
OTHER KEY TO CONTINUE"
5 IF INKEY$="L" THEN GO TO 50
6 IF INKEY$="" THEN GO TO 8
7 IF INKEY$="L" THEN GO TO 8
8 CLS : PLOT 127,0: DRAW 0,17
9 PLOT 0,87: DRAW 255,0
10 DIM L(127): DIM H(127): DIM
G(127): DIM F(127): DIM O(127)
11 LET A=43
12 LET D=-1
13 FOR T=1 TO 4
14 FOR G=1 TO 127
15 IF INKEY$="0" THEN PLOT G+D
16 IF INKEY$="0" AND T=2 THEN
FOR G=1 TO 127: LET H(G)=L(G)+88
17 PLOT G+128,H(G): NEXT G: GO TO
118
118 IF INKEY$="0" AND T=4 THEN
FOR G=1 TO 127: LET U(G)=D(G)+88
19 PLOT G+128,U(G): NEXT G: GO TO
116
116 IF INKEY$="8" THEN LET A=A+
17 PLOT G+D,A: GO TO 100
117 IF INKEY$="5" THEN LET A=A-
18 PLOT G+D,A: GO TO 100
118 IF INKEY$="7" THEN LET A=A+
19 PLOT G+D,A: GO TO 100
119 IF INKEY$="6" THEN LET A=A-
20 PLOT G+D,A: GO TO 100
120 IF INKEY$="1" THEN INPUT "S
TARTING DEGREE": P: GO TO 1000
121 IF T=1 THEN LET L(G)=A: GO
TO 115
122 IF T=2 THEN LET H(G)=A: GO
TO 115
123 IF T=3 THEN LET O(G)=A: GO
TO 115
124 LET U(G)=A
125 NEXT G
126 IF T=2 THEN CLS: PLOT 127
0: DRAW 0,175: PLOT 0,87: DRAW 2

```

```

55,0: LET A=43: LET D=-1
117 IF T=1 THEN LET A=131: LET
D=127
118 IF T=3 THEN LET A=131: LET
D=127
130 NEXT T
140 OVER 1: PLOT 127,0: DRAW 0,
175: PLOT 0,87: DRAW 255,0: PLOT
127,87: OVER 0
141 FOR G=1 TO 127: LET F(G)=(O
(G)-L(G))/8: LET O(G)=(U(G)-H(G)
)/8: NEXT G
145 INPUT "SOUTH TO NORTH ? ";S
146 INPUT "WEST TO EAST ? ";US
147 CLS: FOR C=1 TO 9
148 FOR G=0 TO 128: PLOT G,L(G+
1): PLOT G+128,H(G+1): NEXT G
149 IF S$="" THEN GO TO 152
150 IF US$="" THEN GO TO 200
151 GO TO 2000
152 FOR A=0 TO 126 STEP 4
153 PLOT A,L(A+1)
154 DRAW 128,88+((H(A+1)-88)-L(A
A+1))
155 NEXT A
156 GO TO 150
157 FOR I=0 TO 126
158 LET B=L(I+1): LET A=I
159 LET C=L(I+1): LET A=I
160 LET D=A+12.7: LET B=B+8.8
161 LET E=B+((H(I+1)-88)-L(I+1)
)/10
162 PLOT A,B
163 NEXT G
164 NEXT T
165 GO TO 2000
166 FOR O=0-1 TO 126
167 LET J=(SIN (P/360+2*PI)+40+
40)
168 PLOT O+((T=2 OR T=4)+128),J
+((T=2 OR T=4)+88)
169 IF T=1 THEN LET L(D+1)=J: G
O TO 1030
170 IF T=2 THEN LET H(D+1)=J+88
: GO TO 1030
171 IF T=3 THEN LET O(D+1)=J: G
O TO 1030
172 LET U(D+1)=J+88
173 LET P=P+(360/127)
174 NEXT D
175 GO TO 115

```

```

2000 POKE 65532,PEEK (65496+C*2)
2001 POKE 65533,PEEK (65499+C*2): L
ET A=USR 65400
2002 POKE 65498+((C+1)*2),PEEK 6
5534: POKE 65499+((C+1)*2),PEEK
65535
2003 FOR G=1 TO 127
2004 LET L(G)=L(G)+F(G)
2005 LET H(G)=H(G)+O(G)
2006 NEXT G
2007 CLS
2008 PEEP "S,10"
2009 NEXT C
2010 FOR G=1 TO 9
2011 POKE 65532,PEEK (65498+G*2)
2012 POKE 65533,PEEK (65499+G*2)
2013 LET A=USR 65450
2014 IF INKEY$="E" THEN GO TO 50
2015 GO
2016 NEXT G
2017 FOR G=9 TO 1 STEP -1
2018 POKE 65532,PEEK (65498+G*2)
2019 POKE 65533,PEEK (65499+G*2)
2020 LET A=USR 65450
2021 IF INKEY$="E" THEN GO TO 50
2022 GO
2023 NEXT G
2024 GO TO 4000
2025 CLS: PRINT "PRESS S TO S
AVE ALL FRAMES": PRINT "
AVE ALL FRAMES": PRINT "
R TO RESTART PROGRAM": P
RINT "
R TO SEE A
NIMATION"
2026 IF INKEY$="A" THEN GO TO 40
2027 IF INKEY$="R" THEN GO TO 5
2028 IF INKEY$="S" THEN GO TO 50
2029 GO TO 5010
2030 INPUT "FILE NAME ";N$: IF L
EN(N$) > 10 THEN GO TO 5050
2031 LET J=(PEEK 65518+256-PEEK
65519)-32768
2032 SAVE N$CODE 32768,J: SAVE "
DATA"CODE 65500,18: VERIFY "CODE
"
2033 VERIFY "CODE"
2034 GO TO 5000
2035 INPUT "FILE NAME ? ";N$: IF
LEN(N$) > 10 THEN GO TO 5030
2036 LOAD N$CODE: LOAD "CODE"
GO TO 4000

```

Listing 2.

```

10 DEF FN H(H$)=15*(CODE H$(1)
-48-(7 AND H$(1))+"9")+CODE H$(2)
-48-(7 AND H$(2))+"9")
20 FOR N=65400 TO 65480 STEP 8
30 LET TOT=0
40 PRINT N:
45 INPUT H$: PRINT H$
50 FOR B=1 TO LEN H$ STEP 2
60 LET Z=FN H(H$): LET TOT=TOT
+Z
70 POKE N+((B-1)/2),Z
80 LET H$=H$(3 TO )
90 NEXT B
100 PRINT " = ";: INPUT T: PRIN
T T
110 IF TOT <> T THEN PRINT "INPUT
ERROR - TRY AGAIN": GO TO 30
120 NEXT N

```

Listing 3.

```

65400: 1100402AFCFF1A77 = 775
65408: 2313EB060003E00BE = 547
65416: C29BFF2333E556ECCA = 1179
65424: A2FF043EFAFB8CA9B = 1279
65432: FF18EA78EB7723C3 = 1217
65440: 7EFFF78EB772322FE = 1178
65448: FFC91100402AFCFF = 1088
65456: 7E1223133E5792DA = 711
65464: CFFF463E00B8C9CB = 1183
65472: FF3E00121310F423 = 649
65480: C3B0FF23C3B0FFC9 = 1488

```

WAVES



Timothy Closs with
a Spectrum program to make
you sea-sick.

HOW MANY TIMES have you wanted to show off your new computer but have had nothing more to boast than a load of boring arcade games? Well now you can impress everyone with a stunning graphics display using Waves.

Waves allows a "net" pattern — see examples — to be transformed into another net pattern in a smooth, nine frame animation sequence. It is easy to use, but results can be stunning. When Run, Waves will display the message: PRESS L TO LOAD FRAMES

ANY OTHER KEY TO CONTINUE

If you wish to load some frames from tape, press L and enter the name of the file to be loaded — otherwise press any other key.

A cross will then be displayed on the screen. The lower edge of your first pattern must now be drawn — see controls. When your edge is finished the cursor will move up into the top right hand box and your second edge must be drawn.

The screen will then be cleared and the same

process must be repeated for the edges of your second pattern. The main controls are:

- 5 cursor down at a 45 degree angle
- 6 cursor down at a 22.5 degree angle
- 8 cursor up at a 45 degree angle
- 7 cursor up at a 22.5 degree angle
- 9 cursor across in a straight line

In addition to these basic controls, however, a sine wave can be drawn by pressing 1.

Also, pressing 0 will copy the edge from the bottom left box into the top right box.

Now that all the edges have been entered, Waves will come up with the question "South to North?". Pressing Y will mean that your net patterns will have lines drawn from the bottom edge to the top edge.

If you reply Y to the following question, "West to East?", your patterns will have 10 intermediate lines drawn from the left of the screen to the right. If you reply Y to both questions you will have criss-cross net patterns.

You can escape from the graphical display by

pressing E. The program will then print the message:

PRESS S TO SAVE FRAMES
R TO RESTART PROGRAM
A TO SEE ANIMATION

To enter Waves, first type in the Basic program in listing 1 and save it by typing: SAVE "WAVES" LINE 4

New the program and type in listing 2. Run this program and type in the hex code in listing 3, remembering to enter the checksum at the end of each line. Now save this code directly after the Basic program by typing:

SAVE "WAVECODE" CODE 65400,100
LOAD "WAVES"

and you are ready to start using Waves!

If you do not wish to type in the program and code, simply send a blank tape, SAE and £1 to me at: 5 Western Drive, Shepperton, Middlesex TW17 8HJ for a copy of Waves plus an example of what the program can do. ■

SWITCH ON your 64; the screen memory starts at 1024 — hex 0400 — so that, for example, POKE 1024,1

puts an A in the extreme top-left corner — older 64s may need colour Ram to be poked too. Right? For most purposes, this is assumed to be a fixed feature of the 64.

What's less well known is that the screen can be repositioned through most of the machine's 64K of Ram. The diagram shows the normal situation, with about 39000 bytes of Basic positioned between the top of the screen — \$08000 — and Rom at \$A000. But we can move the screen, in minimum steps of \$0400, anywhere in memory.

Screens under Rom

Some locations aren't suitable, as machine-language programmers will appreciate — for example the zero-page, at the very start of memory, cannot be used as a normal screen. My example puts screens under Rom, partly because many programmers don't know how to

MOVING SCR

Rae West explains a routine which will switch between screens for animation or Help pages.

use this area (machine language is usually needed), so it's usually free, and partly to avoid the complication of altering Basic pointers to prevent programs overlapping the screen area.

"Moving the screen" — what does this mean? Nothing to do with the TV! — we want commands like Print and keys like CLR to

work normally, but to have freedom to alter the actual position in memory that screen information is stored. If we do the job properly, most things will be unaltered, but Pokes to screen, if used, will be different — the addresses will be much larger than usual since the screen Ram is higher up.

Before we continue, it makes sense to ask why anyone should want to move the screen around. In fact, there are several tricks we can perform with this method, which are impossible otherwise:

- We can switch between screens at will. For example, a Help screen might be permanently set up; a keypress would allow instantaneous switching between conventional processing and such a screen.
- Animation is another possibility: there's room for 16 screens in Bank 1, plus 12K of Basic below them, enough for attractive animation of the piston-engine demo type.
- Screens of user-defined graphics and normal characters can be alternated.

Using interrupt techniques, we can mix screens on the same display.

Attractive patterns

My demonstration program puts four user-defined characters in Ram; these are designed to fit together to produce attractive patterns. The program uses two screens — Apple users will know the kind of thing — Apple has two alternate screens. It fills one screen, displays it, then repeats with the other, so there's no delay while one pattern is overwritten with the next. The result is quite impressive.

Vic-II is the key to the action, and it's necessary to get several things right, which is why the technique isn't too simple. As the diagram shows, Vic-II can be programmed to process only a quarter of the 64's memory at one time. All the character definition information — i.e. patterns of 8 by 8 dots — and the screen Ram, and sprite information must be stored within this 16K. The only exception is the 64's Rom character set, which is wired up to override this requirement.

Moving the screen

So, to move the screen under Rom, we must (i) Set Vic-II to bank 2 or 3; (ii) Set Vic-II to read the character set we want; and (iii) ensure Basic writes to our new screen. This last item

Figure 1.

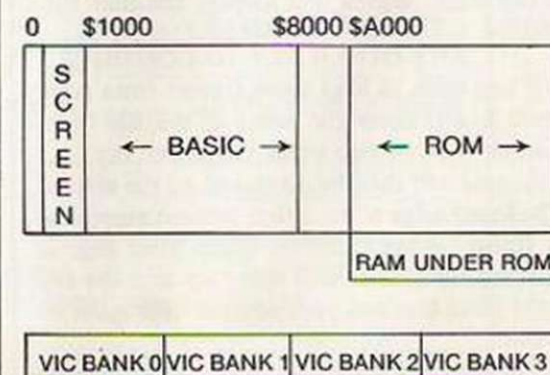


Table 1.

Usable Character Definition and Screen Combinations

Vic Bank 0: selected with POKE 56576,(PEEK(56576)AND 252) OR 3 (DEFAULT) (usual value is 151)

Start of Screen Memory	POKE 648** with	Start of Graphics Character Memory							
		2048	4096	6144	8291*	10240	12288	14336	
		POKE 53272 with:							
1024	4	19	21	23	25	27	29	31	
2048	8	35	37	39	41	43	45	47	
3072	12	51	53	55	57	59	61	63	
The screen cannot be placed at 4096-8191, as the Vic sees character ROM here.									
8192	32	131	133	135	137	139	141	143	
9216	36	147	149	151	153	155	157	159	
10240	40	163	165	167	169	171	173	175	
11264	44	179	181	183	185	187	189	191	
12288	48	195	197	199	201	203	205	207	
13312	52	211	213	215	217	219	221	223	
14336	56	227	229	231	233	235	237	239	
15360	60	243	245	247	249	251	253	255	

*Starred columns correspond to bit-map graphics.

**Not needed with bit-map graphics.

Vic Bank 1: selected with POKE 56576,(PEEK(56576)AND 252) OR 2 (usual value is 150)

Start of Screen Memory	POKE 648 with	Start of Graphics Character Memory							
		16384*	18432	20480	22528	24576*	26624	28672	30720
		POKE 53272 with:							
16384	64	1	3	5	7	9	11	13	15
17408	68	17	19	21	23	25	27	29	31
18432	72	33	35	37	39	41	43	45	47
19456	76	49	51	53	55	57	59	61	63
20480	80	65	67	69	71	73	75	77	79
21504	84	81	83	85	87	89	91	93	95
22528	88	97	99	101	103	105	107	109	111
23552	92	113	115	117	119	121	123	125	127
24576	96	129	131	133	135	137	139	141	143
25600	100	145	147	149	151	153	155	157	159
26624	104	161	163	165	167	169	171	173	175
27648	108	177	179	181	183	185	187	189	191
28672	112	193	195	197	199	201	203	205	207
29696	116	209	211	213	215	217	219	221	223
30720	120	225	227	229	231	233	235	237	239
31744	124	241	243	245	247	249	251	253	255

SCREENS



relies on location 648.

PRINT PEEK (648)

usually returns 4, showing the screen starts at \$0400.

Memory arrangements

Table 1 — which, so far as I know, hasn't been printed before — summaries the 64's screen memory arrangements. You should be able to see from it that my example puts character definitions from 49152 onwards, and uses two screens, starting at 50176 and 51200, which it switches between. While Print takes place, the "wrong" value of 648 is used, which makes the 64 display the alternative screen.

Incidentally, sprites are usable with this method; sprite pointers are hidden away just above the screen, so when a screen is moved these pointers shift too. One final word: when experimenting, Stop-Restore won't change location 648. So if your cursor seems to have vanished, try

POKE 648,4

to return to normal.

Rae West has written a 600 page reference book, *Programming the Commodore 64*, recently published by Level Ltd. It is obtainable from booksellers or by mail from Biblios Distribution, Star Road, Part-ridge Green, Nr Horsham, W. Sussex at £14.90 plus £1 post.

Vic Bank 2: selected with POKE 56576,(PEEK(56576)AND 252) OR 1
(usual value is 149)

Start of Screen Memory	POKE 648 with	Start of Graphics Character Memory							
				ROM char set					
		U.CASE	L.CASE	36864	38912	40960*	43008	45056	47104
32768*	34816								
POKE 53272 with:									
32768	128	1	3	5	7	9	11	13	15
33792	132	17	19	21	23	25	27	29	31
34816	136	33	35	37	39	41	43	45	47
35840	140	49	51	53	55	57	59	61	63

The screen cannot be placed at 36864-40959, as the Vic sees character Rom here.

Above this point in this bank, Ram and Basic Rom co-exist in the memory map; the Vic "sees" the Ram, not the Rom, but the routines that perform screen operations need to read from screen Ram; they can't do so, in this region, without first switching out the Roms and switching in the Ram. This isn't normally done — it can only be done if Basic is not in use. So this area cannot effectively be used for screen Ram. Note, however, that it can be used to store character definitions, since these don't need to be read back, as the Vic chip will read these from Ram while the 6510 reads instructions from the parallel Rom containing Basic.

Vic Bank 3: selected with POKE 56576,(PEEK(56576)AND 252)
(usual value is 148)

Note: only the region of memory \$C000-\$CFFF (49152-53247) can be used as screen RAM: see the comments above.

Start of Screen Memory	POKE 648 with	Start of Graphics Character Memory							
				Caution: I/O chips					
		49152*	51200	53248	55296	57344*	59392	61440	63488
POKE 53272 with:									
49152	192	1	3	5	7	9	11	13	15
50176	196	17	19	21	23	25	27	29	31
51200	200	33	35	37	39	41	43	45	47
52224	204	49	51	53	55	57	59	61	63

To use these tables:

(i) To determine screen start and graphics definition start, Peek contents of 648 and 53272, then refer to the table. Example: when 648 contains 140 and 53272 contains 53, screen Ram starts at 35840 and Rom characters at 36864. Bank 2 is in use; this can be deduced from the position of screen Ram given in 648.

(ii) To set screenstart and graphics definitions, Poke all three parameters, unless already set. Example: POKE 56576, (PEEK(56576)AND252)OR 2: POKE 648,120: POKE 53272,252 selects bank 1, puts screen at 30720 and chooses user-definable characters at 28672. In Basic, POKE 56,28672/256: CLR or POKE 56,112: CLR lowers the top of Basic to protect the definitions and screen.

(iii) To move the normal character definitions, use POKE 56333,127: POKE 1,51 followed by a loop to transfer 53248-57343 (or a subset) to the new position, then POKE 1,55: POKE 56333,129. All this must be in program mode. This method is easier than defining all the characters from scratch.

(iv) The Vic-II's bank-switching forces both screen and character definitions to coexist in the same quarter of the 64's memory map. It's perfectly OK to start the screen up at 49152, and store character definitions in the Ram from 61440, say, taking nothing from Basic. Many character sets can be stored simultaneously, in fact.

Demo program.

```

0 REM *** 'YOUR COMPUTER' - DEMONSTRATION OF TWO C64 SCREENS ***
10 POKE 56576,148 : REM VIC BANK 3
20 S$="@ABC" : REM 4 CHARACTERS
30 FOR J=49152 TO 49183: READ X: POKE J,X: NEXT: REM SET UP USER DEFINED CHARS
40 DATA 36,36,255,0,0,255,36,36
50 DATA 36,36,231,36,36,231,36,36
60 DATA 36,18,9,132,66,33,144,72
70 DATA 36,72,144,33,66,132,9,18
99 REM **** NOW WE DISPLAY ONE SCREEN, WHILE WRITING TO THE OTHER:- ****
100 GOSUB 1000: POKE 53272,17: POKE 648,200: REM ONE SCREEN ...
110 GOSUB 1000: POKE 53272,33: POKE 648,196: REM ... OTHER SCREEN!
120 GOTO 100
999 REM **** MAKE A RANDOM STRING OF LENGTH 9 FROM THE 4 CHARACTERS:- ****
1000 X$="": FOR J=1 TO 9: L=RND(1)*4+1
1010 X$=X$+MID$(S$,L,1): NEXT
1020 PRINT "X$": FOR J=1 TO 11: PRINT X$: NEXT
1030 RETURN
    
```

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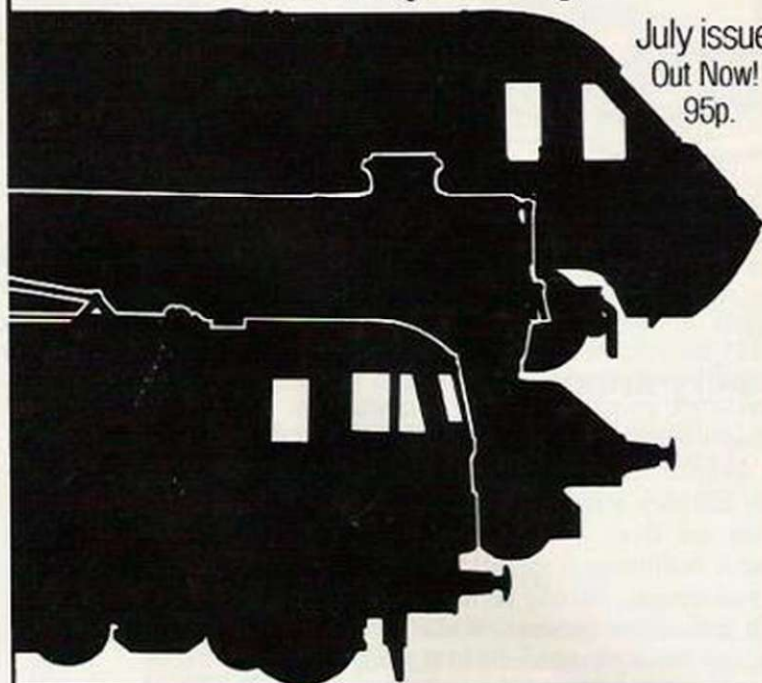
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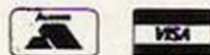
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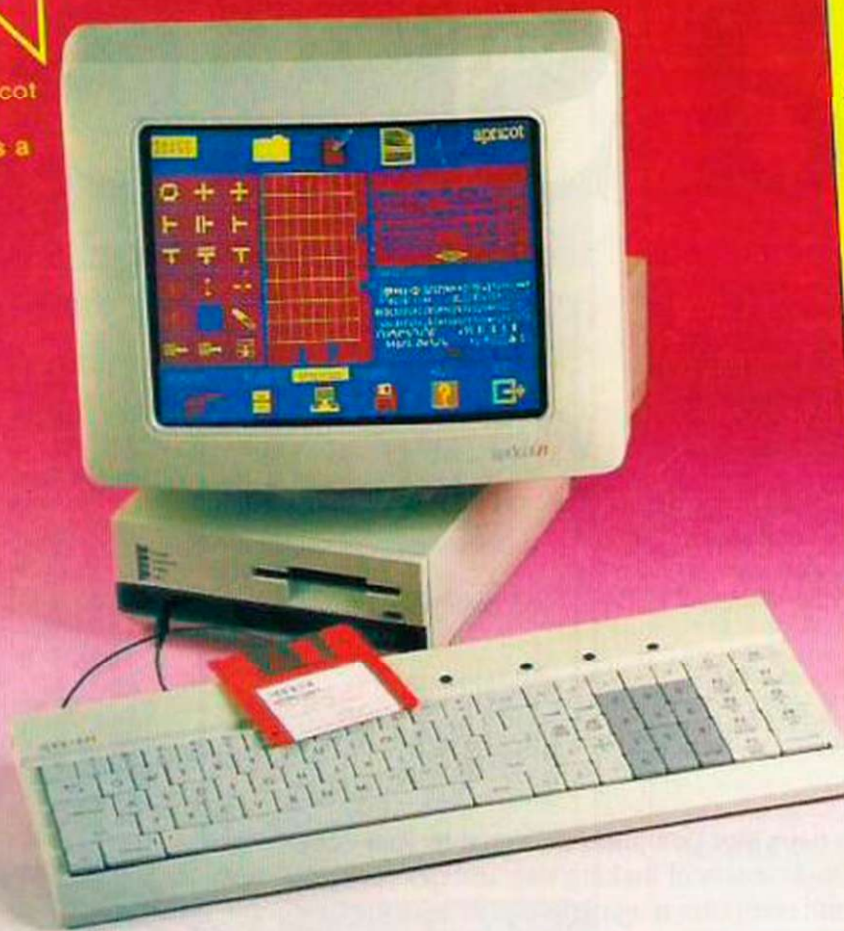
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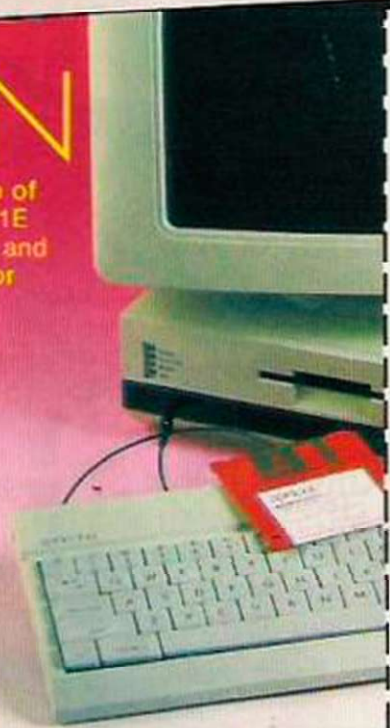
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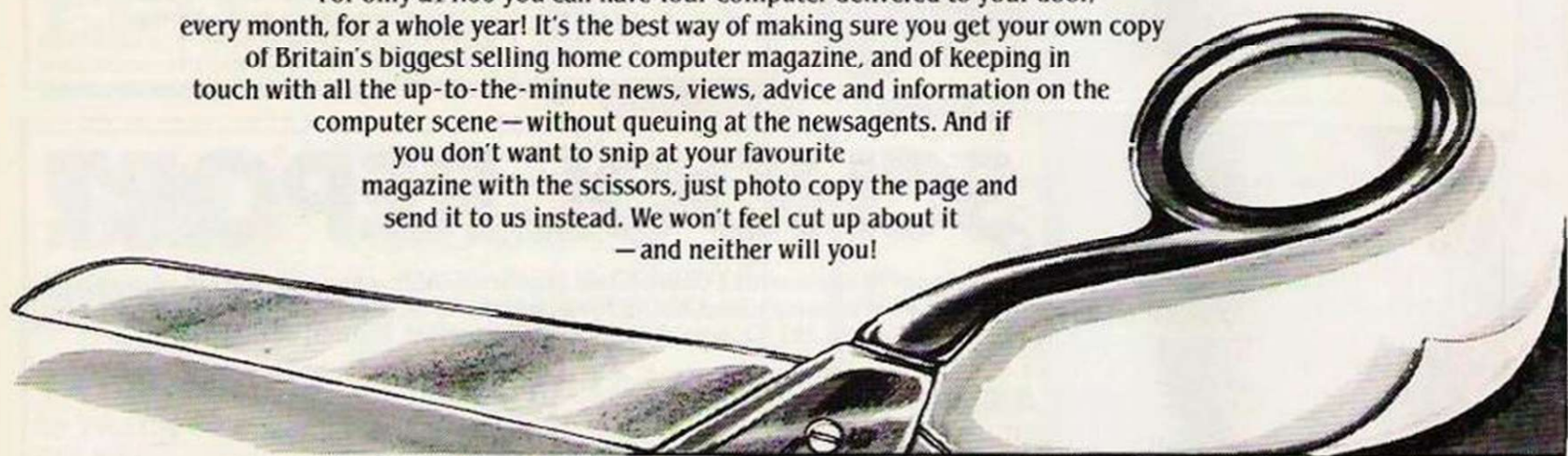
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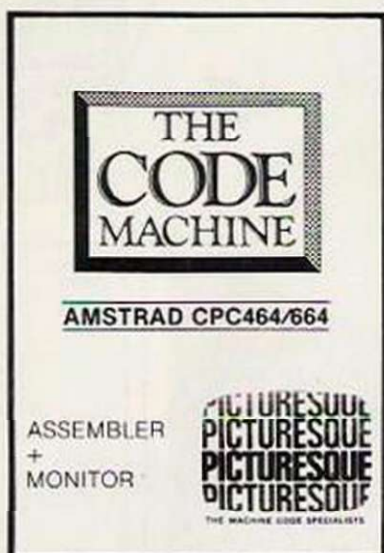
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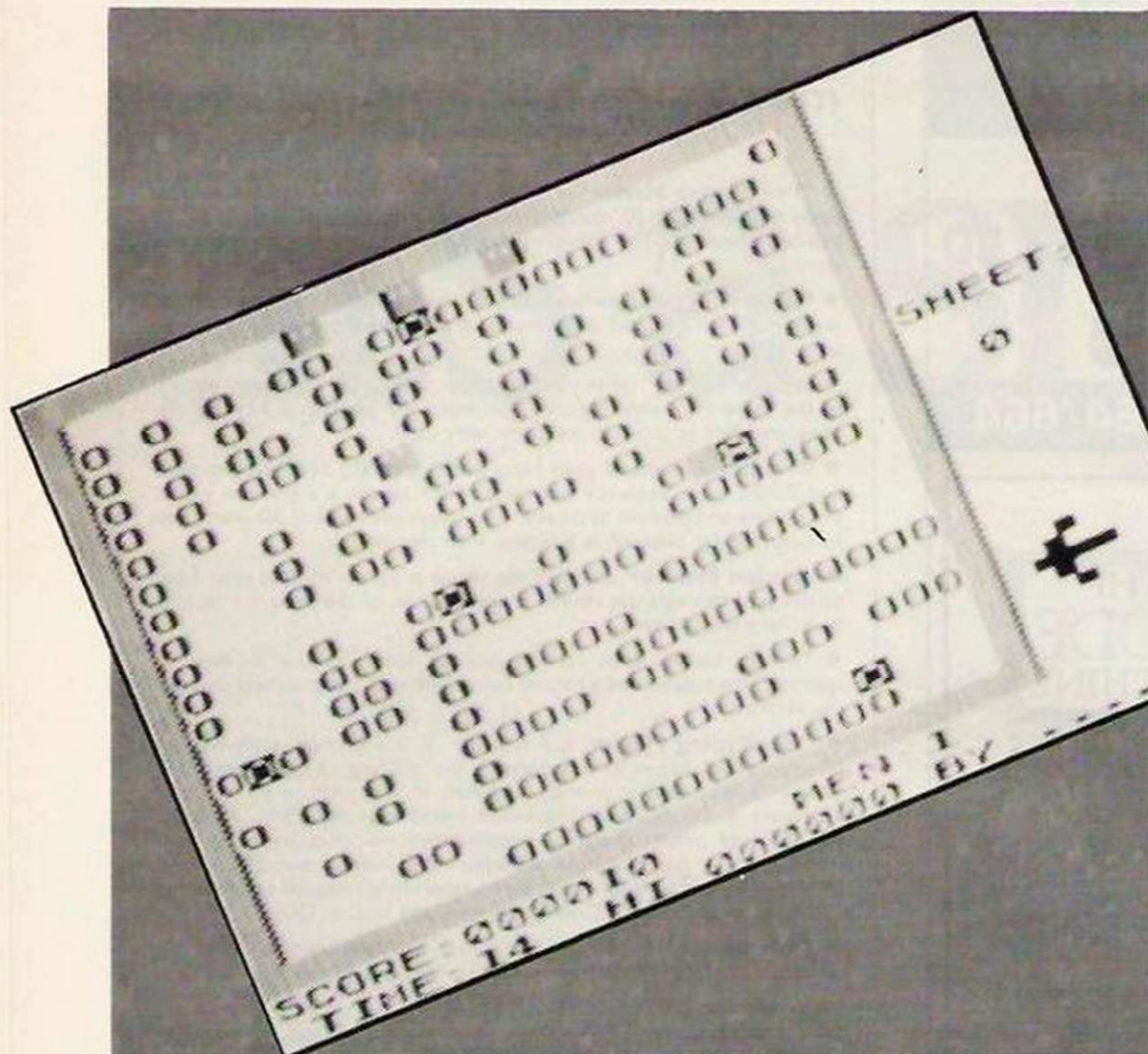
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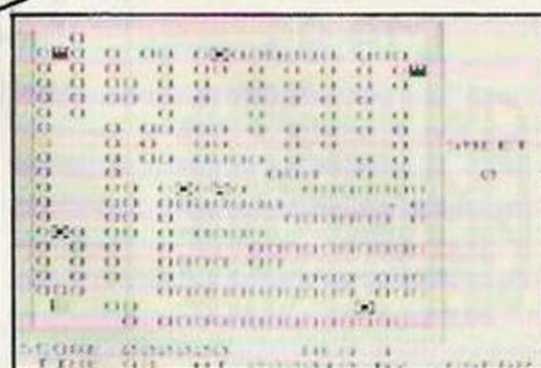
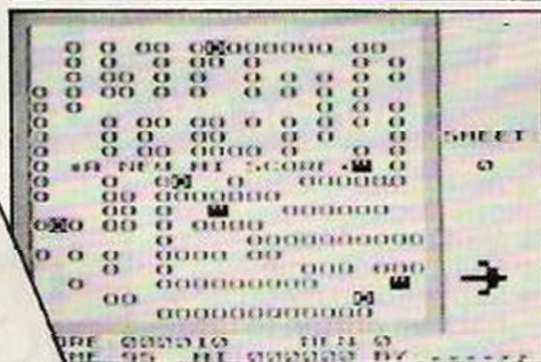
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PO



PONGY is an amiable little penguin — thanks to the chunky ZX-81 graphics an amiable little inverse letter A — that has to collect diamond ice-blocks. Not particularly served by four sno-bees.

To enter the game, first, you have to create a Rem line with enough characters to hold the machine-code. You can do this very easily: Enter a line 1 like this

```
1 PRINT 0+0+0+0+0+0+0+... etc.
```

until you have typed 43 zeros. Check the line by typing

```
PRINT PEEK 16511+256*PEEK 16512.
```

This should give 345. If not, accord your print statement. Then edit this line eight times, until you have lines 1 to 9. Now enter the following commands:

```
POKE 16510,0
POKE 16511,65
POKE 16512,12
POKE 16513,118
POKE 16514,118
POKE 16419,5
5 SAVE "PONGY"
```

Miquel Van Smoorenburg with a ZX-81 game featuring that character we all know and love — the amiable little inverse A who tries to survive against the psychotic tendencies of four nasty inverse 0s.

Don't type Newline during the poking to obtain a listing or the computer will crash! If it does crash, switch your 81 off and try again. If everything is OK, enter the hexloader and the hexcodes as usual. Now save it, for security, and delete the hex-loader. Enter lines 10-50 from the Basic listing, and enter Run 10. The game should start. You can break out of the game by pressing Break during the title-screen. Typing Run will autosave the game. The speed of the game is changeable:

the Poke in line 10 controls sno-bee speed the Poke in line 20 controls timer-speed and the list in line 30 controls pongy-speed.

Decreasing the values will increase the speed. Changing pongy-speed also affects the timer. It is also possible to change the number of lives you have, to a maximum of 9, by typing POKE 18006, 28+ (number of lives)

If you are interested in creating your own Pongy screen layouts, you have to enter lines 100-430. Enter Run 100, and you are to create your own layout.

Use cursor keys to move. If you are satisfied, press 0 and enter the screen-number: 1 to 4. Then you can place the diamonds wherever you wish, use 0 to enter. After you have entered four diamonds, the program stops. You can then watch the result of your action by typing Run 10.

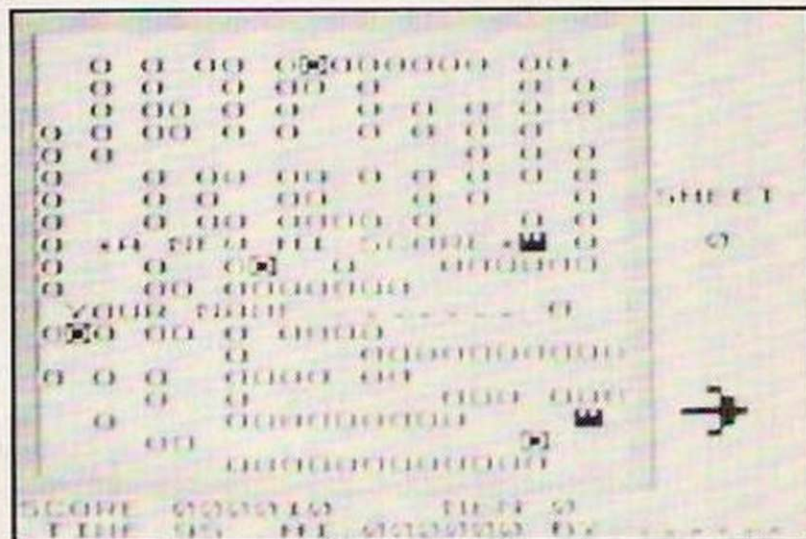
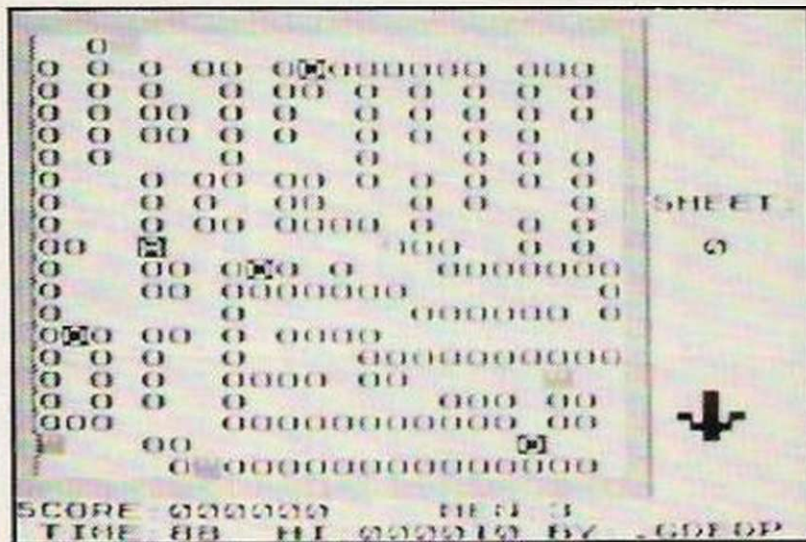
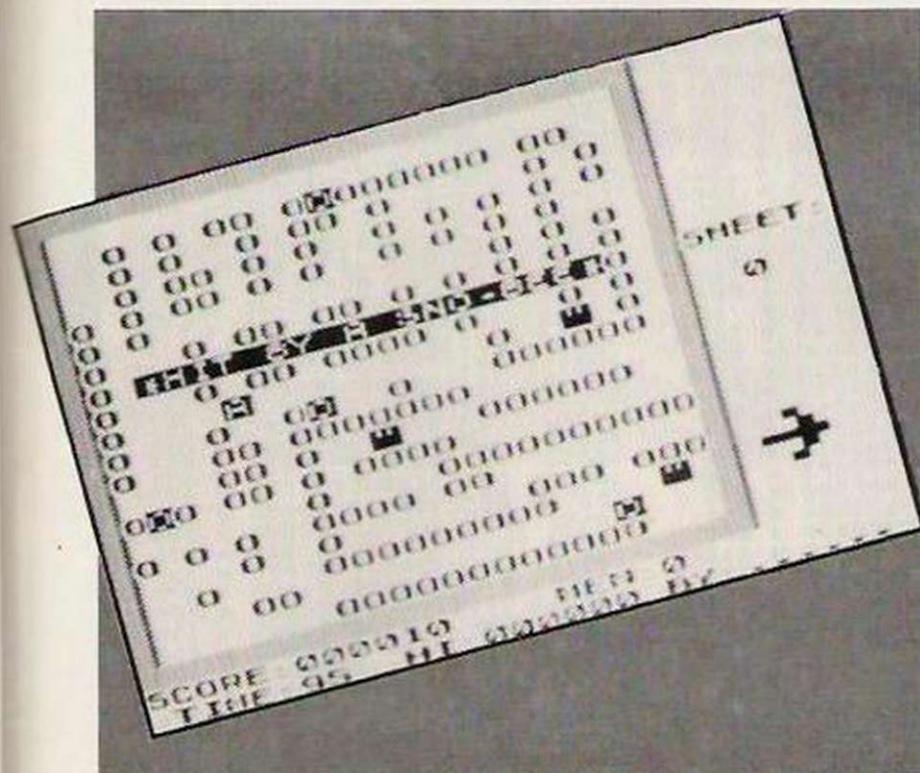
You start the game in the middle of the screen. Your task is to connect three or more diamonds — inverse 0's — in one straight line. Movement is made with the arrow keys, and the direction of Pongy is shown by one big

Hex loader.

```
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 16422=2 THEN SCROLL
```

```
120 LET Z=0
130 FOR K=1 TO LEN A$ STEP 2
140 LET C=(CODE A$(K)-28)*16+C0
DE A$(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 16442=2 THEN SCROLL
210 GOTO 60
220 NEXT N
```

PONGY



arrow on the left hand side of the screen. To move blocks, position Pongy against the block you want to move and press 0. If another block, or the wall, is behind the block it will be grinded to powder — keep 0 pressed — unless it is a diamond. You can kill the sno-bees by squashing them with a block and 10 points are gained for that. However the sno-bees will re-appear in the left-hand corner. If you have succeeded in positioning three

or more blocks in one straight line, you get a bonus of 10xtime left, and when time reaches zero, you move on to the next sheet. In total there are four different sheets. When you are out of lives, the game ends. You can also abort the game by pressing Break. If the high-score is beaten, the computer will ask you to enter your name — don't forget to press Newline. Answering the question "another game?" with N will bring you back to the title screen.

It is possible to hold the game by pressing H. Press another key to continue.

If you don't feel up to the task of typing in the listings, or you cannot manage to get the program to work — not very likely — the game is available on a fresh cassette tape for f10 — Dutch guilders, or £3 — from Miquel Van Smoorenburg, 20 Baljuwstraat, 2461 sl Ter-Aar, Holland.

(hex dump on next page)

Listing 1.

```

5 SAVE "PONGY"
10 POKE 16508,5
20 POKE 16507,6
30 LIST 4000
40 RAND USR 17971
50 REM *DONT FORGET THIS LINE*
60 REM
100 REM ONLY ENTER THE FOLLOW
ING LINES IF YOU WANT TO DEFINE
YOUR OWN SHEETS.
110 LET A$=" "
120 PRINT AT 0,0;A$;AT 21,0;A$
130 FOR X=1 TO 20
140 PRINT AT X,0;"0000000000000000"
150 NEXT X
160 LET P=PEEK 16396+PEEK 16397
*256+35
170 LET P1=P
180 LET K$=INKEY$
190 LET P=P+(K$="8")-(K$="5")+3
3*((K$="6")-(K$="7"))
200 IF PEEK P=136 THEN LET P=P1
210 POKE P1,0
220 IF K$="0" THEN GOTO 250
230 POKE P,166
240 GOTO 170

```

```

250 INPUT A
260 IF A<1 OR A>4 THEN GOTO 250
270 RAND A
280 LET A=USR 17974
285 LET X=1
290 LET Y=1
295 LET A$=" "
300 PRINT AT X,Y;
305 FOR N=1 TO 4
310 PRINT A$;AT X,Y;
320 LET A$=CHR$(PEEK (PEEK 163
98+PEEK 16399*256))
325 PRINT " ";AT X,Y;
330 LET K$=INKEY$
340 LET X=X+(K$="6" AND X<20)-(
K$="7" AND X>1)
350 LET Y=Y+(K$="8" AND Y<22)-(
K$="5" AND Y>1)
360 IF K$<>"0" THEN GOTO 310
370 POKE A,X
380 POKE A+1,Y
390 LET A=A+2
400 LET A$=" "
405 IF INKEY$>" " THEN GOTO 405
410 NEXT N
420 PRINT AT X,Y;A$
430 PRINT AT 21,3;">READY"
A000 -----
(C) MIQUEL VAN SMOORENBURG
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```

Hex dump.

16514:	7576C36644C3FF44	=	1121	17426:	E10219CD1A44E1C9	=	977	18354:	CD294810033D2633	=	487
16522:	322E363A2A310036	=	358	17434:	7EFE1CD8FE26D034	=	1176	18362:	34392D2A37002C26	=	333
16530:	1B381B0038263E38	=	322	17442:	FE25C0381C2B18F0	=	872	18370:	322A000FFFCD147	=	863
16538:	0E3C2D3E0026372A	=	316	17450:	0EFF3A08413D3206	=	519	18378:	FE33CA704AC33946	=	1015
16546:	003E343A00313434	=	325	17458:	41C03A7B40320841	=	625	18386:	E52B2B2B2B545D18	=	605
16554:	302E332C002E3339	=	343	17466:	3A09413D3209412A	=	359	18394:	010600EDB0E1C93A	=	904
16562:	3400323E00353734	=	324	17474:	0C4001FF02097EFE	=	723	18402:	25403C20FAED4B25	=	792
16570:	2C37263200F0031	=	251	17482:	1C380DFE26300935	=	499	18410:	40793C28F8CD8D07	=	934
16578:	2E38392A330003934	=	351	17490:	FE1CC0362525B18E	=	870	18418:	7EC93E171801AF2A	=	654
16586:	002B2C392D002E33	=	286	17498:	23369C23369C0100	=	491	18426:	0C400E1806202377	=	306
16594:	38392A262918181B	=	315	17506:	0079323C40C92A0C	=	550	18434:	2310FC0D20F6C917	=	818
16602:	18D450A84F0101AC	=	743	17514:	40220D4101F740ED	=	725	18442:	1717171717171717	=	184
16610:	50020116520401E7	=	423	17522:	430B41E501770109	=	502	18450:	1717171717000000	=	115
16618:	5103020900FFFF21	=	629	17530:	22DB40E1E5014802	=	849	18458:	0000000000000000	=	0
16626:	00DFFF0100040201	=	486	17538:	09220541E1012300	=	374	18466:	0000000002122D9	=	264
16634:	0303E84000000000	=	302	17546:	0922DD4001150009	=	359	18474:	FD362200E146234E	=	749
16642:	010000C951000158	=	372	17554:	22E140015E020922	=	463	18482:	237E23F5E5CDF508	=	1128
16650:	04F7407E4F870100	=	656	17562:	E5400115000922E9	=	591	18490:	C12A0E401109487E	=	537
16658:	8403010001000500	=	142	17570:	403E0421DD402323	=	518	18498:	120A03CB77200577	=	509
16666:	8682010001878200	=	531	17578:	7723366A233D20F6	=	592	18506:	132318F3F1C5E811	=	1011
16674:	0105010001006500	=	142	17586:	0000003E04320841	=	189	18514:	0948A7ED52444DFE	=	966
16682:	0384010001E521ED	=	636	17594:	3E6300000323C40	=	335	18522:	2B2823FE33281DFE	=	746
16690:	40FE053005871600	=	533	17602:	DD5F1FE002CDD21	=	1393	18530:	3D2816CD8C482100	=	573
16698:	5F195E2356E1C9E5	=	990	17610:	CD44C9ED5F010119	=	833	18538:	002B7C6520F5ED5B	=	959
16706:	ED4B254079FEFF28	=	1083	17618:	3EF5CDB502CD9202	=	1048	18546:	0E40210948ED0618	=	629
16714:	04CDBD077E320141	=	647	17626:	CD2002DD21CD44F3	=	1009	18554:	03CD8C48D9C90616	=	866
16722:	D620CD2F41ED50FF	=	1138	17634:	3A3C40A7CARA4023A	=	775	18562:	CD9948CD8C4810F8	=	1111
16730:	407BA72804ED05302	=	720	17642:	0A413D320A41C2A4	=	619	18570:	D9C92A0E40597EC6	=	951
16738:	413EEF0BFE2FE601	=	1117	17650:	029A7C40320A41CD	=	578	18578:	807231D20F8C921	=	825
16746:	32FE40E1C93A0141	=	918	17658:	1B42C3A402CD3C42	=	785	18586:	401F287CB520FBC9	=	927
16754:	D621FE04D0878787	=	1118	17666:	FE8B28163A3C40A7	=	804	18594:	19368810FBC92A0C	=	737
16762:	08004F210F4109ED	=	444	17674:	2810CD6F41CD5A42	=	798	18602:	401101000618CDA2	=	479
16770:	5B05410103000E050	=	578	17682:	79FE04D4A743CD2A	=	1072	18610:	481121000615CDA2	=	516
16778:	EB011E0009C5E801	=	708	17690:	44C9010100AF323C	=	556	18618:	4811FFFF0617CDA2	=	995
16786:	0300EDB0C1E809E8	=	1088	17698:	40C90FFF5D20115	=	1100	18626:	4811DFFF0615CDA2	=	961
16794:	010200EDB0C9E52A	=	868	17706:	695554AD5552B55D	=	888	18634:	48C9237EFE88C0C5	=	1213
16802:	3240ED5B334019ED	=	819	17714:	7BDD5749555D675D	=	878	18642:	01060009C1C92A0C	=	469
16810:	5B3440192232407D	=	505	17722:	7485D5DFE35728E0	=	1263	18650:	4001D602EDB1C02B	=	930
16818:	E1C932FB400D2053	=	919	17730:	1C80FE72FC094A1F	=	890	18658:	36002318F73EA6CD	=	793
16826:	22FC40E363000608	=	653	17738:	F56F001584FF56FE	=	1104	18666:	D8483E8BCDD8483E	=	1044
16834:	32FB40CD2F41197E	=	833	17746:	2078008F3FFF5E80	=	995	18674:	08CDD848C900003E	=	764
16842:	FE082341D5CDA041	=	1010	17754:	000E020809131302	=	76	18682:	FFED48F7481806AF	=	1091
16850:	D1E61FFE1028607E	=	919	17762:	0B14FFFFFC000010	=	809	18690:	ED4B32400D322140	=	586
16858:	FE8B2831FEA60282D	=	987	17770:	7FFF0100007FFF00	=	1197	18698:	C5CDA848C179E603	=	1189
16866:	FE34280FA72826ED	=	843	17778:	000807FFEF0C04021	=	798	18706:	470E00CB38CB19CB	=	775
16874:	52CDA041E6033C10	=	821	17786:	FDFF8C80008FFFFE	=	1476	18714:	38CB1921244509EB	=	666
16882:	CF181AD5CDA041D1	=	1109	17794:	003000FCFFFD1100	=	825	18722:	2A0C400123000906	=	169
16890:	E61FFE103EFF20E4	=	1108	17802:	0FFFF00200027FFF	=	1037	18730:	373A2140A71AF5CC	=	852
16898:	36080E05A7ED52E8	=	802	17810:	E9000027FFFF6000	=	910	18738:	AD49F1C498491310	=	943
16906:	2AFC4071EB7EFAE6	=	1252	17818:	00030311130B150E	=	88	18746:	F04248EB3A2140A7	=	938
16914:	2004AF323C403688	=	578	17826:	0214C00005DD17D5	=	676	18754:	C80604CD894910FB	=	892
16922:	C921DD400604C5E5	=	955	17834:	5450575141494505	=	544	18762:	CD29481700330039	=	449
16930:	5E2356237E234E0C	=	694	17842:	0517D41441575305	=	500	18770:	2E322A0E25250000	=	226
16938:	B441EBE173237223	=	1004	17850:	556C1554E7D55110	=	839	18778:	202E0E1C1C1C1C1C	=	245
16946:	3AFB40772323C110	=	771	17858:	45FFD116007DFA80	=	1058	18786:	1C00273E0E1B1618	=	224
16954:	E5C9CD41412ADB40	=	1090	17866:	140AFFD4BA0052AF	=	940	18794:	1B1B1BFF0D294808	=	662
16962:	3600197EA72807FE	=	673	17874:	FDFA80152BFFD4E8	=	1394	18802:	1833382D2A2A390E	=	331
16970:	6B28032AD84022DB	=	760	17882:	000B021007081305	=	71	18810:	FF011A0ACDF208ED	=	987
16978:	4036A6C9010000C9	=	687	17890:	0C14FFF0C08021F6	=	635	18818:	48F748CD980AC905	=	1159
16986:	3AFE40A728F62ADB	=	1090	17898:	FFFF6080258FFFD6	=	1431	18826:	46234E23E5CDF508	=	905
16994:	40ED4B0241097E5F	=	673	17906:	801D5AFF556A0055	=	938	18834:	E13EB4D7C1C9D55F	=	1384
17002:	FE082308E63FFE34	=	907	17914:	8BFD56A1055ABFD5	=	1170	18842:	16083E00CB133802	=	372
17010:	20E2E5097EE1FE68	=	1237	17922:	6AF055AA0156AFFD	=	1116	18850:	3E3477CDCC481850	=	767
17018:	CA3043E53FFE34CA	=	1118	17930:	5A800568FFF5A010	=	1006	18858:	F1D1C9D51100067E	=	1015
17026:	3043AF320441E509	=	647	17938:	16FFFFD01007FFF	=	1133	18866:	FE10CB13CDCC4815	=	994
17034:	7EE3FE882815E63F	=	1103	17946:	FF0B090108011013	=	320	18874:	20F57BD112C93434	=	932
17042:	FE342815FE08BCCF4	=	1088	17954:	0B1414141414C33C	=	363	18882:	3417171717343434	=	300
17050:	423600E173D51120	=	722	17962:	7A7600012205EA76	=	632	18890:	3434341717171717	=	271
17058:	031B7AB320FBD118	=	847	17970:	76C3704AC30149CD	=	973	18898:	1717173434341734	=	300
17066:	DDC17B010000FEB4	=	972	17978:	F847CD2948160033	=	710	18906:	1734173417341717	=	271
17074:	C02B7E7E42822223	=	904	17986:	382834372A0E1C1C	=	315	18914:	3417171717173434	=	271
17082:	237E7E4281801DE	=	885	17994:	1C1C1C1C00000000	=	112	18922:	3434341717341717	=	300
17090:	FF097E7E4280A01	=	875	18002:	322A330E1FFF2100	=	476	18930:	1734171717343434	=	300
17098:	4200097E7E40E00	=	849	18010:	0022F748CDF948FD	=	1132	18938:	3434171717171717	=	242
17106:	C001DFFF11210018	=	745	18018:	3621003E63320941	=	372	18946:	3434341734171717	=	300
17114:	0601FFFF11010009	=	544	18026:	CD8440CD87403E7F	=	994	18954:	3417343434171717	=	300
17122:	7E7E428FA010000	=	851	18034:	DBFE1FD21F473EBF	=	1069	18962:	1717171734171717	=	213
17130:	197E0CFE8428F9C9	=	1067	18042:	DBFECB57CCB2462A	=	1273	18970:	3417341717173434	=	300
17138:	E1C9E5D5C509EB21	=	1342	18050:	0A40287CB520F879	=	825	18978:	3434000004000000	=	108
17146:	DD400604C5E54E23	=	834	18058:	A72831FE01280218	=	577	18986:	7600818404000076	=	501
17154:	46626BA7ED42E1D5	=	1183	18066:	DADC294806033C17	=	630	18994:	0080810703047600	=	389
17162:	280C2323232D1C1	=	594	18074:	2D2E3900273E0026	=	267	19002:	0280830600760081	=	514
17170:	10EAC1D1E1C9EB2A	=	1355	18082:	0038333A1627A2A	=	304	19010:	8005008176858007	=	648
17178:	0C4001230009EB73	=	471	18090:	17FFCDE946C36A46	=	1157	19018:	0381807685800400	=	643
17186:	2372233601233610	=	344	18098:	FD363C00CDE147FD	=	1121	19026:	8501768507600005	=	525
17194:	23CD0E4418E07B01	=	693	18106:	363CFFC93A2140A7	=	892	19034:	0076850584008500	=	521
17202:	0000FEB4C83A0441	=	761	18114:	2036CD294808033C	=	475	19042:	7680000000000076	=	370
17210:	3C320441FE04D836	=	707	18122:	17343A3900342B00	=	285	19050:	026264060000CDF4	=	719
17218:	08FE07D83600AF32	=	764	18130:	C92E322A1B1817FF	=	527	19058:	47CD294802063D3C	=	518
17226:	0441C9ED4B05410A	=	668	18138:	CDE946CD29481706	=	855	19066:	2A312834322A0039	=	332
17234:	CD2F412A0D41197E	=	588	18146:	332525FFC365462A	=	788	19074:	341B1B1BFF01000C	=	401
17242:	CB7F200FA0A3FE03	=	647	18154:	0C4001EB02097EFE	=	703	19082:	CD508064C11244A	=	667
17250:	200301F740ED4308	=	662								

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COMMODORE 64, BBC AND SPECTRUM

Figure 1. CBM-64.

```
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 169,1,133,186,169,1,133,184
50 DATA 133,185,169,8,133,183,169,208
60 DATA 133,187,169,2,133,188,169,56
70 DATA 133,251,169,199,133,252,169,251
80 DATA 162,231,160,206,32,216,255,96
90 DATA 68,79,87,78,76,79,65,68
100 SA=51000:LA=52855
110 INPUT"START ADDRESS":A
120 IF (A<SA) OR (A>LA) THEN GOTO 140
130 IF A/8=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 900
170 IF LEN(D#)=20 THEN GOTO 190
180 PRINT"WRONG LENGTH":GOTO 150
190 FOR B=0 TO 7:B#=MID$(D#,2*B+1,2)
200 GOSUB 300:IF E=1 THEN GOTO 280
```

```
210 POKE A+B,D:T=T+D:NEXT
220 B#=MID$(D#,18,3):GOSUB 300
230 IF E=1 THEN GOTO 280
240 IF T=D THEN GOTO 260
250 PRINT"CHECKSUM ERROR":GOTO 150
260 A=A+B:IF A<LA THEN GOTO 150
270 GOTO 800
280 PRINT TAB(8+2*B/D)C#"??"
290 B=8:NEXT GOTO 150
300 E=0:D=0:FOR N=1 TO LEN(B#)
310 C#=MID$(B#,N,1):GOSUB 400
320 IF E=1 THEN D=N-N+4:NEXT:RETURN
330 D=D*16+C#:NEXT:RETURN
400 X=ASC(C#)-48:IF X<0 THEN E=1:RETURN
410 IF X<10 THEN RETURN
420 X=X-7:IF X<10 THEN E=1:RETURN
430 IF X>15 THEN E=1
440 RETURN
500 H#="0123456789ABCDEF"
510 FOR A=SA TO LA STEP 8
520 PRINT A;" ";T=(A-32768)AND255
530 FOR B=0 TO 7:X=PEEK(A+B):GOSUB 600
540 T=T+X:NEXT:PRINT" ";
550 Y=INT(T/256):PRINT MID$(H#,Y+1,1)
570 X=255 AND T:GOSUB 600:PRINT
580 NEXT:GOTO 900
600 PRINT MID$(H#,INT(X/16)+1,1)
610 PRINT MID$(H#,1+(XAND15),1):RETURN
```

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

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

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

Figure 2. CBM-64.

```
51000 ? A9068D21D08D20D0=3E2
51008 ? A90F8D8602A90E20=2E4
51016 ? D2FFA9008D15D0A9=4DD
51024 ? FF8D8A02B88E92CE=510
51032 ? 20AC92007C820F8=4D5
51040 ? C8AD80CEC931F023=532
51048 ? C935F014C936D006=43F
51056 ? 208E774C58C7A914=410
51064 ? 20D2FF202FCB00D8=52E
51072 ? 4C93C94C4AC82063=411
51080 ? CC2022CDA95B85FD=4F1
51088 ? A9CE85FE2028CDA0=547
51096 ? 002095CC202FCBC9=494
51104 ? 44F00BC954D0E20=4E1
51112 ? D2FFA901D007A944=4EF
51120 ? 20D2FFA90885BA20=4B9
51128 ? 25CD9A0820ABC9A9=4A3
51136 ? B085FD99C085FEA0=5A0
51144 ? 002095CC2025CD20=383
51152 ? 95CC9848A0048C83=4CC
51160 ? CE20D8C968A82025=4C4
51168 ? CD2095CC9848A906=4C5
51176 ? 0D83CE20D8C9ADA7=5E3
51184 ? CE85FB8ADA8CE85FC=6EA
51192 ? 68A82060C8A90185=38A
51200 ? B885B998A293A0CE=539
51208 ? 20D2FFA909C8A9A=567
51216 ? CEE8D001C82025CD=479
51224 ? A9FB20D8FF20F1CB=597
51232 ? 6020D9CC90DD00B=3FE
51240 ? A90085C7A92020D2=3E0
51248 ? FFA90D20D2FF60A9=4E7
51256 ? 002029C8A90D20D2=306
51264 ? FF602063CC8A00A9=43F
51272 ? FF9993CEC8D0FA20=5FB
51280 ? D2CB90FB20D2CB8E=5ED
51288 ? FB8D72CEA0008C7C=4D0
51296 ? CE8C7DCE20ECCAD=4D4
51304 ? 72CE29F0C980D0E4=506
51312 ? 20D2CB80DA9973CE=599
51320 ? C8202ECC009D0F0=4EB
51328 ? A000AD76CE2980D0=492
51336 ? 0FA52B85FB18A52C=3D8
51344 ? 6D75CE85FC4C8AC8=587
51352 ? AD78CE85FBAD79CE=607
51360 ? 85FC20D2CB80A820=55E
51368 ? D9CC20D2FFC820D9=607
51376 ? CC202ECC010D0EA=528
51384 ? A92020D2FFAD75CE=56A
51392 ? 202ECD20D2CB8087=4D7
51400 ? CD7CC8E00BA95820=503
51408 ? D2FF2030C84C57C9=52C
51416 ? 20D2CB80F8CD7DCE=65D
51424 ? D0EBAD75CEA8B993=687
51432 ? CED00E2030C8A991=4EE
51440 ? 20D2FF4C7EC94C57=51F
51448 ? 20D2FF4C7EC94C57=51F
51456 ? C8A0008C70CE8C7D=447
51464 ? CE20D2CB80F091FB=5BF
51472 ? 202ECC8CC77CED0=4D3
51480 ? F020D2CB80E0C7C=59E
51488 ? DEF008A95820D2FF=4D8
51496 ? 4C57C820D2CB80CE=4CE
51504 ? CD7DCE8F0034C23C9=473
51512 ? 20ACCB2030C8AD75=409
51520 ? CEA8A9009993CEAD=506
51528 ? 84CE9202D02520BC=436
51536 ? C8A9C820F3C8A955=568
51544 ? 2016CDA95020F3CB=432
51552 ? 20C7CBAC73CEC888=54F
51560 ? B993CE0D2398D0F7=5D4
51568 ? 4C58C7A9552016CD=3DF
51576 ? 20F1C84C630C9AC7=4EF
51584 ? CE20D2CB80D0FA20=57D
51592 ? D2C820D2CB4C47C9=53E
51600 ? 4C5CC8A52885FBA5=4F5
51608 ? 2C85FC8000B1FB99=52A
51616 ? 2200C8B1FB8523F0=4CE
51624 ? 08A52285FBA52385=447
51632 ? FC4C9BC918A5FB69=57D
51640 ? 0285D2852F8531A5=37B
51648 ? FC690085E2E653085=412
51656 ? 32602063CC8A00A9=554
51664 ? 64CEA9008D02DE60=4A3
51672 ? 8E01CE8C82CEA200=533
51680 ? 09098D16C90D0F51=4E2
51688 ? C924D01920D2FF0D=544
51696 ? C3CE84CE9C9E000=64B
51704 ? D0E3E000F0DF20D2=554
51712 ? FFC94CE5C9C93090=554
51720 ? D4C93A901548ADC3=444
51728 ? CEC924F004684CE5=460
51736 ? C968C941908FC947=4BA
51744 ? B0B820D2FF38E930=4D5
51752 ? C90A9002E907E005=36A
51760 ? F0A8B0C3CE8E4CE5=61A
51768 ? C9E000F0A0E001D0=52A
51776 ? 07ADC3CE924F095=4FF
51784 ? A92020D2FFA9FF9D=54F
51792 ? C3CEA2008ECCFCE8E=544
51800 ? D0CE8ED1CE8ED2CE=659
51808 ? ADC3CEC924D006A9=512
51816 ? 0F8D0CE88D0C3CE=5DD
51824 ? C9FFF01D20C8A80=582
51832 ? 3418BD0C3CE6D0CE=524
51840 ? 8D0FC8A9006D0CE=566
51848 ? 8D0FC8A9006D0CE=566
51856 ? 8D0FC8A9006D0CE=566
51864 ? C8AD0FC8A9006D0CE=566
51872 ? A3CEC8AD0CE99A93=660
51880 ? CEC8188C83CEAC82=561
51888 ? CEA81CE602025CD=4ED
51896 ? A200B041CEC921F0=500
51904 ? 0720D2FF84CB8A=570
51912 ? 4CDEC9ADC0CE8DCE=65E
51920 ? CEADCFCE8DD1CEAD=601
51928 ? D0CE8DD2CE18ADD1=639
51936 ? CE6DCFC8D0CFCEAD=68F
51944 ? D2CE6DD0C8D0CE=68E
51952 ? B005CECE0E0E660=625
51960 ? 20630CA90F8D8602=414
51968 ? A95185FD99C085FE=575
51976 ? A000209DCC2025CD=343
51984 ? 209DCC209DCC209D=3DF
51992 ? CC2022CD2020D2FF=30E
52000 ? 95CC2022CD2095CC=411
52008 ? 202FCB20D2FF608E=421
52016 ? 81CE8C82CE2020D2=480
52024 ? 20ECC020ACCC900=48F
52032 ? D00D20FDC0C931F0=4F0
52040 ? 062001CC4C85C88D=314
52048 ? 80CEA81CE8C82CE=597
52056 ? 60A92CE9A4C5BC7=4CE
52064 ? 2022CDA92285FBA5=465
52072 ? CE85FEA0002095CC=4D8
52080 ? 2025CDA90FA92099=393
52088 ? 93CE88D0FA8093CE=619
52096 ? 202FCB0914D010C0=417
52104 ? 00F0F520D2FF88A9=50F
52112 ? 209993CE4C80C80D=50A
52120 ? 0DF00820D2FF9993=4B0
52128 ? CECC010D0DA920=579
52136 ? 20D2FF60A920D2=4B4
52144 ? FFA94F20D2FFA94B=508
52152 ? 20D2FF60A9138D00=452
52160 ? DEA9128D00E60A9=40D
52168 ? 538D00DEA9528D00=40E
52176 ? DE60A996180D87CE=547
52184 ? 8C82CEAC82CE2004=4D4
52192 ? C020ECC0CE87CED0=677
52200 ? 02386020FDC0B0E=509
52208 ? 60A9F8C82CEA820=597
52216 ? 04C08D0FAC82CE=616
52224 ? 602084CC8A2A8CA=3EE
52232 ? D0FDA92099C06020=454
52240 ? 25CDA90220ABCC20=364
52248 ? 95CCAD8ECC20D2FF=573
52256 ? A92020D2FFA9320=3A6
52264 ? ABCC20D8C9604D7D=48A
52272 ? CE8D7DCEA208AD7D=4FA
52280 ? CE2A9010D7DCE49=411
52288 ? 088D7DCEAD7DCE49=460
52296 ? 10BD7DCE27DCE2E=3D5
52304 ? 7DCECDD0E160A000=516
52312 ? A9009900D4C8C018=40A
52320 ? D0F60A99320D2FF=503
52328 ? 60A8A5A2290FD01F=37E
52336 ? A5D448A5A22910F0=4A1
52344 ? 05A9A44C80CC920=42B
52352 ? 20D2FFA9008D4A9=51C
52360 ? 9D20D2FF6885D468=53F
52368 ? 6020D2FFC8B1FD09=620
52376 ? 21D0F6C8602025CD=4B9
52384 ? A90C20A8CC2095CC=46D
52392 ? 60A9058E81CEA8A9=4E6
52400 ? 2020D2FFC8D0FAFE=603
52408 ? 81CE60C914F008C9=505
52416 ? 7FF00160A91460A9=456
52424 ? 7F6020E4FFC9C190=504
52432 ? 07C9DB800338E960=4AF
52440 ? 60C941900CE95890=494
52448 ? 08C961900C97B80=49C
52456 ? 02492060488A4808=2D5
52464 ? 20E1FFD0034C59CB=533
52472 ? 2868AA6860AD00DE=485
52480 ? 49016A9003A90060=250
52488 ? AD01DE6048D000DE=3C7
52496 ? 49026A6A6860200C=223
52504 ? CDB0FB8D01DE20EC=508
52512 ? CC602025CD2020D2=373
52520 ? A90D20D2FF604829=3A0
52528 ? F0A8A6A6A6A8930C9=3CA
52536 ? 3A300318690720D2=21F
52544 ? FF68290F0990C93A=31B
52552 ? 300318690720D2FF=2F4
52560 ? 60444F574E4C4F41=204
52568 ? 44204D45E552131=243
52576 ? 2020205245434549=228
52584 ? 5645213520202045=1FE
52592 ? 58495420544F2042=28A
52600 ? 4153494321362020=22A
52608 ? 2053415645204259=28F
52616 ? 5445532128205553=285
52624 ? 4520122053544F50=26D
52632 ? 209220544F205245=204
52640 ? 545524E20544F20=2CC
52648 ? 4D454E5520292145=28C
52656 ? 4E544552204E554D=2F9
52664 ? 4245522021494620=281
52672 ? 4144445245535320=2E6
52680 ? 495320494E504845=2C8
52688 ? 582C119D9D9D9D9D=476
52696 ? 9D9D9D9D9D9D9D9D=500
52704 ? 9D9D9D9D9D9D9D9D=500
52712 ? 4958205749544820=305
52720 ? 2421535441525420=2E3
52728 ? 4144445245535320=2E6
52736 ? 464F522041524541=220
52744 ? 202146494E414C20=1D3
52752 ? 4144445245535320=236
52760 ? 464F522041524541=238
52768 ? 202150524F475241=22C
52776 ? 40205449544C4520=237
52784 ? 284D415820313620=1E5
52792 ? 4348415220332920=219
52800 ? 21124E4F54205641=21B
52808 ? 4C4944922C205452=2A5
52816 ? 5920414741494E20=249
52824 ? 3A20214449534320=216
52832 ? 4F52205441504520=26B
52840 ? 2820442F54202920=1E0
52848 ? 3F21000000000000=000
```

TEL SOFT

A reminder of how to use the Telsoft service.



a number of other makes. For the CBM-64 it will initially only be available with the OEL Comms pack together with the Telemond 2 or similar modem; later we hope to adapt the service to work with Commodore's modem.

To enter the download program first type in the hexloader for your machine — figure 1 — and then enter the machine code — figure 2. Once the program has been saved you can run it by entering CALL &6000 on the BBC, SYS 51000 on the CBM 64, RANDOMIZE USR

60000 on the Spectrum.

To find out what is available and how to receive software dial up Colchester (0206) 8068. This audio recorded information line will also advise you which telephone numbers to ring for the 300 and 1200 bit/s services.

When a program you want to download is on line, make sure your modem is set up and dial the number appropriate to its speed. As soon as you hear the modem tones switch the modem to line and replace the receiver. Select

Option 1 from the menu — Receive. After a block of data is received you will see "OK" printed if there are no errors, otherwise the program will wait for the blocks to come round again. When the "Program loaded OK" message appears return to the Telsoft menu and select Option 5. You can now save and run the program.

Note that CBM-64 owners will need to use Option 6 if machine code is to be saved.

Figure 1. BBC.

```

10 REM BBC HEX CODE LOADER
15 HIMEM=69FF
20 CLS:PRINT
30 INPUT "START ADDRESS (Hex)";A$
40 A=VAL("&"+A$)
50 IF A>6F8 THEN 200
60 IF A<2A00 OR A>6FE7 THEN 20
70 PRINT "A ";
80 INPUT "B ";B$,C$
90 IF LEN(B$)>16 THEN 50
100 T=0
110 FOR N=0 TO 7
120 X$=MID$(B$,2*N+1,1):GOSUB 300
130 IF E=1 THEN 260
140 X$=MID$(B$,2*N+2,1):GOSUB 300
150 IF E=1 THEN 260
160 B=VAL("&"+MID$(B$,2*N+1,2))
170 "A=B:A=A+1:T=T+B
180 NEXT
190 FOR M=1 TO LEN(C$)
200 X$=MID$(C$,M,1):GOSUB 300
210 IF E=1 THEN A=A-1:GOTO 260
220 NEXT
230 IF T=VAL("&"+C$) THEN 50
240 PRINT "CHECKSUM ERROR !"
250 A=A-B:GOTO 50
260 PRINT "TYPING ERROR !"
270 A=B:(A DIV B):GOTO 50
280 *SAVE "DOWNLOAD" 6A00 6FB7
290 END
300 E=0:IF ASC(X$)<48 THEN E=1:RETURN
310 IF ASC(X$)<50 THEN RETURN
320 IF ASC(X$)<65 THEN E=1:RETURN
330 IF ASC(X$)>71 THEN E=1
340 RETURN
  
```

Figure 2. BBC.

```

6A00 :A9CBA0FEA20120F4,4C6
6A08 :FF20616C204BDC9,38A
6A10 :31F08C934F0E9C9,4C8
6A18 :35F0864C0C6A4C47,280
6A20 :6AA90C20E3FFAFA9,4B2
6A28 :A008A2FF20FAFA9,4F0
6A30 :03A20020FAFA902,363
6A38 :A20220FAFA90CBA0,4C8
6A40 :FEA20020FAFA90A9,4BC
6A48 :0C20E3FF20F76BA9,439
6A50 :15A20120FAFA900,3EB
6A58 :A9FF0899056F0D0A,5B7
6A60 :A915A20120FAFA9,394
6A68 :0C6C908F200C6C80,34B
6A70 :F8A000847784784,416
6A78 :79847A8478057020,38B
6A80 :056D0A57029F0C90,489
6A88 :08E2200C6C80D089,46B
6A90 :7100C020D56C0D9,364
6A98 :D0F8A008A5742990,422
6AA0 :D008A51C857618A5,354
6AA8 :1D65730577280C6,289
6AB0 :080528E3FFC2805,524
6AB8 :6DC01309FA857320,435
6AC0 :B26D200C6C80A0C5,3CC
6AC8 :7AF008A90820E3FF,47B
6AD0 :20E7FF4C676A200C,34F
6AD8 :6C80CC57BFB08A9,49C
6AE0 :5820E3FF20E7FF4C,4AC
6AE8 :676AA573A8B9856F,43E
6AF0 :D80E20E7FFA90820,398
6AF8 :E3FF4C676A200C6,469
6B00 :A000847A8478200C,2C9
6B08 :6C00F2917620D56D,477
6B10 :C0C475D0F1200C6C,45A
6B18 :08E3C57AF008A958,4CE
6B20 :20E3FF20E7FF4C67,48B
6B28 :6A200C6C80CFC57B,3C1
6B30 :F008A90820E3FF4C,447
6B38 :676A20C76020E7FF,429
6B40 :A573A8A90899856F,3F6
6B48 :A58AC902D0E30D7,419
6B50 :6BA9C820556CA935,388
6B58 :20306E9A9020556C,298
6B60 :A915A20120FAFA9,394
6B68 :F76BA471C8808985,505
6B70 :6FD05198D0F7A90C,448
6B78 :20E3FF20E56DA95A,437
6B80 :0582A96FB503A987,407
6B88 :20806E20F86D20A8,2DB
6B90 :6DA90520006E9A88,2DA
6B98 :20E3FF20F86DA9D2,502
6BA0 :20E0FF4C0C6AA955,38F
6BA8 :20306E9A9020556C,298
6BB0 :4C6A68A475200C6C,2D2
6BB8 :08D0FA200C6C200C,316
6BC0 :6C4C48694C6C6AA9,336
6BC8 :2020E3FFA96F20E3,43D
6BD0 :FFA90820E3FF68A9,51E
6BD8 :9CA008A68A0E00D0,41E
6BE0 :08A21320F4FA212,387
6BE8 :20FAFF68A29F23F4,4C0
6BF0 :FFA29620F4FF68A9,553
6BF8 :9CA008A68A0E00D0,41E
6C00 :E8A25320FAFA252,4E7
6C08 :20FAFF6818A99685,44F
6C10 :BF847EA991A20820,38D
6C18 :E3FF4C676A200C6,469
6C20 :68684C0C6AA7E20,2D4
6C28 :496CC68FD0023860,374
6C30 :ASBAC90200062079,369
6C38 :6E08E6C0A991A201,447
6C40 :20FAFF98A47E80DF,55C
6C48 :608AA2D2CAE0CADD,35A
6C50 :F8AA68A990847EAB,458
6C58 :20496C08D0FAA47E,449
6C60 :60A9E0A00A2FF20,452
6C68 :F4FA908058AA90C,460
6C70 :20E3FF20A86DA984,3E4
6C78 :20806E9A9020556C,298
6C80 :6F05B3A00020F86D,39C
6C88 :20156DC941F00BC9,378
6C90 :42F011C943F8174C,3A2
6C98 :616CA908A20120F4,335
6CA0 :FF4CB76CA908A203,34C
6CA8 :20FAFF4C676CA988,433
6CB0 :A20420F4FF68A95,4CE
6CB8 :7C20E3FF4A7E20A8,46B
6CC0 :6DA90820006E20F8,2C4
6CC8 :6DA01720156DC941,20B
6CD0 :08D0C942F011C943,413
6CD8 :F0174C616CA908A2,372
6CE0 :0120FAFF4C676DA9,37F
6CE8 :07A20320FAFF4C08,314
6CF0 :6DA907A20420FAFF,3D6
6CF8 :6E8AA58AC99D0089,443
6D00 :A9E6A008A20120F4,3EB
6D08 :FFA257C20E3FF20E3,495
6D10 :6C20536C6020A86D,2E3
6D18 :A90520006E20F86D,2C1
6D20 :20A86DA90520006E,274
6D28 :20F86D20A86DA985,36B
6D30 :20806E20F86D20A8,2DE
6D38 :6D847EA902082006,2A9
6D40 :A9D220E0F057C60,4DB
6D48 :A90C20E3FF20A86D,3EF
6D50 :A90720006EA99A05,306
6D58 :02A96E0583A00020,361
6D60 :FB06D20A86D2096D,3C0
6D68 :20996D20996D20A8,317
6D70 :6DA90A20006E20F8,2C6
6D78 :6D20A86DA9022000,278
6D80 :6E20FB6D20A86D20,34B
6D88 :E7FFA9D220E0FFA0,5A0
6D90 :09FA20020FAFF68,3D5
6D98 :60A90820006E20F8,287
6DA0 :6D20A86D6020A86D,33A
6DA8 :20A86D20E7FF20E7,445
6DB0 :FF084829F06A6A6A,3FE
6DB8 :6A0930C93A300318,1F1
6DC0 :6A98720E3FF60290F,312
6DC8 :0930C93A3003180F,1F0
6DD0 :0720E3FF60457B05,3AE
6DD8 :7BA208A5782A980C,30B
6DE0 :A57849080578A57A,398
6DE8 :4910857A267A2678,299
6DF0 :CADD0E6020E3FFC8,5AC
6DF8 :0102C90D00F6CB08,4F7
6E00 :067DAAA92020E3FF,47B
6E08 :CADDFA67D60C97F,55F
6E10 :D080A98620FAFF08,4FD
6E18 :00F012A97FC92088,3C3
6E20 :08E90A08AC98DF0,3A1
6E28 :06C97F002A90306,2D1
6E30 :057C087D847EA991,440
6E38 :A20120FAFFA903A2,404
6E40 :0720FAFFA996A200,403
6E48 :20FAFF9829020FA,48A
6E50 :A47CA997A20920FA,41F
6E58 :FFA908A20420FAFF,464
6E60 :A991A20020FAFF08,49F
6E68 :09C00700056804C,2C1
6E70 :0C6AA57CA67DA47E,3DC
6E78 :60847E867DA996A2,446
6E80 :00204FF982901F0,3CD
6E88 :08A996A20920FAFF,400
6E90 :9818980130A67DAA,340
6E98 :7E60444F574E4CAF,2B1
6EA0 :4144494E47204D45,213
6EA8 :4E558D3120202052,193
6EB0 :2020205345542042,1AE
6EB8 :6175642052617445,2E6
6EC0 :0035202020455849,188
6EC8 :5420544F28424153,200
6ED0 :49430D454E544552,217
6ED8 :204E504D42455200,1F6
6EE0 :282055345284354,1FC
6EE8 :524C2D4720544F20,1F5
6EF0 :5245455524E2054,2E4
6EF8 :4F204D454E552029,1ED
6F00 :0053454420545241,208
6F08 :4E534D4954204261,292
6F10 :7544205261746500,24E
6F18 :4120202037352042,1FC
6F20 :6175640D42202033,16C
6F28 :3030204261756400,209
6F30 :4320313230302042,188
6F38 :6175640D5345420,253
6F40 :5245434549564520,223
6F48 :4261756420526174,2C3
6F50 :650050524F475241,230
6F58 :4020204C4F414445,1F2
6F60 :44520206F6805052,200
6F68 :4533528414E5920,213
6F70 :4B455920464F5220,218
6F78 :4D454E550D202020,1A2
6F80 :09C00700056804C,2C1
6F88 :0C6AA57CA67DA47E,3DC
6F90 :60847E867DA996A2,446
6F98 :00204FF982901F0,3CD
6FA0 :08A996A20920FAFF,400
6FA8 :9818980130A67DAA,340
6F80 :7E60444F574E4CAF,2B1
6FA0 :4144494E47204D45,213
6FA8 :4E558D3120202052,193
6FB0 :2020205345542042,1AE
6FB8 :6175642052617445,2E6
6FC0 :0035202020455849,188
6FC8 :5420544F28424153,200
6FD0 :49430D454E544552,217
6FD8 :204E504D42455200,1F6
6FE0 :282055345284354,1FC
6FE8 :524C2D4720544F20,1F5
6FF0 :5245455524E2054,2E4
6FF8 :4F204D454E552029,1ED
6F80 :0053454420545241,208
6F88 :4E534D4954204261,292
6F90 :7544205261746500,24E
6F98 :4120202037352042,1FC
6FA0 :6175640D42202033,16C
6FA8 :3030204261756400,209
6FB0 :4320313230302042,188
6FB8 :6175640D5345420,253
6FB8 :5245434549564520,223
6FC0 :4261756420526174,2C3
6FC8 :650050524F475241,230
6FD0 :4020204C4F414445,1F2
6FD8 :44520206F6805052,200
6FE0 :4533528414E5920,213
6FE8 :4B455920464F5220,218
6FF0 :4D454E550D202020,1A2
  
```

Figure 1. Spectrum.

```

5 REM SPECTRUM 40k fig 1
10 REM Hex Code Loader
15 CLEAR 59000
20 POKE 23650,8:CLS:PRINT
30 INPUT "Start Address ";a
50 IF a>61135 THEN GO TO 200
60 IF a<60000 THEN GO TO 20
70 PRINT a:
80 INPUT " ";b$
85 IF b$="END" THEN GO TO 200
90 IF LEN(b$)>28 THEN GO TO 260
100 LET t=a-256*INT(a/256)
110 FOR n=0 TO 7
120 LET x$=b$(2*n+1 TO 2*n+1)
125 GO SUB 300:LET y=x
130 IF a=1 THEN GO TO 260
140 LET x$=b$(2*n+2 TO 2*n+2)
145 GO SUB 300:LET y=y16*x
150 IF a=1 THEN GO TO 260
170 POKE a,y:LET a=a+1
180 LET t=t+y:NEXT n:LET y=0
190 FOR m=1 TO 3
200 LET x$=b$(17+m TO 17+m)
205 GO SUB 300:LET y=y16*x
210 IF a=1 THEN LET a=a-1:GO TO 260
220 NEXT m
230 IF t=y THEN PRINT " ";b$:GO TO 50
240 PRINT "Checksum Error"
250 LET a=a-B:GO TO 50
260 PRINT "Typing Error"
270 LET a=0:INT(a/8):GO TO 50
280 *SAVE "download"CODE 60000,1136
290 POKE 23650,8:STOP
300 LET a=0:LET x=CODE x$-48-7*(x$>"9")
310 IF x<0 OR x>15 THEN LET a=1
320 RETURN
  
```

Figure 2. Spectrum.

```

60208 :E0EE12133E0012CD,340
60216 :D7ECCDA6ECC3AAEA,6B1
60224 :CD1FE0DAAA2170,518
60232 :EFBE20E121E5EE3A,524
60240 :68EFB56F3E000C67,3CC
60248 :3E00BE200BCDD7EC,40F
60256 :3E2132005CC3FFEB,462
60264 :3E00326FEF3270EF,3C7
60272 :ED5B6BEFB0E0CD1F,40C
60280 :EDDAAA2A3273EFC,634
60288 :EBEC3A6BEFF0E020,506
60296 :053A6YEF6003A73,432
60304 :EF12130C3A6A9F99,3FC
60312 :200CCD1FDDAAA6A,50B
60320 :216FEFBEC22DEB,584
60328 :1FDDAAA2A170EF,5A2
60336 :BEC22DEB3E6F3E2,509
60344 :EE3E6832E3EE3E00,490
60352 :32E4EE3A885CFE21,501
60360 :2003CD15ECCD77EC,553
60368 :CDA6EC21E5E3A68,5C5
60376 :EF85AF3E800C6736,422
60384 :0021E5EED4B66EF,561
60392 :0C7FE00C2BDEA23,4FC
60400 :0D20F63EFCAD94ED,589
60408 :3E01D3FC366EAC,5E8
60416 :1FED30FBC3B0EAF3,594
60424 :0603AFD3FF10FB3E,3DB
60432 :48D3FF3EFD3FF3E,56F
60440 :31D3FF3E0F320F5C,395
60448 :328D5C32485C3E01,250
60456 :03FE21915CCB9EFB,56B
60464 :CD58EDC366EACD15,52F
60472 :EED066ED3E01D3FE,556
60480 :2165EE3E08C0DFEC,442
60488 :CDB4ECCDA3ECCDA6,654
60496 :EC223C77ECCD77EC,58F
60504 :CDA0ECCD04ECCDA6,661
60512 :EC23E0DC0DFECCD,4CF
60520 :04EC23CDA3ECC3E03,498
60528 :CDBFECCD04ECC9CD,608
60536 :A3EC3E07C0DFECCD,561
60544 :04EC23C97FE00C8,520
60552 :CDB0ED23C384EFCF,651
60560 :08C8F53E20CDBED,528
60568 :F13DC38FECCDA8EC,650
60576 :CDA3ECCDA6ECC3E0D,5A6
60584 :CDB0ED3E3FF320C8,574
60592 :C9F513E6A0C81FCB,60C
60600 :1FC81FCB1FF630FE,4CF
60608 :3AFAC6ECC0071213,498
60616 :F1E68FF630FE3AFA,686
60624 :D4ECC0871213C921,46C
60632 :CDEE5CDB04ECC106,69C
60640 :173E20772310FC3E,339
60648 :0077C9E52170EFAE,538
60656 :77C50E087EACB17,449
60664 :308D7EE08773A6F,3C9
60672 :EFEE18326FEF3721,3D5
60680 :6FEFCB1623C9160D,358
60688 :20E2C1E1C9110501,394
60696 :216A00CDB503C93E,32F
60704 :963277EFCDD4EDDA,529
60712 :2EEDF1C366EACDAC,5C8
60720 :07D8E01F602D3FE,548
60728 :AF2177E35200237,2FC
60736 :C9CD77ED38EBC9CD,5F0
60744 :47E2DBFECC0837C9,5E6
60752 :F5D8FF3A81E7FE00,5C7
60760 :20043E3618023E37,187
60768 :D3FFD87FF1C9F53A,675
60776 :81E7FE0020043E36,376
60784 :D3FFC050EDF1C93E,644
60792 :08D8FFE68057C8DB,59
60800 :FFE68237C8DBFF66,626
60808 :82084DB7FA7C93A,3E8
60816 :81E7FE0020043E37,397
60824 :2023E36D3FFD87F,452
60832 :C9CD77ED3A73EFD8,5DE
60840 :F1C366EAF53ED23D,5EE
60848 :20DFD1C9CDACED3D,62A
60856 :28FAC95D5E5F5FE,70D
60864 :7F2813CDF9EDFE0C,538
60872 :280CFE0D20053E2,207
60880 :D73E0DD710103E20,34F
60888 :D73E0DD73A885CFE,4EB
60896 :2128033E0DD73E5F,2E6
60904 :D73E0DD7F1E10C1,640
60912 :C9FE07201FCFCB20,4F3
60920 :19FE0C2014FE0020,388
60928 :19FE0D200CFE20FA,367
60936 :0FEFE08FA11EE3E,48A
60944 :90C93E87C9CD580D,32C
60952 :3E2CDB1163E1832,1C4
60960 :095CC93E121601C0,302
60968 :1122C93E121600CD,257
60976 :1122C93E5D5E3E02,3EB
60984 :CD0116CD47EE38F8,451
60992 :CD5CEEE1D1C1C93A,5CD
61000 :385CC06F200C3A00,20F
61008 :3E521385CC0A6F1,4C3
61016 :4C7C937C9F5111000,3DE
61024 :CD1BEDFC19444F57,4D6
61032 :4E4C4F4144494E47,2B4
61040 :284D454E550D2020,216
61048 :2020524543454956,276
61056 :450053520204578,217
61064 :497420746F204261,328
61072 :7369630820205573,2DF
61080 :6520537960620F6C,393
61088 :2053686966742020,308
61096 :204780746F205265,2C9
61104 :7475726E20746F20,39C
61112 :4D454E5520208045,278
61120 :4E5445522045540,389
61128 :4245522000000000,1C1
  
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	40-way £3.40 £2.00 £1.85	
	50-way £3.85 £2.25 £2.00	
	60-way £4.80 £2.60 £2.25	
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SPACE JUNK

At last, 80,000 characters after blast off, the good ship Space Junk reaches its final destination. Nalin Sharma explains.

HERE IS a reminder of the loading and game instructions for Space Junk.

Insert cassette, press Shift and Run/Stop and start your cassette recorder. Loading time is about two minutes. Put your joystick into Port 2.

Can you retrieve all 32 satellites by mastering control of your ship, which can move up, down, left and right and can also fire bullets?

However, beware of the four yellow junkies which patrol the skies. Unless you can work out how to destroy them you're in trouble! To help you there's a radar at the top of the screen which will pinpoint the junkies and any miscellaneous junk which appears from

time to time and can be retrieved for bonus points.

After every two sheets you'll get an extra life and an attempt at the challenge stage. Here you have 99 units of time to turn the four junkies into stormal — if you succeed you'll get 8000 points! Below your score is shown the number of satellites left to collect, together with the number of lives left.

Pressing F7 will freeze the game and pressing the Space-Bar will restart it. Tape copies of the program are available for £3.25 from Nalin Sharma, 35 Kitchener Road, Walthamstow, London E17 4LJ.



7328	++00101020202020	19+	74e0	0404040404040404	020	7698	464d494d49464946	247	7850	1010040202000402	036	7a10	1d1d191919191d1d	0d8
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7340	0404040404040404	020	74f8	0404040404040404	020	76b0	4249424942494249	22c	7868	0208040202081010	03a	7a28	1d1d191919191d1d	0d8
7348	0404040202020202	016	7500	0404040404040410	02c	76b8	4249424942494249	22c	7870	0402020206000004	024	7a30	1d1d191b191b191b	0d6
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7368	0402020810020202	026	7520	0000000000000000	048	76d8	4649004649004649	1ad	7890	0600000402020206	026	7a50	1d1e191b1d1e2500	0cf
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7378	1002020202081008	038	7530	4900480049004849	16b	76e8	4900464849000000	120	79a0	0404040404040404	020	7a60	0101010108000008	024
7380	0404040410040202	030	7538	4900484949004849	164	76f0	4648490000004648	165	79a8	0404040404040404	020	7a68	0800080008000808	040
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73d0	0404040404040404	020	7588	4649464949464946	23c	7740	0402020804040404	020	79f8	00++00++00++00d3	3ad	7ab8	0404040404040410	02c
73d8	0404040404040404	020	7590	4946494649494649	23f	7748	0402020404040404	01c	7900	++20++00++2c1919	37b	7ac0	0404040404040404	020
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73f0	0404040404040404	020	75a8	4946494649464946	23c	7760	0404040402020404	01c	7918	191d191d191d191d	0a8	7ad8	0410040404040404	02c
73f8	0404040404040404	020	75b0	4946494649464946	23c	7768	0404040404020204	01c	7920	191d191d191d191d	0a8	7ae0	04040404041004	02c
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7428	0202020202020202	010	75e0	4d494d4d494d494d	25c	7798	0204040404020204	01a	7950	1d1d1919161d1d19	0d5	7b10	0404040404040404	020
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Program 1.

```
10 REM *****
20 REM ***** BACK UP UTILITY *****
30 REM ***** K.R.LASLETT 1985 *****
40 REM *****
50 ON BREAK GOSUB 500
60 INK 0,0:INK 1,26:INK 2,6:INK 3,24
70 BORDER 0:PAPER 0:PEN 1:ORIGIN 0,0:CLS
80 LOCATE 1,25:PRINT"LOADING PLEASE WAIT!"
90 REM *****TAPE*****
100 PLOT 120,90:DRAW 120,100,1:DRAW 170,100:DRAW 170,9
0:DRAW 250,90:DRAW 250,80:DRAW 230,80:DRAW 230,77:DRAW
250,77:DRAW 250,70:DRAW 230,70:DRAW 230,67:DRAW 250,6
7:DRAW 250,60:DRAW 200,60:DRAW 200,50:DRAW 190,50:DRAW
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110 DRAW 170,70:DRAW 170,60:DRAW 160,60:DRAW 160,90:DR
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,90:DRAW 170,90:PLOT 170,80:DRAW 180,80:DRAW 180,77:DR
AW 170,77:DRAW 170,80:PLOT 200,80:DRAW 210,80:DRAW 210
,77:DRAW 200,77:DRAW 200,80
120 PLOT 190,90:DRAW 190,60:PLOT 220,90:DRAW 220,60:PL
OT 140,90:DRAW 120,90
130 REM *****TO*****
140 PLOT 280,90:DRAW 340,90:DRAW 340,60:DRAW 310,60:DR
AW 310,90:PLOT 310,80:DRAW 300,80:DRAW 300,60:DRAW 290
,60:DRAW 290,80:DRAW 280,80:DRAW 280,90:PLOT 320,80:DR
AW 330,80:DRAW 330,77:DRAW 320,77:DRAW 320,80
150 REM *****TAPE2*****
160 PLOT 360,100:DRAW 410,100:DRAW 410,90:DRAW 490,90:
DRAW 490,80:DRAW 470,80:DRAW 470,77:DRAW 490,77:DRAW 4
90,70:DRAW 470,70:DRAW 470,67:DRAW 490,67:DRAW 490,60:
DRAW 440,60:DRAW 440,50:DRAW 430,50:DRAW 430,60:DRAW 4
20,60:DRAW 420,70:DRAW 410,70
170 DRAW 410,60:DRAW 400,60:DRAW 400,90:DRAW 390,90:DR
```

```
AW 390,60:DRAW 380,60:DRAW 380,90:DRAW 360,90:DRAW 360
,100:PLOT 400,90:DRAW 410,90:PLOT 410,80:DRAW 420,80:D
RAW 420,77:DRAW 410,77:DRAW 410,80:PLOT 430,90:DRAW 43
0,60:PLOT 460,90:DRAW 460,60
180 PLOT 440,80:DRAW 450,80:DRAW 450,77:DRAW 440,77:DR
AW 440,80
190 REM *****CASSETTE*****
200 PLOT 90,320:DRAW 100,330:DRAW 290,330:DRAW 300,300
:DRAW 300,210:DRAW 290,200:DRAW 100,200:DRAW 90,210:DR
AW 90,320:PLOT 120,200:DRAW 130,230:DRAW 260,230:DRAW
270,200:
210 PLOT 150,220:DRAW 158,220:DRAW 158,213:DRAW 150,21
3:DRAW 150,220:PLOT 240,220:DRAW 240,213:DRAW 232,213:
DRAW 232,220:DRAW 240,220:PLOT 170,287:DRAW 220,287:DR
AW 220,275:DRAW 170,275:DRAW 170,287
220 PLOT 330,320:DRAW 340,330:DRAW 530,330:DRAW 540,32
0:DRAW 540,210:DRAW 530,200:DRAW 340,200:DRAW 330,210:
DRAW 330,320:PLOT 360,200:DRAW 370,230:DRAW 500,230:DR
AW 510,200:PLOT 390,220:DRAW 398,220:DRAW 398,213:DRAW
390,213:DRAW 390,220
230 PLOT 480,220:DRAW 480,213:DRAW 472,213:DRAW 472,22
0:DRAW 480,220:PLOT 410,287:DRAW 460,287:DRAW 460,275:
DRAW 410,275:DRAW 410,287
240 PLOT 100,310:DRAW 110,320,2:DRAW 280,320:DRAW 290,
310:DRAW 290,240:DRAW 100,240:DRAW 100,310:PLOT 340,31
0:DRAW 350,320:DRAW 520,320:DRAW 530,310:DRAW 530,240:
DRAW 340,310:DRAW 340,310
250 PLOT 140,290:DRAW 250,290:PLOT 250,260:DRAW 140,26
0:PLOT 380,290:DRAW 490,290:PLOT 490,260:DRAW 380,260
260 REM *****LOGO*****
270 PLOT 70,340,3:DRAW 60,350:DRAW 60,380:DRAW 70,390:
DRAW 100,390:DRAW 110,380:DRAW 110,350:DRAW 100,340:DR
AW 70,340:PLOT 100,350:DRAW 80,350:DRAW 70,360:DRAW 70
,370:DRAW 80,380:DRAW 100,380:DRAW 100,370
```

AMSTRAD TAPE BACK

How many times have you sat there waiting for what seems to be forever for a program to Load? Well type in this program and make back up copies of your slow loading software that will then Load at twice the normal speed. Alternatively, just make security copies at the reliable normal speed.

A problem that I have encountered with the Amstrad is the way in which the speed of cassette mechanisms vary from machine to machine. Some software will only successfully load one in three attempts which is another reason for making one or maybe two back up copies of that brand new game.

Software recorded on your machine will always be pin sharp and reliable to load successfully even at the fast rate. I generally make two copies of my valuable software, one on a C15 at the fast rate and the other on a C90 at normal speed, just in case.

To use the program type in program 1, check it and save it to tape with

SAVE "AMSTRAD BACK UP"

Now type in program 2, check it and again save it to tape with

SAVE "AMSTRAD BACK UP"

Lastly, type in program 3. Before running save the Basic to another cassette with

SAVE "Data"

Check it carefully then Run it. Insert your first tape with the first two programs on and Save the resulting code.

Reset computer with Ctrl/Shift/Escape. Rewind tape press Ctrl/small Enter and the program will auto run.

The program is user-friendly in that not many instructions are necessary. If all goes well in the loading the computer will beep at you, and ask Save Speed, just press 1 for Fast or 0 for

Normal. You will now be presented with Press Play then any key: which is the standard message you see when you load any program. So why not rewind this tape and make a back up copy of this program just to test it? It copies a program section by section. This program is

made up of three sections.

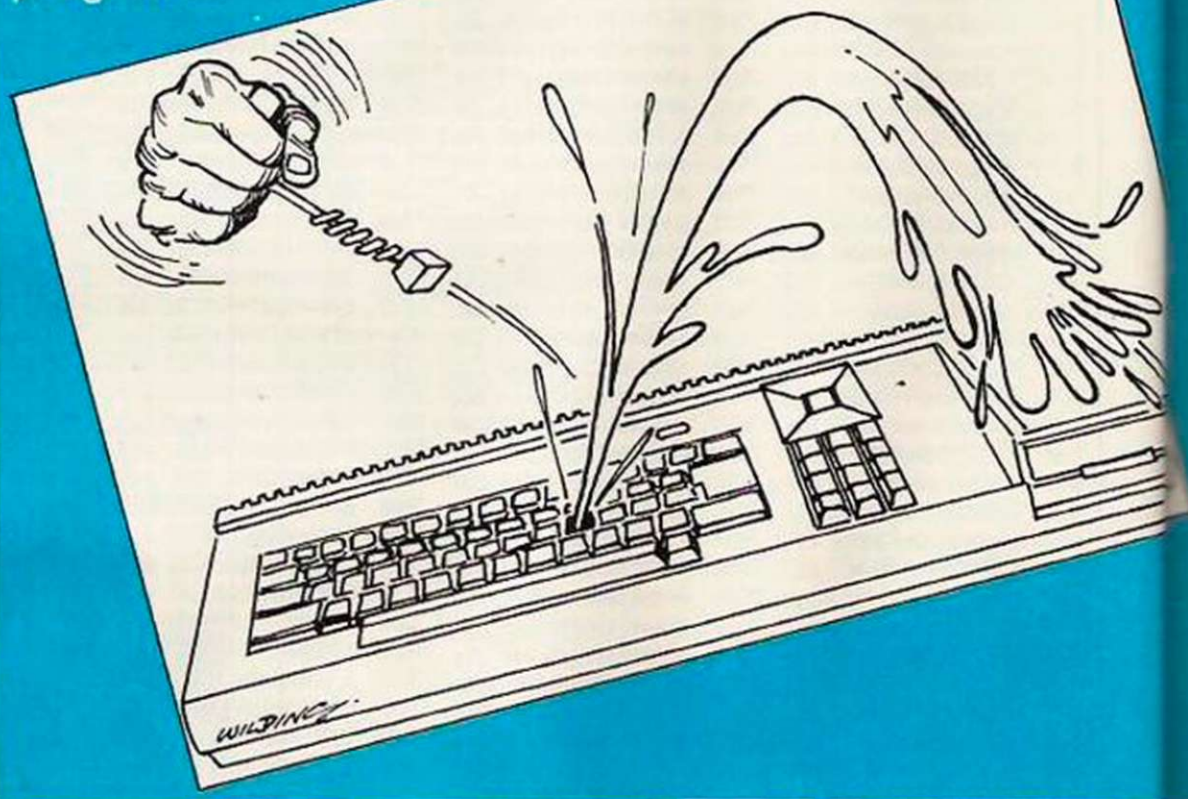
1st section 3 blocks

2nd section 1 block

3rd section 1 blocks

If all is going well, the bottom of the screen should read Loading Amstrad Back Up Block

KR Laslett with a quick and easy way to take extra copies of precious programs.



```

280 DRAW 80,370: DRAW 80,360: DRAW 100,360: DRAW 100,350:
PLOT 120,340: DRAW 120,390: DRAW 140,390: DRAW 140,380: DR
AW 150,390: DRAW 230,390: DRAW 240,370: DRAW 240,390: DRAW
290,390: DRAW 300,380: DRAW 300,390: DRAW 310,390: DRAW 3
10,340
290 DRAW 290,340: DRAW 280,350: DRAW 280,340: DRAW 250,34
0: DRAW 250,370: DRAW 230,340: DRAW 210,380: DRAW 190,380:
DRAW 190,370: DRAW 200,370: DRAW 200,360: DRAW 190,360: DR
AW 190,350: DRAW 210,350: DRAW 210,340: DRAW 150,340: DRAW
140,350
300 DRAW 140,340: DRAW 120,340: PLOT 170,390: DRAW 170,34
0: DRAW 150,365: DRAW 170,390: PLOT 210,390: DRAW 210,380:
PLOT 250,390: DRAW 250,370: PLOT 270,390: DRAW 270,340: PL
OT 330,340: DRAW 330,390: DRAW 350,390: DRAW 350,360: DRAW
370,360
310 DRAW 380,390: DRAW 400,390: DRAW 410,360: DRAW 420,36
0: DRAW 410,370: DRAW 410,390: DRAW 470,390: DRAW 470,360:
DRAW 490,360: DRAW 490,390: DRAW 610,390: DRAW 610,370: DR
AW 600,370: DRAW 600,340: DRAW 580,340: DRAW 580,370: DRAW
560,370
320 DRAW 560,340: DRAW 540,340: DRAW 540,370: DRAW 530,37
0: DRAW 530,380: DRAW 510,380: DRAW 510,370: DRAW 520,370:
DRAW 520,360: DRAW 510,360: DRAW 510,350: DRAW 530,350: DR
AW 530,340: DRAW 400,340: DRAW 400,350: DRAW 380,350: DRAW
380,340
330 DRAW 330,340: PLOT 370,360: DRAW 370,340: PLOT 390,37
0: DRAW 380,360: DRAW 400,360: DRAW 390,370: PLOT 450,390:
DRAW 450,340: PLOT 450,350: DRAW 430,370: DRAW 450,370: PL
OT 410,360: DRAW 410,340: PLOT 490,360: DRAW 490,340: PLOT
530,390: DRAW 530,380
340 PLOT 570,390: DRAW 570,370
350 REM ****ARROW****
360 PLOT 250,150: DRAW 270,165: DRAW 250,180: DRAW 350,16
5: DRAW 330,190: DRAW 380,165: DRAW 330,140: DRAW 350,165:

```

```

DRAW 250,150
370 REM ****CIRCLES****
380 PLOT 250,260: DRAW 250,260,2
390 FOR A=0 TO 67: DEG: ORIGIN 245,275: PLOT 16*COS(A),16
*SIN(A): NEXT: ORIGIN 0,0
400 FOR A=292 TO 360: DEG: ORIGIN 245,275: PLOT 16*COS(A)
,16*SIN(A): NEXT: ORIGIN 0,0
410 FOR A=0 TO 67: DEG: ORIGIN 485,275: PLOT 16*COS(A),16
*SIN(A): NEXT: ORIGIN 0,0
420 FOR A=292 TO 360: DEG: ORIGIN 485,275: PLOT 16*COS(A)
,16*SIN(A): NEXT: ORIGIN 0,0
430 FOR A=112 TO 257: DEG: ORIGIN 145,276: PLOT 16*COS(A)
,16*SIN(A): NEXT: ORIGIN 0,0
440 FOR A=112 TO 257: DEG: ORIGIN 385,276: PLOT 16*COS(A)
,16*SIN(A): NEXT: ORIGIN 0,0
450 r%=10: x%=150: y%=275: DEG: ORIGIN x%,y%: FOR i%=1 TO 4
5: a%=r%*COS(i%): b%=r%*SIN(i%): PLOT a%,b%,1: PLOT -a%,b%
: PLOT a%,-b%: PLOT -a%,-b%: PLOT b%,a%: PLOT -b%,a%: PLOT
b%,-a%: PLOT -b%,-a%: NEXT
460 r%=10: x%=240: y%=275: DEG: ORIGIN x%,y%: FOR i%=1 TO 4
5: a%=r%*COS(i%): b%=r%*SIN(i%): PLOT a%,b%,1: PLOT -a%,b%
: PLOT a%,-b%: PLOT -a%,-b%: PLOT b%,a%: PLOT -b%,a%: PLOT
b%,-a%: PLOT -b%,-a%: NEXT
470 r%=10: x%=390: y%=275: DEG: ORIGIN x%,y%: FOR i%=1 TO 4
5: a%=r%*COS(i%): b%=r%*SIN(i%): PLOT a%,b%,1: PLOT -a%,b%
: PLOT a%,-b%: PLOT -a%,-b%: PLOT b%,a%: PLOT -b%,a%: PLOT
b%,-a%: PLOT -b%,-a%: NEXT
480 r%=10: x%=480: y%=275: DEG: ORIGIN x%,y%: FOR i%=1 TO 4
5: a%=r%*COS(i%): b%=r%*SIN(i%): PLOT a%,b%,1: PLOT -a%,b%
: PLOT a%,-b%: PLOT -a%,-b%: PLOT b%,a%: PLOT -b%,a%: PLOT
b%,-a%: PLOT -b%,-a%: NEXT
490 PAPER 0: RUN: !
500 ORIGIN 0,0: STOP

```

BACK-UP

1 etc, to Block 3. Afterwards, automatically the computer responds with Press Rec and Play then any key, which instructs you to place your back up tape into the machine, press appropriate buttons and any key.

A powerful feature on this program is the Save again option which when your three blocks have been Saved should appear on the bottom of the screen. Simply press Y for yes or N for no. Upon pressing Y the section will be Saved again, on pressing N the program will go back to Press Play then any key in which case carry on with the next section etc.

The program as it stands will transfer a section up to about 22 blocks in length which in most cases will be sufficient. You should become accustomed to this program very quickly as it's very easy to use and the screen always tells you what's going on.

If you get the message "read error a" or a similar message which tells you there's a tape loading error, don't despair press Escape, rewind the tape and load the section again. I've tried to make the program as crash-proof as possible ie, if Escape is pressed during Loading the program will call a routine to reset the cassette manager and call the load routine once more.

If the program hasn't operated as described then re-load the machine code loader, if you save it separately on a tape — program 3 — and check the data carefully. Then re-Save the resultant code. Then try again.

If anybody doesn't want the task of typing in the program, tape copies are available with full instructions from: Mr. K.R. Laslet, 12 Wintour House, Loweswater Close, Wembley HA9 8UF at £3.00 per copy.

Program 2.

```

5 REM *****
10 REM ***** BASIC CONTROL PROGRAM *****
15 REM ***** K.R.LASLETT *****
20 REM *****
25 MEMORY 42999:LOAD"!
30 WINDOW 1,40,24,25:CALL &BC65:CLS:PRINT CHR$(7):PRIN
T"INPUT SAVE SPEED":PRINT"0-NORMAL OR 1-FAST."
40 A$=INKEY$:IF A$="" GOTO 40
50 IF A$="1" THEN SPEED WRITE 1
60 CLS:PRINT CHR$(7):CALL 43000
70 CLS:PRINT CHR$(7):PRINT"SAVE AGAIN":PRINT"YES OR NO
"
80 B$=INKEY$:IF B$="" GOTO 80
90 IF B$="Y" OR B$="y" THEN 110
100 GOTO 60
110 CLS:PRINT CHR$(7):CALL &AB23:GOTO 70

```

Program 3.

```

10 REM MACHINE CODE LOADER
20 MEMORY 42999
30 FOR address=43000 TO 43095
40 READ byte:POKE address,byte
50 NEXT address
60 SAVE"AMSTRAD BACK UP",B,43000,96
65 END
100 DATA &06,&00,&21,&E8,&03,&11,&28,&04
110 DATA &CD,&77,&BC,&D2,&4C,&AB,&22,&EA
120 DATA &03,&ED,&53,&EC,&03,&ED,&43,&EE
130 DATA &03,&32,&F0,&03,&21,&28,&0C,&CD
140 DATA &83,&BC,&D2,&4C,&AB,&22,&F1,&03
150 DATA &CD,&7A,&BC,&06,&10,&2A,&EA,&03
160 DATA &11,&28,&04,&CD,&8C,&BC,&D2,&52
170 DATA &AB,&22,&F3,&03,&21,&28,&0C,&ED
180 DATA &5B,&EE,&03,&ED,&4B,&F1,&03,&3A
190 DATA &F0,&03,&CD,&9B,&BC,&D2,&52,&AB
200 DATA &CD,&8F,&BC,&C9,&CD,&7D,&BC,&C3
210 DATA &FE,&A7,&CD,&92,&BC,&C3,&FB,&A7

```

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TOP TIPS

LISTER

This short machine code program formats the listing so that each statement is printed on a new line and indented. Since Basic regards If . . . Then as two statements these are also separated.

The routine it can be saved to tape with:

SAVE "lister" 65368,66

To use the routine:

PRINT: RANDOMIZE USR
address to LIST to the screen or by

PRINT =3: RANDOMIZE USR
address to send to the Printer.
Alan Mynett.

```

100 REM "LISTER"
101 RESTORE 1000
102 READ ADDRESS, DATA LINES
103 PRINT TAB 10; "Loading Code"
104 FOR N=1 TO DATA LINES
105   READ L, L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L22, L23, L24, L25, L26, L27, L28, L29, L30, L31, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41, L42, L43, L44, L45, L46, L47, L48, L49, L50, L51, L52, L53, L54, L55, L56, L57, L58, L59, L60, L61, L62, L63, L64, L65, L66, L67, L68, L69, L70, L71, L72, L73, L74, L75, L76, L77, L78, L79, L80, L81, L82, L83, L84, L85, L86, L87, L88, L89, L90, L91, L92, L93, L94, L95, L96, L97, L98, L99, L100
106   PRINT L; L1; L2; L3; L4; L5; L6; L7; L8; L9; L10; L11; L12; L13; L14; L15; L16; L17; L18; L19; L20; L21; L22; L22; L23; L24; L25; L26; L27; L28; L29; L30; L31; L32; L33; L34; L35; L36; L37; L38; L39; L40; L41; L42; L43; L44; L45; L46; L47; L48; L49; L50; L51; L52; L53; L54; L55; L56; L57; L58; L59; L60; L61; L62; L63; L64; L65; L66; L67; L68; L69; L70; L71; L72; L73; L74; L75; L76; L77; L78; L79; L80; L81; L82; L83; L84; L85; L86; L87; L88; L89; L90; L91; L92; L93; L94; L95; L96; L97; L98; L99; L100
107 NEXT N
108 RETURN

```

UTILITY PROGRAM

I find this short machine code program extremely useful when writing large programs involving printing control characters.

To enable the program, type SYS 5E4 (50000). This has to be typed after typing New because the IRQ vector is reset. This also occurs after pressing Run/Stop and Restore.

Matthew Wilkes.

```

100 RESTORE
110 FOR I=50000 TO 50012
120 READ D:POKE I,D
130 NEXT
140 FOR I=49152 TO 49197
150 READ B:POKE I,B
160 NEXT
170 REM TYPE "SYS 5E4"
180 REM TO ENABLE
190 DATA120,169,0,141,20
200 DATA3,169,192,141,21
210 DATA3,88,96,32,159
220 DATA255,166,198,208,3
230 DATA76,49,234,202,189
240 DATA119,2,201,133,208
250 DATA8,169,0,141,212,0
260 DATA76,49,234,201,134
270 DATA240,3,76,49,234
280 DATA169,255,141,212
290 DATA8,169,0,141,198
300 DATA8,76,49,234

```

RESPONSE

Frame

'CHEQUE BOOK'

I recently bought an adventure game set in space for my Amstrad. The program used normal text printout, but all the numbers on the screen were like those seen at the bottom of cheques. I have looked all through the character set, including getting my Amstrad to printout the characters from 128 to 255, and I cannot find these "cheque numbers". How did the people who wrote the adventure do it?

Martin Wiaba,
Witham,
Essex.

IT IS LIKELY that the standard numbers in the Amstrad character set were redefined, using the Symbol command. The following routine, which you can use in combination with any programs, will produce numbers as requested by you.

```

10 REM "Cheque-book" numerals
20 SYMBOL AFTER 48
30 SYMBOL 48,0,60,66,66,98,98,98,60
40 SYMBOL 49,0,8,0,0,12,12,12,12
50 SYMBOL 50,0,124,2,2,60,96,96,62
60 SYMBOL 51,0,124,2,2,60,6,6,126
70 SYMBOL 52,0,64,96,100,100,126,4,4
80 SYMBOL 53,0,62,64,64,60,6,6,126
90 SYMBOL 54,0,62,64,64,124,70,70,126
100 SYMBOL 55,0,120,8,8,12,12,12,12
110 SYMBOL 56,0,60,66,66,60,70,70,60
120 SYMBOL 57,0,60,66,66,60,6,6,126

```

DRAGON BUG?

While writing a program on the Dragon 32, I came across a quite interesting messate. Error messages on the Dragon generally consist only of two letters, such as SN Error, but during the execution of one program I got two words. The Dragon was waiting for an ordinary input response, and I entered "Bill, Fred". The Dragon replied "Extra Ignored", and asked for the input again. It seems the Dragon ignores everything following the comma. I've tried everything else, such as semi-colons, but they do not work.

S J Lawton,
Barnsley,
South Yorkshire.

MANY COMPUTERS will behave in just the same way as your Dragon when presented with a comma within an input. You can only use this if you allow for more than one variable to be assigned with the word Input, as in:

```
INPUT "ENTER NAME"; A$, B$
```

If you do this, you'll find the computer will accept input separated by a comma, and will assign the material to the left of the comma to the first variable (A\$) and the rest of the material to the second one (B\$).

VAL ON THE QL

I have recently received a QL and am generally very pleased

with it, having previously owned a BBC Model B and a 48K Spectrum. On trying to convert some Spectrum programs, I've discovered that omissions from SuperBasic make it fairly difficult. I know about coercion, but still find I need Val on the QL. Is there any way of making a Val function? Lastly, is the JM the latest version of the computer available? I have an AH version. Finally, could you tell me how long it takes to load Quill? I wish to know if my Microdrives are as fast as they should be.

S Tomasini,
Dartmouth,
Devon.

THE ONLY WAY to emulate Val on the QL is to make use of coercion, but test the output before printing the result on the screen. The material you are Valling should be of a predictable type, and you might find that adding, or subtracting, 0.5 gives the answer you want — and perhaps using INT as well.

The latest version of the QL out, at the time of going to press, is the JS, which is significantly better than JM, which is the version which immediately preceded it. It includes good error-trapping.

Version 1.1 of QDOS, in the JS Rom, runs Microdrives more quickly than the earlier version. However, because Quill itself has been progressively improved, the time it takes to load depends almost entirely on which Quill you have, rather than the speed with which your Microdrives work. The first version of Quill, on the first (kludged) QL's, took some 70 seconds to load. The time is now down to 20 or less.

In an earlier issue of Your Computer, I gave a routine to simulate on the Spectrum the Left\$, Right\$ and Mid\$ string-handling commands used in most other Basics. Andy Gibbons on Peterborough suggests that it is simpler if the Def FN function is used, and

DRIVE PROBLEM

I have a Sinclair Microdrive and several cartridges. After fairly heavy use of the cartridges, one started to act strangely. I got the message "Microdrive not present" when I tried to catalogue, load or save. The first time this happened, I thought it was a one-off, and threw away the cartridge. However, after buying a new one, the same thing happened after a couple of weeks. How can I get the information back?

P D Scott,
Crewe.

SINCLAIR ALWAYS advises users of the Spectrum to make backup copies of important programs. Whenever I am developing a major program on the Spectrum, I save and resave, using a name which ends with the number of the version I'm saving. I save the partially completed programs on two different cartridges, alternating the saves, so that if one goes down I still have a fairly recent version available.

It sounds to me as if you are giving your cartridges very heavy use. Perhaps you should make sure you do not use one exclusively from now on, and make back up copies frequently, on other cartridges. If you can borrow a second Microdrive, it would be worth trying to copy from your cartridge onto another one, placing your cartridge in the borrowed drive, rather than in your own drive.

Check that the edge connector on your Microdrive is completely clean, by rubbing it gently with an ordinary pencil rubber — and making sure bits of rubber don't get into the works!

outlines the following simple implementations of the standard string-handling, to simplify program conversions:

```

10 DEF FN L$(A$,X) = A$(TO X): REM LEFTS
20 DEF FN R$(A$,X) = A$(X + 1 TO): REM RIGHTS
30 DEF FN M$(A$,X,Y) = A$(X TO (X + Y) - 1): REM MIDS

```

Spitfire

40

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```

10 *****
20 **** PRIEST AND VAMP. ****
30 **** 1985. ****
40 **** FOR THE ****
50 **** AMSTRAD CPC464. ****
60 **** WRITTEN BY ****
70 **** ADAM MURRAY. ****
80 *****
90
100 MODE 0
110 VUZ=48:VDX=49:VLX=50:VRX=51:VFZ=52
KEYS FOR VAMP
120 PUZ=72:PDZ=73:PLZ=74:PRZ=75:PFZ=76
KEYS FOR PRIEST
130 NOZ=0:GOTO 180
140 NOZ=NOZ+1:IF NOZ=39 THEN RESTORE
160:NOZ=0
150 READ dX,nX:SOUND 1,nX,dX,15,1,4:RE
TURN
160 DATA 25,568,50,478,25,426,37,379,1
2,358,25,379,50,426,25,506,37,638,12,5
68,25,506,50,478,25,568,37,568,12,602,
25,568,50,506,25,602,50,750,25,568
170 DATA 50,478,25,426,37,379,12,358,2
5,379,50,426,25,506,37,638,12,526,25,5
06,37,478,12,506,25,568,37,606,12,677,
25,638,75,568,50,568,0,0
180 BORDER 11
190 SKZ=500
200 ENV 1,10,-1,2
210 FOR IX=0 TO 15:INK IX,IX:NEXT
220 SYMBOL AFTER 229
230
240 'define graves
250
260 SYMBOL 230,0,0,24,60,110,94,255,25
5
270
280 'define priest
290
300 SYMBOL 232,60,60,255,60,60,24,255,
255
310 SYMBOL 233,255,189,189,189,189,126
,126,126
320 SYMBOL 234,126,126,126,126,228,4,4
,7
330 SYMBOL 235,126,126,126,39,32,32,22
4
340
350 'define vampire
360
370 SYMBOL 236,112,249,61,63,15,15,3,3
380 SYMBOL 237,14,143,188,252,240,240,
192,192
390 SYMBOL 238,1,1,7,31,63,57,48,32
400 SYMBOL 239,128,128,224,240,252,156
,12,4
410
420 'DEFINE WINDOWS
430
440 SYMBOL 240,0,0,24,52,82,82,145,145
450 SYMBOL 241,255,145,145,145,145,145
,145,255
460
470 'DEFINE GRASS
480
490 SYMBOL 242,32,34,148,72,42,26,40,1
6
500
510 GOSUB 2460 'instructions
520 GOTO 810
530
540 'FILL ROUTINE
550
560 XOZ=XZ:YOZ=YZ
570 XNZ=XZ:YNZ=YZ
580 WHILE TEST (XZ,YZ)<>CZ:PLOT XZ,YZ,C
Z:ZX=XZ+4:WEND
590 XZ=XZ-4
600 WHILE TEST (XZ,YZ)<>CZ:PLOT XZ,YZ:
XZ=XZ-4:WEND
610 XZ=XOZ
620 IF TEST (XZ,YZ+2)<>CZ THEN YZ=YZ+2:
GOTO 580
630 RETURN
640
650 IF TEST (XVZ+32,YVZ-16)<>6 THEN RE
TURN
660 SOUND 4,200,3,7:TAGOFF:PRINT CHR#(
23)+CHR#(0):TAG
670 PLOT -10,0,10:MOVE (XVZ+16),(YVZ+8
):PRINT CHR#(230):MOVE (XVZ+16),(YVZ-
8):PRINT CHR#(143):
680 TAGOFF:PRINT CHR#(23)+CHR#(1):TAG
690 PLOT -10,0,9
700 WCZ=WCZ-1:IF WCZ=0 THEN VOPWZ=1
710 RETURN
720
730 IF TEST (XPZ+16,YPZ-32)<>10 THEN R
ETURN
740 SOUND 4,100,3,7:TAGOFF:PRINT CHR#(
23)+CHR#(0):TAG
750 PLOT -10,0,6:MOVE XPZ,(YPZ-16):PRI
NT CHR#(230):MOVE XPZ,(YPZ-32):PRINT
CHR#(143):
760 TAGOFF:PRINT CHR#(23)+CHR#(1):TAG

```

SOFTWARE

Programs for Software File should be fairly compact and sent on a cassette. Please include clear instructions and say what computer it's for. We pay between £6 and £36 for programs published. They must be double-checked and submitted

File

Vampire and priest

Adam Murray,
12 AD Regt.,
BFPO 20.

Amstrad

VAMPIRE AND PRIEST is a two-player game for the Amstrad CPC-464 and occupies just over 8K. It makes use of both sound and graphics with the latter being in Mode 0 — low resolution with 15 colours.

The game itself is written entirely in Amstrad Basic and is explained with the use of remark statements which can be left out when typing in the program.

Full instructions of how to play the game are provided within the program as is an option to change the skill level.

Provisions have been made for each player to use a joystick but with a few simple changes any keyboard/joystick layout is possible. This is how you do it.

Turn to appendix III page 16 of the user manual which should show a picture of the keyboard with appropriate values written on the individual keys.

Now look at lines 110 and 120. These hold the values of the keys to be used, and can be changed to your own choice. Initially they are set to use joysticks. The variable names are short but meaningful, e.g. VU%= key to use to move vampire up, PF%= key to use as fire for priest etc.

The routine between 560-630 is a simple fill routine and could be placed outside the program if the following parameters are passed: x%-X co-ord to start filling from, y%-Y co-ord to start filling from, c%- the colour to use in filling the area. In this case it must be the same as the outline of the shape. This could easily be changed to suite your own purposes.

I have used this routine to fill the church and castle at the start of the game and although slow does not need to be repeated after every game.

If all is well there should be a tuneful version of Greensleeves playing in the background. This is achieved simply by using the interrupts in the form of ON SQ(?) Gosub.

I think this program demonstrates what can be done with Locomotive Basic and without special techniques.

```

770 PLOT -10,0,8
780 WCZ=WCZ+1:IF WCZ=24 THEN VOPWZ=1
790 RETURN
800
810 BORDER 11:INK 0,13
820 FOR IX=1 TO 15:INK IX,IX:NEXT
830 PRINT CHR#(23)+CHR#(0)
840 A$=CHR#(230)+" "+CHR#(230)+" "+CHR
#(230)+" "+CHR#(230)
850 B$=CHR#(143)+" "+CHR#(143)+" "+CHR
#(143)+" "+CHR#(143)
860
870 'set skyline
880
890 INK 13,26
900 PEN 2:LOCATE 1,1:PRINT STRING$(C$,
143)
910 PEN 14:LOCATE 1,5:PRINT STRING$(80
,143)
920 PEN 13:LOCATE 1,9:PRINT STRING$(60
,143)
930 FOR IX=1 TO 20:LOCATE IX,11:PAPER
13:PEN 12:PRINT CHR#(242):NEXT
940 FOR IX=1 TO 3
950 PEN 0:LOCATE 3,0+IX:PRINT STRING$(
4,143):LOCATE 14,0+IX:PRINT STRING$(3,
143)
960 NEXT
970 MOVE 0,225:DRAW 640,0,0
980
990 'draw castle
1000
1010 RESTORE 1040
1020 MOVE 66,226
1030 FOR DRZ=1 TO 45:READ XZ,YZ:DRAW
XZ,YZ,3:NEXT
1040 DATA 0,55,-10,10,-10,0,0,24,-4,16
,-10,0,0,34,14,4
1050 DATA 0,-14,14,0,2,12,16,0,0,-6,12
,-2,6,0,14
1060 DATA 10,0,0,-30,-10,-10,16,-4,0,-

```

```

16,40,0,0,12
1070 DATA 10,10,0,10,-10,10,0,20,12,8,
0,-14,9,0
1080 DATA 9,10,10,0,0,-10,14,0,0,16,14
,0,-4,-60,-16,0
1090 DATA -14,-20,0,-85,-19,0,0,47,-96
,0,0,-47,-14,0
1100
1110 'draw church
1120
1130 RESTORE 1160
1140 MOVE 400,226
1150 FOR DRZ=1 TO 11:READ XZ,YZ:DRAW
XZ,YZ,15:NEXT
1160 DATA 0,90,35,80,35,-90,100,0,20,-
20,0,-60,-75,0,0,47,-100,0,0,-47,-10,0
1170
1180 'fill castle
1190
1200 CZ=3
1210 FOR IX=1 TO 7:READ XZ,YZ:GOSUB 56
0:NEXT
1220 DATA 71,229,101,359,40,355,193,31
8,220,375,169,375,180,229
1230
1240 'fill church
1250
1260 CZ=15
1270 FOR IX=1 TO 3:READ XZ,YZ:GOSUB 56
0:NEXT
1280 DATA 411,229,432,334,516,229
1290 RESTORE 160
1300 LOCATE 3,4:PEN 0:PAPER 3:PRINT CH
R#(240)CHR#(0)CHR#(10)CHR#(241)
1310 LOCATE 18,8:PAPER 15:PRINT CHR#(2
40)CHR#(8)CHR#(10)CHR#(241)
1320 PAPER 0
1330
1340 'set up graves
1350

```

(continued on page 103)

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SOFTWARE *File*

(continued from page 101)

```

1360 INK 10,20:INK 6,24
1370 FOR y%=14 TO 22 STEP 4
1380 LOCATE 2,y%:PEN 10:PRINT a$
1390 LOCATE 2,y%+1:PEN 10:PRINT b$
1400 NEXT
1410 FOR y%=14 TO 22 STEP 4
1420 LOCATE 13,y%:PEN 6:PRINT a$
1430 LOCATE 13,y%+1:PEN 6:PRINT b$
1440 NEXT
1450 '
1460 'set up variables
1470 '
1480 xp%=416:yp%=270 'co-ord of priest
1490 xv%=80:yv%=246 'co-ord of vampir
e
1500 wc%=12
1510 tod=1:vopw%=0
1520 '
1530 'start of main game
1540 '
1550 PRINT CHR$(23)+CHR$(1);
1560 TAG
1570 PLOT -10,0,8
1580 MOVE xp%,yp%:PRINT CHR$(232);:MOV
E xp%,(yp%-16):PRINT CHR$(233);:MOVE x
p%,(yp%-32):PRINT CHR$(234);
1590 PLOT -10,0,9
1600 MOVE xv%,yv%:PRINT CHR$(236)+CHR$
(237);
1610 TAG
1620 '
1630 'main game loop
1640 '
1650 time1=TIME+SK%+INT(RND*1000)
1660 WHILE time1>TIME AND vopw%=0
1670 IF (XP%-XV%)=16 AND (YP%-YV%)=24
THEN vopw%=1
1680 PLOT -10,0,8:MOVE xp%,yp%:PRINT C
HR$(232);:MOVE xp%,(yp%-16):PRINT CHR$
(233);:MOVE xp%,(yp%-32):PRINT CHR$(23
4);
1690 IF xp%<320 AND yp%>200 THEN 1710
1700 IF INKEY(PU%)=0 AND TEST(xp%+16,y
p%+30)=0 THEN yp%=yp%+32
1710 IF INKEY(PD%)=0 AND yp%>48 THEN
yp%=yp%-32
1720 IF INKEY(PL%)=0 AND TEST(xp%-4,yp
%)<>15 AND xp%>32 THEN xp%=xp%-32
1730 IF INKEY(PR%)=0 AND TEST(xp%+32,y
p%)<>15 AND xp%<560 THEN xp%=xp%+32
1740 MOVE xp%,yp%:PRINT CHR$(232);:MOV
E xp%,(yp%-16):PRINT CHR$(233);:MOVE x
p%,(yp%-32):PRINT CHR$(235);
1750 '
1760 PLOT -10,0,9
1770 MOVE xv%,yv%:PRINT CHR$(236)CHR$(
237);
1780 IF xv%>320 AND yv%>200 THEN 1800
1790 IF INKEY(VU%)=0 AND TEST(xv%+20,y
v%+30)=0 THEN yv%=yv%+32
1800 IF INKEY(VD%)=0 AND yv%>32 THEN y
v%=yv%-32
1810 IF INKEY(VL%)=0 AND TEST(xv%-4,yv
%)<>3 AND xv%>32 THEN xv%=xv%-32
1820 IF INKEY(VR%)=0 AND TEST(xv%+64,y
v%)<>3 AND xv%<530 THEN xv%=xv%+32
1830 MOVE xv%,yv%:PRINT CHR$(238)CHR$(
239);
1840 ON SQ(1) GOSUB 140
1850 PLOT -10,0,8:MOVE xp%,yp%:PRINT C
HR$(232);:MOVE xp%,(yp%-16):PRINT CHR$
(233);:MOVE xp%,(yp%-32):PRINT CHR$(23
5);
1860 IF INKEY(PF%)=0 AND tod=1 THEN GO
SUB 730
1870 MOVE xp%,yp%:PRINT CHR$(232);:MOV
E xp%,(yp%-16):PRINT CHR$(233);:MOVE x
p%,(yp%-32):PRINT CHR$(234);
1880 PLOT -10,0,9
1890 MOVE xv%,yv%:PRINT CHR$(238)CHR$(
239);
1900 IF INKEY(VF%)=0 AND tod=2 THEN GO
SUB 650
1910 MOVE xv%,yv%:PRINT CHR$(236)CHR$(

```

```

237);
1920 WEND
1930 IF vopw%=1 THEN GOTO 1970
1940 SOUND 2,150,3,7,0,0,10
1950 IF tod=1 THEN INK 2,9:INK 14,21:I
NK 13,19:BORDER 18:INK 0,0:tod=2:GOTO
1610
1960 INK 2,2:INK 0,14,14:INK 13,26:BORDE
R 11:tod=1:INK 0,13:GOTO 1610
1970 IF tod=2 THEN GOTO 2010 ELSE GOTO
2100
1980 '
1990 'vamp win
2000 '
2010 TAGOFF
2020 PRINT CHR$(23)+CHR$(0);
2030 TAG
2040 PLOT -10,0,8
2050 MOVE xp%,yp%:PRINT CHR$(143);:MOV
E xp%,yp%-16:PRINT CHR$(143);:MOVE xp%
,yv%-32:PRINT CHR$(143);
2060 TAGOFF
2070 PRINT CHR$(23)+CHR$(1);
2080 PEN 15
2090 FOR r%=12 TO 24
2100 INK 0,RND*26
2110 LOCATE 6,r%:PRINT"Evil wins"
2120 SOUND 1,r%*10,1,7
2130 NEXT:INK 0,0:RESTORE 2310
2140 GOTO 2300
2150 '
2160 'priest win
2170 '
2180 TAGOFF
2190 PRINT CHR$(23)+CHR$(0)
2200 TAG
2210 PLOT -10,10,8
2220 MOVE xv%,yv%:PRINT CHR$(143);:MOV
E xv%+32,yv%:PRINT CHR$(143);
2230 TAGOFF
2240 PRINT CHR$(23)+CHR$(1);
2250 FOR r%=12 TO 24
2260 INK 0,RND*26
2270 LOCATE 6,r%:PEN 8:PRINT"Good wins
"
2280 SOUND 1,r%*10,1,7
2290 NEXT:INK 0,0:RESTORE 2310
2300 FOR d%=1 TO 26:READ n%:SOUND 1,n%
*1,20,7:SOUND 2,n%,20,7:NEXT
2310 DATA 60,53,47,45,60,0,45,47,45,40
,53,0,53,0,53,47,45,36,40,40,45,45,47,
53,47,60
2320 FOR i%=0 TO 13:LOCATE 1,1:PRINT C
HR$(11):NEXT
2330 GOTO 2350
2340 '
2350 'another go
2360 '
2370 INK 1,1+RND*26
2380 LOCATE 3,7:PRINT "Another go Y/N?"
"
2390 IF INKEY(43)=0 THEN no%=0:RESTORE
160:GOTO 2420
2400 IF INKEY(46)=0 THEN RUN
2410 GOTO 2370
2420 FOR i%=0 TO 13:LOCATE 1,26:PRINT
CHR$(8):NEXT
2430 GOTO 1330
2440 NEXT
2450 '
2460 'instructions
2470 '
2480 INK 0,26:INK 13,3,8
2490 LOCATE 5,1:PEN 12:PRINT"****Instr
uctions****"
2500 LOCATE 3,10:PEN 13:PRINT"press sp
ace to cont."
2510 LOCATE 3,18:PEN 9:PRINT"press S t
o start."
2520 IF INKEY(60)=0 THEN CLS:RETURN
2530 IF INKEY$="" THEN GOTO 2540 ELSE
GOTO 2520
2540 GOSUB 3060
2550 LOCATE 1,8:PEN 3:PRINT"*****Vamp
ire*****"

```

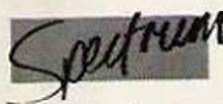
```

2560 LOCATE 9,10:PRINT`CHR$(238);CHR$(
239)
2570 LOCATE 2,13:PEN 9:PRINT "up down
left right"
2580 LOCATE 5,15:PEN 11:PRINT "joy sti
ck 1"
2590 IF INKEY$<>" THEN 2590
2600 GOSUB 3060
2610 LOCATE 1,8:PEN 6:PRINT"*****Prie
st-*****"
2620 LOCATE 10,10:PEN 4:PRINT CHR$(232
);CHR$(10);CHR$(8);CHR$(233);CHR$(10);
CHR$(8);CHR$(234)
2630 LOCATE 2,14:PEN 9:PRINT "up down
left right"
2640 LOCATE 5,16:PEN 11:PRINT "joy sti
ck 0"
2650 IF INKEY$<>" THEN 2650
2660 GOSUB 3060
2670 IF INKEY$<>" THEN 2670
2680 MODE 1:INK 1,0:INK 2,7,8
2690 PRINT"THE PRIEST MAY ONLY CHANGE ALL
THE CYAN"
2700 PRINT"GRAVES TO YELLOW AND THE VA
MPIRE SHOULD"
2710 PRINT"DO THE OPPOSITE."
2720 PRINT
2730 PRINT"THE PRIEST MAY ONLY CHANGE
GRAVES"
2740 PRINT"DURING THE DAY AND THE VAMP
IRE"
2750 PRINT"MAY ONLY CHANGE GRAVES DURI
NG"
2760 PRINT"THE NIGHT."
2770 PRINT
2780 PRINT"NIGHT IS INDICATED BY A SH
ADED GREEN"
2790 PRINT"SKY WHEREAS DAY IS INDICATE
D BY A"
2800 PRINT"SHADED BLUE SKY."
2810 PRINT
2820 PRINT"GRAVES ARE CHANGED BY POSIT
IONING YOUR"
2830 PRINT"PLAYER OVER THE TOP AND PRE
SSING 'FIRE'"
2840 PRINT"ON THE JOYSTICK."
2850 PRINT
2860 PEN 2:PRINT" PRESS SPACE TO
CONTINUE."
2870 IF INKEY$<>" THEN GOTO 2870
2880 CLS
2890 PEN 2:LOCATE 15,2:PRINT"WARNING."
2900 PRINT
2910 PEN 3:PRINT"DURING HIS OWN PLAYIN
G PERIOD A"
2920 PRINT"PLAYER MAY CAPTURE HIS OPPO
NENT FOR"
2930 PRINT"AN IMMEDIATE VICTORY."
2940 PRINT
2950 PRINT"*****"
2960 PRINT
2970 PRINT:PRINT:PRINT" INPUT SKILL
LEVEL (1 TO 20)"
2980 PRINT" 1-HARD 20-EASY ";
2990 INPUT SK%
3000 IF SK%<1 OR SK%>20 THEN SOUND 1,5
0,10,7:GOTO 2990
3010 SK%=(SK%*100)
3020 PRINT:PEN 2:PRINT" PRESS SPA
CE BAR TO PLAY."
3030 IF INKEY$<>" THEN 3030
3040 MODE 0
3050 RETURN
3060 FOR i%=1 TO 23:LOCATE 1,1:PRINT C
HR$(8):NEXT
3070 FOR i%=1 TO 23:LOCATE 1,26:PRINT
CHR$(11):NEXT
3080 BORDER 0:SOUND 1,100,10,7
3090 FOR D%=1 TO 100:NEXT
3100 BORDER 26:SOUND 1,200,10,7
3110 FOR D%=1 TO 100:NEXT
3120 LOCATE 3,19:PEN 13:PRINT"press sp
ace to cont."
3130 RETURN

```

Busy bee

Tony Wye,
Hayes,
Middlesex.



THIS PROGRAM is called Busy Bee and runs on the Spectrum 16 and 48K. It's a maze type game where you have to cut the grass on a lawn avoiding the bees who are attracted to you because of the lawn mower noise.

Upon loading, the game auto runs and the instructions are displayed and the keys to be used — cursor keys — then P must be pressed to play. The screen is set up and you must

move around the flower beds and cut the grass avoiding the bees who are moving about. When all the grass is cut you leave the screen via the bottom and then your bonus is added according to the time you took to clear the grass. Then you go on to the differently shaped screen 2.

This carries on with the screens 1 and 2 in turn and each stage the bees are attracted more and more to you until it is nearly impossible to get away from them. By then all your lives will have been used up. When all three lives are used the game over sign will be displayed and tell you if it is a new high score.

The hex loader.

```

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

```

SOFTWARE *File*

(continued from previous page)

Program 1.

```
10 PAPER 0:BORDER 0:INK 6:
CLS
20 PRINT AT 10,7: FLASH 1:
"BUSY BEE IS LOADING"
30 LOAD ""CODE
40 PRINT USR 31495
9997 REM SAVE ROUTINE
9998 SAVE "BUSY BEE" LINE 10
9999 SAVE "BUSY CODE"CODE 29
625,4525
```

The hex dump.

```
29625: 0018242424241800 = 192
29633: 0010301010103000 = 168
29641: 0018240408103C00 = 148
29649: 0038043804043800 = 180
29657: 002020202020C000 = 204
29665: 003C203804043800 = 212
29673: 0018203824241800 = 208
29681: 003C040808101000 = 112
29689: 0018241824241800 = 180
29697: 001824241C040400 = 132
29705: 1F644A8490A89081 = 922
29713: F80622512500501 = 551
29721: 81091509215226F8 = 569
29729: 81A000A48A44601F = 994
29737: FF20522502102810 = 480
29745: 40A44A04205020FF = 705
29753: 90A892858290A890 = 1177
29761: 41A54B0521512101 = 458
29769: 08140B40A4A40400 = 342
29777: 3C7EFFE7E7F7E3C = 1344
29785: 0800020080008000 = 146
29793: 00000101017F4141 = 260
29801: 0000FE0101F13D3D = 619
29809: 41417F0101010000 = 260
29817: 3D3DF10101FE0000 = 619
29825: 00007F08008FBC8C = 902
29833: 00008008008FE820 = 898
29841: BCBC8F80807F0000 = 902
29849: 8267FE8080800000 = 898
29857: 000704040404043F = 98
29865: 00E02020202020FC = 636
29873: 242427272323201F = 283
29881: 2424E4C4C4C404F8 = 1172
29889: 1F20232327272424 = 283
29897: F804C4C4E4E42424 = 1172
29905: 3F04040404040700 = 98
29913: FC2020202020E000 = 636
29921: 1C1C083E49081414 = 247
29929: 040A11020604153A = 122
29937: 205080406020A85C = 700
29945: 393F1C0F080070201 = 181
29953: 9CFC38F010E04080 = 1008
29961: 00021005801E002 = 348
29969: 113F751AFE4A2805 = 590
29977: 3E327718033E2077 = 471
29985: 23130B78FE0020E8 = 706
29993: 79FE0020E6C90001 = 839
30001: E402112078CD3C20 = 696
30009: 18D0061600004242 = 392
30017: 4242424242424242 = 528
30025: 4242424242424242 = 528
30033: 4242424242424242 = 528
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33257: 32738579321A8232 = 675	33545: 280332708505CD39 = 605	33833: FE022823FE1C281F = 684	34121: FEE104310FE1C20 = 905
33265: 1F82322482783219 = 572	33553: 82FE022823FE1C28 = 783	33841: FE38281BFE112817 = 711	34129: F6FBC110EBC90614 = 1165
33273: 823C321E823C3223 = 545	33561: 1FFE38281BFE1128 = 719	33849: FE882813FE13280F = 777	34137: 6069C5110400CDB5 = 805
33281: 82ED436685111782 = 839	33569: 17FE882813FE1328 = 785	33857: FE8A2808FE1E2807 = 774	34145: 03C110F4C900 = 657

```

5 GO TO 1000
10 L=INT(RND(1)*3+5):REM NO. OF
MINES
20 P=INT(RND(1)*60+40):REM NO. O
F WORKERS
30 M=INT(RND(1)*50+10)*P:REM NO
UNT OF MONEY
40 FP=INT(RND(1)*40+80):REM PRIC
E OF FOOD
50 CE=INT(RND(1)*40+80):REM ORE
PRODUCED/MINE
60 C=0:REM SETS ORE IN STORAGE T
O ZERO
70 S=1:REM SETS SATISFACTION FAC
TOR TO ZERO
80 Y=1:REM SETS YEARS TO ZERO
90 LP=INT(RND(1)*2000+2000):REM
BUYING/SELLING PRICE FOR MINES
100 CP=INT(RND(1)*12+7):REM SELL
ING PRICE FOR ORE.
110 REM CURRENT STATE AFFAIRS OF
COLONY
120 PRINT "L"
130 PRINT "YEAR";Y
140 PRINT
150 PRINT "THERE ARE";P;"WORKERS
IN THE COLONY."
160 PRINT "YOU HAVE";L;"MINES,AND
$";M
170 PRINT "SATISFACTION FACTOR IS
";S
180 PRINT
190 PRINT "YOUR MINES PRODUCED";C
E;"TONS EACH."
200 C=C+CE*L
210 PRINT "AMOUNT OF ORE IN STORE
IS";C;"TONS"
220 PRINT
230 PRINT "L$SELLING$";
240 PRINT "L$";
250 PRINT "ORE SELLING PRICE IS $
";CP;"PER TON"
260 PRINT "MINE SELLING PRICE IS
$";LP;"PER MINE"
270 REM ASKS HOW MUCH ORE TO SEL
L
280 PRINT "HOW MUCH ORE DO YOU WI
SH TO SELL?"
290 INPUT C
300 IF C<0 OR C>10 THEN 290
310 REM TAKES AWAY SOLD ORE
320 C=C-CS
330 REM ADDS TO MONEY SUPPLY
340 M=M+CS*CP
345 CS=0
350 REM ASKS HOW MANY MINES TO S
ELL
360 PRINT "HOW MANY MINES DO YOU
WISH TO SELL"
370 INPUT L
380 IFLS<0 OR L>L THEN 370
390 REM TAKES AWAY MINE(S)
400 L=L-LS:IF L<1 THEN 340
405 LS=0
410 REM ADDS TO MONEY SUPPLY
420 M=M+LS*LP
430 PRINT "YOU NOW HAVE $";M
440 PRINT "L$BUYING$";
450 PRINT "L$";
460 REM ASKS HOW MUCH TO SPEND O
N FOOD
470 PRINT "HOW MUCH TO SPEND ON F
OOD(A PRP. $100 EA.)"
480 INPUT FB
490 REM CHECKS IF THERE'S ENOUGH
MONEY
500 IFFB<0 OR FB>M THEN 480
510 REM ADJUSTS MONEY SUPPLY
520 M=M-FB
525 FB=0
530 REM ADJUSTS SATISFACTION FAC
TOR
540 IFFB/P>120 THEN S=S+.1
550 IFFB/P<80 THEN S=S-.1
560 REM ASKS HOW MANY MINES TO B
UY
570 PRINT "HOW MANY MINES DO YOU
WISH TO BUY?"
580 INPUT B
590 IFLB<0 OR LBLP>M THEN 580
600 REM INCREASE NO. OF MINES IF
NEEDED
610 L=L+LB
620 REM ADJUST MONEY SUPPLY AGAI
N
630 M=M-LB*LP
635 LB=0
640 REM CHECKS SATISFACTION FACT
OR
650 IF S<.6 THEN 880
660 IF S>1.1 THEN CE=CE+INT(RND(1)*
28+1)

```

Mineral Rights

GN Woodhead,
Wyke,
Bradford.

CBM-64

THIS IS AN adventure-type game. You are the leader of a mining colony in outer space and have to make decisions concerning the welfare of the planet. Full instructions are included within the program.

```

670 IF S<.9 THEN CE=CE-INT(RND(1)*2
0+1)
680 REM CHECK IF 10 WORKERS/MINE
690 IF P/L<10 THEN 900
700 IF S>1.1 THEN P=P+INT(RND(1)*10
+1)
710 IF S<.9 THEN P=P-INT(RND(1)*10+
1)
720 REM IF THERE IS MORE THAN 30
WORKERS
730 IF P<30 THEN 700
740 IFRND(1)>.01 THEN 780
750 REM RADIOACTIVE LEAK..WORKER
S HALVED
760 PRINT "RADIOACTIVE LEAK.....
.....MANY DIE!"
770 P=INT(P/2)
780 IF CE<150 THEN 820
790 REM MARKET GLUT..PRICE HALVE
D
800 PRINT "MARKET GLUT.....P
RICE DROPS!"
810 CE=INT(CE/2)
820 REM ADD 1 TO YAERS
830 FORR=1 TO 200:NEXT R
840 Y=Y+1
850 GO TO 90
880 PRINT "THE WORKERS REVOLTED!"
890 GO TO 2000
900 PRINT "YOU'VE OVERWORKED EVER
YONE!"
910 GO TO 2000
920 PRINT "YOU'VE NOT ENOUGH WORK
ERS LEFT!"

```

(continued on next page)

(continued from previous page)

```

930 GOTO2000
940 PRINT"NO MORE MINES....GAME
OVER."
950 GOTO2000
999 REM ROUTINE FOR TITLE
1000 PRINT"TITLE"
1001 POKES3280,0:POKES3281,0:REM
MAKE SCREEN BLACK
1002 JS="C":MINERAL RIGHTS"
1003 FORM=1T02
1010 FORH=0T010
1015 FORHG=1T0100:NEXTHG:REM PAU
SE LOOP
1020 PRINTTAB(H);JS
1030 NEXTH
1035 PRINT"SCREEN"

```

```

1040 JS="C":
1050 NEXTH
1070 PRINT" YOU ARE THE NEWLY
ELECTED LEADER OF A"
1080 PRINT" MINING COLONY ON TH
E PLANET [ASTRON."
1090 PRINT" ALL DECISIONS CON
CERNING THE SALE"
1100 PRINT" OF ORE TO INTERGALA
CTIC TRADERS,FOOD"
1110 PRINT" PURCHASES AND BUYIN
G & SELLING OF"
1120 PRINT" MINES ARE MADE BY Y
OU!"
1125 PRINT" THERE MUST BE AT L
EAST 10 WORKERS/MINE"
1130 PRINT"PRESS

```

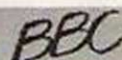
```

ANY KEY"
1140 PRINT"
1150 GETRS:IFRS=""THEN1150
1160 GOTO10
1999 REM 'GAME OVER' SEQUENCE
2000 PRINT"GAME OVER"
2010 PRINT" YOU LASTED:Y;Y'CY
EARS"
2020 PRINT" WOULD YOU LIKE TO
HAVE ANOTHER GAME?"
2030 PRINT"(Y/N)"
2040 GETRS
2050 IFRS="N"THENSTOP
2060 IFRS="Y"THENRUN10
2070 GOTO2040
READY.

```

BBC colours

R. Watson,
Athersley South,
Barnsley.



ON BBC MICROS with Basic II, the filling command Plot 77 is available and is also pretty well known. A lesser known relative of this command is Plot 76, which does not draw a line, but just makes the cursor movements, which may be read using OSword with A=&D.

When the command Plot 77,x,y is given, the graphics cursor travels left until the pixel at that position is a non-background pixel, i.e. a different colour to the origin. This co-ordinate is then noted, the cursor then scans right until a similar pixel is found, and a line is drawn between these two points.

When using Plot 76, similar cursor movements are made, but without any line been drawn between points. Therefore it is possible to use this command to create your own fill routine, as I have done.

A method of obtaining new colours on the BBC which has received a lot of publicity lately is pixel "Dithering". What that means is mixing two or more colours to form a pattern similar to a chess board, the idea being that from normal viewing distance a screenful of such a pattern, say with alternating red and yellow pixels, would look orange. This is what my program sets out to do.

The only things that may need explaining in the program are the OSword call, and the method of pixel dithering. The OSword call with A=&D is used to read the last two sets of graphic co-ordinates. First of all an area must be allocated somewhere for the routine to dump its data — I have used eight locations on the zero page. After the call, the information is laid out like this — as given in the Advanced User Guide.

```

XY + 0 previous x,low
      1 previous x,high
      2 previous y,low
      3 previous y,high
      4 current x,low
      5 current x,high
      6 current y,low
      7 current y,high

```

The pixels are dithered by using the Basic command Eor, and also swapping the colours — 0 and 1. What Eor does is giving the opposite of 1 or 0, in fact reverses it, so 1 Eor 1 = 0, and 1 Eor 0 = 1.

The program therefore toggles between the

colours as it moves across the screen by first using colour 0, then swapping to colour 1 for each alternate pixel.

The pixels are dithered up the screen by swapping the colours in a similar way to which numbers are swapped in a sorting routine.

How to use the routine.

First:

Set colour 0 by ?fc = desired colour

number (0-15)

Set colour 1 by ?sc = desired colour number (0-15)

Second:

Call the procedure by PROCfill (x,y), where x is middle of shape, and y is base of shape + 4.

Do not attempt to fill in any shape which does not have a black background.

```

10MODE 7
20PRINT"DEMONSTRATION (Y/N) :":
30REPEAT:KZ=GET:UNTILKZ=78ORKZ=89
40IFKZ=78 CLS:END
50ONERRORPROCexample:REPEAT UNTIL
GET=32:MODE7:END
60MODE2
70VDU23:8202:0:0:0:
80block=270
90fc=500:sc=281:dc=802
100osword=8FFF1
110SCZ=0:FCZ=0
120FORAXZ=0T01200STEP80
130FORAYZ=100T0100STEP80
140MOVEAXZ,AYZ:GCOL0,7
150PLOT1,64,0:PLOT1,0,-64
160PLOT1,-64,0:PLOT1,0,64
170FCZ=FCZMOD16:SCZ=SCZMOD16
180?fc=FCZ:?sc=SCZ
190PROCfill1 (AXZ+16,AYZ-60)
200FCZ=FCZ+1:NEXT:SCZ=SCZ+1:NEXT
210REPEAT UNTIL GET=32
220PROCexample
230END
330DEFPROCfill1 (AXZ,AYZ)
340FX=0
350AZ=80
360XZ=block MOD 256
370YZ=block DIV 256
380REPEAT
390PLOT76,AXZ,AYZ
40CALL osword:REM read coordinates
410NXZ=block?0+256*block?1
420EXZ=block?4+256*block?5
430FOR SZ=NXZ TO EXZ STEP 8
440GCOL 0,fc?FZ:REM colour 0 or 1
450FZ=FZOR1:REM dither pixel colour
460PLOT69,SZ,AYZ
470NEXT
480REM swap colours
490?dc=?fc:?fc=?sc:?sc=?dc
500FZ=0
510AYZ=AYZ+4
520UNTILPOINT (AXZ,AYZ)<>0
530ENDPROC
540REM *****
550:
560DEFPROCexample

```

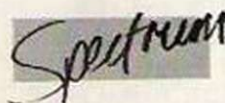
```

570CLS
580GCOL0,7
590MOVE640,260:DRAW660,340
600DRAW660,640:DRAW640,700
610DRAW630,640:DRAW630,340
620DRAW640,260
630?fc=1:?sc=3
640PROCfill1 (640,280)
650GCOL0,7
660MOVE630,640:DRAW600,790
670MOVE660,640:DRAW690,790
680MOVE630,560:DRAW500,700
690DRAW400,600:DRAW500,460
700DRAW630,540
710MOVE660,560:DRAW790,700
720DRAW890,600:DRAW790,460
730DRAW660,540
740?fc=5:?sc=7
750PROCfill1 (500,464)
760PROCfill1 (790,464)
770GCOL0,7
780MOVE660,540:DRAW800,400
790DRAW740,340:DRAW660,340
800MOVE630,540:DRAW500,400
810DRAW550,340:DRAW630,340
820?fc=4:?sc=7
830PROCfill1 (616,344)
840PROCfill1 (660,344)
850PROCcirc (500,600,50)
860PROCcirc (800,600,50)
870?fc=5:?sc=4
880PROCfill1 (800,554)
890PROCfill1 (500,554)
900PROCcirc (500,600,20)
910PROCcirc (800,600,20)
920?fc=3:?sc=7
930PROCfill1 (500,584)
940PROCfill1 (800,584)
950REPEAT UNTIL GET=32:ENDPROC
960:
970DEFPROCcirc (XZ,YZ,RZ)
980GCOL0,0
990MOVEXZ,YZ
1000FORN=0T02*PI+.1STEP.1
1010MOVEXZ,YZ
1020X=COSN*RZ+XZ:Y=SINN*RZ+YZ
1030PLOT85,X,Y:NEXT
1040ENDPROC

```

Multiborder

Campbell Black and
Alasdair Hobbs,
Juniper Green,
Midlothian.



ENHANCE YOUR Spectrum screen displays with a multicoloured border. This machine-code routine can be called instead of using a Pause0. It can be customised by your program to give between two and six coloured borders.

Carefully type in and save the Basic loader

— listing 1. Run the program. If you have entered it correctly, the code will have been poked into memory and you can save it.

Now type in and save the demonstration program — listing 2. Run the program. You should now see some examples of the routine's spectacular possibilities.

Using the routine in your own programs is straightforward. First

CLEAR 64999

The routine should then be loaded into memory. Your own program can then be load-

ed or entered. A few pokes are required before calling the routine. Poke 65089 with the number of colours required in the border. Poke 65081 with the number corresponding to the first colour, Poke 65082 with the number corresponding to the second colour, and so on.

Finally, call the routine with
RANDOMIZE USR 65000

The border will remain multicoloured until a key is pressed. The addresses are summaris-

Table 1.

Start address	65000
No. of Colours	65080 Poke with a number between 2 and 6
1st colour	65081 Starting here, poke the required
2nd colour	65082 number of addresses with a number
3rd colour	65083 in the range 0-7
4th colour	65084
	0 = black 1 = blue 2 = red 3 = magenta 4 = green 5 = cyan
5th colour	65085
	6 = yellow 7 = white
6th colour	65086

ed in table 1.

Examine the demonstration listing to see how all the above was achieved from within a Basic program.

If you are saving and loading from Microdrive, change the syntax of the relevant lines in listings 1 and 2.

Listing 3 is the routine in assembly

```

10 REM
20 REM ==MULTIBORDER DEMO==
30 REM
100 CLEAR 64999
110 LOAD "mborder"CODE
120 LET A$="Pokes required for
this border "
130 BORDER 7: INK 0: PAPER 7: C
L$
140 LET S=65000
200 FOR A=1 TO 2
210 FOR N=2 TO 6
220 CLS : PRINT TAB 10;"MULTIBO
RDER"
230 PRINT "A$
240 POKE S+80,N
250 PRINT "CHR$(244);S+80;CHR$
44;N
260 PRINT
270 LET C=N
300 FOR B=1 TO C
310 READ X
320 POKE S+80+B,X
330 PRINT CHR$(244);S+80+B;CHR$
44;X
340 NEXT B
345 PRINT "PRESS A KEY"
350 RANDOMIZE USR S
360 NEXT A
370 NEXT N
1000 DATA 1,2

```

language. You will find this useful if you have an assembler and wish to incorporate it into a larger machine code program. If you want to relocate the routine, simply change the Org address. Note that the routine will only run in the top 32K of memory. Num is the variable holding the number of colours, Col is for the actual colours.

```

1010 DATA 2,4,6
1020 DATA 3,3,4,5
1030 DATA 3,3,4,1
1040 DATA 6,5,4,3,2,1
1050 DATA 6,5,4,3,2,1
1060 DATA 2,2,2,2,2,2
1070 DATA 2,2,2,2,2,2
1080 DATA 6,6,1,1,1,1
1090 DATA 3,3,1,3,2,1
10 REM ==MULTIBORDER LOADER==
15 LET C=0
20 FOR N=65000 TO 65086
30 READ X
40 POKE N,X
45 LET C=C+X
50 NEXT N
60 IF C<>8507 THEN PRINT "ERRO
R IN DATA": STOP
70 SAVE "mborder"CODE 65000,87
100 DATA 58,58,254,95,214,1,71,
33,48,254,221,33,54,254,35,16,25
0,75,221,113,1,71,33,43
110 DATA 254,35,16,253,126,221,
119,0,118,83,33,57,254,126,211,2
54,221,70,0,221,78,1,13,32,253,1
6,248,175,219,254
120 DATA 47,230,31,192,35,21,32
,231,24,224,0,0,0,0,200,185,187,
182,191,9,6,4,3,2,0,0,0,0,0,0,0,0,0,0

```

Sultan's Tower

Remko Blakenburgh,
Leiden,
Holland.

ZX-81

SULTAN'S TOWER is an original, fast-moving action game which consists for the most part of machine-code. The scene is laid in Arabia in the middle ages. Fatima, the girl-friend of the Arabian prince Achmed, has been kidnapped by the wicked Sultan of Bahrain and put in his harem. She is detained on the upper floor of a tower, which consists of 10 floors.

You play the part of Achmed, who would rather keep his girl for himself. You must save Fatima but, to do so, you must reach the ninth floor starting off from the ground level. Each floor is divided into six parts which lie above each other. You must start off from the bottom part and ascend using ladders and ropes.

At the left of the upper part there is a doorway leading to the floor above you. When you have reached the upper part of the ninth floor you must grasp Fatima and run back downward. You can use slides to move down quickly. To descend to a floor below you, you should use the doorway at the left of the lower part of the floors.

When you have reached the ground level, you can leave the tower by walking through the exit at the left of the lower part and have a happy life together with Fatima. Unfortunately, it's rather difficult to save girls from harems. On every floor, harem-guards are busy chasing you. You had better beware of them because you will be sentenced to imprisonment for life if they get you.

As you progress, more harem-guards will be employed by the ugly sultan to make life hard for you. Each time you reach another floor, two more guards will try to make an end of your freedom.

Sometimes the harem-guards fall into holes. In that case, a guard can't harm you very much but after some time he will climb down

to the part below him using a rope. You can use this rope later to climb up or down.

Your time to complete your mission is limited. If you run out of time, a pretty big bomb at the bottom of the tower will explode, destroying the tower with you and your girl.

The keys used to control the game are:

- I — up/jump
- J — down
- Y — right
- T — left
- O — hold

If you are not pleased with these key controls you can change them by poking:

- 16830, code of key for hold
- 16838, code of key up
- 16845, code of key down
- 16852, code of key left
- 16859, code of key right

You can abandon a game by pressing Shift on its own.

The machine-code is held in one large Rem-statement with line number zero. Before entering the machine-code, you must obtain this line. To do so, enter a line

1 REM

followed by 128 characters — that's four full lines. Then, edit this line and change the line number to 2. Continue this procedure until you have lines 1-11. Finally, enter a line

12 REM

followed by 77 characters.

You can check whether your lines have the correct length by entering:
PRINT PEEK 16396 + 256 * PEEK 16397
— 16509

You should get the number 1557. If not, check your lines and correct them where necessary. Now enter as direct commands, in succession:

- POKE 16510,0
- POKE 16511,17
- POKE 16512,6
- POKE 16514,118
- POKE 16515,118

You now have a massive Rem-statement of

1551 characters long with line number 0. Type in the hex-loader and enter the hex codes. I advise you to save the program at regular intervals in order to prevent you from losing all your work when a crash occurs.

After having entered the hex-codes, delete the hex-loader and type in the Basic program. Now save the program by entering:

RUN 9900

The way in which the program is saved may seem a bit cumbersome, but it is actually a means of reducing saving and loading time. It works like this: before saving, the system variable Ramtop is set to 0, whereby the display-file is reduced to its minimal size. Now the program is shortened for about 750 bytes, so loading time is considerably reduced. After saving, Ramtop will get back its previous value, 128, which causes the display-file to take its normal size.

I am aware of the fact that typing in machine-code programs can be rather tedious. Therefore, I will send you a tape version of my game if you send £3 to Remko Blakenburgh, Korenbloem 34, 2317 KX Leiden, Holland.

The hex loader.

```

99 REM HEX LOADER
100 PRINT "START ADDRESS"
110 INPUT S
120 PRINT "FINISH ADDRESS"
130 INPUT F
140 FOR N=S TO F STEP 2
150 LET T=0
160 PRINT N;" - ";
170 INPUT A$
180 PRINT A$;" = ";
190 INPUT TOT
200 PRINT TOT
210 LET Z=0
220 FOR K=1 TO LEN A$ STEP 2
230 LET C=(CODE A$(K)-28)+16+CO
DE A$(K+1)-28
240 LET T=T+C
250 POKE N+Z,C
260 LET Z=Z+1
270 NEXT K
280 IF TOT=T THEN GO TO 310
290 PRINT "ERROR - PLEASE INPUT
AGAIN"
300 GO TO 150
310 NEXT N

```

(continued from previous page)

Program 1.

```

100 POKE 46416,0
120 CLS
130 PRINT "***** E U L T A N *****"
*****
T O W E R *****
*****
140 PRINT "CHARACTERS."
150 PRINT "X = YOU", "Y = YOU
+ FATIMA", "Z = FATIMA", "S = HAR
EM-GUARD"
160 PRINT "K E Y S : " "T =
EFT", "Y = RIGHT", "I = UP/JUMP", "J =
DOWN", "O = HOLD", "SHIFT = STOP GAM
E"
200 PRINT "PLEASE CHOOSE GA
ME LEVEL (1-3) " "GAME LEVEL =
?"
210 LET K$=INKEY$
230 IF K$<"1" OR K$>"3" THEN GO
TO 210
240 PRINT AT 21,13,K$
250 POKE 15527,17-2*VAL K$
260 PRINT "PRESS ANY KEY
TO PLAY"
265 IF INKEY$<>" " THEN GOTO VAL
"265"
270 IF INKEY$=" " THEN GOTO VAL
"270"
280 CLS
290 RAND USR 15516
295 CLEAR
300 FOR D=0 TO 130
310 NEXT D
320 RUN
9900 FAST
9910 POKE 16389,0
9920 CLS
9930 SAVE "S"
9940 POKE 16389,128
9950 CLS
9960 SLOW
9970 RUN

```

The hex dump.

```

16514: 7676FD362105FD36 = 888
16522: 4800FD367C00CDEA = 988
16530: 40ED7346402A3140 = 708
16538: 223240CDFF540CD92 = 1018
16546: 41CD8844CDB141CD = 11008
16554: 2245CDB433E587B = 10588
16562: 40CD4B433A2E640FE = 8288
16570: FE20E9E0784640C9 = 1214
16578: 0100FFFFDFFF2100 = 1022
16586: 2B31343437001C00 = 279
16594: 0000000000000000 = 0
16602: 0000000000000039 = 57
16610: 2E322A121E10105C = 34
16618: 2A0C40233110A40CD = 841
16626: DD43C92A0C401184 = 724
16634: 000E060620193680 = 258
16642: 2310FB0D20F50E0A = 616
16650: CD77437FEF8020F8 = 1179
16658: 06041121003352019 = 184
16666: 10FB0D20EB2A0C40 = 666
16674: 116400190E05EB08 = 402
16682: 02CD5343E61F5F26 = 767
16690: 00197FFF8020F2A8 = 1036
16698: DS11DFFF19D17E2E1 = 1293
16706: A720E6368A10E2221 = 896
16714: 840019FB0D20D80E = 667
16722: 05CD77432B2B2B06 = 531
16730: 057EFE6020F32310 = 839
16738: F82B2B0604112000 = 393

```

```

16746: 36181910FB0D20E1 = 640
16754: 2A0C40110700197E = 293
16762: 113C001936B4FE25 = 627
16770: 2002363E11940219 = 342
16778: 36B6FE1000369309 = 1112
16786: 2100002230402A0C = 245
16794: 4011D7023A4640CB = 695
16802: 4728031143001922 = 257
16810: 3E407E324040C9ED = 868
16818: 4B254079302804CD = 606
16826: BD077FEF100CB443 = 1055
16834: 210000FE2E200321 = 401
16842: DFFFFF2F20032121 = 860
16850: 00FE392000321FFF = 889
16858: FE3E200321010022 = 419
16866: 3C402A30407EFE24 = 708
16874: CA8442112100193A = 530
16882: 4040FE0E2818FE2D = 762
16890: 26177EA7280FFE18 = 689
16898: 200F3A3040FE128 = 524
16906: 08FEFF2804ED533C = 941
16914: 407EA72014267EFE = 832
16922: 18200E3A4040FE18 = 534
16930: 2007112000ED533C = 488
16938: 402A30403A404077 = 537
16946: ED5B3040197EFE76 = 975
16954: 2843FE80283FFE68 = 964
16962: 2835FE42283C3240 = 603
16970: 40223FE40630473A = 466
16978: 4840CB4F78280236 = 634
16986: BDE52A3040477C85 = 960
16994: B10C78FE542845FE = 1348
17002: B62847FE3EF5CC30 = 1106
17010: 43F1FE93003A4840 = 1095
17018: CB4F206302A3E40 = 782
17026: 18CA060711002036 = 342
17034: BDCD4B4336240D4B = 908
17042: 4310F40636110014 = 375
17050: CD0A3430D484310F8 = 1046
17058: 118442032344392D = 651
17066: 2A3E00203439003E = 319
17074: 047A214540CB86FE = 934
17082: B4F50C3744F1F504 = 1434
17090: 58142A0C40110700 = 296
17098: 1934F12807353521 = 504
17106: 4840CB621214034 = 719
17114: ED7B4540C3934011 = 917
17122: 0080CD4843CD7A44 = 870
17130: 2A0C4011740119E5 = 506
17138: 1111430DD443D506 = 813
17146: 0A11000FDD4B43CD = 594
17154: R34310F8D1E12BCD = 1176
17162: DD43ED784640C928 = 1023
17170: 343320C3726393A31 = 404
17178: 86392E34337322E2 = 450
17186: 38382E3433002834 = 352
17194: 3835312A3395A060E = 377
17202: 1100103630D04643 = 496
17210: 36BEC0484310F421 = 884
17218: 4840CB0EAF3224040 = 800
17226: C9D5187FB320F5D1 = 1234
17234: C9E5D52A3240CB85 = 1184
17242: 845D292A19292929 = 407
17250: 1922324070CD1E1C9 = 932
17258: 05473A2840F7FE78 = 1055
17266: C100C3307ACD5343 = 1111
17274: CD5A43E6077FE0530 = 922
17282: F46F260029295480 = 682
17290: 2929292929191184 = 947
17298: 0019ED580C4019CD = 659
17306: 5343E61F5F180019 = 583
17314: 09D53EFFFE0471100 = 1696
17322: 05CD4B43001EED47 = 752
17330: D109F52A0C401105 = 795
17338: 03192511D543CDD0 = 960
17346: 43E13A26403C20F8 = 794
17354: 3A26403C26F8CDD0 = 936
17362: 43F1092D34316980 = 888
17370: 8080C01ACB77C8B7 = 1182
17378: 77231328F6C92A0C = 714
17386: 40112000197EFE12 = 536
17394: CAFF433D77FE1800 = 1177
17402: 36252B18F00E0208 = 420

```

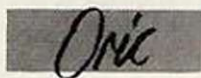
```

17410: 1E3E1F90ED471100 = 592
17418: 04CD4B4310F30D20 = 696
17426: BE111844180B3E34 = 496
17434: 3A0027313A3C002E = 294
17442: 79D5CD7A442A0C40 = 847
17450: 11750118D1CDD043 = 862
17458: ED7B4640C90618C5 = 920
17466: 2A0C4011180319E5 = 416
17474: 11DFFF1801010502 = 946
17482: EDB8110008CD4B43 = 793
17490: C110E4C90617C52A = 906
17498: 0C4011210019E519 = 405
17506: D101D502E8B0E808 = 1080
17514: 2023362004FE51100 = 405
17522: 08CD4B43C110DFC9 = 958
17530: 2A0C400E18062823 = 229
17538: 360010FB30D20F5 = 646
17546: C93A2140472A1040 = 548
17554: B52A0C40CD6A43CD = 930
17562: 0343CB3F5F16003A = 591
17570: 2140B82608CB130E = 754
17578: 12CB13CB18197EA7 = 779
17586: 00DFE5112100197E = 685
17594: E1FE362004FE5173 = 1426
17602: 2072233600233600 = 327
17610: 2336002310C20921 = 558
17618: C240675F1600195E = 629
17626: 0356C94F3A4340FE = 820
17634: FC470D5343CB4778 = 1072
17642: 28020BC738434079 = 745
17650: 214340CB96C8CB96 = 1006
17658: AF32444079C9E53A = 966
17666: 2140472A10405E23 = 419
17674: 56232323233E5A73 = 849
17682: ED52E1E3280510EE = 1070
17690: C33C7A2B267EE1C9 = 515
17698: 3A2140472A1040C6 = 645
17706: E5114140010500ED = 618
17714: B03A4340CB5F280C = 715
17722: 21454035027D4621 = 641
17730: 4340CB9E3A4040A7 = 845
17738: 2826FE1828220604 = 440
17746: 783D4F0DD1442A41 = 849
17754: 40197E0CBFFFE3079 = 1045
17762: 280410EC180A473A = 459
17770: 4340E6F60324340 = 970
17778: 3A4340E603CDD144 = 904
17786: 2A4140197EFE8020 = 736
17794: 0A473A4440FE2D78 = 690
17802: C4DD44FE0ECCDD44 = 1246
17810: FER40CDD442A4140 = 1082
17818: 112100197EFE8A28 = 633
17826: 0EA7280FE18200F3 = 557
17834: 3A4340CB5F28083A = 585
17842: 4340F6033243407E = 687
17850: FE2D20243A4440FE = 811
17858: 2D281D3A4040E603 = 536
17866: FE022005CDD4418 = 811
17874: 0FCD5343CDB472808 = 692
17882: 3A4340F603324340 = 619
17890: 3A4440FE2D202B2A = 606
17898: 4140112100197EFE = 584
17906: 2D281F3A4340E603 = 538
17914: FE032005CDD4418 = 812
17922: 11C05343CB47280A = 696
17930: 3A4340CB87C8CF32 = 987
17938: 43403A4440FE8A20 = 745
17946: 182A414036A430E0 = 489
17954: 324440214340CBDE = 763
17962: CBDE3E1E32454018 = 724
17970: 4A2A41403A444077 = 554
17978: 3A4340E603CDD01 = 1066
17986: 44E1197EFE7E28011 = 873
17994: 473A4040FEB47820 = 843
18002: 1247C8BFFFE3D7820 = 950
18010: 0A3A4340E6013243 = 655
18018: 4018CEFE24C00045 = 657
18026: E5214340CB8E128 = 947
18034: 023E0E3244403624 = 350
18042: 224140E1E6214140 = 785
18050: 010500ED080EBC105 = 852
18058: C2294509C33C7A76 = 1000
18066: 00011900E8303400 = 360

```

Battle Tank

David Yip,
Carlisle,
Cumbria.



THE AIM OF the game is to destroy the enemy tank. In order to do so, you must shoot away the blocks between you and your enemy first — the number of blocks varies. It sounds simple but the catch is that you can only fire a maximum of three shots and a minimum of one shot. You and the other tank will fire at the blocks alternately. The game can be played by one or two players.

One player: You play against the computer and you have five lives. Every time you destroy an enemy tank, you get one point and the computer's intelligence level increases.

```

10 REM *** BATTLE TANK ***
20 TEXT:CLS
30 PAPER 0:INK7
40 REM >> REDEFINE CHARACTERS <<
50 FOR X=46856 TO 46975
60 READ A
70 POKE X,A
80 NEXT X
90 DATA 0,1,3,1,15,31,10,7 'a
100 DATA 0,56,63,60,63,63,42,63 'b
110 DATA 0,0,62,0,0,48,32,0 'c
120 DATA 0,0,12,0,0,0,0,0 'd
130 DATA 30,30,30,30,30,30,30,30 'e
140 DATA 0,0,31,0,0,3,1,0 'f
150 DATA 0,7,63,15,63,63,13,63 'g
160 DATA 0,32,48,32,60,62,20,56 'h
170 DATA 0,0,0,0,0,12,18,18 'i
180 DATA 0,0,0,1,0,2,1,1 'j
190 DATA 0,0,30,12,51,33,30,12 'k
200 DATA 0,0,0,32,0,16,32,32 'l
210 DATA 1,4,1,10,5,34,15,8 'm
220 DATA 0,18,12,51,12,45,18,51 'n
230 DATA 32,8,32,2,40,17,44,8 'o
240 H=0
250 REM >> TITLE <<
260 CLS
270 FOR X=EBB8 TO EBC97 STEP 40

```

```

280 POKE X,22
290 NEXT X
300 PRINT CHR$(4)
310 PRINT SPC(7) CHR$(27);"A";CHR$(27);
"JBATTLETANK"
320 PRINT CHR$(4)
330 PRINT SPC(12) CHR$(27);"0";CHR$(96)
;"DAVIDYIP"
340 PRINT:PRINT:PRINT
350 PRINT"HOWMANYPLAYERS(1OR2):"
;
360 GET A$
370 IF A$="1" THEN P=1:GOTO 400
380 IF A$="2" THEN P=2:GOTO 400
390 GOTO 360
400 PRINT A$
410 S=0:G=0
420 T(1)=5:T(2)=5
430 L=4
440 REM >> SCREEN LAYOUT <<
450 FOR X=EBC28 TO EBC7 STEP 40
460 POKE X,22
470 NEXT X
480 POKE EBD00,18
490 PLOT 15,14,"BLOCK="
500 PLOT 0,17,0

```

(continued on page 110)

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(continued from page 108)

```

510 PLOT 6,17,"PLAYER 1          SCO
RE"
520 PLOT 1,18,3
530 PLOT 20,18,P-1
540 PLOT 2,18,"abc abc abc abc"
550 PLOT 29,18,"0"
560 IF P=1 THEN 590
570 PLOT 23,18,"fgh fgh fgh fgh"
580 PLOT 27,17,"PLAYER 2"
590 POKE £268,7:PRINT
600 IF P=2 THEN PRINT:GOTO 620
610 PRINT SPC(11) CHR$(27):"AHI SCORE =
":H
620 PRINT"
630 PRINT:PRINT:PRINT
650 REM >> BLOCKS <<
660 PLOT 2,12,"
"
665 PLOT 1,12,3
670 PLOT 2,12,"abc"
680 PLOT 32,12,"fgh"
690 FOR X=6 TO 31
700 PLOT X,12,1
710 NEXT X
720 BL=INT(RND(1)*9)+17
730 X=INT((27-BL)/2)
740 PLOT 4+X,12,4
750 FOR Y=5+X TO 4+BL+X
760 PLOT Y,12,"e"
770 NEXT Y
780 PLOT 22,14,STR$(BL)
790 PLOT 22,14,7:G=6+1
800 REM >> GAME BEGINS <<
810 IF G/2=INT(G/2) THEN 1120
820 POKE £268,21:PRINT
830 PRINT"PLAYER 1":PRINT
835 PLOT 24,23," "
840 PRINT" HOW MANY SHOTS (1-3) :";
845 A$=KEY$+KEY$+KEY$
850 GET A$:A=VAL(A$)
860 IF A>3 OR A<1 THEN 845
870 PRINT A$
880 A=A-1:X=5
885 GOTO 930

```

```

890 PLOT X,12,1
900 X=X+1
910 IF SCRN(X,12)=101 THEN 950
920 IF SCRN(X,12)=102 THEN 1010
930 PLOT X,12,"d"
940 GOTO 890
950 SHOOT:BL=BL-1
960 PLOT X,12,4
965 PLOT 23,14," "
970 PLOT 22,14,STR$(BL)
980 PLOT 22,14,7
990 IF A=0 THEN 1120
995 WAIT 20
1000 GOTO 880
1010 GOSUB 1520
1020 IF P=2 THEN 1080
1030 S=S+1
1040 PLOT 28,18,STR$(S)
1050 PLOT 28,18,0
1060 L=L+1
1070 GOTO 650
1080 T(2)=T(2)-1
1090 PLOT T(2)*4+19,10," "
1100 IF T(2)>0 THEN 650
1110 W=1:GOTO 1660
1120 POKE £268,21:PRINT
1130 IF P=1 THEN 1210
1140 REM >> PLAYER 2<<
1150 PRINT"PLAYER 2":PRINT
1160 PLOT 24,23," "
1170 PRINT" HOW MANY SHOTS (1-3) :";
1175 A$=KEY$+KEY$+KEY$
1180 GET A$:A=VAL(A$)
1190 IF A>3 OR A<1 THEN 1175
1200 PRINT A$:GOTO 1290
1210 REM >> COMPUTER <<
1220 PRINT" ORIC : ";PRINT
1230 A=INT(RND(1)*3)+1
1240 IF BL>L THEN 1280
1250 IF (BL+1)/4=INT(BL/4)+1 THEN 1280
1260 A=((BL+1)/4-INT(BL/4))*4
1280 PRINT"I FIRE ";A;"SHOTS
"
1285 WAIT 50
1290 A=A-1:X=31
1300 GOTO 1350

```

```

1310 PLOT X,12,1
1320 X=X-1
1330 IF SCRN(X,12)=101 THEN 1370
1340 IF SCRN(X,12)=99 THEN 1420
1350 PLOT X,12,"d"
1360 GOTO 1310
1370 SHOOT:BL=BL-1
1375 PLOT X,12,4
1376 PLOT 23,14," "
1380 PLOT 22,14,STR$(BL)
1390 PLOT 22,14,7
1400 IF A=0 THEN 820
1405 WAIT 20
1410 GOTO 1290
1420 GOSUB 1500
1430 T(1)=T(1)-1
1435 IF T(1)=0 THEN 1460
1440 PLOT T(1)*4-2,18," "
1450 GOTO 650
1460 W=2
1470 IF P=2 THEN 1660
1480 GOTO 1600
1490 REM >> HIT <<
1500 X=2:PLOT 1,12,1
1510 GOTO 1530
1520 X=32
1530 PLOT X,12," i "
1540 EXPLODE
1545 WAIT 30
1550 PLOT X,12,"jkl"
1560 EXPLODE
1565 WAIT 50
1570 PLOT X,12,"mno"
1580 WAIT 300:RETURN
1590 REM >> GAME OVER <<
1600 PLOT 1,9,1:PLOT 1,10,1
1610 PLOT 2,9,14:PLOT 2,10,14
1620 PLOT 11,9,"G A M E O V E R"
1630 PLOT 11,10,"G A M E O V E R"
1640 IF S>H THEN H=S
1650 WAIT 1000:GOTO 250
1660 POKE £268,21:PRINT
1665 PRINT"WELL DONE PLAYER ";W:PRINT
1670 PRINT"YOU HAVE WON BY ";T(W);"TANK
(S)"
1680 WAIT 1000:GOTO 250

```

Header reader

H.V. Smith,
Brecon,
Powys.

Amstrad

I HAVE WRITTEN a program similar to ones published previously for other computers e.g. the ZX Spectrum or the Amstrad CPC-464. It is a program written in Basic with a short accompanying Z-80 machine-code routine which reads the header at the beginning of a file on tape and interprets this to give the user the information recorded there, which is normally inaccessible to the user.

On running, the program first returns the screen display to its default conditions as at startup when switching on. This is achieved by the two calls to the firmware jumpblock: Call &BBFF and Call &BB4E. Using these two simple calls avoids having to reset all the separate aspects of the screen display i.e. the Mode, Pen, Paper, Ink settings etc. These two calls are in fact quite useful in any program at the beginning to make sure that the effect of printing on the screen can be entirely predictable.

It then calls the subroutine at line 230 and onwards which simply pokes in the short machine code routine at 41000 onwards. It also lowers Himem to 39999 to give space for the routine and for the storage of the data obtained from the header, the amount of space allocated being in fact more than adequate, though this fact is unlikely to mean that there is insufficient memory left for use by any program residing in memory, mainly because it is unlikely that any program other than the header reader would be in the memory.

The program then calls the machine code routine which starts the tape and searches for the header at the beginning of a file. Since the routine uses quite a low level Rom routine

```

10 REM *****
20 REM ** {c} Howard V. Smith 1985 **
30 REM *****
40 CALL &BBFF:CALL &BB4E
50 GOSUB 230
60 POKE 40030,0:CALL 41000:IF PEEK(40030)=253 THEN PRINT"ESCape pressed...":PRINT:GOTO 210 ELSE IF PEEK(40030)<>0 THEN PRINT"Tape Error":PRINT:GOTO 210
70 PRINT SPACE$(7);"Tape Header Reader :":PRINT CHR$(22);CHR$(1);CHR$(11);SPACE$(7);STRING$(18,"_");CHR$(22);CHR$(0)
80 PRINT:PRINT:PRINT"Filename : ";:t=0:FOR a=40000 TO 40015:PRINT CHR$(PEEK(a));:t=t+PEEK(a):NEXT:IF t=0 THEN PRINT"Unnamed File";
90 PRINT:PRINT:PRINT"Block Number :";PEEK(40016)
100 PRINT:PRINT"Last Block ? : ";:IF PEEK(40017)=0 THEN PRINT"No."ELSE PRINT"Yes."
110 PRINT:PRINT"File Type : ";:a=PEEK(40018)
120 a$=BIN$(a,8)
130 t=VAL(MID$(a$,5,3)):IF t=0 THEN PRINT"BASIC Program"ELSE IF t=1 THEN PRINT"Binary File"ELSE IF t=2 THEN PRINT"Screen Image"ELSE IF t=3 THEN PRINT"ASCII File"ELSE PRINT"Unknown."
140 PRINT:PRINT"Protected ? : ";:IF VAL(RIGHT$(a$,1))=1 THEN PRINT"Yes."ELSE PRINT"No."
150 PRINT:PRINT"Length Of Data In Block :";PEEK(40019)+256*PEEK(40020);"Bytes"
160 PRINT:PRINT"Address From Which Written :";PEEK(40021)+256*PEEK(40022)
170 PRINT:PRINT"First Block ? : ";:IF PEEK(40023)=0 THEN PRINT"No."ELSE PRINT"Yes."
180 PRINT:PRINT"Total Length Of File :";PEEK(40024)+256*PEEK(40025);"Bytes"
190 PRINT:PRINT"Entry Address : ";:a=PEEK(40026)+256*PEEK(40027):IF a THEN PRINT a ELSE PRINT"N/A"
200 LOCATE 1,25
210 PRINT"Continue...?":k$="":WHILE k$="":k$=INKEY$:WEND:CLS:IF LOWER$(k$)<>"n"THEN 60
220 END

```

(continued on facing page)

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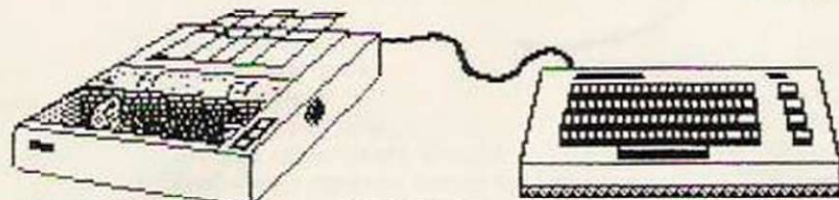
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Proof of what is possible when using 'CENTIPEDE'. So far I have mixed hires with the printers' own font. There's more:-



Above.. I have taken a piece of hires screen, and by using a simple FOR-NEXT loop, have dumped it here using each of the modes available on my printer. I even have a choice of 4 ROTATIONS! (The 4th can be for shading). The rotation can be used in both low and hi-res and, can be either a whole screen or just one character square. There are over 20 commands, and 255 secondary addresses, giving the user plenty of freedom to make his printer perform whatever tricks it was designed to. (and perhaps a few the makers hadn't thought about!).

The writer has even made some amendments to the operating system of the 64, just to make life a little easier. You can print.. "CBMESC:ESC Control codes" Or maybe... "CBM(clr)(rvs)(yel) Control codes"

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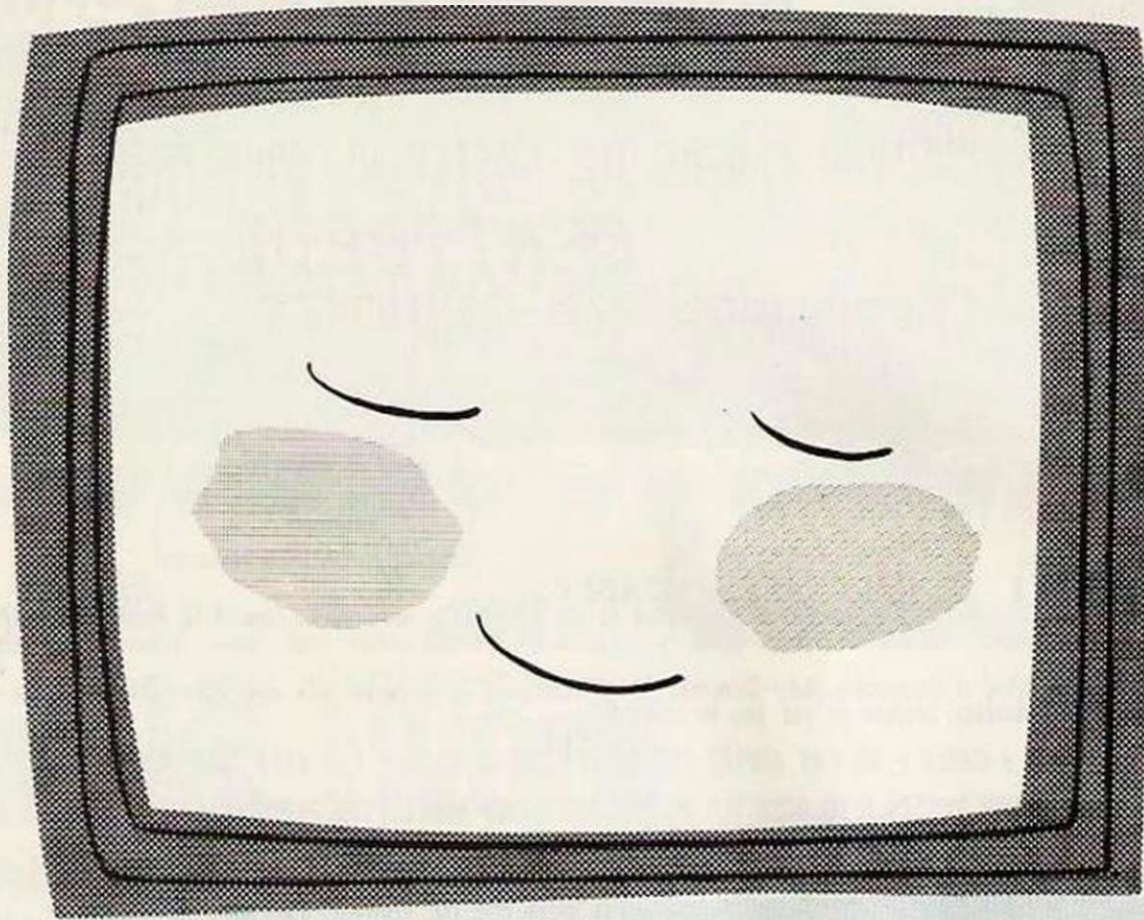
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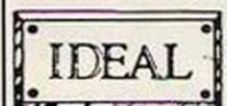
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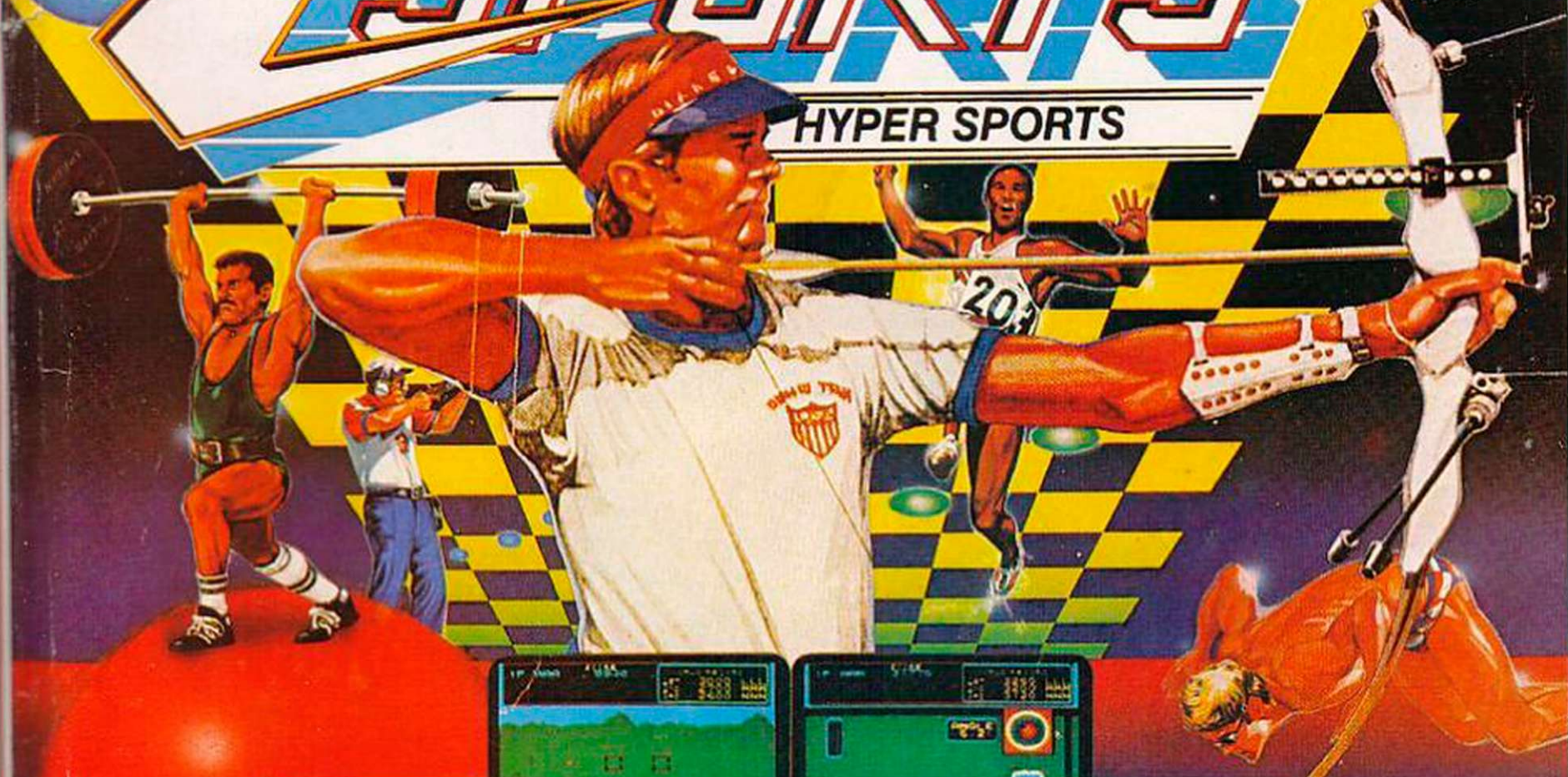
INDEX OF ADVERTISERS

A		N	
Addictive Games	78	New Generation Software	18, 54
Amstrad	62, 63	O	
Anthony Ashpita	87	Ocean Software	32, OBC
B		Odin Computer Graphics	26
Beebug	46	Opus Supplies	91, 94
Betasoft	22	P	
Bondwell	66	Phillips & Phillips	20
C		Picturesque	87
Caldew	94	P.V. Tubes	84
D		Q	
Dean Electronics	87	Quicksilva	4
Dennison Manufacturing Co.	6	R	
E		Ram Electronics	98
E.I. Systems	102	Railway Magazine	84
Elite Systems	5	Romantic Robot	14
English Computer Shop	84	RSD Connections	94
H		S	
Hi-Soft	38	Saga Systems	28
I		Silica Shop	51
IDS	46	Spectrum	6, 7, 8, 9
Imagine	IBC	Swanley Electronics	22
Industrial Process	84	Swescot	102
Interface	22	T	
ITS	46	The Micro Workshop	102
K		Thoughts & Crosses	10, 11
Keyplan Computers	115	U	
Kuma Computers	39	Ultimate Play the Game	30
L		U.S. Gold	IFC, 24, 34, 75
LCL	22	V	
LMT	14	Vector	80
M		Visionstore	43
Memorex	44, 45	Vortex Software	16
Microgold	122	W	
Micro X	14	Walker Computer Systems	102
Mirrorsoft	100		

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