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Dragon Gobbler

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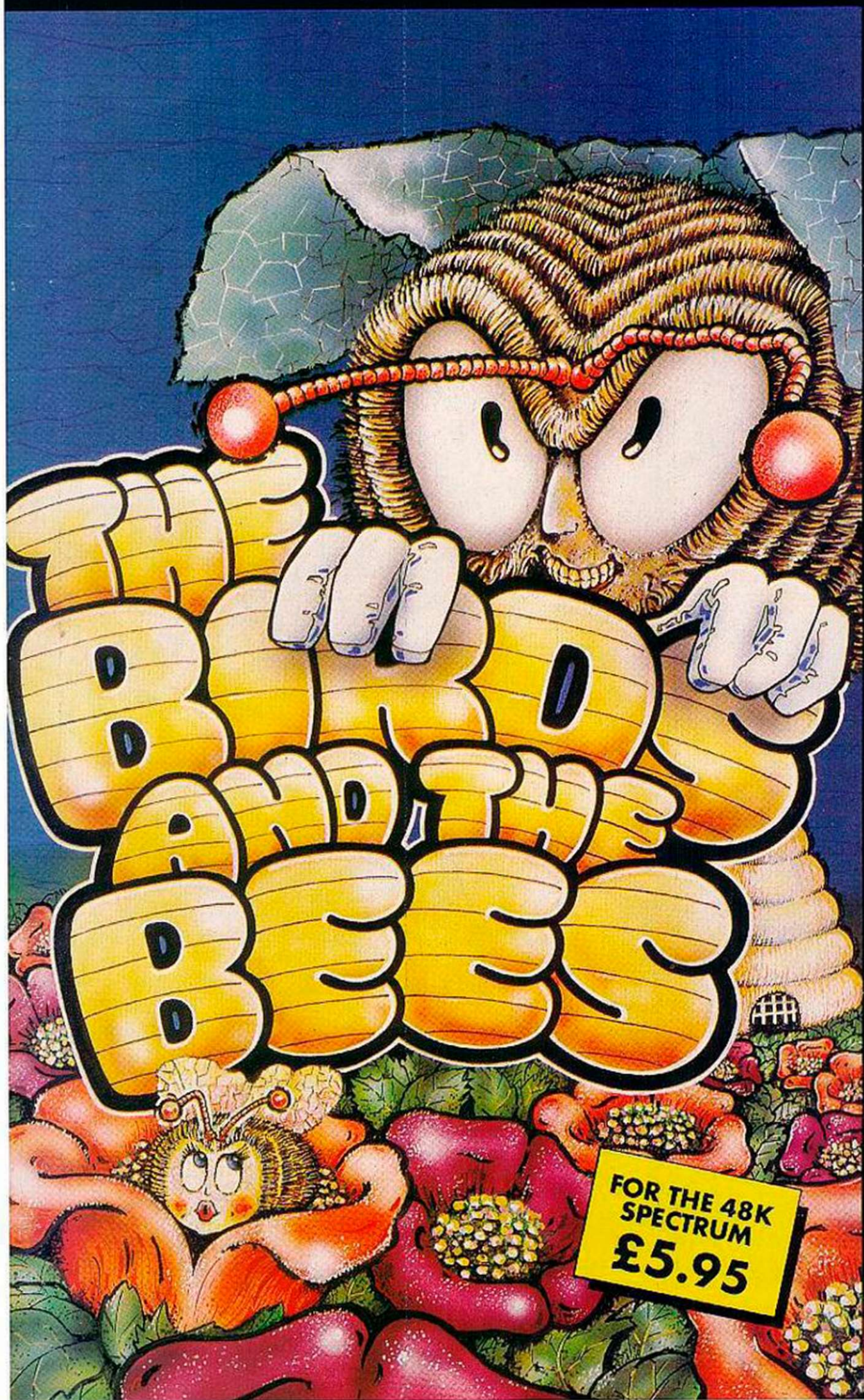
Vic Dogfight and CBM-64 File-It
Spectrum and Acorn games tests

Reviews: Advance, Alphatronic and Tandy

BUG-BYTE SOFTWARE



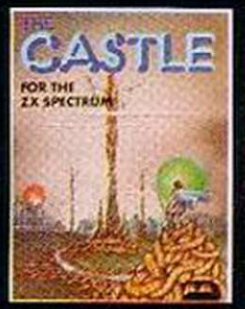
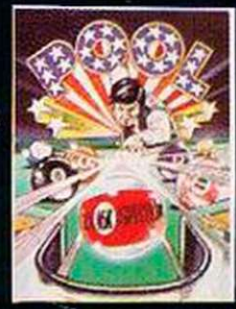
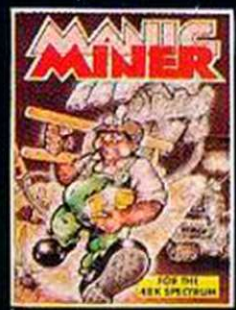
BUG-BYTE SOFTWARE
PRESENTS
THE BIRDS AND THE BEES
THE BIRDS AND THE BEES (C)1983



The Birds and The Bees is an original animated cartoon-style game, introducing, for the first time on screen, Boris the Bee. Boris must collect as much nectar as possible, whilst avoiding various nasties like birds, wasps, centipedes and Venus fly traps. Smooth, fast machine-code action throughout, with sound effects, joystick option (most types) and speech option with the Currah Microspeech Unit.

Author: Adrian Sherwin with graphics by Matthew Smith (of Manic Miner fame)

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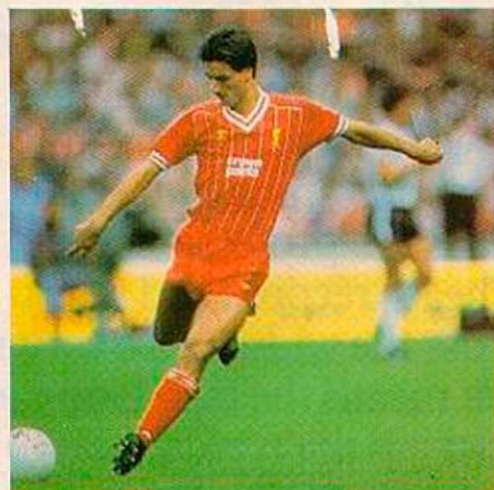
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49 FIRST BYTES: How to animate your characters; what is screen memory; your chance to practise the art of coarse computing with our bug competition.

53 COMPUTER CLUB: Paul Bond goes the rounds in Raunds. **55 SOFTWARE SHORTLIST:** Our look at latest software releases.

59 QUEST CORNER: The laddie with the lamp, brass key, and a strange gleam in his eye assesses new rivers to cross.

60 BBC FOOTBALL SUPREMO: Lee Carpenter kicks off with a program that puts the boot on the other foot. Tactics, strategy suspense. Can you manage?

66 ADVANCE REVIEW: Kathleen Peel looks at an IBM compatible. **69 AMSTRAD:** £200, 64K, built-in storage. Meirion Jones previews.

70 ALPHATRONIC REVIEW: Simon Beesley peers under the hood of the Triumph Adler Alphatronic PC — the Z-80 based 64K micro that gives you CP/M for less than £700.

72 TANDY COLOUR II: Son of TRS-80? Kathleen Peel takes a closer look at some aspects of the new Tandy colour streamlined baby with added O.S.9.

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84 CBM FILES: A cassette-based filing system for the 64 by David Rees. **89 CBM-64 FLIGHT SIMULATOR:** On the flight deck with David Rees.

96 VIC-20 DOGFIGHT: Curse you, Red Baron! Peter Bartley takes us back to the early days of aerial warfare in this nerve-tingling two-player game.

101 ZX-81 GALAXOIGS: Main battle fleet destroyed, the Galaxians adopt a new strategy. S Greaves' excellent machine-code shoot-'em-up.

104 DRAGON GOBBLER: Tom Fiers enters the Dragon maze wherein dwells the hungry gobbler pursued by the tireless ghosts.

110 ORIC SMASH: Bat through the wall with Myles Dunlop. **115 ATARI BUGS:** Les Ellingham and the day of the aphids.

119 SPECTRUM QUICK LOAD: Speed up or slow down your loading with this ingenious utility program from Paul Rhodes.

125 ZX-81 SPEECH: Unaccustomed as it is to public speaking, J N Creak coaxes a few words from the ZX-81 with this speech processor.

129 BBC SPOOLER: This facility allows ASCII files to be transferred from backing store to printer while the micro is being used for some other activity.

135 MICRODRIVE FILE: Kath Peel continues this series on applications for the revolutionary new Sinclair storage device.

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148 DRAGON EDASM: A combined editor and assembler for the Dragon 32. A R Billingham's utility that allows you to change, delete and replace all parts of source code

156 SPECTRUM ZEBEDDY: Vincent and Peter Lee thrust you on to a series of continuing shifting platforms. Watch out for the two-gunned extraterrestrial.

159 CBM-64 INTERRUPTS: Using the IRQ for faster action on the Commodore CBM-64. T Barret helps you get some zest into your programming.

163 RESPONSE FRAME: Tim Hartnell replies to letters. **165 SOFTWARE FILE:** Programs for most home micros.

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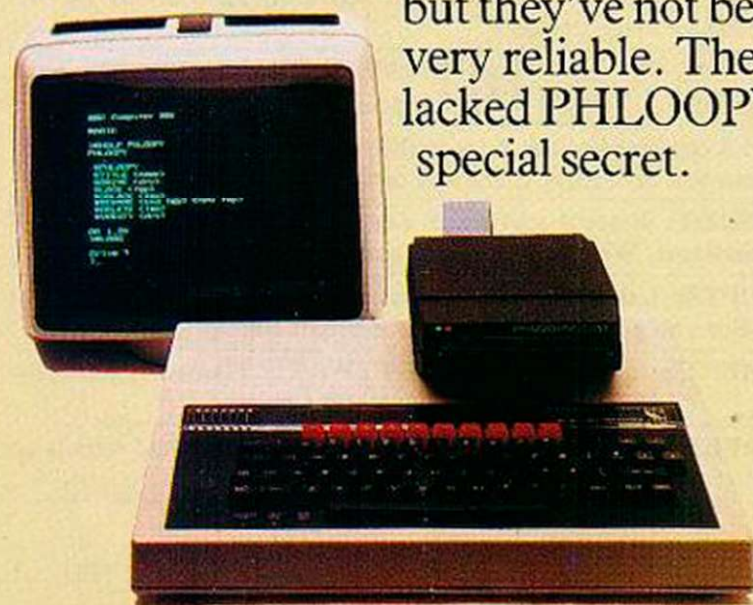
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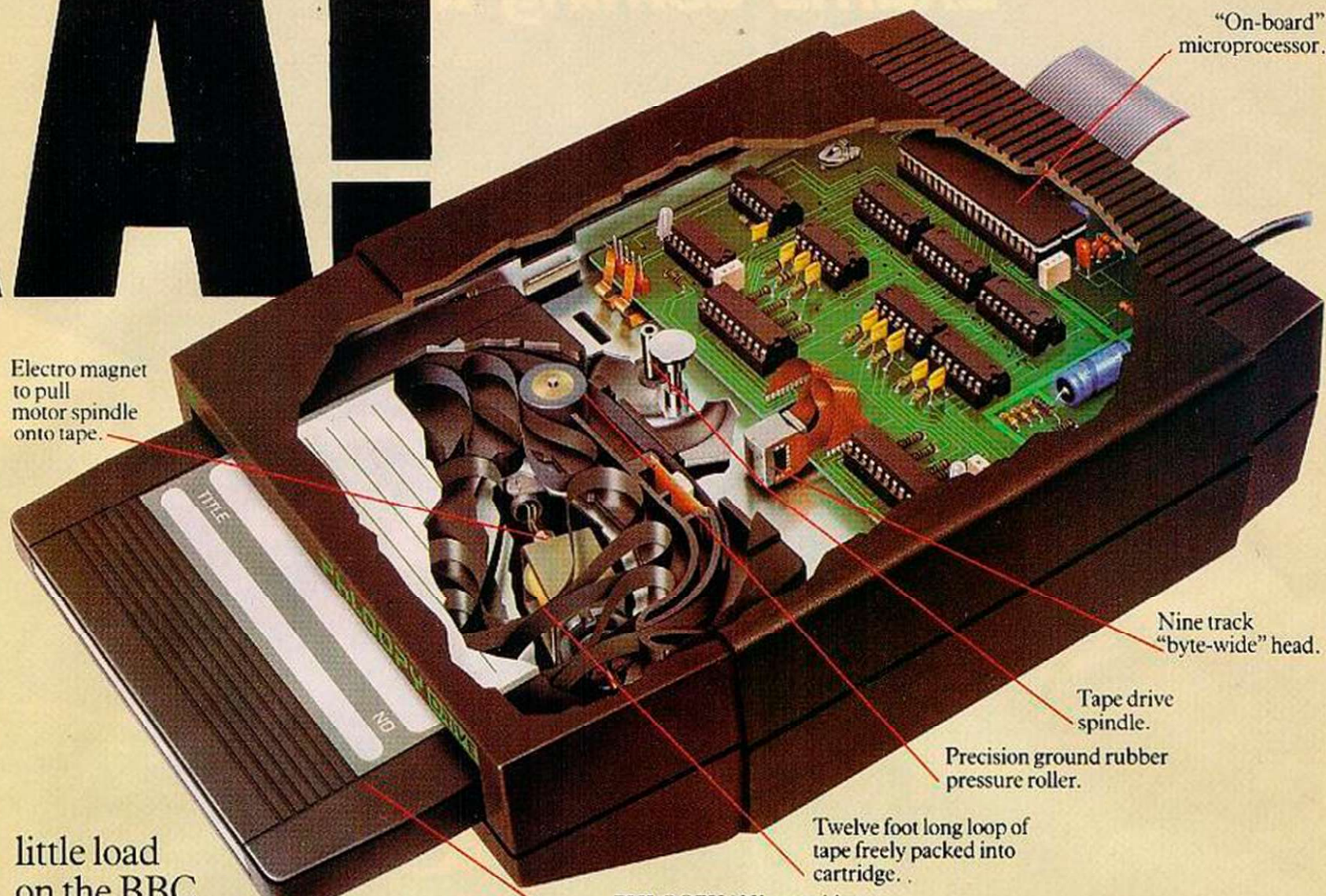
In addition, we've included a feature we know you will appreciate. PHLOOPY has full error detection and correction, so you can be certain you will get back what was originally written onto the tape.

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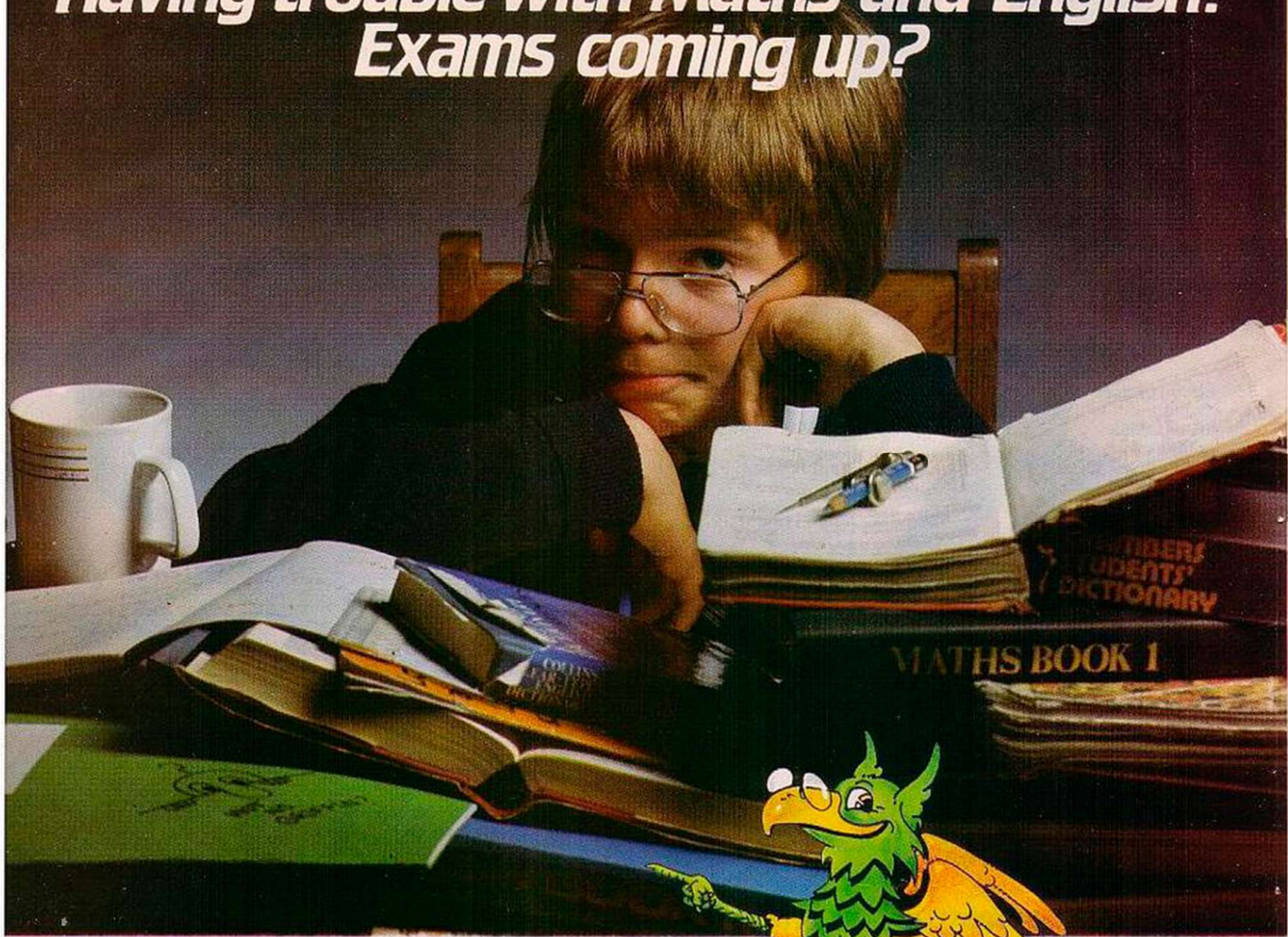
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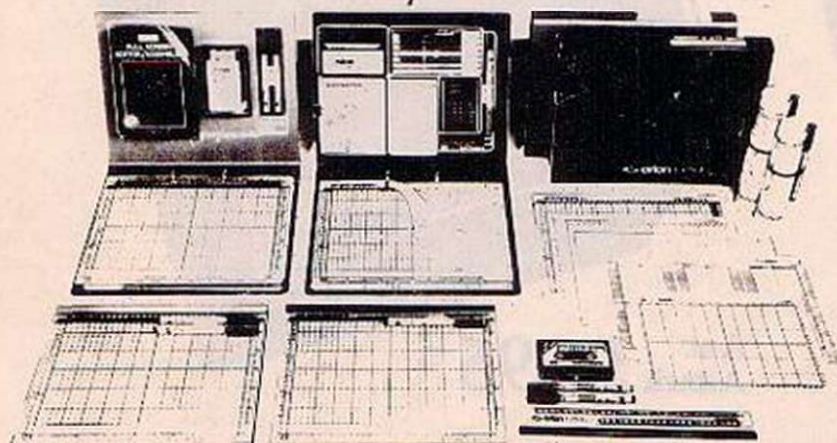


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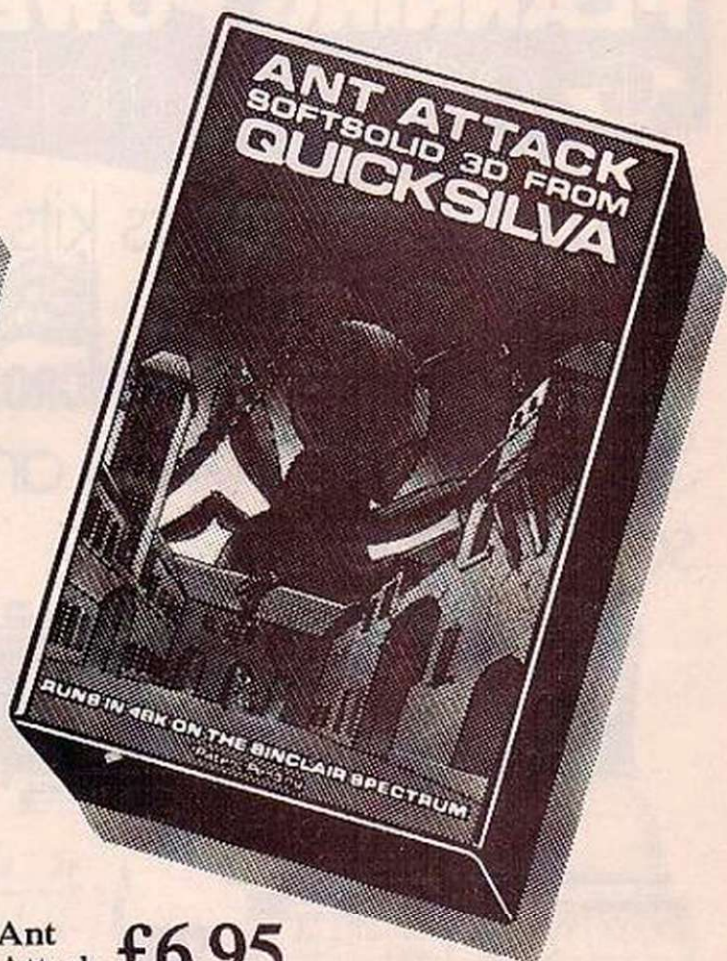


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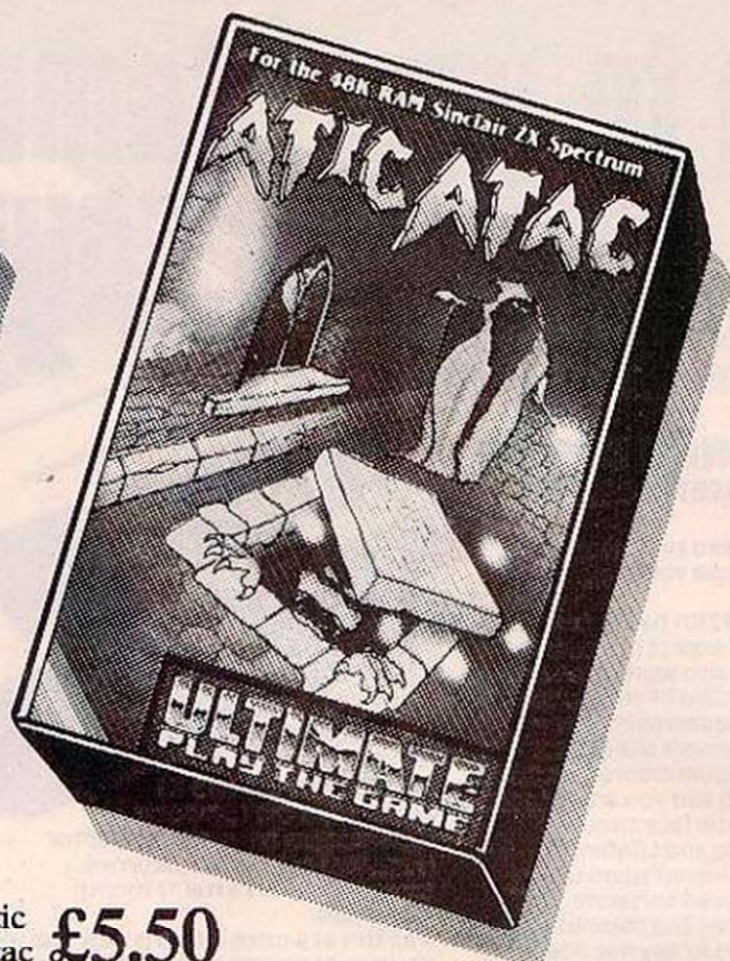
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- DELETE - any block of lines.
- DO - LOOP structure, with WHILE, UNTIL and EXIT IF.
- DPOKE - double POKE.
- EDIT - a specified line number.
- ELSE - used with IF... THEN.
- GET - waits for keyboard entry; doesn't use ENTER.
- KEYWORDS - shifts between new keywords and normal graphics mode.
- ON - GOSUB or GO TO a line number from a list of line numbers.
- ON ERROR - allows trapping of most reports; has available ERROR, LINE and STAT variables.
- POP - removes data from BASIC's stack.
- PROC - named procedures, with DEF PROC and END PROC.
- RENUM - renumber part or whole program with specified start line and increment. Handles GO TO, GOSUB, ON, etc.
- ROLL - pixel movement of part or whole screen in any direction, with wrap-round.
- SCROLL - as ROLL, but without wrap round.
- SORT - sorts part or all of string or numeric arrays according to specified substring or column. SORT INVERSE sorts in reverse order. One hundred strings can be sorted in about one fifth of a second.
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- USING - used with PRINT, formats numbers.

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The MTX Series described; straight from the author's mouth

MANUAL

The first section (of the manual) is a basic tutorial. The grass roots information is here and I could not find any major mistakes. The second part is on Noddy giving a good guide as to how it can be written. . . . The third and fourth sections are on graphics and sound. Both are quite detailed and easy to follow. The fifth section is on how to interface Assembler to Basic.

Personal Computing Today Feb 84.

The provisional manual, which runs to some 250 A4 size pages, has a wealth of detail for the machine-code specialist.

Electronics and Computing Monthly.

INTEGRATED INTERACTIVE SOFTWARE

The MTX ROM has been designed to allow the maximum interaction between components of the software. A single program can be written which uses NODDY to display text and graphics, and a BASIC control program which calls routines written in assembly code. This is a feature of future generation computers not available on any other micro.

BASIC

The Basic is fast and accurate, all the calculations being done in floating point maths, so that you don't lose accuracy to gain speed.

Personal Computing Today Feb 84.

The latest addition to the Memotech range DMX80 Matrix Printer - 80 characters per second print speed, eight character formats, dot addressable graphics, £295.00 including VAT.



Integrated Software - a five to one advantage. Assembler/Disassembler, High resolution Graphics, Arcade style games, Noddy for easy text handling and Front Panel for testing and debugging machine code.

NODDY

A language new to me called Noddy is included in the MTX which is designed to make text handling easy, especially for beginners.

Hobby Electronics.

Also provided is the easy to use beginner's language (Noddy) and a child oriented learning language Logo.

Practical Computing Dec 83.

(Noddy has only 11 commands) that need to be mastered before some quite complex question-and-answer-type programs can be written.

Your Computer Nov 83.

Noddy's . . . main use is for displaying text and I can see applications in the computer assisted learning (CAL) field. Writing in Noddy is like a mixture of Logo and Forth.

Personal Computing Today Feb 84.

ASSEMBLER/DISASSEMBLER

The Assembler can be accessed through BASIC. When used in conjunction with the PANEL it enables the programmer to single step through

and test machine code programs. This is not new to computing, but it is to a home micro.

As well as being able to modify and disassemble sections of code, you can set break points, examine and alter register values, and even single step through code. I hope other Z80 micro manufacturers (particularly in the Cambridge direction) take note of these debugging aids.

Popular Computing Weekly Nov 83.

The Assembler is called from Basic, and it assembles the code in situ, as part of the Basic listing.

Hobby Electronics.

Z80 BOARD

The MTX Series is a more powerful tool for education than the 6502 because it produces a more powerful assembler, allows the PANEL function to be used, and enables integrated software to be written.

RML's 450Z has a (PANEL) function but that is a computer which costs considerably more than the MTX 500.

Hobby Electronics.

FULLY INTEGRATED AND EXTENDED GRAPHICS

The only aspect of the series where extensions to standard language are allowed is in the most comprehensive and integrated graphics available on a home micro.

32 Sprites are supported either 8 x 8 or 16 x 16. They are easy to use and define and do not use extra memory as in the . . . because they have their own area of RAM.

Personal Computing Today Feb 84.

Graphics are very easy to create and manipulate, even for beginners.

Which Micro Jan 84.



MTX512 plus twin 5 1/4" disc FDX. A CP/M based business system - £1245 inc VAT.

SOUND

The simplification of the sound commands for ease of programming has in no way compromised the quality of the sound produced.

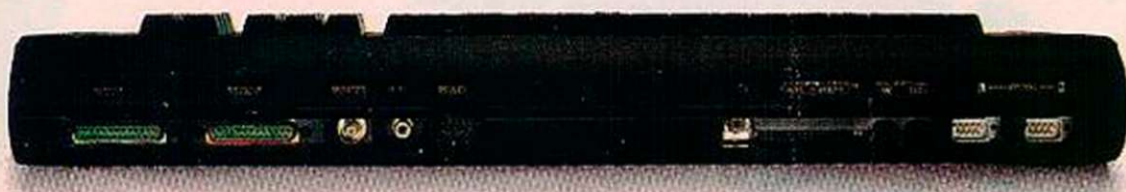
Sound is of great importance for use in games but on many microcomputers it is inadequate. Not so with the MTX... *Your Computer* Nov 83.

As well as good graphics capability the MTX boasts the same sound chip as the BBC micro - the Texas 76489. It has three tone channels and one noise channel, and is easily controlled from Basic. Volume and frequency can also be controlled, using a much easier method than the 14 parameters needed by the BBC.

Popular Computing Weekly Nov 83.

The commands are sufficiently complex to enable the computer to be used as a synthesizer.

Electronics and Computing Monthly.



Input/Output Monitor, Hi-Fi, Power, TV, Centronics, Cassette Mic and Ear, and two Joystick ports all come as standard; the twin RS232 ports are available as expansions.

HARDWARE

Inside the case is what one comes to expect from Memotech - a very neat PCB that holds all the components including the main chips - namely a Z80A processor and TMS 9929 graphics chips as well as about 30 others. *Popular Computing Weekly* Nov 83.

If you are familiar with the ZX81 peripherals that Memotech also make you will know that the company has an eye for good design and does not skimp on materials it uses.

Electronics and Computing Monthly.

CP/M OPERATING SYSTEM

The Series is designed to run under the CP/M operating system. This is the Disc Filing System used on the vast majority of microcomputers in business. Since a program written on one CP/M machine can be transferred and run on almost any other, this makes available 15,000 CP/M based business programs. The powerful LINK program can give access to any device operating under CP/M. With its excellent software support and because of its modular nature, the series is a cost-effective and efficient entry to serious business and educational computing.

FULL-TRAVEL KEYBOARD

It has a professional quality keyboard. This and its elegant styling make it suitable for word processing and business use.

Your Computer Nov 83.

NODE RING

MTX computers can operate together without expensive network systems. Units linked via the ring can share software peripherals and communicate with each other. Many other makes of computer can be interfaced with the ring as terminals.

EDUCATIONAL USAGE

There will be many people who have seen a front panel display on the 380Z computer in secondary schools or

colleges, and the MTX panel is very similar.

Hobby Electronics.

The new language Noddy and the Logo type Turtle Graphic commands would appeal particularly to the growing education market.

Your Computer Nov 83.

Applications are obviously going to suggest themselves in areas of the school curriculum, the fast-training of personnel in commerce, and in adventure-game writing.

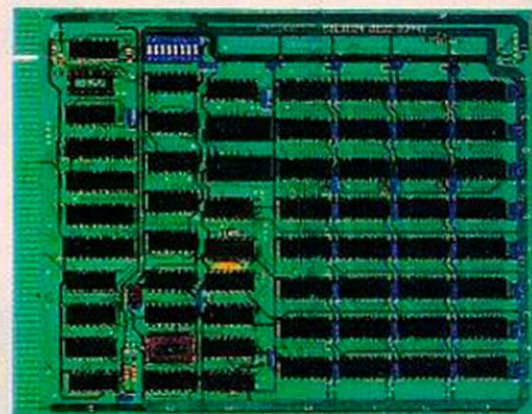
Hobby Electronics.

The MTX expansion potential is well thought out. The key to both the MTX Ring system and to the Disc Drive systems is the communications (RS232) board mentioned earlier.

Electronics and Computing Monthly.

UPGRADABILITY

The MTX 500/512 is part of an existing range of products which can be bought separately and integrated into a single powerful system, now.



Silicon Disc RAM Board 256K fast access RAM

There is plenty of room for expansion with the MTX and Memotech have planned a progression up to their small business machine with 80 column display (instead of the standard 40 x 24) Floppy discs, Silicon (or RAM) discs, and a hard disc under development.

Personal Computing Today Feb 84.

There are a multitude of sockets along the back consisting of two Joystick sockets, cassette connections, Centronics printer circuit, aerial socket, power socket and audio and video output. There is also provision for two RS232 sockets...

Popular Computing Weekly Nov 83.

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CHESS

A fully comprehensive chess package. Ten levels of play, from novice to championship standard. Pitch your wits against the computer with this fast, versatile machine code program.

TOADO

The object of the game is to navigate each of **five toads** across a road and **two rivers** without being run down or drowning (toads can't swim).

—ALICE IN— WONDERLAND

A fully interactive machine code adventure game set in **Wonderland**. You play the part of **Alice**, and explore the fascinating world of Wonderland, full of excitement and suspense. Delve deep into tunnels, caves and wells in search of hidden treasure.

KILOPEDE

Eliminate **mushrooms** and the descending segmented **Kilopede** to gain bonus points — avoid killer **crabs**, **fleas**, **spiders** and **jellyfish** which chase you across multiple levels of increasing difficulty.

—SUPER— MINEFIELD

The object of the game is to get from one side of the minefield to the other without being **blown up**. You only get one life so be careful — not all the mines are visible. The only way you can tell how many mines are nearby is by looking at the **mine detector** in the top right hand corner of the screen.

BLOBBO

Run at high speed around the maze collecting **treasure** and **fruit** worth bonus points — but don't get caught by the **Blobber-eaters**! Tactical dodging must be employed to avoid them. If you're caught or step on a skull and crossbones you lose one of your three lives.

KNUCKLES

Move **Knuckles** around his maze, using a joystick to kick **Roks** and **Magic Squares**. The object is to line up the Magic Squares, using the fire key, and so advance to the next level, gaining a level bonus.

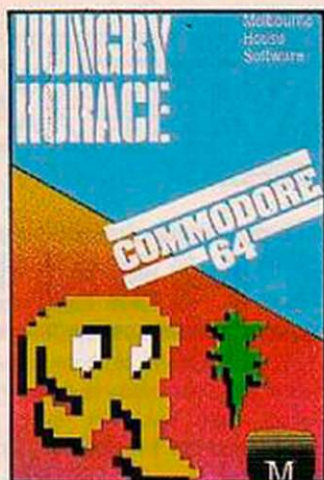
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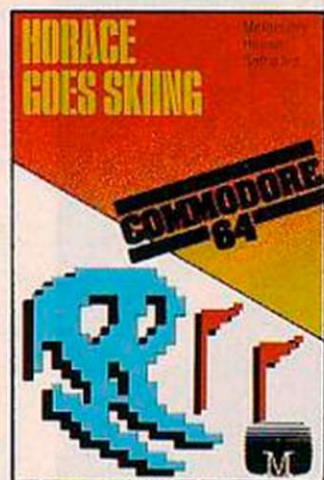


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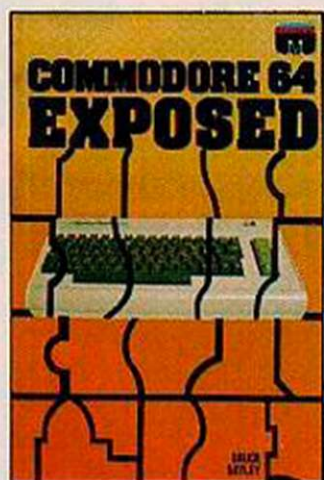
N. MYNHEER



COMMODORE 64 HUNGRY HORACE Just when you thought computer games had nothing more to offer, here comes Horace for your Commodore 64. Hungry Horace creates havoc in the park as he picks the flowers, annoys the guards and steals their lunch. "Defining your own maze simply adds to the enjoyment of a great game." — PC Games



COMMODORE 64 HORACE GOES SKIING The sequel to the very successful Hungry Horace. Our hero attempts winter sports. First of all he must get to the ski shop, then lumbered with a paid of skis, he has to dodge the traffic once again to reach the snow. Skiing is complete with slalom flags, trees and moguls!



COMMODORE 64 EXPOSED A complete and comprehensive guide that clearly explains every function of your Commodore 64 from BASIC to Machine Language. Includes full details on advanced programming, graphics and sound. "A real gem. A most comprehensive and necessary publication." — Commodore Magazine



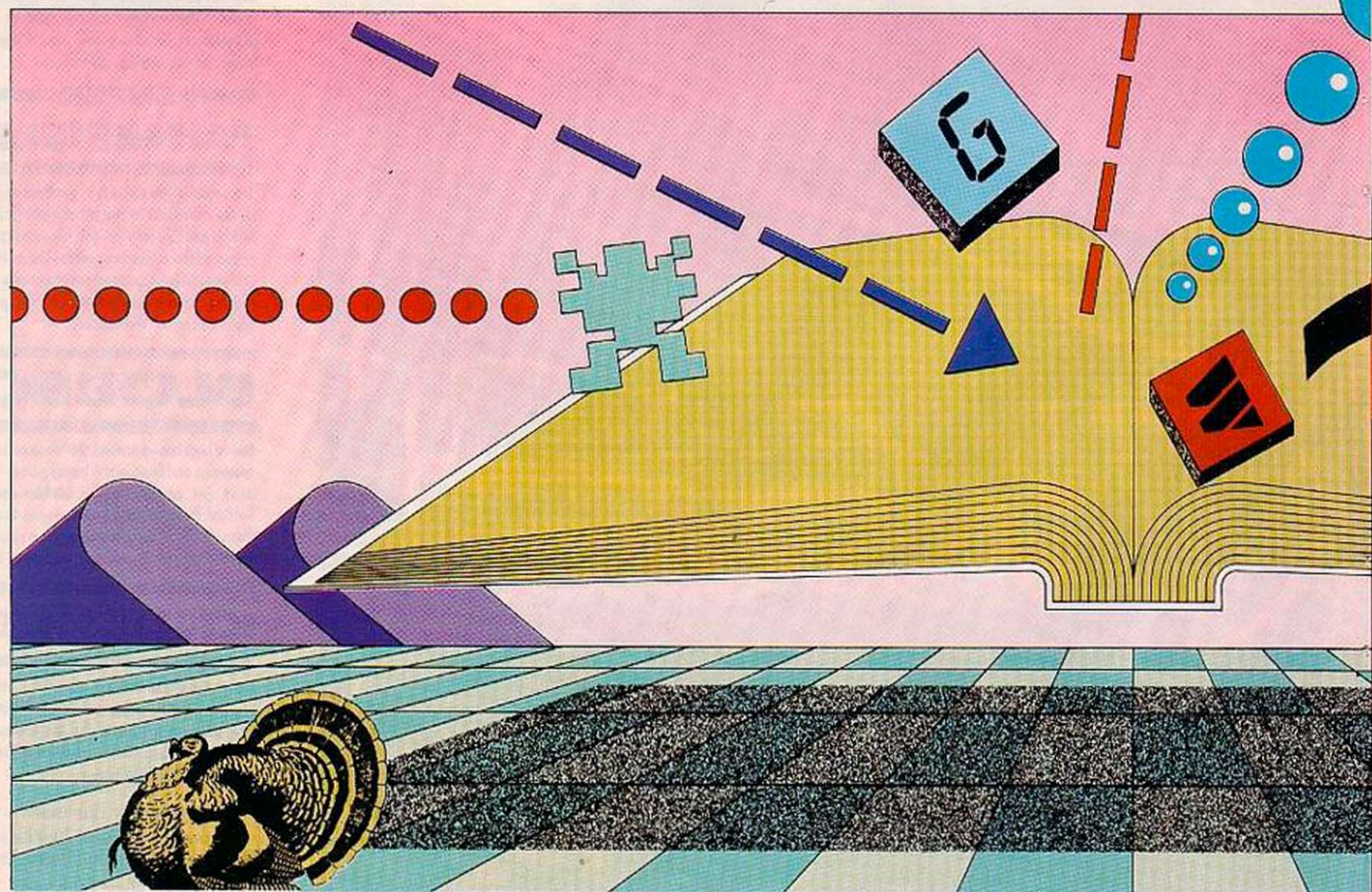
COMMODORE 64 GAMES BOOK Teach your Commodore 64 every trick in the book. 30 programs ranging from nerve-shattering space games to real life adventures. "For a Commodore 64 games enthusiast, this is a must."

— Personal Computer News

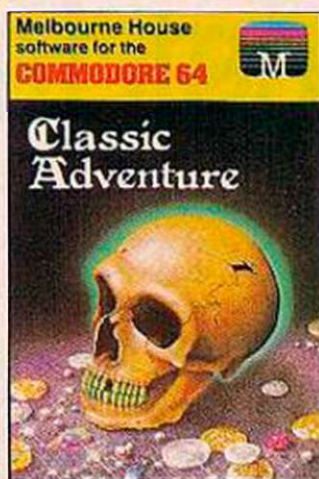


COMMODORE 64 SOUND & GRAPHICS — Now enables you to use all of the sophisticated sound & graphics capabilities of the Commodore 64 — by explaining the features, involving you in design and coding or a real application and by providing the necessary general purpose machine code routines.

COMMODORE



M E L B O U R N E



CLASSIC ADVENTURE This is the program that started it all! Now you can discover the excitement of Classic Adventure on your Commodore 64, and if you are masterful enough you too could become a Master Adventurer.

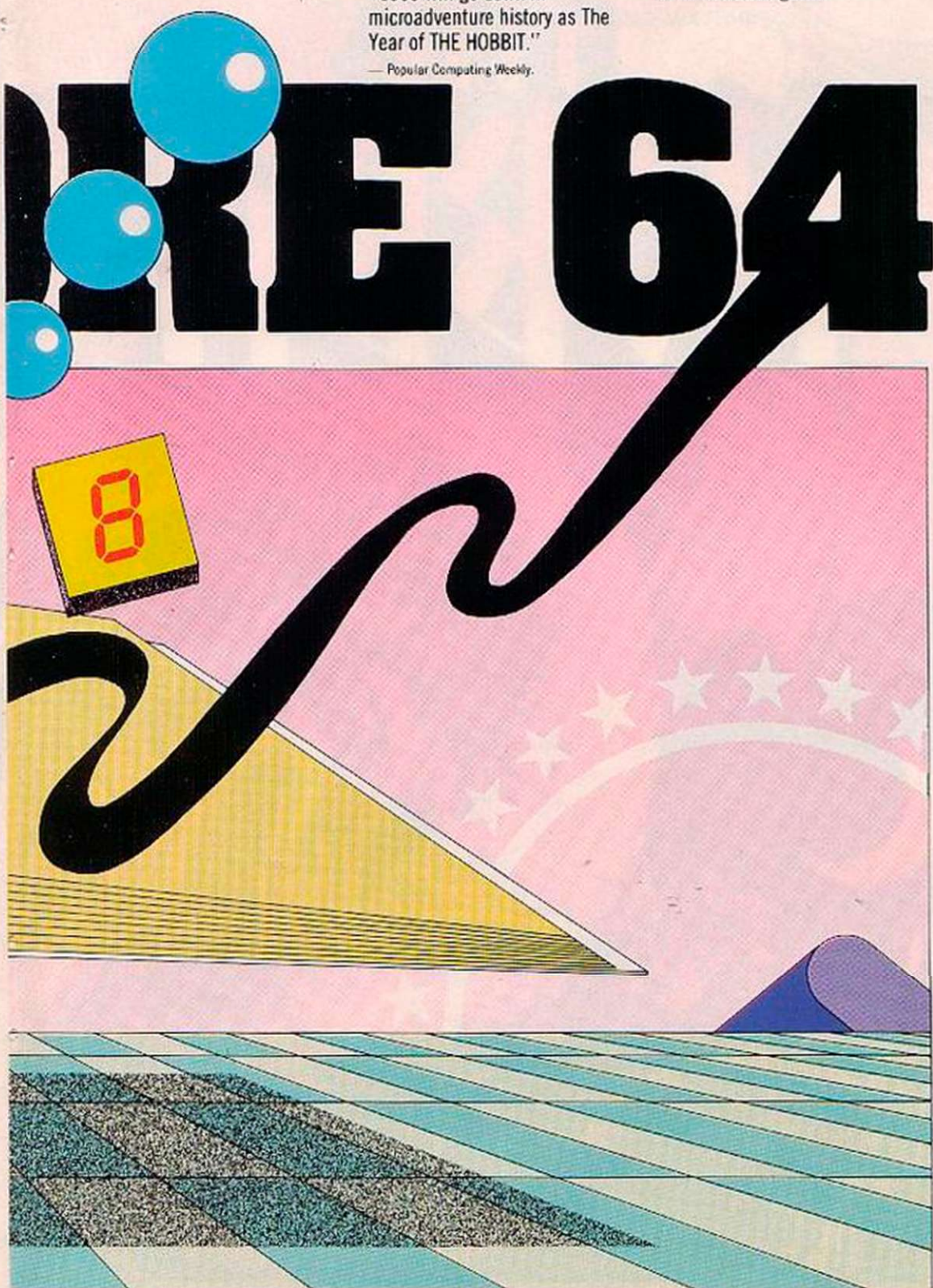


THE HOBBIT Visit J.R.R. Tolkien's Middle Earth with The Hobbit. The most amazing adventure yet devised. "The Hobbit has been transferred to run on the Commodore 64 and what a success it is."

— Which Micro? & Software Review.
 "1983 will go down in microadventure history as The Year of THE HOBBIT."
 — Popular Computing Weekly.



A.C.O.S.+ 36 new BASIC commands for your Commodore 64 covering the fields of cassette input and output, graphics, sound and utility commands. The A.C.O.S.+ program also allows the user to add his own BASIC commands. Includes a free demonstration game.



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H O U S E

The Hobbit. Now the best is

"After a very short time I found that 'The Hobbit' was becoming almost a way of life rather than a game, and so when I finished it for the first time I was partly sad because I felt that all the fun and adventure had ended, but I was wrong. Even now I am discovering new things about the game and feel that it will be some time until all of its secrets are revealed to me."

MR. J. STERN, Herts

"I have at last received your 'Hobbit' program and would like to congratulate you on its excellence. After four days of sweat and tears I have completed only 37.5 per cent of the adventure. The program has lived up completely to expectations, and there is no doubt about it being the best production for the Spectrum to date. You have surpassed all others with this program."

"A lot of fun."

COMPUTER

"The excellent graphics and sound effects. The exciting difference is that it is possible to converse with all the characters, to meet and ask them questions, and to recommend this game to your friends. Tolkien, or novelists."

POPULAR COMP

"I am writing to compliment you on 'The Hobbit'. I think it is one of the most ingenious programs I have ever seen to use. It has kept me stumped for months. I think the effort that has gone into writing a program like this must have been enormous. The effects are brilliant to say the least."

JEREMY CHESTER

"The Hobbit takes first place in the new category of quality and value for money."

SINCLAIR USER

"The graphics in the Adventure are excellent. We have completed 7.5 hours of play."

"The graphics are superb. The plot is well thought out and is superior to any other game for the Spectrum."

COMPUTER

"The Misty Mountains game is a real treat to play and is No. 1 for excitement."

GORDON DEMPSTER, Scotland

"Thanks again for an excellent game in 'The Hobbit'. I feel I have really got my money's worth out of playing time. Congratulations!"

MR. P. RUSHTON, Leeds

"The most powerful computer game yet invented."

COMPUTER WEEKLY

"Within my circle of friends this game has become something of an obsession. We meet every Friday night at someone's house and spend 3-4 hours on 'The Hobbit'. Friday night would not be the same without 'The Hobbit'."

CHRISTINE VERCHILD, Wilts

"One new Adventure game stands head and shoulders above the rest. It alone almost provides you with a good enough reason to buy a 48K Sinclair Spectrum. Not only does The Hobbit produce drawings of the main scenes, but it also understands proper sentences rather than pairs of words for its commands. It comes with a copy of J.R.R. Tolkien's classic book of the same name. It is the program with the most detailed and best written documentation ever."

WHAT MICRO

"This is an impressively packaged Adventure game which makes good use of the Spectrum's colour graphics. They have not only produced one of the best games for the Spectrum, but given everyone else a lesson in good game design."

PRACTICAL COM

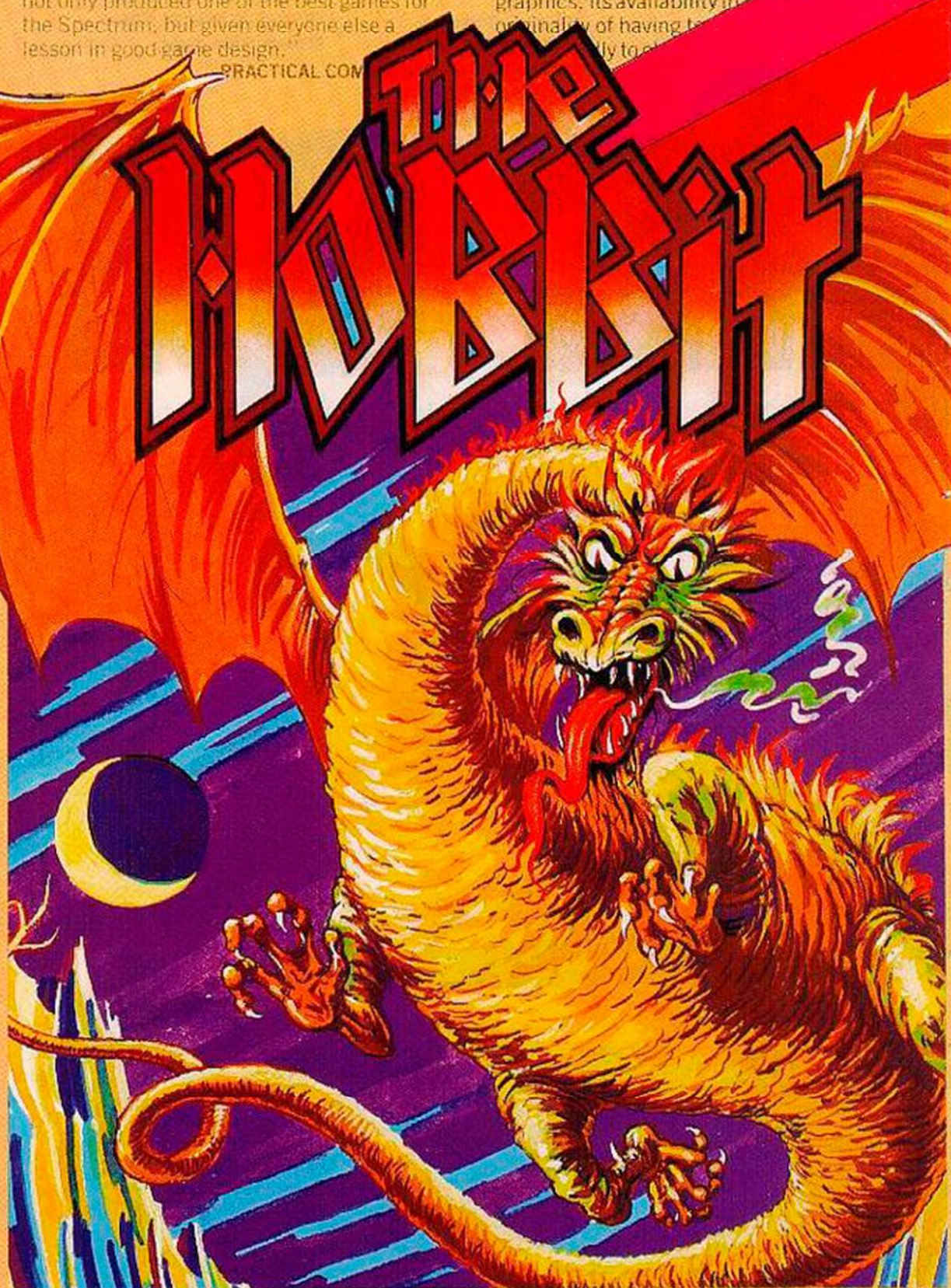
"I am the owner of a copy of 'The Hobbit' which is wonderful entertainment, and very challenging. I have other tapes and publications of yours, all of which are excellent."

MR. D.J. BURGH, Kent

"Having received the most excellent piece of programming I have ever seen, we have had no social life whatsoever. 'The Hobbit' has been dominating our lives since January and many nights have been spent until 3 o'clock trying to conquer it."

SIMON ROGERS, Avon

"I have recently purchased your excellent adventure game 'The Hobbit'. This game is greatly enhanced by the use of colour graphics, its availability in the Spectrum, and the originality of having to play it."



Melbourne House

available for:

"In my software library, your program 'The Hobbit' takes first place."

DAVID MAXWELL, London

"I am the proud owner of your excellent program 'The Hobbit' and have spent many happy, restful, relaxing hours trying to solve its riddles."

SPECTRUM
COMMODORE 64
ORIC 1
BBC

"I congratulate you on a program that I have enjoyed immensely. I must thank you for producing such a clever product. It was worth every penny of the purchase price."

MRS. J. RYCRAFT, Northampton

"The Hobbit' is a beautifully constructed, frantically-maddening, tortuous, gloriously inconsistent, thoroughly spooky adventure — far better than I could have hoped for and certainly the finest of the dozen or so adventure programs I have. In short, I congratulate the four who sweated for a year and a half."

MR. PETER JONES, South Glam.

"Nothing is certain in this Adventure, but uncertainty! Add to this the brilliant graphics that are used to describe many of the locations and we have an Adventure that is going to become a classic for the Spectrum."

POPULAR COMPUTING WEEKLY

"...we are not eating food...we are losing sleep...and it's great! We are lost, in the Hobbit program."

MR. JOHN HARRIS, Kuwait

"The children were immediately enthusiastic about the program (even dedicated footballers gave up some playtimes to use it!). Many children borrowed copies of 'The Hobbit' from the library to read for themselves."

JUNIOR EDUCATION MAGAZINE

"The Hobbit' arrived and single-handedly set the standard for adventure games to come, with its sophisticated mixture of advanced language analysis and beautifully detailed graphics."

MICRO ADVENTURER

"I bought for my ZX Spectrum the program you supply called 'The Hobbit'. It is an excellent program for the money. I find it very realistic. The graphics are accurate. It sticks to the book, which is a very compelling feature."

JOHN CASSIDY, Essex

"Having recently purchased a Sinclair Spectrum I decided to buy 'The Hobbit' since I have been doing a literature project based on 'The Hobbit' with my class of 10 and 11 year old children. Over the last 10 weeks the children, having read the book, have been attempting the program with my assistance. Let me congratulate you on a most entertaining program."

MR. K. REID AND CLASS 7, Nottingham

"...more of a challenge than a program."

POPULAR COMPUTING WEEKLY

"...the most unique feature of this program is that the user instructs the computer in completely ordinary English sentences. The Hobbit program has the capability of very simple and sophisticated communications."

"I purchased 'The Hobbit' a long time ago and since then I have been engrossed in the game, and I'm beginning to think that I want to talk to me a little about the adventures in 'The Hobbit'."

PAUL ROWLEY, South-Trent

"The use of graphics is one of the features which makes 'The Hobbit' special. The addition of graphics as good as these adds a whole new dimension to the Adventure. It is certainly a marvellous game, which should set the standard for future Spectrum adventures."

ZX COMPUTING

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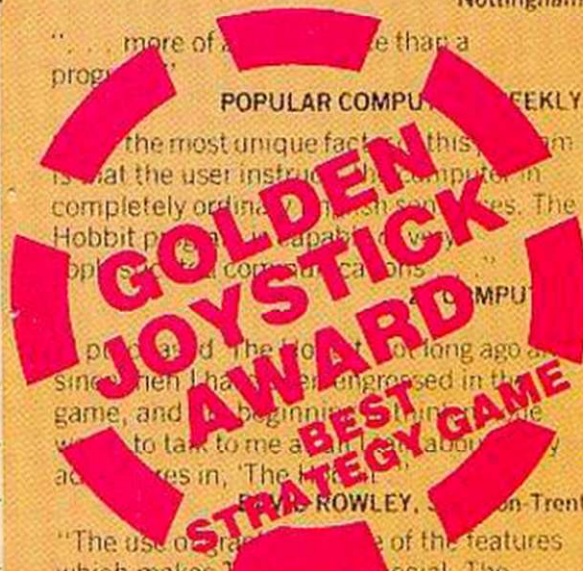
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** Which Micro Hardware Review – Spectravideo SV 318

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Which Micro? Dec 83. **



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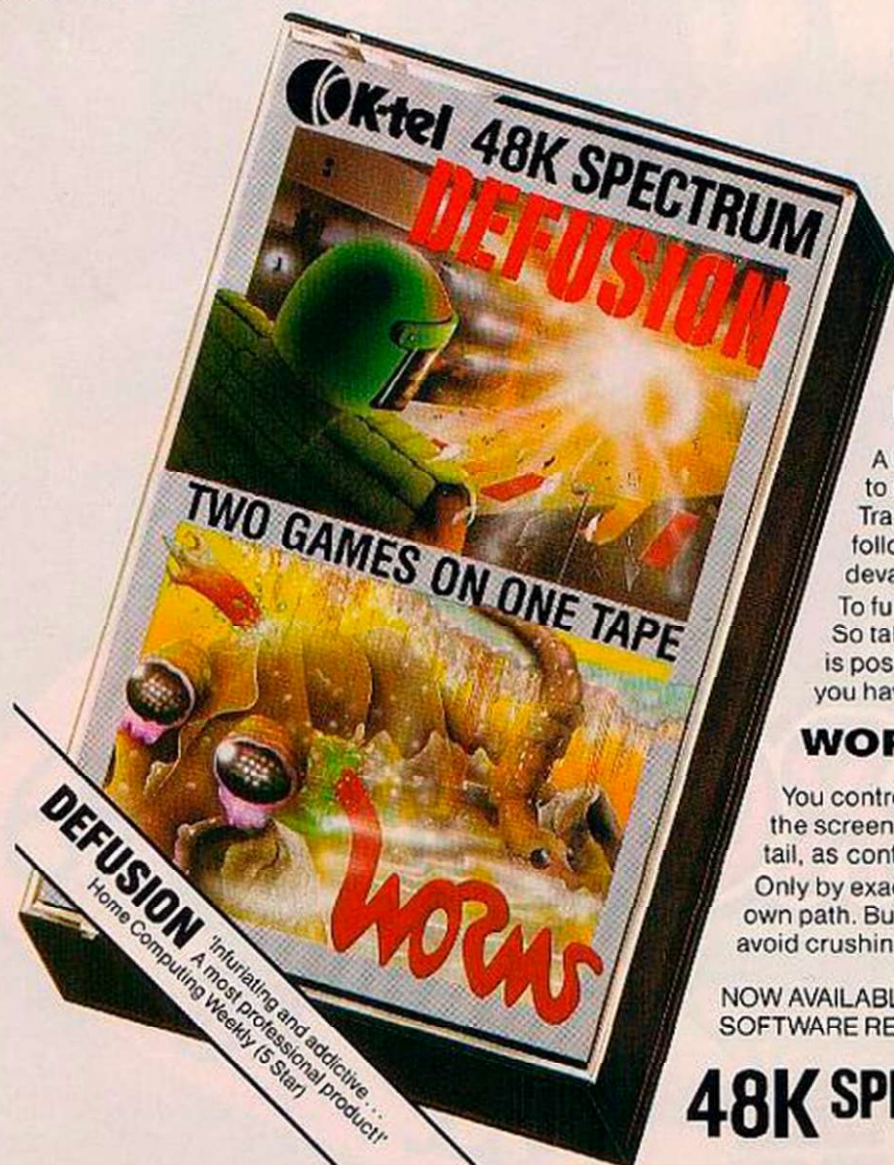
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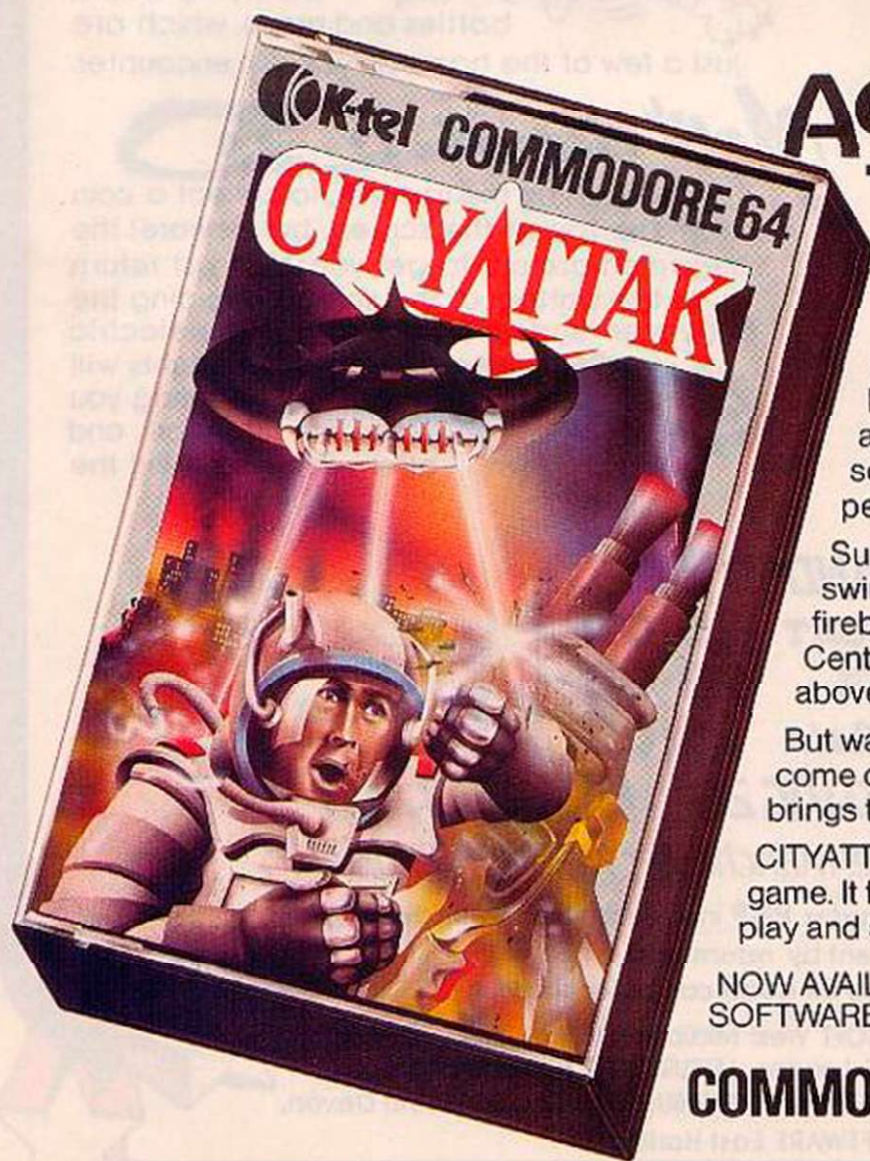
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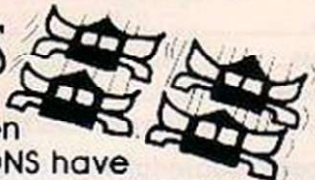
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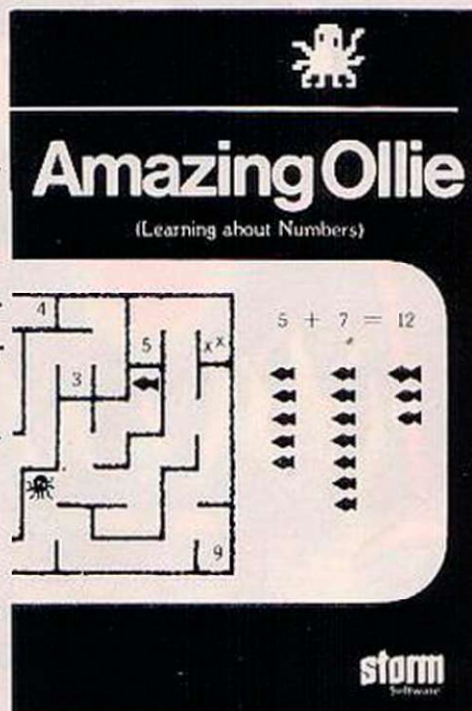
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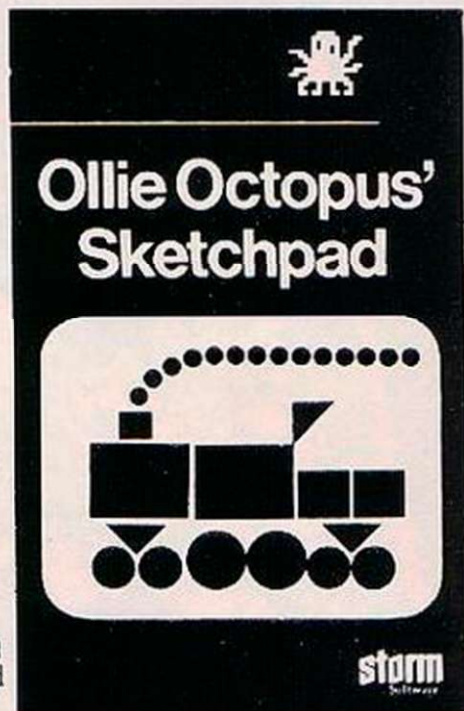
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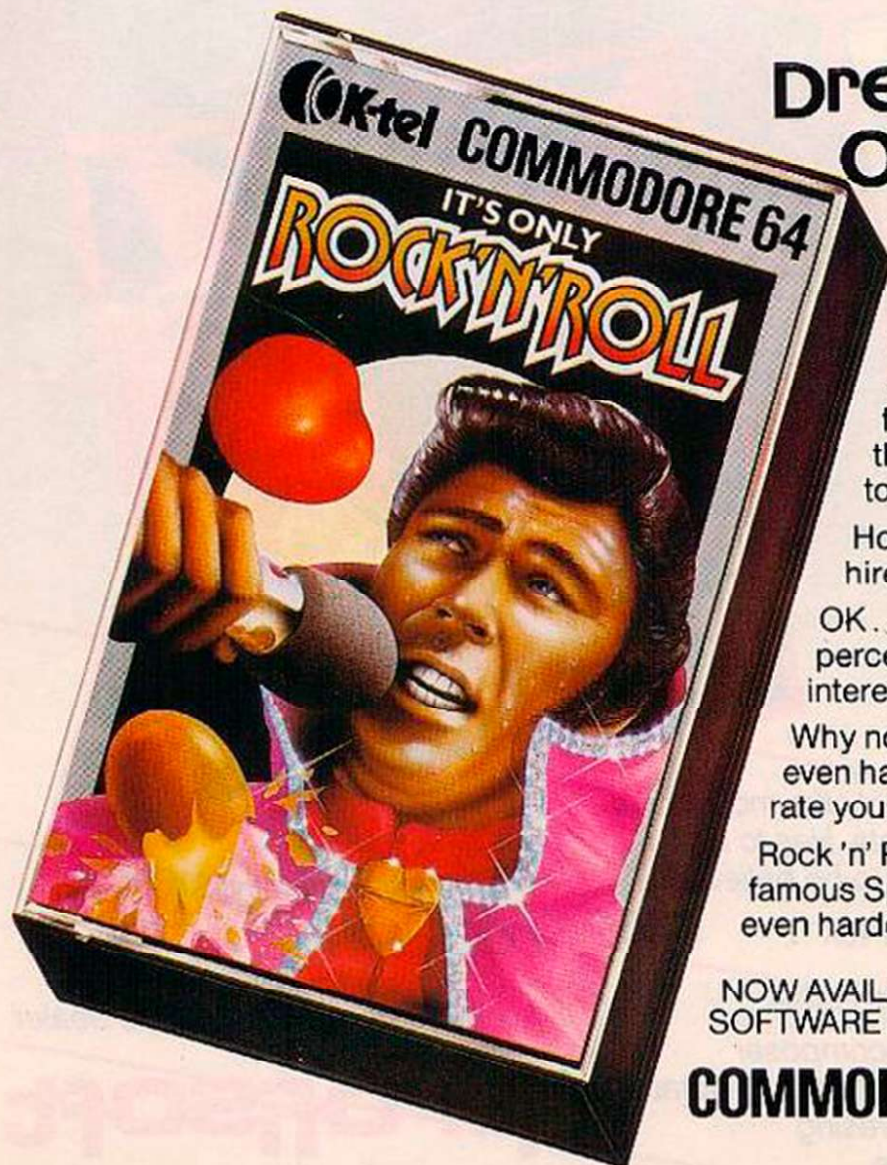
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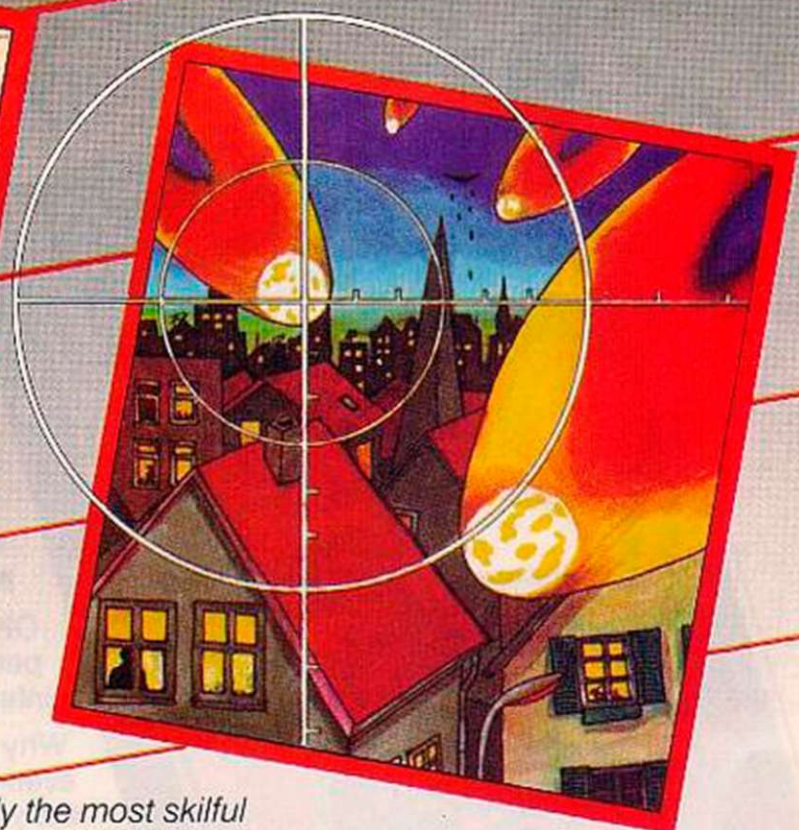
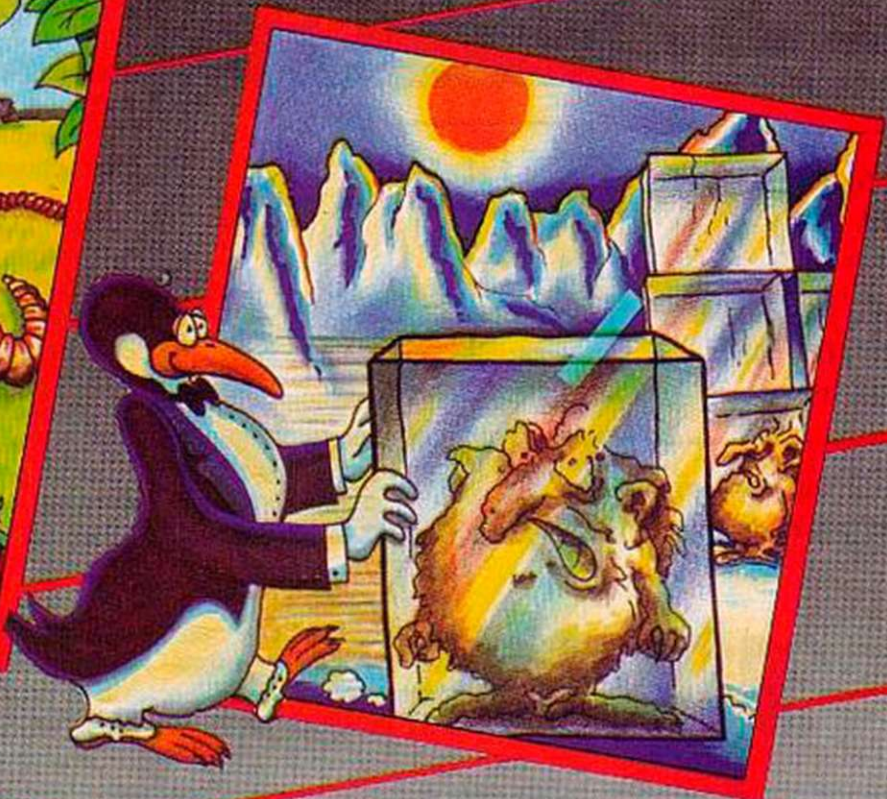
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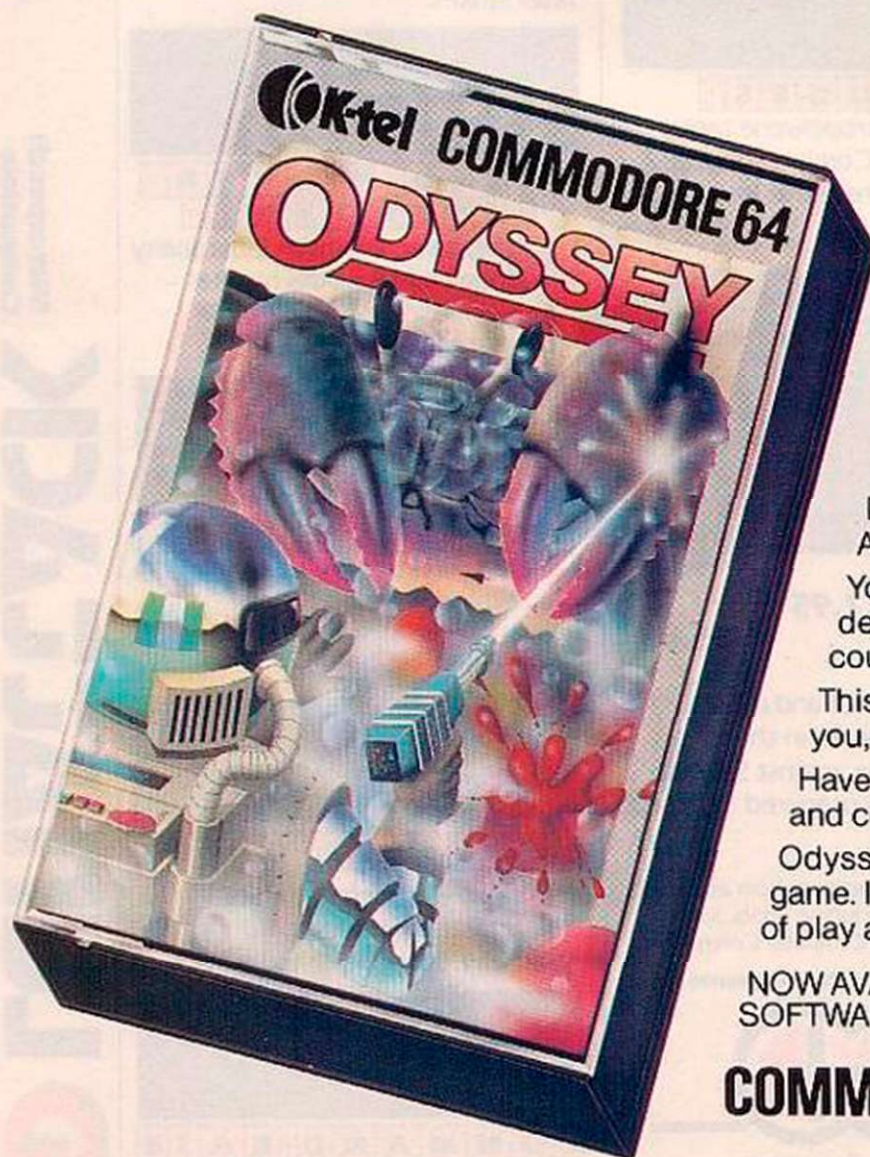
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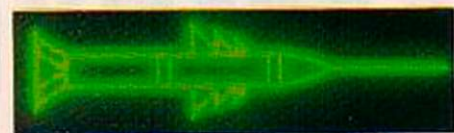


Will you accept this mission?

In your Z5 Luna Hover Fighter you must penetrate the 3 successive Seiddab defensive zones and destroy their command base.

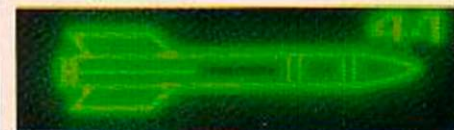
The state of your fighter and its armaments along with status reports of the Seiddab defences is given below.

Good luck! May the power be with you.



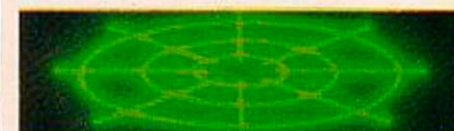
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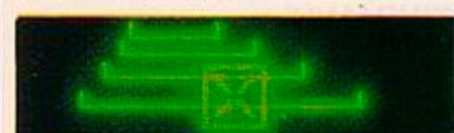
• MISSILES •

Long range weapon system. Radar homing duodec warhead. Armed and ready to fire.



• RADAR •

Long range, over the horizon sensors. Tuned to the plasma output of Seiddab hover fighters.



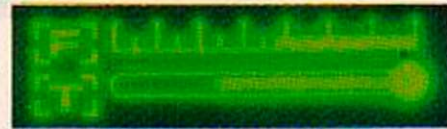
• NAVIGATION •

Locked on to the Seiddab command base. Head up path display.



• SHIELDS •

Di-lithium powered. Combat power level. Status all green.



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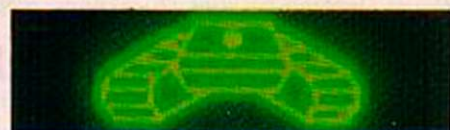
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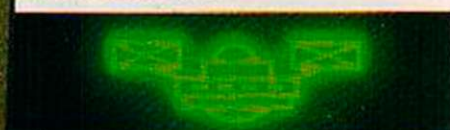
• DAB TANKS •

Robotically controlled. Ytsan missiles – armed. Susceptible to laser strikes.



• SEID HOVER FIGHTERS •

Figh power, low manoeuvrability strike craft Plodium missiles – armed. Susceptible to missile or laser strikes.



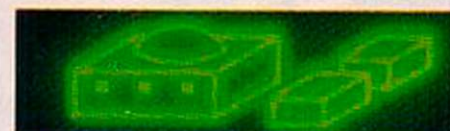
• AERIAL MINES •

Contain proximity fuses, explodes on detecting hoverfighter. Susceptible to laser strike.



• MISSILE SILO •

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ROM	64K.
ROM Contents	Diagnostics, Basic, Cassette O/S
Languages Included	Basic
Type of Keyboard	Full 84 keys tactile
Keyboard Facilities	10 programmable keys
Character Set	256 in ROM
Method of Display	TV, RGB, Comp/Sync colour or monochrome monitor
Display Facilities	Full screen handling, 4 screen paged
Text	80 x 25 or 40 x 25
Graphics Resolution	320 x 200 or 640 x 200
Colours Available	16
Graphics Facilities	Scroll, reverse image
Cassette Recorder	Audio
Interfaces Included	Cassette port, light pen, joystick, Centronics
Sound	Built-in speaker
Operating System	Built-in ROM
Printers	Any using Centronics parallel interface
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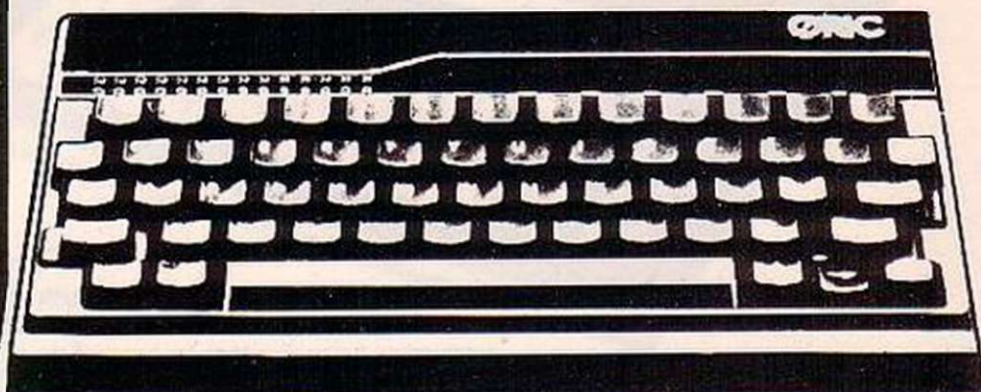
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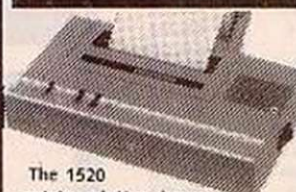
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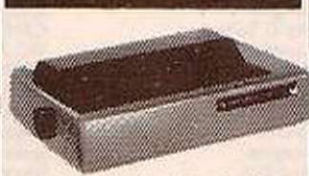
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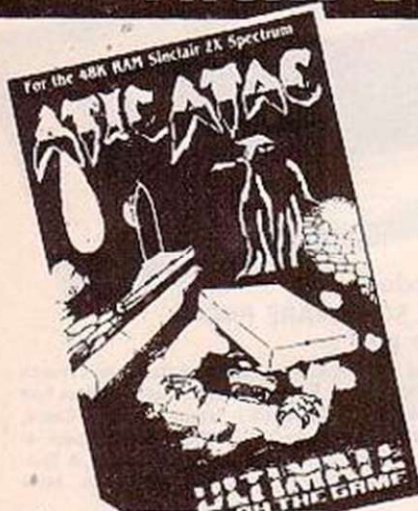
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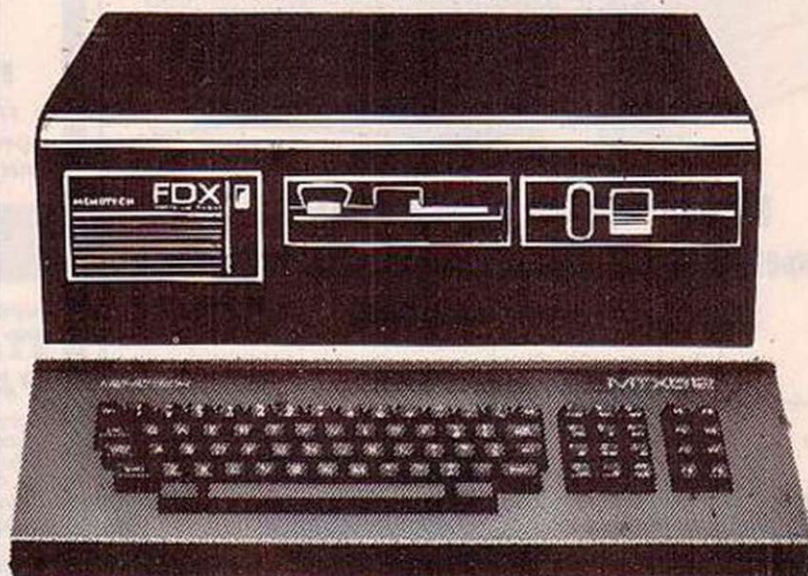
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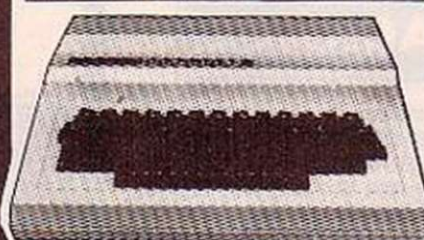
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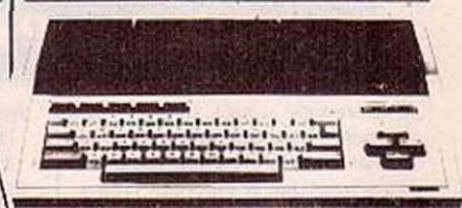


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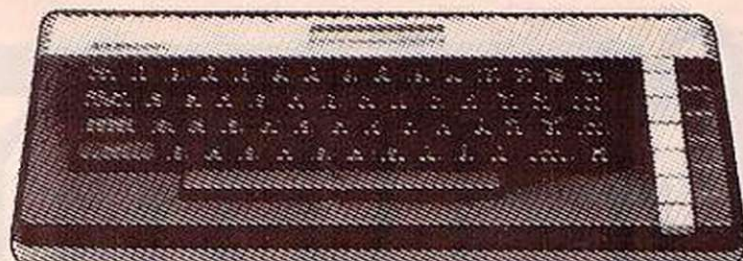
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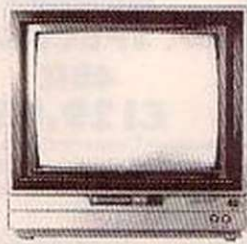
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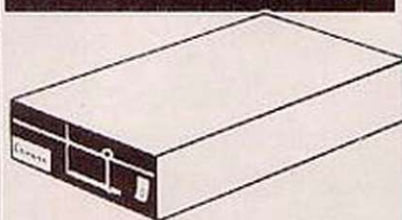
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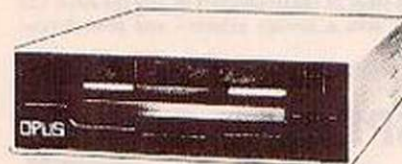


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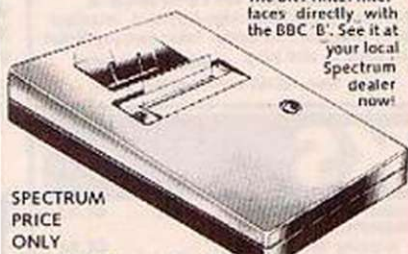
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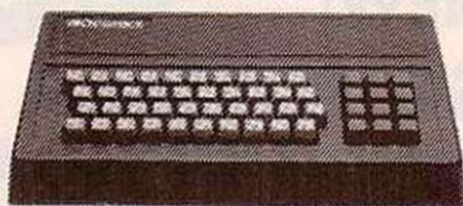
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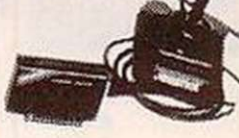
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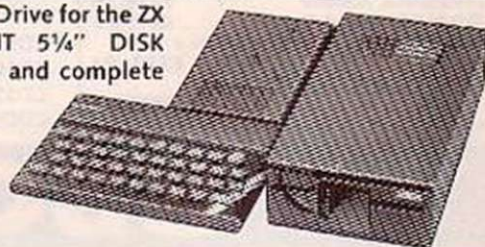


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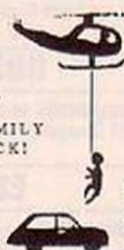
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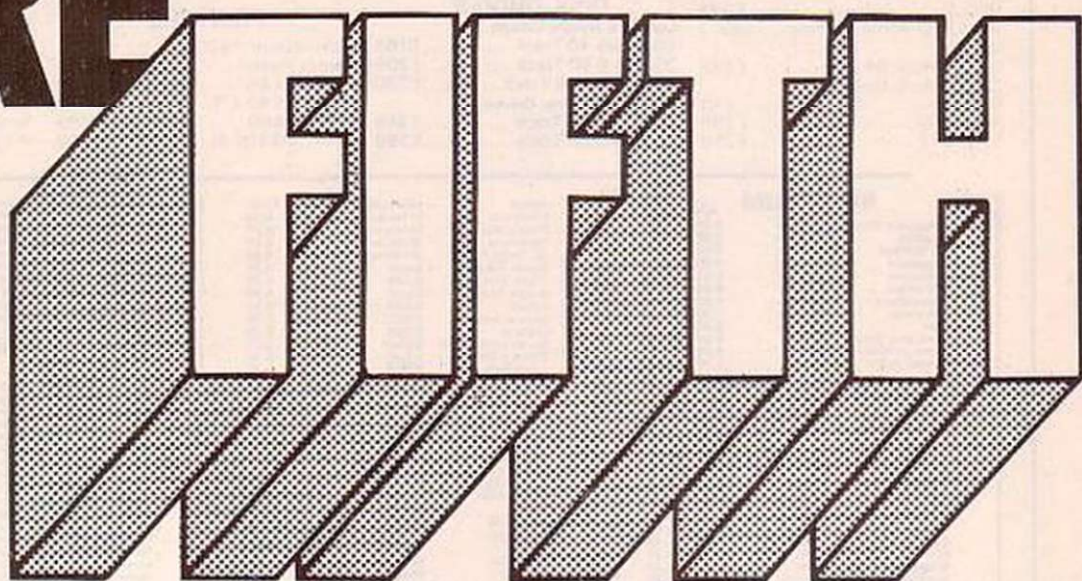
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2 REM * BOMBER *
3 REM * By RICHARD TAYLOR *
4 REM * © CRL September '83 *
5 REM *****
6 REM
10 RANDOMIZE 1000
20 RANDOMIZE USR 61030
30 RANDOMIZE BORDER 6
40 OVER 0: INVERSE 0: FLASH 0
50 BRIGHT 0: INK 0: PAPER 7
60 CLS
70 GO SUB 9000
80 GO SUB 8000
90 LET HI=0: LET Z=1: LET Score=0
100 CLS: PRINT " HI: "; HI; TAB
20: SCORE: "; Score
110 PLOT 0,163: DRAW 255,0
120 LET a=4000: REM LIMIT a
130 LET a=6000: REM INTERACT a
140 GO SUB 3000
150 LET x=0: LET y=50: REM MOVE
Plane,x,y
160 LET x=255: LET a=30: REM MO
VE Enemy,x,a
170 GO SUB 2000: GO TO 170
1000 LET a=0: LET b=175
1010 REM MOVE Plane,a,b:ENABLE P
lane
1020 REM ALL Bomb\MOVE Bomb,a,b
1030 REM ENABLE Bomb
1040 REM MOVE Enemy,a,b:ENABLE E
nemy
1050 CLS
1060 FOR a=0 TO 7
1070 PRINT PAPER a: REM FILL
1080 BEEP .1,a*5: NEXT a
1090 PAUSE 25: FOR a=0 TO 0 STE
P -1: BEEP .005,a: NEXT a
1100 FOR c=0 TO 1000 STEP 20
1110 LET a=10: LET b=3: LET d=50
1120 REM SOUND a,b,c,d
1130 NEXT c
1140 LET a$="SCORE: "+STR$ Score
1150 LET x=0: LET y=50: LET t=2:
LET w=3
1160 REM TEMPS\LARGE
1170 IF HI>Score THEN GO TO 1200
1180 LET HI=Score: LET a$="A New
HIGH SCORE"
1190 LET x=60: LET y=100: LET t=
2: LET w=1: PRINT INK 1: REM LA
RGE
1200 PRINT #0; FLASH 1: " A
New Level? (y/n) "
1210 IF INKEY$("<>") THEN GO TO 12
10
1220 IF INKEY$="n" OR INKEY$="N"
THEN GO TO 1500
1230 IF INKEY$("<>") AND INKEY$("<
>") THEN GO TO 1220
1240 INPUT "New Level? "; Level
1250 IF Level<0 OR Level>3 OR Le
vel<>INT Level THEN GO TO 1240
1260 GO TO 90
1500 INPUT INKEY$: PRINT #0; FLA
SH 1: " Another Game? (y/n)
"
1510 IF INKEY$("<>") THEN GO TO 15
10
1520 IF INKEY$="y" OR INKEY$="Y"
THEN LET Score=0: LET z=1: GO T
O 100
1530 IF INKEY$("<>") AND INKEY$("<
>") THEN GO TO 1520
1540 LET a$="OK": LET w=16: LET
t=20
1550 CLS
1560 LET x=0: LET y=0: REM TEMPS
\LARGE
1570 LET a=21: LET b=31: REM GET
x,y,a,b,a$
1580 FOR a=0 TO 21: LET b=a*.687
5
1590 REM PUT a,b,a$
1600 PAUSE 5: NEXT a
1610 LET a=INT (RAND*8): PAPER a:
BORDER a: CLS: BEEP 1,-10
1620 GO TO 1610
2000 LET a$=INKEY$: IF a$="" THE
N RETURN
2010 IF a$="6" THEN LET y=y+1+(L
evel<2): LET Score=Score-2
2020 IF a$="7" THEN LET y=y-1-(L
evel<2): LET Score=Score-10

```

```

2025 PRINT AT 0,26;Score;" "
2030 IF y<20 THEN LET y=20
2032 IF y>168 THEN LET y=168
2035 REM MOVE Plane,COLUMN Plane
,y
2040 IF a$("<>") THEN RETURN
2050 REM USE Bomb,z
2060 LET z=z+1: IF z=4 THEN LET
z=1
2070 REM LET a=LINE Plane\LET b=
COLUMN Plane\LET c=LINE Bomb
2075 IF c<>175 THEN RETURN
2080 LET a=a+10: LET c=(INT ((c+
4)/8))-32*(c>250): REM MOVE Bomb
,b,a
2090 RETURN
3000 FOR a=2 TO 31: LET b=INT (R
ND*10)+1: IF RND>.8 THEN GO TO 3
040
3010 LET d=INT (RAND*5): FOR c=21
TO 21-b STEP -1
3020 PRINT AT c,a: INK d: BRIGHT
RND,"": BEEP .005,c+25: NEXT c
3030 PRINT AT c,a: INK d;"a"
3040 NEXT a: RETURN
4000 REM LMTPARAM
4010 IF h$="plane" THEN GO TO 50
00
4015 IF h$="enemy" THEN GO TO 45
00
4020 LET o=175: REM LET p=CURREN
T h$;USE h$,h\MOVE h$,COLUMN h$,
\ENABLE h$;USE h$,p
4030 CONTINUE
4500 REM LET o=LINE enemy
4510 LET o=o+1+INT (RAND*6): IF
o>150 THEN LET o=150
4520 IF o<20 THEN LET o=20
4530 LET p=255: REM MOVE enemy,p
,\ENABLE enemy
4540 CONTINUE
5000 REM LET y=LINE Plane
5010 LET p=0: LET y=y+4: IF y>=1
68 THEN GO TO 5500
5020 REM MOVE Plane,p,y:ENABLE P
lane
5030 LET Score=Score-1: PRINT AT
0,26;Score;" "
5040 BEEP .005,60: CONTINUE
5500 LET a=175: LET b=0: REM MO
VE Plane,b,a:ENABLE Plane
5510 REM MOVE Enemy,b,a:ENABLE E
nemy
5520 REM ALL Bomb\MOVE Bomb,b,a\
ENABLE Bomb
5530 POKE 23681,0: CLS
5540 LET a$="YOU HAVE LANDED"
5550 LET w=2: LET t=1: LET x=0:
LET y=0
5560 PRINT INK 2: REM LARGE
5570 LET Score=Score+200
5580 GO TO 1090
6000 REM INTPARAM
6010 IF h$="bomb" OR i$="bomb" T
HEN GO TO 7000
6020 IF h$="plane" OR i$="plane"
THEN POKE 23681,0: GO TO 1000
6030 LET p=255: LET o=50: REM MO
VE enemy,p,\ENABLE enemy
6040 CONTINUE
7000 IF h$="enemy" OR i$="enemy"
THEN GO TO 7500
7010 IF i$="bomb" THEN LET h=i
7015 LET o=175: REM LET p=CURREN
T Bomb;USE Bomb,h\LET q=LINE Bom
b\LET r=COLUMN Bomb\MOVE Bomb,CO
LUMN Bomb,\ENABLE Bomb;USE Bomb
,p
7020 LET q=INT (q/8): LET r=INT
(r/8): IF r>31 THEN LET r=31
7025 IF q>21 THEN LET q=21
7030 LET p=q+INT (RAND*5)+1: IF p
>21 THEN LET p=21
7035 FOR o=q TO 10 STEP -1: PRIN
T AT o,r-1+(r=0): " ";AT o,r+1-
(r=31): " "; BEEP .01,o+
30: NEXT o
7040 FOR o=q TO p: PRINT AT o,r-
1+(r=0): " ";AT o,r: " ";AT o,r+1-
(r=31): " "; BEEP .01,o+30: NEXT
o
7070 LET Score=Score+8-(Level<2)
: PRINT AT 0,26;Score;" "
7080 CONTINUE
7500 LET o=50: REM MOVE Enemy,CO
LUMN Enemy,\ENABLE Enemy
7510 IF h$="bomb" THEN LET i=h
7520 REM LET p=CURRENT Bomb;USE
Bomb,i\MOVE Bomb,COLUMN Bomb,\E
NABLE Bomb;USE Bomb,p
7530 CONTINUE
8000 LET a$="BOMBER": LET x=8
8010 LET y=0: LET t=2: LET w=5
8020 PRINT PAPER 5; BRIGHT 1;"

```

```

3030 REM LARGE
3040 PLOT 0,160: DRAW 255,0
3050 LET a$=" A Game Using"
3060 LET x=0: LET y=25
3070 LET t=1: LET w=2
3080 REM TEMPS\LARGE
3090 PLOT 0,0: DRAW 255,0
3100 DRAW 0,175: DRAW -255,0
3110 DRAW 0,-175: LET t=3
3120 LET w=6: LET x=0
3130 LET y=35: LET a$="FIFTH"
3140 PRINT INK 2: REM LARGE
3150 LET t=2: LET w=1
3160 LET x=55: LET y=65
3170 LET a$="By RICHARD TAYLOR"
3180 PRINT INK 1: REM LARGE
3190 PRINT AT 12,5;"Key 6 to mov
e down"
3200 PRINT AT 14,5;"Key 7 to mov
e up"
3210 PRINT AT 16,5;"Key 0 to dro
p a bomb"
3220 PRINT AT 18,3;" You must c
lear a path to";AT 19,3;"land on
"
3230 LET a=3: REM OBJECT Bomb,a
3240 LET a=1: REM OBJECT Plane,a
3250 REM OBJECT Enemy,a
3260 REM PRINT Bomb,a
3270 REM PRINT Plane,a:PRINT Ene
my,a
3280 LET a=1: LET d=2: LET b=3:
LET c=6
3290 REM SPEED Bomb,b,c
3300 REM SPEED Plane,a,a
3310 REM SPEED Enemy,d,a
3320 PRINT INK 2: REM COLOUR Bo
mb
3330 PRINT INK 1: REM COLOUR En
emy
3340 LET a=7: REM VECTOR Bomb,a
3350 LET a=4: REM VECTOR Plane,a
3360 LET a=12: REM VECTOR Enemy,
a
3370 FOR c=3 TO 13 STEP 10
3380 FOR a=0 TO 500 STEP 10
3390 LET b=5: LET d=80
3400 REM SOUND b,c,d,a
3410 NEXT a: NEXT c
3420 PAUSE 100
3430 BEEP .2,-12: BEEP .2,-10: B
EEP .2,-8: BEEP .2,-12: BEEP .2
,-12: BEEP .2,10: BEEP .2,-8: B
EEP .2,-8: BEEP .2,-5: BEEP .2,-
8: BEEP .2,-8: BEEP .2,-7: BEEP
.2,-5: BEEP .3,-5
3440 PAUSE 30,-5
3450 FOR a=0 TO 7: PAPER a
3460 INK a: PRINT PAPER a-1+a*(a
=0): INK a: REM REPLACE
3470 LET b=40: LET c=5: LET d=0:
LET e=90+a
3480 REM SOUND b,c,d,e
3490 NEXT a: PAPER 7: INK 0
3500 LET a$=" Press any key to
continue
"
3510 PRINT #0;AT 1,0; BRIGHT 1;a
$
3520 PAUSE 5: LET a$=a$(2 TO )+a
$(1)
3530 IF INKEY$="" THEN GO TO 351
0
3540 CLS
3550 PRINT AT 17,0; FLASH 1; BRI
GHT 1;"SELECT LEVEL:"
3560 PRINT "0 - Easy"
3570 PRINT "1 - Medium"
3580 PRINT "2 - Hard"
3590 PRINT "3 - Very Hard"
3600 INPUT "Please Select: ";Leve
l
3610 IF Level<0 OR Level>3 OR Le
vel<>INT Level THEN GO TO 3600
3615 REM ERASE Plane
3620 RETURN
9000 RESTORE
9010 FOR a=USR "a" TO USR "a"+47
9020 READ b: POKE a,b: NEXT a
9030 RETURN
9040 DATA 0,0,0,0,56,124,124,56
9050 DATA 255,153,153,255,255,15
3,153,255
9060 DATA 24,60,126,255,255,153,
153,255
9070 DATA 0,152,145,159,223,153,
153,255
9080 DATA 0,0,249,35,255,255,16,
0
9090 DATA 0,0,159,196,255,255,4,
0
9500 SAVE "Bomber" LINE 9990: SA
VE "Data" CODE 61030,4335
9990 CLEAR 61029: LOAD ""CODE
9999 RUN

```

Just an example of the power of FIFTH CRL, CRL House, 9 Kings Yard, Carpenters Rd, London E15 2HD



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FRUSTRATED SINCLAIR OWNER

I was very interested to read in your magazine about the new Japanese MSX series of computers — it sounds as if they will provide just the type of machine I will need when I get rid of all my Sinclair bits and pieces and breathe a sigh of relief.

Don't misunderstand me — I am firmly committed to the idea of a strong, healthy British electronics industry, have a very high opinion of Sinclair achievements in breaking price barriers and bringing computers within the budget of ordinary mortals like myself, and would 'bend over backwards' to buy British, whenever I had the choice. I even have a perverse liking for Sinclair hardware when I am using it.

And there lies the nub of the problem — when I spend several hundred pounds on equipment I expect that it should be available to be used for a fair proportion of the time after I have paid for it. This of course entails prompt efficient servicing, reasonable periods of time between buying new accessories and having delivery and, when problems arise, as they invariably must, some form of explanation in the form of a card or phone call.

Alas my experience over the past few years has proved that this firm gets worse in its customer service, not better — I will not bore you with details as the catalogue is far too long, but try for an example a 12 month wait for a ZX-81 kit last year.

Now with the latest batch of problems my patience has finally given out. I cannot take any more from this infuriating company, and don't really see why I should any more.

Any offers for a 48K Spectrum — when I get it back, a Micro-drive, Interface and tapes — when the outer Mongolian Post Office finally releases them, a ZX-81 with RAM pack, ZX printer, etc?

Anthony E Briggs, Buxton, Derbyshire.



some readers. It should read:
10030 DATA #A2, #00, #BD, #C8,
#AF, #9D, #F0, #AF, #E8, #E0,
#F, #D0, #F5

Alternatively I am willing to supply the game on tape for £2 including post and packing. This should be sent to: Graham Bailey, 77 Gilbert Road, Frimley Park, Camberley, Surrey GU15 2RD.

QL OR NOT QL

Congratulations to Mr Sinclair for his new QL but, and here comes the problem, where does QL leave us Spectrum owners? I am one of those thousands who has been Sinclairised. I started with a ZX-80 which was a bargain at that time but soon afterwards, I had to purchase his ZX-81 which was a great improvement but, and it seems when you mention Sir Clive the buts keep popping up, the keyboard was a piece of dead flesh, and no HRG, and no colour and sound. But it seems it was worth it, at least the money not the wait, and at that time the ZX-81 was a revolution.

I used to imagine that Sir Clive would be a nice gentleman and give us some extras, changing the ZX-81 into a nice piece of hardware like the Spectrum. But instead he launched a new machine — the Spectrum. It had everything in it, colour, HRG, sound, better keyboard and a fantastic bargain price. So I said to myself I might as well purchase a Spectrum because I am sure that Sinclair will be drawing a full stop here, and will only be using his energy to expand our Spectrum into a dream machine.

But I, like thousands of others, am still waiting for a Sinclair typewriter quality keyboard and a sound chip which would give us sound, not a beep. At least he was kind enough to issue a Joystick Interface which arrived, as usual, late. I have around 30 programs, all commercial, bought at an average price of £5 each which makes them worth more than the Spectrum, but they are not compatible

with Interface 2.

I would like to send only the one message to Mr Sinclair. I hope you do not expect me to purchase your QL so I could have a decent machine, unless you are kind enough to exchange my ZX-80, ZX-81 and Spectrum for your QL.

*Joe Cilia,
Sliema,
Malta.*

MEMOTECH MEMO

With reference to my article Memotech Memory — page 99, March issue — I would like to draw your attention to the following printing errors in the main program:
Lines 40 & 50 — CHARS should read as CHRS
Line 130 — the symbol is a > sign

I would also like to point out that the programs will also operate on a MTX-512 if all addresses marked #8000 (32768 dec.) are altered to #4000 (16384 dec.) to allow for the extra RAM in the 64K version.

*David J. Miles,
Looe, Cornwall,
Suffolk.*

LANGUAGE SCOPE

I am writing in a very agitated state on the subject of Scope computer graphics language. The review in your April 1984 magazine which encompassed Scope was both unfair and misleading.

Scope is a language, not a "games designer" or a "compiler" and as such should not be likened to them. Scope has one very big advantage over the currently available compilers for the 48K Spectrum, speed! It does, in both its present and soon to be released improved states, run a good deal faster than currently available compilers, and the new Scope which is soon to be available has the added advantage of producing independently running programs, which means that Scope will not be required in RAM to run a program written using Scope.

TOOLKIT SAVE

My program published in the April edition of *Your Computer* contains an error which will stop the program working on the 16K Spectrum. The Toolkit program published on page 151 is listed correctly but the method of saving it on the 16K Spectrum is wrong. To save the program on the 16K Spectrum type:
SAVE "TOOLKIT";SAVE "BYTES"
CODE 31276.1330

You should also note that after using any of the routines the computer may give a Nonsense in Basic error. Ignore it as it is just one of the idiosyncrasies of the program.

*Jason Charlesworth,
Kings Lynn,
Norfolk.*

PROGAID AID

Olivera's excellent program Progaid published in the March issue of *Your Computer* contains an error in the printed code which prevents the "UnRem" section from working. If the byte at address 16759, FF, which disassembles as RST 0038 is replaced with EB which disassembles as EX DE, HL the program will run correctly. The full line of code starting at address 16754 should read:

16754: AFED5228ECEBE523 = 1269

A faulty program already on tape can be corrected by loading it using the routine Fast, Rand USR 836, which will load and stop the program

before it moves above RAMtop, entering Poke 16759, 235 and re-saving the program before testing.

*M. Bernstein,
Derby.*

TRUE TOP 20?

I read with some cynicism the letter from Nigel Sutton — April 1984 — concerning the compiling of a list of the top 20 games for a number of home micros.

The accuracy of this survey rests on the assumption that the many lists received will each be a representation of the personal choice of the sender. Towards the end of the letter however Mr Sutton suggests that a prize may be given to the person whose individual top 20 is most similar to that published.

How many people, I wonder, will treat this "survey" as a competition? It would not be difficult for a dedicated games player to construct the most probable top 20 games for his/her micro — easier than the pools I would imagine! Is this really a sound basis for a statistical survey? Could Mr Sutton be the herald of the Top of the Pops mentality of the computer world, and the dawning of a software underground? Roll on Micro-punk revolution!

*Marcus Groan,
Bristol.*

GOING KRAZY

Line number 10030 in my game Krazy Ape, seems to be confusing

RECONFIGURING YOUR VIC-20

In several occasions I have seen writers in your magazine suggest that it is possible to reconfigure a Vic-20 with 8K or more extra memory to 3K extra for the purpose of entering in machine code programs that would themselves run in an unexpanded machine. However as the 3K RAM area runs from 1024 to 4096 and 8K or more RAM runs from 8192 onwards this can not be done.

Reconfigurations of the type:
POKE641,0:POKE642,4:POKE643,0:POKE644,30:POKE648,30:
SYS64824

will result in only 3.5K of memory available although the computer will report 6.5K. The computer doesn't know that the memory chips aren't there but you can prove that this is false by trying the above reconfiguration, Poking some numbers into locations between 1024 and 4096 and then try to retrieve them.

However this difficulty is easily overcome by using the following reconfiguration:

POKE648,30:POKE642,32:POKE641,0:SYS64824

This puts the screen into the unexpanded position and Basic onto the other side of it, ie screen runs from 7680 to 8191 and Basic starts at 8192. This leaves the whole of the unexpanded memory area free and safe from Basic.

Some plus 3K games can be run this way but make sure to delete any reconfiguring pokes before running.

M.J. Curtis, Stalbridge, Dorset.

As a co-author of this new Scope, and being involved in programming with the old Scope, I feel very upset at the abuse which is being dealt to Scope by reviewers who have not used it, and are therefore not qualified to comment upon it!

By the way, please stop insulting Fifth as well which, though it is produced by a rival company, is again a very good utility which is being unfairly reviewed also.

Matthew Probert,
Haslemere,
Surrey.

• I am at a loss to understand why Mr Probert is so het up. Anyone who turns to the article in question will see that I wrote quite favourably of Scope. I was indeed impressed with Scope's speed and said as much in the review. Far from likening it to a games designer I explicitly contrasted it with the games designers reviewed earlier in the piece.

As for Fifth I rated it very highly. In fact I suggested that it was just as effective as Scope but easier to use.

INPUT ITEM

According to your problem Input Items — February — Response Frame — I must give a little correction. It is quite simple to enter Input items at different screen locations. Just try the following example:

```
10 INPUT AT 22,0: AT1,10: "ENTER  
A NUMBER";a
```

This will produce an Input item at the top of the screen.

Hubert Surrer,
Goethestr. 15,
Germany.

CORRECTIONS

There was an error in the text accompanying Mark Jones' Multi-Programming facility in the April issue. To change the program you are currently handling you should press Symbol Shift and Space and not Cap Shift as given.

The last line of the machine code dump in April's ZX-81 game, Laser Duel, should not be entered unless you have created a Rem statement larger than 1100 characters. When you have entered the line starting at address 17604 input the Stop statement to bring the loader program to a halt.

Anyone still having trouble with February's Interceptor game for the Dragon could try inserting the following line:

```
476 POKE&H6EC,12:  
POKE&H6E2,12:  
POKE&H6EC3,12
```

This removes the code which speeds up the processor.

We have been asked by Mine of Information Ltd., to point out that they are the proprietors of the registered trademark "Othello" in respect of printed matter relating to computer programs.

ONCE YOU HAD FINISHED building your Scruppi or Kim 1 back in the pioneering days of 1978, you could experience the joy of pounding machine code in through their full hexadecimal keypads. It was rather like buying a car in kit form, assembling it and then being expected to refine its fuel as well.

By last year we were a little luckier. Home computers were more or less complete. Of course a cassette player had to be snatched away from junior and the household television switched over from Crossroads to channel 36.

The motoring equivalent of this would be having to supply your own seats for the family's new limousine. Up and down the country three-piece suites would be dividing their time between living-rooms and garages.

1984 is the year of the system. In January we published the first review of the Coleco Adam. Its package of computer, printer, high-speed tape storage and built-in word processor goes some way towards the concept of a complete system that the public seems to want.

In that same month Sinclair revealed the QL. Again, although no printer, mass storage and bundled software are two of its main selling points.

Now Amstrad's CPC-464 has arrived with its monitor and built-in cassette player for £200. Even Commodore is building software into its new 264.

Each of these machines falls short of the ideal of total computing in one way or another. The Amstrad is supplied without software, the QL has no printer, the Adam no monitor, and so on. However, all these micros do underline the trend towards the complete home computer system.

Of course some of the latest arrivals on the home-computing scene seem to go against this tide. For

example, whatever the merits of the £200 Electron's excellent BBC Basic, you would have to spend a good deal of money on Acorn's computer to bring it up to the Amstrad specification.

The results of our Design a Micro competition published in last month's edition showed that what many of you want is a system that can be set up and run immediately, that is packaged up with its main peripherals and which will not lead to family squabbles over the use of the television.

This wonder-machine would cost less than £500, and offer discs, printer, screen, Modem and software — word processor, a filing system and graphics package — as standard.

But this idea of a complete system is nothing new. It has always been the norm in the business market and has been tried before without success in home computing. Sharp's 1981 MZ-80K had a built-in screen and tape recorder but failed to make its mark because of a shortage of commercial software.

Manufacturers of business computers are going out of their way to make their machines more accessible to a wider audience with the use of touch screens, icons and mice. The move towards more complete systems may be home computing's equivalent of this but it is still overlooking the obvious. Very little has been done to make programming easier.

Resident program-writing programs could be the answer although they might not be in the manufacturers' best interests: people might spend more time writing their own games rather than buying them. But as things stand at the moment, you are still expected to be a fully-qualified mechanic as well as the driver.

How to write for Your Computer

We called this magazine *Your Computer* precisely because we welcome your views, tips and hints and even your criticism of machines and software in general. If you would like to see your name in print, whether on a Software File program or a full-blooded article, here is how to go about it. Ideally, all articles should be typed double-spaced on one side only of uniform sheets of paper. If listings can be dumped directly from a printer — you can always use a friend's or user group's — this minimises the risk of error. In a perfect world a cassette would accompany the article. That considerably speeds up the checking process. Not only do you get to air your own discoveries and opinions, but we will even pay you for the privilege. We pay £35 per published page — that's as it appears in the magazine and includes illustrations.

Why not give it a try? You have nothing to lose but your postage.

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YOUR COMPUTER TOP 20

Game	Machine	Company
■ Asteroids	ZX-81	Quicksilva
■ Atic Atac	Spectrum	Ultimate
■ Chequered Flag	Spectrum	Psion
■ Chuckie Egg	Dragon	A&F
■ Colony 7	Atari	System 3
■ Crazy Kong	Vic 20	Intercept- or Micro
■ Eight ball	Dragon	Microdeal
■ Flight 015	Vic 20	Ferranti/ Davenport
■ Fortress	BBC	Pace
■ Hunchback	CBM 64	Ocean
■ Hunchback	Spectrum	Ocean
■ Jet Set Willy	Spectrum	Software Projects
■ Lunar Rover Patrol	Dragon	Dragon
■ Manic Miner	CBM 64	Software Projects
■ Revenge of the Mutant Camels	CBM 64	Software Projects
■ Scramble	ZX81	Quicksilva
■ Scubal Dive	Oric	Purnell
■ 3D Art Attack	Spectrum	Quicksilva
■ Twin Kingdom Valley	BBC	Bugbyte
■ Zaxxon	Atari	Centresoft

Video nasties Bill includes computer games for first time

1.—(1) The provisions of this section shall have effect for the Interpretation of terms used in this Act.

(2) "Video work" means any series of visual images (with or without sound)—

10 (a) produced electronically by the use of information contained on any disc or magnetic tape, and
(b) shown as a moving picture.

(3) "Video recording" means any disc or magnetic tape containing information by the use of which the whole or a part 15 of a video work may be produced.

(4) "Supply" means supply in any manner, whether or not for reward, and, therefore, includes supply by way of sale, letting on hire, exchange or loan; and references to a supply are to be interpreted accordingly.

PRESSURE GROUPS are keeping a close watch on computer games in case they become the next video nasties.

Already Mary Whitehouse's National Viewers and listeners Association has had complaints.

NVLA spokesman John Beyer says "we are getting letters from anxious parents". A Buckingham vicar is circulating warnings to schools about the damage violent computer games might do. Yet M.P. John Bright's video nasty Bill currently going through Parliament specifically mentions video games.

Austin Rover Montego talks even more than a Maestro

ONE YEAR ON from the launch of the Maestro, Britain's first talking car, Austin Rover releases the Montego at the end of April. The Montego is a Maestro with a boot and a bigger vocabulary. Rather than just warning of low oil pressure, like the Maestro,

the Montego tells you to pull into the side of the road and have the oil checked. The Motorola 6805-based system built into the dashboard (also has a liquid Crystal Display to spellout simple warning messages in case you are wearing a Walkman.

Software houses have reacted in different ways to the pressure. Artic, whose Ship of Doom has been attacked as a computer nasty denies the charge. Artic says the program is "neither obscene, nasty, grisly, sick or corrupting" although admitting that certain bits of the text "could give rise to offence."

Brian Bandy of Allrian which has sold thousands of Strip Poker games on disc for the Artic says "its such a difficult question when you think about morality and computer games." Now Allrian is producing Commodore 64 Strip Poker which allows you to "experience the heady delights of Suzi or Mellisa in a game of thrills, skills and excitement." Brian Bandy describes it as an "adult" game but admits "there is no way you can say to dealers you must not sell it to people under 18."

At £17 for a pair these Strike Control joysticks for the Dragon and BBC are some of the cheapest around. Contact Consumer Electronics on 061-682 2339 for more information.

Take your privacy case to the House of Lords — Cliff will pay

CLIFF STURT is not selling licences to kill pirates — yet — but he is offering to pay 95 per cent of your costs if you want to drag them through every

court in the land.

As always, there are a few catches. First you need to find £75.75 to register your program with newly

RD Laboratories Tracer for the Spectrum has already sold by the thousand. Now the Tracer, which allows you to trace out shapes or maps from a piece of paper straight onto screen is available for the BBC micro for £70 including software. RD Labs is on (0633) 74333.



formed Software Registry. Along with the crispy fivers you must produce a program listing on paper and sign a guarantee that it is your own copyright and not pirated from elsewhere.

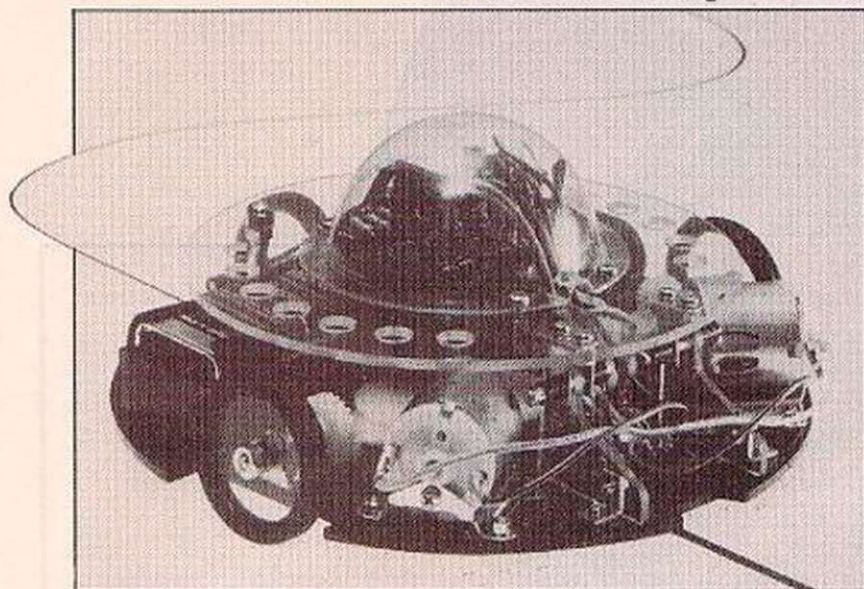
This will be held for five years at a secure location not far from the law courts in London. Now you can approach a software house offering that program which you are sure is going to make your fortune, safe in the knowledge that you have independent evidence of when you wrote the program — so they can't turn round and say it was there all along.

For the first year the Software Registry will pay most of your costs if you decide to take someone to court for stealing your program — even if it goes all the way to the House of Lords with dodderly old men in wigs trying to work out what Henry VIII's lawyers would have thought about Space Invaders.

Cliff would have preferred the government to register all programs rather like the American system "but in the absence of the Government doing it we're going to do it instead".



Prism's robot monkey business will make for cheaper turtles

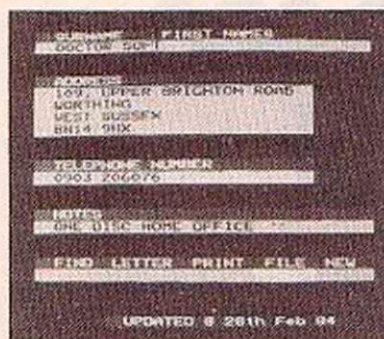


Mid-range Rabbit and Tatung top end micro from East

TWO NEW home micros from the Far East hit Britain this month. One is the £500 Tatung home computer and the other is the £250 Rabbit from Hong Kong. The Rabbit is an 80K Z-80 based micro. It uses the

standard Texas graphics chip to give 16 colours, 256 by 192 resolution and 32 sprites. With an adaptor it will take Coleco vision games cartridges.

Single disc home office on BBC Micro



FILM-MAKER Peter Armstrong wanted a word processor, address data base and spreadsheet all on one disc for his BBC micro. In the end he decided to write his own which has now been released under the name One Disc Home Office who are on (0903) 206076 by Doctor Soft. The company does not pretend that the software is as powerful as individual word processors and spreadsheets on disc but the whole package costs £20.

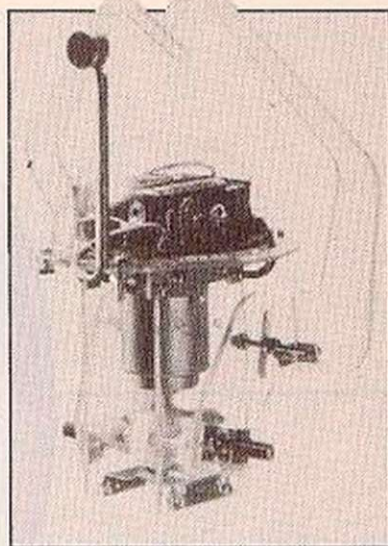
Just because this screen shot from a Sinclair shows a 64-column display don't be fooled into thinking it might be a QL. This is Hi-T, a shorty machine code program which costs £6 from Timedata, running on a Spectrum. Hi-T allows you to display up to 32 lines of 64 characters instead of 24 lines of 32 characters as well as giving you the ability to create windows. Timedata is on (0268) 418121.

DATE	SALES	EXPENSES	PROFIT
February	1000.00	1050.00	112.50
March	800.00	637.50	162.50
April	1100.00	712.50	387.50
May	1150.00	750.00	400.00
June	1210.00	780.00	430.00
July	1270.00	810.00	460.00
August	1330.00	840.00	490.00
September	1400.00	870.00	530.00
October	1470.00	900.00	570.00
November	1540.00	930.00	610.00
December	1610.00	960.00	650.00
TOTAL	13780.00	10000.00	3780.00

CLAP YOUR HANDS and the Movit Monkey will scamper along the line it hangs from. Whistle, and the Movit Piper Mouse will whizz across the floor.

Movits are simple, cheap do-it-yourself robots from Prism which range from the £10 Monkey which only accepts two commands — Go and Stop — to the radio-controlled Circular and the programmable Memoconn Crawler which will execute a series of 250 steps — left, right and forward — while flashing its light and beeping to itself.

Prism is working on an interface so that the £35 Crawler which at present is controlled by a hand-held keypad can be operated from a micro, rather like a BBC Buggy or a turtle. Spectrum, Commodore and BBC versions are planned.



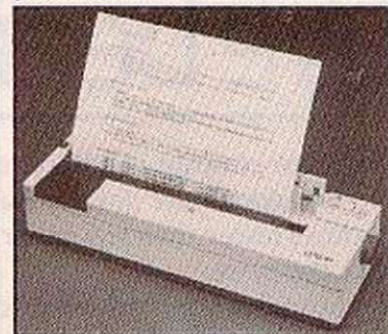
So far Stuart Barnard, Prism's robotics chief has found that adults find it difficult to put the Movit construction kits — which require no soldering — together. But the teenagers and children who the products are aimed at have had no problems.

Mastertronic games: price war returns

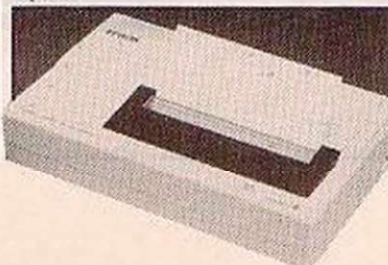
AT LAST the price war seems to be bringing down software prices. Mastertronic, on 01-486 3478, is charging £2 a time for its games cassettes which will be available from computer games stores initially. The programs — which are mainly variants of the old favourites Pac-Man, Duckshoot and so on are being

described as the equivalent of Music for Pleasure albums. But Imagine which tried to bring its prices down to £4 last month has had to put them back up to £6 after dealers complained about low margins. Can Mastertronic succeed where Imagine has failed?

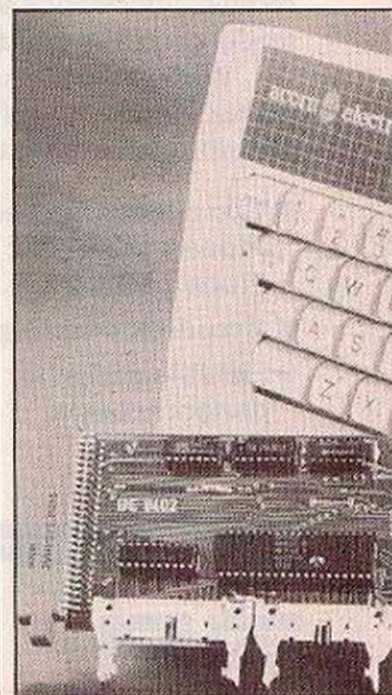
Epson prints portable

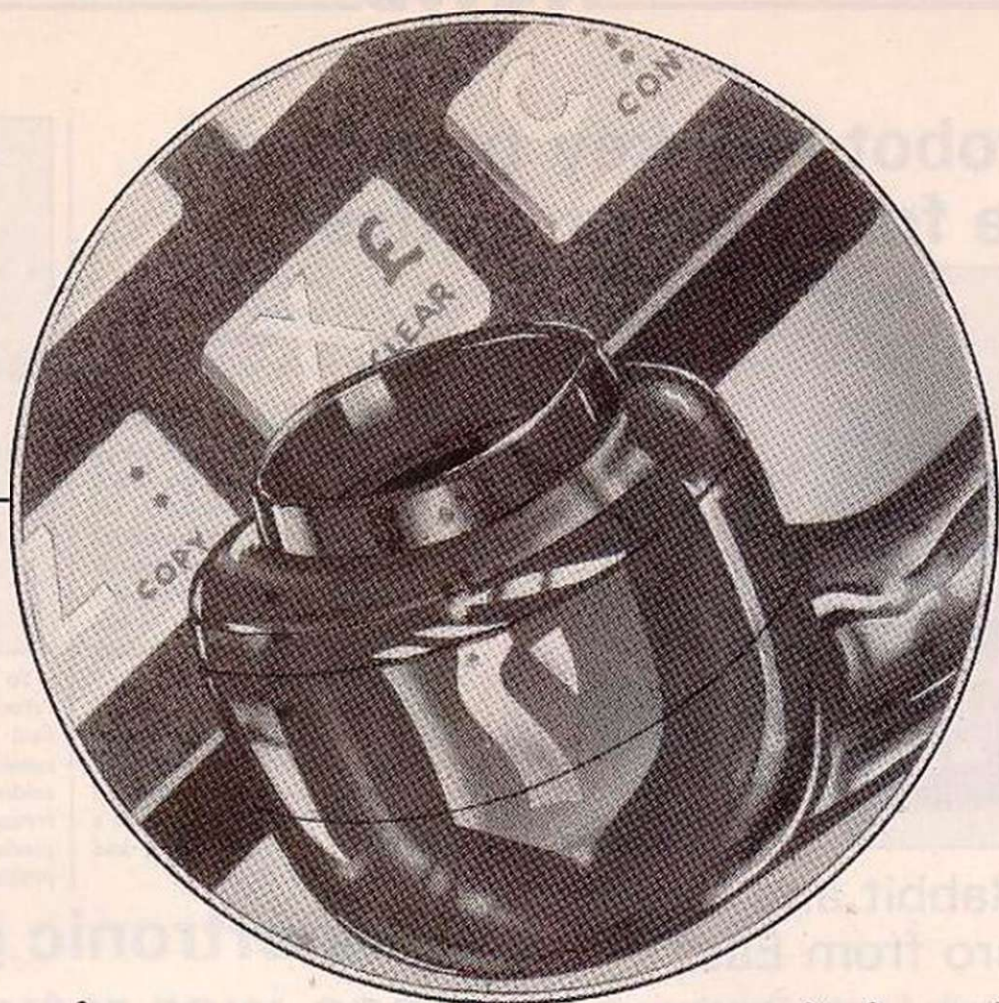


WHILE EPSON prepares for the top secret launch of its new portable computer the company has shown three new printers, including the P-40 portable 40-column thermal printer which can print condensed 80-column for around £100 and a portable 80-column, the £180 P-80 which uses thermal transfer cassettes like the Brother does to print on plain A-4 paper. Third in the list is the JX-80 colour dot matrix which converts to monochrome at the touch of a button — if you have £600 to spare.



Peripheral makers like Broadway Electronics are setting up a whole industry based on the inadequacies of the Electron's interfacing capabilities. This £40 printer and user port from Broadway comes complete with drive software and screen dump routine. Joystick, cartridge and disc drive interfaces are under development. Broadway is on (0234) 58303.





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- *Soft, Sept 83*

"Colossal Adventure is included in Practical Computing's top ten games choice for 1983: 'Poetic, moving and tough as hell.'"

- *PC, Dec 83*

"Colossal Adventure... For once here's a program that lives up to its name... a masterful feat. Thoroughly recommended"

- *Computer Choice, Dec 83*

"Colossal Adventure is one of the best in its class. I would recommend it to any adventurer."

- *Acorn User, Feb 84*

"Adventure Quest... This has always been one of the best adventures for me as it seems to contain the lot. In all it took me about eight months to solve."

- *PCW, 18th Jan 84*

"To sum up, Adventure Quest is a wonderful program, fast, exciting and challenging. If you like adventures then this one is for you"

- *NILUG issue 1.3*

"Colossal Adventure is simply superb... For those who want to move onto another adventure of similar high quality, Dungeon Adventure is recommended. With more than 200 locations, 700 messages and 100 objects it will tease and delight!"

- *Educational Computing, Nov 83*

ADVENTURE REVIEWS

"Colossal Adventure... undoubtedly the best Adventure game around. Level 9 Computing have worked wonders to cram all this into 32K... Finally **Dungeon Adventure**, last but by no means least. This is the best of the lot - a truly massive adventure - you'll have to play it yourselves to believe it."

- *CBM 64 Users Club Newsletter*

"The puzzles are logical and the program is enthralling. **Snowball** is well worth the money which, for a computer program, is a high recommendation."

- *Micro Adventurer, Dec 83*

"**Snowball**... As in all Level 9's adventures, the real pleasure comes not from scoring points but in exploring the world in which the game is set and learning about its denizens... this program goes to prove that the mental pictures conjured up by a good textual adventure can be far more vivid than the graphics available on home computers."

- *Which Micro?, Feb 84*

"**Lords of Time**. This program, written by newcomer Sue Gazzard, joins my favourite series and is an extremely good addition to Level 9's consistently good catalogue... As we have come to expect from Level 9, the program is executed with wonderful style - none of those boring "You can't do that" messages! Highly recommended."

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Betch'a can't play just one . . .

Flying Feathers

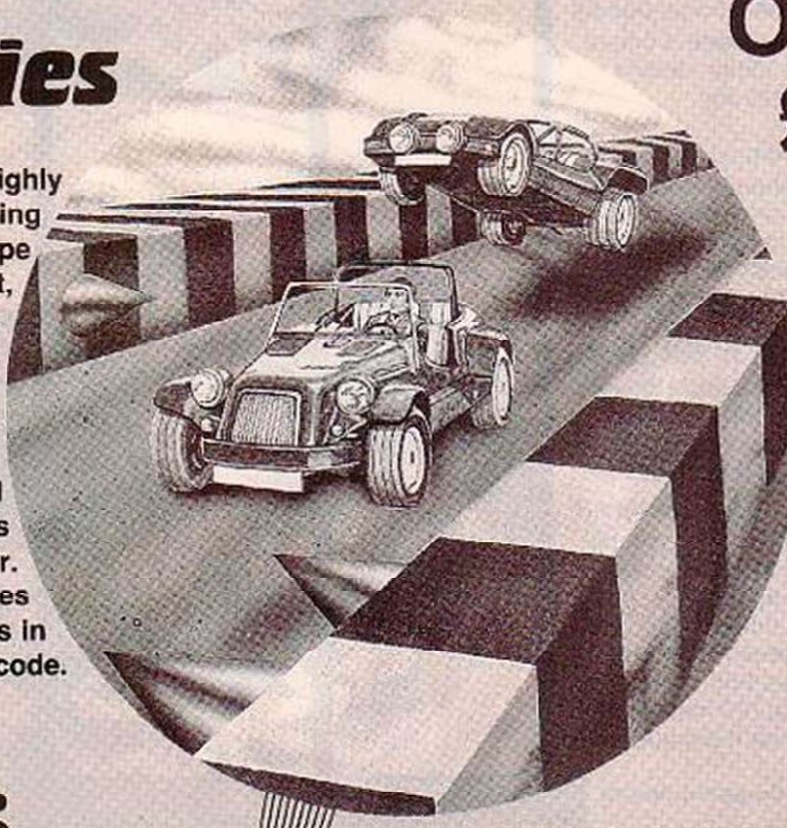
In this highly original game you are the gamekeeper on the lake trying to stop greedy eagles taking all the fish. Two different methods with 4 skill levels each are available for your shot gun. Specially scored music with freeze frame ability, and for the technically minded 10 sprites (yes, that's right, there are only 8 on the 64). High scores kept. All machine code.



NEW

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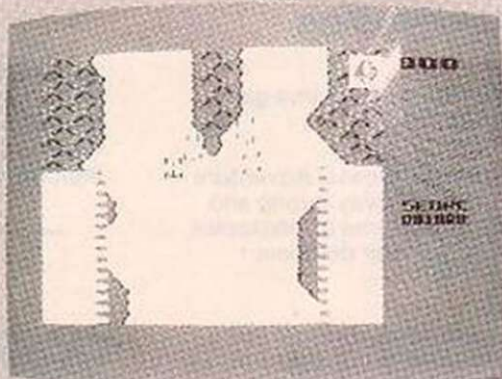
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I could do that...

Seen any interesting bugs lately? If so we would like you to send them in. This month's competition offers £15 to the program with the most subtle and hard to spot bugs. Nothing too obvious please. We are looking for quality not quantity.

The program should be no more than 15 lines long with no multi-statement lines. It should have a single clearly defined task which we would like you to explain in your accompanying letter. To make the job of our competition judge easier you will also need to indicate why the program does not work.

J. Burgess, Greenslates, Bexton Lane, Knutsford, Cheshire, is the winner of March's competition. His program runs on a Spectrum and prints a message around the circumference.

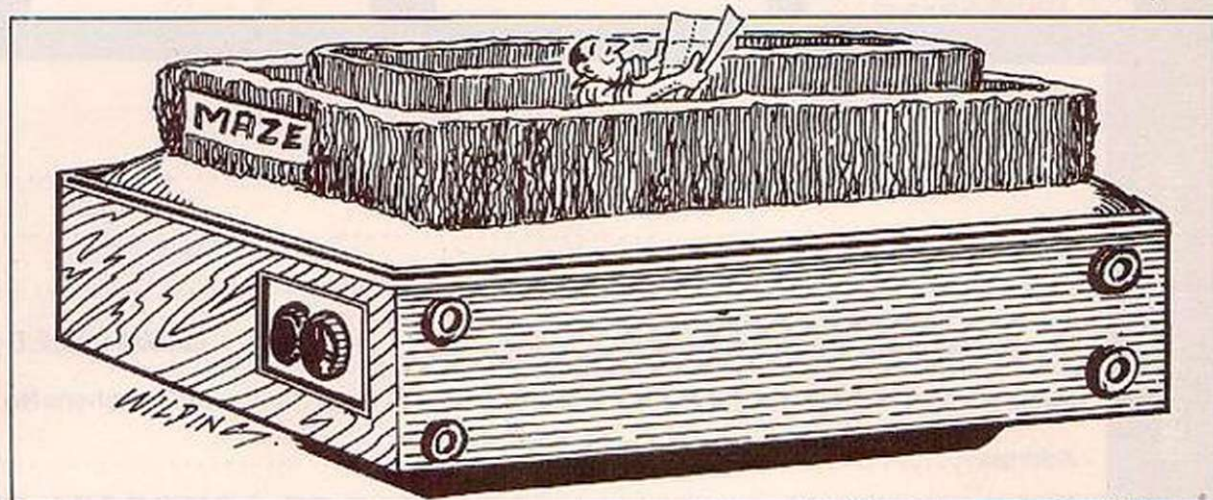
```
10 INPUT M#
15 LET R=10
20 FOR V=1 TO 8
30 FOR I=0 TO 2 STEP 2.1/R
40 FOR N=1 TO LEN M#
50 LET A=(I+N/20)*PI
60 LET X=16+R*SIN A
70 LET Y=11-R*COS A
80 PRINT AT Y,X;M#(N)
85 NEXT N:CLS:NEXT I
90 LET R=R-56N SIN (V*0.7)
100 NEXT V:GO TO 15
```

BEGINNERS

First bytes

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

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



Screen memory?

"What does the term 'screen memory' mean?"

THE SCREEN memory is sometimes called the video RAM or the screen map. As the word map suggests it contains a copy of the information on screen. The computer allocates a region of RAM specifically for this purpose and since it is in RAM it is accessible to the user.

By dealing directly with the screen memory — Peeking and Poking to it — you can manipulate graphics and text on screen. This is often quicker than using Print or Plot commands from Basic. And if you wish to write a game in machine code it is generally the only way of handling graphics.

There are various ways of representing the information on screen in memory. This month we will concentrate on the simplest method, the character mapped screen. Each character on screen is represented in

the screen map by its ASCII code. Each takes up one byte so a 40 by 25 screen needs 1000 bytes for its memory map.

When the computer prints to the screen it first notes the code stored in RAM and then consults the character generator in ROM. The character generator — also known as the character font — holds the pattern of dots which make up the characters.

This process takes place many times a second: the hardware repeatedly scans the RAM, consults

(continued on page 51)

Computer add-ons

ONCE YOU HAVE BEEN using computers for a while you start to look round at the bits of hardware that you can use with your machine — i.e. what add-ons are available. Once you have exhausted the list of normal things — disc drives, cassette units, printers, monitors and the like — you notice a whole group of unclassifiables — the more unusual things that can be plugged in to your micro.

Since most micros are used as games machines the most obvious contenders for the unlikely add-on award are unusual games controllers. At the simple end of the scale there are bizarre joysticks. Notable among these is Le Schtick, which has what looks like a normal handle, but has no base against which to move it — i.e. a free handle with a lead coming out of the bottom.

Another odd games controller is the Trickstick for the Spectrum from East London Robotics. This senses

the blood running through your hand, and has six buttons to control the game... rumour has that you either love it or hate it.

Getting more popular by the minute, and more so since the release of the new Atari model, are ball controllers. These are meant to mimic the movement of the hand, and with the right software can be devices that measure both speed and acceleration — depending on how fast the ball is spun. At the moment the quality of these depends a lot on how much you pay. In the future these ball controllers may well be used in keyboards as replacements for the cursor keys, since they enable you to control position simply, quickly and accurately.

This brings us on to mice. A mouse is any device that uses the concept of running along something to indicate movement to a computer. In practical terms it means a ball

(continued on page 51)



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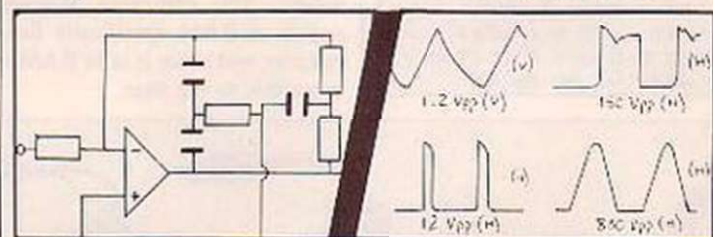
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48 K SPECTRUM

Screen memory?

(continued from page 49)

the character font and refreshes the screen.

In addition to the code for each character the computer also needs to store information about its colour. On the Vic-20 and CBM-64 colour codes are stored in a separate colour memory which mirrors the screen memory, matching up colour codes with character codes byte for byte. In Teletext mode on the BBC colour codes are stored in the screen memory in front of the characters whose colour they determine.

The advantage of having a character mapped screen is that it is economical on memory. The draw-

back is that by confining you to a predefined character set it usually rules out what is generally understood by computer graphics — individual pixel plotting.

Some computers, however, allow you to define your own characters. In effect they enable you to redirect the hardware to a new character font in RAM.

By exploiting this facility you can give a micro with a character mapped screen a limited degree of high-res graphics. The method involves dealing directly with the new character font rather than the screen memory. Each character definition takes up eight bytes to describe the character on an eight by eight grid; by altering these bytes you are effectively plotting or unplotting the pixels within a character space. Your character mapped screen has now

BEGINNERS

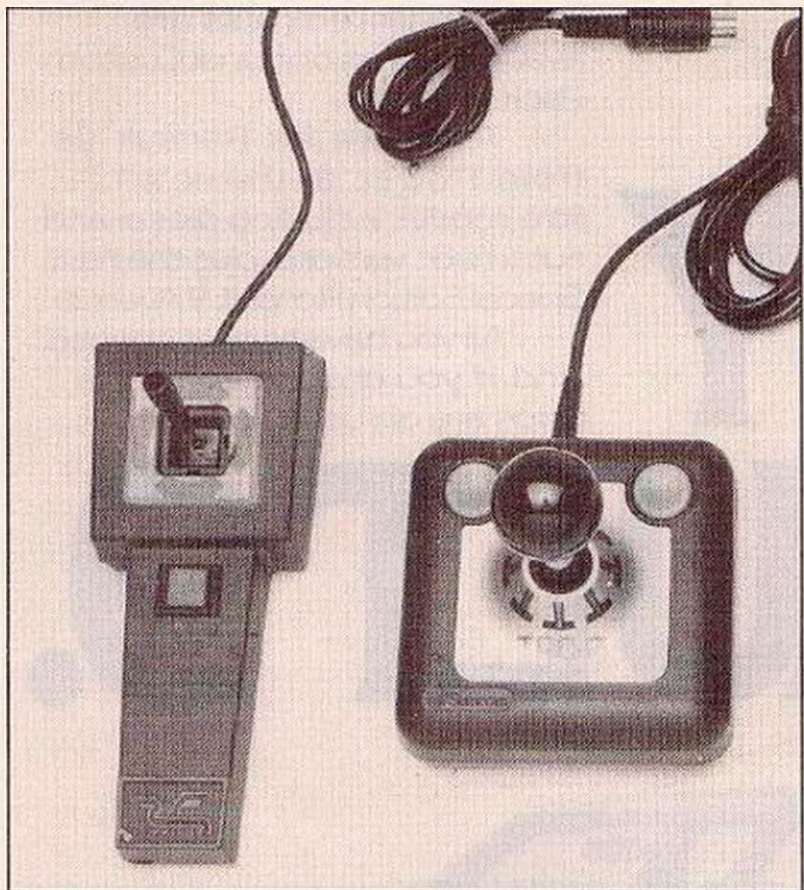
first bytes

become a bit mapped screen in which each pixel is represented by a bit in RAM.

Bit mapped screens will be discussed in next month's First Bytes. If you want to investigate your character mapped screen you must first find out what part of memory it

occupies. Look up the screen memory's start address in the manual and Poke 65 to it.

You should see the letter A in the top left-hand corner. Poking consecutive locations will place letters along the first row. Commodore owners should remember also to Poke colour codes to the corresponding locations in the colour memory map.



Computer add-ons

(continued from page 49)

controller used upside down. Mice are used to indicate position for the main part, but are also used for tracing — maps, diagrams etc. — and as educational aids. Mice are popular with businessmen because they are easy to use.

Mice are much the same as simple robots. The main difference is that robots are usually controlled by the computer, rather than the robot giving the computer information. Robots are currently one of the most expensive add-ons it is possible to buy for your micro, but watch out for them as they will be widely used in the future.

Another odd add-on that is finding its way into more and more micros is speech. For the time being this is mostly reserved to having your computer talk to you, but in the future it seems likely that you will be

able to talk to it. At the moment speech recognition systems are incredibly expensive, but the price is falling fast. Speech synthesisers — the ones that talk to you — are either made to work by having a set of words it knows, or having a set of sounds that can be built up into words. At the moment both types sound more or less like computers in films — with the notable exception of 2,001's HAL, of course — or robots.

Light pens and graphics pads are two more areas where technology has yet to catch up with the potential demand. Both are applications that can be used for fun or for serious artistic work. As the resolution of screens increases there will be more and more graphic art type add-ons on the market. It is much more entertaining to be able to draw on the screen, rather than having to design and plot pictures pixel by pixel.

Animation techniques

"I am writing an arcade-style game in Basic. Can you tell me the best way to animate characters on screen?"

THE PRINCIPLE behind moving objects around the screen is straightforward enough: it is simply a matter of printing a character and then deleting it. But the time taken to do this, in Basic, can be excessive, especially if you want to move more than one character at a time. If your program has other tasks to attend to between printing you run the risk of ending up with a rather sluggish game. So it is important to find the fastest way of animating your characters.

Perhaps the simplest technique is to print a character and then delete it at the same position. Try this one line program, substituting an equivalent function if your version of Basic lacks TAB:

```
10 FOR X=1 TO 20:PRINT  
TAB(X,10);"A":PRINT  
TAB(X,10);" ":NEXT
```

The trouble with this method is that it gives a rather unsatisfactory flickering effect. We can improve on this by printing a character and then deleting it at the previous position. If you substitute X-1 for X in the second Print statement you will notice that the image is steadier.

As it stands this is certainly fast enough and you may want to slow it down by inserting an empty For Next loop after the first statement. But remember that your program will only return to the print routine when it has dealt with its other chores — performing calculations, reading the keyboard, checking for collisions, and so on. The more speed we can find the better.

Clearly one Print statement is faster than two, so a further improvement would be to incorporate the letter A and the delete character — in this case a space — in one string. To do this remove the second Print statement and insert a space before the letter A in the first statement.

What if we now want to move a character up and down or right to

left? The problem here is that computers print from left to right but the character to be deleted is no longer immediately behind. One solution would be to reintroduce a second Print statement. A better method, however, is to incorporate cursor control characters in the string to be printed.

If you look at your computer's character codes you should find four cursor control characters. These have the effect of moving the print position one space in each direction. For example, if 8 and 1 are the codes for the cursor up and cursor left characters then PRINT "A" + CHR\$(11) + CHR\$(8) + "B" will print the letter B above A.

It is easier to assign these characters to a string variable first. This is illustrated in the following program which moves a character from top to bottom:

```
10 DOWNS="A"+CHR$(8)+  
CHR$(11)+"  
20 FOR Y=1 TO 20  
30 PRINT TAB(20,Y);DOWNS  
40 NEXT
```

If you adopt this technique you will need to set up four variables, one for each direction. It is also sometimes a good idea to write four separate subroutines to handle movement. As well as printing the requisite variables these can cope with updating the direction co-ordinates.

Thus every time your program enters the Down subroutine the Y variable will be increased by one. Once again speed is at a premium here and you may find that executing Gosub commands imposes a heavy time penalty in your version of Basic.

There are, of course, several other animation techniques. If your micro has a character mapped screen it may be faster to Poke character codes directly into the screen memory. Either way you have to be content with moving objects a character space at a time. For the smoothest animation you need to move characters a pixel at a time. But to do this you will have to master machine code.

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If you have anything of interest to tell us about your computer club why not contact us on 01-661 3144.

Local news

Gloucester

A congenial evening at 8 Linnet Close, Gloucester. This is the promise of the Midweek Spectrum User Group, Gloucester. The group has its own cassette magazine and is dedicated to the mutually rewarding exchange of ideas. Telephone Barry Ledbury on 0452-23816.

North Staffordshire

Amateur Computer Club of North Staffordshire has now moved to the Frank Jordan Centre, Stone. This informal group of 10-20 persons meets on the first Tuesday of each month. Computers include Nascoms, Video Genies and the more common varieties. Contact Ken Cope on Ash Bank 5244.

Bristol

Format 40/80 BBC Disc User Group offers goodies like a four-disc pack for £5.50. Tapes are out says club organiser Peter Hughes.

For further information about the group, write to 5 Marsh Street, Bristol BS1 4AA.

Stratford

If Shakespeare had been into microcomputer hardware, would he have been a printed circuit bard? However this may be, the Stratford Computer Club meets once monthly at the Wesley Hall from 7 to 9pm. Contact Chris Parry, 16 Sackville Close, Stratford-upon-Avon, Warwickshire. Telephone 0789-68080.

COMPUTER

Paul Bond goes back to school to learn about micros in Northamptonshire and meets Doris and Oscar the paranoid computers.

THE SOMBRE OSTINATO of Black Sabbath's "Paranoid" pulsed from the recreation area of Raunds Manor School as I arrived on a chill Northamptonshire evening to visit the local computer club. The school is very aware of its importance as a community asset — clustered under the huddled evening roofs of this expansive educational establishment you will find people from all walks of life: housewives studying needlework; insurance men dabbling in water-colours; mods, motor-cyclists and, needless to say, computer buffs.

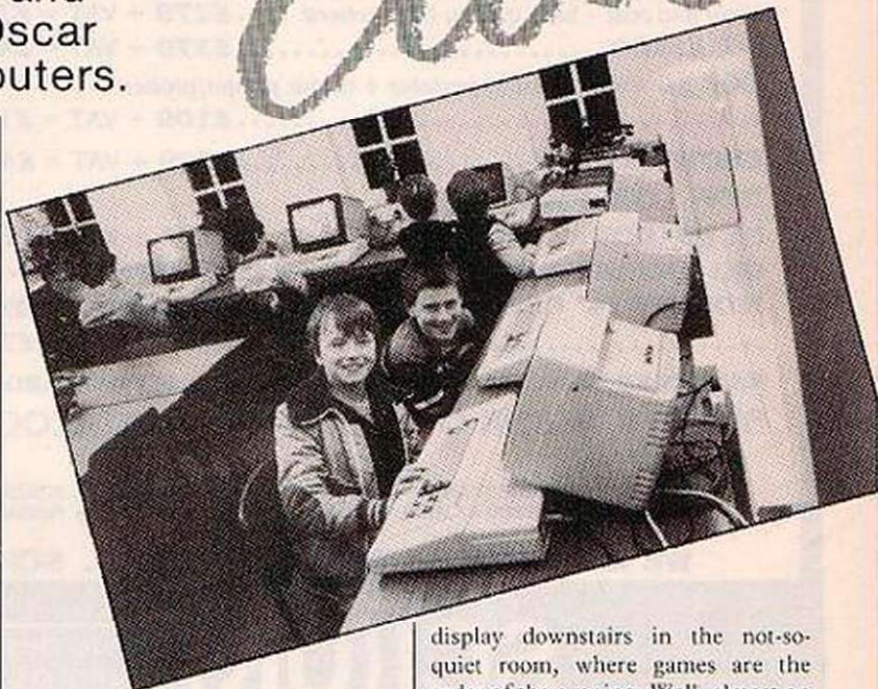
While local predilection for heavy metal might lead one to think that little had changed in the last decade of school life, nevertheless the microprocessor has pulled Raunds Manor School out of the Stone Age.

Bryan Reed — an ex-Plessey man — is Head of Computing at this go-ahead grove of Academe. "We used to be connected to an ICL 2903 mainframe in Northampton," he explained, "but the phone bills proved too expensive."

Careful management of funds seems to have proved beneficial — an upstairs room is cram-full of well over a dozen research machines. The evening sessions, held every Tuesday from 5.30 to 9.30, are split into serious and games sections. Outsiders of all ages and sexes are welcome — you don't have to be a pupil.

The atmosphere upstairs is reminiscent of a starship coming down the curve, gathering momentum for its hyperspace jump, as young members sit purposefully moving their hands across keyboards. Elements of Hitch-hiker's Guide to the Galaxy also creep in as Lee Varga, acting treasurer, prods one of the RMLs into announcing in a Marvinesque voice: "I am a computer." Whether or not it wants to grow up to be a paranoid android, or to have a brain the size of a planet, you could speculate that its musical taste would be well in line with that of the Black Sabbath fans. The program itself was written by Gary Felse, a pupil; the synthesiser hardware and megaphone amplifier are the handiwork of Mr Reed and a colleague.

All the computers and monitors in the "quiet room" rejoice in personal names, lovingly Dymoed on by the Head of Computing one afternoon



"as a form of light relief". Henry, Myrtle, Cedric and Henrietta — to name but a few — are easier to relate to than a batch of serial numbers. "It makes it less hard for the kids to get involved with the machines" explained Mr Reed. But watch out for Doris and Oscar. These two have got some problems.

All the computers are hooked up to a 20 megabyte hard disc system and a Chain network server. As local area networks go it's small — just one room — but plans are afoot to spread this particular LAN all around the school.

Clive Packer, the acting secretary — both secretary and treasurer are pupils — pointed out that since the installation of the LAN, pupils at the school have involvement in computing right from the word go. Formerly it was very much the province of those studying O-level computer science.

"A lot of people are anti-Basic," said Mr Reed, "but I feel it's not fair to anybody if they don't learn some Basic. Some achieve things using one language that they couldn't achieve using another."

Asked about the merits of research machines, Clive Packer opined that in some respects they were not as fast as the BBC Micro which, like the Spectrum and the RML, is recognised by the UK government as a machine which educational establishments can get grants for installing. Under TVEI, the Technical Vocational Educational Initiative, Manor School's Technology Department will be receiving five BBC Micros.

An interesting project was on

display downstairs in the not-so-quiet room, where games are the order of the evening. Well, almost on display. The computer-controlled railway layout had proved very popular since Christmas and was also used by a pupil working on an O-level project. Letting the train take the strain had, however, proved fatal to the little green locomotive, which lay smoking beside the N-gauge track.

When services are running normally, Darlington transistors function as light sensors in the track, just in front of the points. They switch the points just before the train arrives at them. They can be controlled either automatically, by computer program, or manually by using the function keys.

It's not all research machines at Raunds. Grouped under a poster proclaiming "It takes a computer to REALLY foul things up" are three Acorn Atoms, cannibalised, it transpires, from five dud ones sent back to Acorn in those heady pioneer days of home computing. Somebody's dad works for Acorn, so these relics from a bygone era were rescued from the scrap-heap to light off a few more waves of Space Invaders. Contemporaries of the Atom in the shape of rugged Sharp MZ-80As were to be seen glowing greenly in the half-light.

All this will soon change: the area is designated to become a "clean room" for the Technology Department's control projects. You too can wear a white coat, at least if you're a pupil. For more details of the club, which has around 50 members and costs £1.50 per year plus 10p an evening to join, telephone Bryan Reed at Raunds Manor School, on 0933-623921.

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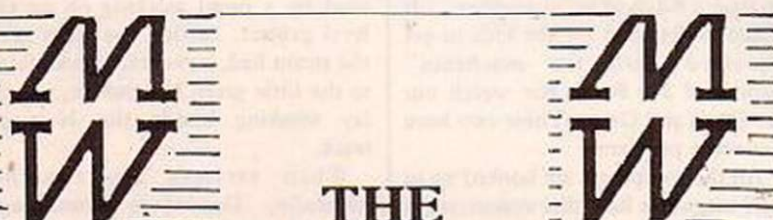
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Star★ chart

City Attak

Commodore CBM-64:
Shoot-'em-up:
£6.95
K-Tel:

★ ★

The invaders are coming. They give no quarter. You fight a lost battle. Do not weaken. This is a combination of Space Invaders with elements of Defender. You fly through the city until you find a forward advancing horde. Down below, urban commandos advance on mission control. Periodically a big ball of neutrons rolls you flat. Every so often your flying saucer bursts into flames. A good idea but rather stoddily implemented.

Fire Ant

Commodore CBM-64:
Maze game:
£7.95
Phoenix:

★ ★

Tedious maze game. You are the lone ant battling against an overwhelming tide of scorpions who lay eggs all over the shop. You eat the eggs and are rendered strong enough to lift the key to get away from the porous arachnids. Eight screenfuls of this and you see the queen ant.

North Sea Oil

Dragon 32
Strategy
£5.75
Shards Software

★ ★

A simple text and graphics game of the finance-your-operation variety. As an oil installation manager you allocate resources then navigate the supply vessel to the rig.

You then pick a place or two to drill and operate the platform until you have collected 100m dollars. Explanations of hitches and hold-ups in drilling are realistic, making up for in educational terms what the game lacks in graphic excitement.

Teachers who want their kids to do projects on the North Sea might do well to have a look at this.

SOFTWARE

Chinese Juggler

Commodore CBM-64
£6.90
Ocean Software

★ ★ ★

THERE ARE FLYING saucers and flying saucers — the objective in this game is not so much to keep 'em flying as to keep them spinning. You know the kind of thing you see on TV when the Paul Daniels show reaches a low ebb and they bring on this guy who rushes around trying to keep spinning plates balanced on the tops of poles? Well, now you can switch off, plug in your 64 and have a go at it yourself without decimating your parents' priceless collection of Dresden china.

The curtain literally goes up on one of the great mysteries of the east — why do people balance plates on poles? Perhaps it is to keep them away from insects. You move a little Chinese man about the stage, taking saucers from their elaborate oriental rests at the front and balancing them on top of a veritable avenue of poles stretching into the backcloth. This is all done by judicious use of the joystick and fire-button. You can even perform trick-shots like chucking the saucer over the juggler's head and catching it by spinning around. This also changes the plate colour.

Like many a good CBM-64 program, this one is really made by the music. The non-stop carnival backing has a manic appeal. The way that the plates spin on top of the poles is very convincing as well — you have to rush from pole to pole, giving each one a bit of extra spin by pressing the fire button to keep the crockery gyrating. The only gripe I have about this is that the plates don't actually shatter when they fall — they just disappear.

This game is a pleasant departure from the run of the mill shoot-'em-up, and is a refreshingly original use of 64 graphics capability.

Shortlist



Sorcery

Spectrum 48K
£5.95
Virgin Games

★ ★ ★

A ONE-DIMENSIONAL Atic Atac — but no bad thing for all that. Virgin are, it must be said, producing a lot of good software now; they had a somewhat shaky start. This has attractive graphics, is a challenging test of your co-ordination, and is a fairly original idea. It might sound like an adventure game, but it has elements of, if not exactly shoot-'em-up, keep out of their way.

The earth has fallen into the Dark Ages. As is their wont, the evil Necromancer and his demonic servants have conquered the lands enslaving the people — which a lot of people would probably say was actually an improvement on three and a half million unemployed.

But being a naive idealist, you as the last of the great sorcerers feel obliged

to travel outside the borders of your homeland to Stonehenge where your mates are locked up — a heavy number in fact, since the demonic servants are as opposed to you moving about as the police force is to flying pickets.

Can you free your friends before the earth is plunged into eternal darkness? By pressing Q to go left, A to go right — not the best choice of keys — and zero to fly, you can get past musclemen rattling their chains and gruesome skull-like figures. You move through magic doors to get from screen to screen. On many of the screens you will find objects which may or may not be of use to you. Only one of the objects in the game will destroy the Necromancer. Stick the wrong one on the altar at Stonehenge and you will die. You could say this was a sorcery of endless fun.

Dinky Doo

Commodore CBM-64
£7.95
Software Projects

★ ★ ★

"WILL YOU STILL need me, will you still feed me, when I'm 64." Thus the witty theme music for Dinky Doo. Another *Your Computer* contributor Damian McComb goes on to greater things with this whimsical odyssey through a house beset with horrors. At the core of this game is a warning against the hallucinogenic properties of cheese. Little Dinky-Doo has been doing some late-night scoffing of the aforesaid substance in sandwich form with the result that he awakes to a nightmare scene — snakes, skulls and all manner of undesirables are drifting through his domicile. The only way to allay the demons is to drink a nice glass of milk. All pretty wholesome stuff, huh?

Dinky-Doo appears on screen as a
(continued on page 57)



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Star★ chart

Cosmic Bounce

Commodore
Novelty:
£6.95
Calde Software:

★ ★ ★

Elements of breakout in this game which puts you in control of a plasmobile defending the vital energy source from attack by doovries, odd-looking fellows, wearing caps with propellers on their heads. You fire a ball of plasma which bounces around the screen destroying everything in its path. You can't fire again until you recapture it. Instructions come in French and German.

3D Space Wars

Dragon 32
Shoot-'em up
£6.95
Hewson Consultants

★ ★ ★

An excellent Dragon game. Okay it's in black-and-white but the hi-res graphics are excellent, and controlling your spacecraft really tricky as you nose through the void trying to push the Seiddab backwards into oblivion.

To every action there is an equal and opposite reaction and killing the inertia of a fast swing to the right with your port trusters is the first trick you learn. Once again, there is some very good stuff around for the Dragon.

Stargate

Dragon 32
Shoot-em-up
£7.95
Abacus Software

★ ★

Too much money for something that just doesn't compare with the new generation of hi-res and perspective programs that some of the more creative software houses have struggled to come up with.

You squat in a square at screen-centre, blasting away at aliens trying to leave the galaxy via the stargate.

Not a patch on 3D Space Wars by Hewson, or Pedro by Imagine.

(continued from page 55)

spherical blob with a fixed grin and slowly blinking eyes. The loveable little berk needs to be guided through the maze without touching the walls or bumping into any of the unwelcome guests.

The object of his quest is the hot milk on the opposite side of the screen. Once downed, the creatures turn into harmless cherries. Gulp these for extra points. If you gulp them all, you can head for a door which appears on the screen. This ushers you into the next part of the game. According to the documentation, this may be mum's room. More often, it isn't, and you are plunged into faster and more complex mazes.

In all fairness, when you compare this game with some of the graphic programs now becoming available for the CBM-64, the game itself is not as visually appealing as some Spectrum programs — the design seems rather watery. Interesting little touches, like the simulation of a Spectrum loading pattern have, however, been added. This is a good idea — there is something very inscrutable about the Commodore 64's presentation of a blank blue screen when it is loading.



Beach-head

Commodore CBM-64
£8.95
Access Software

★ ★ ★

KUHN-LIN IS THE objective of your forces in this shoot-em-up. It has impressively good graphics — aircraft swoop overhead and peel off, accompanied by the roar of engines and your big gun pounds heavily away at them.

The opening sequence simulates an aerial reconnaissance of enemy territory. You can choose either to take your 10-ship fleet through a hidden passage and catch the enemy off-guard, or try a frontal assault. This is done by steering your fleet — represented by mobile cross-hairs on the screen — in the direction you wish to go.

The hidden passage is mined — steer around these — and avoid torpedoes zipping across the screen. Controls are a little strange at first because the ship moves through a three-quarter view rather than a straight plan view — this can lead to a few disasters. If you get through the

SOFTWARE

Shortlist



Olympimania

Spectrum 48K
Automata
£6.00

★ ★

CASHING IN ON THE wave of apathy sweeping the country as regards the 1984 Olympic games in Los Angeles this year. Automata have rushed out another Pi-game. Tracing its line of descent from games like Jumping Jack, the Pi-man competes in all five events of the Olympic Games. He races against time to achieve world records in the Pi Jump, the Alpi skiing, the Steepchase, the Pirathlon, and the Butterpi.

All of these events consist of jumping over things. In the first game, he is jumping over pi-signs, in the second game, he ski-jumps over pine-trees, in the Steepchase over pi-signs, over musclemen in the Pirathlon. There is original departure from this in the Butterpi which is a swimming race viewed from overhead.

There is an octopus in your lane, and you have to punch 8 to dive, leaving a swirl of ripples on the surface. Lurch the office parrot — at least they think he's a parrot — makes a sudden appearance in some of the games dropping steroids on the track — at least they think they're steroids. Other sportsmen are always elbowing you out of the way, and even alligators show up in the swimming pool as the game progresses.

The worst thing about this latest presentation is the PiLand International Anthem on the back. While we may look forward to a future free from tsetse flies, piles and hangovers, using a Martin Luther King voice-over is just plain bad taste in this context. It's an averagely enjoyable game but as regards commercial popularity we suspect Malcolm X's "No Sell-out" would have been a better track to put on the back.

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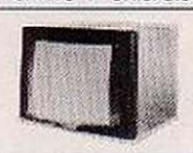
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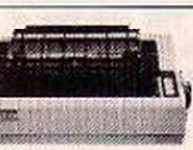
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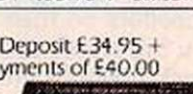


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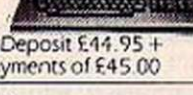
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NEWS

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The crystal ball

MP Software are marketing three highly enjoyable Adventures for the BBC B — Firienwood, Blue Dragon and Survivor. Pure text, they offer plenty of puzzles to test your Adventuring ability.

Gilsoft, Welsh wizards of The Quill, have brought out their Gold Collection for the 48K Spectrum. A series of Adventures all written with The Quill by different authors, the collection includes Africa Gardens, Magic Castle, Mindbender, Barsak and Dwarf, Devil's Island, Diamond Trail, and Spyplane. Gilsoft are also bringing out The Quill for the Commodore 64.

A helping hand

In case you have a little difficulty in finding out how to start time travelling in Level 9's Lords of Time, try this trio of hints. They're written backwards, as usual.

To get inside the time machine:

NI NEHT KCOLC DNIW

To visit, say, time zone 3:

3 GOC NRUT

To leave the time machine:

HTRON NEHT MULUDNEP HSUP

For those having difficulties with Interceptor's Heroes Of Karn, here's a bit of advice.

Can't get at the pirate because he hides in a crevice in the cave wall?

NAC OUY — ITI TEGROF
HSINIF EHT TA MIH TEG YLNO

Blocked by a Barrow Wight?

ELBIB HTIW THGIW KCATTA

Stuck in the dungeon?

DRAUG OT GAB EVIG

That's all the help for this time from, yours in Adventure adversity.

QUEST

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

Lords of Time

■ BBC B/CBM 64/Atari

■ £9.90

■ Level 9 Computing

THE NUMBER NINE looms large in this original adventure from those masters of the art at Level 9 Computing. No only do you have to collect nine rather strange objects — a dragon's wing, a teardrop and a jester's cap are hardly household articles — you must also travel through time, searching in nine different periods to find them.

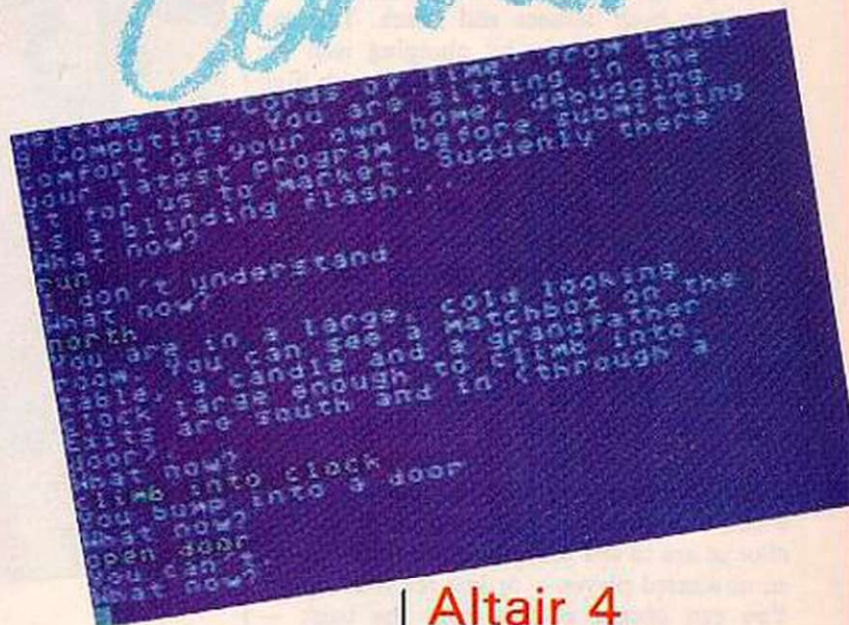
Evil has arisen in the shape of a conclave of Timelords — guess how many — who are trying to remould history in their favour. Father Time, a picturesque figure, allots to you the awful responsibility of journeying through Time to collect nine, vital symbolic objects. Only with these can the rent fabric of History be repaired.

Prepare yourself for a race through the ages — the sands in the hourglass are running away. You won't suffer from jet lag but you might find yourself dazzled as you search in the Ice Age, the Stone Age, through Roman and Viking times and on to Mediaeval and Tudor Periods. Catch your breath in the Present before experiencing the Future and the Far Future.

As with all Level 9 adventures, what you get is an engaging and atmospheric plot and beautifully detailed text with bags of locations, objects and puzzles. There are well over 200 places to explore, 750 messages to enjoy, and 80 objects to play around with. The vocabulary is similarly extensive, over 200 words.

If you think with all that lot you're going to get a slow response, think on — response to your every command is immediate, the whole program having been written in machine code.

The adventure was conceived and designed by Sue Gazzard of Harrow and it's the first she's produced. All I



can say is — more, please, Sue. The actual programming was done by Pete Austin, Level 9's machine-code wizard.

Play Lords of Time and get nine times the pleasure!

Legion

■ BBC B

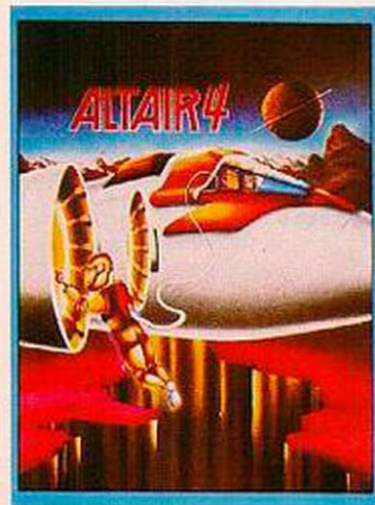
■ £7.95

■ Software Projects

LEGION SETS YOU down in Roman times. Your aim is to obtain warrior status from Caesar in order to go off a'hunting for treasure in the pyramids of Egypt.

Text only, Legion kicks off in a centurion's house. First problem is overcoming the rats whose bite will infect you with the Black Death. Once in the street, you'll have to watch where you're heading — ending up in the gladiatorial arena with no weapon is not likely to increase your chances of winning Caesar's acclaim.

A fairly simple but entertaining adventure, one probably more suited to the apprentice traveller.



Altair 4

■ CBM 64

■ £5.99

■ Voyager Software

ALCATRAZ, DEVIL'S ISLAND and Sing Sing are not likely to be top of your list of ideal holiday resorts. Altair 4, a remote planet, won't be either since for generations every other planet in the galaxy has sent its most dangerous criminals there.

Imagine your feelings then when your strato-cruiser is disabled in an argument with a meteor storm and your computer tells you the nearest place for an emergency landing is the dreaded penal planet, Altair 4.

This text-only adventure starts with your having landed on the planet. Now you must find how to get out of your craft and go in search of the necessary equipment to make the vital repairs. The question is — will you manage to avoid Mekon Monsters, Bug-Blyte Beasts and other marauding bands of the most unpleasant beings in the galaxy?

Exploring your ship, you will soon come across a strange, hairy creature slumped across a control console and snoring loudly. Friend or foe? If you can arouse it, you'll likely find an ally for this turns out to be none other than a giant furry Wookiee. Nearby, you might find a cage of white mice but what purpose do they serve? — they definitely don't seem to want to come out of their cage.

Getting out of the ship is no doddle — there are four buttons controlling the airlock and these must be mastered before you can alight on the planet's surface. Having descended, you may be dismayed to find you're soon on the lip of a volcano, in which boiling, liquid mud bubbles and pops alarmingly.

With luck, you may find such obvious essentials as a lamp, phaser and rocket pack.

You'll be "over the moon, David" with Lee Carpenter's game.

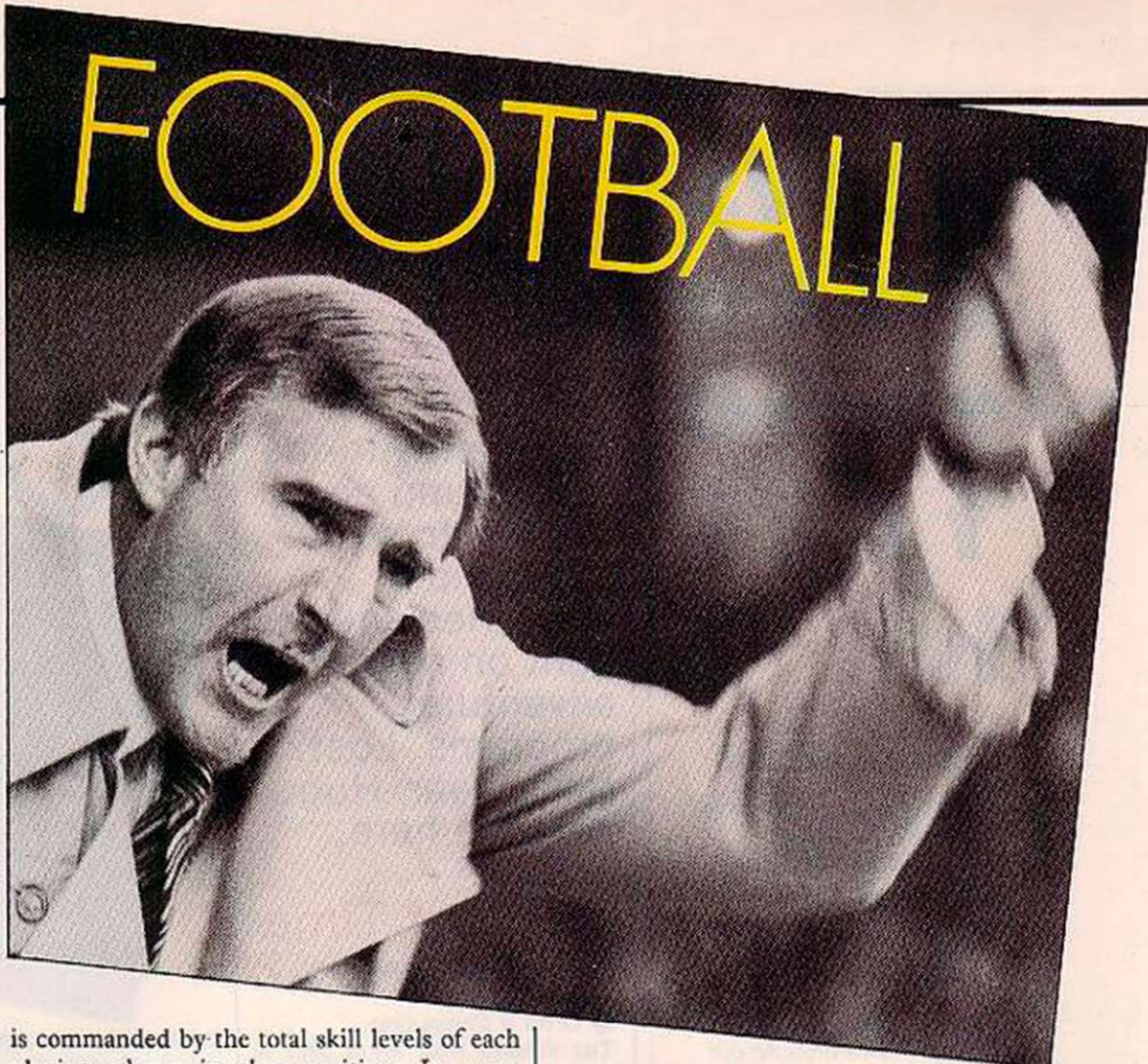
THIS PROGRAM ALLOWS you to take charge of any one of 64 teams, and hopefully steer them to the top of the League, while winning as many FA cups as possible. This is achieved by putting together a balanced team, that is strong in both defence and attack. You can strengthen your team by plunging into the transfer market and buying players with high skill levels.

You are initially given the choice of starting from a previous position that has been saved on tape or starting from a new position. If you start from a new position you are given the choice of which team you want, and then your team is sent to division 4 and the beginning of a new season. You are randomly given a 12 man squad — 11 players, and one substitute — which will play your first game.

After the information has been loaded into the computer — either from tape or generated by the computer — you are given a menu and a choice of what you want to do next. The choices are to sell players, where you can sell an unwanted player — or just see your squad. You can obtain a loan from the bank — interest = 20 per cent — print out your current status — 0 until at least one season has been played — print out all the scores of matches played so far on the season, see the current league table — these last two only available when at least one match has been played in the season — and the chance to save the game so that you can continue the game again at a later date.

Shocked and stunned

When you wish to continue the game, you press f0 and your next opponent is chosen. You only play each team twice in a season — once at home and once away. You then go on to the main part of the game, where you choose your team, and play the game. A set of statistics are shown, for both you and your opponents, and these are what contribute directly to the score of the match. The values are in five categories, energy which is the total energy of the team divided by 11; morale which changes with the scores of previous matches, defence, midfield and attack, which



is commanded by the total skill levels of each playing player in that position. In some football manager games on the market, these are compared directly, and these determine the score, but sometimes give an unlikely score.

For example, if defence of the teams is 19 and 20, and attack in 4 and 5 then it would be likely that there would only be one goal, if any in the match, regardless of other values, but some games could give a four or five goal game, as defence is not compared with attack. This is a major fault, but with this FM game, they are compared, and I will show how they are compared later. To change your team, press 'C' and your squad will be shown.

The letter to the far left is that player's unique player number, and that is what is used to bring him into the team, drop him, or sell him. The next letter is his position — D = defence, M = midfield, A = attack — there is also a colour scheme that allows you to what position they are in with ease. The energy of the player is headed, and so is the skill, and

the value of the player that you should expect for the player if you were selling or buying him.

The last column is what status the player is in — key at the top of the screen. To bring a player into the team, you press his player letter, and the screen will be changed. If there are more than 11 players in the team, you will have to take a player out, in the same manner. When you have a team that you are satisfied with, you press f0 and then you are asked for the substitute. A sub is not a necessity, but is handy for a change at half-time, i.e., if the substitute was a defender, if you were winning at half time, by bringing on a defender will help to try to preserve that lead.

You are then given the new statistics, and if you are satisfied that you do not want to change your team again, press f0, and the match will start. The latest score is shown, and any score is shown, and the score changed. There is a half-time, where you will

```

50*FX200,1
60MODE7
70PROCstart
80REPEAT:REPEAT:REPEAT
90PROCmenu
100IF H%=65 PROCsell
110IF H%=66 PROCloan
120IF H%=67 PROCTable
130IF H%=68 PROCscores
145IF H%=69 PROCstatus
146IF H%=70 PROCkeep
150UNTIL H%=90
160PROCchoose
170PROCgame
180IF LX=1 PROCresults:PROCTable
190PROCpayment
200PROCbuy
210UNTIL I%=30 AND M%=0
220PROCendseason
230UNTILFALSE
240DEFPROCstart
250CLS:VDU23;B202;0;0;0;
255DIM A$(64),B$(24),C$(30),D$(2),A(24),B(24),C(24),
D(14),E(16),F(16),G(16),H(2),J(16),V(16)
260*KEYO Z:M
270C$="DMFI SP":B(0)=-1
280F%=RND(-TIME):FOR H%=1 TO 24:READ B$(H%):NEXT
290F%=131:FOR H%=1 TO 2:PRINT CHR$(141);CHR$(P%);TAB
(10);"FOOTBALL SUPREMO":P%=P%-1:NEXT
300PRINT TAB(5);CHR$(129);"Do you wish to start"
TAB(5);CHR$(129);"from a new position";CHR$(130);"(N)"
TAB(5);CHR$(129);"or a saved position";CHR$(131);"(S)"
310REPEAT:UX=(GET AND &DF):UNTIL UX=78 OR UX=83
320IF UX=83 PROCload:GOTO 430
330N%=4:FORH%=1TO64:READA$(H%):NEXT:FORH%=1TO24:A(H%)
=RND(5):B(H%)=INT(RND(5)+15):NEXT
340I%=0:M%=1:W%=150000:Y%=0:Z%=0:K%=15:R%=20:B1%=1
350FORH%=1TO12
360P%=INT(RND(24)):IF C(P%)=0 C(P%)=4 ELSE 360
370NEXT:C(P%)=3
380H%=1
390IF H%=65 THEN 380
400CLS:PRINT TAB(9);CHR$(131);"CHOICE OF TEAMS":FOR P
%=H% TO H%+7:PRINT TAB(4);CHR$(133);FNF(P%);" "STRING$(
8,"."):A$(P%):NEXT:PRINT CHR$(131);" Which team do y
ou wish to choose";CHR$(130);"f0"CHR$(131);" for further c
hoice."
410PRINT CHR$(134);:INPUT"A$:IFA$="Z" THEN H%=H%+8:GO
TO 390 ELSE Q%=VAL(A$):IF Q%<H% OR Q%>H%+7 THEN 400
420A$=A$(49):A$(49)=A$(Q%):A$(Q%)=A$:Q%=49:FORH%=1TO
16:J(H%)=1:NEXT:J(1)=6
430ENDPROC
440DEFPROCmenu:*FX15
450CLS:PRINT CHR$(133);"KEY";TAB(22);"ACTION"

```

SUPREMO



get the opportunity to bring on your chosen substitute. You then play the second half, and then the result will be shown. If it was an FA cup, the outcome is shown, and if a replay is needed the game will be replayed, and you will have the chance to change your team. If it was a league match, other league matches will be displayed, and then the new league table will be displayed.

If you have less than 16 players in your squad, you will get the opportunity to buy a player. His position will be shown, along with your bank balance, his skill, energy and value. You then have the chance to bid for him. If your bid is refused, or you type f0, you will return to the menu at the beginning of the program. If, however, your bid is accepted, your bank balance is adjusted, and that player is included in your squad.

At the end of the season — when 30 league games have been played, and you are either out of the cup, or have won it outright, all your league game results will be displayed (opponent, venue, score with your score first.)

We was robbed

Any necessary changes in divisions will be made (Top two go up except in division one and bottom two go down except in division four), and hopefully you will be one division nearer that first division title.

The scores in the matches that you play are dependent on the five categories and that of your opponents. All this information is split down into two values — held in D(7), D(8) for

you and D(13) and D(14) — for your opponents.

These are for the total defence and total attack, and are compared with the opposition's opposite i.e. your defence is compared with your opponents attack and vice-versa. The defence is the whole of the defence and half of the energy, morale and midfield. Attack is calculated on the same format — attack plus half energy, morale, and midfield. During the game these are compared and if you attack is much greater than the other team's defence, you are likely to score, but if your attack is a lot lower than his defence, it is unlikely that you will score.

```
460PRINTCHR#131;" A";STRING$(16,".");"sell or list p
layers"CHR#131;" B";STRING$(16,".");"Obtain a loan"
CHR#131;" C";STRING$(16,".");"Print league table"
470PRINTCHR#131;" D";STRING$(16,".");"See previous s
cores"CHR#131;" E";STRING$(16,".");"See status"CHR#
131;" F";STRING$(16,".");"Save game"TAB(10);CHR#
134;"or f0 to continue.":H%=GET AND &DF
480ENDPROC
490DEFPROCsell
500CLS:PROClist
510PRINTCHR#131;"Who do you wish to sell"CHR#131;"
(f0 to continue)":REPEAT:A%=CHR$(GET AND &DF):UNTIL A%
>="A" AND A%<="X" OR A%="Z"
520IF A%="Z" THEN ENDPROC
530U%=ASC(A%)-64:CLS:IF C(U%)=0 THEN PRINT CHR#134;"
You do not have ";B%(U%)CHR#134;"In you team":GOTO 5
70 ELSE IF C(U%)=1 THEN PRINT CHR#133;"There are no o
ffers for ";B%(U%)CHR#133;"Due to the fact that he is
injured.":GOTO 570
540P%=5000*(5-N%)+5000*A(U%):P%=INT(P%+RND(P%/10)-RN
D(P%/10))
550PRINTCHR#131;"Do you except ";P%:" from ";A%(R
ND(64))CHR#131;"for your player ";B%(U%)CHR#133;"Pl
ease answer (Y/N)"
560REPEAT:A%=CHR$(GET AND &DF):UNTIL A%="Y" OR A%="N
":IF A%="Y" W%=W%+P%:C(U%)=0:PRINT CHR#133;B%(U%);" h
as been sold." ELSE C(U%)=RND(2)+1:PRINT CHR#133;B%(U%
```

```
);" is still a ";A%(0%);" player."
570PRINTCHR#129;"Press";CHR#131;"RETURN";CHR#129;"
to continue.":REPEAT:UNTILGET=13:ENDPROC
580DEFFNA IF LX<>1 THEN =FNI ELSE IF G(A1%)=0 AND I%
<>0 THEN =RND(10)+10 ELSE IF G(A1%)=0 THEN =RND(10)+6
ELSE =RND(G(A1%)/I%*3)+10
590DEFFNB(H%) =D(1)+B(H%)
600DEFFND(H%) =D((H%-1) DIV B)+3)+A(H%)
610DEFFND(H%) =INT(D(H%)+D(H%+1)/2+D(H%-2)/2+D(H%-1)
/2)
620DEFFNE(H%) =INT(D(H%)+(D(H%-1))/2+(D(H%-4))/2+(D(
H%-3))/2)
630DEFFNF(H%) A%=STR$(H%)
635 =STRING$(3-(LEN(A%))," ")A%
640DEFFNI H%=INT(RND(1/3)+15):IF H%<=20 THEN =H% EL
SE =H%
660DEFFNG IF (I% DIV 4)<7 THEN =STR$(I% DIV 4) ELSE
IF I%=28 = "SEMI - FINALS" ELSE = "FINALS"
670DEFFNH IF LX=1 THEN = "League match" ELSE = "F.A. C
up match"
CHR#133+"round : "+FNG
680DEFPROCgame
690PROCredo
700FOR P%=B TO 12:D(P%)=INT(FNA)+2:IF D(P%)>20 D(P%)
=20
701NEXT
710D(13)=FND(10):D(14)=FNE(12)
720PROCnewvalues
```

(continued on next page)

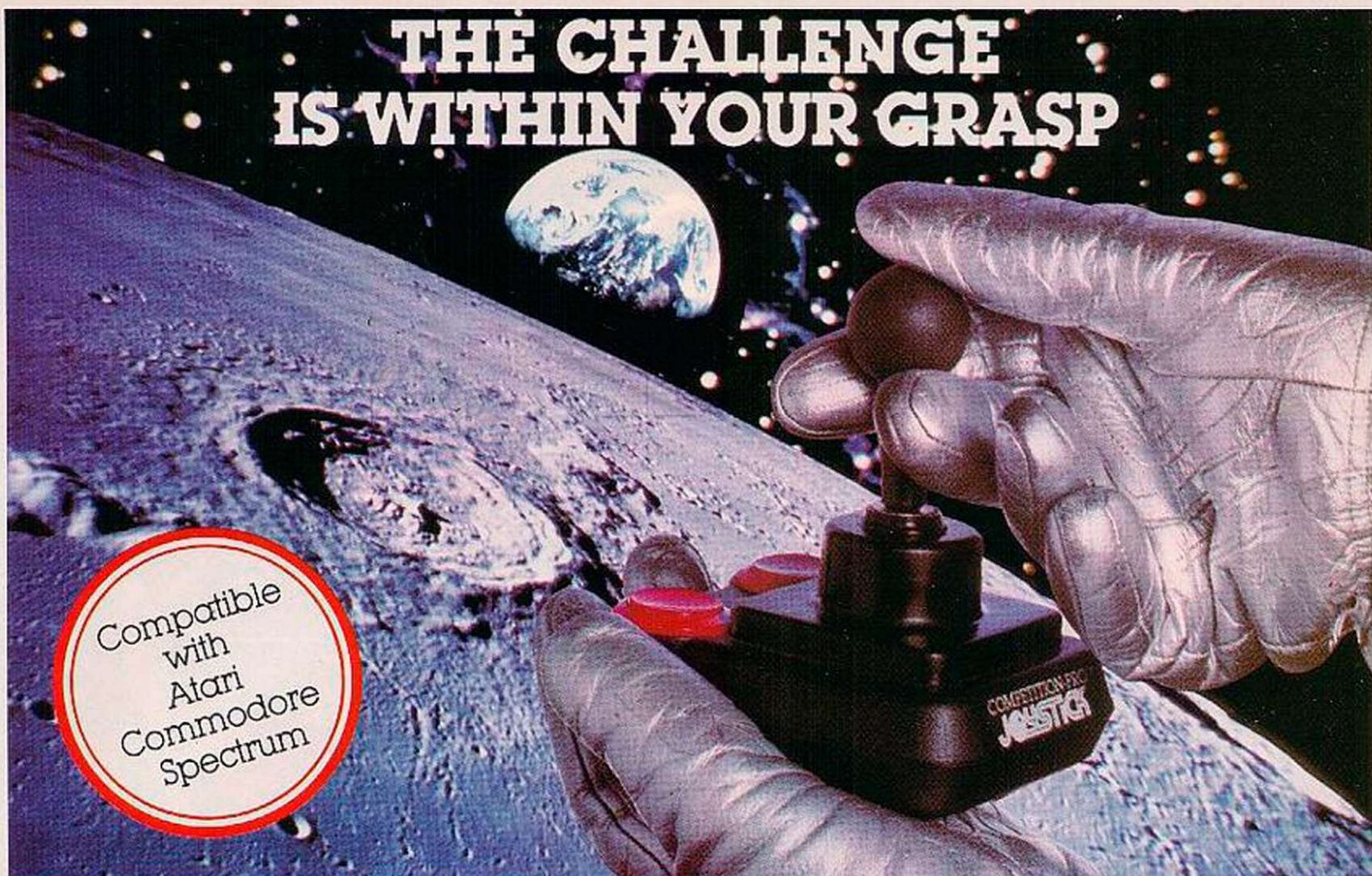


(continued from previous page)

```
730CLS:PRINT CHR$(134);TAB(13);A$(QZ);TAB(25);A$(SZ)
CHR$131;"ENERGY";TAB(15);FNF(D(1));TAB(25);FNF(D(8))
CHR$131;"MORALE";TAB(15);FNF(D(2));TAB(25);FNF(D(9))
740PRINT CHR$131;"DEFENCE";TAB(15);FNF(D(3));TAB(25)
;FNF(D(10));CHR$131;"MIDFIELD";TAB(15);FNF(D(4));TAB(
25);FNF(D(11));CHR$131;"ATTACK";TAB(15);FNF(D(5));TAB
(25);FNF(D(12))
750PRINT CHR$130;"There have been ";X%;" players p
icked ";IF UZ=0 THEN PRINT CHR$130;"and no substitute
" ELSE PRINT CHR$130;"and also a substitute"
760PRINT CHR$129;"C" to change the team,"CHR$129
;"and fo" to play the game.":*FX15
770REPEAT:A$=CHR$(GET AND &DF):UNTIL A$="C" OR A$="Z
":IF A$="C" PROCchange:GOTO 720
780A$="1st half":CLS:H(1)=0:H(2)=0:PROCsheet:PROCwai
t
790REPEAT:IF RND(HZ)>9 PROCchange
800UNTIL RND(HZ)<3
810PROCchalf
820A$="2nd half":CLS:PROCsheet:PROCwait
830REPEAT:IF RND(HZ)>10 PROCchange
840UNTIL RND(HZ)<4
850X%=A1%:U1%=H(A3%):P1%=H(A4%)
860PROCend
870IF LX=2 GOTO 910
880F(1)=F(1)+U1%:E(1)=E(1)+P1%:F(A1%)=F(A1%)+P1%:E(A
1%)=E(A1%)+U1%:I%=I%+1
890IF U1%=P1% G(1)=G(1)+1:G(A1%)=G(A1%)+1 ELSE IF U1
%>P1% G(1)=G(1)+3 ELSE G(A1%)=G(A1%)+3
900GOTO 960
910IF P1%>U1% PRINT "You are out of the cup .....":
M%=0:T%=I%+2 DIV 4:GOTO 940
920IF P1%=U1% PRINT "There is a replay :-":HZ=A3%:A3
%=A4%:A4%=HZ:A$=D$(1):D$(1)=D$(2):D$(2)=A$:H(1)=0:H(2)
=0:A$=GET$:GOTO 690
930IF I%<30 PRINT "You are through to the next round
" ELSE FOR A2%=1TO2:PRINT TAB(4,10+A2%);CHR$131;CHR$15
7;CHR$132;CHR$141;CHR$136;"YOU HAVE WON THE CUP ";C
HR$156:NEXT:M%=0
940*FX15
950A$=GET$
960ENDPROC
970DEFPROCchange
980IF RND(2)=1 THEN 1010
990IF RND(D(14))-RND(D(6))>0 H(A4%)=H(A4%)+1:PROCgoa
l
1000GOTO 1030
1010IF RND(D(7))-RND(D(13))>0 H(A3%)=H(A3%)+1:PROCgoa
l
1020*FX15
1030ENDPROC
1040DEFPROCtable:IF I%=0 PROCnomatch:ENDPROC
1050CLS:PRINT CHR$130;" TEAM";TAB(22);"F";TAB(26);
"A";TAB(29);"Pts";TAB(35);"GD"
1060FORU%=1 TO 16:V(UZ)=0:NEXT
1070FORU%=1 TO 16:X%=0:FORP%=1 TO 16
1080IF (G(P%)>G(X%)) OR (G(P%)=G(X%) AND ((F(P%)-E(P%
))>(F(X%)-E(X%))) AND V4P%=0 THEN X%=P%
1090NEXT:V(X%)=UZ:PRINT CHR$131;FNF(UZ);" ";A$(X%+(N%
-1)*16);TAB(20);FNF(F(X%));TAB(24);FNF(E(X%));TAB(28);
FNF(G(X%));TAB(34);FNF(F(X%)-E(X%))
1100NEXT:PRINT CHR$134;"Your position is ";V(1);" af
ter ";I%;" matches.":*FX15
1110A$=GET$:ENDPROC
1120DEFPROCchoose
1130A2%=0:IF (I% MOD 4=0 AND I%>0 AND M%=1 AND LX=1)
OR (I%=30 AND M%=1) THEN LX=2 ELSE LX=1
1140IF LX=2 THEN GOTO 1170
1150REPEAT:P%=RND(2)+1:S%=RND(16):UNTIL J(S%) MOD P%<
0:J(S%)=J(S%)*P%:A1%=S%:S%=(N%-1)*16+S%
1160GOTO 1180
1170S%=(9-I%/4)*8-RND(8):IF S%=0% THEN 1170
1180IF P%=2 A3%=1:A4%=2:D$(1)=A$(QZ):D$(2)=A$(SZ) ELS
E A3%=2:A4%=1:D$(1)=A$(SX):D$(2)=A$(OZ)
1190CLS:PRINT TAB(8);CHR$133;"This is a ";CHR$134;FN
H TAB(4);CHR$131;D$(1);TAB(19);"v. ";D$(2):IF LX=1
AND I%>0 PRINTCHR$131;"Who is ";V(A1%);" in division
";N%
1200PRINT CHR$131;"You are playing";IF P%=2 PRINT " ho
me." ELSE PRINT " away."
1210*FX15
1220A$=GET$:CLS
1230ENDPROC
1240DEFPROCloan
```

```
1250CLS:PRINT CHR$131;"You have a total of ";W%;"CHR
$131;"And a ";Y%;" loan."CHR$133;"How much do you w
ish to borrow"CHR$133;"Please ensure that it is 1000
's"
1260PRINT CHR$129;:INPUT"X%:IF X%<0 OR X% MOD 1000<
0 THEN 1250
1270IF X%=0 THEN 1320
1280IF X%+Y%>100000*(5-N%) PRINT CHR$130;"The bank
will not allow a loan of"CHR$130;" ";X%+Y%;"The most
in division ";N%CHR$130;"that they will lend is ";1
00000*(5-N%):GOTO1310
1290Y%=Y%+X%*1.2:Z%=Y%/20:W%=W%+X%:PRINT CHR$130;"Th
e bank has agreed to your request for";CHR$130;" ";X%;
" which makes your loan ";Y%CHR$130;"and your weekly
repayments of ";Z%
1300PRINT CHR$131;"You now owe ";W%
1310A$=GET$
1320ENDPROC
1330DEFPROClist
1340P%=0:U%=0:A%=0
1350FORX%=1TO24:IF C(X%)>0 A%=A%+1
1360NEXT
1370VDU28,0,24,39,A%+4:CLS:VDU26
1380PRINT TAB(0,1);CHR$131;"(I=INJURED , S=SUBSTITUTE
, P=PLAYING)"
1390PRINTCHR$133;TAB(16);"energy skill "
1400FORX%=1TO24:IF C(X%)=0 THEN 1430
1410PRINT CHR$134;CHR$(X%+64);CHR$(129+((X%-1) DIV B)
);" ";MID$(C$(X%-1) DIV B)+1,1);" ";B$(X%);TAB(17);F
NF(B(X%));TAB(25);A(X%);TAB(29);5000*(5-N%)+5000*A(X%
);TAB(35);MID$(C$(X%+3),1)
1420IF C(X%)=3 THEN P%=P%+1 ELSE IF C(X%)=4 THEN U%=U
X%+1
1430NEXT
1440ENDPROC
1450DEFPROCredo
1460FORH%=1TO24
1470IF C(H%)=0 THEN 1530
1480IF C(H%)<3 THEN B(H%)=B(H%)+10
1490IF C(H%)=4 THEN B(H%)=B(H%)-1
1500IF B(H%)>20 THEN B(H%)=20 ELSE IF B(H%)<1 THEN B(
H%)=1
1510IF C(H%)=1 AND B(H%)>RND(15) THEN C(H%)=2
1520IF B(H%)<12 AND RND(B(H%))<2 THEN C(H%)=1
1530NEXT:ENDPROC
1540DATA Shilton,Clemence,Neal,Hansen,Osman,Butcher,M
cQueen,Kennedy,Keegan,Robson,Whelan,DalGLISH,Souness,L
ee,Huddle,Rix,Rush,Stapleton,Davis,Withe,Brazil,Crooks
,Nicholas,Francis
1550DATA Liverpool,Arsenal,Tottenham,Ipswich,Man. Utd,
Luton,Coventry,Stoke,Q.P.R.,Norwich,Wolves,Leicester,W
atford,Ast.Villa,West Ham,Everton
1560DATA Brighton,Man.City,Fulham,Chelsea,Sheff.Wed,C
ambridge,Derby,Newcastle,Swansea,C.Palace,Cardiff,Char
lton,Leeds,Blackburn,Barnsley,Oldham
1570DATA Wimbledon,Burnley,Bolton,Carlise,Walsall,Ald
ershot,Millwall,Oxford,Southend,Hull,Reading,Rotherham
,Bradford,Exeter,Grimsby,Plymouth
1580DATA Southport,Brentford,Halifax,Tranmere,Torquay
,Rochdale,Swindon,Port Vale,Wrexham,Orient,Preston,New
port,Crewe,York,Bury,Wigan
1590DEFPROCchange
1600CLS
1610PROClist
1620PRINT CHR$133;"There are ";U%;" players picked":I
F P%=1 THEN PRINT CHR$133;"and a substitute." ELSE PRI
NT CHR$133;"but no substitute."
1630IFU%>11 THEN GOTO 1770
1640PRINTCHR$134;"Who to include in team";CHR$131;"fo
";CHR$134;"to continue."
1650A$=GET$:IF A$="Z" THEN GOTO 1690
1660HZ=ASC(A$)-64:IF HZ<1 OR HZ>24 THEN GOTO 1650
1670IF C(HZ)<2 OR C(HZ)=4 THEN 1650
1680C(HZ)=4:GOTO1610
1690PROClist
1700PRINT CHR$134;"Enter substitutes number "CHR$13
4;"or";CHR$133;"fo";CHR$134;"to continue."
1710A$=GET$:IF A$="Z" THEN GOTO1790
1720HZ=ASC(A$)-64:IF HZ<1 OR HZ>24 THEN GOTO 1710
1730IF C(HZ)<2 THEN GOTO 1710
1740FORP%=1TO24:IF C(P%)=3 THEN C(P%)=2
1750NEXT:C(HZ)=3
1760GOTO 1690
1770PRINTCHR$134;"Who do you want to take out of the
team":
1780REPEAT:A$=GET$:HZ=ASC(A$)-64:UNTILHZ>0 AND HZ<25:
IF C(HZ)<>4 THEN 1780 ELSE C(HZ)=2:GOTO 1610
1790ENDPROC
1800DEFPROCsheet
1810FORP%=1TO2:PRINT TAB(10,2+P%);CHR$141;CHR$134;"MA
TCH IN PROGRESS"CHR$131;CHR$141;D$(1);TAB(20);H(1)
CHR$131;CHR$141;D$(2);TAB(20);H(2)
1820PRINT TAB(4,18+P%);CHR$141;CHR$134;A$:NEXT:ENDPR
OC
1830DEFPROCchalf:*FX15
1840CLS:PRINT CHR$131;"At half-time the score is :";
CHR$133;D$(1);" ";H(1);" ";D$(2);" ";H(2)
1850PRINT CHR$134;"If you wish to bring on your"CHR
$134;"substitute press 'S' otherwise"CHR$134;"Press
fo to continue"
(continued on page 65)
```

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CATALOGUE

(continued from page 62)

```
1860REPEAT:A$=GET$:UNTIL A$="Z" OR A$="S":IF A$="Z" T
HEN GOTD 1930
1870CLS:PROClist:PRINT CHR#134;"Who do you wish to ta
ke off ?" CHR#134;"or fo if you do not want to bring"
CHR#134;"on your substitute"
1880REPEAT:A$=GET$:P%=ASC(A$)-64:UNTIL (P%>0 AND P%<2
5) OR P%=26:IF P%=26 THEN GOTD 1930
1890IF C(P%)<>4 THEN GOTD 1880
1900FOR U%=1TO24:IF C(U%)=3 THEN C(U%)=4
1910NEXT:C(P%)=3
1920PROCnewvalues
1930ENDPROC
1940DEFPROCnewvalues
1950FOR P%=1 TO 7:D(P%)=0:NEXT: X%=0:U%=0:D(2)=K%
1960FOR P%=1 TO 24:IF C(P%)=4 THEN D(1)=FNB(P%):D((P
%-1) DIV B)+3)=FNC(P%):X%=X%+1 ELSE IF C(P%)=3 U%=P%
1970NEXT:D(1)=INT(D(1)/11):FOR P%=2 TO 5:IF D(P%)>20
D(P%)=20
1980NEXT
1990D(6)=FND(3):D(7)=FNE(5)
2000H%=D(7)-D(13)+D(14)-D(6):IF H%<10 THEN H%=15
2010ENDPROC
2020DEFPROCend
2030CLS:PRINT "CHR#131;TAB(10);"FINAL SCORE""CHR#13
3;D*(1);" "H(1);" "D*(2);" "H(2)"
2040IF U1%>P1% THEN K%=(20-K%)/2+K% ELSE IF U1%<P1% T
HEN K%=INT(K%/2)+1
2050IF V(1)=0 THEN V(1)=RND(16)
2060IF L%=2 THEN A2%=A2%+RND(500)+500*I%/2 ELSE A2%=(
17-V(1))*RND(400)+500*(5-N%)
2070PRINTCHR#130;"Gate Receipts = ";A2%
2080IF L%=1 THEN C$(I%+1)=STR$(S%)+","+STR$(A3%)+","+
STR$(H(A3%))+STR$(H(A4%))
2090ENDPROC
2100DEFPROCresults:*FX15,0
2110FORP%=1TO16:V(P%)=0:NEXT
2120V(1)=1:V(A1%)=1:FDRP%=1TO7
2130REPEAT:X%=RND(16):UNTILV(X%)=0:V(X%)=1
2140REPEAT:H%=RND(16):UNTILV(H%)=0:V(H%)=1
2150IF G(X%)<I%*1.5 S%=RND(2*I%) ELSE S%=G(X%)
2160P1%=INT(RND(S%/I%+3))
2170IF G(H%)<I%*1.5 U%=RND(2*I%) ELSE U%=G(H%)
2180U1%=INT(RND(U%/I%+3))
2190V(H%)=1:V(X%)=1
2200PRINT "CHR#134;A$( (N%-1)*16+X%);TAB(18);P1%;" "A
$( (N%-1)*16+H%);TAB(36);U1%
2210F(H%)=F(H%)+U1%:F(X%)=F(X%)+P1%:E(X%)=E(X%)+U1%:E
(H%)=E(H%)+P1%
2220IF P1%>U1% G(X%)=G(X%)+3 ELSE IF U1%>P1% THEN G(H
%)=G(H%)+3 ELSE G(X%)=G(X%)+1:G(H%)=G(H%)+1
2230NEXT:A$=GET$:ENDPROC
2240DEFPROCbuy:U%=0:FDRP%=1TO24:IF C(P%)>0 THEN U%=U%
+1
2250NEXT:IF U%=16 THEN ENDPROC
2260REPEAT:P%=RND(24):UNTIL C(P%)=0
2270CLS:FORU%=1TO2:PRINTTAB(2,U%);VDU131,157,129,141
:PRINT"R A N S F E R M A R K E T ";CHR#156:NEXT
2280X%=5000*(5-N%)+5000*A(P%):*FX15
2290PRINT "CHR#131;"Your bank balance is ";W%
2300PRINT "VDU131,157,129,141:PRINT TAB(4);MID$(C$(
(P%-1) DIV B)+1,1);TAB(10);CHR#132;B$(P%);VDU131,157,1
29,141:PRINT TAB(4);MID$(C$( (P%-1) DIV B)+1,1);TAB(10
);CHR#132;B$(P%)
2310VDU131,157,132:PRINT"skill : ";A(P%);TAB(10);"Ene
rgy : ";B(P%);TAB(22);"Value : ";X%
2320PRINT "CHR#132;CHR#157;CHR#131;"What is your
bid ( fo to continue ) ";CHR#156;CHR#132;CHR#157;CHR#1
31;:INPUT "Your bid "A$:IF A$="Z" THEN GOTD 2390
2330H%=VAL(A$):IF H%<=0 THEN 2270
2340IFH%>W% THEN 2270
2350U%=INT(X%+RND(X%/10)-RND(X%/10))
2360CLS
2370IFH%<U% THEN FOR U%=1 TO 2:PRINTTAB(4,U%);CHR#130
;CHR#141;"Your bid for ";B$(P%)TAB(4);CHR#130;CHR#14
1;"has been refused.":NEXT:A$=GET$:GOTD2390
2380FORU%=1TO2:PRINT TAB(4,U%);CHR#131;CHR#141;"Your
bid for ";B$(P%)TAB(4);CHR#131;CHR#141;"has been acc
epted.":B$(P%)TAB(4);CHR#131;CHR#141;"is now ";A$(Q%
);" player.":NEXT:C(P%)=2:W%=W%-H%:A$=GET$
2390ENDPROC
2400DEFPROCendseason
2410CLS:FORP%=1TO2:PRINTTAB(6);VDU131,157,132,141:PR
INT"END OF SEASON. ";CHR#156:NEXT
2420PRINT "CHR#133;"Press any key to conitnue":A$=GET
$:PROCscores:PROCtable:CLS:PRINT
2430R%=R%+(8-V(1))*5+T%*5:B1%=B1%+1:FDRP%=1TO16
2440IF V(P%)<3 AND N%>>1 THEN PRINT CHR#131;A$(P%+(N%
-1)*16);" have been promoted.":A$=A$( (N%-2)*16+P%):A$
((N%-2)*16+P%)=A$( (N%-1)*16+P%):A$( (N%-1)*16+P%)=A$
((N%-2)*16+P%):A$( (N%-1)*16+P%)=A$( (N%-1)*16+P%)
2450IF V(P%)>14 AND N%<>4 PRINT CHR#134;A$(P%+(N%-1)*
16);" have been relegated.":A$=A$(N%*16+P%):A$(N%*16+
P%)=A$( (N%-1)*16+P%):A$( (N%-1)*16+P%)=A$
2460NEXT
2470IF V(1)<3 AND N%>>1 THEN N%=N%-1 ELSE IF V(1)>14
AND N%<>4 THEN N%=N%+1
2480PRINT "CHR#131;"NEW SEASON""CHR#133;"Division ";N
%:Q%=(N%-1)*16+1
2490FORP%=1TO24:A(P%)=RND(5):B(P%)=15+RND(5):NEXT:FOR
P%=1TO16:V(P%)=0:J(P%)=1:E(P%)=0:F(P%)=0:G(P%)=0:NEXT:
```

```
J(1)=6:K%=15:I%=0:*FX15
2500A$=GET$:ENDPROC
2510DEFPROCkeep
2520CLS:FORP%=1TO2:PRINT TAB(10,3+P%);CHR#131;CHR#141
;"SAVING":NEXT:PRINT "CHR#130;"PLEASE PRESS ";
2530H%=OPENOUT("FM")
2540FOR P%=1TO64:PRINT #HZ,A$(P%):NEXT
2550FORP%=1TO16:PRINT #HZ,E(P%),F(P%),G(P%),J(P%),V(P
%),C$(P%):NEXT
2560FORP%=1TO24:PRINT #HZ,A(P%),B(P%),C(P%):NEXT
2570PRINT #HZ,I%,K%,M%,N%,Q%,W%,Y%,Z%,R%,T%,B1%
2580CLOSE#HZ
2590ENDPROC
2600DEFPROCload
2610CLS:FORP%=1TO2:PRINT TAB(7,5+P%);CHR#131;CHR#141;
"Loading information""CHR#141;CHR#131;TAB(9);"for F
OOTBALL MANAGER":NEXT
2620H%=OPENUP("FM")
2630FOR P%=1TO64:INPUT #HZ,A$(P%):NEXT
2640FORP%=1TO16:INPUT #HZ,E(P%),F(P%),G(P%),J(P%),V(P
%),C$(P%):NEXT
2650FORP%=1TO24:INPUT #HZ,A(P%),B(P%),C(P%):NEXT
2660INPUT #HZ,I%,K%,M%,N%,Q%,W%,Y%,Z%,R%,T%,B1%
2670CLOSE#HZ
2680ENDPROC
2690DEFPROCpayment
2700FORP%=1TO24:IF C(P%)>0 THEN X%=X%+70+(5-N%)*10
2710NEXT
2720H%=X%+500*(5-N%)+Z%
2730CLS:PRINT "CHR#134;"WEEKLY PAYMENYS : ""TAB(5);
CHR#131;"Wage Bill = ";X%TAB(5);CHR#131;"Ground R
ent = ";500*(5-N%)TAB(5);CHR#131;"Loan Repayments
= ";Z%CHR#133;"Total Payments this week = ";H%
2740PRINT "TAB(6);CHR#130;"Gate Receipts = ";A2%CHR
#134;"Weekly Balance ( excluding selling"CHR#134;"and
buying of players ) = ";A2%-H%:W%=W%+A2%-H%
2750IF W%<0 THEN PRINT "CHR#133;"Loan increased to p
ay bills."
2760IF W%<0 THEN W%=W%+1000:Y%=Y%+1200:Z%=Y%/20:GOTD2
760
2770Y%=Y%-Z%:IF Y%=0 THEN Z%=0
2780PRINT "CHR#131;"You have ";W% , and owe ";Y%:*F
X15
2790A$=GET$:ENDPROC
2800DEFPROCscores
2810IF I%=0 PROCnomatch:ENDPROC
2820CLS:PRINT "CHR#131;TAB(6);"SCORES SO FAR THIS SEAS
ON""CHR#130;" Press";CHR#133;"SHIFT";CHR#130;"if scree
n stops scrolling"
2830VDU2B,0,24,39,4,14
2840FOR H%=1 TO I%
2850P%=INSTR(C$(H%),",")
2860A$=A$(VAL(MID$(C$(H%),1,P%-1)))
2870X%=VAL(MID$(C$(H%),P%+1,1))
2880PRINTTAB(21*((H%-1) MOD 2));CHR$(133);A$;TAB(11+(
20*((H%-1) MOD 2));CHR$(134);
2890IF X%=1 PRINT "home"; ELSE PRINT"away";
2900A$=RIGHT$(C$(H%),2)
2910PRINTCHR$(134);MID$(A$,1,1);"-";MID$(A$,2,1);
2920NEXT
2930VDU15,26
2940*FX15
2950A$=GET$
2960ENDPROC
2970DEFPROCgoal:PROCsheet:FDRP%=1TO8:FORX%=1TO2:PRINT
TAB(13,14+X%);VDU141,131,157,132:PRINTTAB(0);"GOAL!
";CHR#156:NEXT:TIME=0:REPEATUNTILTIME=10:FDRB%=1TO2:PR
INTTAB(13,14+B%);VDU141,132,157,131:PRINTTAB(0);"GOAL
! ";CHR#156:NEXT
2980TIME=0:REPEATUNTILTIME=10:NEXT:REPEATUNTILTIME=50
:PRINTTAB(0,14);SPC(1400):PROCwait:ENDPROC
2990DEFPROCwait:TIME=0:REPEATUNTILTIME>300+RND(300):E
NDPROC
3000DEFPROCnomatch
3010CLS:PRINT TAB(3,3);CHR#130;"There have been no ma
tches""CHR#130;" played so far this season.":*FX15
3020A$=GET$:ENDPROC
3030DEFPROCstatus
3035IF B1%=1 THEN P%=20 ELSE P%=R%/(B1%-1)
3040CLS:PRINT "CHR#134;"Team picked : - ";A$(Q%)"CHR#
130;"Managerial status (max 100) = ";P%CHR#131;"Seas
ons played = ";B1%CHR#133;"Morale = ";K%CHR#133;"P
osition ";V(1);" in division ";N%CHR#130;"You own "
;W%," and owe ";Z%
3060*FX15
3070A$=GET$:ENDPROC
```



How advanced is the 16-bit Advance 86A? Kathleen Peel finds out.



THE ADVANCE 86A is an IBM-compatible computer with a 16-bit 8086 processor 128K RAM, 64K ROM and colour, and costs £400. The computer is upgradable to the Advance 86B for another £900, which is compatible with the disc version of the IBM PC. There is also built-in provision on the main PCB for a further 128K RAM, £144, and the 8087 Arithmetic Processor.

The processor board is housed in a large dark-grey box — 530cm×420cm×11cm — which contains a deep recess behind a smoked glass Perspex cover in which the keyboard is stored when not in use, giving the unit a very modern hi-fi look.

At the rear of the processor are the interface and power connectors — the front panel houses the keyboard connector and an on/off switch.

The model supplied for review was a pre-production version assembled by Ferranti. The PCB had one very minor change on it, and the quality of construction looked very good.

The top of the processor box became warm above the power supply, but not excessively so. A monitor can be placed on top of the processor and reduce the very large amount of desk area taken up by the system. I would have preferred the processor on its side in a stand on the floor like the DEC Professional rather than lose this amount of space.

The separate keyboard is plugged into the box via a five-way DIN plug on the end of a coiled lead. It has two fold-away legs at the rear which enable it to be placed at a more convenient angle for typing.

The feel of the keyboard is good and the layout is the IBM standard with a separate, slightly-spaced numeric/edit keypad. The 10

function keys on the left-hand side of the keyboard are user-definable and can be switched to show their current application on the bottom line of the display.

The processor board contains no fewer than nine Ferranti ULAs as well as the 8086 main processor and its support devices — 8253, 8255 and 8259. Sockets provide for the addition of the extra RAM and the Arithmetic Processor.

The Advance has a full range of display connections — TV, video and RGB. The cassette interface is via a five-pin DIN socket with pins 4 and 5 taking the signal In and Out respectively. The Centronics printer interface uses a 25-way D-Shell connector, for which I had to disable pin 15 before getting print output. Once this was done there were no further troubles. This problem is symptomatic of the vast range of standard connectors.

The 80-column display was very clear and even the lower-case characters can be easily read. The display overscanned slightly on both edges, so it would be wise to check this point if you intend to purchase a monitor to provide the display.

A connection is provided for joysticks, 15-way D-shell, and a very useful mains extension socket for a peripheral device — say, a printer or monitor.

At switch-on, the computer performs a diagnostic check to see if everything is working, and faults are signalled either through the loudspeaker as a series of tones or on the screen in the form of error messages.

There is 62.57K free for Basic programs, but this may be increased for machine code to make better use of the 128K RAM.

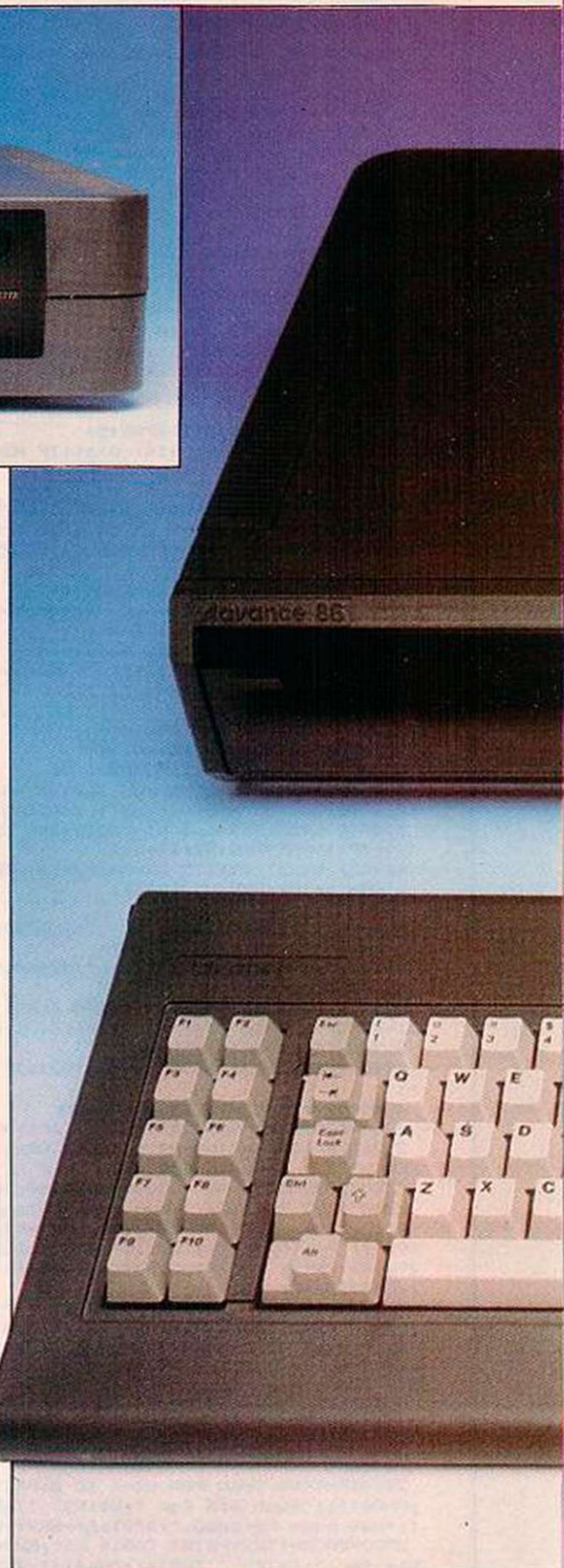
Program debugging is very easy thanks to

Figure 1.

TEXT COLOUR	f	b	bdr	0 black	8 grey
	0-31	0-7	0-15	1 blue	9 light-blue
flashing 16-31				2 green	10 light-green
				3 cyan	11 light-cyan
				4 red	12 light-red
				5 magenta	13 light-magenta
				6 brown	14 light-brown
				7 white	15 bright-white

Figure 2. Medium Resolution

Palette 0	Palette 1	any of 16 colours
0 background	background —	
1 green	cyan	
2 red	magenta	
3 brown	white	

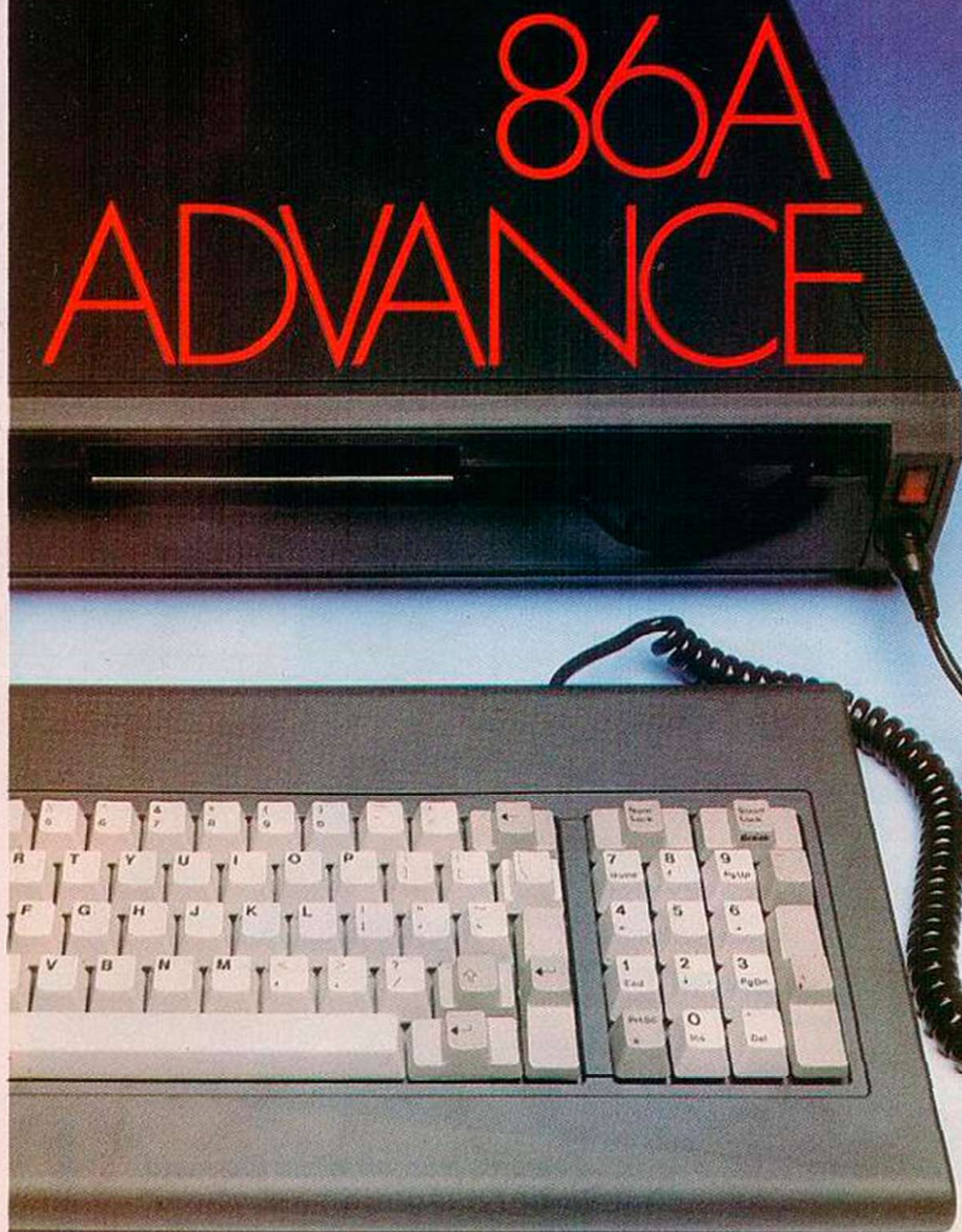


the full-screen editor and keypad, and the fact that you can list the faulty line quickly for correction. It is a shame therefore that the program data is space-sensitive because this is usually a major source of difficulty.

Editing is achieved by moving the cursor to the position in a listed program where the correction is to be made, and either typing over the old text or inserting and deleting by use of the keypad arrow keys. Pressing the Enter key puts the newly corrected line into the program.

The editor can also be used to re-enter a direct command by placing the cursor over some portion of the command and pressing enter again.

REVIEW



The cassette interface is via a five-pin DIN socket which can also be used to switch the cassette motor on and off. File names are of up to eight characters but can be extended by adding a full stop and then up to three characters.

The Basic was quick: the simple speed tests that I normally run took only four and 93 seconds respectively. Benchmark tests show the Advance to be much quicker than the IBM PC.

PC Basic is now widely accepted as the standard. It has a wide range of commands with reasonable structure. In general, PC Basic is not wildly exciting, but it reached the top of the heap by being born with the name

CONCLUSIONS

- The Advance 86A is aimed at the expanding IBM PC compatible market and costs just £400. This can be upgraded to a twin disc-based system for an additional £900 giving MS-Dos compatibility.
- The Advance 86A is equivalent to the basic American IBM PC with colour board, and as such represents a considerable saving in money. Being IBM-compatible means there is a vast range of very high-quality professional business software available for the upgraded MS-Dos version.

IBM. Four data types are supported:

- Single-precision ! Up to seven digits
- Double-precision # Up to 16 digits
- Integer % - 32768 to 32767
- Strings \$ Up to 255 characters long

There are four modes of screen display stored in the 16K video RAM:

- 40 × 25 text eight screens, 16 colours
- 80 × 25 text four screens, 16 colours
- 320 × 200 four colours two palettes, medium resolution

640 × 200 black and white, high resolution

In text mode 16 colours are available, 0-15, flashing 16-31 for the printed character, f, and eight colours for the background, b, with 15 colours for the screen border 0-15, bdr. This is specified by the command

COLOR f,b,bdr

— see figure 1.

Medium resolution gives the choice of two palettes of four colours — figure 2. A palette change instantly changes the screen colours and can be used to create special effects. The graphics commands are limited to PSet, PreSet and Line, although Line can box and fill.

In text mode the user can write to any of the eight/four screens and display another.

SCREEN mode, b/w or col, active scrn, visual scrn

The Advance also has the ability to produce a screen copy using the PrtSc command. Obviously the graphics can only be reproduced on the correct type of printer.

Sound may be generated by either Beep, usually called bell, Chr\$(7) or Sound frequency time.

A program will continue to execute while the sound is playing unless another sound command is met. Then it will wait until the first sound command terminates before continuing.

The documentation provided was not the final version. In general the text was fine but the figures were omitted. There will be an obvious need for a beginners' guide, but they already exist in the guise of IBM PC introductions. I liked the idea of the single reference document — it was not too large and was easily read — even if half referred to the Advance 86B. One minor moan — I like an index at the back; the index preceded user notes on the software supplied with the Advance 86B.

■ The lack of sophisticated graphics and sound facilities prevent the Advance from becoming a first-class games machine, but then it was always intended for more serious uses.

■ The Advance 86A represents good value today. It remains to be seen whether the coming Japanese IBM look-alikes are competitive and offer a challenge in the next few months.

■ My only criticism — which applies equally to the IBM PC — is that it takes up a huge amount of desk space.

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AMSTRAD

PREVIEW



With 64K, screen and tape for £200, the new Amstrad looks a bargain. Previewed by Merion Jones.

WHEN A COMPANY like Amstrad, which smashed open the hi-fi market with low-price audio equipment, starts making micros the Sinclairs, Acorns and Commodores had better watch out.

On paper the CPC-464 looks like it is going to give the Electron and the Commodore-64 a very hard time, not to mention the Oric, Atari and even the Spectrum. It has as much memory as any of them — nominally 64K, in practice 42K free. The Amstrad has a numeric keypad as well as a real typewriter keyboard, and in high resolution mode has 80 character display and 640×200 resolution.

What's more Amstrad is promising that the CPC-464 will be in the shops by June. On these grounds alone the Amstrad would be a strong contender but for £200 it includes a built-in tape recorder and a monochrome green screen monitor in the price. For £100 more you can have a colour monitor.

The power supply unit is in the monitor because Amstrad see the CPC-464 being used as a system. A word processor will be one of the first programs released for the machine and a disc drive with CP/M is planned for release later in the year.

The built-in tape recorder, which was a popular idea in our "Design a Micro" competition, has alternative 1K and 2K baud rates for loading and saving programs. The Amstrad also has a Centronics compatible printer port and a joystick socket. There are RGB and stereo sound outputs, although it also has a small internal speaker.

CPC 464

The CPC-464 is Z-80A based with the standard three-voice AY-3-8912 sound chip. An Uncommitted Logic Array handles graphics which offers you three modes. In low resolution, 160×200 , you can use 16 colours on screen out of a palette of 27. Top mode is any two colours from the palette in 640×200 , 80 character resolution. Default mode is 320×200 , 40 character resolution in four colours.

32K of ROM includes a fast Basic including two new commands — After and Every. Crude windowing allows you to put up to seven text windows and a graphics window on screen. The keyboard is colour coded — red for escape, blue for enter and so on and 32 of the 74 keys can be redefined as function keys.

Amstrad is taking home computers very seriously and has also set up a software house,

On screen
Alan Sugar
Amstrad's founder.

Amsoft, which hopes to have 50 programs ready for the launch of the CPC-464 including games and more educational offerings like Happy Numbers. Since Alan Sugar set the company up in 1968 Amstrad has taken a third of the hi-fi market and its

sales this year will be in the region of £100 million.

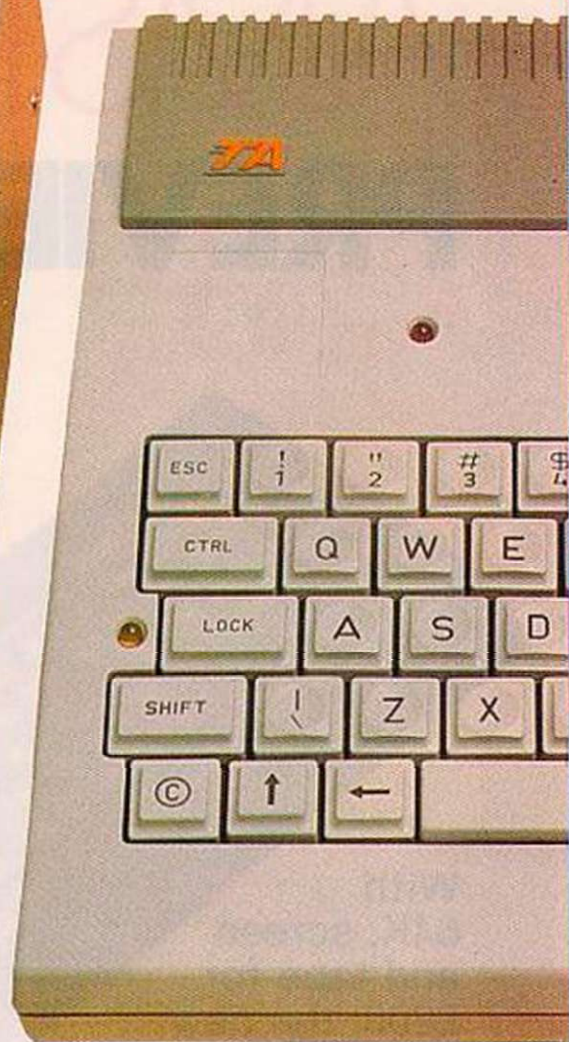
Amstrad plans to sell hundreds of thousands of its CPC-464s by Christmas — way up in the Sinclair and Commodore league. The company has spent 16 months developing the project and is already working on a new range of micro-computers to take up where the CPC-464 leaves off.

At first glance the CPC-464 looks like a winner but can a company with no experience of making computers come straight into the micro market?

Appearances can be deceptive so we will be putting the Amstrad to the *Your Computer* test. Read what our reviewer thinks of the CPC-464 compared to its rivals in these pages next month.

REVIEW

ALPHA-TRONIC



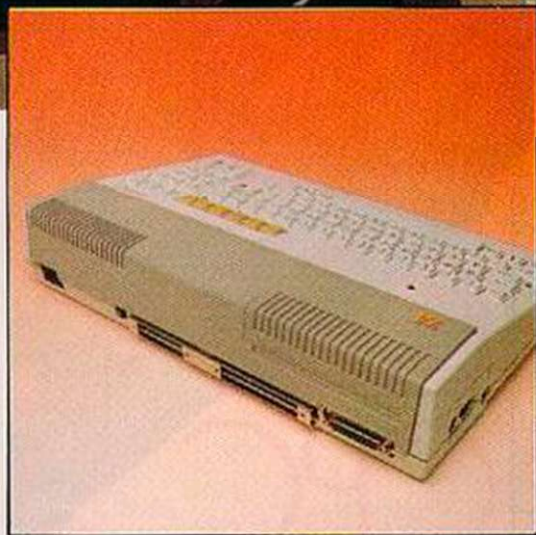
FOR THE LATEST generation of home computer owners the initials CP/M are not especially resonant. Although CP/M is a household name in the world of business micros it rarely appears in the pages of *Your Computer*. One reason for this is that most home computers do not require disc drives.

CP/M is simply the disc operating system which the microcomputing world has come nearest to accepting as standard. Because it has been running on 8080 and Z-80 based micros since 1975, a vast range of software has been developed for it. Well over 2,000 programs are available on CP/M and there probably are as many different hardware configurations which run them.

Once you have got a micro which takes CP/M you can enjoy a choice of packages which range from software classics such as word processors like Wordstar and spreadsheet programs like SuperCalc to language compilers, adventure games and a host of business applications.

You can now buy a CP/M based system for less than £700 — in the form of Volkswagen subsidiary Triumph Adler's Alphatronic PC. This is a 64K computer built around a 4 MHz Z-80A processor. The interest in reviewing this machine in these pages is that it is also claimed to be a dual-purpose computer, one that can provide equally well for games and business applications.

As a stand-alone cassette-based system the PC costs £347. To run CP/M you will need to buy the disc drive for £330 and a CP/M disc for £29, with a second drive costing £270. These are 40-track double-sided, double-



density drives which give 320K storage per 5¼ inch disc.

Triumph Adler's fully-fledged business machines are built like tanks and some of the same principles of construction appear to have been employed in the design of the PC. It is an extremely sturdy machine which makes most home computers look distinctly flimsy.

As you might expect from a typewriter manufacturer the keyboard is excellent. In all it boasts 86 electric typewriter style keys which include a separate numeric keypad and six programmable function keys.

At power-on the function keys are already assigned commands which are displayed in a panel at the bottom of the screen. These can be reprogrammed with up to 15 characters. Pressing the shift key gives you a further six commands.

At the back and the side of the computer are all the I/O ports and interfaces you are likely to need: a cassette port which loads and saves at 1,200 baud, an RS-232 serial interface together with a Centronics type parallel inter-

face, an expansion bus interface to connect two disc drives, and as well as a normal TV signal both RGB and composite video outputs. In addition there is a slot to take ROM cartridges.

All these features make the PC good value as a low-cost business machine. On top of the range of CP/M software Triumph Adler is converting a number of programs written for its larger machines — accounting packages and suchlike. Many of these run on the company's own disc operating system which is supplied with the drives.

A further point in favour of the PC's business capability is that Triumph Adler is adapting its local area network, the Micromite File Server, for the PC, making it possible to link up to 254 machines together.

In its role as a home computer, however, the PC is not quite so impressive. By today's standards the graphics are poor. There are two text display formats, 40 by 24 and 80 by 24. Corresponding to these are two graphics modes which give pixel resolutions of 80 by 72 and 160 by 72. Eight colours are available in the lower text and graphics resolution but switching to the 80-column screen translates these into shades of grey.

In respect of its graphics facility the PC is very similar to the Sharp MZ-700. Like the MZ-700 it also offers a set of predefined graphics characters which can be accessed by pressing the Graph key. But there is no provision for user-defined characters.

This means that there is little scope on the PC for writing interesting games. Certainly you could not achieve the spectacular graphic effects found in games on much cheaper



Sturdy as a Beetle, but what chance does Alpatronic's PC have of becoming the people's home computer? Simon Beesley moves into top gear to find out.

machines. Sound is equally limited and consists of a single beep, emitted from a piezo-electronic buzzer. Triumph Adler says that it will be commissioning games from leading software houses but it is doubtful that many will find the PC promising material. Consider how little software support the Lynx and the Memotech — machines with far greater games potential — have received to date.

Unusually for a micro at this price the PC not only has a full 64K of RAM but also a further 28K of ROM containing the Basic interpreter and monitor. If a disc drive is attached with CP/M on disc the monitor reads in CP/M leaving about 49K RAM spare. Otherwise it transfers the Basic interpreter to RAM.

The Basic interpreter is standard issue Microsoft Basic and consumes a sizeable 24K RAM. Once the monitor and video RAM have taken their share the user is left with around 28K. Microsoft Basic could be called the grandfather of all micro Basics. There is a version of it on the Dragon and most home computer Basics share some of its features.

For a manufacturer it has the advantage of being instantly available. No need to spend months developing your own Basic and then more time ironing out bugs, when you can buy Microsoft Basic virtually off the shelf. Its disadvantage is that it is beginning to show its age.

When you consider that in 16K BBC Basic offers more features, includes an assembler, and is substantially faster, you begin to wonder how efficient Microsoft's code is.

Still, in comparison with, say, Spectrum Basic the Triumph Adler version is quite a

powerful one. It includes a number of programming aids such as Trace, Delete, Auto and Renumber; error-trapping is catered for by ERR, ERL which respectively report the error code number and error line, while Resume and On Error Goto enable a program to carry on after an error; and If Then Else and While Wend make a gesture towards providing a structured programming facility.

Several other of its features will be new to most home computer owners. As well as defining a function, you can use Def to declare that variables beginning with specified letters will be of a particular type — either integer, single or double precision, or string. With Swap you can exchange the values of two variables, while VARPTR returns the address at which a variable is stored.

On the graphics front the range of commands is limited, in keeping with the

machine's low resolution. Pset and Preset switch on pixels in a specified colour — although all the six pixels in one character space must share the same colour. Line, as on the Dragon, is used to draw lines, rectangles and blocks, and Point tests whether a pixel has been set or not.

To format the text display Console and Width are available. Console lets you set the height — but not the width — of a screen window. Width gives either a 40 or 80-column display. In the 80 column format text is not easy to read on a standard television so most owners will need to buy a monitor; particularly since this is the format used by CP/M software.

Triumph Adler has supplemented Microsoft's line editor with a full screen editor similar to that found on Commodore's micros. This is a welcome addition. Full screen editors are always preferable: correcting a program line on the Dragon with the Edit command is a cumbersome business; compare the ease and speed with which the CBM-64 lets you move directly to the line at fault using the cursor keys.

All in all the PC's Basic could be described as dull but worthy. And this judgment could be extended to the machine as a whole. Triumph Adler has produced a well-engineered machine largely lacking in any innovative features.

If you are looking for a genuine work and play computer you would do better to consider Memotech's MTX-512 or Computer's 128K Laureate. Both of these run CP/M as well as offering sound and high-res graphics. Both however cost more. ■

CONCLUSIONS

- The Alpatronic PC's chief merit is as a cheap CP/M based system. Given the large range of CP/M software available it would be suitable for the home computer owner who wants to graduate to more serious applications.
- Its other virtues are sturdiness and reliability. It boasts one of the best keyboards on any computer under £1,000.
- Lack of high resolution graphics and sound renders it unexciting from the point of view of the owner who is interested in games and other leisure pursuits.

TANDY has joined the current fad for putting a proper keyboard on an established computer. In this case it is the Colour Computer 2 which sports a new off-white livery and 64K of memory.

The CoCo 2 is about 15 percent faster than the original CoCo and costs £160. Considering that the CoCo 2 provides a colour and pixel resolution virtually the same as computers costing half the price, it does not appear to be competitive.

What makes a very ordinary computer a little bit special is the new software. The OS-9 operating system is designed by Microware System Corp. for Motorola, and based on the Bell Telephone Laboratories UNIX operating system, to be used on their 6809E processor. This costs £70 from Tandy.

The software is supplied on a 5.25in. disc and comes complete with a very comprehensive set of manuals. To use the OS-9 operating system requires a minimum of one disc drive, this adds a further £350 to the already not insubstantial cost.

The operating system may be enhanced by the addition of Basic-09 costing another £70, and requiring a minimum hardware configuration of two disc drives, a further £250 for the second drive. Fortunately, the user can start at the bottom with just the basic computer and progress from a modest beginning to a system with many of the features more usually found on a minicomputer.

A restyled version

The CoCo 2 is a restyled version of the old Tandy Colour Computer that has been around for a long time now, with 64K of memory. What is interesting is the software for the computer. OS-9 removes the existing minimal operating system and Basic language and substitutes a full operating system. The new operating system has limitations placed on it by the inadequacies of the hardware.

The operating system has hierarchical directories and files, multi-user, multi-tasking capability and device independent input output. The hierarchical directory structure permits the user to group files in logical blocks and sub blocks.

This is organised like a family tree, starting with you and finishing with your ancestors' directories', each directory containing files on each of the people concerned. Access to every file is governed by properties called ownership and attributes. These are Read, Write and Execute for owner, the person who created the file/directory, and public, everyone else.

The other two attributes are Directory/File: on for directory, off for file. Shareable, governs whether more than one person can access the file at the same time.

Multi-user infers that more than one person can access the system simultaneously. Unfortunately the hardware limitations of the CoCo 2 limit usage two users or one user and one printer. Multi-tasking entails that more than one task may be active at the same time, tasks may be sent to sleep and activated after a predetermined time.

The timesharing is achieved by using a facility called timeslicing. The proportion of



Real keys, a white case and the special OS9 operating system — Kathleen Peel sees how the new Tandy shapes up.

time given to each process being set by the priority allocated to each process. Each process can have one of the three states: Active; a process using CPU time; Waiting, a process waiting for termination of an existing process; and Sleeping, a process suspended for a specified time interval. Usual state of processes waiting for input or output.

Device independent I/O refers to the ability of the operating system to transfer data in a neutral manner not specific to any device. To move data, a path of logical devices is given, such as P for printer, D0 for disc drive 0 and so on. Where possible default devices are assigned, the screen for List and disc drive D0 for Save, but these can be overridden by specifying an alternate path.

Besides the operating system there is a high level language which acts as a command interpreter shell. The shell is automatically entered on startup and has commands like ASM, Exbin/Binex, and Login. ASM is assembly language programming which has a

number of limitations. The code must be written in position independent code as the system determines where the code will be at Runtime.

The code must not be self-modifying and must use the standard OS-9 memory module format. All I/O should use OS-9 system calls. Binex converts a binary file into an S-Record file, Exbin does the reverse. An S-record file is a type of text file that contains records representing binary data in hex format. This format is often directly acceptable by commercial programmers and emulators that are RS-232 interfaced.

Three attempts are allowed

Login provides for system security and asks for a user name and password, three attempts are allowed before the process is aborted. An acceptable entry is assigned predetermined file and directory access.

The username and password may be of upto 32 characters including spaces and each user may be given an individual user number of 0

COLOUR II REVIEW



to 65535. The number is allocated to super-user and is used to identify all processes started by the user. Each user has a priority and an initial pathlist for execution and data directory. There is even a message file which will be displayed on successful login. There are a tremendous number of facilities available.

Basic09 is the first language to be produced that will run under the OS-9 operating system. It is an interactive compiler that produces very fast and very short, packed, memory-saving code. It is not really Basic but a very much enhanced, highly structured language, not requiring line numbers, with many of the features of Pascal and Basic incorporated.

The programming system as Tandy call it consists of:

- text editor,
- multi-pass compiler,
- runtime interpreter,
- high level interactive debugger and
- system executive.

Basic09 also contains a Graphics Interface — GFX providing access to the CoCo graphics functions and a Runtime package — RUNB that is a condensed version of Basic09. It occupies half the space, but has no file editing or debugging facilities and only executes packed modules. It is difficult to know what one would do with Basic09.

Programs written in Basic09 require compatible systems to run, OS-9 discs are not readable by the normal Tandy DOS. I also do not know of a similar implementation of Basic, so learning this does not appear to have any long term viability. That said, it is certainly one of the most powerful Basics I have seen on a micro. ■

CONCLUSIONS

- Unfortunately the hardware hardly does the software justice, the limitation on the number of users suggests that the CoCo is really the lowest level at which such an operating system can be implemented.
- I doubt very much whether there is any real potential use as a business system because of the 64K limitation in memory, lack of 80 character width option and no monitor facilities.
- There is no doubt that for someone

who loves his CoCo this represents a natural extension which will be very well received. This is not simple old Basic but a real operating system which is not only very comprehensive, but very complex and not at all suitable for the occasional user.

- It will be of use to those who want hands on experience of a Unix — type operating system and wish to learn on a computer setup that enables the experience to be gained in easy stages, but that does require a similar set of instructions.

SPECTRUM

Mike McCann negotiates an obstacle course, collects glasses, shoots the inevitable aliens, catches mice and gets involved in high finance. Enough to make you take to the bottle — and he does that too!

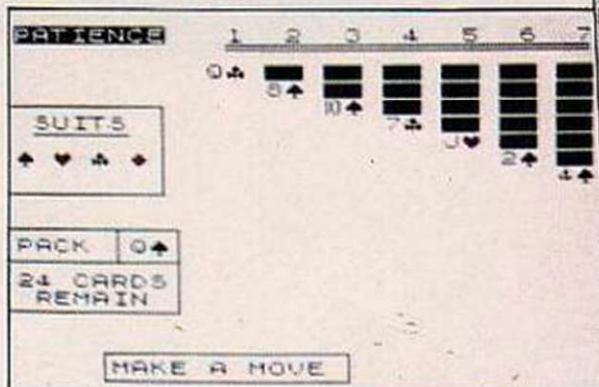
SINCLAIR'S ZX SPECTRUM is the most common home computer in Britain, with well over a million in use today. In spite of its shortcomings — keyboard and interfaces, to name just two — its vast numbers give it a tremendous advantage over its competitors. The software companies obviously want to sell as many of their programs as possible, so they write them for the best-selling machine. The result is that there is more, better and cheaper, £5-7, software for the Spectrum than for any other home computer.

Having said that, however, Spectrum users will be well aware that there are plenty of run-of-the-mill games programs around as well. Perhaps because the Spectrum has been with us for so long and so many programs have been written for it, it is increasingly difficult to come up with a good games idea. Many games are depressingly familiar — there must be at least 57 varieties of Space Invaders and Pac-Man.

There is far too much software in which the main challenge to the user is to co-ordinate finger movement over the keyboard with the movement of the assorted nasties on screen. The action may be fast or slow, the sound fantastic or non-existent, and the graphics may be hi-res or dire, but running the programs is a mechanistic process. Once you have mastered them you hardly have to think what you're doing, especially if you have a joystick.

One way to overcome this drawback is to market your programs not merely as a game, but as a comedy show, with optional song. Automata are past masters at this, remember Groucho, *Your Computer* December 1983?, and the latest in their Pi-Man series is called Pi-Eyed. It uses an idea that has been around for almost as long as the human race: alcohol and its well-documented side effects. You play the Pi-Man in his most bucolic form, cleverly avoiding the traffic by going into pubs. Once you're in the pub, the doors are locked and you are told that you can't leave until you have finished every pint on the bar.

As the Pi-Man's beer consumption increases, he gets more difficult to control, and he staggers around the room, bouncing off his fellow drinkers, slipping on crisp packets and losing you ten points per bounce. He also has the endearing habit of facing the wrong way and you have to plan around with the controls as he reels and lurches about.



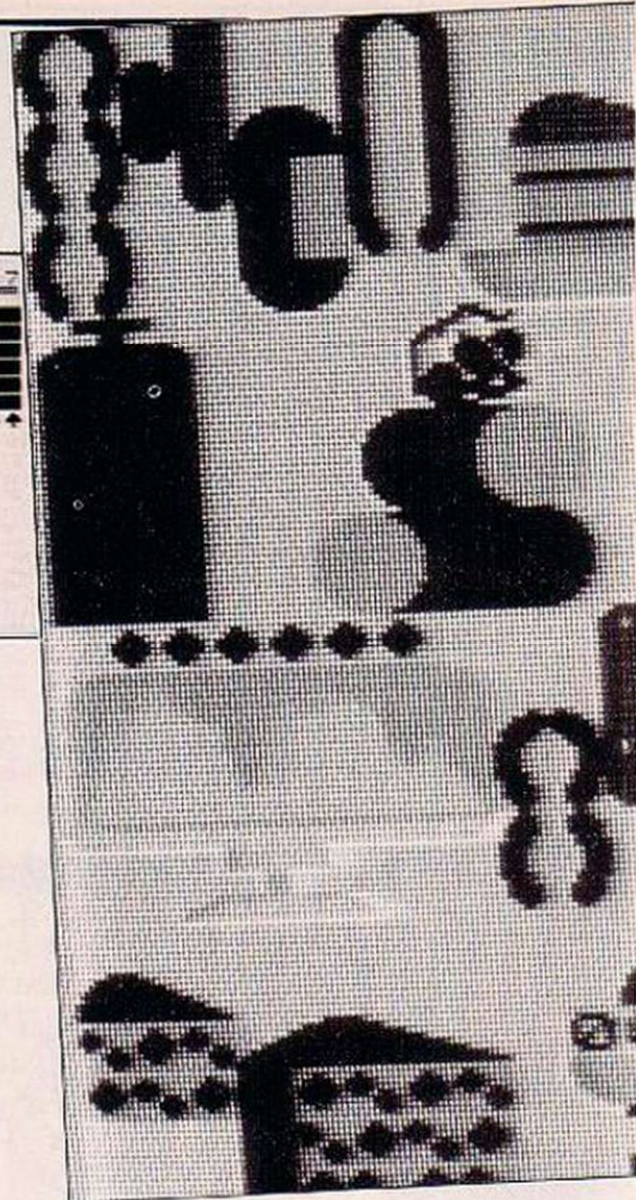
In between dodging cars and downing beers, the Pi-Man causes havoc by going into some other shops on the high street, as well as the Police Station and Automata's Headquarters. His beery presence draws forth a joke, even mine are better than theirs, and our hero is sent on his way — to another pub, of course. One of the friendlier features of this game is that, like a real pub crawl, it lasts quite a long time.

A novice can keep the Pi-Man alive for five minutes, which is a welcome change from the killed-three-times-in-five-seconds space invaders.

An essential part of Automata's package is the "free hit record" on the flip-side of the program tape. Naturally enough, the Pi-Eyed song is about drinking to excess, and it won't be a hit.

The Pi-Man is a durable character, too. He crops up again, though not looking at all like his former self, in Pi-Balled, which is also from Automata. As the sleeve says: "Free Musical Mess by Clair Sinclive", but this time the song is better than the program. You have to hop around a 28 block pyramid, avoiding the Pi-Man and his five accomplices who, in familiar style, try to kill you. Apart from the song, the only link with Pi-Eyed is the scoreboard, which is displayed above a picture of a bar.

Possibly the best of last year's Spectrum programs was Manic Miner, written by Matthew Smith of Software Projects. Jet Set Willy comes from the same team, and is written around the sort of story everybody had heard and nobody can believe. William is extremely rich and extremely brash. He lives in an enormous mansion and has just thrown an enormous party. Now he's got to clear up an enormous mess before his housekeeper will



allow him to crash out. So off you go: left a bit, right a bit, jump and collect as many glasses as you can. As with a thousand other games there are hazards all over the place, most of them fatal.

Some of the rooms in Willy's pied-a-terre are a little bizarre, to say the least: in the Nightmare Room, for example, our hero turns into a flying pig, and has to avoid bats, broomsticks and a large right foot before collecting the glass. At least there are plenty of different rooms — you can be killed by the beastie of your choice.

Software Project's marketing ploy is not a free hit record (though the Spectrum does emit a beep version of "If I were a Rich Man to accompany Willy on his quest for glasses). Oh no; they've hit on the idea of running a competition. A case of Dom Perignon champagne (they don't say what vintage) and a helicopter trip over your home will be yours if you can find out how many glasses Willy has to collect before he can go to bed.



GAMES



Software Projects uses a clever security system for this program, presumably to prevent anyone reading the competition answer from a listing, as well as to prevent illegal taping. You have to enter a code before the program will run.

Speaking of security, imagine stealing your way through the corridors and lifts of the Secret Police Headquarters and turning off the power supply of the main computer. Visions Software claim it's got nothing to do with 1984, the book or the year. They say it will all happen in 1994, which is the name of their new maze and obstacle course game. With seven different levels to negotiate, and all the usual paraphernalia of security to evade — robots, plasma bolts and the odd chainsaw, you might have your work cut out.

The advantage 1994 has over other similar games is in presentation: a menu lists a range of options, including a "panic button" which holds the action so you can take the dog for a walk without losing the game. There is also a practice mode — you can practice at level

seven, even if you can't reach it in a proper game, and the instructions are displayed on the screen.

Orwin Software also score highly for presentation, putting larger companies to shame with their Centipoid Plus Three, which is a brightly coloured space invaders type game with six different screens. Patience is a quality which is sorely tried by computer games. It is also a card game which Haven Hardware has translated into a computer program, faithfully reproducing the original.

The computer shuffles the cards for you, but it is your skill and judgement that wins the game (yes, really!). Picking up the rules and mastering the controls takes a couple of minutes. Because it is a familiar game, Patience could well introduce more people to computers. It will be interesting to see if the real ace which Haven holds is a range of card games as good as this. At least there are no aliens in this one — even the knave of Hearts is harmless.

Competition time again, with Flix from Softricks. This is a brilliant but simple puzzle

game in which you have to use your brain rather than your fingers. You are presented with a picture of a Vogue magazine cover, which is then divided into a grid. The size of the grid depends on the difficulty level which you set at the beginning, between one and four. Level one gives you a 4x3 format; level four is 32x24, and is the one the competition uses. The grid is then shuffled around the screen in the same way as the cheap and nasty plastic puzzles you used to win at fun fairs.

The object of the exercise is to get back to the original picture in as few moves as possible. Level four should take up most of your time between now and the end of October, when the competition closes.

You can save your solutions or part solutions on tape, and go back to them time and time again. And, if you get bored with the Vogue cover, you have a choice of two other startlingly realistic pictures — a fast car and a fast motorbike — to load up. All the graphics are drawn with paintbox graphics software. First prize is a colour monitor for the Spectrum.

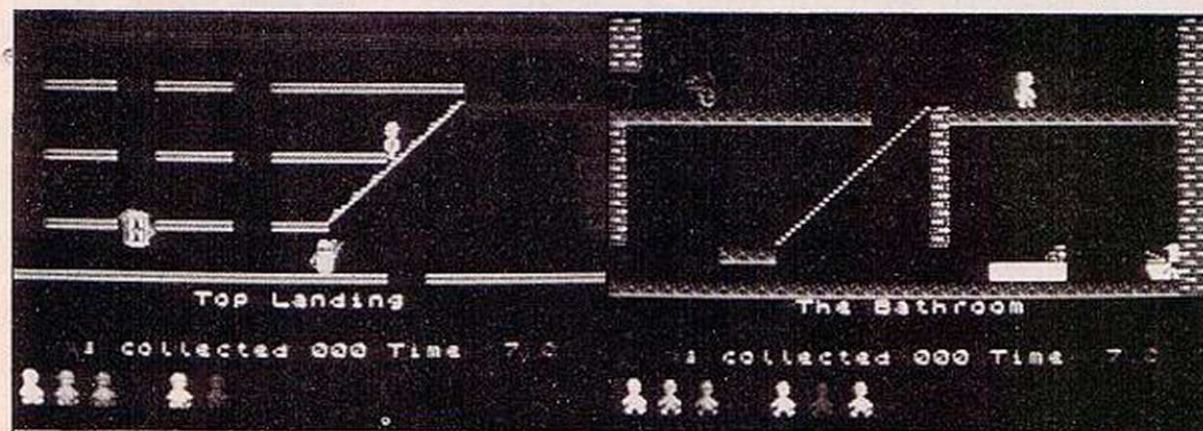
Accountancy and finance might not be your idea of games, but Cases Computer Simulations have come up with three programs: Stock Market, Oligopoly and Manage, which are good fun to play, though can be time-consuming. Each game is a model of the "financial world", and the object is to make as much money as possible, usually at the expense of someone else — see how life-like it is? You type in production levels, price, marketing tactics and so on, the computer can prompt you if you want, or you decide how many shares to buy and sell.

The results are then neatly displayed in tables and graphs on the screen or, in the case of Oligopoly and Manage, on a printer. CCS say that these two programs are suitable for teaching business studies or for real management training, so the printer option is useful. In Stock Market the computer give you an assessment of your performances, picking out mistakes and congratulating your strong points. This is in fact the most entertaining of the three.

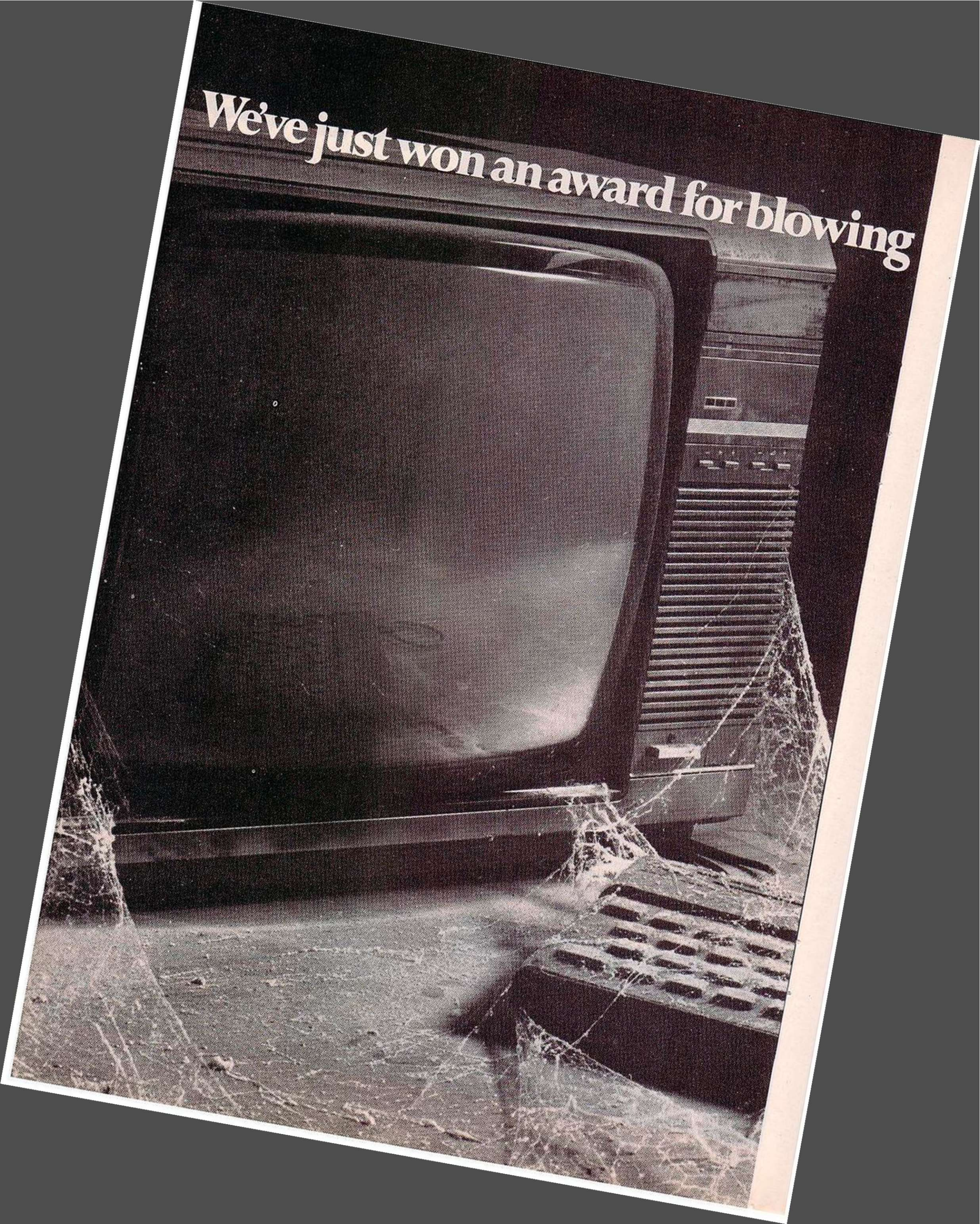
A basic knowledge of accounts is obviously more useful than a joystick for these programs, but even so, I managed to make an after tax profit of £1,950 in a week's trading on the Stock Exchange — by exchanging guns for butter.

Finally, a computer game for the under fives. Caesar the Cat comes from Mirrorsoft, alias Mirror Group Newspapers, and has one of the most attractive displays of any game. The screen is more of a picture rather than plain old graphics, and the animation is almost up to Tom and Jerry standards: Caesar runs, turns and jumps in a pretty realistic way.

His aim in life, as with any other cat, is to catch the mice which continually raid the larder, and deposit them outside. He loses marks for banging his head, and loses one of his feline lives if he breaks a storage jar. ■



We've just won an award for blowing

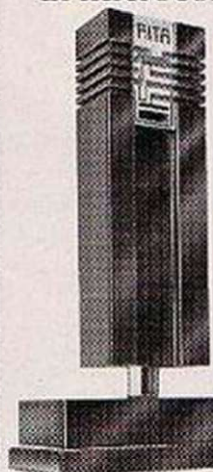


away the cobwebs.

You know the story, the Micro you thought would give endless hours of fun soon becomes a five minute wonder. You get bored and dump it on the shelf to gather dust.

With the introduction of Micronet 800 you now have access to a vast mouth-watering menu of facts, figures and fun.

If we said it was a major breakthrough in microcomputer technology we wouldn't be going over the top.



Just recently at the Which Computer Show we picked up the prestigious RITA award for Systems Innovation of the Year.

RITA is the 'Oscar' of the computer industry. Judged and sponsored by the major forces in related institutes, associations and publications.

Incredibly all it costs is just a pound a week to take up a subscription to the Micronet system. Plus, for most of you a local telephone call whenever you want to connect up.

Then you've got 30,000 pages at your fingertips, including Computer News Flashes all that Prestel has to offer, and Micronet's SwapShop. Where you can buy anything from joysticks to second-hand computers.

Interact with our daily news update. You can even take over the world; competing against hundreds of other subscribers on the system, in our 'Starnet' game.

If we haven't won you over with that then try downloading our wide selection of free games and other tele-software.

Naturally, you can run household accounts, manage businesses, talk to other subscribers nationwide using the system.

The list is endless and so is the fun.

The only addition you need to connect with Micronet 800 is a modem unit.

Apart from that all you'll want is a pen to fill in the coupon for more information. Then we'll have you linked up in no time.

Before the dust settles, in fact.

Please send me the full facts about Micronet 800.

Name _____

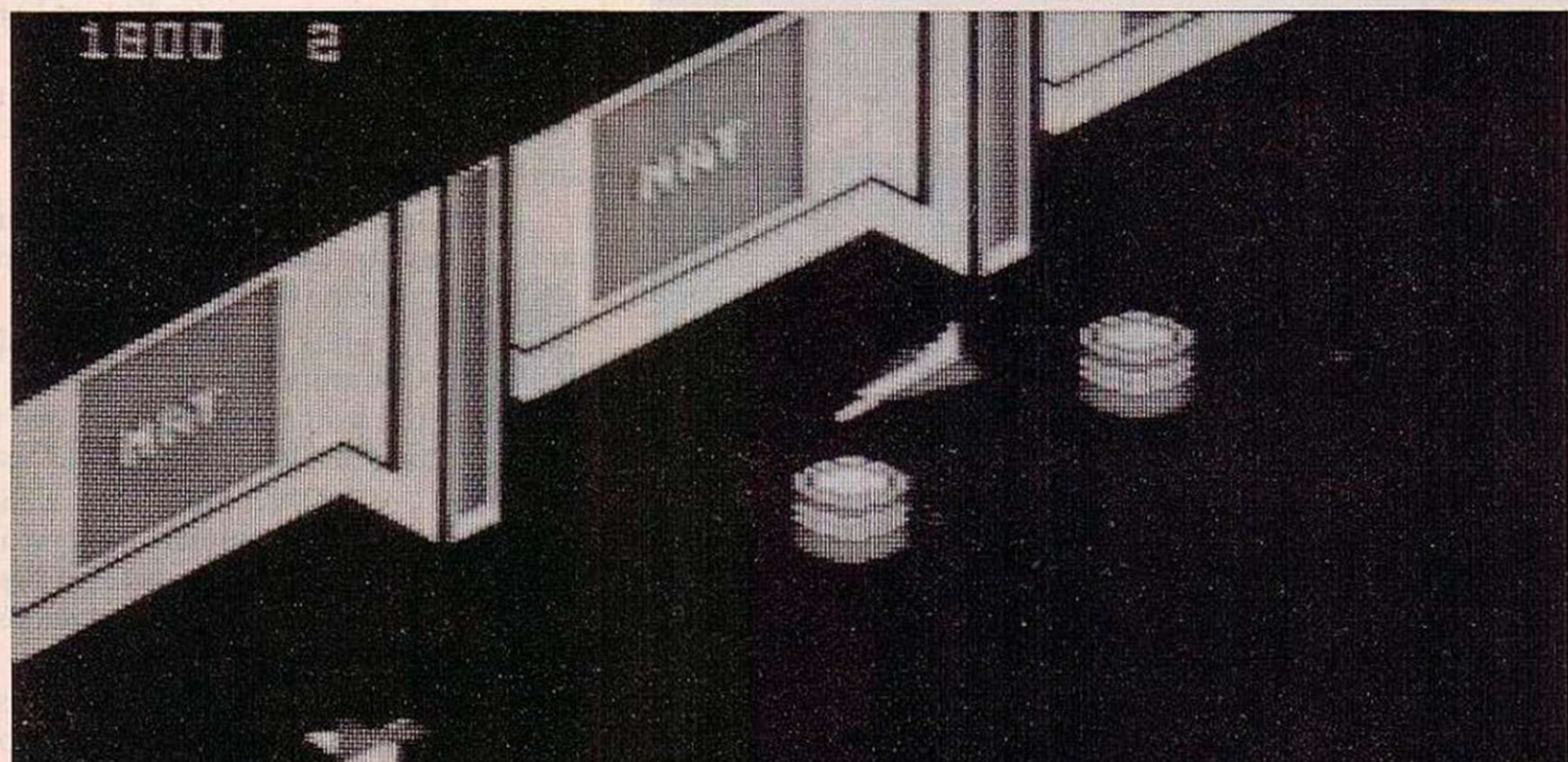
Make/Model of Micro _____

Address _____

Telephone _____

MICRONET 800, Scriptor Court, 155 Farringdon Road, London EC1R 3AJ
Telephone 01-278 3143.

micronet
800



ACORN SOFTWARE

NOSTALGIA TIME at *Your Computer*. Here they come crawling down the screen, but by swift manipulation of the Z and X keys and a few stabs of the Return key we despatch a few more alien intruders to the great cathode ray tube in the sky.

Yes, there is a perverse pleasure in using a relatively highly-priced and sophisticated microcomputer to play Space Invaders derivatives. Of course, it is a sophisticated business and educational tool, but Space Invaders is the micro equivalent of the company cricket or squash team. If you don't cut any ice there, you can forget it, regardless of how good you may be on paper.

Purists and connoisseurs will always find fault. It has been said to me of Beebugsoft's Alien Destroyer — the "classic arcade game for the BBC Micro Model B" — that the aliens descend rather too quickly and are the wrong colour and wrong shape. But control of the laser base is extremely responsive, allowing the player to continue his defence effectively, while dodging the falling bombs.

Enjoyable but somehow staid in comparison with Program Power's Position. This should be sub-titled Mondrian with Machine Gun, as the strange cubes and patterns come sliding down at your beleaguered earth-station. This emits a truly nerve-shredding phaser sound as you blast away, mowing down the advancing hordes like the Czar's soldiers do it to the masses in Battleship Potemkin. That's a film, not a game by the way.

Zarm, from the same company, moves us away from casual genocide to another old arcade favourite, Lunar Lander. Sufficient exposure to these games leaves you with an inordinate amount of admiration for Neil Armstrong and Buzz Aldrin. You wonder how

SURVEY

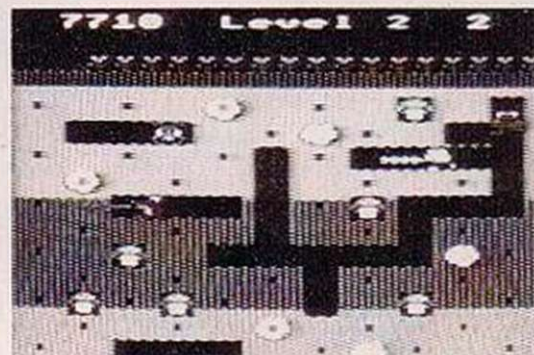
Paul Bond saves the galaxy yet again.

they managed to get as far as bashing the contact wires into the lunar surface, let alone remembering speeches.

On seeing a gap in the space rocks press the release key — the Shift button — and you are on your way into the hurtling mass. Weaving from left to right, pressing the thrust button to slow your descent, you land gently on one of the give landing sites to rescue a stranded astronaut. Same thing in reverse, soft-dock with the orbiter and the quicker you do it, the more bonus points you get. Easy as crashing the car in your own garage.

Rocks and TIE fighters

Still dodging the rocks, Vortex from Software Invasion plunges us into unknown space. You are rather unscientifically being drawn into the black void — presumably a black hole is the real culprit. Of course the fascinating thing about black holes is that some physicists believe that a state of singularity may exist within them. Should your spacecraft fall into one, since the laws of physics no longer apply, it could turn into anything from a tube of toothpaste to a packet of Daz. And the list of possibilities is not limited to products connected with domestic

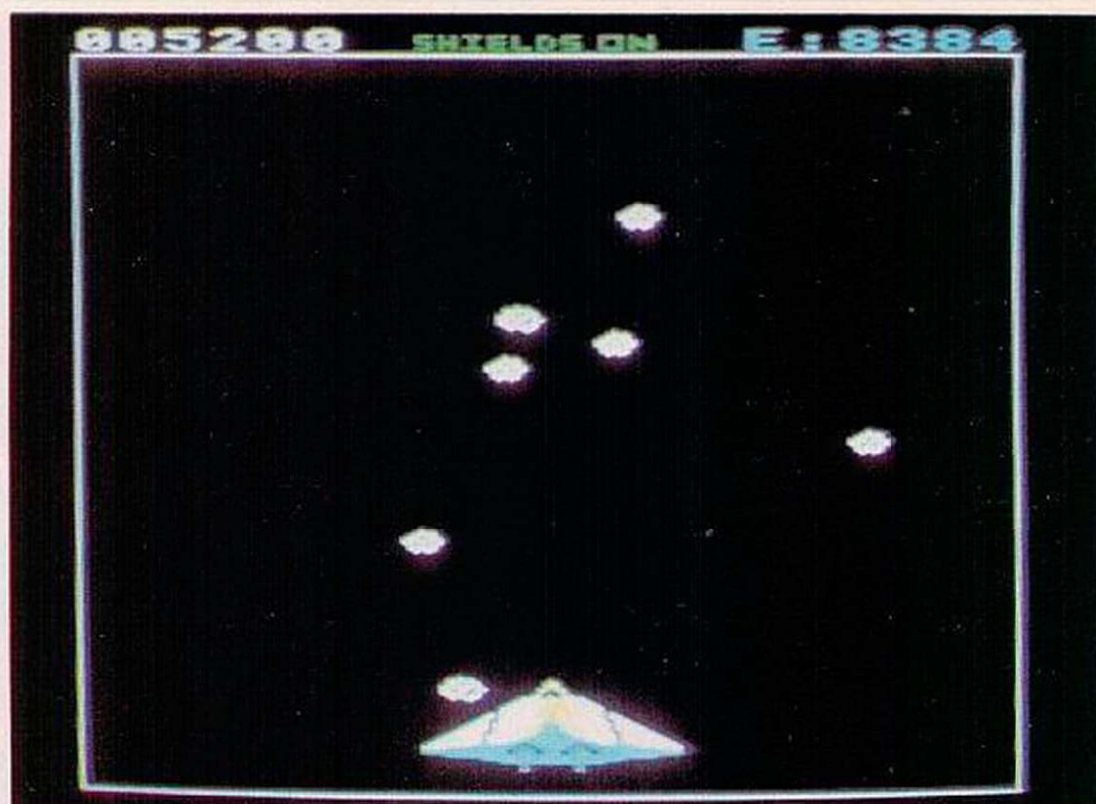


hygiene. Sadly, all this speculation is irrelevant to the actual game which presents you with the usual onslaught of TIE fighters, followed by rocks, followed by TIE fighters, followed by rocks, zzzzzz.

Uh — what was that? Blast, crashed into an asteroid. Always keep your etheric radio on, or chew gum when flying this kind of long monotonous space mission. On earth, long-distance lorry drivers combat boredom by winding down their windows. This is a very silly thing to do in a spacecraft.

Well, what was supposed to be so good about Vortex was that it was apparently in 3D. So is 3D Space Ranger, from Microbyte. It makes up in colour what the previous game lacks, and the spaceship banks.

You have to locate and destroy the Death Star approaching the Federation sector — interesting confusion of Stars Trek and War,



MARE

this — and it is protected by kamikaze cohorts that keep crashing into you. Oh, and don't forget the asteroids. You zip through space resolving the moronic marauders into their component atoms.

A little delta-vee down to the planet's surface, vroom over a multicoloured plain being assailed by more of the same aliens, duck down into a trench and chuck a bomb down the proverbial maintenance shaft, fight your way back through the previous screens and knock off for a glass of Lucazade and an oxygen pill. All in a day's work, cap'n.

Zaxxonesque Defender

Pretty as it is, all this pales into insignificance, however beside Pace Software's excellent *Fortress*. This Zaxxonesque game is a kind of 3D Defender. You must pilot your starfighter through the enemy defences, bombing fuel dumps to boost your own energy supply and keep you airborne. Your craft casts a shadow on the ground, and you are presented with a three-quarter view of the action, rather than head-on as in the previous two programs.

The first obstacle you encounter is a brick wall which you can only fly over at maximum altitude by shooting through a slight dip in the centre of it. Once you've got the hang of this you have to dodge round missile silos, which inevitably spew out a rocket as you pass over them, at the same time as you avoid the remorselessly accurate fire from things which look like hostile liquorice allsorts. The game looks good. But here we must pause, and furrow our brows. Is it playable? I sent some of my best men into the breach here and they were doing well if they got as far as the stage where hostile aircraft start attacking. Surely it

wouldn't hurt a game as good as this to have a couple of easy levels, if only to get people hooked when they play it in the shop?

Aerial traffic is the theme of Microdeal's Air Traffic Control Simulator. Ignore the silly picture of a Harrier crashing into the control tower on the cassette packaging. This is what we call negative marketing. Normally cassettes are designed to make the game look better than it is — this one is designed to make the game look worse than it is.

The aircraft in question are not Harriers but RPVs — remotely piloted vehicles.

You have control of five aircraft, scoring points for each successful landing. The screen display is in black and white. The centre section shows — initially — a radar picture of your control area with the runway across the centre and the runway outer markers shown as dotted lines.

The RPVs are re-plotted on the screen every

two seconds, so it's not exactly smooth scrolling. Once you have steered an aircraft to less than 2000 feet, within 50 pixels of the runway centre line (count them, 50) and 100 pixels of the dotted runway approach markers and you are heading into the wind, not to mention having a bearing within 10 degrees of the runway centre line, you get a different display showing a view of the horizon, the runway and the rear of the plane.

2002 is another landing problem — this time you're in command of a Pan-Am Lockheed Orion space clipper of the kind popularised in Kubrick's movie *2001*. You have to soft-dock with the Space Hilton as it cartwheels in the outer reaches. Like *ATC Simulator*, this is in black and white, plots every two seconds and is pretty user-hostile. Even skilled space-shuttle pilots were scratching their heads over this one.

A subterranean scenario

In contrast, down *The Mine*, from Program Power, pitches us into a subterranean scenario of firebreathing dragons, red monsters, deadly mushrooms and falling rocks. It's like *Dig-Dug* and what the poor miner is doing down there, one can only guess. Perhaps he is a flying picket and this is the only way he can get out of his home county without being harassed by the police.

You steer your man through the bowels of the earth, seeking treasure, timing it so that the beasties following you get crushed by falling rocks and so on. You can pump creatures up to kill them, but you have to be aligned correctly. An addictive little number, this. From the depths of the earth to the thrill of the open road in Program Power's hell *Driver*. No relation to the wonderfully awful old British movie starring everybody from Patrick MacGoohan through to Sean Connery as truck drivers working for a highly dubious firm. Apparently the object of the game is to get to all of the check points on the sheet before your fuel runs out or you are stopped by a police car or fire engine.



Jason Charlesworth with a hill-hopping Spectrum game.

Listing 1.

```

1 DEF FN x(a)=10*INT (a/16)+a
-16*INT (a/16)
10 BORDER 0: INK 7: PAPER 0: C
LEAR 27099: LOAD ""CODE
11 LET SP=5 : LET sc=13230: LE
T h$="J.Charlesworth"
20 POKE 23675,16: POKE 23676,1
27: POKE 23500,SP*10: INK 7: CLS
: PRINT AT 0,3; BRIGHT 1;"";AT
1,3;"";AT 0,27;"";AT 1,27;""; BR
IGHT 0;AT 0,11; INK 5;"Bomb Alle
y"
30 LET a=11: PRINT AT 5,a;"Q
Up";AT 7,a;"A Down";AT 9,a;"O
Decelerate";AT 11,a;"P Acceler
ate";AT 13,a;"Sym.Sft Fire Lase
r";AT 15,a;"M Bomb"
40 PRINT INK 4;AT 17,a;"H Hal
t on";AT 19,a;"S Halt off";AT 2
1,a; INK 2;"O Abort game": PAUS
E 200: BEEP .1,0: CLS : PRINT AT
0,13;"Menu"
50 PRINT AT 5,10; INK 6;"1 Pl
ay game"; INK 5;AT 7,10;"2 Trai
ner mode";AT 9,10; INK 4;"3 Dem
o mode";AT 11,10; INK 3;"4 Chan
ge Speed"; INK 2;AT 13,10;"5 In
formation"; BRIGHT 1; PAPER 1; I
NK 7;AT 21,5;"Please type your o
ption"
60 LET a$=INKEY$: IF a$>"5" OR
a$<"1" THEN GO TO 60
70 GO TO 100*VAL a$
100 POKE 27366,61: RANDOMIZE US
R 27100: PRINT AT 17,20;"
": IF PEEK 23335 THEN GO TO 115
110 PAUSE 1: BEEP 1,0: BEEP 1,0
: BEEP .1,0: BEEP 1,0: BEEP 1,3:
BEEP .5,2: BEEP 1,2: BEEP 1,0:
BEEP .5,-1: BEEP 1,0: GO TO 130
115 BEEP .3,0: BEEP .15,2: BEEP
.15,4: BEEP .3,7: BEEP .3,5: BE
EP .4,7: BEEP .4,4
120 LET a=FN x(PEEK 23298)+100*
FN x(PEEK 23297)+10000*FN x(PEEK
23296)+FN x(PEEK 23301)+100*FN
x(PEEK 23300)+10000*FN x(PEEK 23
299): INK 7: CLS : IF a>sc THEN
LET sc=a: PRINT AT 5,0;"You have
beaten the High score": INPUT "
What is your name ";h$
130 CLS : PRINT AT 5,3; INK 5;"
The High score is held by";AT 7,
9; INK 3;h$;AT 9,5; INK 2;"With
a score of ";sc: PAUSE 200: GO T
O 20
200 POKE 27366,0: RANDOMIZE USR
27100: BEEP 1,0: GO TO 20
300 POKE 23500,80: RANDOMIZE US
R 27104: BEEP 1,0: PAUSE 1: GO T
O 20
400 CLS : PRINT AT 0,5; INK 5;"
Old speed was "; INK 4;sp: INPUT
" New speed please" "(0=Fast T
O 9=Slow) ";a: IF a>9 OR a<0 THE
N GO TO 400
410 LET sp=a: GO TO 20
500 CLS : PRINT PAPER 1; INK 7;
BRIGHT 1;"
Information
"
510 PRINT AT 5,5; INK 4;"";AT 7
,5; INK 3; BRIGHT 1;"";AT 9,5; I
NK 2;""; INK 7;"/"; INK 4;"";AT
11,5; INK 6; BRIGHT 0;"";AT 13,5
; BRIGHT 1; INK 5;"";AT 15,5; IN
K 6;""
520 LET a=9: PRINT AT 5,a;"Fizz
er = 90 points";AT 7,a;"Radar =
30 points";AT 9,a;"Fuel = 50 poi
nts";AT 10,a;" + 50 fuel units";A
T 11,a;"Hut = 10 points";AT 13,a
;"Rocket = 80 points";AT 15,a;"A
steroid - Cannot be";AT 16,a;"de
stroyed"
530 PAUSE 0: GO TO 20

```



SKRAM

THE ALIENS have been defeated thousands of times and have decided to now live out in the open. Now the aliens are seeking revenge for their previous defeats and have built a massive missile with which they intend to destroy earth. Your mission is to fly past all their defence systems and destroy the missile.

Your space ship is equipped with photon torpedoes — you can have five torpedoes flying at anyone time — bombs and also a terrain mapping system. This produces a small picture of what the landscape is like — the left hand half — and what the next section of landscape will be like — the right hand half. Spread across the land are huts, radar posts, missiles, fuel dumps, fizzers and asteroids.

The game has four phases. In phase 1 there are lots of missiles and a few huts etc. spread across the relatively flat land. If you shoot a fuel dump you gain 50 fuel units, but if you run out of fuel, you will crash. Phase 2 gets very hilly and to make it even more difficult there are asteroids which unfortunately for you can not be shot down. Phase 3 is slightly less hilly than phase 2 and it is here you meet the fizzers, small animals which bounce up and down to get in your way. Phase 4 is a mixture of phases 1-3 and hidden somewhere in phase 4 is the missile which you must destroy.

The game features:

A high score — To get on this you must

Listing 2.

```

10 DEF FN x(a$)=(CODE a$-48-(3
9 AND a$(1)>"9"))*16+CODE a$(2)-
48-(39 AND a$(2)>"9")
20 CLEAR 30766: PRINT "Program
2 poking in data" "Please wait"
30 LET x=30767: FOR a=100 TO 3
40 STEP 10: READ a$: LET t=VAL a
$( TO 5): LET a$=a$(6 TO ): IF L
EN a$<>160 THEN GO TO 60
40 FOR b=0 TO 79
50 LET z=FN x(a$(b*2+1 TO b*2+
2)): POKE x,z: LET t=t-z: LET x=
x+1: NEXT b: IF NOT t THEN NEXT
a: PRINT "Finished,no errors": S

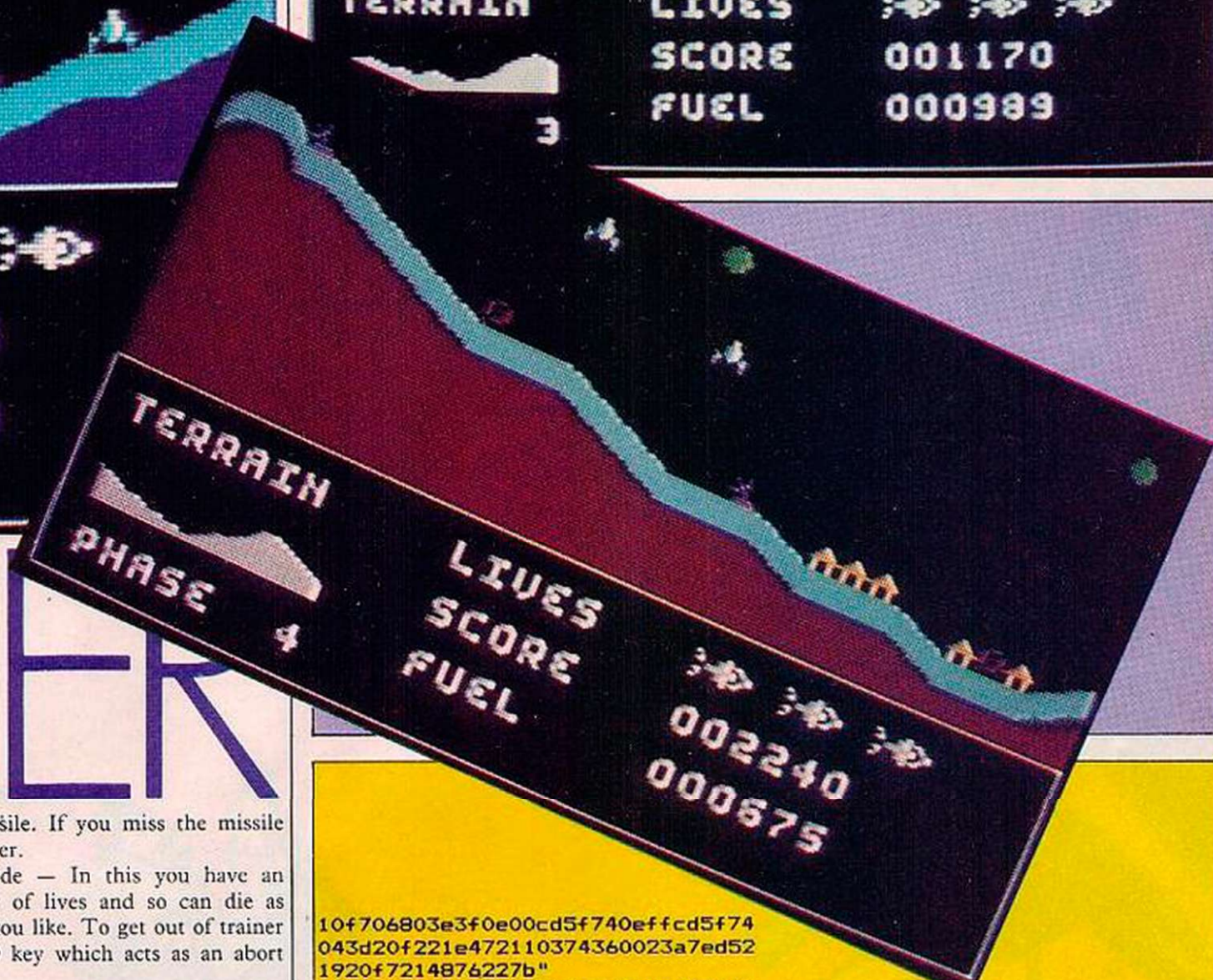
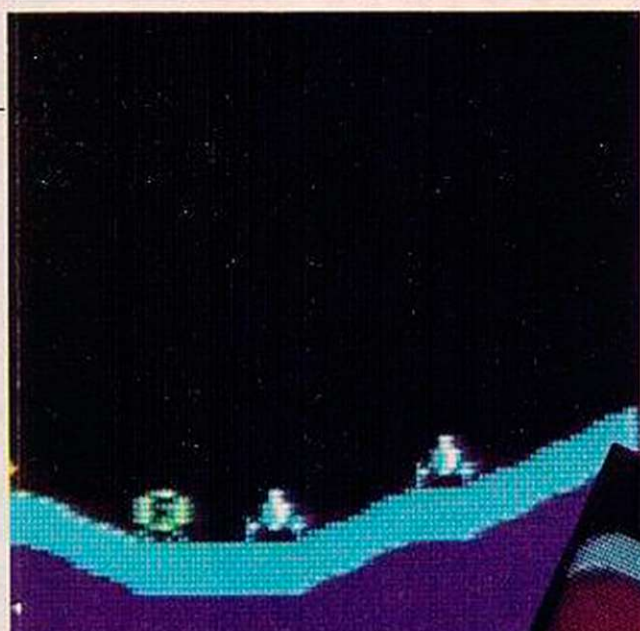
```

TOP

```

60 PRINT "Error in line ";a: S
TOP
100 DATA "0917Bcd2b6ac9cd046bcd
ef6ecd636a01feefed78e601fe01c03a
245bfe0028e9c921055b7ed601277730
0e2b7ed601277730062b7ed601277797
cdad707efe00c0237efe00c0237efe00
c03e0132245bc9cd"
110 DATA "10637046bcde86fcdf26b
cdef6ecd536ccde86fcd636acdfb6901
feefed78e601fe01c03a245bfe00c473
6a3a065bfe00c83a275bfe00c018cb3a
cc5bfe00c847c5060010fec110f8c906
32cdb36ecdd26e10"

```



BLER

destroy the missile. If you miss the missile your game is over.

A trainer mode — In this you have an infinite number of lives and so can die as many times as you like. To get out of trainer mode use the 0 key which acts as an abort key.

A demo mode — This shows all the terrain, to get out of demo mode use the abort key.

A speed change option — The speed of the game can be changed from 0 to 9 — beginners speed. It starts off at speed 5.

An information option — This prints out the values of all the objects you can destroy.

To set up the game type in listing 1 and save (continued on page 83)

```

120 DATA "05534f8cdf26b210e5b06
1936002310fb21000022035b2e102204
5b062021a473114473c57efe00281536
00237ec6084f23463e04328f5c3e03cd
7b742b2b2323231afe0028169712131a
c6084f131a471b1b"
130 DATA "060933e45328f5c3e07cd
7b74131313c110c19732245bcdad703a
065b3d32065bfe00c4c86b21107f227b
5c1e040100003e17cd76750c1d20f9c9
062b21005b36002310fb3e0332065b21
1077220a5b213f77"
140 DATA "06534220c5b3e1032045b
97328d5ccd6b0d060021005a36072310
fb062021005011e05736ff3eff122313

```

```

10f706803e3f0e00cd5f740effcd5f74
043d20f221e472110374360023a7ed52
1920f7214876227b"

```

```

150 DATA "067005c219f6b1e297efe
ff200a231d4e23461d231d18f1cd7675
0c231d20e997cdad7097cd9c70cdc86b
21e059062036282310fbc9ff0111160c
14140a0f11ff0c11100f180c15ff0c13
150b12140cff0c15"

```

```

160 DATA "063140d170c10ff011613
0e0a150c21107f3e07328f5c227b5c3a
065b0114115f97cd76753c0ccd76750c
0c1d20f23e17cd76750ccd7675c92110
7f227b5c21145b0605c5e57efe002810
234e2346cdb1753e"

```

```

170 DATA "0705507ae77cdc4753600
e1c123232310e221105b237efe00280e
472b4e3e07328f5c3e02cd7b7423237e
fe00280d4f23463e07328f5c3e02cd7b
743e07328f5ced4b0e5b97cdda74c921
107f227b5c3e0732"

```

```

180 DATA "086248f5ced4b0e5b97cd
da74cd096dcd6d6cc901fe7fed78e604
5f3a105bfe0020197bfe0428141e04ed
4b0e5b78e6f8c6084779c6104fed4310
5b3a125bfe0020173e04bb2812ed4b0e
5b78e6f8c6084779"

```

```

190 DATA "08103c6084fed43125b21
105b0602c54e23462b97b82842e5cdb1
757ee1fe002811fe07280de5cda36de1

```

```

36002336002b182778c60847e5cdb175
7ee1fe002804fe0720e17123703e0732
8f5c11107fed537b"

```

```

200 DATA "066845c3e02cd7b742b23
23c110b0c93a265bfe0028069732265b
181001fe7fed78e602fe0228053e0132
265b21145b0605c57efe0020243a265b
fe0120643eff32265b3e0177cdb36e23
ed4b0e5b04040404"

```

```

210 DATA "0902179c6184f23702b71
2b234e2346e5c3db1757ee1fe00280ffe
07280be5cda36de12b2b3600182a79c6
084ffef838062b2b3600181c702b712b
e5cdc4757ee1fe0020c7e5cdb1753e07
ae77cdc47536ffe1"

```

```

220 DATA "09599232323c11089c9c5
21107f227b5ccdd26ecdb1755e7bfe46
cab16e3a085bbbcab16e3a095bbbcab1
6e3e43bb2015328f5c79e6f84f78e6f8
473e04cd7b743e30c3a16e328f5c7bfe
06201b78e6f84779"

```

```

230 DATA "07971e6f84fcdb1753600
97328f5c3e06cd7b743e10c3a16efe04

```

(continued on page 83)

THE HOTTEST GAMES IN TOWN FROM LLAMASOFT

HELL GATE

HELL GATE on the 64 is certainly no REVENGE or HOVER BOVVER, being the VIC 20 code tweaked to run on this system. However we are offering it at a bargain price to those who like an unusual shoot-'em-up. Fans of Gridrunner and Matrix should enjoy themselves and the game is challenging to all. Available for Commodore 64 £5.00 and VIC-20 £6.

LASER ZONE

Experience Laser Zone - an utterly NEW, totally ORIGINAL masterpiece of Video games design. Learn to control two spaceships at once. Feel the EXHILARATION as, after long hours of practice, you control the two ships so that they function as a smooth, co-operative team! Feel the raw POWER as you lunge for the electro button and BLAST your enemies into expanding clouds of SPACE JUNK!! Feel the humiliation as a carelessly aimed BLAST slams into the side of your last remaining ship!! 8K expansion required. Available for Commodore 64 £7.50 and VIC-20 £6.

METAGALACTIC LLAMAS BATTLE AT THE EDGE OF TIME

A fast and original game for the unexpanded VIC. Challenging and colourful, with good sonics and a unique game action and design, this promises to be the most exciting new 3.5K VIC game since the introduction of GRIDRUNNER nearly a year ago. £5.50

MATRIX

Jeff Minter has taken Gridrunner - the game that topped bestseller charts in USA and UK - and created an awesome sequel. Graphically superb, it features multiple screens, new aliens and attack waves, mystery bonuses, renegade humanoids, deflexor fields, diagonal tracking countdown/panic phase and much, much more... Packed into 20 mind-zapping zones and accompanied by incredible sonics. 8K expansion required. Available for Commodore 64 £7.50 and VIC-20 £6.

ATTACK of the MUTANT CAMELS

Planet earth needs you! Hostile aliens have used genetic engineering to mutate camels from normally harmless beasts into 90 foot high, neutronium shielded, laser-spitting death camels!! Can you fly your tiny, manoeuvrable fighter over the mountainous landscape to weaken and destroy the camels before they invade the humans stronghold! You must withstand withering laser fire and alien UFOs. Game action stretches over 10 screen lengths and features superb scrolling, scanner, 1/2 player actions and unbelievable animation! Play this game and you'll never be able to visit a zoo again without getting an itchy trigger finger! Awesome m/c action! Available for Commodore 64 £7.50.

GRIDRUNNER

Finally true arcade quality on the unexpanded VIC! Shoot down the segmented DROIDS invading the grid. Beware of the pods and zappers! The awesome speed, sound, and graphics gives you the best blast available for unexpanded VIC. Available for VIC-20 £5.00 Commodore 64 £5.00 Atari 400/800 £7.50

HOVER BOVVER

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REVENGE OF THE MUTANT CAMELS

At last the long awaited sequel to Attack of the Mutant Camels is available. You are controlling a ninety foot high, neutronium shielded laser spitting death camel, leading a rebellion against your evil Zyxian overlords. The game features beautiful smooth scrolling graphics and no less than 42 different attack waves, more than any game in video history. The challenge of play will last for months as you battle to see what's on the next wave.

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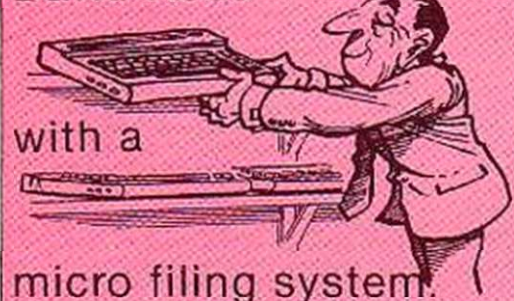
49 MOUNT PLEASANT,
TADLEY, HANTS. RG26 6BN.
TELEPHONE: TADLEY (07356) 4478


```

1 REM*****
2 REM CODE DATA :
3 REM BY *
4 REM DAVID REES *
5 REM*****
10 FORN=0T014:FORM=0T0255:READA:IFA=-1:THEN0
20 POKE49152+N64+M,A1C+A1:NEXTM
30 NEXTN
50 FORN=0T0255:POKE16384+N,255:NEXT
60 POKE16128,128:POKE16129,64
70 POKE51,250:POKE55,250:POKE52,62:POKE56,62
80 PRINT"CHECKSUM SHOULD BE: 97914"
90 PRINT"THEN CHECKSUM IS:"C
5000 DATA173,1,63,133,252,133,254
5010 DATA173,,63,133,251,24,185,32,144,3
5020 DATA24,230,254,133,253,173,,63
5030 DATA205,2,63,208,9,173,1,63,205,3,63
5035 DATA200,1,96,160,,177,251
5040 DATA145,253,200,192,32,200,247
5050 DATA165,251,56,233,32,176,2,190,252
5060 DATA24,133,251,165,253,56,233,32
5070 DATA176,2,190,254,24,133,253
5080 DATA205,2,63,200,216,165,254,205,3,63
5090 DATA200,209,173,,63,24,105,32,144,4
5100 DATA24,230,1,63,141,,63,96,-1,-1
5200 DATA173,3,63,133,252,133,254
5210 DATA173,2,63,133,253,24,105,32,144,3
5220 DATA24,230,252,133,251,173,,63
5230 DATA205,2,63,200,9,173,1,63,205,3,63
5235 DATA200,1,96,160,,177,251
5240 DATA145,253,200,192,32,200,247
5250 DATA165,251,24,105,32,144,3,24,230,252
5260 DATA133,251,165,253,24,105,32
5270 DATA144,3,24,230,254,133,253
5280 DATA205,,63,200,216,165,254,205,1,63
5290 DATA200,209,173,,63,56,233,32,176,3
5300 DATA206,1,63,24,141,,63,96,-1,-1
5400 DATA160,,177,251,133,2,177,253
5410 DATA197,2,200,6,200,192,16,200,241
5420 DATA96,56,229,2,144,2,24,96,160,
5430 DATA177,251,133,2,177,253,145,251
5440 DATA165,2,145,253,200,192,32
5450 DATA200,239,96,-1
5490 REM
5500 DATA169,,133,251,169,64
5510 DATA133,252,162,,220,75,200,1,96
5520 DATA160,,177,251,201,255,240,15
5530 DATA165,251,24,105,32,144,3,24
5540 DATA230,252,133,251,24,144,235
5550 DATA232,229,75,200,236,165,251
5560 DATA24,105,32,144,3,24,230,252
5570 DATA133,251,96,-1
5690 REM#SORT INIT#
5700 DATA32,64,193,230,75,165,252
5710 DATA133,77,133,79
5720 DATA165,251,133,76,24,105,32,144,3
5730 DATA24,230,79,133,70,32,64,193
5740 DATA165,252,133,81,165,251,56,233,32
5750 DATA176,2,190,81,24,133,80,165,76
5760 DATA133,251,165,77,133,252,165,78
5770 DATA133,253,165,79,133,254,197,81
5780 DATA208,9,165,78,197,80,200,3,169
5790 DATA13,96,165,76,197,80,200,9
5800 DATA165,77,197,81,200,3,24,144,230
5810 DATA169,,96,-1,-1
5890 REM
5900 DATA32,,193,165,251,24,105,32
5910 DATA144,3,24,230,252,133,251
5920 DATA165,253,24,105,32,144,3,24
5930 DATA230,254,133,253,197,80,200,225
5940 DATA165,254,197,81,200,219,165,80
5950 DATA56,233,32,176,2,190,81,24
5960 DATA133,80,197,78,200,203,165,81
5970 DATA197,79,200,199,96,-1
6000 DATA32,128,193,240,1,96,32,,194,96,-1
6090 REM#SORT SHORT#
6100 DATA32,128,193,240,1,96,32,,193,165,251
6110 DATA24,105,32,144,3,24,230,252
6120 DATA133,251,165,253,24,165,32
6130 DATA144,3,24,230,254,133,253,197,80
6140 DATA209,225,165,254,197,81,200,219
6150 DATA96,-1
6199 REM#S/L#
6200 DATA173,1,63,133,254,173,,63,24
6210 DATA105,32,144,3,24,230,254,133,253
6220 DATA169,,133,251,169,63,133,252
6230 DATA162,1,160,255,32,106,255,169,
6240 DATA32,109,255,169,251,166,253
6250 DATA164,254,32,216,255,96
6260 DATA162,1,160,255,32,106,255
6270 DATA169,,32,169,255,162,255,160,255
6280 DATA32,213,255,96,-1,-1
6299 REM#GET#
6300 DATA32,64,193,160,,177,251,201,255
6310 DATA206,4,141,,204,96,105,64,63,240,17
6320 DATA177,251,57,96,63,133,2
6330 DATA105,32,63,57,96,63,197,2,200,0
6340 DATA200,192,32,200,219,76,128,195
6350 DATA165,251,24,105,32,144,3,24
6360 DATA230,252,133,251,24,144,199
6370 DATA-1
6399 REM
6400 DATA169,,96,165,1,41,254,9,6,133,1,96
6410 DATA165,1,234,9,7,133,1,96
6420 DATA32,131,195,32,120,193,32,140,195,96
6430 DATA32,131,195,32,,192,32,140,195,96
6440 DATA32,131,195,32,120,194,32,140,195,96
6450 DATA32,131,195,32,64,195,32,140,195,96
6460 DATA32,131,195,32,66,195,32,140,195,96
6470 DATA32,131,195,32,64,192,32,140,195,96
6480 DATA32,131,195,32,192,194,32,140,195,96
6490 DATA32,131,195,32,240,194,32,140,195,96
6500 DATA32,131,195,32,64,193,32,140,195,96
6510 DATA32,131,195,32,109,195,32,140,195,96
6520 DATA32,131,195,32,120,192,32,140,195,96
6700 DATA-1
READY.

```

David Rees



CBM FILES

THE FOLLOWING program is a cassette-based filing system for the Commodore 64. It can accommodate up to 1,000 different entries, and, after the file has been loaded, allows very fast and easy manipulation of the data.

The reason that it is so fast is that the data is

stored bitwise in memory, all routines having to access this being in machine code. As none of the file is stored as space wasting variables and part of it is stored in the 8K or RAM hidden by the Basic ROM — 40960 to 49512 — a large number of entries can be

```

1 REM#MAIN PROGRAM#
2 IFPEEK(49152)<>173THENPRINT"NO MACHINE CODE":END
4 V=53240:POKEV+32,0:POKEV+33,0
8 E$="I CANNOT FIND THIS DATA"
10 DIMP(14),Z(32),O$(16),AN$(13):PR=0
12 SN$="" :CN$="" :SE=0:SX=0
14 O$(0)="X":O$(1)="M":SX$(0)="M":SX$(1)="F"
16 O$(2)="S":O$(3)="G"
18 O$(4)="R":O$(5)="M"
20 O$(6)="S":O$(7)="G":O$(8)="R"
22 F$(0)="H":F$(1)="C":F$(2)="S"
24 F$(3)="B":F$(4)="L":F$(5)="W"
26 AN$(0)="SURNAME":AN$(1)="CHRISTIAN NAME"
27 AN$(2)="FORM":AN$(3)="SEX"
29 FORN=0T05:AN$(N+0)="OPTION NO. "+STR$(N+1):NEXT
30 SN$="REAS":CN$="DAVID":Y=2:SE=3:SX=1
40 Z(0)=0:Z(1)=0:Z(2)=0:Z(26)=0
96 YY$(2)="ND":YY$(3)="RD":YY$(4)="TH":YY$(5)="TH"
98 SU$(0)="MATHS":SU$(1)="ENGLISH":SU$(2)="":SU$(3)=" "
99 FORN=0T03:AN$(N+4)="SUBJECT SET "+SU$(N):NEXT
100 PRINT"CHOICE OF OPTIONS"
102 PRINT"1) DISPLAY A GIVEN SET OF DATA"
104 PRINT"2) ADD NEW PUPILS TO A YEAR GROUP"
106 PRINT"3) CHANGE PUPILS DATA"
108 PRINT"4) DELETE A PUPIL"
110 PRINT"5) LOAD FILES"
112 PRINT"6) SAVE FILES"
114 PRINT"7) CHANGE 0-2;2-3;3-4;5-0TH YEAR"
116 PRINT"8) END"
120 GETA$:A=VAL(A$):IFA=0THEN120
122 IFA=8THEN950
124 IFA=9THEN120
126 ONAGOSUB200,400,500,700,800,830,860
128 GOTO100
200 PRINT"CHOICE OF DATA TO BE DISPLAYED"
201 PRINT" DISPLAY:"
202 PRINT"1) A GIVEN SUBJECT SET"
204 PRINT"2) AN OPTIONS SUBJECT GROUP"
206 PRINT"3) A GIVEN FORM"
208 PRINT"4) A GIVEN YEAR BY FORMS"
210 PRINT"5) A GIVEN YEAR BY SUBJECT SETS"
212 PRINT"6) RETURN TO OPTIONS"
214 GETA$:A=VAL(A$):IFA=0THEN214
216 IFA=6THENRETURN
218 IFA>5THEN214
220 PRINT"SCREEN(1) OR PRINTER(2) OUTPUT"
222 GETP$:PR=VAL(P$):IFPR<1ORPR>2THEN222
226 PR=PR-1
228 PRINT"WHICH DATA IS TO BE DISPLAYED (ANSWER Y OR N)?"
230 FORN=0T013
232 PRINTAN$(N),
234 GETA$:IFA$<>"Y"AND$<>"N"THEN234
236 P(N)--(A$="Y"):PRINTA$
238 NEXT
240 GOSUB340
250 ONAGOTO252,272,290,302,326
252 PRINT"GO TO DISPLAY A GIVEN SUBJECT SET"
254 PRINT"PLEASE INPUT THE SUBJECT"
256 INPUTS$
258 FORO=0T03
260 IF$=SU$(O)THEN266
262 NEXT
264 PRINT"INVALID SUBJECT":GOTO254
266 PRINT"PLEASE INPUT THE SET (RANGE 0-15)?"
268 DD=27+INT(O/2):KK=15:IFINT(O/2)<>O/2THENKK=240
268 INPUTSE:IFSE<0ORSE>15THENPRINT"TRY AGAIN":GOTO268
270 S(O)=SE:GOTO380
272 PRINT"GO TO DISPLAY AN OPTIONS SUBJECT GROUP"
274 PRINT"PLEASE ENTER OPTIONS NUMBER (1-6)"
276 GETA$:A=VAL(A$):IFA<0ORA>6THEN276
278 O=A-1
280 PRINT"PLEASE ENTER SUBJECT"
282 GETA$:IFA$=""THEN282
284 FORN=0T015:IFA$=O$(N)THEN288
286 NEXT:GOTO282
288 DD=29+INT(O/2):KK=15:IFINT(O/2)<>O/2THENKK=240
288 GOTO380
290 PRINT"GO TO DISPLAY A GIVEN FORM"
292 PRINT"PLEASE ENTER FORM LETTER"
294 GETA$:IFA$=""THEN294
296 FORSE=0T05:IFA$=F$(SE)THEN300
298 NEXT:GOTO294
300 DD=26:KK=56:GOTO380
302 IFPR=1THENOPEN1,4
303 PRINT"GO TO DISPLAY YEAR 'Y' BY FORMS"
304 FORN=0T031:Z(N)=0:NEXT
306 Z(26)=56
308 FORKK=0T05

```

Figure 2. One Entry (32 bytes)

BYTE NO.:	0	1314	2526	2627	2829	31		
Description:	Surname	Christian Name	Bits 0-2 Year (Y) 3-5 Set (SE) 6 Sex (SX)	0-3 5(0) 4-7 5(1)	0-3 5(2) 4-7 5(3)	0-3 0(0) 4-7 0(1)	0-3 0(2) 4-7 0(3)	0-3 0(4) 4-7 0(5)
E.g.	HALL	CLARE	Y=5 SE=2 SX=1 (Group 4) H (F)	3 5	2 1	History Music	Geog Chem	Phys Biol

stored. An added bonus is that the Basic program can be stopped — e.g., as a mistake or to check the listing — and the file will remain unaffected. You can simply start the program again to find everything intact.

The whole program can be thought of as being in four parts. Part 1 is the machine code, loaded from Basic data in listing 1. Please be careful when entering this data, as one mistake could cause the whole program to crash. The check sum is there to help, but it is not infallible e.g., if one number is too high, and one too low the checksum could stay the same. Thus, it is always best to save the program before you try it out.

Parts 2 and 3 in the main program will probably be the most important parts to you. Part 4 is your own file, loaded and saved by the earlier programs. The Basic part is set up as an example of use for a school, with four years, six forms per year, and numerous sets which cross form, but not year, boundaries. Name, sex, year, form, subject and options are stored in the file.

The great advantage of putting main program control in Basic is that it is easily changed. To simply adapt the program, all you have to do is change variable limits, strings at the beginning, and text — e.g.

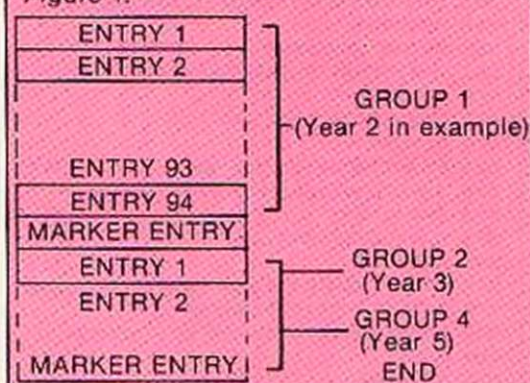
replacing "year" with "office number". To help with this, table 1 gives a list of variables.

The program itself is fairly complete, allowing diverse manipulation of data, deletion, alteration and printouts — on a Vic 1525 printer. Each action — except saving and loading — takes less than two seconds, so there are no annoying delays. There is even a check number, incremented with each file save.

Saving and loading are fast for the Commodore 64, taking roughly two seconds per three entries. Even if you are not satisfied with three facilities, there is still another 5K of room for more Basic routines. All the above has been to do with Part 2 — everything up to line 997. Even this is no the end of the program flexibility. Figure 2 shows the present structure of each entry, and figure 1 shows how it lies in the main file. If you are not satisfied with this layout — e.g., you want less options, but longer names — you can change the entry structure by altering Part 3 — lines 998 onwards.

Lines 1070 to 1210 and lines 1600 to 1690 respectively enter and read entries, so by altering these you can change the layout of figure 2 — see table 1 for which variables do

Figure 1.



what. Also the limits of Y — see lines 1000 to 1020 and others — can be changed to provide more or less groups up to a maximum of seven, so changing figure 1.

Table 1.

Y	Year, or group number.
SN\$	Surname string.
CN\$	Christian name string.
SE	Set number
SX	Sex
OS(16)	Options strings for each number (0-15).
FS(7)	Strings for each form.
Z(31)	Ordering number for sorting entries.

```

310 A$="FORM"+STR$(Y)+F$(KK)+"":SE=KK
312 IFPR=0THENPRINTA$:GOTO316
314 PRINT#1,A$
316 GOSUB1500:IFE=1THEN320
318 GOSUB2100:IFE<>1THEN318
320 E=0:SN$="":CN$="":NEXTKK
322 IFPR=1THENCLOSE1:PR=0
324 GOTO392
326 PRINT"GO TO DISPLAY YEAR"Y" BY SUBJECT SETS"
328 PRINT"WHICH SUBJECT DO YOU WISH TO CHOOSE?"
330 FORN=0TO3:PRINT"Y"Y"+1,SU$(N):NEXT
332 PRINT"ENTER NUMBER"
334 GETSU$:SU=VAL(SU$):IFSU<1ORSU>4THEN334
336 SU=SU-1
338 FORN=0TO3:Z(N)=0:NEXT
340 KK=15:IFINT(SU/2)<>SU/2THENKK=240
342 Z(27+INT(SU/2))=KK
344 IFPR=1THENOPEN1,4
346 FORKK=0TO15
348 S(SU)=KK:A$="Y"+SU$(SU)+" SET"+STR$(KK)+"Y"
350 IFPR=0THENPRINTA$:GOTO354
352 PRINT#1,A$
354 GOSUB1500:IFE=1THEN358
356 GOSUB2100:IFE<>1THEN356
358 NEXTKK
360 IFPR=1THENCLOSE1:PR=0
362 GOTO392
380 IFPR=1THENOPEN1,4
382 FORN=0TO3:Z(N)=0:NEXT
384 IFPR=1THENOPEN1,4
386 Z(DD)=KK:PRINT"Y"Y"
388 GOSUB1500:IFE=1THENRETURN
390 GOSUB2100:IFE<>1THEN388
392 IFPR=1THENCLOSE1:PR=0
394 PRINT"PRESS ANY KEY TO RETURN TO OPTIONS"
396 GETA$:IFA$=""THEN394
398 RETURN
400 PRINT"GO TO ADD NEW PUPILS TO A YEAR GROUP"
402 GOSUB940
404 FORN=0TO13:P(N)=1:NEXT
406 PRINT"HOW MANY PUPILS ARE TO BE ADDED?"
410 INPUTA$:IFA<1THENRETURN
412 PRINT"Y"Y" A PUPIL IS":IFA>1THENPRINT"Y"Y" ARE":
414 PRINT"BE ADDED TO THE"Y:Y$(Y)" YEAR"

```

```

416 GOSUB900:IFC=0THENPRINT"TRY AGAIN":GOTO402
418 FORNN=1TOA
420 PRINT"Y"Y" PUPIL NUMBER"NN"Y"
422 GOSUB562
426 GOSUB568
430 GOSUB574
440 GOSUB586
446 PRINT"Y"Y" SUBJECT SET NUMBER:ENTER 0 IF NO SET"
450 FORN=0TO3
452 PRINT"Y"Y" ENTER "SU$(N)" SET"Y"
454 INPUTS(N):IFS(N)<0ORS(N)>15THEN452
456 NEXT
458 PRINT"Y"Y" SUBJECT WITHIN AN OPTION"
460 PRINT"ENTER 'X' IF NO SUBJECT IS REQUIRED"
462 FORK=0TO5:PRINT"Y"Y" OPTION NUMBER"K+1"Y"
464 GETOP$:IFOP$=""THEN462
466 FORM=0TO15:IFOP$=O$(M)THEN470
468 NEXTM
468 PRINT"SUBJECT NOT PRESENT:TRY AGAIN":GOTO462
470 O(K)=M:PRINTOP$:OP$(K)=OP$:NEXTK
472 P=0:GOSUB1700
474 GOSUB900:IFC=0THENPRINT"TRY AGAIN":GOTO422
476 GOSUB1000
478 NEXTNN
480 RETURN
500 PRINT"Y"Y" CHANGE A PUPILS' DATA"
502 GOSUB940
504 FORN=0TO25:Z(N)=255:NEXT
507 Z(26)=64
508 PRINT"Y"Y" PLEASE ENTER THE PUPILS'":
510 GOSUB562
516 GOSUB568
522 GOSUB586
524 FORN=0TO13:P(N)=1:NEXT
528 PRINTSN$ "CN$ " SX$(SX)
530 GOSUB900:IFC=0THENPRINT"TRY AGAIN":GOTO508
531 PRINT"Y"Y"
532 GOSUB1500:IFE=1THENPRINT"Y"Y" PUPIL NOT PRESENT:
TRY AGAIN":GOTO508
533 PRINT"Y"Y"
534 GOSUB900:IFC=0THENPRINT"TRY AGAIN":GOTO508
535 GOSUB2200

```

(listing continued on next page)

(listing continued from previous page)

```
536 PRINT "*****CAUTION!"
538 PRINT " THIS ENTRY HAS BEEN REMOVED FROM THE "
540 PRINT "FILE. STOPPING THE PROGRAM WILL RESULT "
542 PRINT "IN THE ERASING OF THIS ENTRY."
544 GOSUB 1700
546 PRINT "WHAT DO YOU WISH TO CHANGE?"
548 PRINT "0:ABORT 1:SURNAME 2:CHRISTIAN NAME"
549 PRINT "3:FORM 4:SEX 5:SET NUMBER"
550 PRINT "6:OPTION SUBJECT"
552 GETA$:IFA$=""THEN552
554 IFA$="0"THEN640
556 A=VAL(A$):IFA>6THEN552
558 ONAGOSUB562,568,574,586,592,610
560 GOTO536
562 PRINT "SURNAME (14 LETTERS MAX)"
563 INPUTSN$:IFLEN(SN$)>14THEN562
564 SN$=SN$+
565 SN$=LEFT$(SN$,14)
566 RETURN
568 PRINT "CHRISTIAN NAME (12 LETTERS MAX)"
569 INPUTCN$:IFLEN(CN$)>12THEN568
570 CN$=CN$+
571 CN$=LEFT$(CN$,12)
572 RETURN
574 PRINT "ENTER FORM (H,C,S,B,L,W)"
576 GETA$:IFA$=""THEN576
578 FORSE=0TO5:IFA$=F$(SE)THEN584
580 NEXT
582 GOTO576
584 PRINTA$:F$=STR$(Y)+F$(SE):RETURN
586 PRINT "ENTER SEX (M/F)"
588 GETA$:IFA$<"M"ANDAS$<"F"THEN588
590 SX=- (A$="F"):PRINTA$:SX$=A$:RETURN
592 FORN=1TO4:PRINT "N,SU$(N-1):NEXT
594 PRINT "INPUT SUBJECT NUMBER"
596 GETA$:A=VAL(A$):IFA<1ORA>4THEN596
598 A=A-1:PRINT "SU$(A)
602 PRINT "SUBJECT SET NUMBER (0 IN NO SET)"
604 INPUTS(A):IFS(A)<0ORS(A)>15THEN606
608 RETURN
610 PRINT "SUBJECT WITHIN AN OPTION"
612 PRINT "CHOOSE OPTION NUMBER (1-6)"
614 GETA$:A=VAL(A$):IFA<1ORA>6THEN614
616 PRINT "A:A=A-1
620 PRINT "SUBJECT WITHIN THIS OPTION"
622 PRINT "ENTER 'X' IF NO SUBJECT IS REQUIRED"
624 GETS$:IFS$=""THEN624
626 FORN=0TO15:IFS$=O$(N)THEN632
628 NEXT
630 PRINT "SUBJECT NOT PRESENT: TRY AGAIN":GOTO622
632 O(A)=N:PRINT "S$":OP$(N)=S$:RETURN
640 FORN=0TO13:P(N)=1:NEXT
644 PRINT "L":GOSUB 1700
646 GOSUB 900:IFC=1THEN1000
648 GOTO546
700 PRINT "DELETE A PUPIL"
702 GOSUB 940
712 GOSUB 562:GOSUB 568
718 FORN=0TO13:P(N)=1:NEXT
720 FORN=0TO25:Z(N)=255:NEXT
722 FORN=26TO31:Z(N)=0:NEXT:PRINT "Q"
724 GOSUB 1500
728 PRINT "DO YOU WANT TO ABORT (Y/N)?"
730 GETA$:IFA$="Y"THENRETURN
732 IFA$<"N"THEN730
734 IFE=1THEN700
736 PRINT "IS THIS THE CORRECT FILE?"
738 PRINT "D=DELETE"
740 PRINT "F= FIND ANOTHER FILE"
742 GETA$:IFA$="F"THEN700
744 IFA$<"D"THEN742
746 GOTO2210
800 PRINT "LOAD DATA"
802 PRINT "IS THE TAPE IN THE CORRECT POSITION?"
803 PRINT "PRESS 'Y' WHEN IT IS"
804 GETA$:IFA$<"Y"THEN804
806 SYS50130
808 X=PEEK(16320):Y=PEEK(16321)
810 X=X+1:IFX>255THENX=0:Y=Y+1
812 A=X+Y*256:POKE 16320,X:POKE 16321,Y
814 PRINT "FILE HAS BEEN SAVED*A*TIME*":IFA>1THENPRINT "S"
816 PRINT:A=PEEK(16128)+256*PEEK(16129)
818 X=(48896-A)/32
820 PRINT "YOU HAVE SPACE FOR*X*MORE PUPILS"
822 GOTO392
930 PRINT "SAVE DATA"
932 PRINT "IS THE TAPE IN THE CORRECT POSITION?"
933 PRINT "PRESS 'Y' WHEN IT IS"
934 GETA$:IFA$<"Y"THEN834
936 A%=(PEEK(16128)+256*PEEK(16129)-16128)*21/1024
938 PRINT "SAVING WILL TAKE APPROX*A%*SECS"
940 SYS50120:RETURN
960 PRINT "MOVE PUPILS UP 1 YEAR,REMOVING 5TH YEAR"
962 POKE 16130,0:POKE 16131,64
970 SYS50078
978 FORN=0TO13:P(N)=0:NEXT
```

```
880 FORN=0TO31:POKE 16384+N,255:NEXT
882 FORZ=0TO13:Z(N)=255:NEXT
884 FORN=14TO31:Z(N)=0:NEXT
886 SN$="*****"
888 Y=4
890 GOSUB 1500:A=A+32:IFA>255THENA=0:B=B+1
892 POKE 16128,A:POKE 16129,B
894 RETURN
900 PRINT "IS THIS CORRECT (Y/N)"
910 GETA$:IFA$="Y"THENC=1:RETURN
920 IFA$<"N"THEN910
930 C=0:RETURN
940 PRINT "PLEASE ENTER THE YEAR (2-5)"
942 GETA$:Y=VAL(A$):IFY<2ORY>5THEN942
944 PRINT "Y":RETURN
950 PRINT "V=53248"
952 POKEV+32,14:POKEV+33,6
954 PRINT "THANK YOU."
956 END
997 END
998 REM*INSERT A NAME*
1000 IFY>5THENY=5
1010 IFY<2THENY=2
1020 POKE75,Y-2:SYS50148:PRINT "PEEK(75)"
1030 A=PEEK(251):B=PEEK(252)
1040 POKE 16130,A:POKE 16131,B
1050 SYS50078
1060 I=A+B*256
1070 L=LEN(SN$):IFL<1THEN1100
1080 FORN=1TOL:MF=MID$(SN$,N,1):V=ASC(MF)
1090 POKE I+N-1,V:NEXT:IFL=13THEN1110
1100 FORN=LTO13:POKE I+N,32:NEXT
1110 L=LEN(CN$):IFL<1THEN1140
1120 FORN=1TOL:MF=MID$(CN$,N,1):V=ASC(MF)
1130 POKE I+N+13,V:NEXT:IFL=11THEN1150
1140 FORN=LTO11:POKE I+14+N,32:NEXT
1150 B(0)=(YAND7)+(SEAND7)*8+(SKAND1)*64
1160 B(1)=(S(0)AND15)+(S(1)AND15)*16
1170 B(2)=(S(2)AND15)+(S(3)AND15)*16
1180 FORN=0TO2
1190 B(N+3)=(O(N*2)AND15)+(O(N*2+1)AND15)*16
1200 NEXT
1210 FORN=0TO5:POKE I+26+N,B(N):NEXT
1220 IF I<16160THENPOKE75,Y-2:SYS50088
1230 RETURN
1499 REM*READ 1ST FILE NAME*
1500 FORN=0TO31:POKE 16224+N,Z(N):NEXT
1510 FORN=0TO31:POKE 16192+N,-Z(N)<0):NEXT
1520 I=16160:GOSUB 1070
1530 IFY>5THENY=5
1540 IFY<2THENY=2
1550 POKE75,Y-2:SYS50148:IE=0:NL=0
1560 SYS50098:X=PEEK(780)
1570 A=PEEK(251):B=PEEK(252):I=A+256*B
1575 IFPEEK(1)=255THENPRINTE$=1:RETURN
1580 A=PEEK(251):B=PEEK(252):I=A+256*B
1599 REM*TRANSLATE*
1600 SN$="" :CN$=""
1610 FORN=0TO13:X=PEEK(N+1):SN$=SN$+CHR$(X):NEXT
1620 FORN=14TO25:X=PEEK(N+1):CN$=CN$+CHR$(X):NEXT
1630 X=PEEK(1+26):SE=(X/8)AND7
1640 SX=(X/64)AND1:F$=STR$(Y)+F$(SE):SX$=SX$(SX)
1650 X=PEEK(1+27):S(0)=XAND15:S(1)=INT(X/16)
1660 X=PEEK(1+28):S(2)=XAND15:S(3)=INT(X/16)
1670 FORN=0TO2:X=PEEK(1+29+N):O(N*2)=XAND15
1680 O(N*2+1)=INT(X/16):OP$(N*2)=O$(XAND15)
1690 OP$(N*2+1)=O$(X/16):NEXT
1700 PR$=""
1710 IFP(0)=1THENPR$=PR$+SN$
1720 IFP(1)=1THENPR$=PR$+CN$
1730 IFP(2)=1THENPR$=PR$+F$
1740 IFP(3)=1THENPR$=PR$+" "+SX$
1750 FORN=0TO3
1760 IFP(4+N)=1THENPR$=PR$+STR$(S(N))
1770 NEXT
1780 FORN=0TO5
1790 IFP(8+N)=1THENPR$=PR$+OP$(N)
1800 NEXT
1810 IFPR=0THENPRINTPR$:GOTO1830
1820 PRINT#1,PR$
1830 RETURN
1999 REM*STORE BACK AFTER CHANGES*
2000 GOTO1070
2099 REM*GET NEXT NAME*
2100 POKE52224,0
2110 SYS50158:IFPEEK(52224)=255THENE=1:RETURN
2120 E=0:GOSUB 1500:RETURN
2130 END
2199 REM*DELETE NAME*
2200 GOSUB 1500:IFE=1THENRETURN
2210 POKE 16130,A:POKE 16131,B
2220 SYS50168
2230 RETURN
10000 XX=16+1824
10010 FORN=0TO31:X=PEEK(CX+N):PRINTCHR$(X):NEXT
10020 XX=XX+32:GOTO10010
READY.
```

MAKE MONEY WITH YOUR MICROCOMPUTER

Most people buy a micro either to play games, like 'Invaders', on it ... or to learn more about computers ... or as an educational aid for their children. But now, there is another — potentially far more exciting — way to use your microcomputer.

The fact is, your micro can do the same amount of work it took several people many hours to do only a few years ago ... in a matter of minutes. What's more, most of your expenses are already covered — electricity, rent, rates and even the computer itself ... they're all paid for. So any money you bring in with your micro should be almost pure profit. All you need now is the 'inside track' on who needs which services where, how to get them to sign on with you and what to charge.

New Guide Tells All

"Make Money With Your Micro" is a new, working manual that answers all these questions ... and a lot more besides. Like how to set up a small computer business ... what books to keep ... when to call in professional help ... how to arrange your workspace to maximum advantage ... why the right micro based business can be unusually profitable, and what you need to climb on the bandwagon ... before it really gets rolling. Here is a brief sampling of what else you can expect to learn from this special report:

What You Will Learn

- Where to find customers ... and what to offer them.
- Why word processing is different ... and some rather surprising, little-known, ways to make it pay big.
- How to save businesses money ... and make yourself a small fortune in the process.
- Which number services pay best ... and how to perform them efficiently.
- Where to get referrals ... and why they matter.
- Managing your time ... always important, but vital if you plan a part time operation.
- Preparing mailing lists ... why this is potentially one of the most profitable services you'll be offering.
- And much, much more.

Where Do I Find Customers?

In addition to taking you through the very necessary steps that precede any truly successful microcomputer-based business, "Make Money With Your Microcomputer" gives you the low-down on exactly which businesses want what services, and how best to get these firms as big paying customers.

Working from this profession-by-profession section, you can find several openings available right now to suit your circumstances — areas where you, with your micro, can really coin money ... giving people and businesses in your part of the country what they want and need to become more efficient ... and, therefore, more profitable.

Do I Need Capital?

You don't require any 'capital' as such to get started in this microcomputer business ... remember, what we are talking about here is primarily a service industry. You can work from home, in your own time at your own pace ... starting with just a couple of evenings a week only, if you like. There's no need for 'staff' ... your micro does the hard work for you ... and your 'office' is already paid for because this, more than any other business in the world, takes very little space ... almost any quiet corner will do.

Must I Be An Expert?

It really doesn't matter if you don't know a lot about computers, because there are plenty (almost too many!) 'ready-made' programmes already on the market ... most of them with built-in instructions ... covering just about every and any computer job you are likely to encounter in your new business. But, naturally, if you can design your own programmes, and that is what you enjoy, there's nothing to stop you doing so — although, frankly, the chances are there's a better, less expensive programme already in existence.

Which Micro Do I Need?

Almost any modern micro will do, because most programmes these days are — or can be made — compatible with just about any other microcomputer. If you haven't yet bought your own micro, you'll find the cost surprisingly low ... and certainly very small compared to its earning potential. However, either way, you may need a few 'add-ons' ... although, again, these cost very little when you consider how much money they can make for you.

An Alternative Service

If you prefer offering a service direct to the public, you'll also find in this new manual a special section devoted to areas where you can do just that. But, it's only fair to tell you now, you are likely to make much more money helping companies and the professions (e.g. Doctors, Architects, etc. etc.) than you ever could selling services direct to the public.

Get There First

As with any other business, to be successful you must find a need and fill it. Right now, there are literally dozens of companies and professions in your area that urgently need micro based help. The big money in this field will be made by those men and women, young or old, who are first to sign these businesses on as customers, and then grow with them.

Your Guarantee

"Make Money With Your Microcomputer", the practical, working manual that can guide you into this exciting new field, costs just £10, post paid. There is a 3 day satisfaction-or-your-money-back guarantee, so all you are risking to find out more about what could be the fastest growing part of our economy over the next few years is a few postage stamps.

How To Order

To order your copy now, just complete the form below and return it here. And remember — the sooner you get it, the sooner you too can "make money with YOUR microcomputer!"

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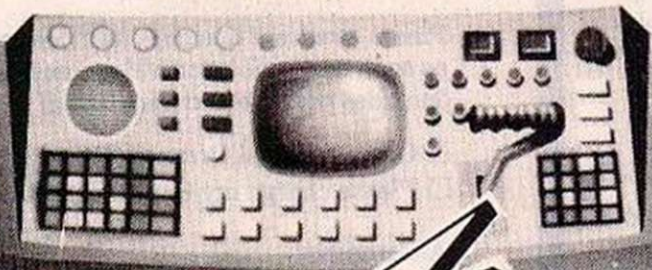
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747



SIMULATOR

FLIGHT

David Rees reaches for a simulated sky in this simulation of a simulator.

HAVE YOU EVER WANTED to fly a 747? Now you can — almost — if you have a Commodore 64. What it lacks in detail it makes up for in safety — no hospital bills if you crash. It has no runway display, as the basic CBM-64 has no high resolution graphics commands, but it is detailed and fast enough so anyone who wants to fly by instruments can become engrossed in the program. In case you do have an extended Basic, a gap has been left in the display, and using the '64s mixed mode feature, you could put high resolution graphics here.

I have also tried to make it possible for the program to be useful for other computers by separating calculations from the display section of the program. These should be very useful, as it is very difficult to build a simulation model that will behave like the real thing, and can be treated as a core for your

own flight simulator. Calculations are located at lines 2300 to 2375 and 2500 to 2999. Table 1 gives variable meanings so you can convert the program more easily.

Careful with machine code

When entering the program, be especially careful with machine-code data, and save the program before running it as one mistake could crash the computer. The code gives the simulator its speed, controlling sound effects, almost all key input, turn rate, power, elevation, attitude and sprites. These are updated twice per second, with the rest of the display being updated once per second. However, it is important to remove all Rems, as these slow the program down.

To use the simulator, you must first select two airports in order of present location to destination. A choice of nine locations is given

and their data is stored at lines 6100 to 6180. You are given bearing to destination and distance, as well as wind velocity and bearing, and you are asked to choose the amount of fuel you will need. After this, you can begin to fly the simulator.

To work it, you must first know the controls and readouts of the simulator, and these are listed as follows:

Bearing: direction of desired motion — in degrees — of your aircraft, excluding wind effects.

Turn rate: rate of change of your bearing — degrees per second. Note that if you exceed the range of +2 to -2 the turn will be so sharp that turn rate will increase of its own accord. Controlled by keys + and -.

Destination bearing: direction of destination from your present position.

(continued on page 91)

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(continued from page 89)

IAS: inertial air speed, giving aircraft's total speed in knots including climb rate.

VSI: vertical speed indicator, in feet per minute.

Distance: distance to destination, in miles.

Height: altitude in feet.

Gear: status of undercarriage. Up or down — use keys U and D.

Flaps: status of flaps. None — no effect; Mid — gives extra lift; Full — slows speed dramatically. Use F key for none to mid to full, and shift F for full to mid to one.

Power: percentage power. Gives actual power being produced by the engines. Linear dial below gives optimum power — i.e., at zero feet — desired and is directly controlled by right (higher)/left (lower) cursor key.

Tips and conditions

ELL: elevation. Gives rate of change of attitude e.g. if it is positive attitude increases. Controlled by down (higher)/up (lower) cursor key.

ATT: attitude. Gives an indication of desired angle of ascent/descent.

Fuel: gives fuel remaining in tons.

Stall: during take-off this gives the speed that must be reached to start climbing in altitude. After this, it gives the speed above which the engine functions efficiently.

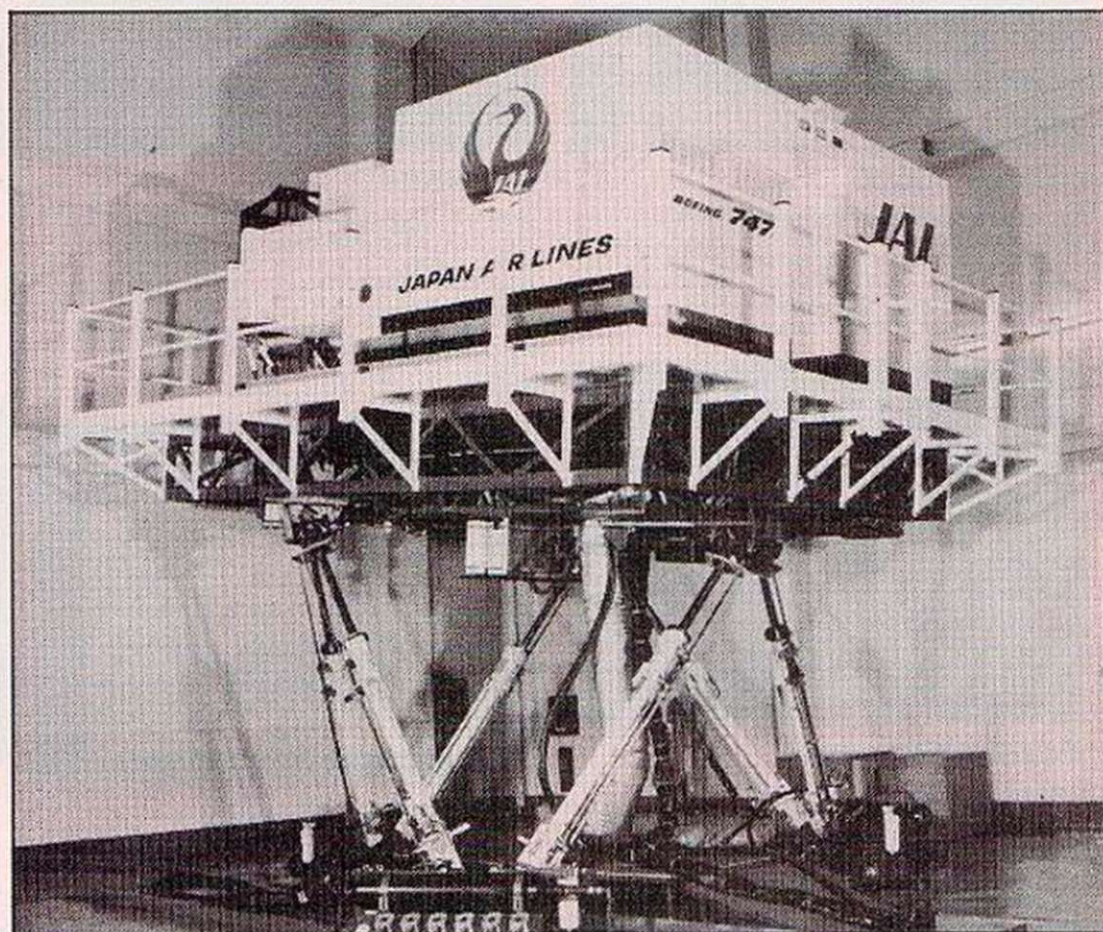
Time: gives flight time.

All controls mentioned above have auto repeat. One other control exists, given by key T. When pressed, all distances and bearings are changed as if 10 minutes had elapsed.

To help you start, here are some tips and conditions. When taking off, always make sure you have a high climb rate — e.g. high ATT and Flaps set to Mid — or you will crash when you leave the ground. Also, when you

Table 1.

F	fuel	HH	arbitrary constant (100000).
AP%	actual power input by keys.	VS	vertical speed in metres per second.
AP	resulting actual power.	AT%	attitude.
HA	maximum altitude in metres.	GS	speed parallel to the ground.
L	your altitude in metres.	XF	x position of aircraft.
AS	inertial airspeed (Kmph).	YF	y position of aircraft.
SL	stall speed (Kmph).	WV	wind velocity.
TR%	turn rate input by keys.	BC	wind bearing in radians.
BE	your bearing.	D	distance to destination.
FL%	flaps status: 0 = none, 1 = mid, 2 = full.	XT	x position of destination.
G%	gear status 0 = up.	YT	y position of destination.
		DB	destination bearing.



```

1 REM#FLIGHT SIMULATOR#
2 REM# BY DAVID REES #
4 REM# REMOVE REMS #
5 REM# FOR USE #
6 0%=(1/ELX+0/FLX+0/TRX+0/PRX+0/APX+0/ATX+0
7 POKES4276,0/ASX+0/IG=0
8 POKES4296,3/POKES4277,25/POKES4278,240
9 POKES4276,129/POKES4273,0
10 POKES1,0/POKES5,0
20 POKES2,60/POKES6,60
30 V=33248/POKEV+32,0/POKEV+33,0
40 POKES2040,254/POKES2041,255/POKES2042,255
50 POKESV+21,0
60 POKESV,18/POKEV+1,178
70 POKESV+2,209/POKEV+3,194
80 POKESV+4,249/POKEV+5,184
90 POKESV+30,11/POKEV+40,11/POKEV+41,1
499 REM#(CYAN)(CLS);.(RIGHT)
500 PRINT"FLIGHT SIMULATOR"
509 REM#(DOWN)
510 PRINT"BY DAVID REES (1983)"
519 REM#(DOWN)
520 PRINT"YOU WILL PILOT A PLANE BETWEEN 2 *
530 PRINT"AIRPORTS OF YOUR CHOICE"
539 REM#(DOWN);.(RVS ON)
540 PRINT"NOTE"
550 PRINT"TO LAND YOU MUST BE"
560 PRINT"1. UNDER 150 FT"
565 PRINT"2. UNDER 200 KNOTS"
570 PRINT"3. VS BELOW 300 FT/MIN"
580 PRINT"4. LESS THAN 0.4 MILES FROM THE"
585 PRINT" AIRPORT"
599 REM#(DOWN);(GREEN)
590 PRINT"THE CHOICE OF AIRPORTS IS:"
610 FORN=16256TO19800
620 READA:IFA--1THEN660
625 IFA=-2THEN780
630 POKEN,A
640 NEXTN
660 READA:FORX=NTDA:POKEK,0/NEXTKIN=X100TO640
700 FORN=8TO1:READA:(N),X(N),Y(N):NEXT
705 FORN=8TO1:PRINTN+1,A(N):NEXT
709 REM#(DOWN)
710 PRINT"WHICH AIRPORT DO YOU WISH TO?"
715 PRINT" FLY FROM?"
719 REM#(DOWN)
720 PRINT"INPUT THE NUMBER,PLEASE!"
730 INPUTA:F=VAL(A)-1
735 IFF<0ORF>9THEN720
739 REM#(DOWN)
740 PRINT"WHICH AIRPORT DO YOU WISH TO FLY TO?"
749 REM#(DOWN)
750 PRINT"INPUT THE NUMBER,PLEASE!"

```

```

760 INPUTA:T=VAL(A)-1
770 IFT<0ORT>9THEN750
780 IFT=FTHEN705
799 REM#(CLS)
800 PRINT"YOU ARE FLYING"
809 REM#(DOWN);.(RVS ON)
810 PRINT"FROM"
819 REM#(DOWN);.(RVS ON)
820 PRINT"TO"
829 REM#(DOWN)
830 PRINT"DISTANCE (MILES)"
835 D=((X(T)-X(F))^2+(Y(T)-Y(F))^2)^.5
840 PRINT(D/(1609))/10;"MILES"
845 XF=X(F):YF=Y(F)
846 XT=X(T):YT=Y(T)
850 XI=X(F):X2=X(T)
860 YI=Y(F):Y2=Y(T)
870 GOSUB 4000:DB=AN
879 REM#(DOWN);.(LEFT)
880 PRINT"BEARING (JAN)"
890 W=10*INT(RND(1)*15)+10*INT(RND(1)*360)
899 REM#(DOWN)
910 PRINT"WIND VELOCITY (KNOTS)"
919 REM#(DOWN);.(LEFT)
920 PRINT"BEARING (B)"
949 REM#(DOWN)
950 PRINT"HOW MUCH FUEL (20-90 TONS)?"
960 INPUT F:IFF<22 OR F>90 THEN 960
970 F=INT(F*10)/10
979 REM#(DOWN)
980 PRINT"TAKE OFF WEIGHT IS 1220-F TONS"
989 REM#(DOWN);(RVS ON)
990 PRINT"PRESS ANY KEY TO START"
995 GETA:IFA=" "THEN995
999 REM#(CLS)
1000 PRINT"BEARING";."TURN RATE"
1009 REM#(DOWN)
1010 PRINT"DESTINATION BEARING"
1049 REM#(DOWN);
1050 PRINT"VS"
1060 PRINT"DISTANCE";."HEIGHT"
1069 REM#(PURPLE)
1070 PRINT" "
1080 PRINT"GEAR (DOWN)FLAPS (NONE)"
1090 PRINT" "
1099 REM#(DOWN);(GREEN)
1100 PRINT"POWER (X)"
1109 REM#(PURPLE)
1110 PRINT" "
1129 REM#(GREEN)
1130 PRINT"50 100"
1140 PRINT"FEUL"

```

```

1150 REM#(UP);
1160 PRINT" "
1169 REM#(LEFT);
1170 FORN=0TO10:READA:PRINT" "
1189 REM#(HOME);(CYAN)
1190 PRINT" "
1300 POKESV+21,255
1900 BE=90:SL=272/BC=B**/180
1910 TIS="000000":HH=100000
1920 C1=16384:C2=16678:C3=16881:HA=30000
2000 FFX=FL/100+GX:SYSC1=SYSC2=SYSC3
2020 REM#(HOME);(DOWN);.(LEFT);.(LEFT)
2030 PRINT" "
2039 REM#(LEFT)
2040 PRINT", (B) "
2049 REM#(DOWN);(RIGHT);.(LEFT)
2050 PRINT"INT(AS/1.7)"
2054 REM#(UP);.(LEFT)
2055 PRINT"TAB(24)INT(VS*3.28)"
2059 REM#(LEFT)
2060 PRINTTAB(9);INT(D/1609)/10"
2061 REM#(UP);.(LEFT)
2062 PRINT"TAB(27)INT(L*3.28)"
2119 REM#(DOWN);.(LEFT)
2120 PRINT"INT(AP)"
2129 REM#(DOWN);(RIGHT);.(LEFT)
2130 PRINT"INT(F*10)/10"
2139 REM#(LEFT)
2140 PRINT"STALL INT(SL/1.7)"
2150 IFL<0ANDTA=0THEN1="000000"
2155 IFL<0THENTA=" "
2159 REM#(DOWN)
2160 PRINT"TIME (T)IS"
2300 F=F-AV/100000:IFF<0THENF=0/PRX=0
2310 AP=APX*(HA-L)/60000
2315 IFAS<SLANDL>0THENAP=AP*(AS/SL)
2320 TRX=TRX+TRX/20-(TRX<0)
2330 BE=BE-TRX*(L/10):IFBE<360THENBE=BE-360
2340 IFBE<0THENBE=BE+360
2350 SL=272*(HA-L)/HA
2360 AS=AS-((1-(FLX*2)-(GX*1))*AS/10)*(HH-L)/HH
2365 AS=AS+AP*1.2-EL/100-VS/1000
2370 AS=AS+(AS/SL)*(L/10)+SINKATX/100.0)
2375 AS=AS-(220+F)/10000-TR/10-ABS<TRX>
2459 REM#(HOME);(DOWN);
2460 PRINT" "
2465 SYSC1=SYSC2=SYSC3:IFL=0ANDGX=0THENGX=1
2466 PRINT:IFGX=0GX=1:IFL=0ANDGX=1
2469 REM#(RIGHT);(UP)
2470 IFGX=0THENPRINT" "
2479 REM#(RIGHT);(UP)
2480 PRINT" "

```

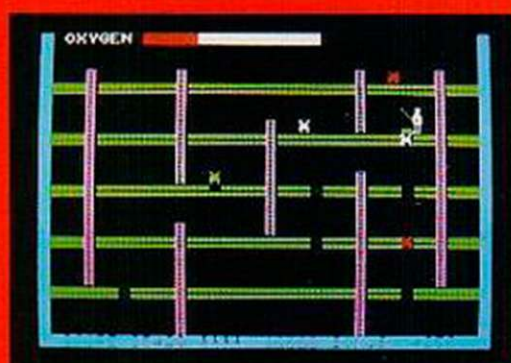
(listing continued on page 93)

A SUPERB RANGE OF GAMES SOFTWARE FOR SHARP MZ-700 SERIES



FROGGER — £6.95

This most popular of arcade games has been totally recreated for the Sharp computer. Superb graphics and as fast as you like from beginner's level up to 'Superhuman'. Get each of four frogs over the busy motorway, then hop from boat to raft to log to crocodile until safely home sitting on a lily pad. Terrific fun.



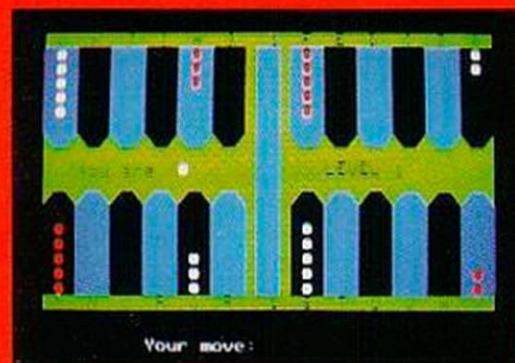
SPACE PANIC — £7.95

How long can you survive in the multi-storey building filled with alien bugs. This machine-code programme accurately simulates the arcade game where you climb ladders and dig holes to catch the aliens then fill them in again once they are caught. The red ones must fall through one floor, the green ones, two floors and white ones, three floors. Red aliens who have time to dig themselves out get rather cross and become green. PANIC!! Joy stick or keyboard control.



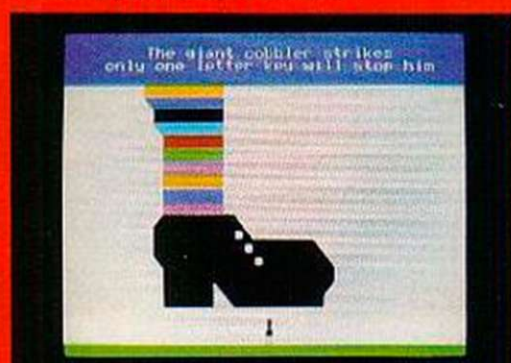
GALAXIANS — £7.95

A high-speed machine-code version of the popular arcade game where the massed space invaders must be cleared from the skies. After a few seconds they will begin to swoop and dive at you, showering you with scatter bombs as they go. The game becomes progressively more demanding as you kill more and more of the marauding aliens. Very entertaining — hours of fun!! Joy stick or keyboard control.



BACKGAMMON — £7.95

Now available for the MZ-700, this traditional board game can now be played against the computer. Simple to follow instructions for the beginner — higher levels available for the more experienced player.



NIGHTMARE PARK — £6.95

If you have never played this type of game before, you're in for a treat. As you make your way along the intricate pathways to the exit, you are constantly given tasks to perform or games to play. Each of these must be successfully completed before you are allowed to continue. It takes a lot of doing. You must remain quick and alert at all times. A little luck is handy. Amazing graphics and sounds!!!



FIGHTER COMMAND — £6.95

A mission flown completely on instruments where you are pursuing a fleet of ten enemy aircraft fleeing from you. They will show on your long range radar screen and you must manoeuvre your craft to get them within range of your missiles. If you get too near, they will fire at you and warp away to safety. You only have one chance to destroy incoming missiles with your lasers.



CHESS — £9.95

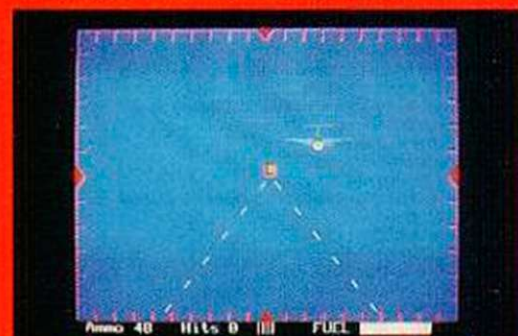
Suitable for the rank beginner through to the more experienced player, this Chess program may be used in three different ways.

1. As a referee between two players, checking for valid moves, CHECK and CHECKMATE situations.
 2. As an opponent with 14 levels of intelligence to match your skills.
 3. As a teaching aid when asked to play against itself or show you the best move if you get into difficulties.
- Long games may be saved on cassette for completion at a later time and a print-out of all moves made is available.



XANAGRAMS — £9.95

Not only a terrific spelling test but also a great game. You are asked to guess up to five words, represented by blocks on the screen in a crossword format. All the letters that you need are shown on the right of the screen in alphabetical order and the computer will give you the first letter if you ask it nicely. Suits almost any age with 5 skill levels and from 1 to 5 words to be guessed. Really habit-forming!!!



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Choose your rank in the RAP and you are immediately sent on a mission to catch and shoot down ten enemy Mirage jets that are fleeing after their attack on your airbase. You must manoeuvre your plane to get them in your gun-sights whilst they are weaving about the sky to avoid being hit. Limited ammunition and fuel available so efficiency and accuracy are all important to your completion of the mission. Promotion for the successful but poor performances can mean you are asked to leave the air force. Joy stick or keyboard control.

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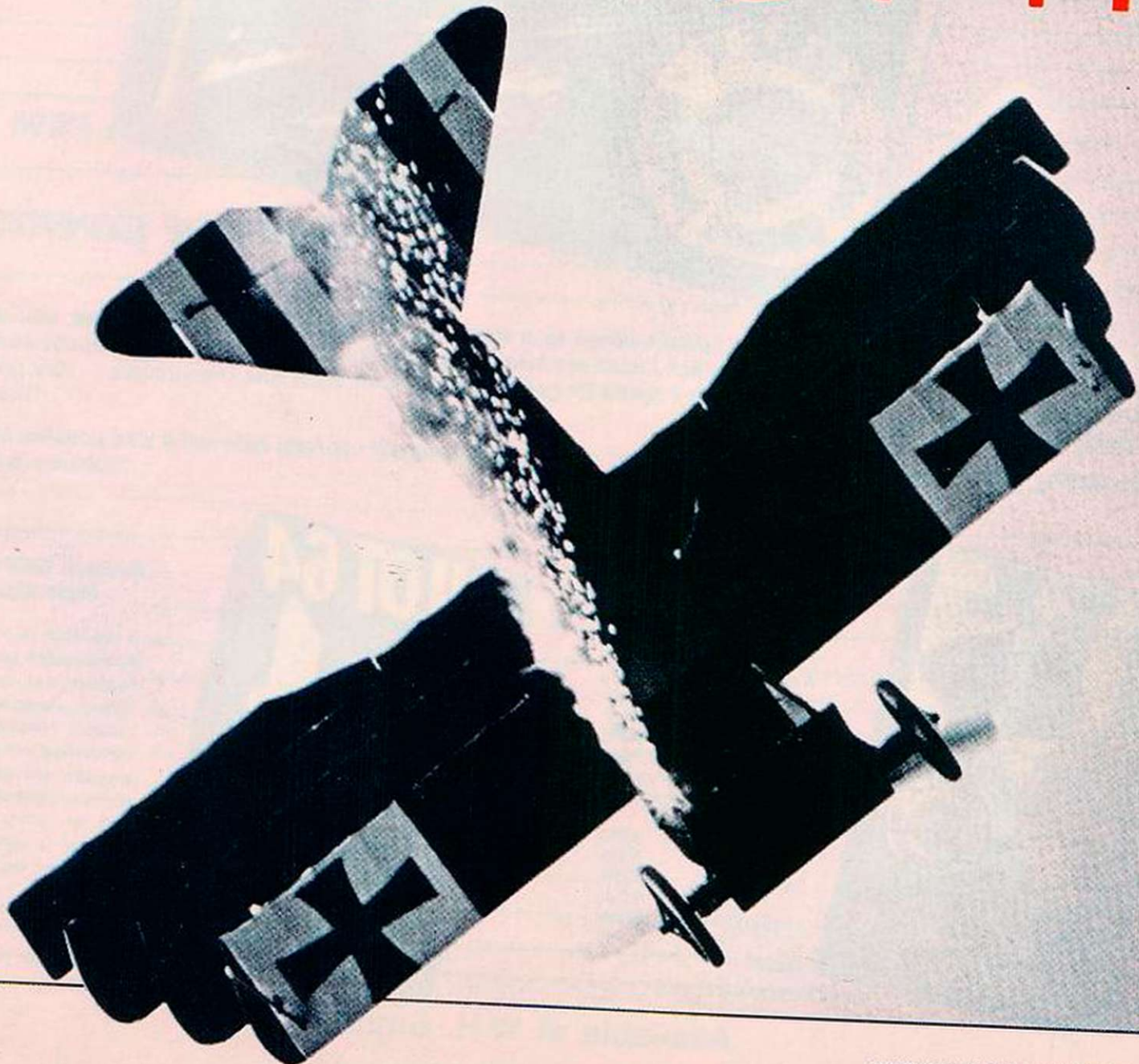
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Program 2.

```
00 V=39879:W=V-4:Y=W+1:POKEV+1,238:POKEV-9,255:POKEV,15:PRINT"UTUVS8888L4D088L  
MPO88"  
05 A(1)=-1:A(2)=-2:A(3)=-2:A(4)=-2:A(5)=-1:A(6)=-3:A(7)=-2:A(8)=-2:ITIS="888888"  
"  
00 A=3:81=-1:82=-1  
05 POKEJ,32:J=8:62:H=1:81=81+1:IFA(<)3THEN105  
100 POKEK,32:K=8:143:I=5:82=82+1  
105 FORA=8TO21:POKE8184+A,1:POKE38884+A,8:NEXTI:IF81>8THENPRINT"8888888888!"  
110 PRINT"8888888888"RIGHT$(STR$(81),1)"8888888888"RIGHT$(STR$(82),1)  
115 IF82>8THENPRINT"0888888888!"  
120 8Y88888I:P=PEEK(7684)+PEEK(7685)+PEEK(7686)+PEEK(7667)  
125 IFPEEK(7688)=8ANDL=8THENL=J+A(H):M=A(H):Z=L+M*5:POKEV-1,208  
130 IFP=156THENE=H:GOTO175  
135 IFP=148THENE=1  
140 IFP=136THENE=2  
145 IFP=152THENE=3  
150 IFP=24THENE=4  
155 IFP=28THENE=5  
160 IFP=20THENE=6  
165 IFP=148THENE=7  
170 IFP=132THENE=8  
175 C=PEEK(197):IFC=64THEND=1:GOTO205  
180 IFC=28ANDN=8THENN=K+A(I):O=A(I):Y=N+O*5:POKEV-1,208  
185 IFC=44THEND=1  
190 IFC=52THEND=3  
195 IFC=29THEND=7  
200 IFC=21THEND=5  
205 IFH<EANDL-H<4THENH=H+1  
210 IFH<EANDL-H>4THENH=H-1:IFH=8THENH=8:GOTO220  
215 IFH>EANDH-E<4THENH=H-1
```

(listing continued on page 99)

DOG FIGHT





£5.95

WHAT THE EXPERTS SAY

Its wealth of detail is amazing. One of the busiest games for a long time. The graphics are really excellent, well drawn and animated. A complicated, demanding game which I can't see losing its appeal for a long time. Krakatoa is both addictive and hard to play. It takes ages to get any good and the scope for getting better scores each time is enormous — very good, highly recommended. Game of the month.

"Crash Micro"

An amazing piece of programming, a great program. A year ago we would not have believed it was possible to do this.

"Software Supermarket"



The only review said "Speech is effective and must be at the limit of spectrum capabilities, graphics are excellent and animation superb. A combination of graphics, adventure maze and chase games makes this an unusual, fascinating and addictive program which must rank among the spectrum classics.

Value for money	100%
Graphics	100%
Overall score	100%
	H.C.W.

Home Computing Weekly

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(continued from page 96)

to a left-right one. Pushing the stick in the opposite direction will cause the plane to move in this direction, but it will always turn in the same direction. This is unless you specify that you want to turn in another direction by pushing the stick in that direction and then in the actual direction you want to be going in. So, if you want the plane to turn downwards, you would push the stick down first, and then hard right.

The bullets have a range of six plane lengths after which they become ineffective. It is impossible to shoot the other player if his plane is directly in front of you — in an adjacent character space.

Arcade freaks may remember that the original game Dogfight had the screen edged with flak. Partly due to screen size, and partly to do with speed — although the method of Poking directly to character memory is very quick — the flak has been omitted from this version. Hence full-screen wraparound operates — you can leave the screen on one side and come back on the other side. But beware — so do the bullets!

The program is in two parts. Program 1 defines the characters, sets up a machine-code routine to read the joystick and produces a title screen — animated — with music.

The Print statement in line 80 must be typed in exactly as listed to produce the correct display.

Lines 95 and 100 may seem to be in an odd position, but they come into their own in conjunction with the On-Goto statement in

(listing continued from page 97)

```

220 IFH>EANDH-E>4THENH=H+1:IFH=9THENH=1
225 IFI<DANDD-I<=4THENI=I+1
230 IFI<DANDD-I>4THENI=I-1:IFI=0THENI=8:GOTO240
235 IFI>DANDI-D<=4THENI=I-1
240 IFI>DANDI-D>4THENI=I+1:IFI=9THENI=1
245 IFL>0ORN>0THENPOKEV-1,0
250 F=PEEK(L+M):IFL>0ANDL<>ZANDF=32THENPOKEV,32:L=L+M:POKEV+30720,0:POKEV,18:GOT
0250
255 POKEV,32:L=0:M=0
260 IFF>0ANDF<9THEN300
265 B=PEEK(N+0):IFN>0ANDN<>YANDB=32THENPOKEV,32:N=N+0:POKEV+30720,0:POKEV,18:GOT
0265
270 POKEV,32:N=0:O=0
275 IFB>0ANDB<8ORK+A<1><7702ORK+A<1>>81630RJ+A<H><77020RJ+A<H>>8163THEN300
280 POKEV,32:POKEJ,32:IK=K+A<1>:J=J+A<H>:POKEK+30720,2:POKEK,1:POKEJ+30720,6
285 POKEJ,H:IFJ=KTHEN300
290 POKEW,133+H:POKEK,127+I:IFTI#>="000131"THENPOKE188,0:POKEV,0:GOTO365
295 PRINT"*****RIGHT*(TI#,3):GOTO120
300 T=150:POKEV+1,234:IT#>TI#>:IFJ+A<H>>8163THENPOKEJ,19:POKEJ+30720,0:IA=1:GOTO355
305 IFK+A<1>>8163THENPOKEK,19:POKEK+30720,0:IA=2:GOTO355
310 IFF>0ANDF<8ORK+A<1><7702THENB=K:IA=2
315 IFB>0ANDB<80RJ+A<H><7702THENB=J:IA=1
320 IFJ=KTHENB=J:IA=3
325 POKEW,0:POKEK,0:POKEB,18:Q=B:FORR=250TO100STEP-1:POKEB+30720,RND(1)*14:POKEV
-1,R
330 NEXT:POKEV-1,0
335 POKEB+30720,0:POKEB,17:POKEW,T:Q=Q+22:T=T+1:IFPEEK(B)=11THEN345
340 POKEB,7:POKEB+30720,RND(1)*5+2:FORB=1TO50:NEXT:GOTO335
345 POKEW,0:FORB=QTOB-22STEP22:POKEB,32:NEXT:POKEB-22,19:POKEV-1,155:FORB=QTOB-2
26STEP22
350 POKEB,9:FORU=1TO100:NEXT:IGI=RND(1)*4-2:POKEV-13,38+0:POKE38698+0,2+0:POKEB
,32:NEXT
355 POKEV-1,155:FORB=15TO88STEP-.04:POKEV,S:NEXT:POKEV-1,0:POKEV,15:POKEV-13,38
360 POKEV+1,230:TI#>T#>:ONAGOTO85,100,85
365 PRINT"*****"GAME OVER"*****
_*
370 FORA=1TO1000:NEXT:POKE188,0
375 GETH:IFA#>"*THENRUN
380 GOTO375
READY.

```

line 360. This saves repeated definition of the plane positions both at the start of a game and after a crash/collision.

The trouble with two-player games like this

is the need to repeat the control sequences which use up a lot of the Vic's already short memory. Conceivably the game could be enhanced if memory expansion is a

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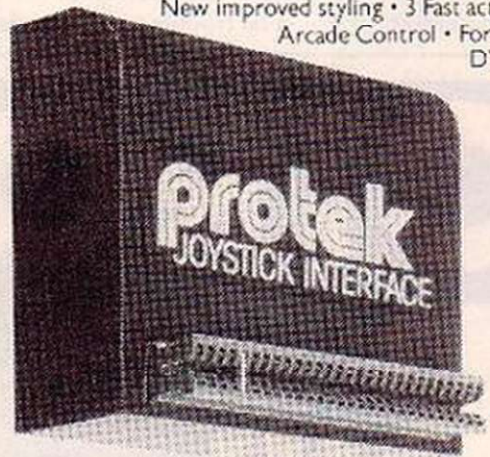
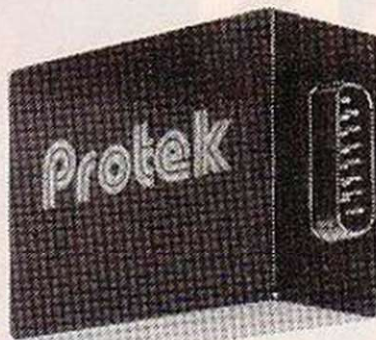


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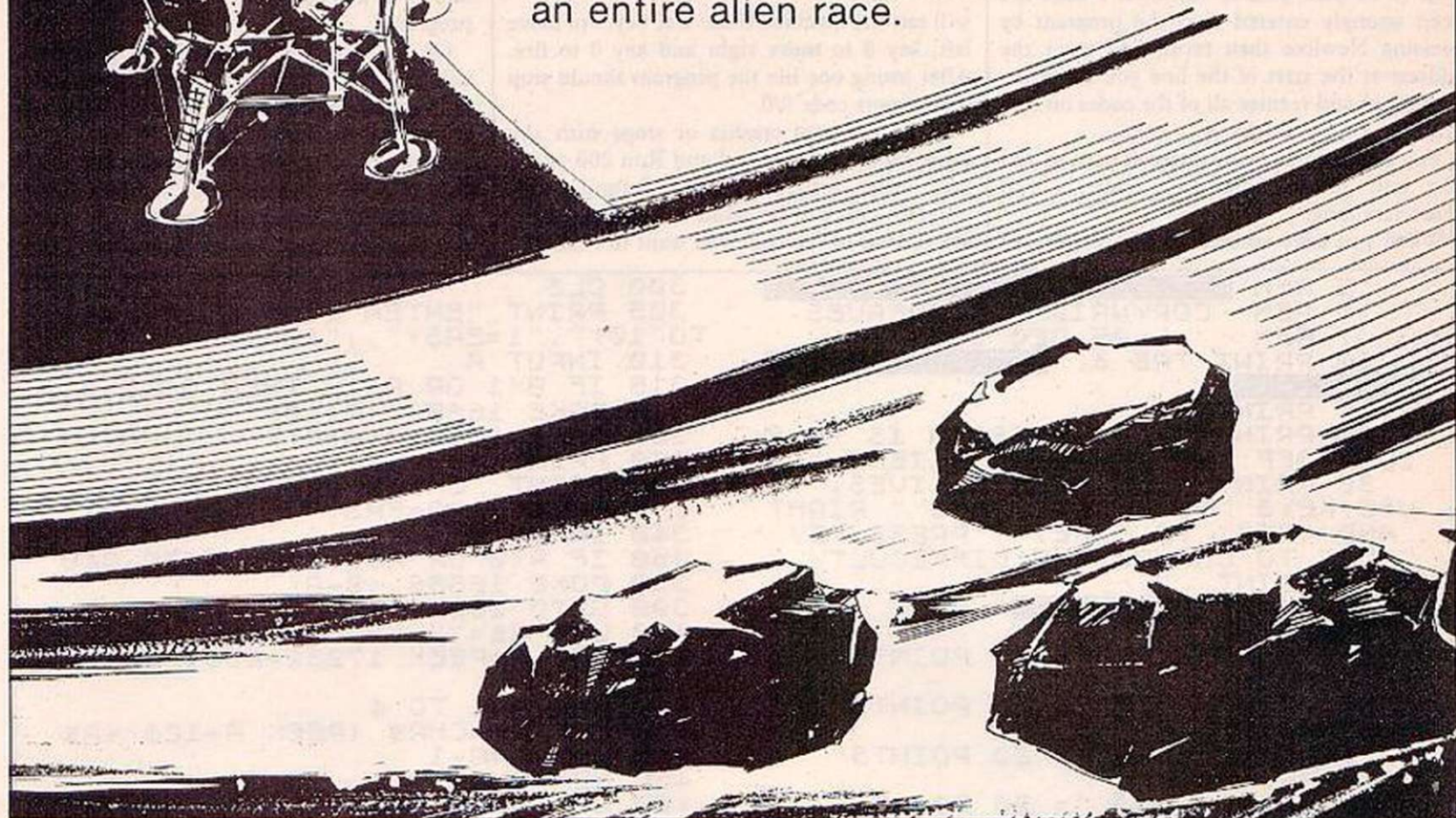
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Hex loader.

```

99 REM ***HEX LOADER***
100 CLS
130 PRINT "START ADDRESS"
140 INPUT S
150 PRINT "FINISH ADDRESS"
160 INPUT F
180 FOR N=5 TO F STEP 8
190 LET T=0
200 PRINT N; " - ";
210 INPUT A$
220 PRINT A$; " = ";
230 INPUT TOT
240 PRINT TOT
245 LET Z=0
250 FOR K=1 TO LEN A$ STEP 2
260 LET C=(CODE A$(K)-28)*16+C0
DE A$(K+1)-28
270 LET T=T+C
280 POKE N+Z,C
290 LET Z=Z+1
300 NEXT K
310 IF TOT=T THEN GOTO 340
320 PRINT "ERROR - PLEASE INPUT
AGAIN"
330 GOTO 190
340 NEXT N
350 STOP

```

GALAXOIGS

FED UP WITH the annihilation of their main battle fleet the Galaxians have returned, this time with a completely revised battle strategy. Instead of trying to invade our planet in an orderly formation and being blasted out of existence the main fleet hovers just out of range of your gun. But, waves of fighters are sent in to try and soften up the opposition.

Your task is to destroy as many of the aliens as you can. You score 10 for hitting stationary starships and 20 for each moving fighter. As you progress the number of fighters in the battle area will increase thus making stronger waves of attack and life more hazardous for you as the defender. You will have to dodge bombs and decide your priorities as you play

the game.

Now for the boring part of the whole thing, entering the machine code for the program.

First make a Rem statement line 1 of 100 characters and edit it seven times to make lines 1 to 8 each of 100 characters. Then add line 9 Rem followed by another 34 characters. To check that all is correct type in as a direct command:

```
PRINT (PEEK 16396 + 256 * PEEK
16397), NEWLINE
```

If everything is correct you should be rewarded by the number 17397 appearing in the top left corner of your screen. If not check and adjust your Rem statements accordingly.

When all is well enter the following as direct commands:

```
POKE 16511,116 N/L
POKE 16512,3 N/L
POKE 16510,0 N/L
POKE 16514,118 N/L
POKE 16515,118 N/L
```

You should now have a Rem line 0 with nothing after it.

If all is well enter the hex loader and reader. You will find that the computer will keep listing line 0 so after entering line 10 as direct commands:

```
LIST 10 N/L
POKE 16419,10 N/L
```

(continued on next page)

(continued from previous page)

then enter the rest of the program. On Running the program you will be asked to enter the starting address for the machine code to be put. This is 16516. If a code has been wrongly entered stop the program by pressing Newline then rerun and enter the address at the start of the line you made the mistake in and reenter all of the codes on that line.

You can enter as many codes at once as you like but, please note each code is two characters long.

When you have entered all the codes, save

the complete program on tape a couple of times.

Direct command

USR 16549

will test the machine code. Use key 5 to move left, key 8 to move right and key 0 to fire. After losing one life the program should stop with report code 0/0.

If the program crashes or stops with any other report code, reload and Run 200 of the hex loader program. When Running this program you will be asked to enter the starting address of the code you want to read. If a

mistake is found you can correct it in a manner previously described.

When the machine code part of the program is correct delete the loader program line by line — do not use new — then enter the Basic program.

On Running the completed program you will be offered the opportunity of changing both speed and difficulty. This is set initially at five and five by the listing.

Anybody with suicidal tendencies might like to try entering the highest choices available. Whichever combination you choose you will have three lives to lose so good luck.

```
5 REM RETURN OF THE GALAXIANS
6 REM COPYRIGHT S.GREAVES
7 REM 25 DEC 1983
10 PRINT TAB 4;"RETURN OF THE
GALAXIANS"
15 PRINT
20 PRINT "YOUR MISSION IS TO F
IGHT OFF THE INVADING ALIENS."
30 PRINT "YOU HAVE 3 LIVES."
USE KEYS ""5"" LEFT, ""8"" RIGHT
AND ""0"" TO FIRE, ""PRESS KEY
""C"" TO CHANGE THE DIFFICULTY."
35 PRINT
40 PRINT "SCORING"
45 PRINT
50 PRINT ""X"" = 10 POINTS"
55 PRINT
60 PRINT ""█"" = 20 POINTS"
65 PRINT
70 PRINT ""█"" = 20 POINTS"
75 PRINT
80 PRINT ""█"" = 20 POINTS"
85 PRINT
90 PRINT TAB 4;"PRESS ANY KEY
TO START";AT 21,9;"C TO CHANGE
DIFFICULTY"
95 LET HI=0
100 GOTO 170
150 PRINT AT 11,4;"PRESS ANY KEY
TO START";AT 13,9;"C TO CHANGE
DIFFICULTY"
170 IF INKEY#(">") THEN GOTO 170
180 IF INKEY#="" THEN GOTO 180
185 IF INKEY#="C" THEN GOTO 300
190 LET L=USR 16549
195 GOTO 800
200 PRINT AT 9,9;"GAME OVER"
210 GOSUB 400
220 GOTO 160
300 CLS
305 PRINT "ENTER DIFFICULTY (1
TO 10)";"1=EASY";"10=HARD"
310 INPUT A
315 IF A<1 OR A>10 THEN GOTO 310
320 POKE 16859,(A*10)
325 POKE 16641,(A*2)
330 PRINT
335 PRINT "ENTER SPEED (0 TO 9)";
"0=SLOW";"9=FAST"
340 INPUT A
350 IF A<0 OR A>9 THEN GOTO 340
355 POKE 16866,(9-A)
390 GOTO 160
400 LET A#=""
410 LET A=PEEK 17282+256*PEEK 1
7283
420 FOR N=1 TO 4
430 LET A#=CHR$(PEEK A-128)+A#
440 LET A=A-1
450 NEXT N
455 LET S=VAL A#
470 IF S>HI THEN GOSUB 500
480 RETURN
500 LET HI=S
510 LET A=17275
520 FOR N=1 TO 4
530 POKE A,(CODE A#(N)+128)
540 LET A=A+1
550 NEXT N
570 RETURN
600 LET L=PEEK 16545
610 LET A=PEEK 17282+256*PEEK 1
7283
620 POKE (A+9),(L+156)
630 IF L=0 THEN GOTO 200
640 LET L=USR 17185
650 GOTO 600
1000 SAVE "ROTE"
1010 RUN
```

Machine code.

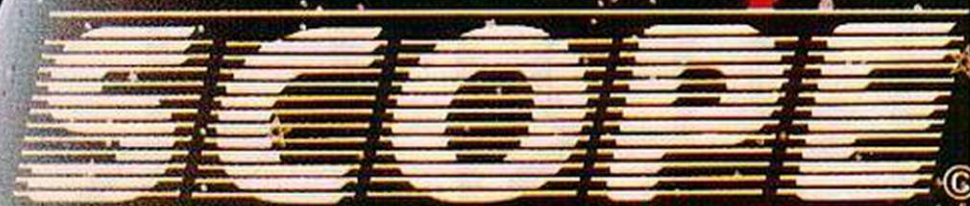
16516: E05B3240E032EFD07A = 968	16788: 427FEF0020030302 = 678	17092: 16F735000C08A422A = 776
16524: 870600E05298E052 = 970	16795: 4136000024430313 = 686	17100: 92437E50FEA8CA45 = 1074
16532: 085F50E052300123 = 730	16804: 43D5810630C92121 = 990	17108: 4377EBC9000A521 = 894
16540: 2232437D03900009A = 638	16812: 001906300C92A7540 = 998	17116: D84877E1C92A0C40 = 948
16548: 4C212143036032A0C = 442	16820: 038333600221220019 = 218	17124: 118402191121000E = 268
16556: 48118502191122443 = 442	16828: 05813500C92A7540 = 927	17132: 1408207E7E1B00FD = 928
16564: 96201A77201310FA = 863	16836: 232333600321200019 = 217	17140: 422B10F72B0D20F1 = 701
16572: 111500A7ED0522262 = 888	16844: 095203500C9210000 = 432	17148: 09197FEFE00200335 = 706
16580: 432A0C400E1583336 = 888	16852: 09D8E500054480539 = 1092	17156: 18A7E05203600C97E = 1022
16588: 0523061E35E023110 = 101	16860: 3000E1E5111210019 = 500	17164: 06CCDA42FE04C00A = 1174
16596: 783635230020372D = 780	16868: 7E7E0020023618E1 = 720	17172: 42C3054321A1407E = 717
16604: 0040233300068077 = 330	16876: D1000A3402227840 = 900	17180: 30FE0077C9030C540 = 1091
16612: 23107FC023243111E = 590	16884: 11010418788220F8 = 893	17188: 160A2A0C40230E16 = 821
16620: 00A7ED08232A34021 = 780	16892: 9E821B3407E7E70CC = 1200	17196: 06207E0680772310 = 660
16628: 0443064036002310 = 074	16900: 7E84427E7E770C8E8 = 1164	17204: F9230020F315800E = 858
16636: 78E109428360A0DEE = 1074	16908: 7E7E000005422A75 = 1140	17212: 1108C81578B220F8 = 1020
16644: 41E10942836218443 = 891	16916: 38000233600E8B369 = 408	17220: 09069C28E521D842 = 958
16652: 227840237E7E00002 = 300	16924: 003360428360A34021 = 430	17228: 7E30FE1520023E14 = 977
16660: 0A410C8440E50F006 = 967	16932: 7E7E0007642FE000C = 856	17236: 7700C0C843366000 = 840
16668: 09916005E2A0C4019 = 301	16940: 78422A0C4370FE000 = 856	17244: 8A42C90000000000 = 661
16676: 8B2A7E4073237223 = 765	16948: 2E8203500112100A7 = 088	17252: 88A8B487A8A49090 = 1348
16684: 850C844016030E177 = 1267	16956: 7E7E00000443FE81C = 1190	17260: 9C0C9C9C9C9C9C9C = 1304
16692: 230C200410042023 = 390	16964: 0C443FE820C0443FE = 1300	17268: 9C9C9C9C9C9C9C9C = 1140
16700: 18F7C0E811210942 = 1065	16972: 18008943FE00046A = 970	17276: 264A002E4A00234A = 949
16708: 4E2134432278405E = 603	16980: 423817280C4300E1 = 868	17284: 00024B02254A0024 = 226
16716: 2388837E7E000C95 = 903	16988: 42032AC24370FE000 = 048	17292: 4A00C94802944A0E = 976
16724: 41FE0100A41FE02 = 1018	16996: 00A7ED08232A34021 = 780	17300: 4F40C3284A000000 = 272
16732: 00B141FE0300C141 = 1180	17004: 00A7ED08232A34021 = 780	17308: 0000000000000000 = 0
16740: 3E00127E000C0C61 = 946	17012: 42032AC24370FE000 = 048	17316: 0000000000000000 = 0
16748: 41FE85000141FE06 = 1174	17020: 00A7ED08232A34021 = 780	17324: 0000000000000000 = 0
16756: 000A42FE1B0C8141 = 1168	17028: 8D5E222043C92100 = 840	17332: 0000000000000000 = 0
16764: FE00C40B4370C0D = 1266	17036: 0000136255237E7E = 840	17340: 0000000000000000 = 0
16772: 41E82A7E40732372 = 790	17044: 000001183E000918 = 358	17348: 0A542C0C84C021 = 1144
16780: 232300C28412103 = 603	17052: 1A7E0028001133E00 = 402	17356: 8443061423230601 = 950
	17060: 093607ED480942006 = 803	17364: 23107F9E1C30E42FE = 1248
	17068: 0732810F0E8218443 = 706	17372: 172011000C842C0C = 984
	17076: 7E7E0000B237E8A28 = 743	17380: 422A0C24335002100 = 456
	17084: 0923230020F20923 = 602	17388: 0022C243210000C9 = 528



SCOPE COMPILES
TRUE MACHINE CODE TO
RUN TOTALLY INDEPENDENTLY!



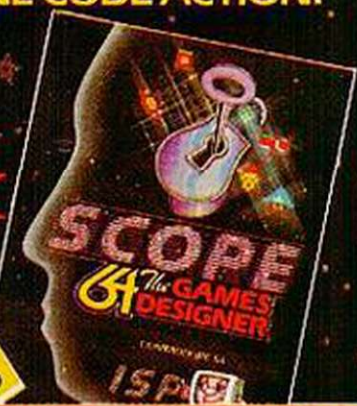
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- ★ Tape Demo Routines
- ★ Free Membership of SCOPE User's Club
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THIS REMARKABLE PRODUCT will revolutionise programming on the *Commodore 64*. By using the simple plain English commands you can now write and publish your own games to compete with the professionals. Powerful yet easy to use SCOPE will benefit beginner and competent programmer. You will handle all aspects of **Graphics, Sprites, Colour, Sound, Music & Animation.** All in original super-fast machine code.

COMMODORE 64

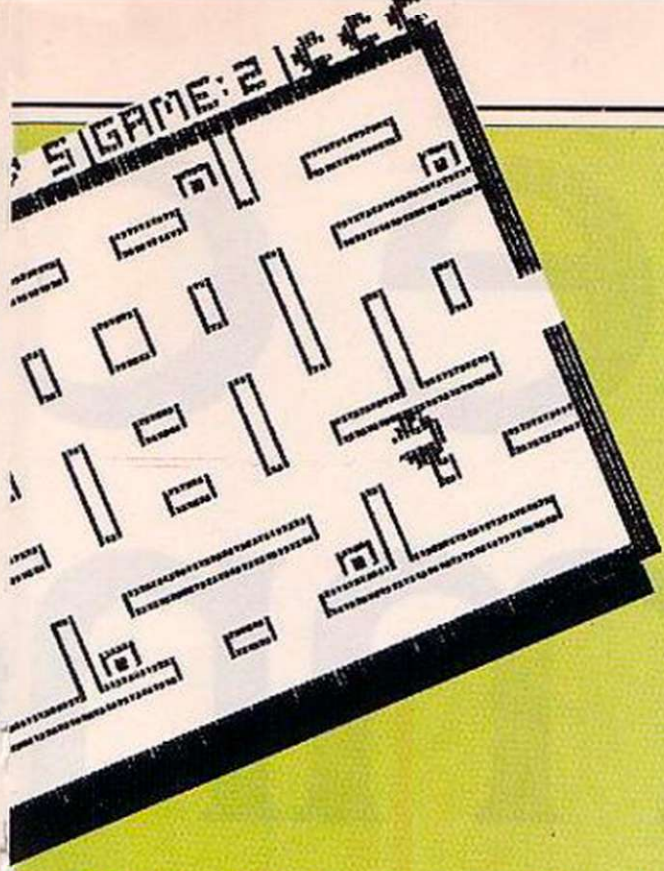
CLIP THE COUPON NOW AND UNLOCK YOUR IMAGINATION
15a Castons Yard, off New Road, Basingstoke, Hants
Money refunded if not satisfied and returned within 7 days.
Please rush me... SCOPE 64 tape SCOPE 64 disc
(Cheques payable to ISP Marketing Ltd)

Post to: ISP Marketing Ltd
Tel: 0256-79 6559
7 days. Please rush me

Name _____
Address _____

Block capitals
Dealer Enquiries
Welcome





DRAGON

Hexloader.

```

5 REM HEXLOADER
10 PCLEARB
100 'COMPARE ADDRESS AND ENTER LINE
110 'WITH CHECKSUM AND NUMBERS AS PRINTED
115 'EG. TYPE FOR ADDRESS 26000 TYPE IN THE ENTIRE LINE FROM 7E TO 505 WITH SPACES BETWEEN THE NUMBERS
120 CLS: CLEAR2000,26000
130 INPUT"ENTER START ADDRESS";A
140 R=0
150 CLS: PRINT"ADDRESS "; A: PRINT: PRINT"ENTER LINE: ": PRINT
160 LINE INPUT A$
170 IF A$="END" THEN END ELSE IF A$="NEW" THEN 130
175 'ENTER END TO END AND NEW TO CHANGE START ADDRESS
180 FOR X=1 TO 10
190 Z=VAL("&H"+LEFT$(A$,2))
200 POKE A,Z
210 A=A+1: R=R+Z
220 A$=MID$(A$,4)
230 NEXT X
240 R1=VAL("&H"+A$)
250 IF R1=R THEN 270
260 PRINT "DATA ENTRY ERROR": R=0: SOUND1,4: A=A-10: FOR T=1 TO 1000: NEXTT: GOTO150
270 R=0: GOTO150
280 END
  
```

start address and start entering the program line by line.

An error check is included. If you type it in in parts, then save each part as CSAVEM"PACMAN",26000,X,0 where X is the address you reached. Do not

forget to load it before entering a new part. save the complete program after "PACSCRN" with X=32760. To play it type: PCLEAR8: CLEAR100,26000 CLOADM: CLOADM: EXEC 2600

Table 1.

Function	Address	Value	Default
Lives	26264	1-15	3
Program Delay	26644	1-10	5
Pacman Delay	26697	10-255	20
Time Ghosts	26290	20-255	120

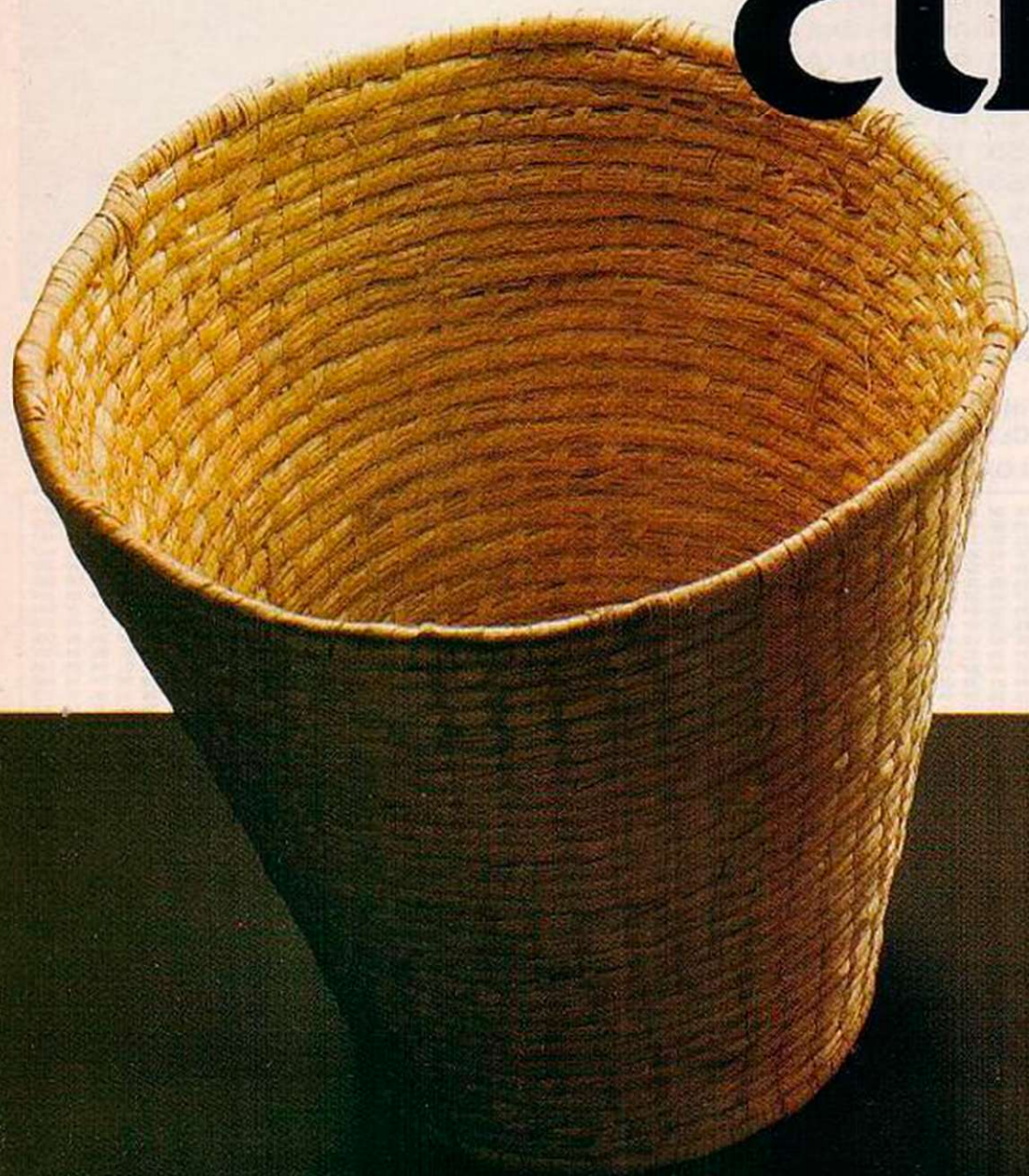
Listing 2 Hex code.

```

26000 : 7E 66 00 BF 7F E1 B6 7F 07 C6 505
26010 : 20 30 FD 7E 30 C2 01 C0 B3 7E 4C6
26020 : 30 C3 10 00 F3 7F E1 1F 02 EE 46D
26030 : A4 EF 09 00 E0 EE A9 00 02 EF 584
26040 : 09 00 E2 39 00 FF FF FF 00 00 4A1
26050 : 26 03 7E 7E F4 7E 6E F1 00 7F 478
26060 : 7C CA 00 BA 77 00 00 12 39 00 48C
26070 : 00 00 B6 3F 87 FF 23 7F FA 20 43C
26080 : C6 44 86 7F 07 48 37 7E 2A 73 480
26090 : FF 20 7C 7E 2A B6 7E 2A 4A 26 411
26100 : FD 5A 26 F1 B6 37 87 FF 23 39 558
26110 : 00 FA 00 65 CB 0E 04 2B 8F 00 463
26120 : 00 0E 7B 65 8B 90 E5 05 63 520
26130 : 00 00 00 00 79 4B 00 90 E5 86 502
26140 : EF 1F 09 0E 04 00 ED 94 ED 89 510
26150 : 01 E0 50 09 00 02 8C 04 20 25 271
26160 : F1 30 09 FF FF ED 84 30 89 00 502
26170 : 20 0C 05 ED 25 7F 4F 10 0E 7C 414
26180 : E0 0E 04 A4 EE A1 EF 91 4C 81 5EA
26190 : 0C 25 F7 30 89 00 08 4F 8C 2C9
26200 : 05 23 ED 0E 05 CA 0F 00 00 0E 441
26210 : 7C 0C 00 90 E5 0D 00 E5 27 FB 6FA
26220 : 01 4B 26 05 7F 7F CC 20 05 B6 39C
26230 : 01 07 7F FC 0E 2A 00 10 0E 1E 3A7
26240 : 00 EC 01 ED 4E AD 9F F4 00 ED 675
26250 : A9 0B 03 A1 89 00 02 10 0C 2A 333
26260 : 00 25 EA B6 03 87 7F 53 B6 01 3AB
26270 : B7 7F 4E 10 0E 00 00 10 BF 7E 370
26280 : 27 10 BF 7F 29 10 BF 7E 2B B6 39D
26290 : 7B 07 7F 00 07 FF C5 B7 FF C2 6A1
26300 : BF 7F 00 07 FF C7 FF FF C7 06 020
26310 : FF 22 04 FC 0A 03 07 FF 22 B6 624
26320 : AF 07 7F 57 CC 01 01 FD 7F 35 40B
26330 : FF 37 37 7F 39 37 7F 3B FD 61C
26340 : 7F 22 FD 7F 24 7E 7F 00 01 DF 406
26350 : 23 02 00 0A 07 7F 00 7F 7F 4F 332
26360 : CC 00 00 00 7F 7F 7F 31 B6 44A
26370 : 01 07 7F AB 07 7F 7F 7E 69 50C
26380 : 07 7E A2 07 7E 2C 07 7F 2D 7F 510
26390 : 7F 2C 00 00 00 7F 7F 7F 7F 576
26400 : 09 FD 07 F3 FD 7F F0 B6 02 B7 713
26410 : 7E A1 CC 00 01 FD 7F 97 87 7E 533
26420 : 99 FD 7E A3 FD 7E A5 87 7E 1E 70B
26430 : 07 7F 26 B6 30 89 00 7F FB 86 15 40D
26440 : 07 7F FB 07 7F 7F 07 7F F2 BE 70F
26450 : 1E 10 B6 7F 4E 00 7C 0B 4F 0D 4C9
26460 : 7F 09 00 7E 9A 0E 12 00 10 BE 47B
26470 : 1E 00 EE A1 EF 09 F4 00 EF 01 509
26480 : 8C 1E 00 25 F3 0E 14 AF 10 BE 381
26490 : 7F 1C 00 67 8B 0E 19 AF 10 BE 4E2
26500 : 7F 60 7E 60 0A 20 16 7F 07 312
26510 : EC A1 ED 04 30 89 00 20 7C 7F 4D2
26520 : 07 0A 7F 07 01 08 25 EE 39 BE 3A6
26530 : 0C 2C 00 00 EB 09 00 C0 ED 427
26540 : 01 B6 0C 3A 25 F5 8E 0C 4C 10 350
26550 : 0E 7E 4E 5F 46 A0 04 0F 07 04 40D
26560 : 5C 30 89 00 20 C1 05 25 F1 30 341
26570 : 09 FF 61 7F 7F 07 5F A6 A0 A7 53A
26580 : 04 5C 30 89 00 20 C1 05 25 F3 397
26590 : 50 89 FF 61 7C 7F 07 F5 7F 07 497
26600 : 01 07 25 E4 89 7C 6F 8B 7E 549
26610 : 8D 6E 63 7E 68 13 0E 12 00 10 337
26620 : 8E 0A 00 EC 81 ED 01 10 0C 12 430
26630 : 00 25 F4 39 8D 67 8B 00 67 FB 517
26640 : 7E 67 A1 B6 05 8B 7F FC 21 0B 470
26650 : CA FA 30 83 00 01 26 FB B6 7F 497
26660 : FE 27 1B B6 7F FB 01 01 26 05 410
26670 : 7E 7F 3E 01 02 26 03 7E 7F 41 325
26680 : 81 03 26 03 7E 7F 44 7E 7F 47 332
26690 : 7E 7F FF B6 7E FF C6 14 70 7F 675
26700 : 4E F7 7F 07 81 7F 07 25 0C 7F 302
26710 : 7E FF 8E 7F FC 00 8A C4 7E 7F 6A8
26720 : 0A B6 7F FB 27 25 8D 00 12 B6 58C
26730 : 01 5A 01 3A 25 03 7E 69 01 01 267
26740 : 05 22 03 7E 7F 41 B6 01 5B 01 2F8
26750 : 3A 25 03 7E 7F 47 01 05 22 30 31E
26760 : 7E 7F 44 8D 0B 05 10 FF FF 65A
26770 : 10 BF 01 50 10 BF 01 52 10 BF 311
26780 : 01 54 10 BF 01 56 10 BF 01 58 203
26790 : 01 59 26 03 7E 7F 3E 01 0B 26 299
26800 : 03 7E 7F 41 81 5E 26 03 7E 7F 346
26810 : 44 81 00 10 26 FF 07 7E 7F 47 308
26820 : 0F 84 FC 01 20 30 C3 06 03 03 89 402
26830 : 0F 84 FC 01 39 10 BE 7F 5B EC 487
26840 : 01 ED B4 30 89 00 20 10 8C 7F 406
26850 : 68 25 F2 30 89 FF 00 39 10 BE 406
26860 : 7F 68 EC 01 ED B4 30 89 00 20 48E
26870 : 10 8C 7F 7B 25 F2 30 89 FF 00 462
26880 : 39 8E 7F FB 5D 68 C4 B6 7F FE 65B
26890 : 27 5B 9C 81 94 25 4D F6 7F FE 43A
26900 : C1 1F 26 26 7F 7F CC 00 00 3F0
26910 : A7 B4 30 89 00 20 5C 01 0B 25 34E
26920 : F5 30 89 FE 61 7F 7F FE 00 6E 64E
26930 : D3 EC 89 19 0E EB 09 01 00 7E 45A
26940 : 7F 0A 7C 7F FA 5F A6 89 18 00 4F4
26950 : A7 84 5C 30 89 00 20 C1 0B 25 34E
26960 : F1 30 89 FF 01 7F 7F FE 00 60 5CB
26970 : 03 7E 7F 0A 87 7F FE 7E 69 69 67E
26980 : A6 89 00 02 84 00 27 0A 10 27 36D
26990 : 00 51 8C 00 3E 00 00 A6 09 00 289
27000 : E2 84 00 01 40 10 27 00 A6 404
27010 : 89 18 82 81 01 26 10 30 09 10 294
27020 : 62 1F 12 50 89 07 9E 4F A7 470
27030 : 00 01 A7 69 00 01 07 E3 20 3B1
27040 : 11 81 14 26 00 09 09 1B 62 1F 228
27050 : 12 30 89 F7 9E 8B 7F 87 8E 7F 587
27060 : 1F 89 FD 7F 0B 7F 7F 33 B6 7F 587
27070 : FE 20 1B 86 7F 0B 01 02 26 05 417
27080 : 7E 7F 41 81 05 26 05 7E 7F 44 32C
27090 : 81 04 26 03 7E 7F 47 7E BA 3C9
27100 : 10 8E 7F 5B 81 03 27 8E 02 2B2
27110 : 27 32 6A 89 18 02 6A 45 31 33F
27120 : A9 FF 30 89 FF FF A6 89 00 680
27130 : 02 B6 6A 45 31 A9 00 30 89 340
27140 : 00 21 7C 7F 33 B6 7F 33 00 00 304
27150 : 25 0D 7E 7F 30 89 00 01 7E 40C
27160 : A8 87 A6 09 10 02 8D A6 5E 31 30C
27170 : A9 FF 30 89 FF FF A6 89 00 680
27180 : 02 80 6A 45 31 A9 00 30 89 310
27190 : 00 21 7C 7F 33 B6 7F 33 00 00 304
27200 : 25 0D 7E 7F 30 89 00 01 C4 520
27210 : 03 27 02 8A 89 47 89 00 01 6A 348
27220 : A9 09 01 5A 54 54 54 89 00 01 39C
27230 : E6 A9 00 01 C4 5F 27 10 01 02 380
27240 : 27 32 6A 89 27 02 8A 20 B4 80 707
27250 : 20 02 8A 20 87 89 00 02 16 6 507
27260 : 1F 89 FD 7F 0B 7F 7F 33 B6 7F 587
27270 : FE 20 1B 86 7F 0B 01 02 26 05 417
27280 : 7E 7F 41 81 05 26 03 7E 7F 44 32C
27290 : 01 04 26 03 7E 7F 47 7E 5A 3C9
27300 : 10 8E 7F 5B 81 03 27 2F 81 02 2B2
27310 : 27 32 6A 89 18 02 6A 45 31 33F
27320 : A9 FF 30 89 FF FF A6 89 00 680
27330 : 02 80 6A 45 31 A9 00 30 89 304
27340 : 00 21 7C 7F 33 B6 7F 33 00 00 304
27350 : 25 0D 7E 7F 30 89 00 01 7E 40C
27360 : A8 87 A6 09 1B 02 8D A6 5E 31 30C
27370 : A9 FF 30 89 FF FF A6 89 00 680
27380 : 02 80 6A 45 31 A9 00 30 89 310
27390 : 00 21 7C 7F 33 B6 7F 33 00 00 304
27400 : 25 0D 7E 7F 30 89 00 01 C4 520
27410 : 03 27 02 8A 89 47 89 00 02 E4 34E
27420 : A9 09 01 5A 54 54 89 00 01 39C
27430 : E6 A9 00 01 C4 0F 27 10 C1 02 350
27440 : 27 32 6A 89 20 87 89 00 02 16 6 507
27450 : 1F 89 FD 7F 0B 7F 7F 33 B6 7F 587
27460 : FE 20 1B 86 7F 0B 01 02 26 05 417
27470 : 7E 7F 41 81 05 26 03 7E 7F 44 32C
27480 : 01 04 26 03 7E 7F 47 7E 5A 3C9
27490 : 10 8E 7F 5B 81 03 27 2F 81 02 2B2
27500 : 27 32 6A 89 18 02 6A 45 31 33F
27510 : A9 FF 30 89 FF FF A6 89 00 680
27520 : 02 80 6A 45 31 A9 00 30 89 304
27530 : 00 21 7C 7F 33 B6 7F 33 00 00 304
27540 : 25 0D 7E 7F 30 89 00 01 7E 40C
27550 : A8 87 A6 09 1B 02 8D A6 5E 31 30C
27560 : A9 FF 30 89 FF FF A6 89 00 680
27570 : 02 80 6A 45 31 A9 00 30 89 310
27580 : 00 21 7C 7F 33 B6 7F 33 00 00 304
27590 : 25 0D 7E 7F 30 89 00 01 C4 520
27600 : 03 27 02 8A 89 47 89 00 02 E4 34E
27610 : A9 09 01 5A 54 54 89 00 01 39C
27620 : E6 A9 00 01 C4 0F 27 10 C1 02 350
27630 : 27 32 6A 89 20 87 89 00 02 16 6 507
27640 : 1F 89 FD 7F 0B 7F 7F 33 B6 7F 587
27650 : FE 20 1B 86 7F 0B 01 02 26 05 417
27660 : 7E 7F 41 81 05 26 03 7E 7F 44 32C
27670 : 01 04 26 03 7E 7F 47 7E 5A 3C9
27680 : 10 8E 7F 5B 81 03 27 2F 81 02 2B2
27690 : 27 32 6A 89 18 02 6A 45 31 33F
27700 : A9 FF 30 89 FF FF A6 89 00 680
27710 : 02 80 6A 45 31 A9 00 30 89 304
27720 : 00 21 7C 7F 33 B6 7F 33 00 00 304
27730 : 25 0D 7E 7F 30 89 00 01 7E 40C
27740 : A8 87 A6 09 1B 02 8D A6 5E 31 30C
27750 : A9 FF 30 89 FF FF A6 89 00 680
27760 : 02 80 6A 45 31 A9 00 30 89 310
27770 : 00 21 7C 7F 33 B6 7F 33 00 00 304
27780 : 25 0D 7E 7F 30 89 00 01 C4 520
27790 : 03 27 02 8A 89 47 89 00 02 E4 34E
27800 : A9 09 01 5A 54 54 89 00 01 39C
27810 : E6 A9 00 01 C4 5F 27 10 01 02 380
27820 : 27 32 6A 89 27 02 8A 20 B4 80 707
27830 : 1F 89 FD 7F 0B 7F 7F 33 B6 7F 587
27840 : FE 20 1B 86 7F 0B 01 02 26 05 417
27850 : 7E 7F 41 81 05 26 03 7E 7F 44 32C
27860 : 01 04 26 03 7E 7F 47 7E 5A 3C9
27870 : 10 8E 7F 5B 81 03 27 2F 81 02 2B2
27880 : 27 32 6A 89 18 02 6A 45 31 33F
27890 : A9 FF 30 89 FF FF A6 89 00 680
27900 : 02 80 6A 45 31 A9 00 30 89 304
27910 : 00 21 7C 7F 33 B6 7F 33 00 00 304
27920 : 25 0D 7E 7F 30 89 00 01 7E 40C
27930 : A8 87 A6 09 1B 02 8D A6 5E 31 30C
27940 : A9 FF 30 89 FF FF A6 89 00 680
27950 : 02 80 6A 45 31 A9 00 30 89 310
27960 : 00 21 7C 7F 33 B6 7F 33 00 00 304
27970 : 25 0D 7E 7F 30 89 00 01 C4 520
27980 : 03 27 02 8A 89 47 89 00 02 E4 34E
27990 : A9 09 01 5A 54 54 89 00 01 39C
28000 : E6 A9 00 01 C4 5F 27 10 C1 02 380
28010 : 27 32 6A 89 27 02 8A 20 B4 80 707
28020 : 1F 89 FD 7F 0B 7F 7F 33 B6 7F 587
28030 : FE 20 1B 86 7F 0B 01 02 26 05 417
28040 : 7E 7F 41 81 05 26 03 7E 7F 44 32C
28050 : 01 04 26 03 7E 7F 47 7E 5A 3C9
28060 : 10 8E 7F 5B 81 03 27 2F 81 02 2B2
28070 : 27 32 6A 89 18 02 6A 45 31 33F
28080 : A9 FF 30 89 FF FF A6 89 00 680
28090 : 02 80 6A 45 31 A9 00 30 89 304
28100 : 00 21 7C 7F 33 B6 7F 33 00 00 304
28110 : 25 0D 7E 7F 30 89 00 01 7E 40C
28120 : A8 87 A6 09 1B 02 8D A6 5E 31 30C
28130 : A9 FF 30 89 FF FF A6 89 00 680
28140 : 02 80 6A 45 31 A9 00 30 89 310
28150 : 00 21 7C 7F 33 B6 7F 33 00 00 304
28160 : 25 0D 7E 7F 30 89 00 01 C4 520
28170 : 03 27 02 8A 89 47 89 00 02 E4 34E
28180 : A9 09 01 5A 54 54 89 00 01 39C
28190 : E6 A9 00 01 C4 5F 27 10 C1 02 380
28200 : 27 32 6A 89 27 02 8A 20 B4 80 707
28210 : 1F 89 FD 7F 0B 7F 7F 33 B6 7F 587
28220 : FE 20 1B 86 7F 0B 01 02 26 05 417
28230 : 7E 7F 41 81 05 26 03 7E 7F 44 32C
28240 : 01 04 26 03 7E 7F 47 7E 5A 3C9
28250 : 10 8E 7F 5B 81 03 27 2F 81 02 2B2
28260 : 27 32 6A 89 18 02 6A 45 31 33F
28270 : A9 FF 30 89 FF FF A6 89 00 680
28280 : 02 80 6A 45 31 A9 00 30 89 304
28290 : 00 21 7C 7F 33 B6 7F 33 00 00 304
28300 : 25 0D 7E 7F 30 89 00 01 7E 40C
28310 : A8 87 A6 09 1B 02 8D A6 5E 31 30C
28320 : A9 FF 30 89 FF FF A6 89 00 680
28330 : 02 80 6A 45 31 A9 00 30 89 310
28340 : 00 21 7C 7F 33 B6 7F 33 00 00 304
28350 : 25 0D 7E 7F 30 89 00 01 C4 520
28360 : 03 27 02 8A 89 47 89 00 02 E4 34E
28370 : A9 09 01 5A 54 54 89 00 01 39C
28380 : E6 A9 00 01 C4 5F 27 10 C1 02 380
28390 : 27 32 6A 89 27 02 8A 20 B4 80 707
28400 : 1F 89 FD 7F 0B 7F 7F 33 B6 7F 587
28410 : FE 20 1B 86 7F 0B 01 02 26 05 417
28420 : 7E 7F 41 81 05 26 03 7E 7F 44 32C
28430 : 01 04 26 03 7E 7F 47 7E 5A 3C9
28440 : 10 8E 7F 5B 81 03 27 2F 81 02 2B2
28450 : 27 32 6A 89 18 02 6A 45 31 33F
28460 : A9 FF 30 89 FF FF A6 89 00 680
28470 : 02 80 6A 45 31 A9 00 30 89 304
28480 : 00 21 7C 7F 33 B6 7F 33 00 00 304
28490 : 25 0D 7E 7F 30 89 00 01 7E 40C
28500 : A8 87 A6 09 1B 02 8D A6 5E 31 30C
28510 : A9 FF 30 89 FF FF A6 89 00 680
28520 : 02 80 6A 45 31 A9 00 30 89 310
28530 : 00 21 7C 7F 33 B6 7F 33 00 00 304
28540 : 25 0D 7E 7F 30 89 00 01 C4 520
28550 : 03 27 02 8A 89 47 89 00 02 E4 34E
28560 : A9 09 01 5A 54 54 89 00 01 39C
28570 : E6 A9 00 01 C4 5F 27 10 C1 02 380
28580 : 27 32 6A 89 27 02 8A 20 B4 80 707
28590 : 1F 89 FD 7F 0B 7F 7F 33 B6 7F 587
28600 : FE 20 1B 86 7F 0B 01 02 26 05 417
28610 : 7E 7F 41 81 05 26 03 7E 7F 44 32C
28620 : 01 04 26 03 7E 7F 47 7E 5A 3C9
28630 : 10 8E 7F 5B 81 03 27 2F 81 02 2B2
28640 : 27 32 6A 89 18 02 6A 45 31 33F
28650 : A9 FF 30 89 FF FF A6 89 00 680
28660 : 02 80 6A 45 31 A9 00 30 89 304
28670 : 00 21 7C 7F 33 B6 7F 33 00 00 304
28680 : 25 0D 7E 7F 30 89 00 01 7E 40C
28690 : A8 87 A6 09 1B 02 8D A6 5E 31 30C
28700 : A9 FF 30 89 FF FF A6 89 00 680
28710 : 02 80 6A 45 31 A9 00 30 89 310
28720 : 00 21 7C 7F 33 B6 7F 33 00 00 304
28730 : 25 0D 7E 7F 30 89 00 01 C4 520
28740 : 03 27 02 8A 89 47 89 00 02 E4 34E
28750 : A9 09 01 5A 54 54 89 00 01 39C
28760 : E6 A9 00 01 C4 5F 27 10 C1 02 380
28770 : 27 32 6A 89 27 02 8A 20 B4 80 707
28780 : 1F 89 FD 7F 0B 7F 7F 33 B6 7F 587
28790 : FE 20 1B 86 7F 0B 01 02 26 05 417
28800 : 7E 7F 41 81 05 26 03 7E 7F 44 32C
28810 : 01 04 26 03 7E 7F 47 7E 5A 3C9
28820 : 10 8E 7F 5B 81 03 27 2F 81 02 2B2
28830 : 27 32 6A 89 18 02 6A 45 31 33F
28840 : A9 FF 30 89 FF FF A6 89 00 680
28850 : 02 80 6A 45 31 A9 00 30 89 304
28860 : 00 21 7C 7F 33 B6 7F 33 00 00 304
28870 : 25 0D 7E 7F 30 89 00 01 7E 40C
28880 : A8 87 A6 09 1B 02 8D A6 5E 31 30C
28890 : A9 FF 30 89 FF FF A6 89 00 680
28900 : 02 80 6A 45 31 A9 00 30 89 310
28910 : 00 21 7C 7F 33 B6 7F 33 00 00 304
28920 : 25 0D 7E 7F 30 89 00 01 C4 520
28930 : 03 27 02 8A 89 47 89 00 02 E4 34E
  
```

(listing 2 continued on page 108)

Three cu amme



A rubbish bin for your old
has been.



Yet more money for your
bolt ons.

■ Believe it or not, computers often suffer from amnesia. 99% start off with large enough memories, but operating functions like text, colour, sound and more particularly high resolution graphics, take large bytes out of them. Leaving very little "useable" memory for programming and games.

Not so the new Oric Atmos 48K.

This is the one home computer that takes these normal working functions in its stride.

Unlike other home computers it uses the highly sophisticated serial attribute handling method used by Viewdata and Teletext,

in which the attributes are stored on the screen alongside the data, instead of taking up space in the memory.

Thus the Oric Atmos never offers less than a healthy 37K of useable memory - even when the new colour printer and disc drive unit are attached. (Technical buffs see details overleaf).

So it rivals the performance of the supposedly larger, more expensive Commodore 64K, which unfortunately loses 26K of its "elephantine" memory in high resolution graphics.

It beats its immediate competitors like the Sinclair Spectrum, Dragon 32K, Vic 20 and Atari 600.

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Features for mesia.



The new Oric Atmos 48K.

It beats the Lynx 48K, which costs over a third more, yet loses 34K.

It even beats the Acorn Electron and the BBC Micro which costs more than twice as much, yet loses 23K in high resolution graphics.

And while this may surprise you, it's totally in keeping with a company recognised in the computer industry for performance and innovation.

Like its predecessor, the Oric-1, the Oric Atmos has the powerful loudspeaker and amplifier unit that prompted "Which

Micro" (November issue) to comment... "Its sound facilities have more in common with those of the £400 Beeb, than the rather pathetic beep of the Spectrum. At full volume it can compete with most arcade games..."

Yet the Oric Atmos 48K costs a mere £170, including all the leads and adaptors you need to get it going.

So if you're buying a computer, remember our name. We could save you a fortune on bolt-ons... or wastepaper bins.

The new Oric Atmos 48K. **ORIC**

Now we've whetted your appetite, here's something to get your teeth into.

Printer Technical Specifications

Printer/Plotting system	Ball Point Pen, 4 colour
Plotting speed: (horizontal)	52 mm/sec (2.05ips)
(vertical)	73 mm/sec (3.08ips)
Printer Speed	12 characters per second
Resolution	0.2 mm/step (0.00787 inch)
Effective plotting range	96 mm (3.804 inch) x axis, divided into 480 steps. (No limit in y direction)
Characters per line	80 or 40 text mode (determined by software in graphics mode)
Characters per line	INT (480/n+1) *6 for 0=n=15
Accuracy (repetition)	0.2 mm max
(movement)	0.3 mm max
(distance)	0.5% max (x-axis) 1% (y-axis)
Pen life	250 metres (825 feet)
Parallel interface	8-bit parallel Uses STROBE and ACKNOWLEDGE
Temperature range	18.3 to 35°C (65 to 96°F)
storage	-40 to 71°C (-40 to 160°F)
Humidity range	10% to 80% relative non-condensing
Power supply	Switching power supply input 100-120 VAC 200-240 VAC
Dimensions	10 3/4" wide 6 7/8" deep 2 1/2" high

Atmos Technical Specifications

CPU	6502 A
Memory	Choice of 16K or 48K RAM
Memory (48K Model)	Minimum 48K RAM, max 64: 16K ROM external control signals allow use of full 64K RAM or maybe used externally to increase ROM/RAM
Language	Extended Microsoft basic
Keyboard	Typewriter style and pitch, 57 keys, standard computer layout, additional cursor control keys, autorepeat facility, tactile and acoustic feedback
Display	Output for B&W or colour TV, RGB output for colour monitor.
Text format	40 line x 28 rows
Character set	Similar to Teletext format, standard ASCII double height, flashing, 80 user definable characters
Graphics	240 x 200, 8 colours
Graphic Facilities	Points, lines, circles
Sound	Internal loudspeaker and amplifier. 3-Channel sound synthesiser envelope control, amplitude control 8 octaves, noise channel
Storage	Most cassette recorders via DIN socket 300 or 2400 BAUD. Disc Drive.
Interface	Centronics, expansion port, Hi-fi, RGB Monitor, UHF TV, cassette recorder
Other	Warm reset to regain control without clearing program or data

Micro Disc Technical Specifications

Formatted Capacity	160K bytes per side (double density as standard)
No. of Tracks	40 (80 available as option at a future date)
No. of Sectors	16
Bytes per Sector	256
Transfer Rate	250K Bits/Sec
	Supports up to 599 files per side, four drives single or double sided, 40 or 80 track. User definable configuration allows mixing of drive types including 5 1/4" (five and a quarter inch) Extensive wild card facilities Copy allows merging of basic and machine code files
<u>Utilities</u>	
The Utilities are as follows:	
1. Backup	Copy a whole disc
2. Copy	Copy a file to another
3. Del	Delete a file allowing wildcards
4. Dir	Display directory listing
5. Drv	Set the default drive number
6. Format	Format and initialise a disc
7. Load	Load a file (code data or basic)
8. Protect	Change protect status of file
9. Recall	Recall a basic array from a file
10. Ren	Rename a file
11. Save	Save a file (code, data or basic)
12. Store	Store a basic array as a data file
13. Sys	Change system configuration

Prices and data correct at time of going to press. Specifications on the above models may change without notice.

Available at Alders, Currys, Dixons, Greens, Harrods, Laskys, Rumbelows, Spectrum and Zappo Computer Centres.



ORIC

(listing 2 continued from page 105)

28940	: 7E	EF	B1	7E	EF	10	25	00	AF	7F	4F0	
28950	: 7E	A6	7E	7E	9D	1F	23	B6	7F	4F	403	
28960	: 27	12	A6	A9	00	8F	27	0C	86	7F	37F	
28970	: 32	26	07	86	AA	B7	7F	33	20	05	31D	
28980	: 06	FF	B7	7F	33	A6	A9	00	03	27	467	
28990	: 58	A6	A4	B1	02	22	52	B1	01	27	342	
29000	: 18	30	B9	FF	FF	A6	A9	00	03	B1	4A2	
29010	: 01	26	04	B6	03	20	06	B1	02	27	184	
29020	: 02	06	01	20	04	A6	A9	00	03	C6	2C3	
29030	: 18	30	C3	7F	60	1F	02	5F	7F	7F	375	
29040	: EF	A6	A0	B4	7F	33	AA	B4	A7	B0	5F0	
29050	: 5C	C1	03	25	F2	30	89	00	1D	7C	389	
29060	: 7F	EF	F6	7F	EF	C1	08	27	03	5F	524	
29070	: 20	E1	30	B9	FF	00	1F	32	39	10	353	
29080	: BE	7F	C0	EC	89	17	ED	ED	B9	FF	6AE	
29090	: E0	EC	B9	19	00	ED	B9	01	00	EC	4D1	
29100	: A1	B4	7F	33	F4	7F	33	ED	B4	30	54E	
29110	: 89	00	20	10	0C	7F	00	25	EC	30	3D5	
29120	: 89	FF	00	39	BE	7F	FB	10	BE	7E	4E5	
29130	: 9F	30	B9	FF	FD	BE	7E	30	31	A9	59B	
29140	: 00	01	BD	68	C4	8F	7E	2E	A6	A9	4A4	
29150	: 00	03	10	27	00	E2	4C	A7	A9	00	280	
29160	: 03	B1	04	10	25	00	91	6F	A9	00	266	
29170	: 03	E6	A4	C1	02	10	22	00	90	C1	3D3	
29180	: 01	27	3F	5F	A6	B9	18	01	A7	B9	33E	
29190	: 00	01	30	B9	00	20	5C	C1	08	28	224	
29200	: EF	30	B9	FF	FF	FF	7E	34	10	554		
29210	: BE	7E	30	6A	8F	FF	FF	35	10	8C	52E	
29220	: 0C	1F	27	03	7E	72	86	86	55	A7	34D	
29230	: 8A	30	B9	00	20	8F	7E	2E	7E	74	38A	
29240	: 86	1F	E7	B4	20	4B	30	B9	00	01	332	
29250	: 5F	A6	B9	17	FF	A7	B9	FF	FF	30	602	
29260	: 89	00	20	5C	C1	08	25	EF	30	B9	39B	
29270	: FF	00	BF	7E	2E	34	10	BE	7E	30	41A	
29280	: 6C	B9	FF	FF	35	10	8C	00	40	27	437	
29290	: 03	7E	72	86	86	55	A7	B9	01	00	385	
29300	: 7E	74	95	BF	7E	2E	BE	7E	30	5F	48D	
29310	: E7	B4	E6	A4	C1	02	22	05	BE	7E	51B	
29320	: 2E	20	27	BE	7E	30	A6	B4	E6	A4	495	
29330	: C1	03	27	0F	4C	A7	B4	BE	7E	2E	3DB	
29340	: 30	B9	00	20	BF	7E	2E	20	0D	4A	28B	
29350	: A7	B4	BE	7E	2E	30	B9	FF	00	BF	5EC	
29360	: 7E	2E	34	20	BD	71	1B	35	20	BE	35C	
29370	: 7E	30	BC	7F	F2	10	26	FF	0B	7E	466	
29380	: 7E	9D	A6	A9	FF	F7	27	67	4F	E6	623	
29390	: A4	C1	02	27	1F	C1	03	27	32	C1	38B	
29400	: 04	27	41	E6	B9	00	22	C4	C0	C1	442	
29410	: 40	27	4A	E6	B9	00	A2	C4	C0	C1	507	
29420	: 40	27	40	7E	71	E4	E6	B9	00	5F	44B	
29430	: C4	03	C1	01	27	33	E6	B9	00	9F	3F1	
29440	: C4	03	C1	01	27	29	7E	71	E4	E6	492	
29450	: 89	FF	E0	C1	55	27	1E	E6	B9	FF	631	
29460	: E1	C1	55	27	16	7E	71	E4	E6	B9	576	
29470	: 01	00	C1	55	27	0B	E6	B9	01	01	2BA	
29480	: C1	55	27	03	7E	71	E4	E6	A9	FF	52A	
29490	: F7	34	30	1F	13	7F	7E	FD	B6	7F	4BC	
29500	: 4E	01	02	25	10	6C	A9	00	8C	A6	34D	
29510	: A9	00	8C	B1	02	25	04	6F	A9	00	2F9	
29520	: 8C	A6	A9	00	8C	10	27	00	99	7C	3B3	
29530	: 7E	FD	BE	7E	30	A6	B4	1F	31	B1	512	
29540	: 7F	FD	22	4D	B1	7F	FD	26	07	B6	4F5	
29550	: 7E	FD	10	26	00	7E	A6	A9	00	BF	40D	
29560	: 26	3F	EC	B9	01	00	B1	55	27	1F	2F7	
29570	: C1	55	27	1B	B4	04	A7	A4	6C	A9	442	
29580	: 00	03	35	30	BE	7E	30	6C	B4	1F	2E3	
29590	: 31	30	B9	00	20	BF	7E	2E	7E	72	365	
29600	: B2	B6	7E	FD	26	4C	B6	03	A7	A4	529	
29610	: A7	A9	FF	F7	35	30	7E	72	B2	A6	5F3	
29620	: A9	00	BF	26	C3	A6	B9	00	1F	B4	3F3	
29630	: 55	27	1F	C1	55	27	1B	B4	03	A7	323	
29640	: A4	6C	A9	00	03	35	30	BE	7E	30	38D	
29650	: 6A	B4	1F	31	30	B9	FF	00	BF	7E	513	
29660	: 2E	7E	72	B2	B6	7E	FD	26	0D	B4	48A	
29670	: 04	A7	A4	A7	A9	FF	F7	35	30	7E	578	
29680	: 72	B2	BE	7E	30	A6	B9	FF	FF	1F	5DC	
29690	: 31	B1	7F	FA	22	49	B1	7F	FA	26	516	
29700	: 07	B6	7E	FD	10	27	FF	50	A6	A9	50D	
29710	: 00	BF	26	30	A6	B9	00	22	B4	C0	3B7	
29720	: B1	40	27	19	A6	B9	00	A2	B4	C0	416	
29730	: B1	40	27	0F	B6	01	A7	A4	6C	A9	3DE	
29740	: 00	03	35	30	1F	31	7E	72	B2	B6	310	
29750	: 7E	FD	10	27	FF	20	B6	02	A7	A4	4A4	
29760	: A7	A9	FF	F7	35	30	7E	72	B2	A6	5F3	
29770	: A9	00	BF	26	C3	A6	B9	00	1F	B4	3F3	
29780	: 03	B1	01	27	19	A6	B9	00	9F	B4	317	
29790	: 03	B1	01	27	0F	B6	02	A7	A4	6C	2FA	
29800	: A9	00	03	35	30	1F	31	7E	72	B2	303	
29810	: B6	7E	FD	10	27	FE	E3	B6	01	A7	577	
29820	: A4	A7	A9	FF	F7	35	30	7E	72	B2	5F1	
29830	: BE	7E	30	C6	1F	E7	89	FF	FF	BE	67D	
29840	: 7E	2E	7E	72	B6	30	B9	FF	E0	BF	579	
29850	: 7E	2E	7E	72	B6	30	6F	B9	FF	FF	5CC	
29860	: 7E	2E	7E	72	B6	30	2B	B1	01	404		
29870	: 26	0B	B6	7C	CA	26	03	BD	7A	F2	47C	
29880	: 7E	74	C1	BD	7F	E9	BD	7E	2B	10	54E	
29890	: BE	7F	FB	BE	7E	A2	7F	7F	33	B6	59A	
29900	: 7F	FA	C6	04	3D	B6	7F	FD	B1	02	535	
29910	: 27	09	B1	02	22	0B	FB	7F	FE	20	375	
29920	: 03	F0	7E	FE	7F	2A	30	B9	00	40B		
29930	: 01	A6	A4	B1	7F	F8	25	09	B0	7F	4D3	
29940	: FB	B1	06	25	09	20	35	BB	06	B1	347	
29950	: 7F	F8	25	2E	A6	A9	FF	FF	C6	04	5E4	
29960	: 3D	A6	B9	FF	FD	B1	02	27	0B	B1	49B	
29970	: 02	2A	06	EB	B4	20	02	E0	B4	F1	410	
29980	: 7E	2A	25	09	F0	7E	2A	C1	06	25	35A	
29990	: 1C	20	07	CB	06	F1	7E	2A	24	13	2E4	
30000	: 7C	7F	33	31	A9	FF	F0	B6	7F	33	56C	
30010	: 81	03	10	25	FF	A7	7E	86	13	A6	3FE	
30020	: 89	00	8C	10	27	00	5F	4F	A7	B4	325	
30030	: A7	B9	00	BC	A6	A4	B1	2B	24	04	3D7	
30040	: B6	A9	20	02	B6	15	A7	A4	B6	0F	36C	
30050	: A7	A9	FF	FF	BD	75	94	BE	06	C0	66B	
30060	: EC	B9	18	00	ED	B1	0C	12	00	25	3BE	
30070	: F5	7E	68	22	00	B9	18	01	ED	B9	415	
30080	: 00	01	7C	7F	07	B6	7F	07	30	B9	2F8	
30090	: 00	20	B1	08	25	E2	35	10	1F	32	246	
30100	: B6	7F	4D	4D	B7	7F	4D	06	44	34	46B	
30110	: 30	BD	7F	E9	BD	7E	27	35	30	39	455	
30120	: 73	30	7F	7F	07	BE	7F	FB	7F	7F	4B0	
30130	: 4F	B0	68	C4	B6	7F	FD	B1	02	26	513	
30140	: 04	30	B9	FF	FF	4F	10	AE	B9	00	451	
30150	: C0	10	AF	B9	00	E0	10	AE	B9	00	42F	
30160	: C2	10	AF	B9	00	E2	30	B9	FF	E0	584	
30170	: 4C	B1	07	23	E3	10	8D	65	93	7E	41F	
30180	: 75	F3	B9	00	E0	10	AE	B9	10	E2	512	
30190	: 10	AF	B9	00	E2	30	B9	00	E0	34	3F7	
30200	: 10	BD	7E	24	55	10	7C	7F	07	B6	26C	
30210	: 7F	07	B1	08	25	B9	BE	00	00	10	28B	
30220	: BE	00	00	31	A9	00	01	10	0C	9C	2A1	
30230	: 40	25	F6	30	B9	00	01	0E	00	01	2A2	
30240	: 25	E9	39	B6	7F	2A	7A	7F	53	B6	7F	4B3
30250	: 53	27	03	7E	66	F8	5F	BE	24	41	3AD	
30260	: 10	BE	0C	49	BD	76	05	BE	06	12	351	
30270	: BD	76	77	BE	24	41	BD	76	85	BE	4E3	
30280	: 7E	5F	BD	76	A7	BE	24	41	BD	76	4DD	
30290	: 85	BE	0C	29	BD	76	61	BE	0C	E9	45F	
30300	: BD	76	61	20	0E	10	BE	00	00	4F	2AF	
30310	: 10	AF	B1	4C	B1	07	25	F8	39	BD	427	
30320	: BB	ES	27	FB	7E	76						

Listing 1.

```

10 REM ** MACHINE CODE LOADER **
20 FOR I=#A000 TO #A64C
30 READJ
40 POKEI,J
50 NEXTI
60 END
1000 DATA160,0,185,40,160,153,32,185
1010 DATA200,192,24,208,245,169,0,168
1020 DATA153,0,4,200,192,6,208,248
1030 DATA169,0,141,6,4,169,10,141
1040 DATA106,2,32,64,160,76,28,161
1050 DATA0,12,30,63,63,30,12,0
1060 DATA31,63,63,0,0,0,0,0
1070 DATA62,63,63,0,0,0,0,0
1080 DATA169,128,133,64,169,187,133,65
1090 DATA169,0,133,66,169,167,133,67
1100 DATA160,0,177,66,145,64,24,165
1110 DATA66,105,1,133,66,165,67,105
1120 DATA0,133,67,24,165,64,105,1
1130 DATA133,64,165,65,105,0,133,65
1140 DATA165,64,201,224,208,220,165,65
1150 DATA201,191,208,214,32,128,160,96
1160 DATA160,5,162,0,185,0,4,24
1170 DATA105,48,157,137,187,136,232,224
1180 DATA6,208,241,173,6,4,24,105
1190 DATA48,141,166,187,96,169,0,168
1200 DATA153,0,4,200,192,6,208,248
1210 DATA169,5,141,6,4,169,20,141
1220 DATA7,4,32,64,160,169,1,32
1230 DATA44,162,169,216,141,11,4,174
1240 DATA7,4,202,224,5,208,1,232
1250 DATA142,7,4,169,19,141,8,4
1260 DATA169,26,141,9,4,172,118,2
1270 DATA185,216,192,48,8,169,1,141
1280 DATA12,4,76,234,160,169,7,141
1290 DATA12,4,234,173,118,2,48,8
1300 DATA169,10,141,10,4,76,253,160
1310 DATA169,32,141,10,4,32,117,161
1320 DATA32,189,163,173,11,4,240,95
1330 DATA201,255,240,91,238,13,4,172
1340 DATA7,4,162,0,232,208,253,136
1350 DATA208,250,240,225,160,0,185,64
1360 DATA161,153,189,189,200,192,13,208
1370 DATA245,160,0,185,77,161,153,204
1380 DATA190,200,192,26,208,245,173,8
1390 DATA2,201,132,208,249,76,157,160
1400 DATA7,8,71,65,77,69,32,79
1410 DATA86,69,82,9,3,7,8,80
1420 DATA82,69,83,83,32,39,83,80
1430 DATA65,67,69,39,32,84,79,32
1440 DATA83,84,65,82,84,9,3,206
1450 DATA7,4,240,3,76,178,160,238
1460 DATA7,4,76,178,160,174,8,4
1470 DATA173,8,2,201,172,240,31,201
1480 DATA188,240,39,201,157,240,46,169
1490 DATA37,142,8,4,160,27,32,209
1500 DATA161,169,35,232,32,209,161,169
1510 DATA38,232,32,209,161,96,32,189
1520 DATA161,202,224,2,176,1,232,76
1530 DATA135,161,32,189,161,232,224,38
1540 DATA144,245,202,208,242,173,8,2
1550 DATA201,186,208,249,96,160,27,138

```

ORIC SMASH

SCORE 000233

BALLS 2



SMASH RUNS on a 48K One-1 and is a version of the game where you have to knock all the balls out of a wall; it includes two walls, five balls, a bonus ball for every 1,000 points, increasing difficulty, and on-screen scoring. It was written completely in machine-code and is located in RAM from address 40960 to 43872.

First, the machine-code should be entered by typing in, saving, and Running the machine-code loader. Then, the screen generating program — listing 2 — should also be typed in, saved, and Run. This program performs the task of printing the screen

display and copying it into memory locations 42752 to 43872 where it will be accessed by the main program whenever a new screen is required. A line of possible interest to programmers is line 10, it permits the use of the full 28 lines on the screen.

At this point, both listings should have been entered and Run, which means that the game is finished!! So, to get it going, type CALL40960;

if all runs successfully then press the reset button and type
 CSAVE"SMASH",A40960,E43872,AUTO
 The machine code will then run automatically

on loading. If the computer crashes or the game does not work properly then reload and check the listings in turn, and when corrected save the new versions and repeat the above procedure.

The keys used are cursor left to move left, cursor right to move right, P to pause, and R to continue after a pause.

If you feel that the game is at the wrong speed, then the initial speed — it gets faster after each screen — can be altered by typing
 POKE41134,n
 where n is an integer from 1 to 255 (the lower the number the faster the game).

SCOPE C.G.L.

1560 DATA72,169,32,32,209,161,232,32	2050 DATA4,35,0,0,4,38,0,1	2540 DATA32,254,161,133,80,32,22,165
1570 DATA209,161,232,32,209,161,104,170	2060 DATA5,0,0,5,5,0,95,3	2550 DATA169,32,133,81,32,22,165,76
1580 DATA96,133,64,134,65,132,66,152	2070 DATA5,37,0,7,5,35,0,7	2560 DATA245,164,200,32,254,161,133,80
1590 DATA72,169,128,133,67,169,187,133	2080 DATA5,38,0,7,5,128,0,7	2570 DATA32,22,165,136,202,32,254,161
1600 DATA68,164,65,198,66,48,16,24	2090 DATA5,128,128,1,5,128,95,1	2580 DATA133,81,32,22,165,165,80,201
1610 DATA165,67,105,40,133,67,165,68	2100 DATA7,0,0,7,7,80,0,5	2590 DATA24,176,10,201,17,144,6,56
1620 DATA105,0,133,68,76,227,161,165	2110 DATA7,80,95,3,7,128,0,5	2600 DATA233,16,32,128,165,165,81,201
1630 DATA64,145,67,104,168,96,134,65	2120 DATA7,128,128,3,7,128,95,3	2610 DATA24,176,10,201,17,144,6,56
1640 DATA132,66,152,72,169,187,133,68	2130 DATA7,0,95,1,7,0,128,1	2620 DATA233,16,32,128,165,96,201,24
1650 DATA169,128,133,67,164,65,198,66	2140 DATA5,0,128,3,3,0,128,5	2630 DATA176,9,201,17,144,5,169,16
1660 DATA48,16,24,165,67,105,40,133	2150 DATA1,0,128,7,3,38,95,7	2640 DATA32,209,161,96,72,165,80,201
1670 DATA67,165,68,105,0,133,68,76	2160 DATA3,0,37,4,5,37,95,1	2650 DATA24,176,10,201,17,144,6,169
1680 DATA14,162,177,67,133,64,104,168	2170 DATA5,35,95,1,5,0,38,4	2660 DATA128,133,80,104,96,201,17,176
1690 DATA165,64,96,96,201,2,240,5	2180 DATA5,0,128,3,7,0,128,1	2670 DATA6,169,0,133,80,104,96,201
1700 DATA160,0,76,55,162,160,21,185	2190 DATA3,35,95,7,255,173,13,4	2680 DATA32,208,6,169,0,133,80,104
1710 DATA212,162,201,255,240,237,32,128	2200 DATA41,1,208,1,96,174,10,4	2690 DATA96,104,96,72,165,81,201,24
1720 DATA162,200,185,212,162,72,10,10	2210 DATA172,9,4,169,16,32,209,161	2700 DATA176,10,201,17,144,6,169,128
1730 DATA144,7,72,169,1,141,232,2	2220 DATA173,12,4,32,105,164,160,0	2710 DATA133,81,104,96,201,17,176,6
1740 DATA104,162,2,142,225,2,162,1	2230 DATA185,248,162,132,83,205,12,4	2720 DATA169,0,133,81,104,96,201,32
1750 DATA142,229,2,141,231,2,162,0	2240 DATA208,99,201,255,240,29,200,185	2730 DATA208,223,169,0,133,81,104,96
1760 DATA142,226,2,142,227,2,142,228	2250 DATA248,162,32,36,165,197,80,208	2740 DATA0,255,1,255,0,0,1,1
1770 DATA2,142,230,2,152,72,32,33	2260 DATA84,200,185,248,162,32,75,165	2750 DATA0,1,255,1,0,0,255,255
1780 DATA244,104,168,104,133,64,232,208	2270 DATA197,81,208,73,200,185,248,162	2760 DATA133,70,173,3,4,133,71,173
1790 DATA253,198,64,208,249,200,208,183	2280 DATA141,12,4,10,168,185,112,165	2770 DATA0,4,24,101,70,201,10,144
1800 DATA132,80,133,64,24,101,64,133	2290 DATA133,64,185,113,165,133,65,173	2780 DATA122,56,233,10,141,0,4,173
1810 DATA65,169,0,105,0,133,66,165	2300 DATA10,4,24,101,64,141,10,4	2790 DATA1,4,105,0,201,10,144,113
1820 DATA65,24,101,64,133,67,165,66	2310 DATA173,9,4,24,101,65,141,9	2800 DATA169,0,141,1,4,173,2,4
1830 DATA105,0,133,68,169,1,141,225	2320 DATA4,174,10,4,172,9,4,192	2810 DATA105,0,201,10,144,105,169,0
1840 DATA2,169,0,141,229,2,141,228	2330 DATA27,240,34,32,254,161,201,24	2820 DATA141,2,4,173,3,4,105,0
1850 DATA2,165,64,141,227,2,32,30	2340 DATA176,10,201,17,144,6,56,233	2830 DATA201,10,144,97,169,0,141,3
1860 DATA244,165,65,141,227,2,165,66	2350 DATA16,32,128,165,169,36,32,209	2840 DATA4,173,4,4,105,0,201,10
1870 DATA141,228,2,238,225,2,32,30	2360 DATA161,32,47,166,96,164,83,200	2850 DATA144,89,169,0,141,4,4,173
1880 DATA244,165,67,141,227,2,165,68	2370 DATA200,200,200,208,139,206,6,4	2860 DATA5,4,105,0,201,10,144,81
1890 DATA141,228,2,238,225,2,32,30	2380 DATA32,128,160,173,6,4,208,8	2870 DATA169,0,141,5,4,165,71,205
1900 DATA244,164,80,96,100,80,100,80	2390 DATA169,2,32,44,162,76,28,161	2880 DATA3,4,240,21,173,7,4,201
1910 DATA100,80,90,112,100,60,90,108	2400 DATA174,8,4,32,189,161,76,203	2890 DATA9,240,14,152,72,138,72,32
1920 DATA80,80,90,80,80,116,67,100	2410 DATA160,201,0,240,38,201,1,240	2900 DATA199,250,104,170,104,168,238,6
1930 DATA255,80,200,60,210,80,110,70	2420 DATA50,201,3,240,68,201,4,240	2910 DATA4,152,72,138,72,32,128,160
1940 DATA100,100,100,50,100,200,250,255	2430 DATA86,201,5,240,101,136,32,254	2920 DATA32,250,250,104,170,104,168,206
1950 DATA1,80,0,3,1,80,95,5	2440 DATA161,133,80,32,22,165,200,202	2930 DATA11,4,96,141,0,4,76,221
1960 DATA1,128,0,3,1,128,128,5	2450 DATA32,254,161,133,81,32,22,165	2940 DATA165,141,1,4,76,221,165,141
1970 DATA1,128,95,5,1,0,95,7	2460 DATA76,245,164,136,32,254,161,133	2950 DATA2,4,76,221,165,141,3,4
1980 DATA1,0,0,1,0,80,0,4	2470 DATA80,32,22,165,169,32,133,81	2960 DATA76,221,165,141,4,4,76,221
1990 DATA0,128,0,4,0,0,0,0	2480 DATA76,245,164,136,32,254,161,133	2970 DATA165,141,5,4,76,221,165,165
2000 DATA3,35,0,1,3,37,0,1	2490 DATA80,32,22,165,200,232,32,254	2980 DATA80,166,81,201,35,240,17,201
2010 DATA3,38,0,1,3,0,95,5	2500 DATA161,133,81,32,22,165,76,245	2990 DATA38,240,13,201,37,240,9,224
2020 DATA3,128,0,1,3,128,128,7	2510 DATA164,200,32,254,161,133,80,32	3000 DATA95,240,5,201,80,240,1,96
2030 DATA3,128,95,7,3,0,0,3	2520 DATA22,165,136,232,32,254,161,133	3010 DATA32,16,251,96,0
2040 DATA4,0,0,4,4,37,0,7	2530 DATA81,32,22,165,76,245,164,200	

There is always another brick in the wall in this fast machine code game written by Miles Dunlop.

Listing 2.

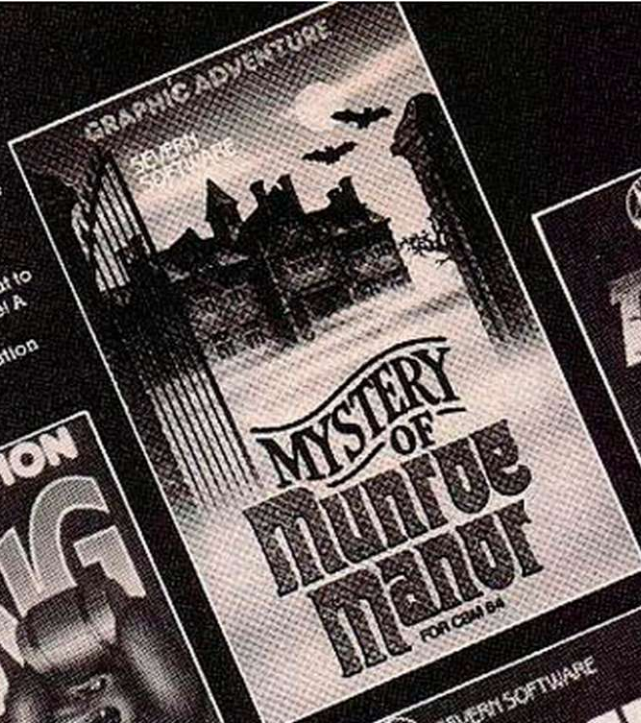
```

5 REM FOR "-" READ POUND
SIGN
10 POKE623,28:DOKE621,47960
15 PRINTCHR$(17)
20 CLS
30 E$=CHR$(27)
40 PRINTE$"H"E$"G SCORE
BALLS ";
50 PRINTE$"I"E$"CPPPPPPPPPP
PPPPPPPPPPPPPPPPPPPPPPPP";
60 FORI=1TO4:GOSUB10000:
NEXT
70 C$="T":GOSUB20000
80 C$="U":GOSUB20000
90 C$="V":GOSUB20000
100 FORI=1TO3:GOSUB10000:
NEXT
110 C$="V":GOSUB20000
120 C$="R":GOSUB20000

130 C$="Q":GOSUB20000
140 FORI=1TO12:GOSUB10000
: NEXT
150 PRINTE$"I"E$"G";
160 B=#A700
170 FORA=#BBBOTO#BFEO
180 POKEB,PEEK(A)
185 B=B+1
190 NEXTA
195 PRINTCHR$(17)
200 END
10000 PRINTE$"I"E$"C_
_";:RETURN
20000 PRINTE$"I"E$"C_";
20010 FORI=1TO36:PRINTESC$:
: NEXTI
20020 PRINT"_";
20030 RETURN

```

ary of Munroe Manor
and yourself wandering the
moors when you come across
ates to Munroe Manor. Old man
w has disappeared but reports
of his wealth hidden somewhere
manor. The baying of hounds
within the grounds bring to mind
of wandering ghosts and hidden
You, our intrepid friend, are about to
apt to solve this mystery. . . and live! A
graphic adventure containing 70
ent screens displaying each location
action during the game.

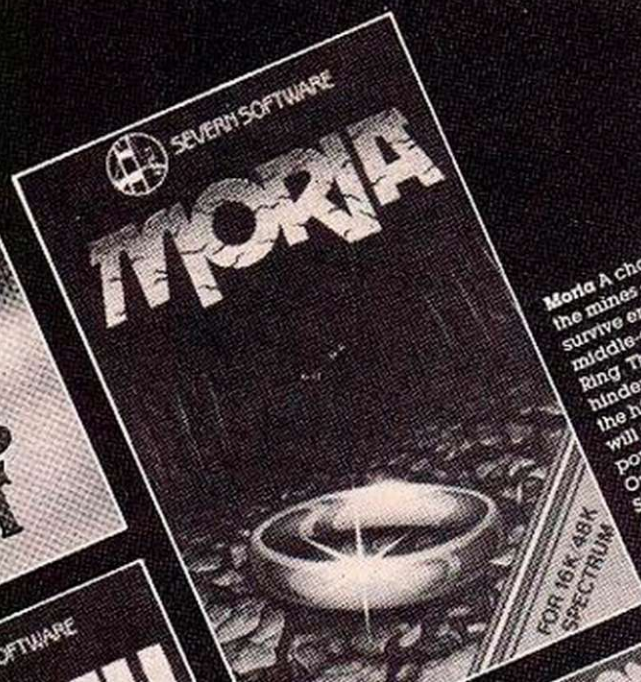


SEVERN SOFTWARE
MYSTERY OF MUNROE MANOR
FOR CBM 64



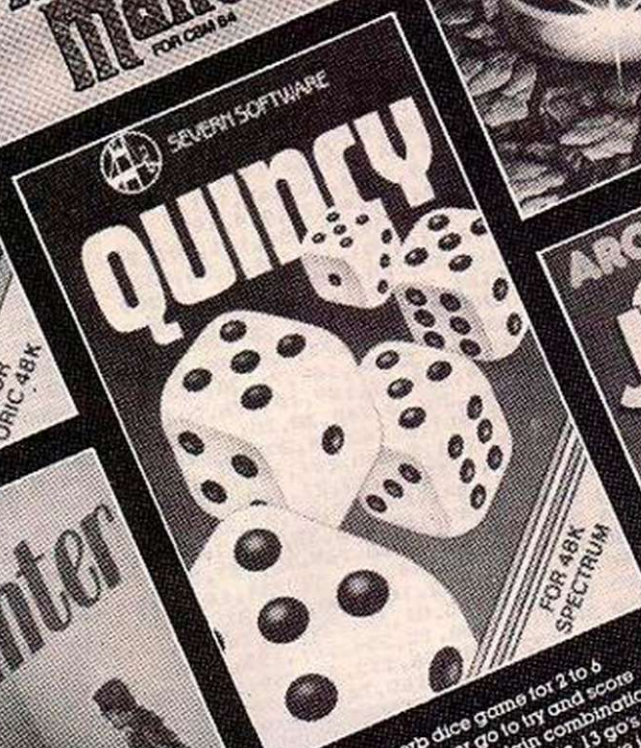
ARCADIE ACTION
DINKY KONG

apt
cive
lovely
end
s held
ve by the
of gorilla
u climb
connecting
ers and move
orilla will be
ing barrels and
ills at you! The only
o reach her is to
over these obstacles
progress to the top
de action with sound
is full colour action
ics, skill levels, etc.
r - Adrian Sheppard
48K - £6.95



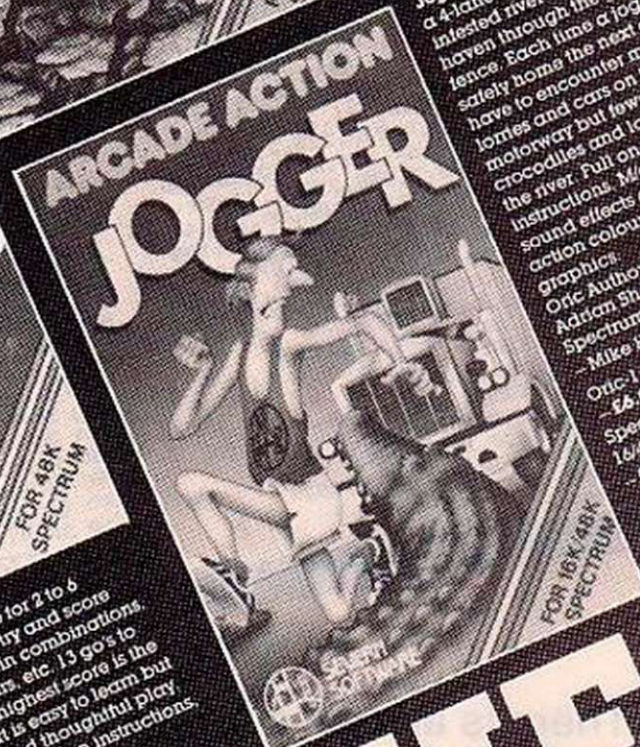
SEVERN SOFTWARE
MORIA

Moria A challenging adventure game set in the mines of Moria. You'll have to try and survive encounters with the monsters of middle-earth while trying to locate Durin's Ring. The Wizard and Trader may help or hinder you on your journey to find and open the hidden doors to freedom - a game that will really test your character and staying power.
Oric Author - Adrian Sheppard
Oric Author - Mike Howard
Spectrum Author - Mike Howard
Oric-1 48K - £6.95
Oric-1 Almos - £6.95
Spectrum 16/48K - £4.95



SEVERN SOFTWARE
QUINCY

Quincy A superb dice game for 2 to 6 players. 3 throws per go to try and score points by obtaining certain combinations, i.e. 3 of a kind, a run, pairs, etc. 13 go's to complete a game. The highest score is the winner! It's a game that is easy to learn but can be won by skilful and thoughtful play. Full colour graphics, on-screen instructions, bonus scores etc.
Author - Tony Churcher
Spectrum 48K - £4.95



ARCADIE ACTION
JOGGER

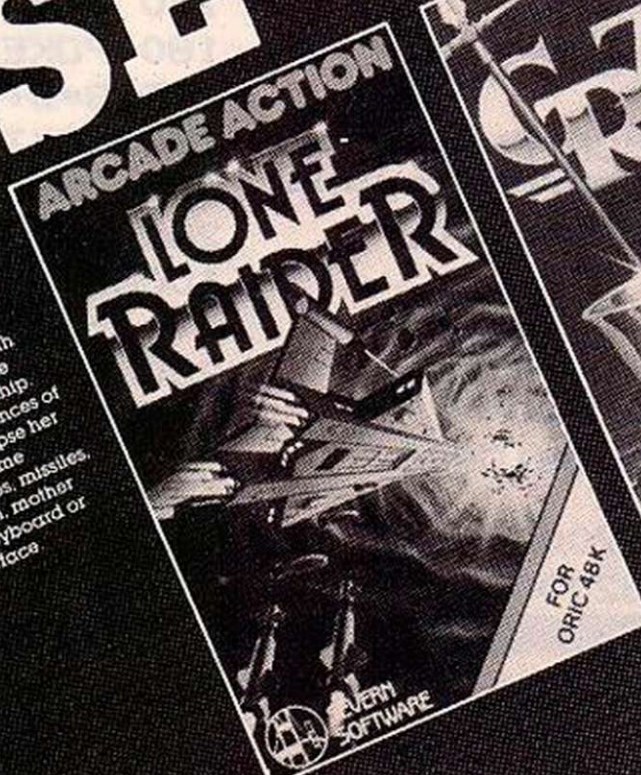
Jogger Guide your joggers across a 4-lane motorway and crocodile infested river to reach their safe haven through the gap in the fence. Each time a jogger is safely home the next one will have to encounter more lorries and cars on the motorway but fewer crocodiles and logs in the river. Full on-screen instructions, Micode, sound effects and full action colour graphics.
Oric Author - Adrian Sheppard
Spectrum Author - Mike Howard
Oric-1 48K - £6.95
Spectrum 16/48K - £4.95



SEVERN SOFTWARE
ENCOUNTER

ounter A complex and intriguing classic text adventure. A Girl has been kidnapped by thugs - your job is to locate and rescue her! Everything you need can be found in the game but sometimes you may have to manufacture items. Chemistry knowledge will help! Most commands are verb followed by noun although abbreviations can be used. If the alarm sounds you have twenty moves to stop it before you too are caught. It's worthwhile making a map noting what you find and where as the time limit is only 500 moves.
Oric-1 48K - £7.50
Oric Almos - £7.50
CBM 64 - £7.50
Spectrum 48K - £5.95

RISE TO THE



ARCADIE ACTION
LONE RAIDER

Lone Raider As Captain of the spaceship 'Lone Raider' your mission is to save earth from the alien Zugs, who are aiming to destroy all forms of intelligent life in the Universe. The 'Lone Raider' possesses formidable weaponry such as phaser cannons and neutron bombs. Armed with these you will need to battle through the planetary defences to seek the mother ship. She is heavily guarded and your chances of surviving long enough to even glimpse her are slim. . . . Superb graphics, volume control, hi-score, mines, sharks, octupi, mother ship, etc. Can be played with keyboard or joystick using the Fase 1td interface.
Author - Adrian Sheppard
Oric-1 48K £8.50
Oric Almos £8.50



SEVERN SOFTWARE
GRAIL

Grail You have been chosen to seek and recover the Holy Grail from the Castle Perilous. Throughout the course of your task you will have to use your skill, intelligence and logic (along with a little luck) as you encounter many losses. You will have the opportunity to gather weapons and armour to fight with, but if you are wounded your strength will drain away - many other features such as warp, jewels, etc.
Author - Adrian Sheppard
Oric-1 48K - £6.95
Oric Almos - £6.95

Utilities

Address File Manager This is a new departure for software for the Oric-1 micro. It will allow you to keep ALL your important records of NAMES & ADDRESSES. Up to 255 can be kept in each file and files can be SAVED & LOADED using an ordinary cassette recorder. This means an unlimited amount of information can be permanently stored in a convenient format.

Features: Menu-driven • Prompted Keyboard entry of data with check • Delete option for old data • Search by surname (initials, multiple occurrences) • Saves and loads NAMED files to cassette • Prints on screen or printer • Up to 255 records can be kept in each file. The program and all information to the user is read from and can be used by anyone who can operate the Oric-1.

Author: Mike Sheppard
Oric-1 48K - £6.95
Oric Atmos - £6.95

Oric Atmos Extended Basic No Atmos programmer can afford to be without this program! 23 extra commands yet taking up only 3K of RAM.

Commands include: Copy • Scroll • Rotate • Write • On & Off clock • Reset time • Extra sound commands • Facility to enter in upper and lower case and others • Demonstration program and full instructions included with program to enter yourself.

Author: Adrian Sheppard
Oric Atmos - £8.95

Oric-1 Extended Basic A must for the programmer! Extended Basic offers the user 13 additional commands to the present Oric-1 48K commands and yet only takes up 2K of RAM.

Features: Commands include: Verify • Write • Recall • Find • Scroll • Draw box • Rotate and others • Takes up only 2K of RAM. So plenty of memory left for users to program. Demonstration programs - all detailed in the cassette's inlay • Full instructions.

Author: Adrian Sheppard
Oric-1 48K - £7.50

Oricade A combined assembler, disassembler and editor for the Oric. Handles full 48K Mnemonics, Assembles, Saves and Reloads M/C addresses.

A powerful tool for any serious programmer.

Author: Adrian Sheppard
Oric-1 48K - £8.50

The Typing Wizard If you want to learn to type or improve your typing capabilities this program is a must. Continuous on screen displays and sound routines keep your eyes up and away from the keyboard to develop the proper technique. The teaching method is on a row to row basis starting at the home row with others being added. Each lesson has letter groups of letters, word and finally sentence drill and at the end of each lesson the speed is given in words per minute and a count of the number of errors is given. A beep signals any errors during the exercises. You couldn't find a more patient teacher!

CBM 64 - £8.50

CHALLENGE with your Oric-1, Oric Atmos, Spectrum or CBM 64.



Ghostman Control Ghost-Man around the maze eating dots and fruit and avoiding the ghosts, who are very clever at finding you. If you are cornered by the ghosts, try to get to a Power-Pill (there's one in each corner) so you can become temporarily invincible to the ghosts. You can even catch the ghosts for extra points! When you have eaten all the dots and fruit you proceed to the next level where the action is even faster. Machine code action and sound. 9 levels of difficulty. Ghosts, Ghost-Man, Dots, Power-Pills, Fruit and Hi-Score.

Oric-1 48K - £7.50
Oric Atmos - £7.50

All Oric-1 and Oric Atmos titles available from Laskys, Dinky Kiosks also available from W H Smith. All Oric-1 and Oric Atmos titles are recommended by ORIC PRODUCTS INTERNATIONAL LTD.

All Spectrum software is available on MICRONET 800.

Other titles available from selected retail outlets or direct from:

Severn Software
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Gloucestershire
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Ingenious unit for Spectrum, with 2 x 28 pin sockets and a Reset button allows up to 16K of Basic or M/C program to RUN or LOAD instantly from EPROMS. Cabled connector and full extender card.
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The very popular PROMER-81 for the ZX81 has been adapted to the Spectrum, and the price kept low. £22.95

ROM-81 for ZX81
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At last! A low cost reliable programmer for 2516/32, 2716/32 EPROMS. Requires 4 x PP3 batteries £19.95

DHOB1 UV ERASER
Compact. Mains powered. Safe. Fully cased. Up to 3 EPROMS £18.95

DHOB1 2 With automatic timer £22.95

BLOPROM-81

A uniquely sophisticated
EPROM PROGRAMMER

In use at various labs incl. Sinclair
Eprom programmer for the 2516, 27XX single supply families, yes, even the 27128 from Intel. Check, Read, Program + Verify all or part of Eprom.

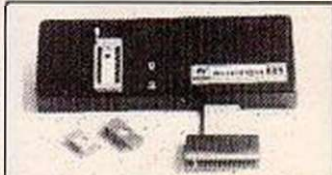
So immensely user friendly you'll hardly need the manual. Designed for the beginner but includes a single key entry route for the professional. Supplied as firmware, the m/c driver routine alone is worth more than the price of BLOPROM-81. No personality

Cards, or other additions, just a ZX81. Several inbuilt safety features. On-board Vpp generation. 28pin ZIF socket. Cabled connector and extender plug. ABS case. £79.95

Dream-81
Full 64K Rampack with link options to disable 0-8-16K. Plus a 28 pin EPROM socket for 2716, 2732/2764 and even the latest 27128 from Intel. Fast/slow Eprom option, professionally built and tested. In an ABS case with an LED indicator £59.95

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CRAMIC-81
Ingenious hardware/software allows this 16K CMOS RAM with lithium battery to CO-exist in same memory area as ordinary RAM. ZX81 can multitask on two completely independent programs. £79.95



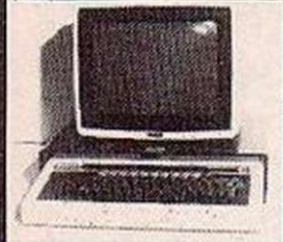
STATUS NO. OF SYSTEM — HEX
EPROM TYPE — 27128
RAM START ADDR — 4000
EPROM ST. ADDR — 8000
JOB LENGTH — 4000
TASK — CHECK

WHICH TASK DO YOU WISH TO DO
N CHECK THAT EPROM IS OK
R READ THE CONTENTS OF EPROM INTO RAM
V VERIFY AN EPROM WITH DATA FROM RAM
W VERIFY THAT EPROM DATA IS THE SAME AS IN RAM
O TO QUIT
A TO RESTART

FAST CODES AVAILABLE
D H FOR WXYZ

PRINTER/MONITOR ACCESSORIES

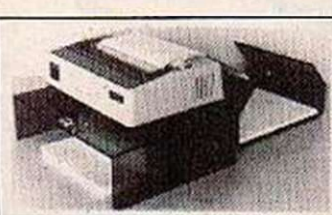
MSB Monitor Stand for BBC micro.
Sits over the Beeb 17" x 12" x 3.75"
P&P £3.50 £19.95
PSS Standard printer stands for
OKI, Epson etc. 15" x 12" x 4.5".
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CUSTOM PRINTER STANDS for larger printers
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GEM SOFTWARE < BISHOP'S STORTFORD > LTD
NEW RELEASES FOR EASTER

DISCO DAN For SPECTRUM 48K £4.95

Can poor Dan decontaminate the atomic fuel rods in time? In this new 3D machine code game, you control Dan Dan The Atomiser Man, jumping him from disc to disc, trying to reduce the ever increasing radiation levels in an atomic pile. However, Up 'n' Atom 'Arry and his gang of vagrant particles are thirsting for the energy in your back pack, which makes life a bit awkward at times. Then there's Ron the Rapacious Robot, not the sort to meet in a dark alley (or anywhere else for that matter)!!

GALACTIC EMPIRE For BBC-B (O.S. 1.0+) .. £9.95

A game of inter-stellar logistics, trade and battle. You and your fellow galactic war lords must wage war across the Galaxy, until one of you achieves total supremacy. You must balance your resources to fuel colonisation programs, starship production, battle campaigns and a host of other enterprises whilst fighting off attacks from other war lords, avoiding famine, plagues and natural disasters such as super novae, black holes and accidents in hyperspace.

DIGGER MAN For LYNX 48/96K £7.95

The nasties are out to get you, as you run around the levels and ladders of the four different screens in this new and exciting machine code game!! Your only defence is your trusty spade! You must dig holes in the levels so that the nasties fall in, then bash them on the bonce, so that they fall all the way through. Beware though, give them time to crawl out of the hole and they turn purple with rage becoming twice as difficult to destroy!!

TWINKLE For LYNX 48/96K £7.95

Wave upon wave of swooping, darting, alien ramships, diving fireballs, perilous energy bands and moving space docks all combine with incredible sound and technicolour graphics, to make this one of the best and fastest games ever likely to be seen on your Lynx. With choice of joystick or keyboard controls.

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All tapes despatched within 48 hours of receipt of order.
Access orders welcome.

GEM SOFTWARE

Unit D, The Maltings, Station Road,
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- Programming techniques: utilities; games; expert systems etc.
- Range of computer languages: Forth, LISP, Pascal, machine code etc.
- Activities suitable for beginners through to experts (more activities than you will have time for!).
- Excellent supervision (lots of enthusiastic, talented staff).
- Country House location.

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BLOPROM-81

PROMER-81

PROMER-81

CRAMIC-81

MEMIC-81

MONITOR STANDS

ROM-SP

PROMER-81

PROMER-81

PROMER-81

PROMER-81-S

PRINTER STANDS



Les Ellingham, an Atari and multifarious creepy crawlies go harvesting.

BUGS IS A SIMPLE game which I hope will show that some good games can be written for your Atari even if you do not understand some of the more advanced programming techniques. No player-missile graphics, no VBI routines, all of the action is achieved by Pokes to the screen. By level 9 the action gets quite fast.

You play the part of a ladybird who has to harvest a whole host of aphids by collecting them into one of four 'nests' on each side of the screen. Dotted around the place are several mushroom looking things which, if you touch them, will hatch out into more aphids. These are poisonous to a degree and will sap your strength but strength can be made up by pushing the aphids right into the nests and killing them. There are some aphids which are deadly — the orange ones — and touching these will mean instant death. These will multiply if you are not quick enough in collecting the green aphids. If your strength falls to zero, you die and you must have a certain strength ratio to progress to the next level.

In order to achieve the maximum speed possible in Basic, the main game loop has been kept short and all routines which may be needed during the course of play are at the beginning of the program. Routines which are used only once or infrequently are put at the end of the program.

Line 10 sends the program immediately to the initialisation and titles.

Line 20 is a simple delay loop with the variable DL set at different points in the program. By putting this loop at the beginning of the program more accurate timing can be achieved.

Lines 30-50 maintain the score. The variable SC keeps track of the points scored by killing aphids less points deducted for hatching them out. CSC is the maximum score at any one point during the game and

Score is only updated if the points gained exceed the maximum so far.

Thus hatching an aphid puts you back a number of points and you must kill more to get to a stage where you can increase your score. STR is a measure of your strength and if this falls to 0 the program jumps to the death routine. Line 50 stops the 'attract' mode.

Lines 60-150 are the main subroutine to determine if the aphids you are collecting collide with anything. The variables M and M2 hold the next location to which the aphid will be pushed. If that location is a 'mushroom' then the routine jumps to line 150 which hatches out the mushroom and decreases your score. If the aphid is going to collide with anything else — line 70 — then we must determine if it is possible for the aphid to move aside.

Death routine reached

This is determined in lines 95-110 which search an array for all possible locations of escape. If none can be found, the program exits the loop to line 115 which kills the aphid by Poking the ladybird into the aphid's position. The score is increased in line 120 and this line also resets the timer and checks to see if all the bugs have been killed. If there is room for the aphid to escape then line 105 jumps out of the loop and returns to line 75 which places the aphid at the next available blank position.

Lines 200-255 are the main game loop. Line 200 reads the joystick and if it is not being used, moves your ladybird to a new position chosen randomly from the array MPOS. This line also contains a delay routine according to the level of the game.

Line 210 determines the position you are trying to move to if the joystick is active and the following lines determine if something is in that position.

Line 240 contains a delay loop to set the action at a speed commensurate with current level and line 245 moves your ladybird to the next position.

Lines 500-580 determine bonuses and take you to the next level when all the bugs have been killed. Note that line 500 will skip the bonus and next level if you have failed to improve your score in a particular level. These lines are fairly simple and merely give you 5 bonus points for each remaining mushroom and then increase the level (LV).

Lines 600-665 are the death routine reached either by hitting the killer bug — line 230 — or by losing all your strength — line 45. Line 600 simply Pokes your position with all the characters available accompanied by some sound before going on to give an end of game message.

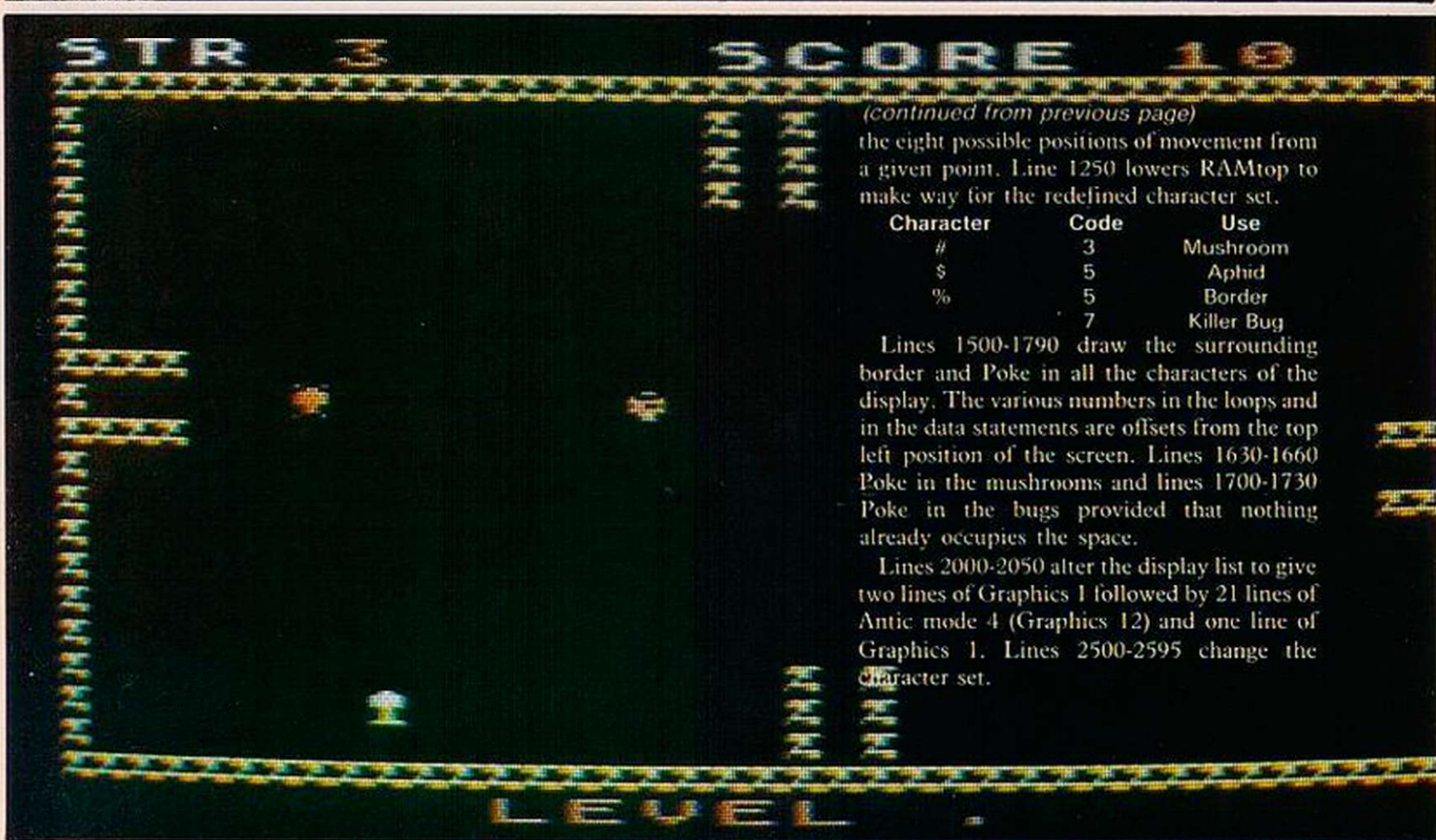
Lines 800-820 are the sounds used when an aphid is killed. Note that the routine is used in different ways by jumping to the beginning — line 530 — or entering part way through — line 115. By entering a subroutine at different points, one routine can serve several purposes.

Lines 900-930 add a new orange bug if a certain time has elapsed without killing an aphid — line 235. It simply Peeks the screen to find a blank position and then Pokes in the character representing the orange bug. If you want more killer bugs to appear reduce the figure 3 in line 235.

Lines 1000-1100 are the titles and options and are quite straightforward. Note again the sound subroutine being used at different points.

Lines 1200-1280 initialise things. The array ST holds the amount by which various positions of the joystick will move your character. By reading this array in line 210 much greater speed can be achieved than by using If . . . Then statements. MPOS holds

(continued on next page)



(continued from previous page)

the eight possible positions of movement from a given point. Line 1250 lowers RAMtop to make way for the redefined character set.

Character	Code	Use
#	3	Mushroom
\$	5	Aphid
%	5	Border
	7	Killer Bug

Lines 1500-1790 draw the surrounding border and Poke in all the characters of the display. The various numbers in the loops and in the data statements are offsets from the top left position of the screen. Lines 1630-1660 Poke in the mushrooms and lines 1700-1730 Poke in the bugs provided that nothing already occupies the space.

Lines 2000-2050 alter the display list to give two lines of Graphics 1 followed by 21 lines of Antic mode 4 (Graphics 12) and one line of Graphics 1. Lines 2500-2595 change the character set.

Listing 1.

```

10 GOTO 1000
19 REM XX DELAY SUBROUTINE XX
28 FOR D=1 TO DL:NEXT D:RETURN
29 REM XX UP-DATE SCORE ETC XX
38 IF SC<CSC THEN CSC=SC:SCORE=CSC+BSC
35 STR=INT(SC)/3:IF STR<8 THEN STR=8
40 POSITION 20,0:?"STR ";INT(STR)
41 POSITION 20,0:?"SCORE ";SCORE
45 IF STR<8 THEN POP :GOTO 600
50 POKE 77,0:RETURN
59 REM XX CHECK FOR COLLISIONS ETC XX
60 M=22:H2=22-2
65 IF PEEK(M+M2)=3 THEN 150
70 IF PEEK(M+M2)=4 OR PEEK(M+M2)=5 OR
PEEK(M+M2)=7 THEN 95
75 POKE M,0:POKE M+M2,4
80 SOUND 1,10,0,0:RETURN
95 FOR I=0 TO 7:M2=MPOS(I)
105 IF PEEK(M+M2)=0 THEN POP :GOTO 75
110 NEXT I
115 POKE 2,0:POKE M,4:GOSUB 815
120 BUGS=BUGS-1:SC=SC+10:SCORE=SCORE+2
:CSC=CSC+2:POKE 20,0:POKE 19,0:IF BUGS
<=0 THEN POP :GOTO 500
125 M=M2:GOSUB 30
130 RETURN
150 POKE M+M2,4:BUGS=BUGS+1:TS=TS-1:SC
=SC-(LVX*6)-TS:XA:GOSUB 30:GOTO 60
199 REM XX MAIN GAME ROUTINE XX
200 S=STICK(0):IF S=15 THEN 22=2+MPOS
(INT(RND(0)*8)):FOR D=1 TO 72-LVX:NEXT
D:GOTO 215
210 22=2+ST(S)
215 IF PEEK(22)=5 THEN 200
220 IF PEEK(22)=3 THEN GOSUB 150
225 IF PEEK(22)=4 THEN GOSUB 60
230 IF PEEK(22)=7 THEN GOTO 600
235 IF PEEK(19)>3 THEN GOSUB 900
240 FOR D=1 TO 45-LVX:NEXT D
245 POKE 2,0:Z=22:POKE 2,4
250 SOUND 0,12,10,4:SOUND 0,0,0,0
255 GOTO 200
499 REM XX LEVELS AND BONUSES XX
500 IF SC<CSC THEN 500
520 GRAPHICS 17:POSITION 6,9:?"#6;"LEV
EL ";LV
525 FOR I=1 TO 20-(LVX*6)-TS:POSITI
ON I-1,11:?"#6;"X":BONUS=BONUS+5
530 V=2:GOSUB 810:V=1
535 DL=10:GOSUB 20
540 POSITION 6,13:?"#6;"BONUS ";BONUS
545 NEXT I:BSC=BSC+BONUS
550 DL=500:GOSUB 20
555 LV=LV+1:IF LV>9 THEN LV=9
560 ? #6;CHR$(125):POSITION 6,9:?"#6;"
LEVEL ";LV:SOUND 0,255,10,0:SOUND 1,25
4,10,0
565 FOR I=0 TO 255:POKE 700,I:NEXT I
575 DL=500:GOSUB 20:GOSUB 820
580 BONUS=0:GRAPHICS 0:POKE 755,0:POKE
710,0:GOTO 1260
599 REM XX END OF GAME ROUTINE XX
600 FOR I=255 TO 0 STEP -5:SOUND 0,255
-1,10,0:FOR D=1 TO 5:NEXT D:POKE 2,1:N
EXT I
610 FOR I=1 TO 3:GOSUB 815:NEXT I
620 GRAPHICS 18:POSITION 5,0:?"#6;"GAM
E OVER"
625 IF SCORE>HI THEN HI=SCORE
630 POSITION 2,2:?"#6;">>>>>>>><<<<<<<<
("&
635 POSITION 5,4:?"#6;"SCORE ";SCORE
640 POSITION 5,6:?"#6;"HI-SC ";HI
645 POSITION 2,8:?"#6;">>>>>>>><<<<<<<<
("&
650 POSITION 3,10:?"#6;"press start to
play again"
655 POKE 711,PEEK(20)
660 IF PEEK(53279)<0 THEN 655
665 GRAPHICS 0:POKE 710,0:POKE 755,0:S
C=10:CSC=0:BSC=0:LV=1:GOTO 1260
800 REM XX SOUNDS ETC XX
810 FOR S=14 TO 0 STEP -1:SOUND 0,5X10
,12,S:NEXT S
815 FOR S=14 TO 0 STEP -1:SOUND 0,150-
5X10,12,S:NEXT S:SOUND 0,0,0,0:RETURN
820 SOUND 0,0,0,0:SOUND 1,0,0,0:RETURN
899 REM XX ADD NEW KILLER BUG XX
900 X=SCREEN+INT(RND(0)*799)+40
910 IF PEEK(X)<0 THEN 900
920 POKE X,7
930 POKE 19,0:POKE 20,0:RETURN
1000 REM XX TITLES XX
1005 GRAPHICS 18:V=1
1010 FOR I=1 TO 17 STEP 2:POSITION I,0
:?"#6;"=:POSITION I,11:?"#6;"=:NEX
T I
1020 FOR I=1 TO 0:POSITION I,2:?"#6;"b
":POSITION I-1,2:?"#6;"":POSITION 19-
I,2:?"#6;"s":POSITION 20-I,2:?"#6;" "
1025 GOSUB 80:NEXT I
1029 DL=500:GOSUB 20
1030 POSITION 9,2:?"#6;"ug"
1035 GOSUB 810
1040 POSITION 9,5:?"#6;"by":POSITION 4
,7:?"#6;"les ellingham"
1045 GOSUB 1200:DL=750:GOSUB 20
1050 POSITION 2,5:?"#6;"select level "
;LV
1055 POSITION 1,7:?"#6;"press start to
play"
1060 IF PEEK(53279)=5 THEN GOSUB 815:L
V=LV+1:IF LV>9 THEN LV=1
1062 POSITION 15,5:?"#6;"LV
1065 IF PEEK(53279)=6 THEN 1250
1080 P=PEEK(700):POKE 700,PEEK(710):PO
KE 710,P
1090 DL=250:GOSUB 20
1100 GOTO 1060
1200 REM XX INITIALISE XX
1210 DIM ST(14),MPOS(7)
1215 LV=1:SC=10:V=1
1220 FOR I=1 TO 14:READ A:ST(I)=A:NEXT
I
1225 DATA 0,0,0,0,41,-39,1,0,39,-41,-1
,0,40,-40
1230 FOR I=0 TO 7:READ A:MPOS(I)=A:NEX
T I
1235 DATA 1,-1,39,-39,40,-40,41,-41
1245 RETURN
1250 POKE 106,PEEK(106)-5:GRAPHICS 0:P
OKE 710,0:POKE 755,0
1255 GOSUB 2500
1260 M=0:M2=0:Z=0:Z=0:BUGS=LVX3:TS=LV
X*6+6
1265 POKE 756,CS/256:GOSUB 2000
1270 POKE 710,10
1275 SCREEN=PEEK(80)+256*PEEK(89)
1280 GOSUB 1500:GOSUB 30:POKE 19,0:POK
E 20,0:GOTO 200
1499 REM XX DRAW SCREEN XX
1500 FOR I=40 TO 79:POKE SCREEN+I,5:NE
XT I
1510 FOR I=80 TO 839 STEP 40:POKE SCRE
EN+I,5:POKE SCREEN+I+39,5:NEXT I
1520 FOR I=840 TO 879:POKE SCREEN+I,5:
NEXT I
1545 RESTORE 1560
1550 FOR I=1 TO 5:READ A:POKE SCREEN+8
85+I,A:NEXT I
1560 DATA 44,37,54,37,44
1570 POKE SCREEN+892,LV+16
1600 REM
1610 RESTORE 1620:FOR I=1 TO 24:READ A
:POKE SCREEN+A,5:NEXT I
1620 DATA 361,362,343,441,442,443,98,1
00,138,140,178,180,476,477,478,556,557
,558,740,742,780,782,820,822
1630 FOR I=1 TO LVX*6+6
1640 X=SCREEN+INT(RND(0)*799)+40
1650 IF PEEK(X)=5 THEN 1640
1660 POKE X,3:NEXT I
1700 FOR I=1 TO LVX3
1710 X=SCREEN+INT(RND(0)*799)+40
1720 IF PEEK(X)=5 OR PEEK(X)=4 THEN 17
10
1730 POKE X,4:NEXT I
1740 Z=SCREEN+500+I:IF PEEK(Z)<0 THEN
I=I+1:GOTO 1740
1745 POKE Z,6
1750 X=SCREEN+INT(RND(0)*799)+40
1760 IF PEEK(X)=5 OR PEEK(X)=4 OR PEEK
(X)=3 THEN 1750
1770 POKE X,7
1790 RETURN
2000 REM X NEW DISPLAY LIST X
2005 POKE 559,0
2010 DL=PEEK(560)+256*PEEK(561)
2020 POKE DL+3,70:POKE DL+6,6
2030 FOR I=7 TO 27:POKE DL+I,4:NEXT I:
POKE DL+28,6:POKE DL+29,65
2040 POKE DL+30,PEEK(560):POKE DL+31,P
EEK(561)
2045 POKE 559,34
2050 RETURN
2500 REM X CHANGE CHARACTER SET X
2505 RESTORE 2530
2515 CS=(PEEK(106)+1)*256
2520 DIM MC$(32):FOR I=1 TO 32:READ A:
MC$(I)=CHR$(A):NEXT I:A=USR(ADR(MC$
),57344,CS)
2530 DATA 104,104,'23,204,104,133,203,
104,133,206,104,133,205,162,4
2535 DATA 160,0,177,203,145,205,136,20
0,249,230,204,230,206,202,200,240,96
2550 RESTORE 2500
2560 READ A:IF A=-1 THEN RETURN
2570 FOR J=0 TO 7:READ B:POKE CS+AX8+J
,B:NEXT J:GOTO 2560
2580 DATA 6,0,20,65,213,01,213,60,20
2585 DATA 4,130,40,170,170,170,40,40,1
30
2590 DATA 3,60,255,255,169,40,40,17
0
2592 DATA 7,65,20,85,85,85,20,20,65
2595 DATA -1

```

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QUICK LOAD

Paul Rhodes with a program to stop you pulling your hair out!

TAPESYS IS A machine code program for the 48K ZX Spectrum designed to alleviate loading frustration. Its main purpose is to decrease loading time, but it can also be used to save and load at a slower, more reliable rate than normal. The program also includes a head reader routine.

The program can be loaded to any location nnnnn in the top 32K of memory — from 32768 to 63663. Before Loading, type
CLEAR nnnnn - 1

This protects Tapesys from the Basic system and the New command. Then load with the line:

LOAD "TAPESYS" CODE nnnnn

Once the code has been loaded, enter the command

PRINT USR nnnnn

This will return the address from which the program can be run with either:

RANDOMIZE USR (run address)

or

RANDOMIZE USR USR nnnnn

followed by a colon, and one of the commands Pause, Save, Load, Verify, Merge or Cat. The syntax for these commands is the same as in Sinclair Basic, including the use of Line, Code, Screen\$ and Data as described in the Spectrum manual, the only exception being Cat — under key 9 — which is used with no parameters. Commands can be strung together, separated by colons, as in Basic, for example

RANDOMIZE USR USR nnnnn: PAUSE 4:
SAVE "Program" LINE 10: CAT

This line will call the machine code, set it to run at speed 4, Save the program to auto-run on loading from line 10, and finally enter the

head reading section of the program.

PAUSE: This command is used to select one of 10 operating speeds, numbered 0 to 9. The syntax for the command is:

PAUSE (required speed option)

The approximate baud rate will then be displayed at the bottom of the screen — see table for more accurate figures. Pause 1 is equivalent to the normal Spectrum load/save, while Pause 9 is nearly 2.5 times as fast. Pause 0 is a special low speed, giving greater reliability when loading. Note that a program or other data block can not be loaded at a different speed to that at which it was saved, so commercial software cannot be loaded using Tapesys — except at pause 1 — unless you make a high or low speed copy of the program. The Pause command can be used in conjunction with any of the other recognised commands.

SAVE, LOAD, VERIFY, MERGE: All these commands are used in exactly the same way as in Basic. They must follow a Rand USR statement, as shown above, and, if the speed is to be changed, a pause n command, as already described. For example
RANDOMIZE USR USR nnnnn: PAUSE 3: SAVE "name" DATA a\$(): VERIFY "" DATA a\$()

Approximate baud rates taking normal speed at 1500 baud.

Pause	Baud Rate
0	1431
1	1500
2	1860
3	1929
4	2747
5	3048
6	3236
7	3304
8	3474
9	3635

If you wished to save something else, say a screen, at the same speed, then the pause 3 command would not have to be repeated, so the line might read:

RANDOMIZE USR USR nnnnn: SAVE "screen" SCREENS

The program has two other features worth mentioning here. First, when the item to be loaded is found in the tape, it is indicated on the screen by a flashing asterisk alongside the name. Secondly, if an error occurs during loading, other than Break, the program will instruct you to rewind the tape to the beginning of the program and will start the loading process again.

Now to the built-in head reader, which is called via the Cat command. This routine will load headers from the tape — provided that they were saved at the current operating speed — and will display the information contained in them. This information consists of the type of data on the tape — Basic program, "bytes" file, character (\$) or number (#) array; the filename; the auto-run Line number — for a Basic program, the start address — for a "bytes" file — or the array name; and the length of the data block. To exit from Cat, press Break.

The Tapesys program returns to Basic on encountering any character it does not understand. The character could be a CHR\$ 13 signifying the end of the line, a command other than Save, Load, Verify, Merge, Cat or Pause, or perhaps a colon placed immediately after a separating colon. This last method can be used to return to Basic in the middle of a line. For example

RANDOMIZE USR USR nnnnn: LOAD "" CODE::BEEP 1,10

To enter the program, type
CLEAR 49999

load your favourite hexloader, or type in and
(continued on page 121)

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Listing 1.

```

10 REM hexloader
20 DEF FN h$(a)=CHR$(INT (a/1
6)+48+7*(a>159))+CHR$(a-16*INT
(a/16)+48+7*((a-16*INT (a/16))>9
))
30 DEF FN h(h$)=CODE h$-48-7*(
h$>"9")
40 INPUT "START ADDRESS:";s
50 INPUT "FINISH ADDRESS:";f
60 FOR n=s TO f STEP 8
62 PRINT n;";";
65 LET tot=0
66 REM input the whole line of
eight hexadecimal figures from
the first digit to the last with
spaces between
67 REM eg. at address 50000 in

```

```

put the line from C5 to 42
70 INPUT a$
75 IF a$="END" THEN STOP
77 PRINT a$
80 FOR b=0 TO 7
90 LET z=FN h(a$)*16+FN h(a$(2
))
95 LET tot=tot+z
100 POKE (n+b),z
110 LET a$=a$(4 TO )
120 NEXT b
130 PRINT " = ";
135 REM enter total
140 INPUT t
150 IF t<>tot THEN PRINT "DATA
INPUT ERROR": GO TO 62
160 PRINT t
170 NEXT n

```

(continued from page 119)

run listing 1. Enter 50000 decimal as the start address and 51871 as the end address. Then enter the bytes from listing 3.

Once it has all been typed in, save it with the command

```
SAVE "TAPESYS" CODE 50000,1872
```

and save the Basic hexloader, in case it is needed to rectify any mistakes. Verify them both, enter New and type in and run listing 2. This should produce a screen picture, save it at a speed you specify, then clear the screen and attempt to reload it. If you get an error during loading, remember: "If at first you don't succeed . . .".

If however, the computer does not act as expected, then pull the plug to clear the computer, type

```
CLEAR 49999
```

and reload the code and the hexloader. Add the line in listing 4, and then type

```
RUN 100
```

Check the bytes

The computer will then list the bytes for you to check against listing 3. Write down the address of any errors you see, and when the listing has finished the computer will allow you to correct these mistakes. When finished, type in S as the address, and the corrected code will be saved. Finally, enter New and go back to listing 2. If you cannot afford the time to type all the hex in, perhaps you can afford to send £3 to me at 104 Ventnor Gardens, Luton, Beds., LU3 3SW for a copy of the code on tape.

Finally, I shall mention a few interesting sections of the program. Most important are the SABTS — SAVE bytes — and LDBTS — LOAD bytes — which are almost directly copied from the equivalent ROM routines. Other major sections equivalent to ROM

routines are pointed out within the listing, and for further details you should refer to Dr. Ian Logan's excellent *Complete Spectrum ROM Disassembly*, which was invaluable during the development of the Tapesys program. The major extra routines I have added are those dealing with relocating the program, decoding the Basic line, changing the speed, and the head reader. I will now deal briefly with each of these.

The **RELOCATE** routine at the beginning of the program first works out the displacement of the routine from the address to which it was originally assembled — note that if you change the Org, you must also change the LD BC,C350 at the beginning of the program to te new address. On entry, BC always holds the number in the USR statement. The start of the table of addresses to be altered — RELCD — is then calculated using this displacement.

The routine fetches in turn all the 2-byte addresses until it comes across a 0000 at which point it returns with the Run address — PSTRT — in BC.

It adds the displacement to find the enw address, fetches the 2-byte number from this address, adds the displacement to this number, and replaces it in the program, then

Listing 2.

```

18 BORDER 0: PAPER 1: INK 7: C
LS:
20 FOR f=0 TO 174 STEP 2: PLOT
0,f: DRAW OVER 1;f,174-f: PLOT
255,f: DRAW OVER 1;-f,174-f: NEX
T f
25 FOR f=0 TO 174 STEP 2: PLOT
0,f: DRAW OVER 1;174-f,-f: PLOT
255,f: DRAW OVER 1;-174+f,-f: N
EXT f
30 FOR f=1 TO 7: PRINT PAPER !
-(f=1);AT 7+f,9;
: NEXT f
40 INPUT "PAUSE (0 TO 9):";p
45 LET p=INT p: IF p<0 OR p>9
THEN GO TO 40
50 RANDOMIZE USR USR 50000: PR
USE P: SAVE "pic-PAUSE"+STR$ p$C
REEN$
60 CLS : RANDOMIZE USR USR 500
00: LOAD "SCREEN$
70 GO TO 40

```

jumps back to fetch the next address for alteration. The routine modifies itself, so running it a second time will have the same effect, except to return and Run address, which is why Randomize USR USR nnnnn works.

Decoding the Basic line is much simpler. It involves getting the next character in the line after the colon and comparing it to each of the six recognised comands in turn. If it matches, the correct routine is activated, then the next statement is considered. Otherwise, a return is made to Basic, with CH ADD holding the address of the character that does not match. Basic expects either a colon or Enter, so any other character will give error C — Nonsense in Basic.

The changing of the speed involves altering the lengths of the delay loops in SABTS and LDBTS. The eight values for each speed are stored near the end of the program at PAUSD, the current speed number in PAUSNO and the 'nnnn BD' messages at MSGP. The nubmer o possible values recognised is limited to the value in the CP instruction near the beginning of the Pause routine.

Alter speeds easily

You can add your own speeds, or alter those included fairly easily, mainly by trail and error — the methods for calculating the exact values are too complicated to go into here; except that the fourth and seventh numbers should be identical, and the fifth number two greater. Remember, if you add a speed, you must also add a message to the MSGP list, terminated by 8D hex, and alter the CP instruction mentioned above. The routine that modifies the SABTS and LDBTS routines works on a table of displacements at PAUSD2. For example, the second number goes six bytes after the first, and the third, 14 bytes after the second. If you modify the program at all within the SABTS, LDBTS or TDE routines, you may have to alter those bytes too.

The CAT routine repeatedly loads a header from the tape and prints out the type and name as usual, then jumps to the relevant routine for the type to print out the line number/start address/arry name, before returning to the next header ont he tae.

I hope the program saves you much time and, perhaps, gives you ideas of your own to develop.

Listing 3.

```

50000: C5 E1 01 50 C3 A7 ED 42 = 1168
50008: E5 C1 21 10 CA 09 5E 23 = 811
50016: 56 23 7A B3 28 0F E5 EB = 941
50024: 09 5E 23 56 EB 09 EB 72 = 817
50032: 28 73 E1 18 E9 01 79 C3 = 957
50040: C9 C3 BB C4 21 A4 C4 E5 = 1401
50048: 21 80 1F CB 7F 28 03 21 = 598
50056: 98 0C 08 13 DD 2B F3 3E = 760
50064: 01 47 10 FE D3 FE EE 08 = 1056
50072: 06 A4 2D 20 F5 05 25 F2 = 776
50080: 92 C3 06 2F 10 FE D3 FE = 1129
50088: 3E 08 06 37 10 FE D3 FE = 866
50096: 01 0C 3B 0B 6F 18 09 7A = 346
50104: B3 2B 0B DD 6E 00 7C AD = 858
50112: 67 3E 01 37 1B 17 6C 1B = 400
50120: F5 79 CB 7B 10 FE 30 04 = 1011
50128: 06 1A 10 FE D3 FE 06 15 = 794
50136: 20 EF 05 AF 3C CB 15 20 = 767
50144: EB 1B DD 23 06 08 3E 7F = 721
50152: DB FE 1F D0 7A 3C 20 C7 = 1125
50160: 06 3B 10 FE C9 14 0B 15 = 585
50168: F3 3E 09 D3 FE 21 A4 C4 = 1172
50176: E5 DB FE 1F E6 20 F6 02 = 1243

```

```

50184: 4F BF C0 CD B5 C4 30 FA = 1294
50192: 21 15 04 10 FE 2B 7C B5 = 676
50200: 20 F9 CD B1 C4 30 EB 06 = 1100
50208: 9C CD B1 C4 30 E4 3E C6 = 1222
50216: BB 30 E0 24 20 F1 06 C9 = 972
50224: CD B5 C4 30 D5 7B FE D4 = 1381
50232: 30 F4 CD B5 C4 D0 79 EE = 1393
50240: 02 4F 26 00 06 E2 1B 1F = 406
50248: 0B 20 07 30 0F DD 75 00 = 448
50256: 1B 0F CB 11 AD C0 79 1F = 776
50264: 4F 13 18 07 DD 7E 00 AD = 649
50272: C0 DD 23 1B 0B 0E E4 2E = 763
50280: 01 CD B1 C4 D0 3E ED BB = 1222
50288: CB 15 06 E2 30 F3 7C AD = 1044
50296: 67 7A B3 20 CB 7C FE 01 = 1018
50304: C9 CD B5 C4 D0 3E 07 3D = 1073
50312: 20 FD A7 04 CB 3E 7F DB = 1064
50320: FE 1F D0 A9 E6 20 2B F3 = 1207
50328: 79 EE FA 4F E6 07 F6 0B = 1179
50336: D3 FE 37 C9 F5 3A 4B 5C = 1188
50344: E6 3B 0F 0F D3 FE 3E = 858
50352: 7F DB FE 1F FB 3E 02 CF = 1147
50360: 0C F1 C9 CD E7 C8 DF FE = 1567
50368: 3A C0 E7 FE FB 20 06 AF = 1196

```

```

50376: 32 9E CA 1B 34 FE EF 20 = 1011
50384: 07 3E 01 32 9E CA 1B 29 = 545
50392: FE D6 20 07 3E 02 32 9E = 779
50400: CA 1B 1E FE D5 20 07 3E = 824
50408: 03 32 9E CA 1B 13 FE CF = 917
50416: 20 07 3E 04 32 9E CA 1B = 539
50424: 0B FE F2 C0 CD B0 CB 1B = 1301
50432: BA 01 11 00 3A 9E CA A7 = 789
50440: 2B 02 0E 22 F7 D5 DD E1 = 996
50448: 06 0B 3E 20 12 13 10 FC = 416
50456: DD 36 01 FF CD 9F CB 21 = 1128
50464: F6 FF 0B 09 03 30 0F 3A = 645
50472: 9E CA A7 20 02 CF 0E 7B = 902
50480: B1 2B 0A 01 0A 00 DD E5 = 688
50488: E1 23 EB ED B0 DF FE E4 = 1613
50496: 20 41 3A 9E CA FE 03 CA = 774
50504: BA 1C E7 CD B2 2B CB F9 = 1272
50512: 30 0B 21 00 00 3A 9E CA = 510
50520: 3D 2B 10 CF 01 C2 BA 1C = 685
50528: 23 7E DD 77 0B 23 7E DD = 894
50536: 77 0C 23 DD 71 0E 3E 01 = 577
50544: CB 71 2B 01 3C DD 77 00 = 757
50552: EB E7 FE 29 20 DF E7 EB = 1482

```

(Listing 3 continued on next page)

Handwritten notes at the bottom left of the page:

```

152
20
19
298
43
243
62
747
0-9
A=10
B=11
C=12
D=13
E=14

```

(Listing continued from previous page)

50560: C3 31 C6 FE AA 20 1C 3A = 984
50568: 9E CA FE 03 CA BA 1C E7 = 1216
50576: DD 36 0B 00 DD 36 0C 1B = 600
50584: 21 00 40 DD 75 0D DD 74 = 785
50592: 0E 1B 4A FE AF 20 4C 3A = 707
50600: 9E CA FE 03 CA BA 1C E7 = 1216
50608: CD 4B 20 20 0C 3A 9E CA = 771
50616: A7 CA BA 1C CD E6 1C 1B = 1022
50624: 0F CD 92 1C DF FE 2C 2B = 939
50632: 0C 3A 9E CA A7 CA BA 1C = 965
50640: CD E6 1C 1B 04 E7 CD 82 = 1057
50648: 1C CD 99 1E DD 71 0B DD = 982
50656: 70 0C CD 99 1E DD 71 0B = 859
50664: DD 70 0E 60 69 DD 36 00 = 823
50672: 03 18 3E FE CA 2B 06 DD = 812
50680: 36 0E 80 1B 14 3A 9E CA = 658
50688: A7 C2 BA 1C E7 CD 82 1C = 1121
50696: CD 99 1E DD 71 0B DD 70 = 1068
50704: 0E DD 36 00 00 2A 59 5C = 512
50712: ED 5B 53 5C 37 ED 52 DD = 1098
50720: 75 0B DD 74 0C 2A 4B 5C = 686
50728: ED 52 DD 75 0F DD 74 10 = 1025
50736: EB 3A 9E CA A7 CA 6B CB = 1329
50744: 0E 01 11 00 DD 09 DD 22 = 732
50752: 9B CA 22 9A CA ED 73 9C = 1252
50760: CA DD E5 11 11 00 AF 37 = 916
50768: CD F5 C3 DD E1 30 F2 3E = 1443
50776: FE CD 01 16 FD 36 52 07 = 878
50784: 0E 80 DD 7E 00 DD BE EF = 1139
50792: 20 02 0E F6 FE 04 30 D9 = 817
50800: 11 34 C9 C5 CD 0A 0C C1 = 887
50808: DD E5 D1 21 F0 FF 19 06 = 1218
50816: 0A 7E 3C 20 03 79 80 4F = 559
50824: 13 1A BE 23 20 01 0C D7 = 530
50832: 10 F6 3A 9E CA FE 04 C2 = 1132
50840: 1A C7 C5 E5 D5 DD E5 3E = 1376
50848: 17 D7 3E 05 D7 3E 20 D7 = 829
50856: DD 7E 00 FE 00 20 22 DD = 888
50864: 7E 0E E6 C0 20 11 3E CA = 875
50872: D7 DD 4E 0D DD 46 0E CD = 1037
50880: 2B 2D CD E3 2D 1B 1A 3E = 677
50888: 01 11 55 C9 CD 0A 0C 1B = 555
50896: 10 FE 03 20 24 DD 4E 0D = 653
50904: DD 46 0E CD 2B 2D CD E3 = 1030
50912: 2D 3E 2C D7 DD 4E 0B DD = 897
50920: 46 0C CD 2B 2D CD E3 2D = 852
50928: AF 11 55 C9 CD 0A 0C 1B = 729
50936: 1A DD 7E 0E E6 7F F6 40 = 1054
50944: D7 DD 7E 00 FE 02 00 03 = 853
50952: 3E 24 D7 3E 2B D7 3E 29 = 733
50960: D7 18 CE DD E1 D1 E1 C1 = 1518
50968: 0E FF CB 79 C2 49 C6 3E = 1120
50976: 2E D7 3E 12 D7 3E 01 D7 = 820
50984: 3E 2A D7 3E 0D D7 E1 DD = 1055

50992: 7E 00 FE 03 2B 0C 3A 9E = 651
51000: CA 3D CA 99 C7 FE 02 CA = 1275
51008: 47 CB E5 DD 6E FA DD 66 = 1404
51016: FB DD 5E 0B DD 56 0C 7C = 1020
51024: B5 2B 0D ED 52 38 2B 2B = 689
51032: 07 DD 7E 00 FE 03 20 1F = 674
51040: E1 7C 85 20 06 DD 6E 0D = 912
51048: DD 66 0E E5 DD E1 3A 9E = 1228
51056: CA FE 02 37 20 01 A7 3E = 775
51064: FF CD F5 C3 DA BE CA 11 = 1521
51072: 0A C9 AF CD 0A 0C DD 2A = 876
51080: 9B CA 2A 9A CA ED 7B 9C = 1268
51088: CA C1 E5 01 11 00 C3 49 = 910
51096: C6 DD 5E 0B DD 56 0C E5 = 1072
51104: 7C B5 20 06 13 13 13 EB = 635
51112: 1B 0C DD 6E FA DD 66 FB = 1191
51120: EB 37 ED 52 38 09 11 05 = 696
51128: 00 19 44 4D CD 05 1F E1 = 636
51136: DD 7E 00 A7 2B 3E 7C B5 = 921
51144: 2B 13 2B 46 2B 4E 2B 03 = 339
51152: 03 03 DD 22 5F 5C DD EB = 885
51160: 19 DD 2A 5F 5C 2A 59 5C = 698
51168: 2B DD 4E 0B DD 46 0C C5 = 853
51176: 03 03 03 DD 7E FD F5 CD = 1059
51184: 55 16 23 F1 77 D1 23 73 = 861
51192: 23 72 23 E5 DD E1 37 3E = 976
51200: FF C3 79 C7 EB 2A 59 5C = 1228
51208: 2B DD 22 5F 5C DD 4E 0B = 795
51216: DD 46 0C C5 DD E5 19 C1 = 1152
51224: E5 C5 CD 55 16 DD 2A 5F = 1096
51232: 5C 23 DD 4E 0F DD 46 10 = 748
51240: 09 22 4B 5C DD 66 0E 7C = 671
51248: E6 C0 20 0A DD 6E 0D 22 = 842
51256: 42 5C FD 3A 0A 0D D1 DD = 905
51264: E1 37 3E FF C3 79 C7 DD = 1333
51272: 4E 0B DD 46 0C C5 03 F7 = 839
51280: 36 80 EB D1 E5 E5 DD E1 = 1530
51288: 37 3E FF CD F5 C3 38 03 = 1076
51296: C3 7F C7 E1 ED 5B 53 SC = 1249
51304: C3 D2 0B E5 3E FD CD 01 = 1163
51312: 16 AF 11 A1 09 CD 0A 0C = 611
51320: FD CB 02 EE CD D4 15 DD = 1355
51328: E5 11 11 00 AF CD 7C C3 = 962
51336: DD E1 06 32 76 10 FD DD = 1110
51344: 5E 0B DD 56 0C 3E FF DD = 962
51352: E1 CD 7C C3 C3 BE CA 01 = 1331
51360: 00 00 3A 9E CA FE 04 CB = 876
51368: E7 CD BC 1C CD F1 2B C9 = 1294
51376: E7 CD 82 1C CD 99 1E 79 = 1103
51384: FE 0A DD 32 B5 C9 DD 21 = 1158
51392: 86 C9 21 D1 C3 11 06 CA = 1045
51400: A7 CB 21 CB 21 CB 21 06 = 881
51408: 00 DD 09 06 0B C5 DD 7E = 788
51416: 00 77 06 00 EB 4E EB 13 = 692
51424: 09 DD 23 C1 10 EF C9 11 = 931

51432: 6A C9 3A B5 C9 F5 D5 3E = 1261
51440: 00 CD 01 16 3E 16 D7 AF = 702
51448: D7 AF D7 21 00 01 11 00 = 656
51456: 01 CD B5 03 D1 F1 CD 0A = 1055
51464: 0C C9 FF 0D 12 01 10 02 = 518
51472: 11 06 13 01 20 4C 4F 41 = 295
51480: 44 49 4E 47 20 20 45 52 = 505
51488: 52 4F 52 20 2D 2D 20 52 = 479
51496: 45 57 49 4E 44 20 20 54 = 523
51504: 41 50 45 20 BD 0D 3E 42 = 528
51512: 41 53 49 43 BA 0D 23 41 = 587
51520: 52 52 41 59 BA 0D 24 41 = 518
51528: 52 52 41 59 BA 0D 3E 42 = 645
51536: 59 54 45 53 BA 80 20 42 = 737
51544: 59 54 45 53 BD 4E 4F 20 = 655
51552: 4C 49 4E C5 BD 31 34 30 = 714
51560: 30 20 62 64 BD 31 35 30 = 569
51568: 30 20 62 64 BD 31 38 35 = 577
51576: 30 20 62 64 BD 31 39 30 = 573
51584: 30 20 62 64 BD 32 37 35 = 577
51592: 30 20 62 64 BD 33 30 35 = 571
51600: 30 20 62 64 BD 33 32 35 = 573
51608: 30 20 62 64 BD 33 33 30 = 569
51616: 30 20 62 64 BD 33 35 30 = 571
51624: 30 20 62 64 BD 33 36 35 = 577
51632: 30 20 62 64 BD 09 46 41 = 563
51640: 34 AC AE CB AC 16 43 3E = 921
51648: 31 B0 B2 CB B0 16 35 30 = 905
51656: 23 C2 C4 D8 C2 15 33 2E = 953
51664: 21 C5 C7 DA C5 15 23 1E = 930
51672: 11 D8 DA E6 D8 0C 1F 1A = 966
51680: 0D DC DE E9 DC 0A 1D 1B = 971
51688: 0B DF E1 EB DF 09 1C 17 = 977
51696: 0A E0 E2 EC E0 0B 1B 16 = 977
51704: 09 E1 E3 EC E1 0B 1A 15 = 977
51712: 08 E2 E4 ED E2 07 06 0E = 952
51720: 60 21 0B 05 13 FE 00 EF = 654
51728: 76 C3 C9 C4 D4 C4 DF C4 = 1537
51736: EA C4 F5 C4 71 C6 F2 C6 = 1622
51744: 7A C3 7D C3 6A C4 B2 C4 = 1265
51752: 32 C6 1D C7 7A C7 7D C7 = 1121
51760: 80 C7 02 CB B1 C5 45 CB = 1124
51768: A0 C3 FE C3 36 C6 97 C7 = 1406
51776: 1B C4 22 C4 0C C4 31 C4 = 906
51784: 3B C4 FD C4 1D C5 51 C6 = 1209
51792: 5C C8 61 C8 B6 C8 9A C8 = 1277
51800: 05 C5 2B C5 43 C5 40 C6 = 965
51808: 43 C6 37 C7 6F C7 8B C7 = 1164
51816: 8B C7 47 C6 3B C7 40 C7 = 1128
51824: BF C7 A3 C8 C0 C8 C3 C8 = 1492
51832: C6 C8 56 C5 8B C5 AB C5 = 1379
51840: 86 C5 CA C5 FE C5 93 C6 = 1574
51848: 98 C6 9D C8 BC C4 E8 C8 = 1523
51856: EB C8 BC C8 53 C3 00 00 = 1101
51864: 01 5F 00 40 36 C3 01 FF = 665

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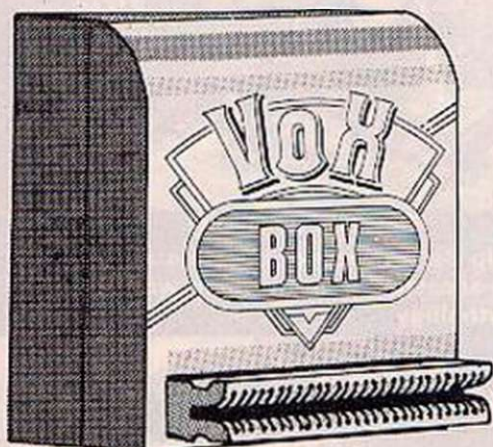
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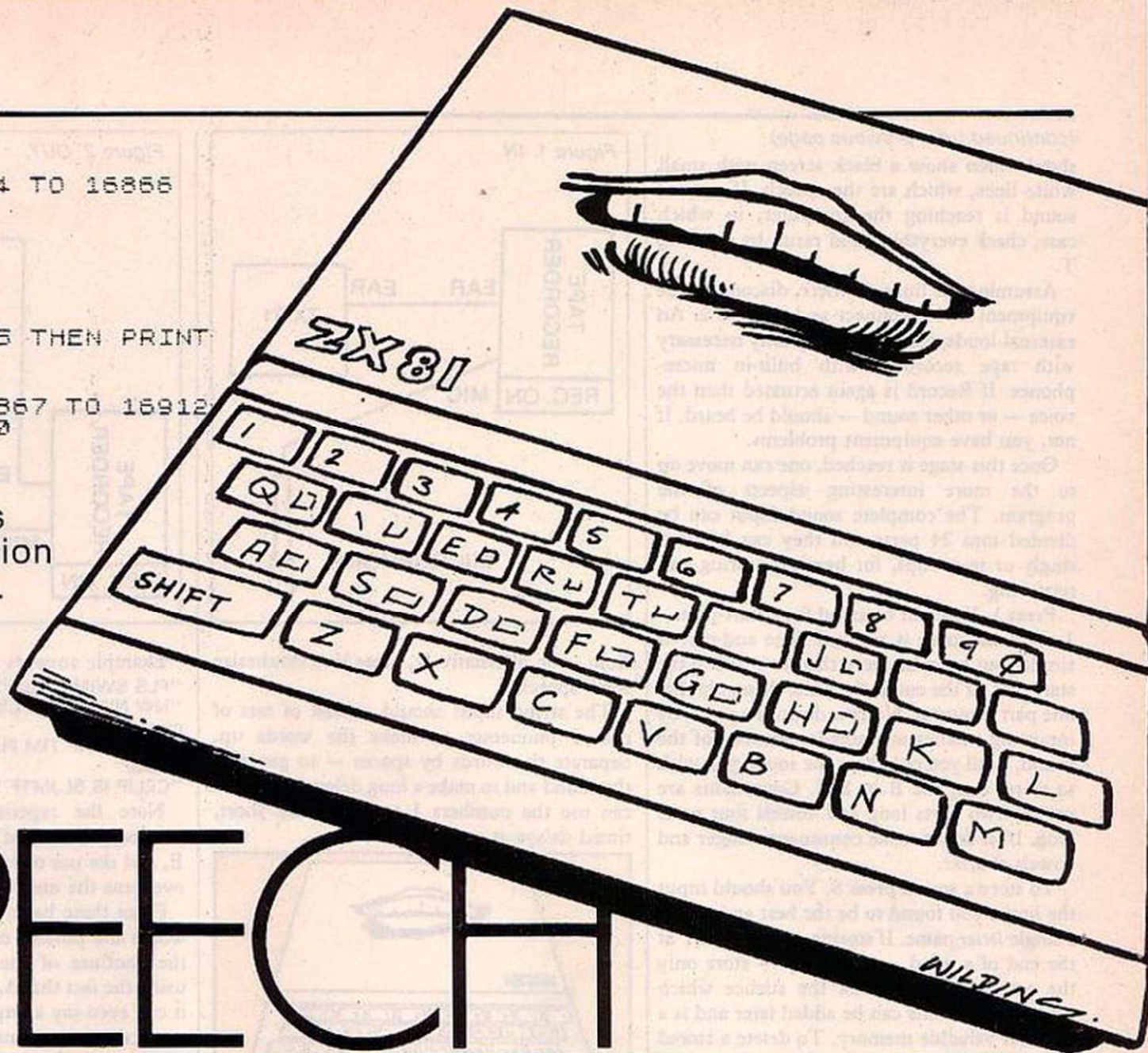


Listing 1.

```

10 LET T=0
20 FOR A=16514 TO 16865
30 INPUT X
40 POKE A,X
50 SCROLL
60 PRINT A,X
70 LET T=T+X
80 NEXT A
90 IF T<>32625 THEN PRINT
  "ERR
OR IN DATA";0
100 FOR A=16867 TO 16912
110 POKE A,70
120 NEXT A
  
```

J N Creak gets into conversation with his ZX-81.



SPEECH

Listing 2.

```

10 PRINT "PRESS ANY KEY TO CON
T."
15 PAUSE 4E4
20 RAND USR 16514
25 PAUSE 4E4
30 POKE 16542,104
35 POKE 16555,128
50 CLS
60 RAND USR 16540
70 IF INKEY$(">") THEN GOTO 150
0
80 FOR A=1 TO 50
90 NEXT A
95 GOTO 50
100 GOSUB 3000
105 GOSUB 1000
110 PRINT "WHAT NAME ?"
115 INPUT A$
120 CLS
130 POKE 16670, CODE A$
140 POKE 16671, U-0+1
150 POKE 16672, 0+100
160 LET A=INT (USR 16675/255)
170 IF A=1 THEN GOTO 2100
180 IF A=2 THEN GOTO 2200
190 RETURN
200 GOSUB 3000
205 PRINT "WHAT LETTER ?"
210 INPUT A$
215 CLS
220 POKE 16670, CODE A$
230 IF USR 16741/255 THEN GOTO
2300
240 RETURN
500 GOSUB 1000
510 POKE 16542,103+0
520 POKE 16555,104+0
530 RETURN
1000 PRINT "WHAT START (1 TO 24)
?"
1010 INPUT 0
1020 PRINT "AND END (1 TO 24) ?"
1030 INPUT 1
1040 RETURN
1500 IF INKEY$="T" THEN RUN
1510 IF INKEY$="1" THEN GOSUB 50
0
1520 IF INKEY$="S" THEN GOSUB 10
0
1530 IF INKEY$="V" THEN GOTO 200
0
1540 IF INKEY$="D" THEN GOSUB 20
0
1550 GOTO 80
2000 POKE 16542,104
2005 GOSUB 3000
2010 PRINT "ENTER LETTERS NOW"
2015 CLEAR
2020 DIM A$(25)
2025 INPUT A$
2030 CLS
2035 LET A$=A$+" 2"
2040 IF USR 16570/255 THEN GOTO
2500
2050 FOR A=1 TO 140
2060 IF INKEY$(">") THEN GOTO 240
0
2070 NEXT A
2080 GOTO 2040
2100 PRINT "NO ROOM - MEM. FULL.
" "THINK AGAIN"
2110 PAUSE 100
2120 RETURN
2200 PRINT "DATA LIST FULL." "T
HINK AGAIN"
2210 PAUSE 100
2220 RETURN
2300 PRINT "NO SUCH PHONEME: "
A$ " "
2310 PAUSE 100
2320 RETURN
2400 CLEAR
2410 GOTO 1100
2500 PRINT "PHONEME NAME NOT FOU
ND."
2510 PAUSE 100
2520 GOTO 2400
3000 PRINT "PHONEME: " "LENGTH: "
. . .
3010 LET A=PEEK 16673+255+PEEK 1
6674
3020 IF A=16867 THEN GOTO 3050
3030 FOR A=16867 TO A+3 STEP 3
3040 PRINT TAB 2, CHR$(PEEK A);TAB
15;PEEK (A+2)
3050 NEXT A
3060 PRINT
3070 RETURN
  
```

USING THE excellent 48K Spectrum Speaks article in the June 1983 edition of *Your Computer*, it is possible to make an actual speech processor on a 16K ZX-81.

This program uses a "ZX-81isation" of that routine as its basis. Manipulation of the data is, however, made far easier.

The sounds can be stored and retrieved so that it is possible to construct whole sentences phonetically by joining together the stored sounds. 16K RAM is very limiting for the amount of data necessary to make useful speed possible, but the program uses it to its best possible advantage.

To enter the program first set RAMtop to 19712 in the usual way by:

```

POKE 16389,77
NEW
  
```

Next type in the hexadecimal loader program — listing 1 — and enter the machine code. When this is complete delete the loader program line-by-line and enter listing 2.

I suggest you now save it several times in case the machine code crashes when executed. A single error will generally cause a complete system reset, deleting everything, including any data above RAMtop.

Set up tape recorder

The next thing to do is to set up your tape recorder and ZX-81 as in figure 1. This works on the principle that almost all portable tape recorders have a monitor function during recording. This means that what is being recorded through the microphone can be put to an external loudspeaker or, in this case, to a

computer. If you have no separate microphone but your tape recorder has a built-in one, then use that.

Set up the equipment, insert a fairly long blank tape — or one that can be overwritten — and start recording. Alternatively, you can play a recorded tape into the computer directly, without speaking, at about 1/4 times normal loading volume.

Set to Fast mode. Type Run and you will get a prompt. Decide what to say into the machine first, press Newline, and say it. If you make a mistake or over-run the time limit, hold down T when the prompt reappears. When it reappears for a second time it is ready to go again. If you have said the word correctly, just press Newline. The TV screen

(continued on next page)

(continued from previous page)

should then show a black screen with small white lines, which are the speech. If not, no sound is reaching the computer, in which case, check everything and rerun by pressing T.

Assuming the lines are there, disconnect the equipment and reconnect as in figure 2. An external loudspeaker is usually only necessary with tape recorders with built-in microphones. If Record is again actuated then the voice — or other sound — should be heard. If not, you have equipment problems.

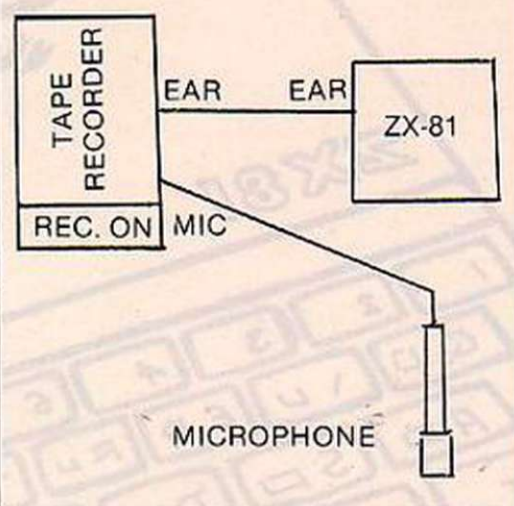
Once this stage is reached, one can move on to the more interesting aspects of the program. The complete sound input can be divided into 24 parts and they can be used singly or in groups, for hearing, storing and retrieving.

Press 1. You will be asked for a start-part — 1 to 24 inclusive is allowed. The end-part is similar but must be more than or equal to the start-part. If the end is the same then only that one part is output. Narrow down the parts, by inputting smaller and smaller sections of the sound, until you only hear the sound you wish to store, e.g., the B in Ball. Consonants are usually two parts long and vowels four parts long. If in doubt make consonants longer and vowels shorter.

To store a sound press S. You should input the limits you found to be the best and give it a single letter name. If storing a sound like P at the end of a word — as in help — store only the actual noise and not the silence which precedes it, as this can be added later and is a waste of valuable memory. To delete a stored phoneme at any time, press D.

When you have stored all the sounds you want from a particular word in memory, press T to input another word — to get more sounds

Figure 1. IN.



from — or, alternatively, press V to synthesize some speech.

The string input should consist of sets of named phonemes to make the words up. Separate the words by spaces — to generate the sound and to make a long delay — and you can use the numbers 1 to 9 to make short, timed delays at any point.

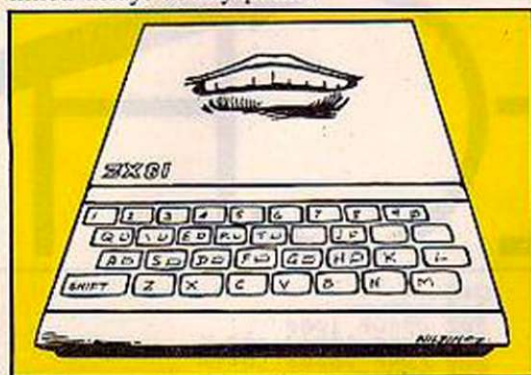
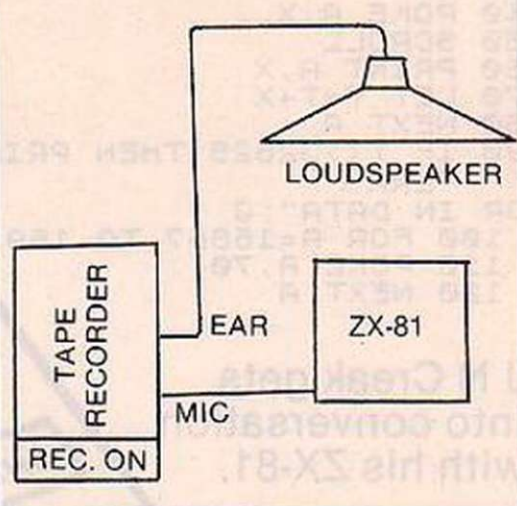


Figure 2. OUT.



Example answers to the synthesis input:

"FLS SWIM OICLIF" — 'eels swim quickly'

"HW NW BRWN CW" — 'how now brown cow'

"TEL MF HF TIM PLFZ" — 'tell me the time please'

"CELIP IS SLJM1F" — 'kelp is slimy'

Note the repetition of sounds to save

memory, the use of E and F as soft and hard E, and the use of 1 as a short delay. If a word overruns the memory a tone is generated.

From these basic principles large, complex words and phrases can be synthesized, within the confines of the memory. For example, using the fact that A, B, C, D etc. end in "ee", it can even say a large part of the alphabet, if correctly programmed.

This program does all it can with the RAM available, but is still very limited. Nevertheless, it gives a good demonstration of what can be done on a small microcomputer.

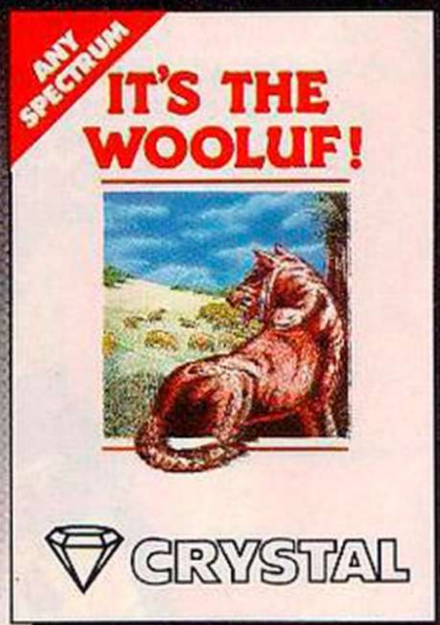
Machine code.

16514	03	0	104	0	0	16580	0	1	200	207	01
16519	210	2054	2054	205	205	16584	03	00	00	10	00
16524	203	203	2034	203	203	16589	207	00	00	0	00
16529	16	244	200	14	00	16594	0007	00	00	00	207
16534	104	204	100	00	00	16599	0007	100	207	00	00
16539	201	03	0	104	0	16714	03	00	07	200	71
16544	0	03	70	400	4	16719	14	0	100	40	0
16549	00	03	011	00	0	16724	27	20	07	00	0
16554	0	2010	204	00	0	16729	007	176	07	00	00
16559	16	2040	200	00	00	16734	00	001	17	0	00
16564	104	204	100	00	00	16739	00	0	00	00	207
16569	201	40	100	0	1	16744	00	0	100	200	007
16574	0	0	0	17	0	16749	00	0	100	200	201
16579	104	00	70	100	00	16754	40	0	10	200	00
16584	104	00	00	100	00	16759	00	70	100	40	00
16589	00	00	00	00	00	16764	200	40	00	00	107
16594	04	00	100	00	10	16769	00	0	00	210	17
16599	100	0	0	04	0	16774	0	0	0	0	4
16604	0	0	0	4	0	16779	00	0007	00	0	00
16609	0	40	0	0	10	16784	00	00	00	70	00
16614	240	01	00	204	0	16789	00	00	140	107	71
16619	24	17	00	200	00	16794	107	00	00	00	07
16624	20	04	00	40	10	16799	14	0	00	107	00
16629	214	00	71	14	0	16804	170	10	00	00	00
16634	11	00	107	10	04	16809	100	00	40	70	04
16639	0	007	170	00	00	16814	100	00	00	27	041
16644	100	00	00	00	0	16819	107	00	00	0	0
16649	100	70	100	40	7	16824	0	00	007	170	007
16654	00	00	00	10	047	16829	00	00	00	200	100
16659	200	01	00	00	70	16834	10	00	140	10	100
16664	14	0	40	100	40	16839	10	10	240	00	70
16669	0	007	170	00	00	16844	10	4	001	107	007
16674	100	0	0	0	007	16849	00	110	04	00	00
16679	01	00	71	0	00	16854	00	00	70	00	00
16684	00	100	00	100	100	16859	00	140	00	00	00
16689	00	100	00	100	100	16864	00	1	001	00	00

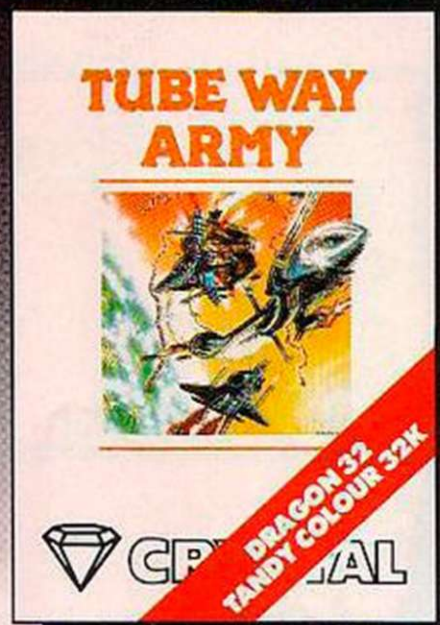
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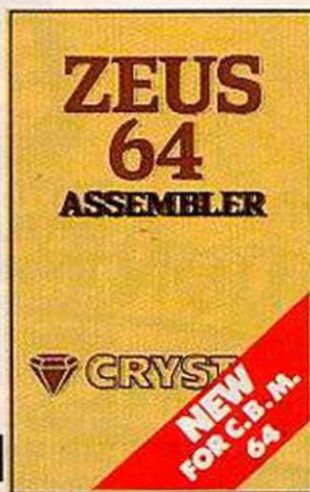
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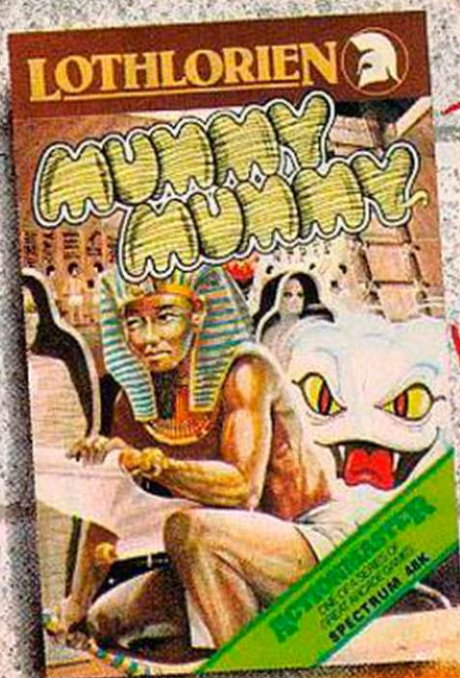
NEW

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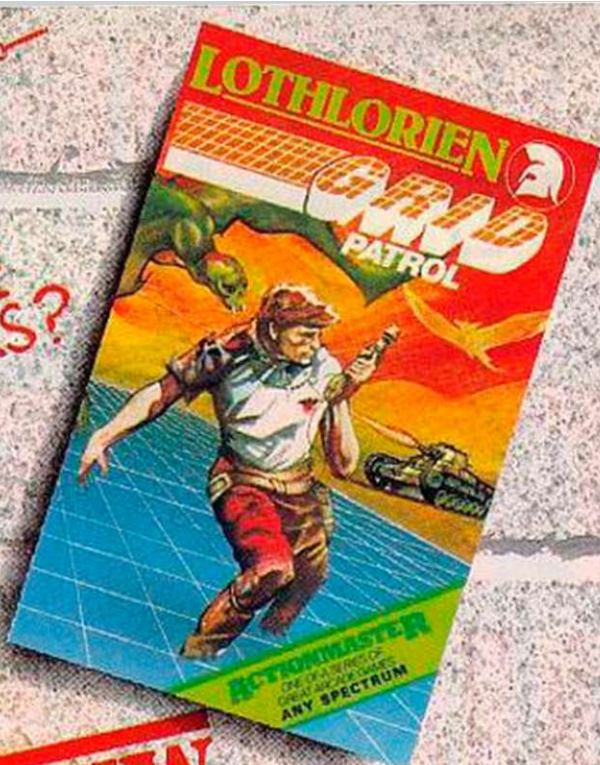
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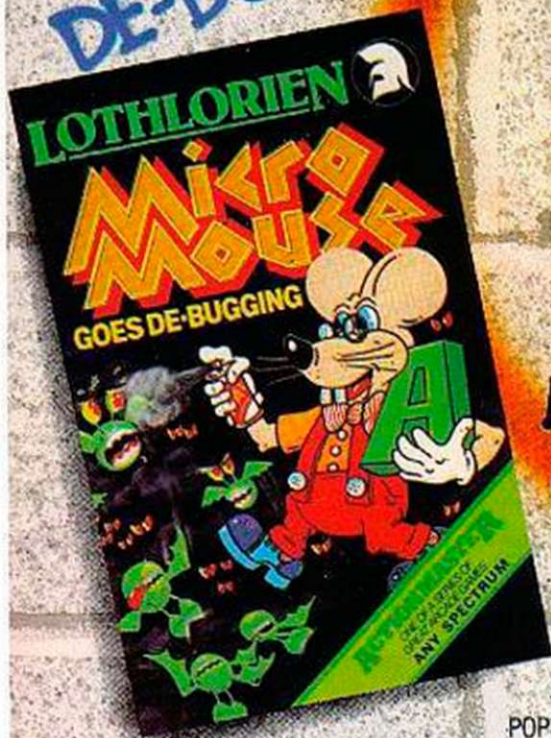
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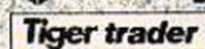
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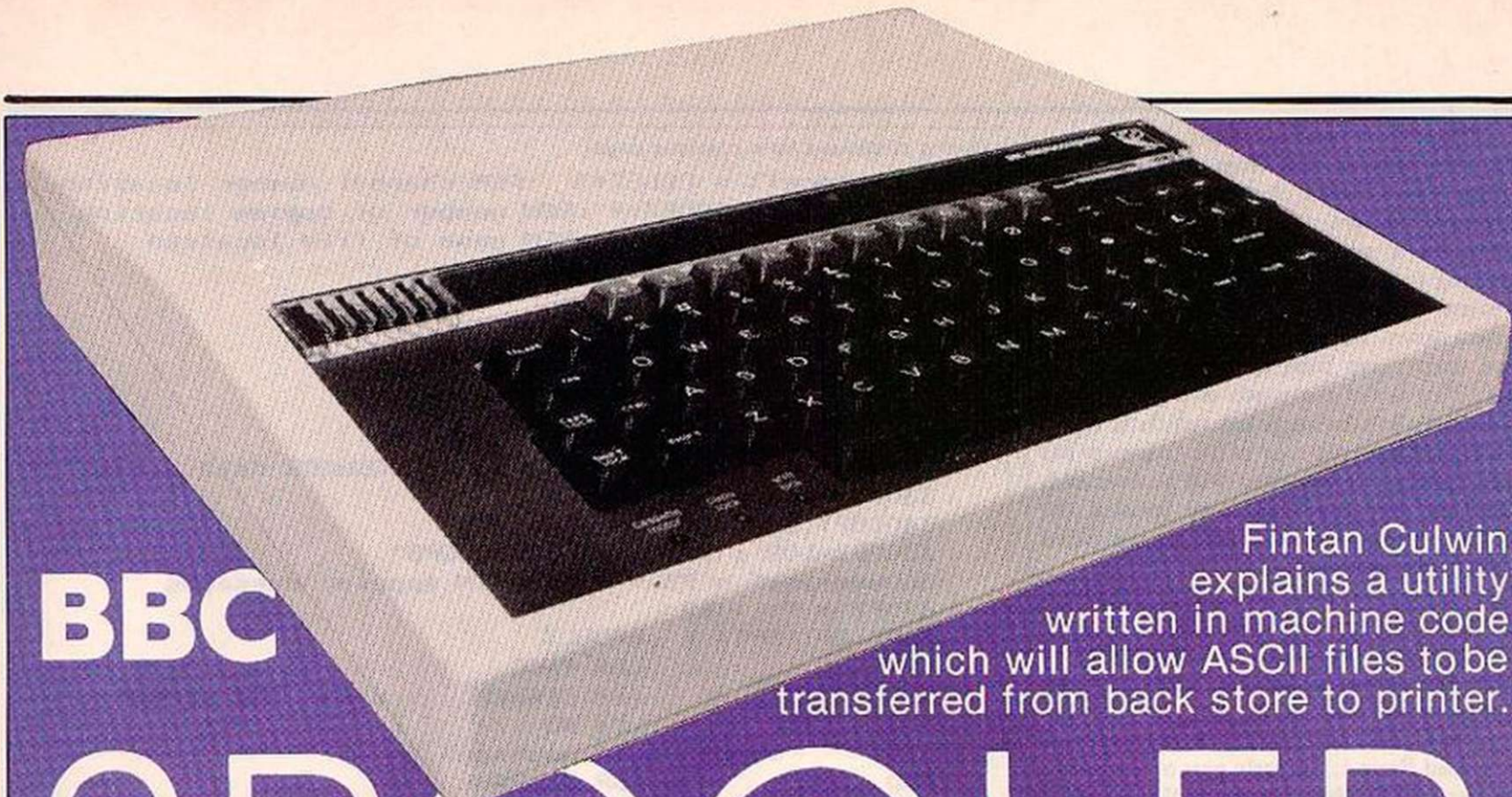
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BBC

Fintan Culwin explains a utility written in machine code which will allow ASCII files to be transferred from back store to printer.

SPOOLER

PROFESSIONAL MICROS and dedicated word processors have the ability to print a document "in the background", while the machine is actually being used for some other activity. I have always regarded the BBC as a professional machine and have produced this utility which allows ASCII files to be transferred from backing store to printer without causing too many problems for the machine's user.

The routine is written in machine code and assembles into just 253 bytes of memory, allowing it to be fitted into the cassette filing system's reserved page (&OD), or any extra page of memory for the disc system. The code is non-relocatable and will have to be reassembled if its location is to be moved. The routine has been written to Acorn's published standards for adding utilities and should cause no problems for other such systems. Unfortunately it appears to be incompatible with Wordwise. Possibly this is because Wordwise

redirects screen output in an unusual way.

Once installed in memory the routine is activated by a call to its load address plus hex 1A — &D1C in the page &OD version. It can also be installed on disc and accessed with a *Spool command — see your disc manual. The routine will clear the screen announce itself and await input of the file name and the number of copies.

The spooler will only cope with ASCII files. That is Basic listings which have been Execed — see user guide page 402 — or text files which have been saved in a formatted state as in Wordwise option 8.

Non-user-friendly

In order to fit the routine into one page of memory some degree of user-friendliness has been sacrificed. The number of copies to be spooled and the name of the file to be spooled have to be given in one command. The first character is interpreted as the number of

copies, and the remaining characters up to a maximum of 10 as the filename. The one character determining the number of copies is interpreted by subtracting &30 from its ASCII code. Conveniently this gives one copy for the character "1", two copies for "2" etc. If more than nine copies are required then the alphabetic characters

;; <=>?@ABC . . .

onwards have to be used. Not friendly or convenient to use but it did save a few bytes.

For tape users the cassette relay will become active as the CFS — cassette filing system — looks to open the file on the tape; this could take some time and would require the tape to be rewound after each copy of the document had been spooled. For disc users, the file — if it exists — will be opened; otherwise the Spool Error message will be output to the printer.

Once the file has been opened, one

(continued on next page)

```

100*FX 5,2
110*FX 8,5
120WRCHV = &20E
130DSWORD = &FFF1
140DSFIND = &FFCE
150DSBGET = &FFD7
160DSWRCH = &FFEE
170DSBYTE = &FFF4 :REM operating system locations
180form_feed% = &0C
190CODE% = &D02 :REM address of machine code
200temp% = CODE%
210STOREVECT = CODE%+1 :REM new vector location

```

(listing continued on next page)

(continued from previous page)

character will be sent from the file to the printer every time a character is sent to the screen. If you are not going to be using the micro for a period of time and want the spooling to continue, put in a dummy list or preview command. Spooling will slow the system down. This is especially noticeable for tape users every time an inter-block gap is met. This is not too much of a problem, as whilst spooling the micro can run faster than I can type. After each copy of the document has been spooled, a form-feed will be executed. After the last copy has been spooled the routine will disable itself and can be called again in the same way.

For those who have no wish to delve into the mysteries of the operating system or assembler code then all that needs to be noted about the listing is that the location of the routine is determined by the value of the variable Code% in line 190 of the listing. I have used Basic 1, the early part of the listing can be simplified by using the EQU assembler commands available in Basic2.

After the spooler has been installed by running the assembler program the utility can be saved directly by using the command: 6*SAVE"SPOOL" PPPP+FF (PPPP+&27) where PPPP is the hex page address of the code, +FF gives the length of the code and (PPPP+&27) is the execution address hex 27 bytes higher than the value of Code%. When assembling into page &0D the first two bytes should be left unused as this area is polled by O.S. 1.2 and the Econet filing system. It is usually safe to start at the beginning of a page in other locations.

Vectored through RAM

The most obvious method to implement such a system would be to use the vectored interrupts of the BBC operating system. The spooler would then act totally independently of the front end of the system. For example, every second tenth of a second or so — which is no good for this application, as the interrupt routine must return within one to two milliseconds. When dealing with peripheral devices, even discs, this time limit cannot be guaranteed and other methods have to be used.

The other method of diverting the micro from its usual path is to use the vectored routines; the two most obvious are the Read character vector and the Write character vector. These are not time critical, and will cope with the long delays of the tape system. Every time the keyboard is read or a character is output to the screen the operating system and any other system which has been correctly written uses OSWRCH for writing and OSRDCH for reading.

The obvious place to put the routine would be via OSRDCH. But this would only send characters to the printer every time a key is pressed — which is slower than if it were every time a character was sent to the screen. The problem with using OSWRCH is that the routine itself should use OSWRCH to send characters to the printer.

Both these routines are vectored through the machine's RAM space, allowing them to be changed. If they existed solely in ROM then

(continued on page 133)

(listing continued from previous page)

```
220channel% = CODE%+3 :REM channel number location
230count% = CODE%+4 :REM number of copies location
240name% = CODE%+5 :REM name of file location
250FOR OPT% = 0 TO 3 STEP 2
260P% = CODE%
270[OPT OPT% : .data% : ]
280?P% = (count% MOD 256)
290P%?1 = (count% DIV 256)
300P%?2 = &0B
310P%?3 = &20
320P%?4 = &7E :REM set up OSWORD data block
330P%=P%+16
340[OPT OPT% : .emess% : ]
350?P%=&0D : $P% = "RORRE LOOPS"
360message% = P% + 5 :REM spooler messages
370P% = P% + 12
380[ OPT OPT% : .SPOOL%
390 LDA #&0C
400 JSR OSWRCH \ clear the screen
410 LDX #5
420 .mout% LDA message%,X
430 JSR OSWRCH
440 DEX
450 BPL mout% \ output prompt
460 LDY #(CODE% DIV 256)
470 LDX #(CODE% MOD 256)
480 LDA #0
490 JSR OSWORD \ input spool command
500 LDA count%
510 SEC
520 SBC #&30
530 STA count% \ correct count to absolute
540 LDA #0
550 STA channel% \ clear channel number
560 JSR store_vect% \ store original vectors and activate spooler
570 RTS \ end of spooler initialisation
580 .entry% PHA \ entry to main routine
590 TXA
600 PHA
610 TYA
620 PHA \ stack processor status
630 JSR reset% \ deactivate spooler
640 LDY channel%
650 BNE main% \ branch if channel active
660 LDX count%
670 BEQ alt_exit% \ branch if finished
680 DEX
690 STX count% \ decrement count
700 LDY #(name% DIV 256)
710 LDX #(name% MOD 256)
720 LDA #&C0
730 JSR OSFIND \ attempt to open file
740 STA channel% \ store channel number
750 CMP #0
760 BEQ error% \ branch if file unopenable
770 .exit% JSR setvec% \ exit with spooler active
780 .alt_exit% PLA \ exit with spooler inactive
790 TAY
800 PLA
```

(listing continued on page 133)

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(continued from page 130)

any changes would be impossible. By changing the address given in the RAM part the routine can be redirected to the spool routine before being allowed to continue with its original task.

The code itself is in two parts. I will not give a complete description as the code is annotated. It is in two sections. The first part initialises the system by clearing the screen and then outputting the message Spool. It then uses Osword to input the command into its own memory space. The number of copies now stored at location Count% is converted from ASCII to absolute. The current channel number is set to zero, the vector stored and the vector set.

The OSWRCH routine vectors through location &20E/&20F usually labelled as WRCHV. The contents of this location are copied to a location labelled Storevect. WRCHV can now be changed to point to our own routine labelled by the variable Entry%. With the vector set OSWRCH will indirect to our own routine which will terminate with a jump to the address stored in Storevect.

The initialising routine now returns control to the host system. The next time OSWRCH is used the actual routine which performs the spooling will be activated.

This routine commences by storing the accumulator, X and Y registers on the stack, and terminates by unstacking the information and jumping to the main OSWRCH routine via Storevect. In the interim OSWRCH will have to be used to output characters to the printer. If the vector was still active then it would reenter the spool routine. A recursive situation which would never terminate!. To cope with this the vector is restored after the registers have been stacked and in most cases is set before exit. If the spooling is finished or an error has been detected then the exit is made without setting the vector, leaving the spooler inoperative.

To perform the spooling the routine first establishes if a file is active by examining the current channel number. Zero indicates that a file is not active and any other number should indicate an active file. If no file is active then one is opened, using Osfiel the channel number stored and the document count decremented. If the counter reaches zero then all copies have been spooled and the vector is left unset on exit.

If a file is active then the routine labelled Main% will obtain the next character using OSBGET and send it directly to the printer. Error conditions can occur if the file cannot be opened or a character cannot be obtained from the file these are dealt with in the routine labelled Error%.

The end of file is determined by OSBGET returning with the accumulator containing &FE and the carry bit set. This causes Channel% to be set to zero indicating no file is open and a form feed is sent to the printer.

Errors detected by the spooler will result in the message "Spool Error" being printed by the printer and a form-feed. The spool routine is exited without the vector being set so the spooler is left inactive. Operating system errors are met with the vector reset also and will display an operating system error message.

(listing continued from page 130)

```
810 TAX
820 PLA \ unstack processor
status
830 JMP (STOREVECT) \ jump to usual OS
WRCH routine
840 .main% JSR OSBGET
850 STA temp% \ get and store one
byte
860 BCS qerror% \ carry set indicate
s error
870 JSR print_on%
880 LDA temp%
890 JSR OSWRCH \ send one byte to p
rinter
900 JSR print_off%
910 JMP exit% \ exit with vector s
et
920 .qerror% CMP #&FE
930 BNE error% \ branch if not EOF
940 JSR print_on%
950 LDA #form_feed%
960 JSR OSWRCH \ print form feed
970 JSR print_off%
980 LDY channel%
990 LDA #0
1000 STA channel% \ clear channel numb
er
1010 JSR OSFIND \ close file
1020 JMP exit%
1030 .error% JSR print_on%
1040 LDA #&OD
1050 JSR OSWRCH \ print channel numb
er
1060 LDX #&OC
1070 .emout% JSR print_on%
1080 LDA emess%,X
1090 JSR OSWRCH
1100 DEX
1110 BPL emout%
1120 JSR print_off% \ print error
message
1130 JMP alt_exit%
1140 .print_on% LDA #02
1150 JSR OSWRCH
1160 LDA #01
1170 JSR OSWRCH
1180 RTS \ send next OSWRCH c
all to printer
1190 .print_off% LDA #03
1200 JSR OSWRCH
1210 RTS \ wally trap
1220 .store_vect% LDA WRCHV
1230 STA STOREVECT
1240 LDA WRCHV+1
1250 STA STOREVECT+1 \ store original v
ector and
1251 \ continue by sett
ing vector
1260 .setvec% LDA #(entry% MOD 256)
1270 STA WRCHV
1280 LDA #(entry% DIV 256)
1290 STA WRCHV+1
1300 RTS \ set vector for spooler
1310 .reset% LDA STOREVECT
1320 STA WRCHV
1330 LDA STOREVECT+1
1340 STA WRCHV+1
1350 RTS \ restore original
1360 J
1370 NEXT
1380 STOP
1390 CALL SPOOL%
1400 STOP
```

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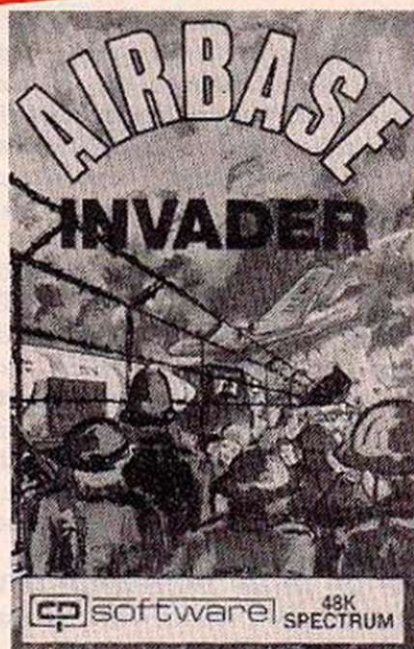
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| 4. Chr\$ Scramble | 27. Uni-Note Sound-Gen | 50. Program to Upper Case |
| 5. Super-Renumber | 28. Dual Note Sound Gen | 51. Program to Lower Case |
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| 7. Dec -> Hex Converter | 30. Multi-BEEP Simulator | 53. Clarify |
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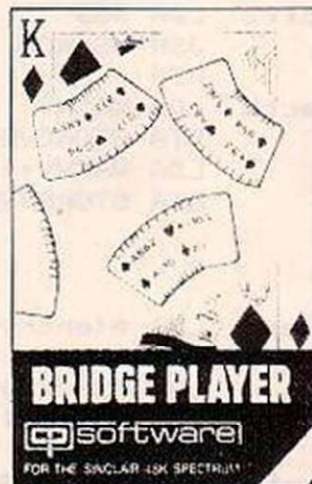
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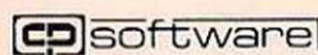


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MICRODRIVE

FILE

MY PLANS FOR LAST month's Microdrive File were thrown into confusion when I became aware of another version of the Microdrive ROM.

At the time, it was assumed to be the finished ROM which would supersede the EPROM of the early Microdrives and remove some of the bugs. As you can imagine, I was not too keen to continue with the possibility of changes to calls in the programs depending upon which version of the Microdrive the reader had.

Fortunately in one way, the new ROM was in fact, meant for an entirely new product, the QL. This in itself has raised a new set of difficulties, the problem now becomes one of non-interchangeability between cartridges

'formatted' and 'written to' by the different ROM operating systems.

Do we just ignore the problem and accept that the files, data programs etc. can not be mixed or do we take the minimal step of at least writing the new commands in such a way as to enable programs to be networked?

This means that the rather long winded Microdrive save routines could be changed from:

SAVE *'m';1;'file-name'

to either,

* 1S'file-name'

or

SAVE MDV1-file-name-1

for the QL the MDV1 is not necessary, but if left out the command would refer to a cassette

Kathleen Peel with more on Sinclair's Microdrive.

save on the Spectrum.

The use of the later style of command completely negates the reason for writing new commands in the first place, i.e., to simplify

(continued on next page)

Figure 1. "Free memory" program listing.

```

! PRINT AT 10,7;"REMOVE CARTRIDGE": P
AUSE 15: LET a$=INKEY$: IF INKEY$="" THE
N GO TO 1
2 CLEAR 65535: GO SUB 9931
100 FOR a=(PEEK 23735+256*PEEK 23736)-5
TO 65535: PRINT a,PEEK a: NEXT a: STOP
500 ERASE "m";1;"uprog": SAVE *"m";1;"u
prog": CAT 1: STOP
9931 DEF FN t(s)=PEEK s+256*PEEK (s+1):
LET s=23730: LET nt=FN t(s)-80: CLEAR nt
: RESTORE 9934: LET s=23730: LET nt=FN t
(s): LET rt=nt+80: LET h=INT (nt/256): L
ET l=nt-256*h: IF rt<=FN t(s+2)-2 THEN
IF PEEK (rt+2)=42 AND PEEK (rt+3)=42 THE
N POKE (rt+10),l: POKE (rt+11),h: GO TO
9933
9932 POKE 23736,h: POKE 23735,l+4
9933 POKE (s+1),h: POKE s,l: FOR a=1 TO
80: READ d: POKE (nt+a),d: NEXT a: RETUR
N
9934 DATA 42,42,0,215,24,0,254,245,194,2
40,1,215,32,0,254,42,40,2,231,0,215,32,0
,205,183,5
9936 DATA 215,26,31,42,178,92,237,66,68,
77,215,43,45,215,227,45,195,193,5
9937 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
9938 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
9995 CLOSE #3: FORMAT "t";600: OPEN #3;"
t": RETURN

```

Figure 2.

**NOP	42 42 0	Routine Marker	DEF W	0	Non sense in Basic
CALL NN	215 24 0	Get Char routine old ROM	CALL NN	215 32 0	Check last expression
CP 'PRINT'	254 245	Is char 'PRINT'	CALL NN	205 183 5	SYNTAX CHK return
dP NZ ERR	194 240 1	No Jump original vector address.	CALL NN	215 26 31	Bytes in Use in BC
CALL NN	215 32 0	call next char routine of ROM	LD HL (RAMTOP)	42 178 92	Get RAMTOP
CP '**	254 42	Is char '**	SBC HL BC	237 66	Get Spare in HL then into BC
JR Z DIS	40 2	Jump	LD 8 H	68	
RST 32	231	Call new ROM Error Routine	LD C L	77	
			CALL STK-BC	215 43 45	Place on stack
			CALL PRNT-FP	215 227 45	PRINT
			JP END	195 183 5	EXIT OK message.

(continued from previous page)
data entry.

In writing this month's article, it has become apparent that certain precautions need to be taken when writing machine code routines for use with the Microdrives.

The problem lies in the fact that it is possible to erase all your hard work by a couple of accidental Pokes. I have therefore amended the Basic program to include a warning to remind you to remove the microdrive cartridge before testing a new routine.

This month I have produced a very simple "memory free" command that will enable me to explain two of the problems encountered in producing this type of command as opposed to the graphics command of the previous article.

Figure 1 is the Basic program listing and figure 2 the annotated listing. I have chosen the command

PRINT *

to provide the 'memory left function'.

The items of note are as follows:

The last jump used in the run time section

is the new ROM O'K error message. Without this, all sorts of messages can be printed which are irrelevant when the command is used in the direct mode.

Changing the format to

*f

will provide a value of free memory, but it is printed in the last used print position, which if the command is typed in directly, is the input area and so it is overwritten by the next system message.

One way round this is to use the command in a line i.e.

10 PRINT AT 0,0, '*f:STOP

As you will have noticed, this part of the Microdrive File is rather short, so I will add a couple of points of more general interest.

I have lately seen a number of solutions to the monitor problem of the Spectrum. These generally involve making the Vid link on the PCB near the modulator, invalidating the guarantee.

One of the side effects of making the link on the Spectrums I have is a reduction in output level through the normal TV outlet, this

generally shows up as loss of colour on the more sensitive TV's.

An alternative solution you might like to try is the use of the 0V and Y connections — Page 180 of the manual. These work well on my monochrome monitor and a MK2 Spectrum and do not affect the normal TV output. The connection can be made on a rear expansion plug which does not entail opening the Spectrum and invalidating the guarantee.

All program development is done on the monitor and the program run on a normal TV to check colour operation. It's a lot easier on the eyes without ghosting, shimmer and dot crawl.

Interface 2 does not take the video connections though. This means that to get video quality from the cartridge software, it is necessary to use a double ended connector between the Interface and the computer, further increasing the likelihood of the dreaded wobbles.

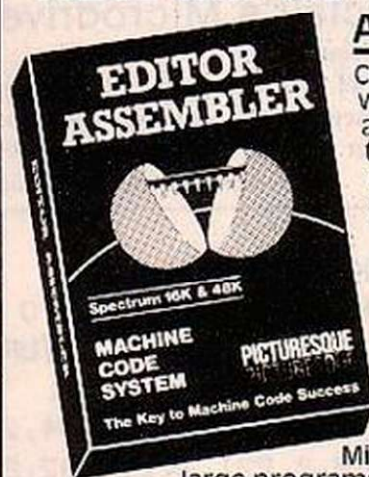
The Microdrive wallet is expected to be available sometime in the summer, at present there is no indication of price. ■

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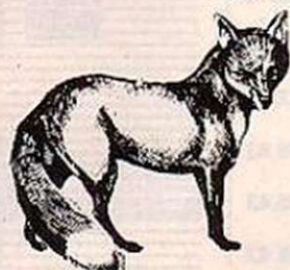
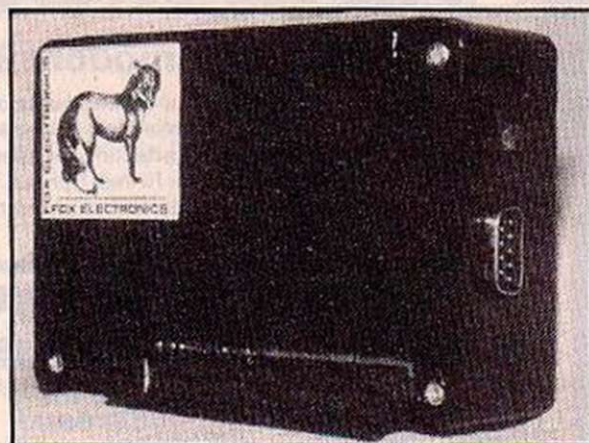
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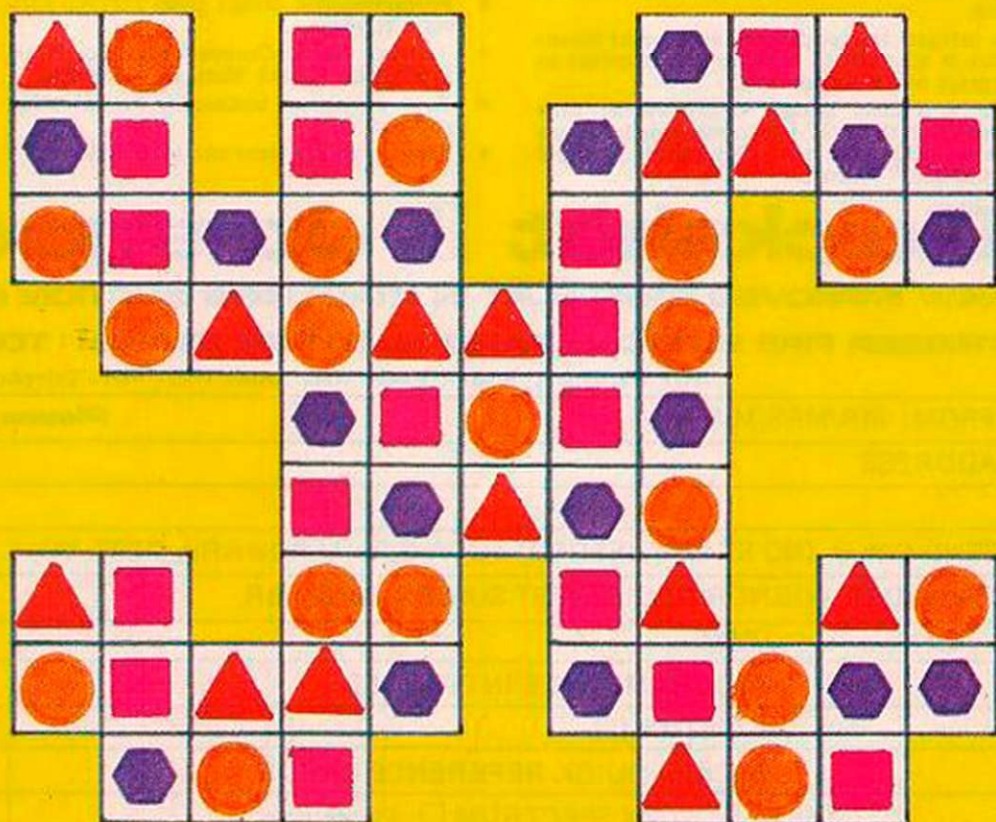
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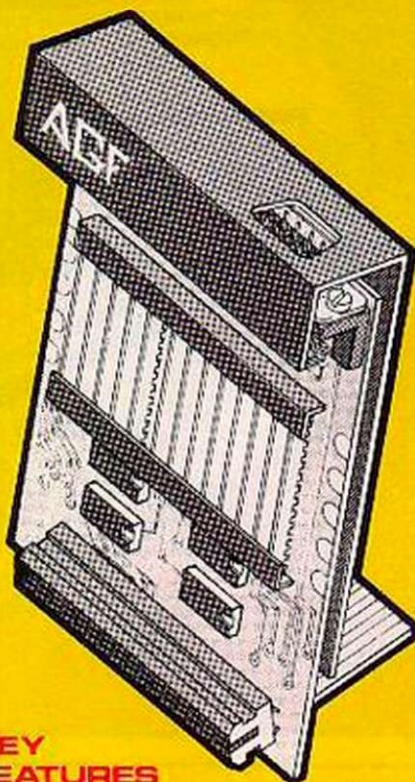
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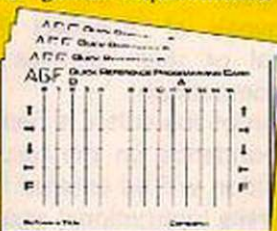
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(continued from previous page)

very primitive and could be improved enormously by using some of the procedures listed in the Heartstop series. You have to enter .E. to escape from the editing routines when the program asks you for a new entry — lines 2520 and 2530.

The following Oric printer commands are used in this program:

VDU 1,17 sends a control character to make the printer output text. The manual incorrectly says that the number of characters per line is fixed by an internal switch in the printer. The switch is wired permanently inside the case and the number of characters per line is altered by the S code in graphics mode. The setting you establish in graphics mode remains in force on return to text mode.

VDU 1,18 sends the control character 18 decimal to the printer to switch it into graphics mode.

C — Change the pen colour. The four colours are designated 0-3; 0 = Black; 1 = Blue; 2 = Green; 3 = Red when the pens are correctly installed.

D — Draw a line from the present position to another absolute set of XY co-ordinates.

H — Move the plotting head to the present Home position.

I — Set the present position of the plotting head as the Home position — in other words initialise the plotter.

J — Draw a line from the present position to another position which is calculated by adding or subtracting the co-ordinates following the command to the present position.

M — Move to the absolute position set by the co-ordinates following the command.

0	John's H	260	320	..
1	Knight's H	239	304	..
2	Grant's H	230	297	..
3	Cottage	225	290	..
4	T	225	301	..
5	P	320	326	f
6	P	278	323	dg
7	P	235	312	d
8	Pine trees	226	275	d
9	fence	206	297	f
10	fence	164	202	f
11	fence	145	36	f
12	tree	130	30	f
13	fence	110	21	f
14	fence	85	1	f
15	yew	189	323	g
16	tree	162	325	g
17	Graves	136	343	g
18		135	332	o
19		126	346	r
20	logs	150	281	rg
21	Hughes' Farm	183	239	..
22	Black Barn	170	210	..
23	Rectory	85	345	..
24	post	190	307	..
25		85	1	r
26		320	326	r

Figure 2. Current items in the bearing array.

P — In graphics mode, print the text following the command.

S — Set the size of the letters printed using the P command. S0 is very small — 80 characters per line.

The map parameters may change if you use a different plotter, the baseline found in line 1430 may be much larger if you are using an A4 flat-bed plotter. PROCplot, PROCnorth and PROCmakelinks all use commands that are specific to the Oric printer/plotter. However the important procedure is PROCxy and this is plotter-independent.

PROCxy takes the two bearings for each object from the OB\$ array and turns the strings into real numbers — lines 1870 and 1880. The bearing of Base 1 from Base 2 has

been stored previously in NDirection and this is subtracted to bring the bearings to a correct magnetic north orientation.

Lines 1890 and 1900 use the bearings and the length of the baseline to calculate the X and Y co-ordinates of each object relative to Base 1. These figures are then converted into absolute X and Y co-ordinates by Lines 1910 and 1920. Finally, the results are stored in two further slots in the array in the same lines.

Line 1780 takes the absolute XY co-ordinates and outputs them to the Oric plotter. Line 1790 marks the position with a + and prints the name of the object immediately afterwards.

The baseline lies across the map because angles near the line between the two bases are difficult to calculate and tend to produce inaccurate results. A very small alteration in the bearing makes a very large difference in the apparent position of the object.

The scale of the map will depend on the distance from the base stations of the objects that you measure. The field shown in figure 3 is about 300 yards across the long axis and it was plotted with the scale set to 0.9.

If you attempt to set the scale so that the baseline is longer than the X axis of the map the program will clear the screen and ask you to input the scale again — lines 1410 and 1420.

When you set up the Chainlinks that you want before plotting a map, you are asked for the link, which must be the same character as you have entered into the array, and then the colour which is to be used for the plot. You should enter 0, 1, 2, or 3 to select the colour that you want.

Figure 1.

```

10
20
30
40 REM MAP PLOTTING PROGRAM - 2
50 REM STARTED 11 MARCH 1984
60
70 DIM OB$(5,50): DIM HELP$(10)
80 DIM LINK$(9,1)
90 P=20: L=1: NN=0: NDirection = 0
100 XN = 0: YN = 0: NORTH = 0
110 NORTHLINE = 75: LS1 = 0: LS2 = 0
120 BASELINE = 0: BASE = 300
130 A = 0: B = 0: X = 0: Y = 0
140
150 *KEY 9 "LISTO 7 ;M MODE 7 ;M IN LIST ;M"
160 *KEY 0 "RUN ;M"
170 *KEY 2 "VDU 2 ;M #FX6,0 ;M"
180 *KEY 3 "VDU 3 ;M"
190 HELP$(0) = "A Add bearings to the array"
200 HELP$(1) = "C Clear the array for a fresh start"
210 HELP$(2) = "E Edit an item in the array"
220 HELP$(3) = "L List the items in the array"
230 HELP$(4) = "F Plot a map"
240 HELP$(5) = "D Quit MAP PLOTTER to BASIC"
250 HELP$(6) = "R Read bearings array from tape"
260 HELP$(7) = "? HELP - Display this screen"
270
280 PROCinitialise
290
300 REPEAT
310 CLS
320 PRINT TAB(7,20): "MAP PLOTTING PROGRAM"
330 PRINT TAB(0,22): "Press ? for help or enter command"
340 REPEAT
350 K$ = INKEY$(10)
360 UNTIL K$ <> ""
370 IF K$ = "A" THEN PROCadd
380 IF K$ = "C" THEN PROCclear
390 IF K$ = "E" THEN PROCeditarray
400 IF K$ = "L" THEN PROClist
410 IF K$ = "P" THEN PROCplotmap
420 IF K$ = "?" THEN PROChelp
430 IF K$ = "R" THEN PROCtestplot
440 IF K$ = "R" THEN PROCtaperead
450 UNTIL K$ = "B"
460 CLS
470 END
480
490 DEF PROCinitialise
500 FOR Z = 0 TO 5
510 FOR ZZ = 0 TO 50
520 OB$(Z,ZZ) = " "
530 NEXT ZZ: NEXT Z
540 N=0
550 ENDPROC
560
570 DEF PROCtypein
580 CLS
590 ENDF = FALSE
600 PRINT "Type in object name and bearings"
610 PRINT "Enter 'Q' or 'q' to finish entering data"
620 Y$ = INKEY$(500)
630 REPEAT
640 CLS
650 PRINT "Object ";N+1;
660 INPUT " " OB$(0,N)
670 IF OB$(0,N) = "Q" THEN ENDF = TRUE: GOTO 770
680 IF OB$(0,N) = "q" THEN ENDF = TRUE: GOTO 770
690 IF OB$(0,N) = "" THEN OB$(0,N) = " "
700 INPUT "Bearing 1 " OB$(1,N)
710 IF OB$(1,N) = "" THEN 700
720 INPUT "Bearing 2 " OB$(2,N)
730 IF OB$(2,N) = "" THEN 720
740 INPUT "Chainlink " OB$(5,N)
750 IF OB$(5,N) = "" THEN OB$(5,N) = " "
760 N=N+1
770 UNTIL N>=50 OR ENDF = TRUE
780 ENDPROC
790
800 DEF PROCadd
810 PROCtypein
820 PRINT TAB(0,10): "Save the array on tape <Y> ";
830 INPUT " " Y$
840 IF Y$ = "Y" THEN PROCtapesave ELSE ENDPROC
850 ENDPROC
860
870 DEF PROCclear
880 CLS
890 INPUT "Are you SURE you want to" "Wipe out the array
<Y> " Y$
900 IF Y$ <> "Y" THEN ENDPROC
910 PROCinitialise
920 PROCadd
930 ENDPROC

```

(continued on page 144)

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(continued from page 142)

```
940
950 DEF PROCHELP
960 CLS
970 PRINT TAB(0,5): "HELP INSTRUCTIONS"
980 PRINT: PRINT
990 FOR H= 0 TO 10
1000 PRINT HELP*(H)
1010 NEXT H
1020 Y* = INKEY*(1000)
1030 IF Y* = "?" THEN PROCHELP
1040 ENDPROC
1050
1060 DEF PROClist
1070 CLS
1080 PRINT TAB(5,10):
1090 INPUT "Display on printer <Y> " Y*
1100 IF Y* <> "Y" THEN 1130
1110 PROCprintarray
1120 ENDPROC
1130 ENDF = FALSE
1140 CLS
1150 PRINT "CURRENT ITEMS IN THE BEARINGS ARRAY"
1160 NN=0
1170 REPEAT
1180 FOR L= 2 TO P
1190 PRINT TAB(0,L) OB*(0,NN):
1200 PRINT TAB(25,L) OB*(1,NN):
1210 PRINT TAB(35,L) OB*(2,NN):
1220 IF NN = N-1 THEN ENDF = TRUE: GOTO 1260
1230 NN = NN+1
1240 NEXT L
1250 PRINT TAB(0,25): "Press any key for next page ":
1260 REPEAT
1270 Y* = INKEY*(10)
1280 UNTIL Y* <> ""
1290 CLS
1300 UNTIL ENDF = TRUE
1310 ENDPROC
1320
1330 DEF PROCplotmap
1340 PROCmapparameters
1350 PROCplot
1360 ENDPROC
1370
1380 DEF PROCmapparameters
1390 CLS
1400 PRINT TAB(0,10): "Enter scale":
1410 INPUT " " SCALE
1420 IF BASE * SCALE > 480 THEN 1370
1430 BASELINE = BASE * SCALE
```

```
1440 PRINT: INPUT LINE "Enter title " TITLE*
1450 PRINT: INPUT "Enter bearing of Base 1 from Base 2 "
NDIRECTION
1460 PRINT: INPUT "Do you want Chainlinks <Y> " Y*
1470 IF Y* = "Y" THEN PROCchainlink
1480 ENDPROC
1490
1500 DEF PROCplot
1510 VDU 15
1520 VDU 2
1530 VDU 1,18
1540 PRINT "S1"
1550 VDU 1,17
1560 PRINT
1570 PRINT TITLE*
1580 VDU 1,18
1590 PRINT "C0"
1600 PRINT "D0,-600"
1610 PRINT "I"
1620 PRINT "D479,0"
1630 PRINT "D479,600"
1640 PRINT "D0,600"
1650 PRINT "S0"
1660 PROCnorth
1670 PRINT "C2"
1680 PRINT "M";STR$(230-(BASELINE/2));",300"
1690 PRINT "P2"
1700 PRINT "M";STR$(240-(BASELINE/2));",300"
1710 PRINT "J";STR$(BASELINE);",0"
1720 PRINT "P+1"
1730 XREF = 240+(BASELINE/2)
1740 YREF = 300
1750 PRINT "C0"
1760 FOR NN = 0 TO N-1
1770 PROCxy
1780 PRINT "M";OB*(3,NN);", "OB*(4,NN)
1790 PRINT "P+";OB*(0,NN)
1800 NEXT NN
1810 PROCmakeLinks
1820 PRINT "H"
1830 VDU 3
1840 ENDPROC
1850
1860 DEF PROCxy
1870 A = EVAL(OB*(1,NN))-NDIRECTION
1880 B = EVAL(OB*(2,NN))-NDIRECTION
1890 Y = (BASELINE * SIN(RAD(A)) * SIN(RAD(B))) /
SIN(RAD(180-B-(180-A)))
1900 X = -Y * (1/TAN(RAD(A)))
1910 OB*(3,NN) = STR$(INT(XREF-X))
```

(continued on page 146)

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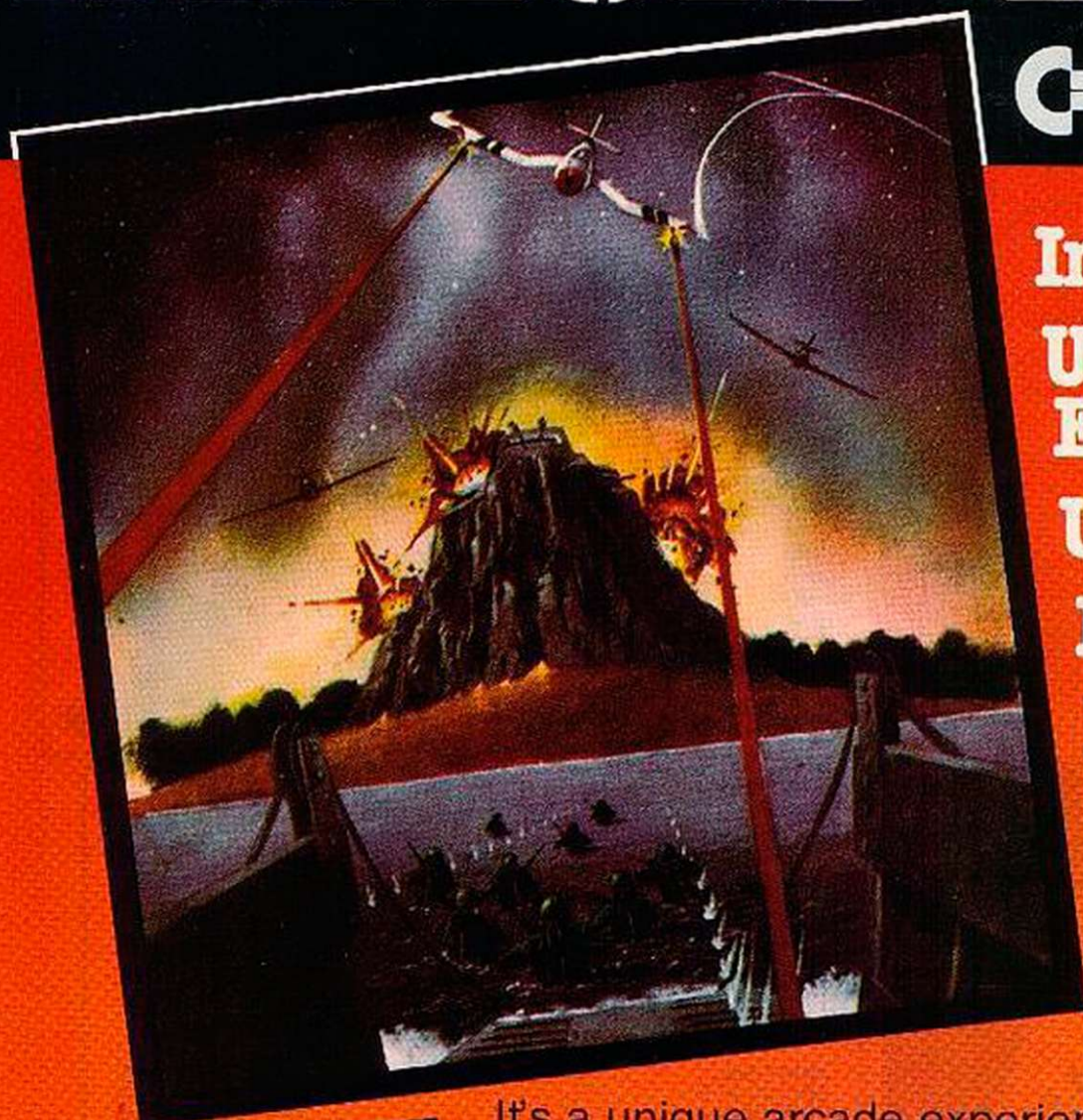
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(continued from page 144)

```

1920 DR#(1,NN) = STR$(INT(YREF-1))
1930 ENDFROC
1940
1950 DEF PROCprintarray
1960 VDU 2
1970 #FX0,0
1980 PRINT TAB(15); "CURRENT ITEMS IN THE BEARING ARRAY"
1990 PRINT STRING$(70,"-")
2000 FOR NN = 0 TO N-1
2010 PRINT NN; " ";
2020 PRINT TAB(35); OB$(0,NN);
2030 NEXT NN
2040 VDU 3
2050 ENDFROC
2060
2070 DEF PROCnorth
2080 IF SCALE >= 1.0 THEN 2100
2090 NORTH = NORTHLINE * SCALE
2100 PRINT "C3"
2110 PRINT "M"; STR$(1.5*NORTH); " "; STR$(600-(1.5*NORTH))
2120 XN = INT(NORTH * COS(RAD(NDIRECTION)))
2130 YN = INT(NORTH * SIN(RAD(NDIRECTION)))
2140 PRINT "J"; STR$(XN); " "; STR$(YN)
2150 ENDFROC
2160
2170 DEF PROCtapesave
2180 X=OPENOUT("BEARINGS")
2190 FOR J = 0 TO N
2200 FOR K = 0 TO 5
2210 PRINT#X,OB$(J,K)
2220 NEXT K
2230 NEXT J
2240 CLOSE#X
2250 ENDFROC
2260
2270 DEF PROCtaperead
2280 CLS
2290 PRINT TAB(0,10); "Start tape ... ";
2300 J = N
2310 X=OPENIN("BEARINGS")
2320 REPEAT
2330 FOR K = 0 TO 5
2340 INPUT#X,OB$(K,J)
2350 NEXT K
2360 J = J - 1
2370 UNTIL EOF#X
2380 CLOSE#X
2390 N = J - 1
2400
2410
2420 ENDFROC
2430
2440 DEF PROCeditarray
2450 REPEAT
2460 CLS
2470 PRINT TAB(0,10); "Enter the number of the
entry" "that you want to modify "
2480 INPUT " " K
2490 PRINT STR$(0),STR$(1),STR$(2),STR$(3),STR$(4),STR$(5); PRINT
PRINT OB$(0,K),OB$(1,K),OB$(2,K),OB$(3,K),OB$(4,K),OB$(5,K)
2500 PRINT: INPUT "Enter array element " J
2510 PRINT: INPUT "Type in new entry " L#
2520 IF L# <> ".E." THEN OB$(J,K) = L#
2530 UNTIL L# = ".E."
2540 ENDFROC
2550
2560
2570 DEF PROCchainlink
2580 CLS
2590 INPUT "How many links do you want " LS
2600 FOR LSI = 1 TO LS
2610 PRINT STR$(LSI); " Link " LINK$(LSI,0)
2620 INPUT " Colour <0-3>." LINK$(LSI,1)
2630 NEXT LSI
2640 PRINT: INPUT "Are these entries correct <Y> " Y#
2650 IF Y# <> "Y" THEN 2580
2660 ENDFROC
2670
2680
2690
2700
2710 DEF PROCmakelinks
2720 FOR LSI = 1 TO LS
2730 LS2 = 0
2740 Y# = LINK$(LSI,0)
2750 IF Y# = "" THEN 2780
2760 YY = INSTR(OB$(5,LS2),Y#)
2770 IF YY <> 0 THEN GOTO 2800
2780 LS2 = LS2+1
2790 IF LS2 = N THEN 2880 ELSE 2760
2800 PRINT "C"; LINK$(LSI,1)
2810 PRINT "M"; OB$(3,LS2); " "; OB$(4,LS2)
2820 REPEAT
2830 LS2 = LS2+1
2840 YY = INSTR(OB$(5,LS2),Y#)
2850 IF YY = 0 THEN 2870
2860 PRINT "D"; OB$(3,LS2); " "; OB$(4,LS2)
2870 UNTIL LS2 = N
2880 NEXT LSI
2890 ENDFROC
2900

```

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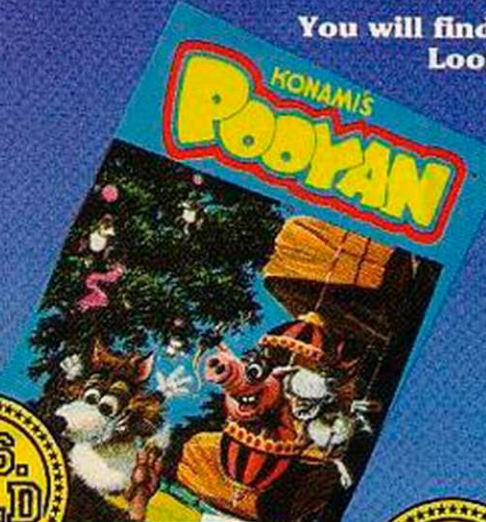
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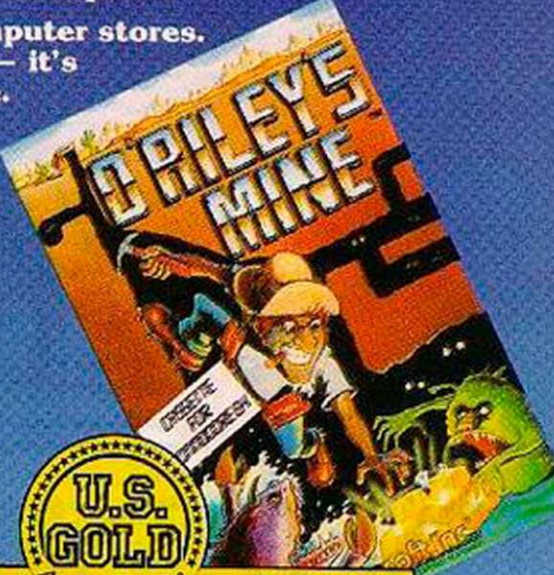
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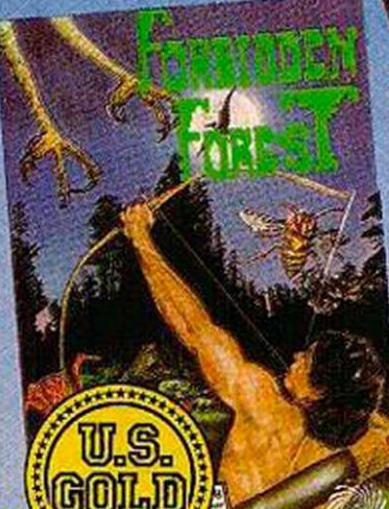
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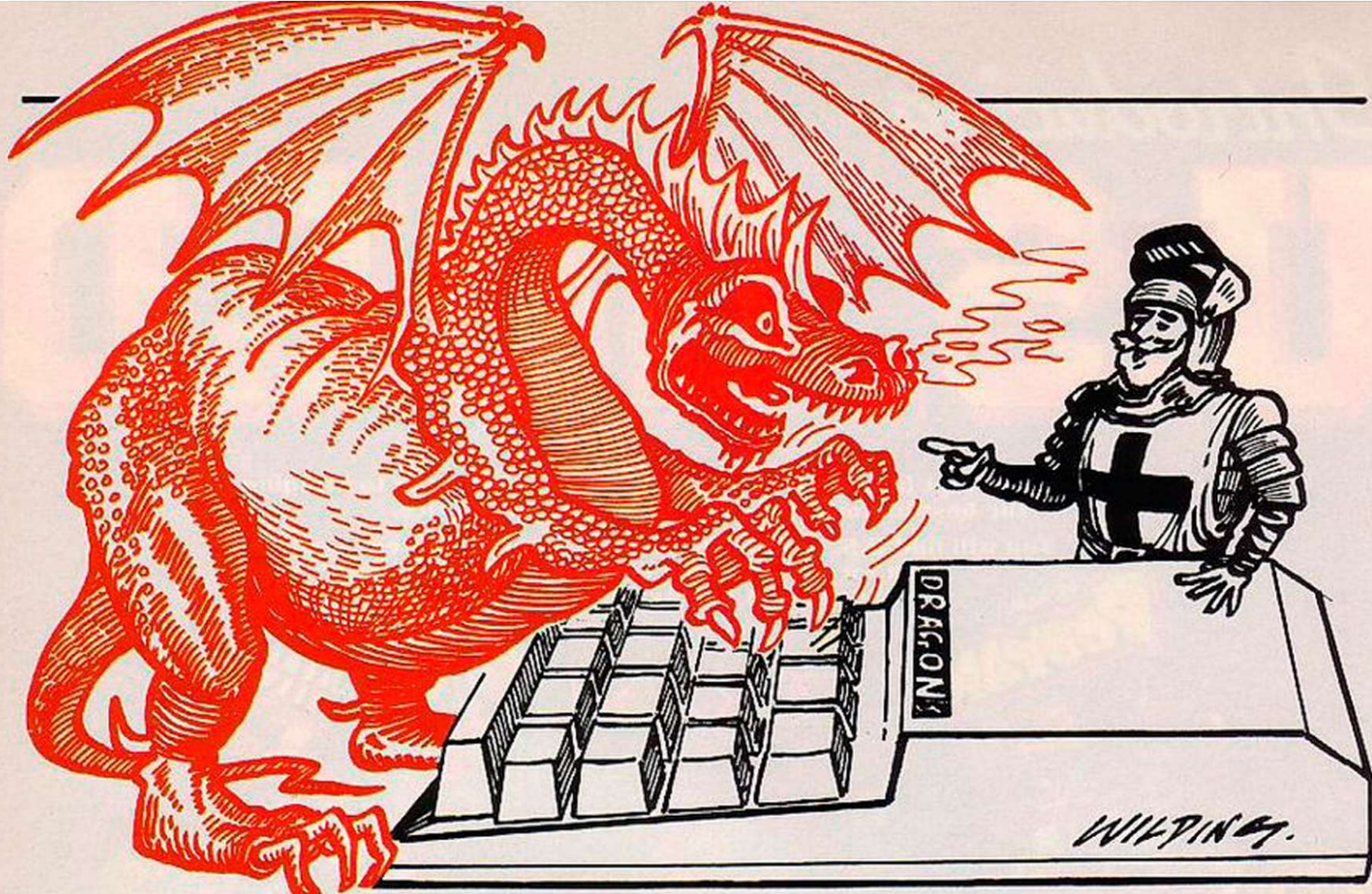


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EDITOR AND ASSEMBLER

A R Billingham explains his program which provides the Dragon 32 with a combined editor and assembler which, although written entirely in Basic, is reasonably fast and will assemble all of the opcodes that he has encountered.

EDASM IS A COMBINED editor and assembler for the Dragon 32. The assembler is reasonably fast and assembles all the opcodes and addressing modes I have yet encountered.

It is written in Basic so you only need to type in the single listing given here. Remove the Pokes in line 210 if your machine does not have a double speed capability. If the program crashes with an OM error while running change line 80 to

```
CLEAR 7100,28999
```

When run the editor will immediately prompt you with 0001| and is ready for input of source code.

The syntax of assembly is:
 LABEL [] OPERATION [] DATA
 ie. LOOP [] LDX [] #S400
 or [] LDX [] #S400

where [] indicates a space. This means that if an instruction has no label it must be preceded by a space. If the space is omitted then the operation is assumed to be the label and the Data will be considered to be the operation. The editor/assembler will stop at faults of this nature with

```
OPCODE LINE N
```

where N is the offending line. To type in a

```

1 CLSO
12 FOR J=0 TO 6
20 FOR I=0 TO 288 STEP 32
30 PRINT I+J*(32+J),STRING$(24,143+16*(J+16));
40 NEXT I
45 NEXT J
50 FOR I=231 TO 500 STEP 32
60 PRINT I,STRING$(24,32);
70 NEXT I
71 PRINT 0230,"DRAGON 32";
73 PRINT 0230,"EDITOR & ASSEMBLER";
74 PRINT 0369,"BY";
75 PRINT 0395,"A.R. BILLINGHAM";
76 PRINT 0460,"press any key";
79 IF INKEY="" THEN 79 ELSE CLR
80 PCLEAR1: CLEAR 7100,28999
90 DIM L$(500)
100 DIM A$(500)
110 DIM L#(100)
120 DIM Z$(6)
130 DD=1
140 PRINT RIGHT$("0000"+MID$(STR$(DD),2),4);:LINEINPUT
" ";L#
150 POKE 65494,0
160 IF L#="EDIT" THEN GOSUB 440:GOTO 140
170 IF L#="SAVE" THEN GOSUB 240:GOTO 140
180 IF L#="LOAD" THEN GOSUB 330:GOTO 140
190 IF L#="SAVE" THEN LINE INPUT "NAME OF FILE TO SAVE
?";NH$:C$AVENMS,8R,8L,8T:GOTO 140
200 IF L#="LOAD" THEN LINE INPUT "NAME OF FILE TO LOAD
?";NH$:C$LOADMS:GOTO 140
210 IF L#="ASH" THEN POKE 84FFD7,0:GOSUB 1090:POKE 6549
4,0:GOTO 140
220 IF L#="TEST" THEN EXEC (8T):GOTO 140
230 L$(DD)=L#;DD=DD+1:GOTO 140
240 'SAVE
250 LINE INPUT "NAME OF FILE TO SAVE ?";NH$
260 OPEN "O",#-1,NH$
270 FOR I=1 TO 500
280 IF L$(I)="" THEN 320
290 IF LEFT$(L$(I),1)="" THEN A$(I)=MID$(L$(I),2) ELSE
A$(I)=L$(I)
300 PRINT#-1,A$
310 NEXT I
320 DD=1:CLOSE#-1:RETURN
330 LINE INPUT "NAME OF FILE TO LOAD ?";NH$
340 INPUT "MERGE FILE (Y/N)";M#
350 IF M#="N" THEN S=1:GOTO 370
360 FOR I=1 TO 500:IF L$(I)="" THEN S=1:GOTO 370 ELSE
NEXT I
370 OPEN "I",#-1,NH$
380 FOR I=0 TO 500
390 IF EOF(-1) THEN 430
400 INPUT#-1,L$(I)
410 IF LEFT$(L$(I),1)="" THEN L#(I)=MID$(L$(I),2)
420 NEXT I
430 DD=1:CLOSE#-1:RETURN
440 'EDIT
450 LINE INPUT "COMMAND?";CM#
460 IF LEFT$(CM#,1)="" THEN RETURN
470 IF LEFT$(CM#,1)="" THEN GOSUB 530:GOSUB 640:GOTO 450
480 IF LEFT$(CM#,1)="" THEN GOSUB 530:GOSUB 680:GOTO 450
490 IF LEFT$(CM#,1)="" THEN GOSUB 530:GOSUB 800:GOTO 450
500 IF LEFT$(CM#,1)="" THEN GOSUB 530:GOSUB 870:GOTO 450
510 IF LEFT$(CM#,1)="" THEN GOSUB 980:GOTO 450
520 PRINT "COMMAND?";GOTO 450
530 L#="MID$(CM#,2)
540 SL=0:EL=0
550 IF SL=0 THEN IF INSTR(L#,"")=0 THEN SL=VAL(L#):EL
=L#
560 IF L#="" THEN SL=1:EL=500
570 IF LEFT$(L#,1)="" THEN SL=1:EL=VAL(MID$(L#,2))
580 IF RIGHT$(L#,1)="" THEN EL=500:SL=VAL(LEFT$(L#,LEN
(L#)-1))
590 IF EL=0 AND SL=0 THEN 600 ELSE RETURN
600 PP=INSTR(L#,"")
610 IF PP=0 THEN RETURN
620 SL=VAL(LEFT$(L#,PP-1))
630 EL=VAL(MID$(L#,PP+1))
640 RETURN
650 FOR I=SL TO EL
660 IF L$(I)="" THEN RETURN
670 PRINT RIGHT$("0000"+MID$(STR$(I),2),4);TAB(6);L$(I)
680 NEXT I:RETURN
690 IF L$(I)="" THEN 730
700 L$(I)=""
710 DD=DD+1
720 NEXT I
730 IF EL=500 THEN RETURN
740 FOR I=1 TO 500-EL
750 IF L$(I+EL)="" THEN RETURN
760 L$(I+SL-1)=L$(I+EL)
770 L$(I+EL)=""
780 NEXT I
790 RETURN
800 FOR I=SL TO EL
810 IF L$(I)="" THEN RETURN
820 PRINT RIGHT$("0000"+MID$(STR$(I),2),4);TAB(6);L$(I)
830 LINE INPUT "ALTER ?";A#
840 IF A#="" THEN 860
850 L$(I)=A#
860 NEXT I:RETURN

```

source program

RUN (Enter)

and to each 000N | prompt reply with your code with syntax as above. There are several assembler directives:

ORG [] Location (when used as the first creative code line it will locate the m/code will be assembled to locations)

Lable [] Equ [] Value (will assign the value "Value" to the lable "Lable" n.b only locations work)

EXEC [] Location (will define the user entry post for the m/code routine if not the first instruction)

* All characters following are ignored
 Editor directives: ASSM will assemble the source code to 29000 unless otherwise specified.

SAVE will save your source file to tape.
 SAVEM will save your assembled code to tape. Keep two separate tapes labelled "Source" "Code" or something similar.

LOAD will load a source file into memory.
 If merge is used two files will be merged.

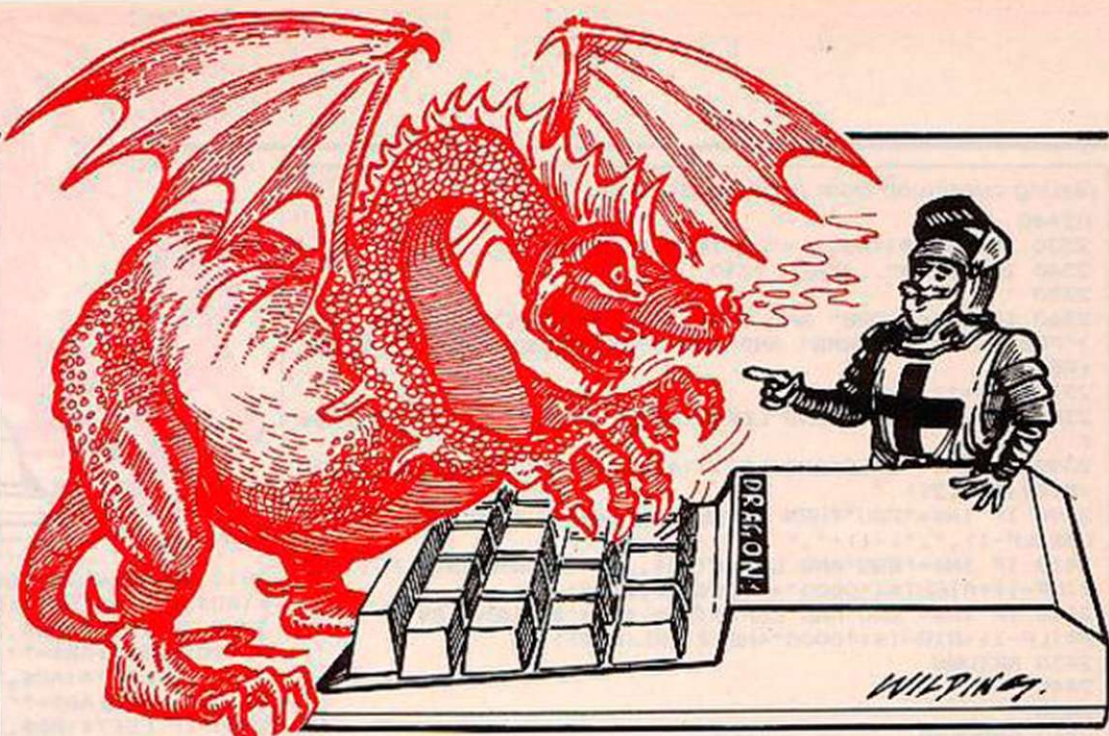
TEST will execute the file i.e., EXEC 29000 or as specified by Exec [] Location.

EDIT allows you to change, delete, replace etc. all or parts of the source code — see below.

Editor directives: L: — Lists whole program; L1 — lists line 1; L1, 10 — list lines 1 to 10 inclusive; L10, — lists lines 10 to end of program; L, 10 — Lists to line 10.

The first character indicates editor mode and the other character are Data.

Other directives: D Delete line/lines; L List line/lines; A Alter line/lines; I Insert lines before — terminated by "end"; R Replace line/lines — the strings are inputted separately; E End Edit and return to normal



mode.

```
EXAMPLES (1)
0001 | LDX | # $400
0002 | Loop | COM |, X +
0003 | | CMPX | # $600
0004 | | BLO | LOOP
0005 | | RTS
0006 | ASSM
```

When assembly is completed type "TEST" (Enter) and observe the results. This is equivalent to the Basic program.

```
1 X = &H400
2 POKEX, (256 - PEEK(X)):X = X + 1
3 IF X < SH600 THEN 2
4 END
```

Now if we want to change the program to fill the screen with spaces. Instead of rewriting the whole routine we can edit it. Type "EDIT" and you will be prompted with "Command —". Then we want to Insert line 2 "LDA # 0". Alter line 3 "LOOP STA,X+" so type 12 Enter And then "| LDA | # 0"

to leave Insert type "END" and you are prompted with "Command" now list the program by typing L Enter. You should now see:

```
0001 | LDX # $400
0002 | LDA # 0
0003 | LOOP COM ,X +
0004 | CMPX # $600
0005 | BLO LOOP
0006 | RTS
```

Command: We want to "A"lter line 3 so type "A3" you will see "ALTER|" and the line you desired. (If you press Enter without typing in any data the line will be unchanged). Type in "LOOP | STA |, X+" Enter. You should now have "COMMAND"—Try listing it L and then Type E to return to Editor. You should see "0007|". Which is asking you for the next line and type "ASSM" Enter. Then test it as before described.

You can write your own editor which will work as long as the syntax is the same and is stored in LS.

```

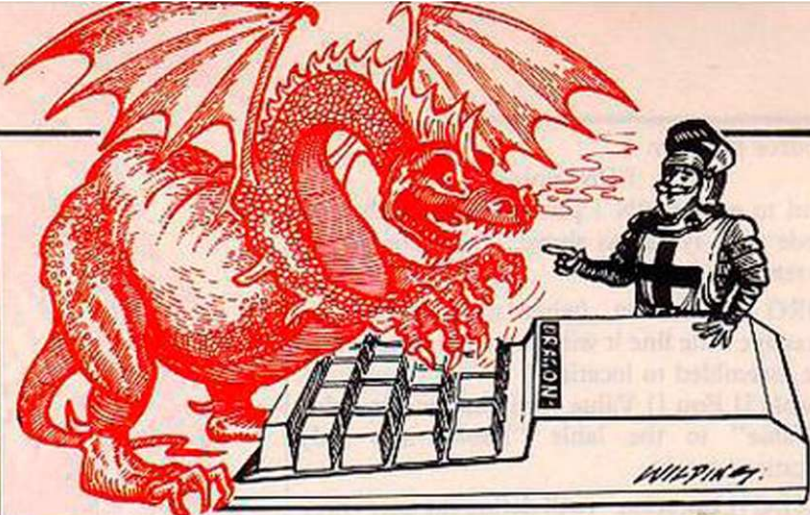
970 LINE INPUT SEARCH STRING ?;SS#
980 LINE INPUT REPLACE WITH ?;RR#
990 FOR I=SL TO EL
1000 IF L$(I)="" THEN RETURN
1010 PP=INSTR(L$(I),SS#)
1020 IF PP=0 THEN 970
1030 FF=LEFT$(L$(I),PP-1)
1040 AA=RIGHT$(L$(I),PP+LEN(SS#))
1050 L$(I)=FF+RR+AA#
1060 PRINTRIGHT$( "0000"+MID$(STR$(I),2),4);TAB(6);L$(I)
1070 NEXT I;RETURN
980 SL=VAL(MID$(CH#,2))
990 PRINTRIGHT$( "0000"+MID$(STR$(SL),2),4); " |LINE
INPUT ?";AA#
1000 IF AA#="END" THEN RETURN
1010 DD=DD+1
1020 FOR I=1 TO 500
1030 IF L$(I)="" THEN EL=1:GOTO1050
1040 NEXT I;PRINT"NO SPACE ?";RETURN
1050 FOR I=EL TO SL+STEP -1
1060 L$(I)=L$(I-1)
1070 NEXT I
1080 L$(SL)=AA#;SL=SL+1:GOTO990
1090 REM *** START ASSEMBLY ***
1100 IP=1:LP=1:AP=1
1110 ST=29000
1120 LO=29000
1130 BL=29000
1140 BA=29000
1150 IF LEFT$(L$(IP),4)<>" ORG" THEN 1210
1160 IF MID$(L$(IP),6,1)="" THEN LO=VAL("MH"+MID$(L$(I
P),7)) ELSE LO=VAL(MID$(L$(IP),6))
1170 BA=LO
1180 BK=BA
1190 ST=LO
1200 IP=IP+1
1210
1220 PRINT"*****ASSEMBLING*****";
1230 KK=L$(IP)
1240 IF KK="" THEN 1480
1250 IF LEFT$(KK,1)="" THEN IP=IP+1:GOTO1230
1260 IF LEFT$(KK,1)="" THEN 1330
1270 SP=INSTR(KK," ")
1280 IF SP=0 THEN PRINT"SYNTAX IN LINE ";IP;RETURN
1290 LL=LEFT$(KK,SP-1)
1300 PP=RIGHT$( "0000"+HEX$(LO),4)
1310 L$(LP)=LL+""+PP+LP+1
1320 KK=MID$(KK,SP)
1330 IF KK="" THEN 1480
1340 AS=MID$(KK,2):GOSUB 1950
1350 IF HD="" THEN HD=AS
1360 IF DR="" THEN 1370 ELSE PRINT"PRINTERS;" IN LINE
"IP;RETURN
1370 PRINTHEX$(LO);IF HD<>" THEN AC$(AP)=HEX$(LO)+"
+HD";AP=AP+1
1380 IF LEFT$(L$(IP),1)<>" " THEN PRINTTAB(6);LEFT$(L$(
IP),INSTR(L$(IP)," ") -1);
1390 PRINTTAB(6);INSTR(22);AD#
1400 IF INSTR(HD#,"C")=0 AND INSTR(HD#,"E")=0 THEN LO=
LO+LEN(HD#)/2;IP=IP+1:GOTO1230
1410 IF RIGHT$(HD#,1)="" THEN 1450
1420 PP=INSTR(HD#,"E")
1430 PP=PP-1/2
1440 PP=PP+1:LO=LO+PP;IP=IP+1:GOTO1230
1450 PP=INSTR(HD#,"C")
1460 PP=PP-1/2
1470 PP=PP+2:LO=LO+PP;IP=IP+1:GOTO1230
1480
1490 FOR I=1 TO AP
1500 IF INSTR(AC$(I),"#")=0 THEN 1710
1510 PP=INSTR(AC$(I),"#")
1520 DD=MID$(AC$(I),PP+1,LEN(AC$(I))-PP-1)
1530 FOR J=1 TO LP
1540 IF L$(J)="" THEN 1590
1550 PD=INSTR(L$(J),")"
1560 IF LEFT$(L$(J),PD-1)+DD# THEN 1590
1570 NEXT J
1580 PRINT"JND LABEL=";DD#;RETURN
1590 TT=VAL("MH"+MID$(L$(J),PD+1))
1600 FF=VAL("MH"+LEFT$(L$(J),4))
1610 DD=TT-FF
1620 IF MID$(AC$(I),6,2)="" THEN DD=DD-3:JK=4 ELSE DD
=DD-2:JK=2
1630 IF MID$(AC$(I),6,2)="" THEN 17"DR MID$(AC$(I),6,2)="" 16"
MEN DD=TT-FF-3:JK=4
1640 IF JK=4 AND DD<0 THEN DD=DD+65536
1650 IF JK=2 AND DD<0 THEN DD=DD+256
1660 IF JK=2 THEN DD=RIGHT$( "00"+HEX$(DD),2)
1670 IF JK=4 THEN DD=RIGHT$( "0000"+HEX$(DD),4)
1680 PD=INSTR(AC$(I),"#")
1690 AC$(I)=LEFT$(AC$(I),PD-1)+DD#
1700 GOTO1820
1710 IF INSTR(AC$(I),"C")=0 THEN 1820
1720 DP=INSTR(AC$(I),"C")
1730 DD=MID$(AC$(I),DP+1,LEN(AC$(I))-DP-1)
1740 FOR J=1 TO LP
1745 IF L$(J)="" THEN 1780
1750 JJ=INSTR(L$(J),")"
1760 IF LEFT$(L$(J),JJ-1)+DD# THEN 1790
1770 NEXT J
1780 PRINT"JND LABEL=";DD#;RETURN
1790 DD=MID$(L$(J),JJ+1)
1800 JJ=INSTR(AC$(I),"C")
1810 AC$(I)=LEFT$(AC$(I),JJ-1)+DD#
1820 NEXT I
1830 PRINT"***** FINISHED *****";
1840 FOR I=1 TO 500
1850 IF AC$(I)="" THEN RETURN
1860 DD=AC$(I)
1870 PRINTGG#
1880 PP=INSTR(GG#,")"
1890 DD=MID$(GG#,PP+1)
1900 FOR H=1 TO LEN(GG#)/2
1910 IF BL<29000 OR BL>32766 THEN PRINT"JND MEMORY";RE
TURN
1920 POKEX, VAL("MH"+MID$(GG#,2*H-1,2));BL=BL+1
1930 NEXT H
1940 RETURN
1950 TP=""
1960 SP=INSTR(AS#,")"
1970 IF SP=0 THEN IN#="AS";PK#="IN";AD#="" ELSE IN#="LEFT#
(AS#,SP-1)";PK#="IN";AD#="MID$(AS#,SP+1)
1980 IF LEN(IN#)<THEN IN#="IN#"; "GOTO1980
1990 Z$(0)="ABX .....S...A...IADCA B9AB...9...IADCB CDEF
...9...IADDA B9AB...B...IADDB CDEF...B...IADDD CDEF...3...
2000 Z$(1)="BITA B9AB...5...2BITB CDEF...5...2CLRA ...
4...F...ICLRB ...5...F...ICLRL ...067...F...2CNPA B9AB...1...
1CMPB CDEF...1...1CMPD B9AB...3102CMPB B9AB...C112CMPB
B9AB...3112CMPX B9AB...C...2CMPY B9AB...C102CMA ...4...
3...1COMB ...5...3...1COML ...067...3...2"
2010 Z$(2)="CMAI 3...C...1DAA ...1...9...1DECA ...
4...A...1DECB ...5...A...1DEC ...067...A...2EDRA B9AB...B...
1EDRB CDEF...B...1EXC ...1...E...1INCA ...4...C...1INCB
...5...C...1INC ...067...C...2JMP ...067...E...2JSR ...9AB...
D...2LDA B9AB...6...1LDB CDEF...6...1"
2020 Z$(3)="LDB CDEF...C...2LDB CDEF...E102LDB CDEF
...E...2LDB B9AB...E...2LDB B9AB...E102LEAS ...3...2L
2LEAU ...3...3...2LEAX ...3...0...2LEAY ...3...1...2LDBL
...4...B...1LSLB ...5...B...1LSL ...067...B...2LDBR ...4...
4...1LBRB ...5...4...1LSR ...067...3...2"
2030 Z$(4)="MUL ...3...D...1NEBA ...4...0...1NEBB ...
5...0...1NEC ...067...0...2NOP ...1...2...1ORA B9AB...A...
1ORB CDEF...A...1ORCC ...1...A...1PBBS ...4...4...1PBHJ
3...6...1PULB ...5...5...1PULL 3...7...1RDLA ...4...
9...1RDLB ...5...9...1RDL ...067...9...2"
2040 Z$(5)="RORA ...4...9...1RORB ...5...6...1RRR ...067
...8...2RTI ...3...B...1RTB ...3...9...1RBCA B9AB...2...
1RBCB CDEF...2...1RDX ...1...D...1STA ...9AB...7...2STB
...DEF...7...2BITD ...DEF...D...2BITB ...DEF...F102BTU ...DEF...
F...2BTX ...9AB...F...2BTY ...9AB...F102"
2050 Z$(6)="SUBA B9AB...0...1SUBB CDEF...0...1SUBD B9AB
...3...2SMI ...3...F...1SMI ...3...F...101SMI ...3...F11
BYNC ...1...3...1TFR ...1...F...1TBT ...4...D...1TBTB
...5...D...1TBT ...067...D...2"
2060 FOR H=0 TO 6
2070 PK=INSTR(Z$(H),IN#)
2080 IF PK<>0 THEN 2120
2090 NEXT H#
2100 IN#="PK#
2110 GOTO 2180
2120 PK#MID$(Z$(H),PK+5,11)
2130 TP#LEFT$(PK#,6);PK#MID$(PK#,7)
2140 HD#LEFT$(PK#,2);PK#MID$(PK#,3)
2150 F#LEFT$(PK#,2);PK#MID$(PK#,3)
2160 IF F#="" THEN F#=""
2170 LN#VAL(PK#)
2180 IF IN#="BB#" THEN IN#="BCC"
2190 IF IN#="LBB#" THEN IN#="LBCB"
2200 IF IN#="BLD#" THEN IN#="BCB"
2210 IF IN#="LBD#" THEN IN#="LBCB"
2220 IF HD#<>" THEN 2440
2230 IF LEFT$(IN#,1)="" OR LEFT$(IN#,2)="" LB# THEN 2240
ELSE 2350
2240 TP#""
2250 OP#="CDBEGBETHLEBLTHINEPLRANVCB"
2260 RR#="4,5,7,C,E,2,F,3,D,8,6,A,0,1,8,9"
2270 FOR I=1 TO 16
2280 IF RIGHT$(IN#,2)=MID$(OP#,I+2-1,2) THEN HD#MID#
(RR#,I+2-1,2):GOTO2300
2290 NEXT I
2300 IF IN#="BBR" THEN TP#""
2310 IF IN#="LBR" THEN TP#""
2320 IF IN#="LBR" THEN TP#""
2330 IF IN#="LBR" THEN TP#""

```

(listing continued next page)

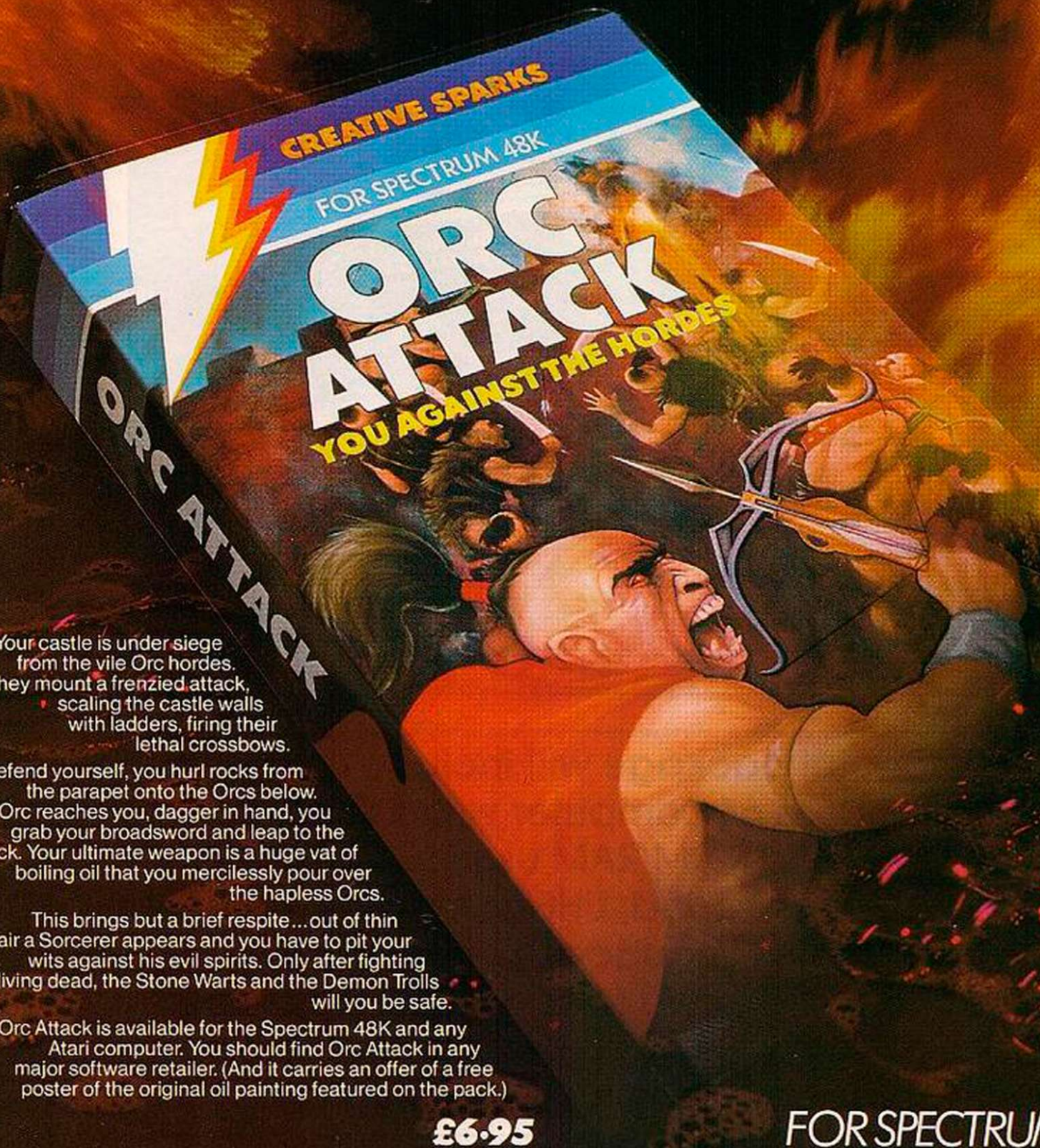
(listing continued from previous page)

```
02440
2330 IF LEFT$(IN$,2)="LB" THEN F$="10"
2340 IF HD$<>". " THEN 2440
2350
2360 IF IN$<>"ORG" AND IN$<>"EQU" AND IN$<>"FCC" AND IN$<>
>"FCB" AND IN$<>"RMB" AND IN$<>"EXEC" THEN ER$="JOB CODE"
: RETURN
2370 ER$=""
2380 IF IN$="EXEC" AND LEFT$(AD$,1)<>"$" THEN ST=VAL(AD$)
)
2390 IF IN$="EXEC" AND LEFT$(AD$,1)="$" THEN ST=VAL("&H"
+MID$(AD$,2))
2400 IF IN$="EQU" THEN LB$(LP-1)=LEFT$(LB$(LP-1), INSTR(
LB$(LP-1),",")-1)+","
2410 IF IN$="EQU" AND LEFT$(AD$,1)="$" THEN LB$(LP-1)=LB
$(LP-1)+RIGHT$("0000"+MID$(AD$,2),4)
2420 IF IN$="EQU" AND LEFT$(AD$,1)<>"$" THEN LB$(LP-1)=L
B$(LP-1)+RIGHT$("0000"+HEX$(VAL(AD$)),4)
2430 RETURN
2440
2450
2460 AMODE=0
2470 IF LEFT$(IN$,3)="PSH" OR LEFT$(IN$,3)="PUL" THEN AM
=1
2480 IF LEFT$(AD$,1)="#" AND INSTR(AD$,",")=0 THEN AM=1
IMMEDIATE
2490 IF INSTR(AD$, "(DP)")<>0 THEN AM=2 DIRECT PAGE
2500 IF AM=0 AND (LEFT$(AD$,1)="$" OR INSTR(AD$,".")=0
) THEN AM=4
2510 IF AD$="OR" OR IN$="TFR" OR IN$="EXG" THEN AM=5
2520 IF MID$(TP$,6,1)<>". " THEN AM=6
2530 IF AM=0 THEN AM=3
2540 IF MID$(TP$,AM,1)=". " THEN ER$="JADDRESS TYPE-": RE
TURN
2550 HE$=F$+MID$(TP$,AM,1)+RIGHT$(HD$,1)
2560 HD$=HE$
2570 IF AM<>1 THEN 2650
2580 IF LEFT$(IN$,3)="PSH" OR LEFT$(IN$,3)="PUL" THEN 33
40
2590 IF MID$(AD$,2,1)="$" THEN DD$=MID$(AD$,3)
2600 IF MID$(AD$,2,1)<>"$" AND ASC(MID$(AD$,2,1))>5B TH
EN HD$=HD$+"["+MID$(AD$,2)+"J": RETURN
2610 IF MID$(AD$,2,1)<>"$" THEN DD$=HEX$(VAL(MID$(AD$,2
)))
2620 IF LEN(DD$)<>LN*2 THEN DD$="0"+DD$: IF LEN(DD$)>4
THEN ER$="JADDRESS ": RETURN ELSE GOTO 2620
2630 HD$=HD$+DD$
2640 RETURN
2650 IF AM<>2 THEN 2690
2660 RR$=MID$(AD$,6)
2670 IF LEFT$(RR$,1)="$" THEN HD$=HD$+MID$(RR$,2): RETUR
N
2680 HD$=HD$+RIGHT$("000"+HEX$(VAL(RR$)),2): RETURN
2690 IF AM<>4 THEN 2730
2700 IF MID$(AD$,2,1)="#" THEN DD$=RIGHT$("00000"+HEX$(
VAL(MID$(AD$,3))),4): HD$=HD$+DD$: RETURN
2710 IF MID$(AD$,1,1)<>"$" THEN HD$=HD$+"["+AD$+"J": RE
TURN
2720 HD$=HD$+RIGHT$("0000"+MID$(AD$,2),4): RETURN
2730 IF AM<>5 THEN 2760
2740 IF IN$<>"EXG" AND IN$<>"TFR" THEN RETURN
2750 GOTO 3200
2760 IF AM=6 THEN HD$=HD$+"@"+AD$+"@": RETURN
2770 REM INDEXED
2780 DD$="00000000": AB$=""
2790 IF LEFT$(AD$,1)="#" THEN AD$=MID$(AD$,2,LEN(AD$)-2
): CN=1 ELSE CN=0
2800 IF LEFT$(AD$,1)="#" AND MID$(AD$,2,1)<>"-" AND RIGH
T$(AD$,1)<>"+" THEN AB=0: AB$="": DD$="1"+RIGHT$(AD$,1)+
"000100": GOTO 3040
2810 IF LEFT$(AD$,2)="A," THEN DD$="1"+RIGHT$(AD$,1)+"0
00110": AB=0: AB$="": GOTO 3040
2820 IF LEFT$(AD$,2)="B," THEN DD$="1"+RIGHT$(AD$,1)+"0
00101": AB=0: AB$="": GOTO 3040
2830 IF LEFT$(AD$,2)="D," THEN DD$="1"+RIGHT$(AD$,1)+"0
01011": AB=0: AB$="": GOTO 3040
2840 IF INSTR(AD$,",")>1 AND RIGHT$(AD$,1)<>"+" AND LEF
T$(AD$,1)<>"A" AND LEFT$(AD$,1)<>"B" AND LEFT$(AD$,1)<>"
D" AND INSTR(AD$, "PCR")=0 AND MID$(AD$,2)<>"-" THEN 2850
ELSE 2920
2850 IF LEFT$(AD$,1)<>"#" THEN DD$="1"+RIGHT$(AD$,1)+"0
01001": AB$="["+LEFT$(AD$, INSTR(AD$,",")-1)+"J": AB=0: GO
TO 3040
2860 IF MID$(AD$,2,1)="$" THEN NN=VAL("&H"+MID$(AD$,3, I
NSTR(AD$,",")-3))
2870 IF MID$(AD$,2,1)<>"$" THEN NN=VAL(MID$(AD$,2, INSTR
(AD$,",")-2))
2880 IF NN>=-16 AND NN<=15 THEN AB=NN-32*(NN<0): AB$="
": DD$="0"+RIGHT$(AD$,1)+"000000": GOTO 3040
2890 IF NN>=-128 AND NN<=127 THEN NN=NN-(NN<0)*256: AB$=
RIGHT$("00"+HEX$(NN),2): AB=0: DD$="1"+RIGHT$(AD$,1)+"00
1000": GOTO 3040
2900 IF NN<0 THEN NN=NN+&HFFF
```



```
2910 AB$=RIGHT$("00000"+HEX$(NN),4): AB=0: DD$="1"+RIGHT
$(AD$,1)+"001001": GOTO 3040
2920 IF LEFT$(AD$,2)="A," THEN DD$="1"+RIGHT$(AD$,1)+"0
00110": AB=0: AB$="": GOTO 3040
2930 IF LEFT$(AD$,2)="B," THEN DD$="1"+RIGHT$(AD$,1)+"0
00101": AB=0: AB$="": GOTO 3040
2940 IF LEFT$(AD$,2)="D," THEN DD$="1"+RIGHT$(AD$,1)+"0
01011": AB=0: AB$="": GOTO 3040
2950 IF RIGHT$(AD$,2)="+" THEN DD$="1"+MID$(AD$,2,1)+"
000001": AB=0: AB$="": GOTO 3040
2960 IF RIGHT$(AD$,1)="#" THEN DD$="1"+MID$(AD$,2,1)+"000
000": AB=0: AB$="": GOTO 3040
2970 IF MID$(AD$,2,2)="--" THEN DD$="1"+RIGHT$(AD$,1)+"0
00011": AB=0: AB$="": GOTO 3040
2980 IF INSTR(AD$, "PCR")=0 AND MID$(AD$,2,1)="-" THEN DD
$="1"+RIGHT$(AD$,1)+"000010": AB=0: AB$="": GOTO 3040
2990 IF LEFT$(AD$,1)<>"#" THEN AB$="@"+MID$(AD$,1, INSTR
(AD$,",")-1)+"@": AB=0: DD$="10001101": F$="": GOTO 3040
3000 NN=VAL(MID$(AD$,2, INSTR(AD$,",")-2))
3010 IF NN>=-128 AND NN<=127 THEN DD$="10001100": AB$=RIG
HT$("00"+HEX$(NN-256*(NN<0)),2): AB=0: GOTO 3040
3020 IF NN<0 THEN NN=NN+&HFFFF: AB$=RIGHT$("0000"+HEX$(
NN),4): DD$="10001101": AB=0: GOTO 3040
3030 AB$=RIGHT$("0000"+HEX$(NN),4): DD$="10001101": AB=0
: GOTO 3040
3040 BY=0
3050 IF LEFT$(DD$,1)="1" THEN BY=BY+128
3060 IF MID$(DD$,2,1)="1" THEN BY=BY+64
3070 IF MID$(DD$,3,1)="1" THEN BY=BY+32
3080 IF MID$(DD$,4,1)="1" THEN BY=BY+16
3090 IF MID$(DD$,5,1)="1" THEN BY=BY+8
3100 IF MID$(DD$,6,1)="1" THEN BY=BY+4
3110 IF MID$(DD$,7,1)="1" THEN BY=BY+2
3120 IF MID$(DD$,8)="1" THEN BY=BY+1
3130 BY=BY+AB
3140 IF MID$(DD$,2,1)="Y" THEN BY=BY+32
3150 IF MID$(DD$,2,1)="U" THEN BY=BY+64
3160 IF MID$(DD$,2,1)="S" THEN BY=BY+64+32
3170 IF CN=1 THEN BY=BY+16
3180 HD$=HD$+RIGHT$("000"+HEX$(BY),2)+AB$
3190 RETURN
3200 EXG /TFR
3210 CP=INSTR(AD$,",")
3220 FF$=LEFT$(AD$,CP-1)
3230 TT$=MID$(AD$,CP+1)
3240 PB=0
3250 FOR L=0 TO 1
3260 IF L=0 THEN G$=FF$ ELSE G$=TT$
3270 IF G$="D" THEN PB=0
3280 IF G$="X" THEN PB=1 ELSE IF G$="Y" THEN PB=2 ELSE IF G$="U
" THEN PB=3 ELSE IF G$="S" THEN PB=4 ELSE IF G$="PC" THEN PB=5 ELSE
IF G$="B" THEN PB=9 ELSE IF G$="CC" THEN PB=10 ELSE IF G$="DP" THEN
PB=11
3290 IF G$="A" THEN PB=8
3300 IF L=0 THEN FF=16*PB: PB=0
3310 IF L=1 THEN FF=FF+PB
3320 NEXT L
3330 HD$=HD$+RIGHT$("000"+HEX$(FF),2): RETURN
3340 REM PUSH PULL
3350 IF LEFT$(AD$,1)="#" THEN HD$=HD$+RIGHT$(AD$,2): RET
URN
3360 IF INSTR(AD$,",")=0 AND ASC(LEFT$(AD$,1))<5B THEN
HD$=HD$+RIGHT$("0000"+HEX$(VAL(AD$)),2): RETURN
3370 PB=0
3380 CP=INSTR(AD$,",")
3390 IF CP=0 THEN CC$=AD$: LA=1 ELSE CC$=LEFT$(AD$,CP-1
): LA=0: AD$=MID$(AD$,CP+1)
3400 IF CC$="PC" THEN PB=PB+128
3410 IF CC$="S" THEN PB=PB+64
3420 IF CC$="Y" THEN PB=PB+32
3430 IF CC$="X" THEN PB=PB+16
3440 IF CC$="DP" THEN PB=PB+8
3450 IF CC$="B" THEN PB=PB+4
3460 IF CC$="A" THEN PB=PB+2
3470 IF CC$="CC" THEN PB=PB+1
3480 IF LA=0 THEN 3380
3490 HD$=HD$+RIGHT$("000"+HEX$(PB),2)
3500 RETURN
```

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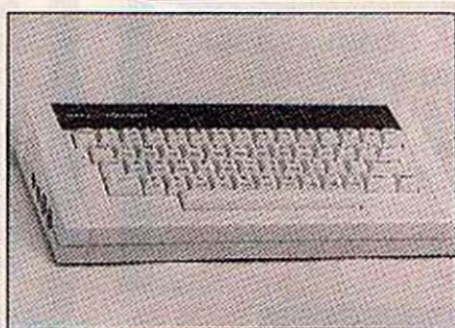
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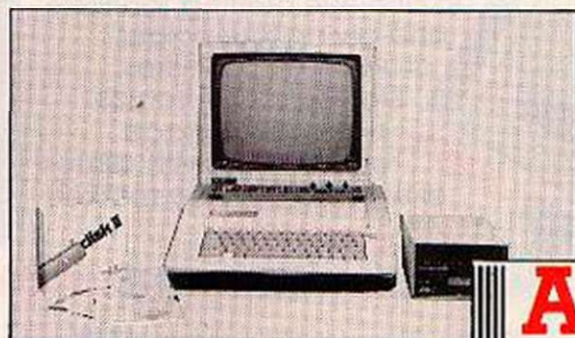


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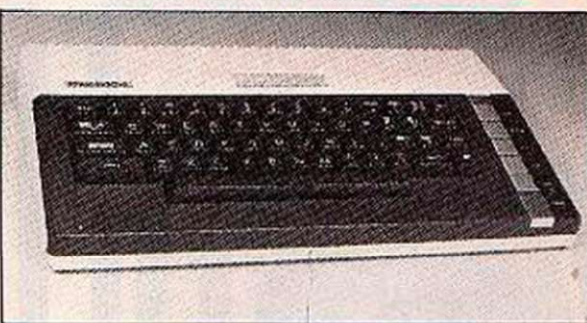


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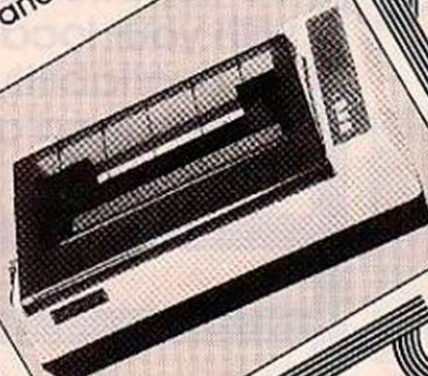
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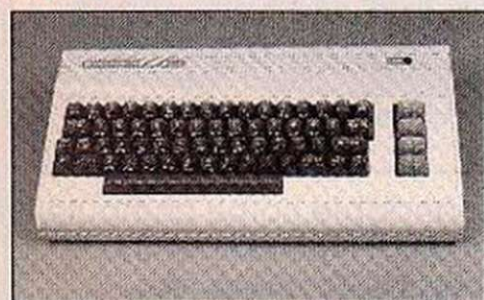
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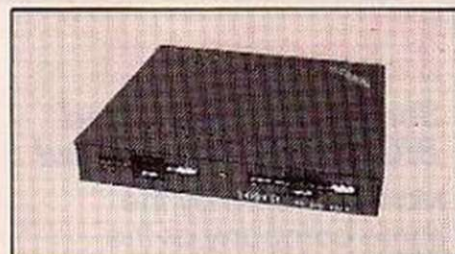
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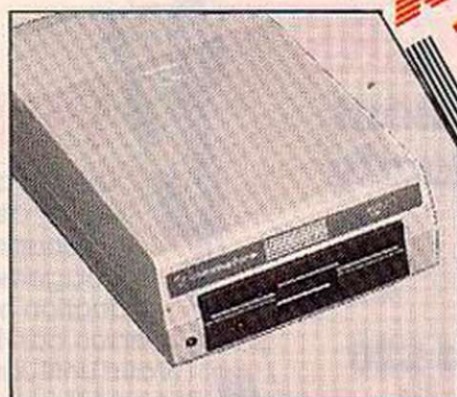
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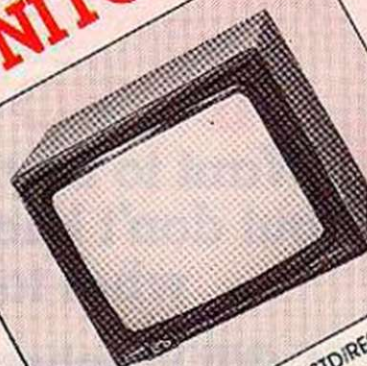
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THIS PROGRAM is a mixture of machine code and Basic and runs on the 16K and 48K ZX Spectrums.

The object of the game is to move your Zebbedy up a series of continuously shifting platforms. This is done by jumping through the holes which appear. To avoid falling through them and suffering an agonising death, you can move him either left or right.

At the beginning of the game you will have only to jump the platforms. When you reach the top platform you should proceed to strike a bell on the top left-hand corner of the screen with the provided hammer. This will gain you bonus points and entry into the next round of the game where you will encounter a UFO — which, like all the obstacles in the game, you must avoid — flying across any one of the platforms. To enter the next round you sound the bell again.

In this round you avoid, not another UFO, but a swooping robot which can lose you some lives if you are not careful.

If you get to enter the last round you'll be

Figure 2.

```
10 REM Machine Code Loader
20 LET a=32000
30 INPUT b
40 PRINT a,b: POKE a,b
50 LET a=a+1
60 IF a<32160 THEN GO TO 30
```

He wishes he were back on the *Magic Roundabout* now that he's met Vincent and Peter Li's Spectrum UFOs.

up against a two-gunned extra-terrestrial, bobbing up and down in the centre of the screen, firing plasma beams in either or both directions between the platforms.

These rounds are repeated, if you're lucky to survive through the first.

Key 1 to move Zebbedy left

Key 2 to move Zebbedy right
Key 0 to jump

Initially, you are assigned five Zebbedies to amass a high score. For every successful or attempted jump you are awarded 50 points. An extra 500 points are gained as bonus every time you succeed in striking the bell.

A Zebbedy is lost every time you fail to avoid the holes in the platforms or the obstacles. The game will end when all your men have been used up.

The program comes in three parts: Basic, user-defined characters and machine code.

The order of programming is as follows:

1. Type in the machine code loader in

ZEBBE

Figure 3.

```
32000: 6 8 213 213 225 35 197 1
32008: 31 0 26 237 176 43 119 35
32016: 35 19 193 225 17 0 1 25
32024: 229 209 16 230 201 0 0 0
32032: 6 8 213 213 225 43 197 1
32040: 31 0 26 237 184 35 119 43
32048: 43 27 193 225 17 0 1 25
32056: 229 209 16 230 201 0 243 17
32064: 64 64 205 0 125 17 191 64
32072: 205 32 125 17 0 72 205 0
32080: 125 17 127 72 205 32 125 17
32088: 192 72 205 0 125 17 63 80
32096: 205 32 125 0 205 154 125 197
32104: 6 8 203 30 23 16 251 119
32112: 35 193 16 243 205 154 125 203
32120: 56 203 56 203 56 72 17 7
32128: 0 25 17 16 0 6 8 126
32136: 245 43 16 251 25 13 32 245
32144: 205 154 125 241 119 35 16 251
32152: 251 201 6 24 33 128 127 201
```



Figure 1.

```
10 REM ZEBBEDY
20 REM @ VINCENT &
30 REM PETER LI (LEE), 1983
LOAD "CODE"
40 LET a=0: GO SUB 610
50 LET x=x+INKEY$="1")+INKEY$
60 IF x=0 THEN LET x=0
70 IF x=30 THEN LET x=0
80 PRINT AT 0,5: " " AT 7+1,5
90 PRINT AT 0,0: INK 3: "0" AT
0,1: INK 4: "1"
100 RANDOMIZE USR 32062
105 REM enter letters between
quotation marks in graphics
code
110 PRINT AT 21,8: INK 4: c
120 IF y=0 AND x=1 THEN PRINT @
T y,1: BRIGHT 1: INK 4: "0": BEEP
.03,60: LET sc=sc+500: LET st=5
t+1: GO SUB 680: IF st=5 THEN GO
```

```
SUB 675
130 PRINT AT y,x: INK 4: "AB": AT
y+1,x: INK 3: "00"
140 IF SCREEN$ (y+2,x)="" THEN
IF SCREEN$ (y+2,x+1)="" THEN G
O SUB 530
150 IF INKEY$="0" THEN IF SCREE
N$ (y-1,x)="" THEN IF SCREE
N$ (y-1,x+1)="" THEN GO SUB 530
160 IF INKEY$="0" THEN PRINT AT
y,x: " " AT y+1,x: " " LET y=y
-3: LET sc=sc+500
170 LET r=y: LET s=x
180 LET a=a-1: IF a=-1 THEN LET
a=1
190 IF st=2 THEN GO TO 230
200 IF st=3 THEN GO TO 300
210 IF st=4 THEN GO TO 420
220 GO TO 50
230 POKE 32155,24: POKE 32157,1
240 IF c<0 OR c>27 THEN LET d=d
-1: LET d=d
250 IF t=0 THEN LET e=e+1
260 IF t=1 OR t=0 THEN LET c=c+
d
270 IF e<0 OR e>15 THEN LET e=e
-1: LET e=e
280 PRINT AT e,c: INK 4: "4CHR
```

```
240 LET c=c+d
250 PRINT AT e,c: INK 5: "FGH"
LET j=e: LET k=c: BEEP .0005,50
260 IF ATTR (y,x-1)=5 THEN GO S
UB 530
270 IF ATTR (y,x+2)=5 THEN GO S
UB 530
280 PRINT AT j,x: " "
290 GO TO 50
300 RANDOMIZE: LET t=INT (RND*
2)
310 POKE 32155,24: POKE 32157,1
320 IF c<0 OR c>27 THEN LET c=c
-1: LET d=d
330 IF t=0 THEN LET e=e+1
340 IF t=1 OR t=0 THEN LET c=c+
d
350 IF e<0 OR e>15 THEN LET e=e
-1: LET e=e
360 PRINT AT e,c: INK 4: "4CHR
```

figure 2. Run and enter code from figure 3.

2. Using the UDG loader in figure 4, enter the code from figure 5.

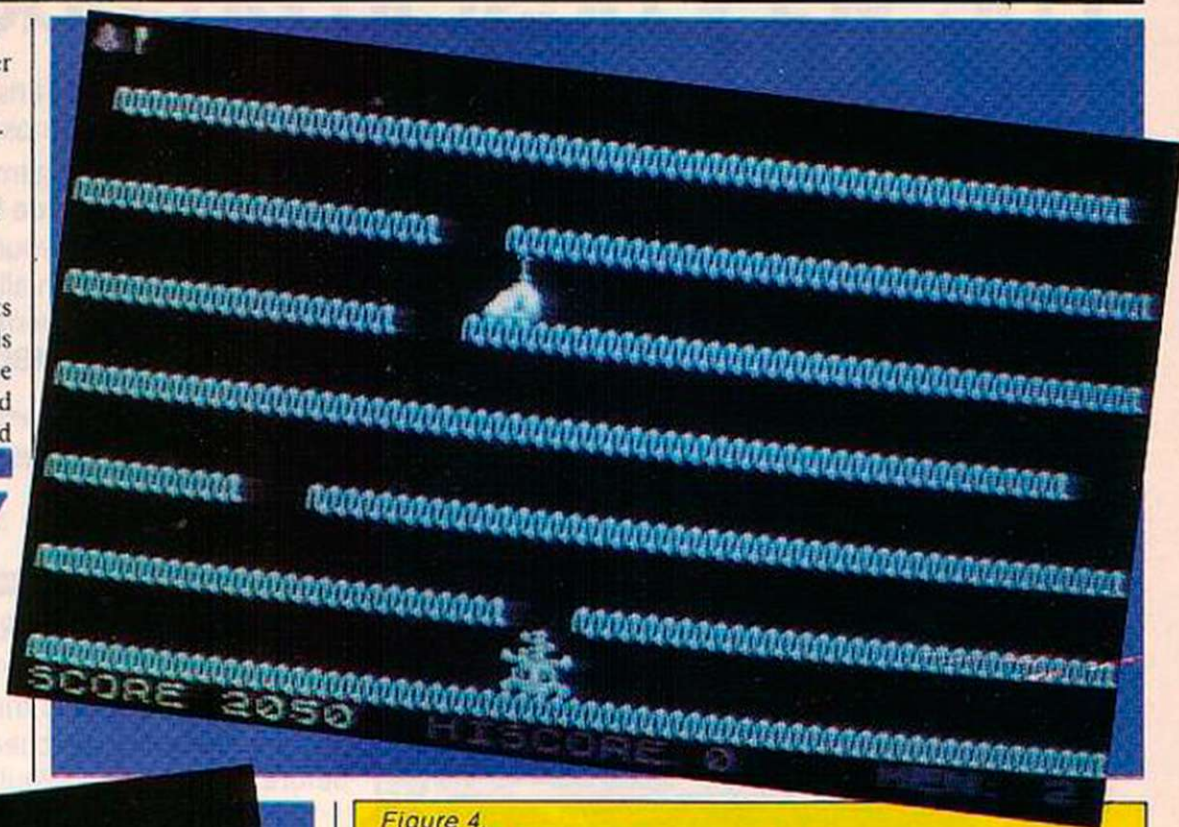
3. Write in the main program in figure 1.

4. Finally, save the lot by entering:

SAVE "ZEBBEDY" LINE 10
 SAVE "GRAPHICS" CODE USR "A", 168:
 SAVE "ZEBCODE" CODE 32000, 160

and verify them.

The machine code used in the game consists of two self-written routines. The first scrolls with wrap-around specific lines by one character either left or right and the second adds animation to selected user-defined graphics.



ZEBBEDY

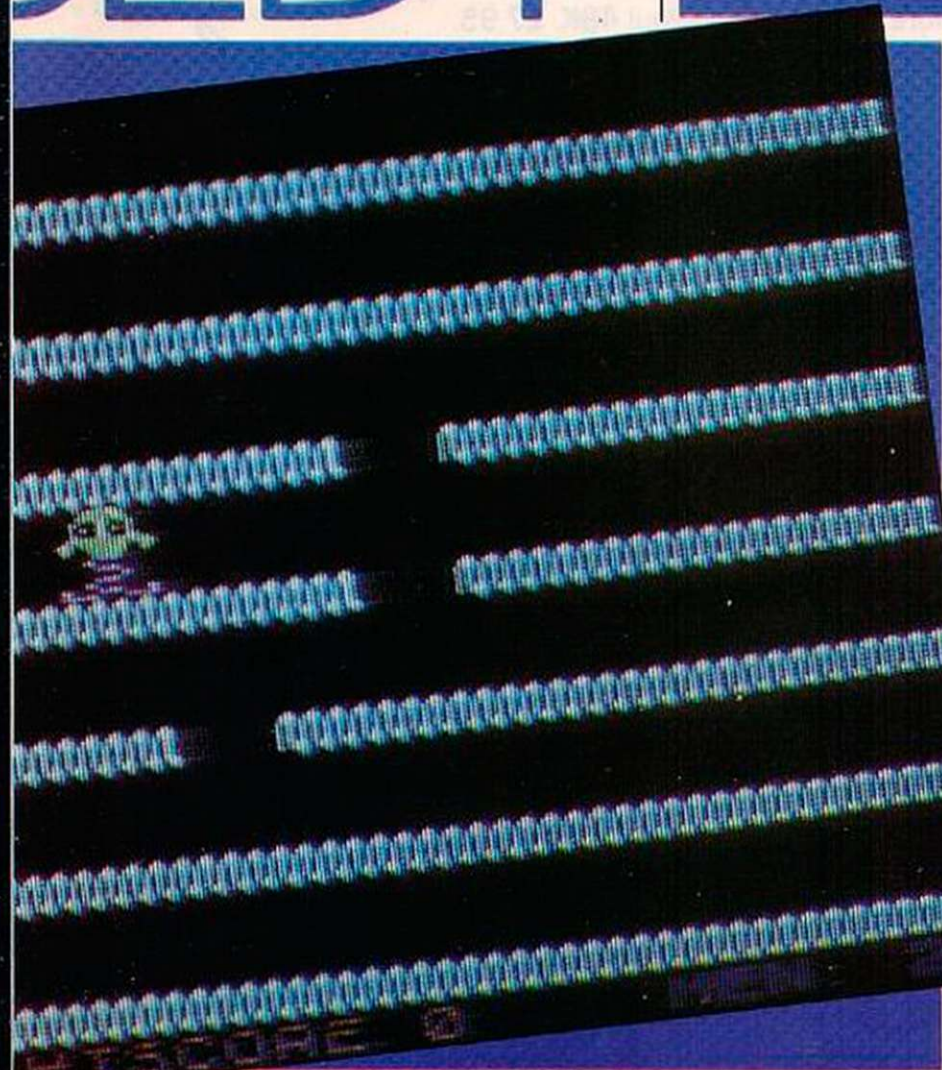


Figure 4.

```
10 REM Graphics Loader
20 LET a=USR "a"
30 INPUT b
40 PRINT a,b: POKE a,b
50 LET a=a+1
60 IF a<(USR "a"+168) THEN GO TO 30
```

Figure 5. GRAPHIC

```
A: 7,15,17,21,17,63,239,71,
B: 224,240,136,168,136,252,247,226,
C: 3,12,3,0,3,12,195,252,
D: 192,0,192,48,192,0,195,63,
E: 60,126,219,126,24,24,189,63,
F: 0,0,113,139,143,139,112,0,
G: 60,255,159,159,243,243,126,231,
H: 0,0,128,206,241,206,0,0,
I: 0,0,1,1,3,7,15,15,
J: 60,126,255,255,164,231,0,252,
K: 0,0,128,224,252,254,15,240,
L: 127,85,127,85,127,28,8,60,
M: 20,8,8,8,8,28,8,60,
N: 0,238,170,170,170,170,187,0,
O: 0,24,60,60,60,126,126,24,
P: 0,28,28,28,8,8,8,8,
Q: 0,32,112,224,80,8,4,2,
R: 14,24,63,49,253,181,191,31,
S: 112,24,253,141,239,172,252,248,
T: 28,134,163,171,255,169,160,128,
U: 60,97,197,213,255,149,5,1,
```

```
5 (155+a) AT e+1,c BRIGHT 1. IN
K 5: "INK": LET j=c LET k=c
370 BEEP .0005,00
380 IF ATTR (y+1,x-1)=69 THEN G
0 SUB 530
390 IF ATTR (y+1,x+2)=69 THEN G
0 SUB 530
400 PRINT AT j,k: " " AT j+1,k
410 GO TO 50
420 POKE 32155,16 POKE 32157,2
24: LET t=INT (RND*3)
430 PRINT AT e+15 BRIGHT 1. IN
K 2: "AS" AT e+1,15 "TU": LET j=c
LET k=15
440 IF t=1 OR t=2 THEN BEEP .00
1.50: PRINT AT e+1,3: INK 7:05
IF ATTR (y+1,x+2)=7 THEN GO SUB
530
450 PRINT AT e+1,3:c5
460 IF t=0 OR t=2 THEN BEEP .00
1.50: PRINT AT e+1,17: INK 7:05
IF ATTR (y+1,x-1)=7 THEN GO SUB
530
```

```
470 PRINT AT e+1,17:c5
480 LET e=e+1
490 IF e<0 OR e>15 THEN LET t=
500 PRINT AT j,k: " " AT j+1,k
510 IF e=y AND x=15 THEN GO SUB
530
520 GO TO 50
530 FOR y=0 TO 15 STEP 3: PRINT
AT y,x: INK 4:00 AT y+1: IN
K 3: "00": BEEP .007,y: PRINT AT
y,x: " " AT y+1,x: NEXT y
540 FOR o=1 TO 5: FOR p=0 TO 0
STEP 1: BEEP .000,p+2: BEEP .00
p: PRINT AT y,x: INK 5:00 AT
y+1,x: INK p:"AB": NEXT p: NEXT
y
550 LET men=men-1: PRINT AT 21,
30: INK 1:men: IF men=0 THEN PRI
NT AT 10,10: FLASH 1: INK 9/20
560 GO TO 50
570 LET x=15: LET y=15: RETURN
570 INPUT "WANT ANOTHER TRY? "
```

```
0) 7:125
580 IF s=0 THEN LET h:=50
590 IF s=9 THEN GO SUB 810
GO TO 50
600 GO TO 9999
610 BORDER 0: PAPER 0: CLS
620 FOR g=2 TO 18 STEP 3: PRINT
AT g,0: INK 6: "NNNNNNNNNNNNNNNN
NNNNNNNNNNNNNNNNNNNNNNNNNNNN
NNNNNNNNNNNNNNNNNNNNNNNNNNNN
271+4": NEXT g
630 PRINT AT 20,0: INK 5: "NNNNN
NNNNNNNNNNNNNNNNNNNNNNNNNNNN
640 LET c#=""
650 LET c#=""
660 LET e=c: LET men=5
670 PRINT AT 21,0: INK 4: "50000E
680 AT 21,12: INK 5: "HISCORE "
690 AT 21,25: INK 1: MEN: MEN
695 LET e+1
700 LET e+10: LET y=15: LET c=0
710 LET g=0: LET s=0: LET f=0
720 LET e=1: LET y=0: LET k=0
710 RETURN
```

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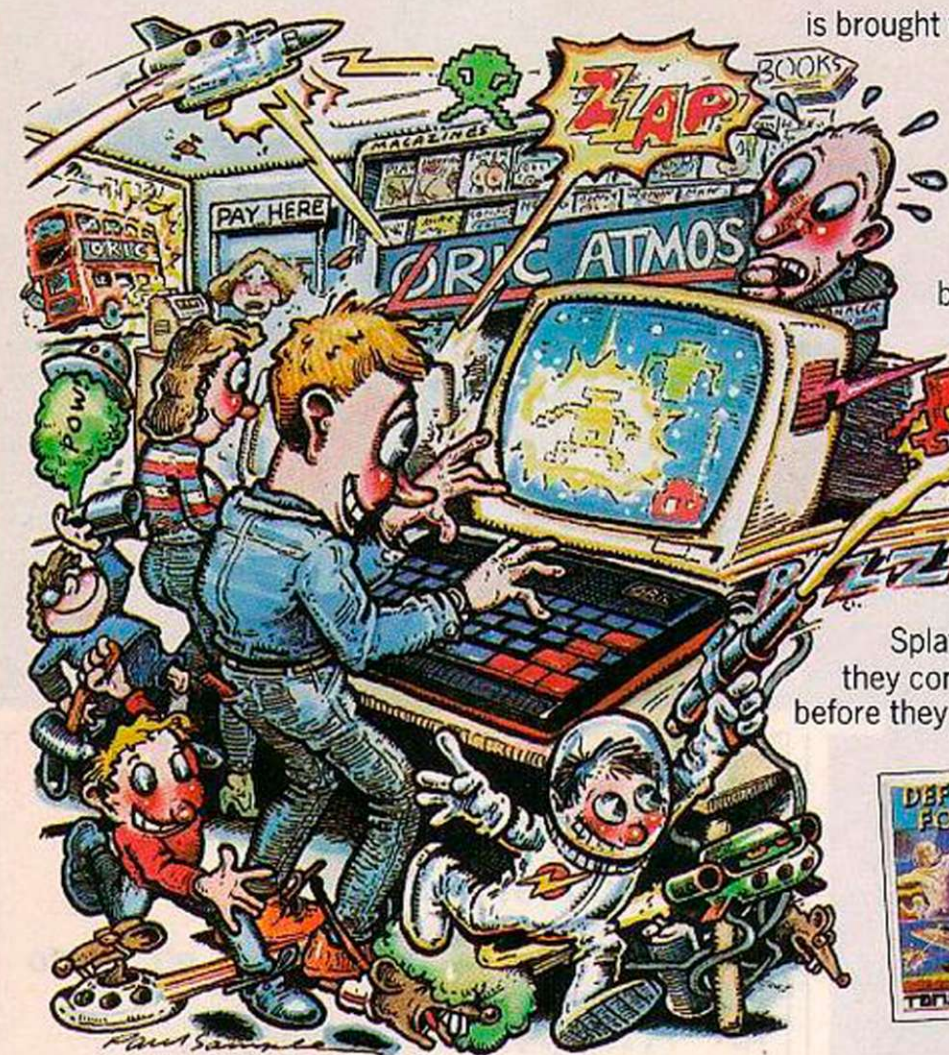
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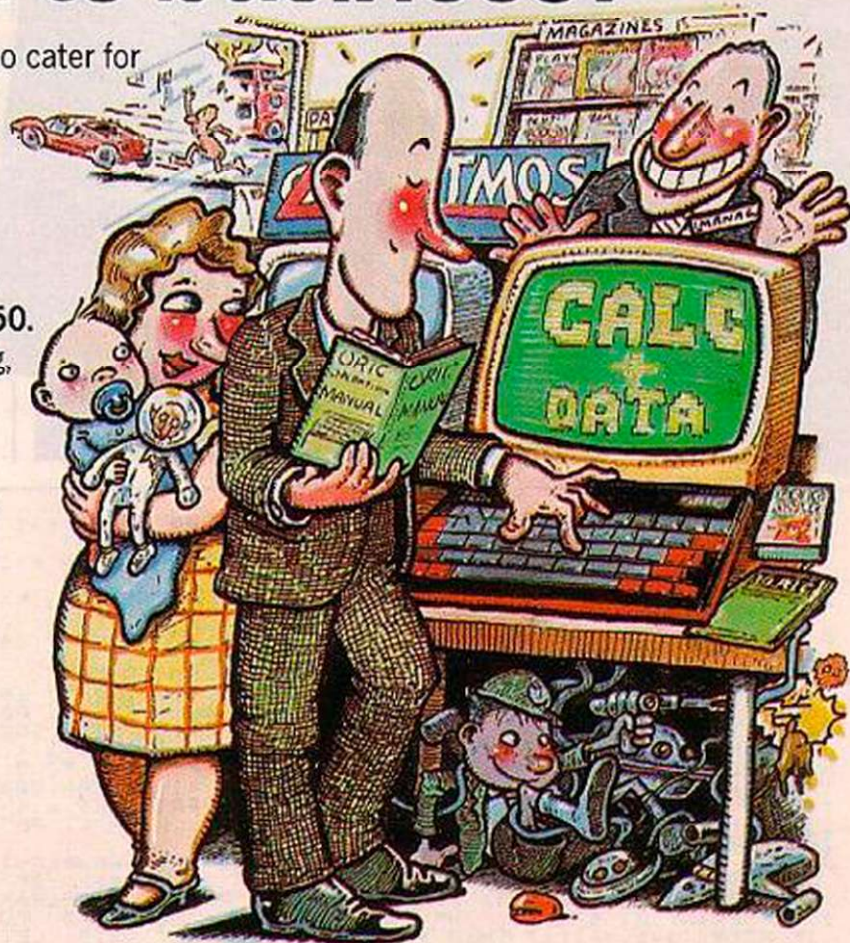
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TANSOFT


```

10 REM COMMODORE 64
20 REM IRQ INTERRUPT
30 REM DEMONSTRATION PROGRAM
100 DATA120,169,13,141,20,3,169,192
110 DATA141,21,3,88,96,173,0,220,201
120 DATA126,240,15,201,125,240,24,201
130 DATA123,240,33,201,119,240,42,76
140 DATA49,234,173,1,208,201,25,240,3
150 DATA206,1,208,76,49,234,173,1,208
160 DATA201,220,240,3,238,1,208,76,49
170 DATA234,173,0,208,201,20,240,3,206
180 DATA0,208,76,49,234,173,0,208,201
190 DATA255,240,3,238,0,208,76,49,234
210 DATA11279:REM*CHECKSUM*
300 FORI=49152TO49238
310 READJ:CC=CC+J
320 POKEI,J:NEXTI
330 READJ:REM*CHECKSUM*
340 IFCC<>J THEN PRINT"DATA ERROR"
350 SYS(49152)
400 REM*DEMONSTRATION PROGRAM*
410 FORI=0TO62:POKEI+832,255:NEXTI
420 POKEVC+21,1:POKEVC+39,14
440 POKEVC,150:POKEVC+1,120
450 END

```

(continued from previous page)

The next routine will allow you to move a sprite around the screen under joystick control; however, this does not include movement on the extreme right of the screen.

Included in the routine is a short demo that sets up a sprite to show off its potential.

After typing it in and saving it, type Run and, after a few seconds, Ready will appear on the screen plus a square sprite in the centre. Now plug in a joystick in port 2 and move the joystick in all directions. Hey Presto, faster movement. You will notice that this routine runs independent of any Basic program.

The IRQ can be speeded up even faster by

```
POKE 56325, (0 - 50)
```

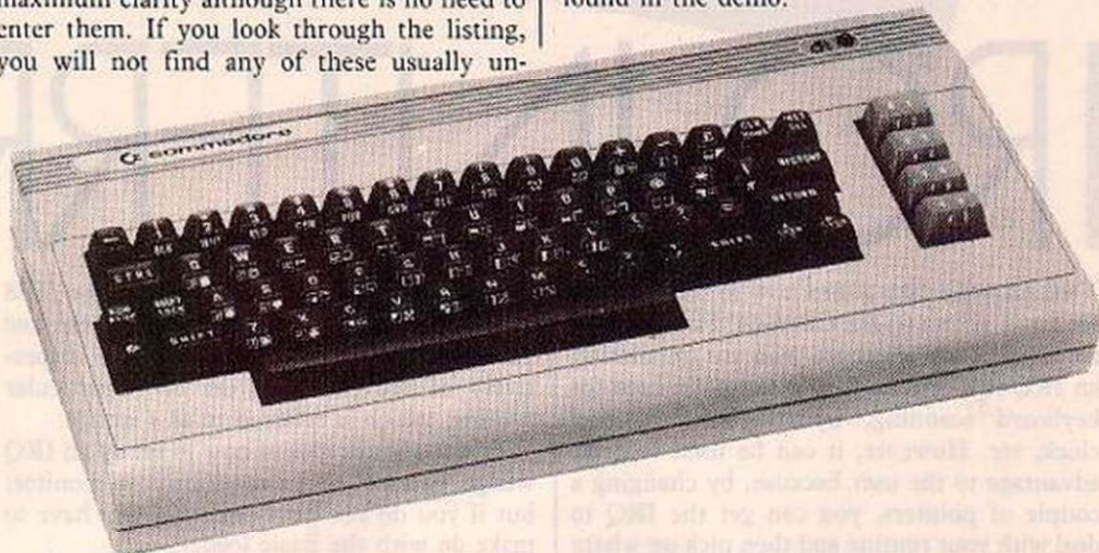
The lower the number, the faster the action.

The main program is a complete game that can be very enjoyable. The idea of the game is to fly your spacecraft as far as you can through a storm of rather large fireballs that fall relentlessly from the top of the screen, build-

ing up speed as they go, until it is near on impossible to avoid them. The game uses multi-color sprite characters for greater effect.

The listing has been heavily Remed for maximum clarity although there is no need to enter them. If you look through the listing, you will not find any of these usually un-

readable control characters, instead, I have used CHR\$ functions in their place which goes to show that you don't really need them. The program contains a slightly different version of the code than that which is to be found in the demo.



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- *PC, Dec 83*

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- *Computer Choice, Dec 83*

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- *Acorn User, Feb 84*

"Adventure Quest... This has always been one of the best adventures for me as it seems to contain the lot. In all it took me about eight months to solve."

- *PCW, 18th Jan 84*

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- *NILUG issue 1.3*

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- *Educational Computing, Nov 83*

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- *CBM 64 Users Club Newsletter*

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- *Micro Adventurer, Dec 83*

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- *Which Micro?, Feb 84*

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QL OR BBC?

I was planning to buy a BBC Micro, to upgrade from my 16K ZX-81. However, now that I have seen advertisements for the Sinclair QL, and have read several reviews, I think I will get a QL instead. I know that although you could not load ZX-81 programs directly into a Spectrum, most of them would work fairly well if just typed in. Is this true for the QL? I would hate to lose all the hours I've put into writing my ZX-81 programs.

Graham Westbrook,
Tintagel.

THE QL USES A LANGUAGE which Uncle Sir Clive and his crew have called SuperBASIC. I suspect that the name was given only to reassure people who know how to program in Basic, so they wouldn't get the feeling they were going to have to learn a new language. Sinclair Research have tried to, in the words of Clive's sidekick Nigel Searle, 'make right all the things which were wrong with Basic'. It is a brave attempt, and one which should be applauded, given the immense impact any computing decision made by Sinclair can have.

Acorn tried it with the Atom and produced a strange language which was strongly defended by those who learned to use it. It proved to be very flexible, and formed the basis of the Basic supplied with the BBC Micro. But it did not ever really take off. SuperBASIC will enjoy wide use, simply because of the zillions of QLs which will be sold. However, although you will be able to transfer some of your ZX-81 knowledge, there is no real question of typing in programs direct, and hoping they will run.

The QL user guide is a frightening document, much bigger than the computer. However, once you realise that half of it refers to the software supplied with the machine — Quill, Abacus, Easel and Archive — it seems to become more manageable. You'll recognise many of the commands — such as Beep and CLS — though others — like Baud, Block for window definition and CSize for setting the character size — will be new, although not particularly difficult to understand. However, like BBC Basic (but going beyond its somewhat modest testing-the-water approach) SuperBASIC is a disciplined, structured language, making much use of defined procedures and functions.

Its numerical range is extraordinary (10^{-15} to 10^{15}) and in contrast to some Basics which get excited at strings more than 128 or

255 characters long, SuperBASIC is understood to accept strings up to 32K long!

The string handling — using To instead of the Left\$, Mid\$ and Right\$ of most other Basics — is the same as with the ZX machines. In conclusion, then, you'll find quite a bit you can take with you from the ZX computers, and a hell of a lot you'll need to learn from scratch if you're going to make the most of the QL's capabilities.

16K/48K DIFFERENCE

I have a 48K Spectrum. While typing in programs which contain machine-code routines, I have experienced difficulty in getting them to run if it was stated that the program was for the 16K Spectrum. Those that are for the 48K Spectrum run perfectly. Is there a difference between the machines which would cause this, and how can the problem be solved?

Andrew Torry,
Harare,
Zimbabwe.

THE LOCATION OF routines in machine code is vital, as is the destination of relative jumps. As has been shown by the large amount of correspondence by people who have succeeded in getting routines written for 48K machines to work on 16K Spectrums, there is no single answer which will apply for every routine.

On a 18K computer, for example, you may well be storing your machine code above address 61439 whereas the equivalent address on your 16K machine may be 28671.

PRINTER FOR ZX-81

I am attracted by the virtues of the Tandy CGP115 colour printer which was glowingly reviewed about a year ago in Your Computer. Can this printer be interfaced with the ZX-81? I wish to use the printer for word processing.

T.C. Hanson,
Southwick,
West Sussex.

THE SHORT ANSWER is Yes. Almost anything can be interfaced with almost anything else if you can be bothered to do so, and can afford to do so. However, before you start down the road to jury-rigged connections, it would be best to ask yourself a few questions. How important will this word processing be to you? If you're doing a lot of it, starting with a ZX-81 is hardly ideal. Is it worth buying a printer such as the one you mentioned (with colour!) to cripple it by joining it to a limited machine such as the ZX-81? Would it not be better to examine your

needs, and then spend your money on a system which is — in the end — likely to produce far better results for you. Like the man who got confused when giving another man directions, I feel like ending up by saying 'If that's where you want to go, I wouldn't start from here.' Coupling a quality colour printer to your poor little ZX-81 is not a route guaranteed to lead you where you want to end up.

VIC-20 SOUND

I own a Vic-20, and am very interested in upgrading a number of programs I have written by adding to the sound. I have used all of the routines in the manual — the "whistling birds" and the "explosion" and the rest — but want to be able to produce sounds which are more like real synthesizers. Can you tell me how to do that?

Peter Dascoign,
Anstey,
Leicester.

THE ANSWER TO that question would possibly take up the whole of this issue of *Your Computer*. However, Philip Campbell, author of *Delving Deeper into your Vic-20*, suggests you could try a technique of rapidly switching the sound registers — or the volume register — on and off, or from one pitch to another. This is a very useful technique, he says, for sounds like motors or laser beams. A sample routine to show this is:

```
10 REM LASER
20 S1=36874:S2=S1+1:S3=S1-2:N=S1-3:V=S1+4:
   POKEV,15
30 FOR Z=1 TO 15:POKE S3,235+Z:POKE S2,238+Z
40 POKE S3,0:POKE S2,0:NEXT
```

COMPATIBILITY

I have had an Oric now for just over a month. It is my first computer. I have seen user-defined graphics on the Spectrum and understand that it is possible to do the same thing on the Oric. However, I couldn't make the instructions from a Spectrum book work on the Oric. Are the computers that different? I managed to make several of the programs work fairly well, so why am I having trouble with graphics?

Brett Hale,
Chalfont St Giles.

PERHAPS YOU WERE just lucky with the programs you chose. Many of the very standard elements of the Basic language are almost identical from computer to computer. Other parts of the language, such as those controlling graphics, are wildly different. On the Spectrum, for example, the graphics are on an eight by eight grid, while those on the Oric — contrary to the claims made in one *Granada* book on the subject — are on a six by eight grid. The Oric characters are held in memory from locations 46080 to 48120, and you can Poke a new shape into place so that each time you would normally get, say, the 'X', you get instead a

fierce alien. Although the techniques, in general, are the same for creating graphics on the Spectrum and the Oric, their implementation is quite different.

GOTO STATEMENT

I have a BBC Micro Model B and I have written a number of games on it in Basic. I previously owned a ZX-81. A friend of mine was looking at my programs — which all run pretty well — and became quite critical of the way I had written them. He said that using Goto was bad programming practice, and said I should use the BBC's procedures. Apart from the fact that I don't know how to use procedures — there aren't any on the ZX-81, on which I learned to program — I can't see anything wrong with Goto. If the program works well, isn't that enough?

Simon Ross,
Newport,
Gwent.

THE ANSWER IS partly yes, and partly no. The real argument against the use of Goto — an argument, by the way, which makes some people very, very excited and angry — arose in the 'old days' when Basic only allowed a Goto after an If/Then.

This means you could not do If something Then Let A=10 or If something then Print "string". As a result, programs used to leap all over the place, creating what was known poetically as spaghetti code. The programs were a nightmare to follow and debug.

However, now that we can follow an If/Then with practically anything, Gotos are often used to send programs round in endless loops, rather than to jump back and forth. A Repeat/Until sequence is much better for this on the BBC Micro. And you really should examine procedures, as they are quite simple to use. But, and this will surprise your critical friend, in many programs a procedure is slower than a Goto on the BBC Micro.

CORRECTION

Andrew Gallon from Walmer, Deal, Kent, writes to correct a recent printing error in Response Frame:

In the answer you gave to a question about how to tell the difference between a 48K Spectrum and a 16K one, you suggested entering directly DIM A\$(40,000), on the assumption that a computer which accepted it (without an out of memory error message) was a 48K. The Spectrum will not accept the comma in the number, so it should read DIM A\$(40000).

Another program to do this, which was supplied by Sinclair Research, is to enter PRINT PEEK 23733/4 - 15.75;"K". This will print 48K at the top of the screen if it is a 48K machine, and 16K at the top of the screen for a 16K machine.

At last!

MASTER MACHINE CODE on your Spectrum



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code. The book explores and utilises the incredible speed of machine code, giving you real time graphics games like BREAKOUT and leads you up to a full working DRAUGHTS program. Among other useful skills you'll acquire the ability to create music in real time (impossible in BASIC) and to plot in high-resolution graphics faster than you would have believed possible.

SPECTRUM MACHINE CODE MADE EASY

Volume One — James Walsh

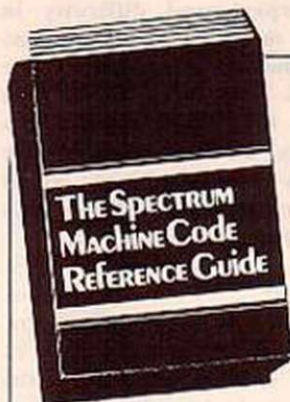
Volume Two — Paul Holmes

These two books provide a graduated course in machine code programming on the ZX Spectrum. Book one starts off with the basic concepts of machine code, followed by an explanation of binary maths, hexadecimal and base conversion, leading as quickly and painlessly as possible onto the rules and types of addressing the Spectrum's



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THE SPECTRUM MACHINE CODE REFERENCE GUIDE

Microdrive, Interface 1, and ROM Disassembly

Richard Ross-Langley £4.95

This 170-page reference work for Spectrum machine code programmers contains a full disassembly of the Spectrum ROM, with details of the Microdrive and Interface 1.

Features of the disassembler include: Zilog mnemonics are used, eg LD A, (HL) instead of MOV A, M; relative jumps show the signed decimal offset and the result; hex values are default and are printed without suffix; decimal values are preceded by a plus or minus sign; and some restart instructions are followed by data bytes. The absolute addresses of all system variables and several important routines have been named, using where possible the standard names shown in the manual. The chapter headings in the Microdrive/Interface 1 section of the book include the RS232 Interface; Microdrive Channel data; Local Area Network; Network Algorithms; System Variables; and a summary of functions. This book is a must reference work for serious Spectrum machine code programmers.

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

Please send me the following books. I enclose £_____

- Mastering Machine Code on your ZX Spectrum — Toni Baker — £9.95
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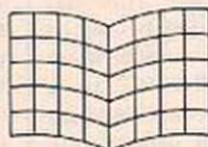
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Ack-ack

A M Tucker,
Charminster,
Dorset.



THE GRAPHICS animation in this game is very smooth, through the use of the excellent machine-code routine by Robert Newman, *Your Computer*, April 1983. This is used for nearly all the graphics, including the introductory title.

In the game, a spaceship descends slowly in a series of diagonal slants across the screen. You have an ack-ack gun with controls for range and elevation. The shell travels in a parabola, making aiming more difficult, especially at extreme range. Also, the spaceship has only one vulnerable spot: a hit elsewhere is quickly repaired. If you succeed in destroying the spaceship, your score will depend mainly on the height at which you did it.

The section 1000-1120 should be entered first and saved, together with the bytes. Then the rest of the program can be entered, and saved, using

SAVE "name" LINE 1

The bytes are then put on the tape after the main program, using the name and code details as in line 410 of the main program. On loading, the program should load the bytes and self-run.

The first address in the machine code must be the address immediately following RAMtop, which will have to be set in a 16K Spectrum to not more than 32399. The machine code would then start at 32400, and the calling address will be Rand Usr 32411. The various Poke addresses will also have to be changed.

```
10 REM Ack Ack
    by A.M.Tucker,
    Charminster.

20 CLEAR 61149: GO SUB 410: IN
K 0: CLS
30 PRINT TAB 10;"* ACK ACK *"
    " Use n & m for range."
    " Use a & z for elevation."
    " Use
    e x to fire."
40 PRINT AT 10,0;"To destroy t
he spaceship,it must be hit exac
tly in the centre: damage from
other hits will be repaired."
50 INPUT "To start choose sing
le shot or automatic (s/a)
- ";f$
60 CLS : PLOT 255,15: DRAW -25
5,0: DRAW 18,0: DRAW 0,10: DRAW
25,0
70 RESTORE 80: FOR n=61150 TO
61155: READ a: POKE n,a: NEXT n:
PRINT INK 0;: RANDOMIZE USR 611
61
80 DATA 120,27,32,12,1,13
90 PRINT INK 0;AT 19,30;"S": R
EM graphics S
100 LET hit=0: LET rd=0: LET e=
32: LET r=16: LET s=5: LET t=0
110 FOR n=0 TO 670: LET x=(230-
n)*(n<231)+(n-230)*(n>230 AND n<
461)+(670-n)*(n>460)
120 LET y=INT (170-n*.225): IF
y<24 THEN LET y=24
130 RESTORE 130: FOR p=61150 TO
61155: READ q: POKE p,q: NEXT p
: DATA x,y,24,9,1,1: PRINT INK 0
;: RANDOMIZE USR 61161
140 IF n>600 THEN NEXT n
150 IF INKEY$="x" AND s=6 AND f
$="s" THEN GO TO 270
160 IF s<5 THEN GO TO 240
170 IF (s/4+t)>48 THEN LET t=0:
POKE USR "a",0: POKE USR "a"+1,
0
180 LET e=e+(INKEY$="a")*(e<35)
-(INKEY$="z")*(e>1)
190 LET r=r+(INKEY$="m")*(r<24)
-(INKEY$="n")*(r>3)
200 PRINT AT 21,21;"E:";e*2+20;
" ";R:";r*4: LET f=r*.33
210 LET b=INT ((s(e)-2.7*f)*f+1
5.5): IF b>175 THEN LET b=175
215 IF b<33 THEN LET b=33
220 LET a=245-INT (c(e)*f+.5):
IF a<0 THEN LET a=0
230 IF s>4 AND INKEY$="x" THEN
INK 2: LET s=0: POKE 61155,9: GO
TO 300
240 IF s<4 THEN INK s+2: POKE 6
1155,9+s: GO TO 330
250 IF s=4 THEN LET s=5: POKE 6
1154,0: GO TO 330
260 LET s=s+1
270 LET t=t+1-50*(t=50): NEXT n
280 PRINT INK 0;: RANDMIZE USR
61161
```

```
290 DRAW 1,0: FOR n=1 TO 10: DR
AW 0,-1: PAUSE 6: NEXT n: GO TO
370
300 IF a=x+8 AND b=y THEN GO TO
350
310 IF a>x+1 AND a<x+15 AND b=y
THEN POKE USR "a"+(a>x+8),3: LE
T hit=hit+10
320 BEEP .05,-56: LET rd=rd+1
330 POKE 61150,a: POKE 61151,b:
POKE 61152,8: POKE 61153,8
340 RANDOMIZE USR 61161: INK 0:
GO TO 260
350 POKE 61155,5: PRINT INK 2;:
RANDOMIZE USR 61161: BEEP .1,-4
0: BEEP .1,-48: BEEP .1,-56
360 FOR p=1 TO 80: NEXT p: POKE
61154,0: RANDOMIZE USR 61161: L
ET hit=hit+20
370 INK 0: PRINT AT 21,0;"Score
=";hit+y-24;TAB 14;"Rounds fir
ed=";rd
380 INPUT "Another game? (y/n)
- ";q$
390 IF q$="y" THEN CLS : POKE U
SR "a",0: POKE USR "a"+1,0: GO T
O 30
400 STOP
410 LOAD "ackack"CODE 61156,200
: CLS : PRINT AT 10,8;"Switch of
f tape"
420 DIM s(36): DIM c(36): FOR n
=10 TO 45: LET s(n-9)=SIN (n*.03
5)*45: LET c(n-9)=COS (n*.035)*4
5: NEXT n
430 CLS : BORDER 5: PRINT PAPER
4;AT 21,0,,
440 POKE 61152,8: POKE 61153,8:
POKE 61154,1
450 INK 2: LET a=1: FOR i=0 TO
2: POKE 61155,a
460 PRINT AT 20,8;"A" AND i<1:T
AB 14;"C" AND i<2;TAB 20;"K" AND
i<3: PAUSE 30: BEEP .07,-48
470 FOR n=0 TO 80: POKE 61150,6
4+i*48-n/2.5*i: POKE 61151,n+15:
RANDOMIZE USR 61161: NEXT n
480 PRINT AT 20,8;"A" AND i<1:T
AB 14;"C" AND i<2;TAB 20;"K" AND
i<3: PAUSE 30: BEEP .07,-48
490 FOR n=0 TO 80: POKE 61150,6
4+i*48+n/2.5*(2-i): POKE 61151,n
+15
500 RANDOMIZE USR 61161: NEXT n
: LET a=3+8*i: NEXT i
510 PLOT 60,84: DRAW 0,14: DRAW
112,0: DRAW 0,-14: DRAW -112,0
520 RESTORE 530: FOR n=USR "a"
TO USR "a"+159: READ a: POKE n,a
: NEXT n: RETURN
530 DATA 0,0,0,3,-1,192,15,-1,2
40,9,36,144,15,-1,240,63,-1,-4,6
3,-1,-4,4,0,32,14,0,112,0,0,0,0,
0
540 DATA 0,145,0,4,82,32,2,0,64
,0,76,0,28,1,56,0,200,0,2,0,64,4
,82,32,0,145,0,0,0,0,0,0
```

```
550 DATA 0,0,20,56,28,40,0,0,0,
16,4,64,2,32,8,0,24,66,1,128,1,1
28,3,84,8,64,2,128,0,65,0,36
560 DATA 56,28,0,0,84,42,8,0,18
6,93,28,0,84,42,a,28,186,73,28,4
2,84,8,42,93
570 DATA 16,62,28,42,16,-1,42,9
3,19,-1,136,42,63,-1,200,8,127,-
1,a,-4,-1,a,a,a
580 DATA 128,64,32,16,14,30,60,
-1,0,112,80,112,0,0,0,0
998
999 REM * Hex loader & code *
1000 LET a=10: LET b=11: LET c=1
2: LET d=13: LET e=14: LET f=15
1010 FOR n=0 TO 9: READ a$: FOR
i=1 TO 20
1020 POKE 61155+n*20+i,VAL a$(i*
2-1)*16+VAL a$(i*2): NEXT i: NEX
T n
1030 DATA "0000000000dd2ab25cdd2
32a7b5cdd5e051dcb23"
1040 DATA "cb23cb23160019ebdd4e0
0dd4601dd7e03f5c5dd"
1050 DATA "7e02dd7706cdaa22dd770
7dd34072fe6073cdd77"
1060 DATA "08d5e5cddb0be1d1ddcb0
44620050100001805eb"
1070 DATA "46234eebdd360908dd360
a097edd3507280907dd"
1080 DATA "350add350720f7cb21cb1
017dd350add35062013"
1090 DATA "dd350a280607dd350a20f
a77c1f1053d209bc9dd"
1100 DATA "3509200addcb04462804e
b231825dd350820cdd"
1110 DATA "350a280607dd350a20fa7
723d5e5f5cddb0bf1e1"
1120 DATA "d1dd360808dd360701189
94eebdd36090818d300"
```

Bomb squad

D. Green,
Ashford,
Kent.



THIS PROGRAM is a fast flicker-free machine-code game for the 16K ZX-81. The idea behind the game is original, and in it you have to get to several bombs that are lying around, represented on the screen by flashing numbers. If a bomb reaches zero then it will explode, destroying everything next to it, and one or two more bombs will appear to replace it. You lose a life every time you get caught in one of these explosions, but get an extra one for every 10000 points that you score. Scoring for each bomb reached is proportional to how near it is to exploding. When all of the bombs have been defused you get some bonus points,

(continued on next page)

SOFTWARE FILE

(continued from previous page)

more bombs appear, and the game gets faster.

To enter the program you will need a line 1 Rem statement at least 640 characters — five complete lines — and then to Edit it to make four lines of this length. Then type in, as direct commands:

```
Poke 16510,0
Poke 16511,146
Poke 16512,2
```

This will make them into one big line.

Next you will have to type in a hex loader, preferably one with a checksum. Then enter the machine code shown in listing 1. Do not include any spaces. This should not take too long as the program has been made as short as possible. When you have finished this, type in the Basic program in listing 2 that displays the instructions and sets up the data for the game — the instructions are optional but make sure

Name:	Function:	Start:
1. Bombprint	Subroutine to print a bomb at a random position.	16514
2. Set	Sets various variables (score etc.).	16580
3. Borderprint	Draws border and prints bombs by calling Bombprint.	16636
4. Bombscan	Counts down all bombs on screen — if any bomb has got to zero then prints explosion and new bomb.	16675
5. Move	Moves the player and checks if hit by explosion.	16768
6. Erase	Erases all explosions on screen, waits for a short time, and then jumps to Bombscan.	16849
7. Explosion	Prints a hi-res explosion and subtracts a life.	16907
8. Endgame	Prints "Game Over" and returns to Basic.	16954
9. Allgone	Prints "All Bombs Defused etc." and starts new wave.	16975
10. Score	Subroutine to add 10 to score and to check for a bonus life.	17096

that the first-declared variable is the string A\$ with at least 66 characters in it, otherwise the machine code will crash when you call it. Save the completed program on tape and then try out the game.

If the program does not work or you want to modify it, then the following table should come in useful. It shows what every section of the machine code does. So if, for example, the

program only gets as far as drawing the border then the error is probably in the Bombprint routine, and you will only have to check the hex codes from 16514 to 16579, instead of the whole program.

Useful addresses that you can Poke are 16605 which is the number of bombs at the start of the game and 16610 which is the speed of the game.

Listing 1. The machine code.

```
16514: ED 5B 40 40 13 1A E6 1F =762
16522: 3C 3C FE 1E 30 F6 2A 0C =752
16530: 40 23 B7 28 04 23 3D 20 =454
16538: FC 13 1A E6 1F 3C 3C FE =932
16546: 13 30 F6 D5 11 21 00 B7 =759
16554: 28 04 19 3D 20 FC D1 7E =749
16562: B7 20 D1 13 1A E6 03 B7 =885
16570: 28 F9 C6 A2 77 ED 53 40 =1152
16578: 40 C9 2A 0C 40 11 5A 01 =491
16586: 19 22 3C 40 3A 34 40 5F =491
16594: 0A 05 40 E6 07 57 ED 53 40 =819
16602: 40 40 3E 05 32 3F 40 3E =434
16610: 0A 32 3E 40 2A 10 40 11 =325
16618: 03 00 19 E5 01 01 15 CD =465
16626: F5 08 E5 D1 E1 01 1E 00 =947
16634: ED 00 2A 0C 40 3E 80 06 =727
16642: 20 23 77 10 FC 11 1F 00 =502
16650: 06 13 23 23 77 19 77 10 =374
16658: F9 23 06 20 23 77 10 FC =744
16666: 3A 3F 40 47 CD 82 40 10 =671
16674: FB 2A 0C 40 06 14 C5 06 =527
16682: 7E FE 76 28 4E E6 7F 1E =1227
16690: 1C 38 F4 FE 26 30 F0 7E =1034
16698: FE 80 30 05 C6 7F 77 18 =903
16706: E6 D6 80 77 FE 1C 20 DF =1228
16714: E5 11 22 00 AF ED 52 3E =836
16722: 08 77 23 77 23 77 11 1F =483
16730: 00 19 77 23 23 77 19 77 =477
16738: 23 77 23 77 CD 82 40 ED =944
16746: 5B 40 40 13 1A ED 53 40 =648
16754: 40 E6 0F FE 0F CC 82 40 =976
16762: E1 18 AC C1 10 AB 2A 3C =908
16770: 40 7E FE 08 CA 0B 42 11 =748
16778: 00 00 3E EF DB FE CB 67 =1080
16786: 20 03 11 21 00 CB 5F 20 =415
16794: 03 11 DF FF CB 57 20 01 =821
```

```
16802: 13 9E F7 DB FE CB 67 20 =1139
16810: 01 1B 35 00 19 7E FE 08 =495
16818: CA 0B 42 FE 80 20 04 2A =739
16826: 3C 40 AF B7 28 0C E6 7F =891
16834: 47 3E 26 90 47 CD CB 42 =857
16842: 10 FB 36 3D 22 3C 40 16 =562
16850: 00 2A 0C 40 06 14 23 7E =562
16858: FE 76 28 1A FE 08 20 02 =305
16866: 36 00 FE 1C 20 02 36 00 =734
16874: 7E E6 7F FE 1C 38 E7 FE =424
16882: 26 30 E3 14 18 E0 10 DE =1306
16890: 7A B7 CA 4F 42 3A 3E 40 =819
16898: 47 0B 78 B1 20 FB C3 23 =892
16906: 41 01 00 19 36 BD 0B 78 =465
16914: ED 47 36 3D B1 20 F5 3E =939
16922: 1F ED 47 36 00 01 16 18 =437
16930: CD F5 08 7E 3D 77 FE 1C =1046
16938: CA 3A 42 2A 0C 40 11 5A =551
16946: 01 19 22 3C 40 C3 D1 41 =653
16954: 01 0A 0A CD F5 08 E5 2A =750
16962: 10 40 11 3C 00 19 D1 01 =392
16970: 09 00 ED 80 C9 01 07 0A =641
16978: CD F5 08 E5 2A 10 40 11 =826
16986: 21 00 19 D1 01 11 00 ED =522
16994: 80 E5 01 0B 0C CD F5 08 =887
17002: EB E1 01 0A 00 ED 80 06 =890
17010: 84 CD C8 42 10 FB 3A 3F =959
17018: 40 C6 05 FE 9B 20 02 D6 =924
17026: 05 32 3F 40 3A 3E 40 D6 =580
17034: 03 FE FE 20 02 C6 03 32 =796
17042: 3E 40 01 00 00 0B 78 B1 =435
17050: 20 FB 01 1E 15 CD F5 08 =793
17058: 7E 3C FE 26 20 02 3E 1C =602
17066: 77 2A 0C 40 E5 11 5A 01 =574
17074: 19 22 3C 40 E1 06 14 23 =469
17082: 7E FE 76 20 05 10 FB C3 =994
17090: FC 40 36 00 18 F1 C5 E5 =1061
```

```
17098: 2A 0C 40 11 BF 02 19 46 =423
17106: E5 23 23 23 7E 3C FE 26 =812
17114: 20 05 36 1C 2B 18 F5 77 =550
17122: E1 7E B8 28 09 01 16 15 =828
17130: CD F5 08 7E 3C 77 3A 35 =874
17138: 40 5F 3A 34 40 E6 0F 57 =665
17146: ED 53 40 40 E1 C1 C9 1C =1095
```

Listing 2. The Basic program.

```
REM ...MACHINE CODE...
5 LET A$="SCORE 000000" LIVE
S:3 WAUE:11111111111111111111
10 PRINT TAB 6;"BOMB SQUAD";TAB
8 6;"(C)D.GRE
EN 1984"
20 PRINT "YOU HAVE TO GET TO
THE BOMBS BEFORE THEY COUNT
DOWN TO ZERO AND EXPLODE (BE VER
Y CAREFUL NOT TO GET CAUGHT IN A
NY EXPLOSIONS)"
30 PRINT "YOU SCORE ACCORDIN
G TO HOW NEAR THE BOMB IS TO GOI
NG OFF. (10=10 POINTS,90
POINTS)"
40 PRINT "YOU START OFF WITH
3 LIVES,AND GET AN EXTRA ONE F
OR 10000 PTS."
50 PRINT "TAB 2;"USE ARROW KE
YS TO MOVE"
60 PRINT "TAB 2;"
70 IF INKEY$("<") THEN GOTO 70
80 IF INKEY$="" THEN GOTO 80
90 CLS
100 LET X=USR 16580
110 GOTO 70
240 SAVE "SQUA"
250 RUN
```

The hex loader.

```
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 SCROLL
80 PRINT N;" - ";
90 INPUT A$;" "
100 PRINT A$;" "
110 INPUT TOT
120 PRINT TOT
130 LET Z=0
140 FOR K=1 TO LEN A$ STEP 2
150 LET C=(CODE A$(K)-26)*16+C0
DE A$(K+1)-26
160 LET T=T+C
170 POKE N+Z,C
180 LET Z=Z+1
190 NEXT K
200 IF TOT=T THEN GOTO 240
210 SCROLL
220 PRINT "ERROR - PLEASE ENTER
AGAIN"
230 GOTO 60
240 NEXT N
250 STOP
```

Moving sprites

David Angier,
Leamington Spa,
Warwickshire.



USING SPRITES on the Commodore 64 is a very easy way of getting moving graphics, but if a Basic program has to control more than about three sprites then everything gets very slow and the arcade quality of the game drops

rapidly. Instead of having to change the co-ordinates of a sprite continually, this program allows you to supply x/y velocities and let a machine code program look after the rest.

Just type in program 1 — a loader program — to get the machine code added to a program.

The program is controlled by poking into locations 688 to 719. The first 16 locations are the x/y speeds, they are in the same order as the VIC registers so 688 is sprite #1 x Speed

and 691 is sprite #2 y Speed. Then locations 704 to 719 are the x/y directions: — 255 is left/up, 0 is stationary, 1 is right/down and again they are in the same order as the VIC sprite registers.

Example: If you want sprite #2 to move down rapidly and left slowly to give a diagonal speed, then the following commands will do the job:

```
POKE 690,4 : REM SPRITE #2 X SPEED
SLOW
```

SOFTWARE FILE

```
POKE 691,1 : REM SPRITE#2 Y SPEED
FAST
POKE 706,255: REM X DIRECTION LEFT
POKE 707,1 : REM Y DIRECTION DOWN
```

Also if the sprite is not to move in the x direction then set its direction to zero. The lower the speed value the faster it will go.

Program 2 is an example showing all eight sprites moving at once with a reasonable speed.

For technical buffs the source code is also shown with a few cryptic comments to help you understand. The general principle is re-directing the routine that updates the clock every 60th of a second to my own routine that decrements timers, and when zero moves the corresponding sprite in the right direction.

Variable list

Neil Canham,
Colchester,
Essex.



THIS MACHINE-CODE PROGRAM for the 16K or 48K Spectrum lists all the variables so far defined by a Basic program, with the exception of arrays, to provide a feature often found on larger micros, but rarely present on those such as the Spectrum.

The name and contents of each numeric or string variable are printed and the name of each control variable only printed, in inverse video.

There are several methods of entering the code:

If you have an assembler then the opcodes can be entered. Note that the assembler used required line numbers — third column of listing. The final machine code should be stored at address 65195 for 48K Spectrum, or 32427 for 16K Spectrum. Alternatively, the hex codes in column 2 of the assembler listing can be entered using a standard hex-loader. Again, the code should be stored at, and run from the relevant address mentioned above. Either way, the code should be saved using

48K — SAVE "Variables" CODE 65195,173
16K — SAVE "Variables" CODE 32427,173

If you find any of this confusing, then enter the Basic program, which will lower RAMtop by the required amount, and Poke the code in automatically. The program will stop if it detects an error, using a built in check-sum. Finally, the code will be automatically saved to tape.

Whichever method of entry is used, the code should be loaded using

Program 1.

```
10 FOR I=0T090:READA:POKE12*4096+I,A:NEXT
20 SYS12*4096
1000 DATA120,169,192,141,21,3,169,13,141,20,3,88,96,162,15,169,128
1010 DATA141,61,3,141,60,3,222,208,2,208,44,189,176,2,157,208,2
1020 DATA189,192,2,240,33,16,12,189,0,208,8,222,0,208,40,240,7
1030 DATA208,19,254,0,208,208,14,173,60,3,208,9,173,61,3,77,16
1040 DATA208,141,16,208,173,60,3,208,3,78,61,3,73,128,141,60,3
1050 DATA202,16,191,76,49,234
```

Program 2.

```
5 V=13*4096
10 FOR I=0T090:READA:POKE12*4096+I,A:NEXT:REM ENTER MACHINE CODE
20 FOR I=0T062:READA:POKE832+I,A:NEXT:REM SET UP SPRITE
25 FOR I=0T031:POKE688+I,0:NEXT:REM CLEAR M/C REGISTERS
30 FOR I=0T07:POKE2040+I,13:NEXT:REM SET SHAPES THE SAME
40 POKEV+21,255:FORI=1T03:FORJ=1T03:REM ENABLE SPRITES
50 S=(I*3+J-4)*2:IF S>9THENS=S-2:REM GET SPRITE NO IN S
60 POKEV+S,(I-1)*120:POKEV+S+1,(J-1)*115:REM GIVE A POS
70 IFJ=1THENPOKE704+S+1,1
80 IFJ=3THENPOKE704+S+1,255:REM AND A
90 IFI=1THENPOKE704+S,1:REM DIRECTION
100 IFI=3THENPOKE704+S,255
110 NEXTJ,I
120 FORI=0T015:POKE688+I,1:NEXT:REM SET ALL SPEEDS AT 1
130 FOR I=0T07:POKEV+39+I,8+I:NEXT:REM SET UP COLOURS
135 POKEV+23,255:POKEV+29,255:REM ENLARGE THEM
140 SYS12*4096:REM ALL SYSTEMS GO
150 LIST:REM AND LIST PROG AT SAME TIME!!
999 REM MACHINE CODE
1000 DATA120,169,192,141,21,3,169,13,141,20,3,88,96,162,15,169,128
1010 DATA141,61,3,141,60,3,222,208,2,208,44,189,176,2,157,208,2
1020 DATA189,192,2,240,33,16,12,189,0,208,8,222,0,208,40,240,7
1030 DATA208,19,254,0,208,208,14,173,60,3,208,9,173,61,3,77,16
1040 DATA208,141,16,208,173,60,3,208,3,78,61,3,73,128,141,60,3
1050 DATA202,16,191,76,49,234
1999 REM SPRITE DEFINITION
2000 DATA0,127,0,1,255,192,3,255,224,3,227,224
2010 DATA7,217,240,7,223,240,7,217,240,3,231,224
2020 DATA3,255,224,3,255,224,2,255,160,1,127,64
2030 DATA1,62,64,0,156,128,0,156,128,0,73,0,0,73,0
2040 DATA0,62,0,0,62,0,0,62,0,0,28,0
```

48K — Clear 65194: LOAD "" CODE

16K — Clear 32426: LOAD "" CODE

and called when required using

48K — Randomise Usr 65195

16K — Randomise Usr 32427

The Spectrum manual contains quite a lot of information about variables, hidden away in Chapter 24. There are six different types of variables, each stored in a different way. First, the code of the first letter of the variable name has 96 subtracted from it, so as to leave bits 5, 6 and 7 as zeros. These three bits are then used to identify each type of variable with its own unique code.

The contents of the next byte will depend upon the type of variable in question. If it is a numeric variable with a one-character name, then the next 5 bytes after the letter will contain the number, in 5-byte floating point form. If however, the numeric variable has a name of more than one character, then the first character is stored as mentioned, using code 101 for bits 5, 6 and 7. Then comes the second character, with bit 7 reset, up to the

last character of the name, which has bit 7 set. This is followed of course by the number, in 5 byte floating point form again.

Control variables for For-Next loops have code 111, and are followed by 18 bytes of information about line number, present value, step etc. Strings are easiest to handle. First, the character of the name is stored, using code "010" as bits 5, 6 and 7. This is followed by 2 bytes containing the number of characters of the string, followed by the text itself.

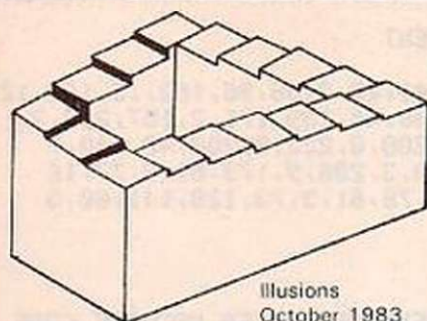
The way in which arrays are handled is slightly more complex. However, anyone wishing to add their own array — handling routines to my program will find the necessary information on page 167 and 168 of the Spectrum manual.

The program first checks to find out what type of variable it has found, then calls the relevant routine to either print the name and value of the variable, or just the name, in inverse video, of control variables for For-Next loops, or to jump over the correct number of bytes to find the next variable.

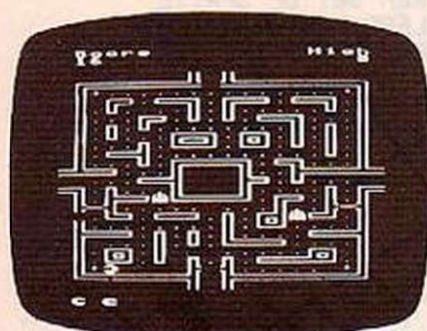
```
10 REM variables list code
20 REM N.R.CANHAM
30 LET a=(PEEK 23730+256*PEEK
23731)-173
40 CLEAR a
45 LET s=0
50 LET a=PEEK 23730+256*PEEK 2
3731
55 FOR n=1 TO 173
60 READ b: LET s=s+b: POKE a+n
```

```
,b: NEXT n
70 DATA 62,2,205,1,22,205,107,
13,42,75,92,126,254,128,200,203,
127,32,6,203,111,40,52,24,85,203
,119,32,6,203,111,32,115,24,6,20
3,111,40
80 DATA 2,24,8,35,94,35,86,25,
35,24,218,229,62,2,205,1,22,225,
62,20,215,62,1,215,126,238,160,2
```

(continued on page 169)



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SOFTWARE FILE

(continued from page 167)

```

15,62,13,215,17,19,0,25,24,192,2
29,62,2,205,1,22,225,126,215
90 DATA 62,36,215,62,61,215,62
,34,215,35,70,35,35,126,215,35,1
6,251,62,34,215,62,13,215,24,157
,229,62,2,205,1,22,225,126,203,1
75,215,62,61,215,35,126,35,94,35
100 DATA 86,35,78,35,70,35,229,

```

```

205,178,42,205,227,45,225,62,13,
215,24,216,229,62,2,205,1,22,225
,126,238,224,215,35,126,203,127,
32,3,215,24,247,203,191,215,24,2
04

```

```

110 IF s<>18235 THEN PRINT "Err
or has occurred. Please check cod
e": STOP
150 SAVE "variables"CODE a+1,17
3

```

Hopit

Andrew Watson,
Glossop,
Derbyshire.



THIS IS A GAME program for the Dragon 32, written largely in Basic, with machine code subroutines and controlled by the right-hand joystick.

The game is formed by a pyramid of green cubes over which the hopper can roam under control of the joystick in an attempt to avoid the red bounding ball which can only move downwards. When a ball reaches the bottom of the pyramid, a new one is introduced at the top. The hopper, in avoiding the bouncing ball, must hop from cube to cube changing each green-topped one to blue, until all are changed, when a new game is started, and a bonus is added to the score.

If the hopper fails to avoid the ball, then a life is lost, the screen is refreshed and the game restarts. This process will continue until all three lives are lost, when the game will end.

Line 1500 contains a Poke which alters the machine speed. On certain versions of the Dragon 32, the program will crash, if the machine speed is altered, and therefore the Poke should be removed from line 1500 on those machines.

The program listing shows a £ symbol, this is printer interpretation of a hash #. Save the program under the name HOPIT before running it, as an error in the machine code could cause the program to crash.

The game is loaded and operated as follows:

Type CLOAD "HOPIT". On completion of successful load — screen display OK, then type RUN. The program will be activated, a

screen display of the program name and HOPIT symbol will appear on the screen for eight seconds while the program constructs the high-resolution screen, after which the display changes to ask whether the inbuilt program instructions are to be displayed, before proceeding with the game.

The program description is as follows:

150-690	Draw hi-res screen.
700	Program variables.
710-1120	Main instruction sequence.
1130-1200	Life loss and screen refresh.
1210-1430	Game over and high score table.
1440-1520	Completed screen, bonus update.
1530-1660	In-built instructions.
1670-2020	Title screen.
2020-2070	Machine code.

To alter the degree of difficulty, the variable LE in line 700 should be altered in steps of 50. Increasing the value reduces difficulty, and conversely decreasing LE increases difficulty.

```

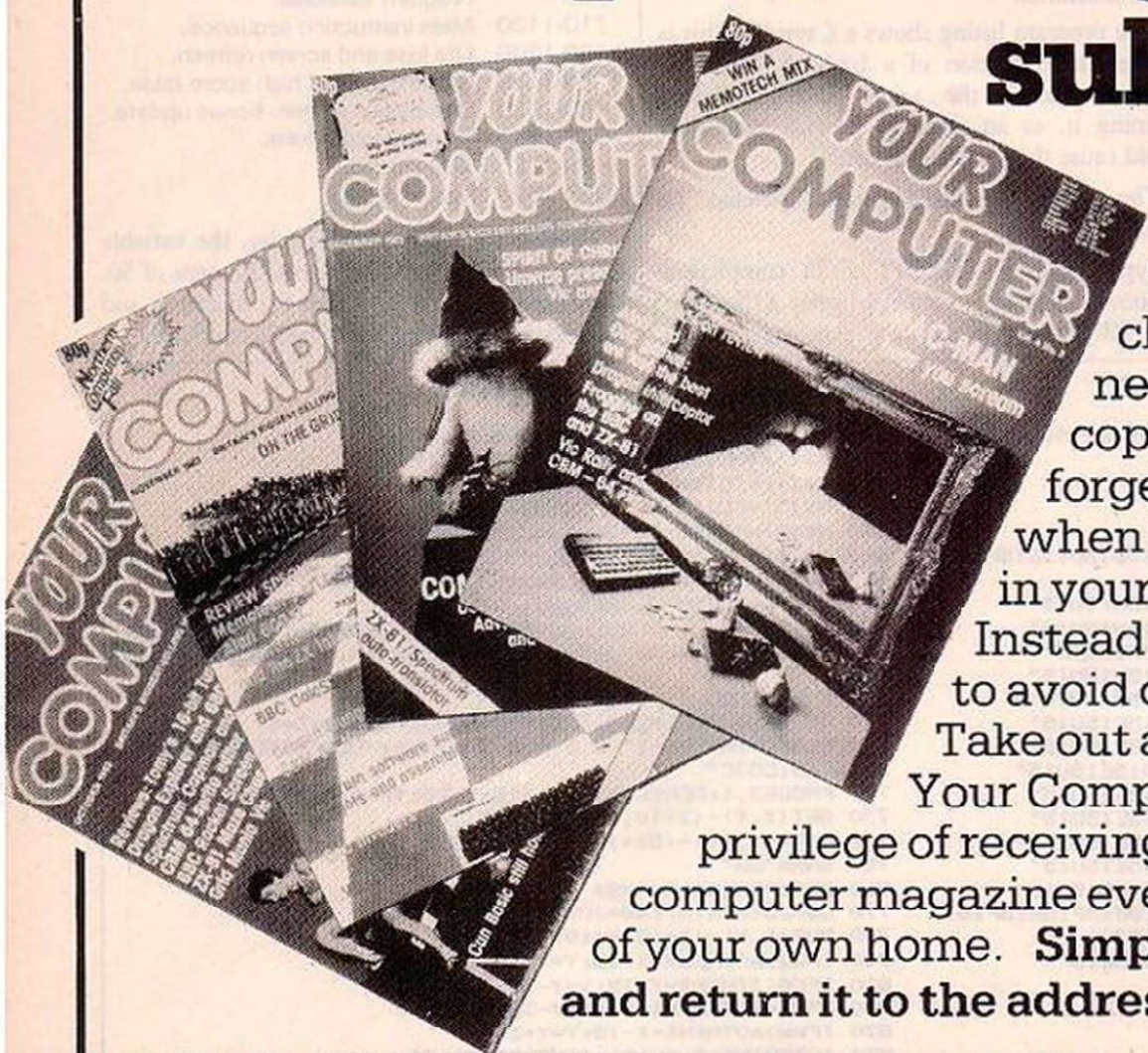
110 CLS
120 CLEAR500,31999:PCLEAR8
130 DIMA(10),A$(10):FORF=1TO10:A(F)=10000-(F*1000):A$(F)="HOPIT":NEXTF
140 GOSUB1670
150 DIMQQ(3),WW(3),EE(3),RR(3)
160 PMODE3,1:PCLS
170 DRAW"BM108,20;C3;E15F15G15H15I15J15K15L15M15N15O15P15Q15R15S15T15U15V15W15X15Y15Z15";
180 DRAW"BM108,35;C3;G15F15E15D15C15B15A15";
190 DRAW"BM73,65;C3;G15F15E15D15C15B15A15";
200 DRAW"BM78,95;C3;G15F15E15D15C15B15A15";
210 DRAW"BM63,125;C3;G15F15E15D15C15B15A15";
220 DRAW"BM138,35;C3;F15G15H15I15J15K15L15M15N15O15P15Q15R15S15T15U15V15W15X15Y15Z15";
230 DRAW"BM153,65;C3;F15G15H15I15J15K15L15M15N15O15P15Q15R15S15T15U15V15W15X15Y15Z15";
240 DRAW"BM168,95;C3;F15G15H15I15J15K15L15M15N15O15P15Q15R15S15T15U15V15W15X15Y15Z15";
250 DRAW"BM183,125;C3;F15G15H15I15J15K15L15M15N15O15P15Q15R15S15T15U15V15W15X15Y15Z15";
260 DRAW"BM123,65;C3;F15G15H15I15J15K15L15M15N15O15P15Q15R15S15T15U15V15W15X15Y15Z15";
270 DRAW"BM108,95;C3;F15G15H15I15J15K15L15M15N15O15P15Q15R15S15T15U15V15W15X15Y15Z15";
280 DRAW"BM93,125;C3;F15G15H15I15J15K15L15M15N15O15P15Q15R15S15T15U15V15W15X15Y15Z15";
290 DRAW"BM138,95;C3;F15G15H15I15J15K15L15M15N15O15P15Q15R15S15T15U15V15W15X15Y15Z15";
300 DRAW"BM153,125;C3;F15G15H15I15J15K15L15M15N15O15P15Q15R15S15T15U15V15W15X15Y15Z15";
310 DRAW"BM48,155;C3;G15E15F15D15C15B15A15";
320 DRAW"BM123,125;C3;F15G15H15I15J15K15L15M15N15O15P15Q15R15S15T15U15V15W15X15Y15Z15";
330 COLOR2,1
340 CIRCLE(15,14),4
350 LINE(11,20)-(19,20),PSET
360 PAINT(15,14),2,2
370 LINE(10,12)-(20,12),PSET
380 LINE(14,11)-(16,11),PSET
390 PSET(15,10,4)
400 LINE(13,17)-(13,20),PSET
410 LINE(17,17)-(17,20),PSET
420 PSET(15,14,4)
430 PSET(15,20,1)
440 GET(10,10)-(20,20),QQ,G
450 CIRCLE(30,30),5,4:CIRCLE(30,30),2,4
460 GET(25,25)-(35,35),EE,G
470 PAINT(0,0),4,3
480 DRAW"BM5,5;C1;D20U10R10U10D20"
490 DRAW"BM20,5;C2;BM+3,+0;G3D14F3R4E3U14H3L4"
500 DRAW"BM35,5;C1;D20U17E3R4F3D4G3L4H3"
510 DRAW"BM50,5;C2;R10L5D20R5L10"
520 DRAW"BM65,5;C1;R10L5D20"
530 DRAW"BM80,5;C2;BM+2,+0;G2D10F2E2U10H2;BM82,20R1F2D162L1H2U1E2"
540 PMODE3,5:PCLS
550 PCOPY1TO5:PCOPY2TO6:PCOPY3TO7:PCOPY4TO8
560 SCREEN0,1
570 DIMN$(11)
580 N$(0)="C1BM+0,-1FR2EU4HL2GD4"
590 N$(1)="C1BM+1,+0U6G"
600 N$(2)="C1BM+4,+0L4EUR2EUHL2G"
610 N$(3)="C1BM+0,-1FR2EUHL2R2EUHL2G"
620 N$(4)="C1BM+3,0U6G3R4"
630 N$(5)="C1BM+0,-1FR2EU2HL3U2R4"
640 N$(6)="C1BM+0,-2ER2FDGL2HU4ER2F"
650 N$(7)="C1BM+2,+0U2E2U2L4"
660 N$(8)="C1BM+1,+0R2EUHL2HUER2FDGL2GDF"
670 N$(9)="C1BM+0,-1FR2EU4HL2GD4FR3"
680 S$="C1BM+0,-1FR2EH4ER2FBM+4,+5HU4ER2FHL2GD4FR2EBM+4,+1R2EU4HL2GD4FBM+6,+0U6R3FDGLRF3BM+4,+0R4L4U3R4L4U3R4"
690 GOSUB1530
700 SC=0:LI=3:LE=250:T=0:A=0:B=0:C=0:E=0:D=0
710 CLS:PRINT@266," R E A D Y ":PLAY"02V31T5L8GAAEBO3C02GAGE01C03C"
720 PMODE3,1:SCREEN1,0:X=118:Y=20:TF=0:SX=118:SY=80
730 GET(X,Y)-(X+10,Y+10),WW,G
740 GET(SX,SY)-(SX+10,SY+10),RR,G
750 DRAW"SB"
760 DRAW"BM180,20"+S$
770 QQ=JOYSTK(0):WW=JOYSTK(1)
780 PUT(X,Y)-(X+10,Y+10),WW,PSET
790 IFQQ>60THENX=X+15:Y=Y+30:GOTO830
800 IFQQ<3THENX=X-15:Y=Y-30:GOTO830
810 IFWW<3THENX=X+15:Y=Y-30:GOTO830
820 IFWW>60THENX=X-15:Y=Y+30
830 IFPPPOINT(X,Y+10)=4THENGOTO1130
840 IFPPPOINT(X-1,Y-1)=1THENPAINT(X,Y),3,3:SC=SC+100:TF=TF+1:C=C+1
850 IFX=SX ANDY=SY THEN1130
860 GET(X,Y)-(X+10,Y+10),WW,G
870 PUT(X,Y)-(X+10,Y+10),QQ,PSET
880 IFLE>0THENFORF=1TO LE:NEXT
890 IFTF=21THEN1440
900 PUT(SX,SY)-(SX+10,SY+10),RR,PSET
910 IFT=0THENSY=SY+30
920 IFSX=X THENR=RND(2) ELSE960
930 IFR=1THENSX=SX+15:IFPPPOINT(SX-1,SY-1)=4THENSX=SX-30
940 IFR=2THENSX=SX-15:IFPPPOINT(SX-1,SY-1)=4THENSX=SX+30
950 GOTO980
960 IFX<SX THEN SX=SX-15:IFPPPOINT(SX-1,SY-1)=4THEN SX=SX+30
970 IFX>SX THENSX=SX+15:IFPPPOINT(SX-1,SY-1)=4THENSX=SX-30
980 GET(SX,SY)-(SX+10,SY+10),RR,G
990 PUT(SX,SY)-(SX+10,SY+10),EE,PSET

```

(continued on page 171)

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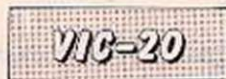
```

1090 COLOR4,1:LINE(180,21)-(256,40),PSET,BF
1100 DRAW"SB"
1110 DRAW"BM180,40"+N$(E)+"BM195,40"+N$(D)+"BM210,40"+
N$(C)+"BM225,40"+N$(B)+"BM240,40"+N$(A)
1120 GOTO770
1130 LI=LI-1
1140 EXEC32500:PLAY"D1T4V31L46GL76GL4B-AAGGFEG"
1150 IFLI=0THEN1210
1160 PRINT@266,"LIVES="LI
1170 T=0
1180 FORF=1TO1000:NEXTF
1190 PMODE3,1:PCLS
1200 PCOPY5TO1:PCOPY6TO2:PCOPY7TO3:PCOPY8TO4:SCREEN1,0
:GOTO720
1210 POKE&HFFD6,0:PLAY"V3101T2L46GL8B-AAGGFEG"
1220 CLSO
1230 PRINT@266,"game";"over";
1240 FORF=1TO250
1250 B=0
1260 NEXTF
1270 FORF=1TO10
1280 IFSC>A(F)THENB=F:F=10
1290 NEXTF
1300 IFB=0THEN1350
1310 FORF=10TO B STEP-1:A(F)=A(F-1):A$(F)=A$(F-1):NEXT
F
1320 CLS:A(B)=SC:INPUT"YOU ARE ONE OF THE TOP SCORERS
PLEASE ENTER YOUR NAME (LESS THAN 10 LETTERS)";B$
1330 IFLen(B$)>10THEN1320
1340 A$(B)=B$
1350 CLS:PRINT:PRINT"          HOPIT  HALL OF FAME"
1360 PRINT:FORA=1TO10:PRINT"  A".."A(A)"..."A$(A)
1370 NEXTA
1380 PRINT:PRINT" PRESS (SPACEBAR) TO PLAY AGAIN";
1390 SCREEN0,1
1400 FORF=1TO300
1410 AA$=INKEY$:IFAA$=""THENNEXTF:EXEC32000:GOTO1400
1420 IFAA$=CHR$(32)THENCLS:PCOPY5TO1:PCOPY6TO2:PCOPY7T
O3:PCOPY8TO4:GOTO700
1430 GOTO1420
1440 CLSO
1450 PRINT@266,"well";CHR$(128);"done";
1460 PLAY"O2T5CEFL1GP4L4CEFL1GP4L4CEFL2GECEL1DPBL4EEDL
2.CL4CL2EL4GGGL1FL4EFL2GEL4CL8DD+EGL4AL1O3C"
1470 LE=LE-50
1480 IFLI=3THENS=SC+1000:D=D+1
1490 IFLI<>3THENS=SC+500:FORF=1TO5:C=C+1:IFC>9THEND=D
+1:C=0 ELSE NEXTF
1500 IFLE=0THENPOKE&HFFD7,0:LE=150
1510 T=0
1520 PCOPY5TO1:PCOPY6TO2:PCOPY7TO3:PCOPY8TO4:GOTO720
1530 CLS:PRINT@266,"INSTRUCTIONS (Y/N)?"
1540 AA$=INKEY$:IFAA$=""THEN1540
1550 IFAA$="N"THEN RETURN
1560 IFAA$<>"Y"THEN1540
1570 CLS:PRINT"YOU ARE THE LONELY HOPIT AT THE TOP OF
THE PYRAMID OF CUBES.HALF WAY DOWN THE PYRAMID STARTS
THE EVIL BOUNCING RED BALL WHICH"
1580 PRINT"MUST BE AVOIDED AT ALL COSTS.THE BALL CAN O
NLY MOVE DOWN THE  SCREEN AND CANNOT BOUNCE UPWARDS.
WHEN THE BALL REACHES THE"
1590 PRINT"BOTTOM IT REAPPEARS AT THE TOP  OF THE PYRA
MID.":PRINT:PRINT" PRESS ANY KEY TO CONTINUE";:EXEC411
94
1600 CLS:PRINT"TO MAKE THINGS HARDER THE BALL  HOMES I
N ON YOU,SO BEWARE!"
1610 PRINT"  EACH TIME YOU JUMP ON A GREEN TOP CUBE IT
CHANGES TO A BLUE  TOP CUBE AND YOU GAIN 100 POINTS
IF YOU CHANGE ALL THE CUBE ";
1620 PRINT"TOPS BLUE THEN YOU GO ONTO A NEW  FASTER
SHEET AND GAIN A BONUS  TO YOUR SCORE"
1630 PRINT:PRINT" TO CONTROL THE HOPIT YOU USE  THE R
IGHT JOYSTCK.":PRINT:PRINT"PRESS ANY KEY TO CONTINUE":
EXEC41194
1640 CLS:PRINT" IF YOU CHOOSE TO USE THE  JOYSTIC
K THEN USE THE FOLLOWING DIRECTIONS TO MOVE:--"
1650 PRINT:PRINT" UP-LEFT = LEFT":PRINT:PRINT" UP-RIGH
T = UP":PRINT:PRINT" DOWN-LEFT = DOWN":PRINT:PRINT" DO
WN-RIGHT = RIGHT":PRINT:PRINT:PRINT"PRESS ANY KEY TO S
TART":EXEC41194
1660 RETURN
1670 CLS:PRINT"          HOPIT"
1680 DATA2,2,7,2,2,3,7,3,2,4,7,4,2,5,3,5,4,5,5,5,6,5,7
,5,2,6,7,6,2,7,7,7,2,8,7,8
1690 DATA10,3,10,4,10,5,10,6,10,7,11,2,11,8,12,2,12,8,
13,2,13,8,14,8,14,2,15,3,15,4,15,5,15,6,15,7
1700 DATA18,2,19,2,20,2,21,2,22,2,18,3,23,3,18,4,23,4,
18,5,19,5,20,5,21,5,22,5,18,6,18,7,18,8
1710 DATA26,2,27,2,28,2,29,2,30,2,31,2,28,3,29,3,28,4,
29,4,28,5,29,5,28,6,29,6,28,7,29,7,26,8,27,8,28,8,29,8
,30,8,31,8
1720 DATA34,2,35,2,36,2,37,2,38,2,39,2,40,2,41,2,37,3,
38,3,37,4,38,4,37,5,38,5,37,6,38,6,37,7,38,7,37,8,38,8
,999,0
1730 CLSO
1740 READX,Y:IFX=999THEN1760
1750 SET(X+10,Y,5):GOTO1740
1760 DATA7,11,28,11,29,11,30,11,24,12,25,12,26,12,27,
12,28,12,29,12,30,12,31,12,32,12,20,13,21,13,22,13,23,
13,24,13,25,13,26,13,27,13,28,13,29,13,30,13,31,13,32,
13,33,13,34,13,35,13,999,0
1770 READX,Y:IFX=999THEN1790
1780 SET(X,Y,8):GOTO1770
1790 FORF=25TO30:SET(F,14,2):NEXTF
1800 FORF=24TO31:SET(F,15,2):NEXT
1810 FORF=23TO32:SET(F,16,2):NEXT
1820 FORF=22 TO 33:SET(F,17,2):NEXT
1830 FORF=21TO34:SET(F,18,2):NEXT
1840 FORF=17TO38:SET(F,19,2):NEXTF
1850 FORF=20TO35:SET(F,20,2):NEXT
1860 FORF=21TO34:SET(F,21,2):NEXT
1870 FORF=22TO33:SET(F,22,2):NEXT
1880 FORF=23TO32:SET(F,23,2):NEXT
1890 FORF=24TO31:SET(F,24,2):NEXT
1900 FORF=24TO31:SET(F,25,2):NEXT
1910 PRINT@428,CHR$(159);:PRINT@431,CHR$(159);
1920 PRINT@269,CHR$(206);:PRINT@270,CHR$(205);:PRINT@3
01,CHR$(203);:PRINT@302,CHR$(199);
1930 PRINT@333,CHR$(156);:PRINT@334,CHR$(156);
1940 FORF=1TO3:PRINT@457+F,CHR$(223);:NEXT:FORF=1TO3:P
RINT@462+F,CHR$(223);:NEXT
1950 PRINT@457,CHR$(215);:PRINT@466,CHR$(219);
1960 DATA17,20,17,21,17,22,17,23,16,22,18,22,38,15,38,
16,38,17,38,18,37,16,39,16,999,0
1970 READX,Y:IFX=999THEN1990
1980 SET(X,Y,2):GOTO1970
1990 DATA32,40,3,41,32,1,14,4,18,5,23,32,23,1,20,19,15
,14,32,50,56,47,49,49,47,49,57,56,51,999
2000 A=0
2010 READX:IFX=999THEN2030
2020 POKE1504+AA,X:AA=AA+1:GOTO2010
2030 DATABASE,04,00,8C,06,00,27,29,A6,00,B1,40,25,17,81,
80,25,19,1F,B9,C4,FO,84,OF,43,F7,7F,FF,B4,OF,BB,7F,FF,
A7,80,20,DE,8B,40,A7,80,20,DB,8B,C0,A7,80,20,D2,39
2040 FORF=1TO50:READZZ$:POKE31999+F,VAL("&H"+ZZ$):NEXT
F
2050 DATABASE,06,00,A6,00,43,A7,80,8C,1E,00,26,F6,39
2060 FORF=1TO14:READZZ$:POKE32499+F,VAL("&H"+ZZ$):NEXT
F
2070 RETURN

```

Moon Land

P Ingram,
Stoke-on-Trent,
Staffordshire.



THIS GAME for the unexpanded Vic-20 is based on an arcade game. The object of the game is to land your ship on any of the three red bases, the controls to do this are: Z = Left and C = Right.

If you decide that you cannot make a landing you can abort the mission by pressing the space-bar. This will launch your ship back into space but will use more fuel. When all of

your fuel is used up you will fall to the surface of the planet. However you can still guide your ship to the landing base.

When you land a ship you are awarded a number of points — the amount depends upon the speed of the game and the amount of fuel left.

If you crash you will lose one of your six lives. A two-part relocatable machine-code routine is used to reprint the background to prevent the ship erasing the stars, part 1 (SYS 673) saves the displayed picture in RAM; part 2 (SYS705) reprints the picture stored in RAM back on to the screen.

The screen shows score; ships and a fuel bar

which turns red as the fuel is used.

Lines	
110-430	Main program
600	Crash routine
700	Landed routine
800	Game over
1000	Abort routine
1200	No fuel routine
2000	Instructions, chr + M/C DATA, lower ram top

The program works by looking at each colour location 38400 to 38905. The value Peeked at each location is loaded into the

(continued on next page)

SOFTWARE FILE

(continued from previous page)

accumulator, this value is first added with 15 and then compared with the two chosen colours; if it is one of the two chosen colours then the accumulator is loaded with the opposite colour, the program then jumps back

and Pokes the memory location with the new colour.

If it is not one of the chosen colours the program jumps back and Pokes the memory with the old value i.e., no change in colour.

This is repeated until all of the screen has

been covered.

If the value Peeked at each location is not added with 15 the program will not work due to the fact that the character colour is only four bits long but each location peeked is eight bits long.

```

110 GOSUB2000:W=0:L=5:F=10:N=0
250 A=0:P=INT(RND(TI)*17)+7702:F=10
254 FORG=1 TO 10:POKE8170+G,37:POKE38890+G,5:NEXT
255 PRINT"SCORE:"W/TAB(14)"SHIPS:"L
258 PRINT"*****FUEL *****F"
260 K=PEEK(197):R=INT(RND(TI)*3):F=F-.3
265 POKEP+A,35:POKEP+A+30720,1:POKE36878,10:POKE36877,253
268 M=PEEK(P+A+22)

270 IFK=32ANDP+A<8142THEN1000
280 IFR=0ANDK=64THENA=A+22
290 IFR=1ANDK=64THENA=A+21
300 IFR=2ANDK=64THENA=A+23
310 IFK=33THENA=A+21
311 IFK=34THENA=A+23
350 IFM<>32ANDM<>46THEN600
360 FORDE=1 TO H:NEXT:SYS705:IFH>15THENH=H-1
385 IFF<0THEN1200
420 FORG=1 TO FSTEP-.1:POKE38890+G,2:NEXT:GOTO260
430 IFF+A<8105THEN260
600 IFM=37THEN700
610 POKE36877,200:L=L-1
620 FORS=15 TO 0STEP-.1:POKE36878,S:NEXT
630 PRINT"*****CRASHED"
635 FORDE=0 TO 2000:NEXT:SYS705
640 POKE36877,0:IFL<0THEN800
650 GOTO250
700 POKE36878,15
710 FORJ=0 TO 2:FOR T=200 TO 220:POKE36876,T:NEXTT,J:POKE36876,0
720 PRINT"*****LANDED":N=N+1
740 W=W+100+INT(5000/H+F)
750 FORDE=0 TO 2000:NEXT:SYS705:GOTO250
800 FORDE=0 TO 3000:NEXT
810 PRINT"*****GAME OVER":PRINT"YOU SCORED"W
830 PRINT"*****LANDED"N":END
1000 POKE36878,15:POKE36877,130
1020 FORS=0 TO 7:POKEP+A,35:POKEP+A+30720,1:F=F-.2:IFF<0THENPOKE
36877,0:GOTO1200
1030 FORDE=0 TO 90:NEXT:POKEP+A+22+30720,2
1040 POKEP+A+22,38:FORDE=0 TO 90:NEXT:POKEP+A+22,39
1050 FORDE=0 TO 90:NEXT:SYS705
1060 IFF+A-22>7702THENA=A-22
1070 NEXT
1080 POKE36877,0:POKE36878,0:GOTO260
1200 PRINT"*****NO FUEL"
1210 POKE36878,15
1220 FORU=235 TO 190STEP-.5:POKE36876,U:NEXT
1230 POKE36878,0:POKE36876,0:IFL<0THEN800
1235 GOTO260
2000 PRINT"*****MOON LANDER"
2010 PRINT"*****MOON LANDER"
2040 PRINT"*****LEFT":PRINT"*****RIGHT"
2070 PRINT"*****SPACE TO ABORT"
2090 FORA=0 TO 511:POKE7168+A,PEEK(32768+A):NEXT
2090 FORA=0 TO 39:READZ:POKE7448+A,Z:NEXT
2110 PRINT"*****POKE36879,8:POKE36869,255
2130 FORA=0 TO 30:S=INT(RND(TI)*300)
2140 POKE7702+S,46:POKE36422+S,7:NEXT
2150 PRINT"*****"
2160 L=673
2170 READZ:IFZ=-1THEN2210
2180 POKEL,Z:L=L+1:GOTO2170
2200 POKE51,50:POKE52,24:POKE55,50:POKE56,24
2210 SYS673
2220 RETURN
2250 DATA24,36,126,90,126,36,66,231,24,100,131,0,0,0,0
2260 DATA255,255,255,255,0,0,0,0
2270 DATA36,36,24,24,0,0,0,0,90,66,36,36,24,24,0
2280 DATA162,0,189,22,30,157,136,24,189,242,30,157,100,25
2290 DATA199,22,150,157,64,26,189,242,150,157,28,27
2300 DATA232,224,220,208,227,96
2310 DATA162,0,189,136,24,157,22,30,189,100,25,157,242,30
2320 DATA189,64,26,157,22,150,189,28,27,157,242,150
2330 DATA232,224,220,208,227,96,-1

```

Space hopper

Gavin Day,
Bungay,
Suffolk.



SOME TIME AGO I saw for the first time, the popular arcade game Moon Buggy. I thought it would be good to write a variation of this on my Oric 1.

This game is very simple as only the space bar is used for jumping. You control a space hopper while exploring the moon's surface.

The problem is, as you move along, you come across craters which, if you fall down, you die. These must be jumped over. You have to get as far as possible with one life. If you think that's boring then you had better read on.

Every so often a landing pad or Jewel appears on which you can land for bonus points. At the end of the game you will be told your score and whether it is a new high score or not. If it is left like this for long enough, the computer will exit from that part and return to the instructions via a colourful display.

This program includes some machine code

which was submitted to the July 1983 edition of *Your Computer* by Myles Dunlop. The machine code scrolls the screen from right to left. I used Pokes for printing the Moon Hopper and Peeks to check if it is going to hit a landing pad or jewel or if it is going to fall down a crater. The machine code is located in high-resolution graphics memory so it would be advisable not to type Hires before saving the game, otherwise it will have to be retyped in. Warning: Take a £ sign for A#.

For those of you who are new to programming, each subroutine is labelled with a Rem.

```

5 REM MOON HOPPER - G. DAY
7 PAPER0: INK7
9 REM M/C COURTESY OF MYLES DUNLOP / JULY YOUR COMPUT
ER
10 A=#9800
20 READB:IFB=999THEN154
30 POKEA,B
40 A=A+1
50 GOTO20
60 DATA#A9,128,#85,128,#A9,187,#85,129
70 DATA#A9,1,#85,130,#A5,128,#85,131
80 DATA#A5,129,#85,132,#A6,130,#A5,131
90 DATA#1B,#69,40,#85,131,#A5,132
100 DATA#69,0,#85,132,#CA,#D0,240
110 DATA#A0,3,#B1,131,#88,#91,131,#CB
120 DATA#CB,#C0,39,#D0,245,#A9,32
125 DATA#91,131,#88,#91,131
130 DATA#A6,130,#EB,#E0,28
140 DATA#F0,5,#86,130,#1B,#90,198,#60
150 DATA999
154 GOSUB1500:UDG'S
155 GOSUB1000:INSTRUCTION OP.
160 REM INITIALISE
170 SC=0:LP=000:J=000:PC=0:HS=100
180 PRINTCHR$(17)
200 REM MAIN LOOP
201 CLS:PAPER0: INK7
210 POKE775,255
220 A=INT(RND(1)*1)+23
230 REPEAT
235 PC=PC+1
240 PLOT37,A,126:PLOT37,24,126:PLOT37,25,126:PLOT37,2
6,126
250 CALL#9800
260 UNTILPC=37:PC=0
270 X=48888
280 POKEX,97:POKEX+1,98:POKEX+40,99:POKEX+41,100
290 PLOT10,5,"PRESS ANY KEY TO BEGIN"
300 GETZZ$
310 CALL#9800
320 POKEX,97:POKEX+1,98:POKEX+40,99:POKEX+41,100
330 POKEX-1,32:POKEX+39,32
340 A=INT(RND(1)*2)+23
350 PLOT37,A,126:PLOT37,24,126:PLOT37,25,126:PLOT37,2
6,126
360 K$=KEY$
370 IFK$="" THENGOSUB430
380 IFPEEK(X+80)=32THEN570
401 IFPEEK(X+41)=101THEN610
402 J=J+1
403 IFJ=050THENPLOT36,21,105:PLOT37,21,106:PLOT36,22,
107:PLOT37,22,108:J=0
404 LP=LP+1
405 IFLP=025THENPLOT36,22,101:PLOT37,22,102:LP=0
406 SC=SC+1
429 GOTO310
430 REM JUMP SUBROUTINE
440 FORN=1 TO 4
450 POKEX,97:POKEX+1,98:POKEX+40,99:POKEX+41,100
451 A=RND(1)*2+23
452 PLOT37,A,126:PLOT37,24,126:PLOT37,25,126:PLOT37,2
6,126
460 CALL#9800
470 X=X-40
480 POKEX+80,32:POKEX+81,32:POKEX-1,32:POKEX+39,32:PO
KEX+79,32

```

(continued on page 174)

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SOFTWARE FILE

(continued from page 172)

```

490 NEXTN
500 FORN=1T04
510 POKE X,97:POKE X+1,98:POKE X+40,99:POKE X+41,100
511 A=RND(1)*2+23
512 PLOT37,A,126:PLOT37,24,126:PLOT37,25,126:PLOT37,2
6,126
520 CALL#9800
530 X=X+40
540 POKE X-40,32:POKE X-39,32:POKE X-1,32:POKE X+39,32:PO
KEX-41,32
545 IFPEEK(X+80)=1010RPEEK(X+81)=1010RPEEK(X+80)=102T
HENGOSUB610
546 IFPEEK(X+80)=1070RPEEK(X+80)=1080RPEEK(X+81)=107T
HENGOSUB680
550 NEXT
560 RETURN
570 REM CRASH SUBROUTINE
580 POKE X,32:POKE X+1,32:POKE X+40,103:POKE X+41,104
590 FORN=12T01STEP-1:MUSIC1,3,N,0:PLAY1,0,1,5000:NEXT
600 GOTO720
610 REM LAND ON PAD SUBROUTINE
620 PRINT:PRINT:PRINT:PRINTSPC(10)CHR$(142)"WELL DONE
!!!!!"
630 PRINTSPC(10)CHR$(142)"WELL DONE !!!!"
640 FORN=1T0B:PING:WAIT4:NEXTN
650 PRINT:PRINT:PRINT:PRINT:PRINT"          500
BONUS"
655 WAIT50
660 FORN=1T013:FORN=1T037:PLOTN,M,32:NEXT:NEXT
665 SC=SC+500
666 PRINT"          PRESS ANY KEY TO CONTINUE"
667 GETZZ$
668 FORN=1T03:GOTO450
675 REM LAND ON JEWEL SUBROUTINE
680 PRINT:PRINT:PRINT:PRINTSPC(10)CHR$(138)"1000"
690 PRINTSPC(10)CHR$(138)"1000"
700 FORN=1T06:MUSIC1,N,7,10:WAIT2:NEXT:PING
704 SC=SC+1000
705 X=X+40
710 RETURN
720 FORN=1T06:INK0:PAPER7:INK7:PAPER0:NEXT
730 CLS
740 PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINTSPC(9)"YOUR SC
ORE IS ";SC
750 IFSC>=HSTHENPLOT10,15,"A NEW HIGH SCORE":HS=SC
770 PLOTS,23,"PRESS SPACE FOR ANOTHER GAME"
780 PLOT6,24,"PRESS 'I' FOR INSTRUCTIONS"
788 DOKE#276,65535
789 REPEAT
790 ZZ$=KEY$
800 IFZZ$=" "THENRUN
810 IFZZ$="I"THEN1070
820 UNTIL DEEK(#276)=65035
821 GOSUB2000'DISPLAY
1000 REM INSTRUCTION OPTION
1010 CLS:PRINT"          m n n o p n q q r s"
1020 PRINT:PRINT:PRINT:PRINT:PRINT"DO YOU REQUIRE IN
TRUCTIONS (Y/N) ?"

```

```

1030 INPUTI$
1040 IFI$="N"THEN160
1050 IFI$="Y"THEN1070
1060 GOTO1030
1070 CLS:PRINT"          m n n o p n q q r s"
1080 PRINT:PRINT:PRINT"          YOU PATROL A MOON HOPPER
AND "
1090 PRINT"HAVE TO HOP OVER THE MOONSCAPE "
1100 PRINT"AVOIDING THE HOLES AND CRATERS USING"
1110 PRINT"THE SPACE BAR TO JUMP.EVERY SO OFTEN"
1120 PRINT"A LANDING PAD OR A JEWEL WILL APPEAR"
1130 PRINT"ON WHICH YOU CAN LAND TO GAIN EXTRA"
1140 PRINT"POINTS."
1150 PRINT:PRINT:PRINT"          ab"
1160 PRINT"          cd = MOON HOPPER (YOU)
1170 PRINT:PRINT"          ij"
1180 PRINT"          kl = JEWEL"
1190 PRINT:PRINT:PRINT"          ef = LANDING PAD"
1200 PLOTS,26,"PRESS ANY KEY TO START"
1210 GETZZ$:GOTO160
1500 REM USER DEFINED GRAPHICS
1510 FORY=1T019
1520 READDTA:FORI=DTATODTA+7
1530 READF:POKEI,F
1540 NEXTI:NEXTY
1550 DATA46856,16,8,4,3,7,9,19,63
1560 DATA46864,2,4,8,48,56,36,50,63
1570 DATA46872,54,31,13,7,9,16,16,56
1580 DATA46880,27,62,44,56,36,2,2,7
1590 DATA46888,0,63,10,12,16,31,40,48
1600 DATA46896,0,63,20,12,2,62,5,3
1610 DATA46904,32,25,15,12,25,31,54,26
1620 DATA46912,6,40,48,48,48,8,42,12
1630 DATA46920,0,0,0,1,3,6,13,27
1640 DATA46928,0,0,0,32,48,56,60,62
1650 DATA46936,55,23,31,15,15,7,3,1
1660 DATA46944,63,62,62,60,60,56,48,32
1670 DATA46952,18,63,63,63,63,51,51,18
1680 DATA46960,12,30,63,51,51,63,30,12
1690 DATA46968,18,59,63,63,63,63,55,18
1700 DATA46976,18,51,51,63,63,51,51,18
1710 DATA46984,30,63,59,63,62,56,56,16
1720 DATA46992,31,62,48,62,62,48,62,31
1730 DATA7000,30,63,59,63,60,62,55,19
1740 RETURN
2000 CLS:Q=1:PRINT
2001 REPEAT
2010 A=INT(RND(1)*7)+128
2020 PRINTCHR$(142)CHR$(A)"          m n n o p n q q r
s"
2030 PRINTCHR$(142)CHR$(A)"          m n n o p n q q r
s"
2035 Q=Q+1
2036 PRINT:PRINT
2037 MUSIC1,5,Q,B
2040 UNTILQ=6
2045 WAIT20
2050 PING
2060 WAIT100:GOTO1070

```

Black Adder

BBC

Nigel Gray,
Bolton,
Lancashire.

ELECTRON

AT THE MENTION of machine code, most people scream and try to forget they had ever heard of it. One of the most attractive features of the Acorn Electron is its built-in assembler, which makes learning machine code so much easier for this type of person. For the experienced programmer, it makes the debugging process so much easier and quicker.

The Black Adder is a game written for the Electron in assembly language, though it will run on a BBC Model B with MOS 1.2. After assembling the code, the program asks you if you require instructions. On hitting Y it will tell you that you play a snake — a very hungry snake — who is trying to eat all the strawberries as they appear. Eating a strawberry causes the snake to grow one character bigger; then another strawberry will appear for the snake to eat.

However, there are quite a few snags. These are not ordinary strawberries, but mutant

ones. After a certain time, they mutate into an alien fruit, lethal to your snake. What is more, even if the snake manages to eat the strawberry in time, the area around it is still contaminated, causing a mutant fruit to grow after the original time limit has elapsed.

You can probably see that as the game goes on, and your snake gets longer and longer, and the screen begins to fill with poison fruit, it becomes increasingly difficult, until eventually it is downright impossible! To make it even worse, the snake also dies if it crashes into the wall or tries to eat itself.

To control the snake, use keys A — up, Z — down, N — left, M — right. To run the program, simply enter it in, and type run, whereupon the machine code will be assembled. Pressing a key will ask you if you want instructions and — why not type it in and see? Or if you find the listing too daunting to type, a cassette version is available from me at the address below. If you require a cassette, please send £3.50 including postage and packing. Nigel Gray, 53 Buttermere Road, Farnworth, Bolton, BL4 0RJ, Lancs. In the listing please read a hash sign wherever there is a £.

```

10DIMQX1000
20FORIX=0T03STEP3
30FX=QZ
40IDPTIX
50.HX EQUB 10
60.HY EQUB 15
70.TX EQUB 12
80.TY EQUB 15
90.Count EQUB 128
100.TempX EQUB 0
110.TempY EQUB 0
120.TempA EQUB 0
130.Len EQUB 3
140.Dir EQUB 0
150.X EQUB RND(30)
160.Y EQUB RND(24)
170.Plot PHA
180LDA#31
190JSR&FFEE
200TXA
210JSR&FFEE
220TYA
230JSR&FFEE
240PLA
250JSR&FFEE
260RTS
270.Read LDA#31
280JSR&FFEE
290TXA
300JSR&FFEE
310TYA
320JSR&FFEE
330LDA#135
340JSR&FFF4
350RTS
360.Dsnake LDX HX
370LDY HY
380LDA#224
390JSR Plot:INX
400JSR Plot:INX
410JSR Plot
420RTS
430.Dtarg LDX X
440LDY Y
450LDA#225
460JSR Plot
470RTS
480.Snake LDX Dir
490CPX#0
500BEQ Left
510CPX#1
520BEQ Right
530CPX#2
540BEQ Up
550CPX#3
560BEQ Down
570RTS
580.Left JSR Testch
590LDA#32
600LDX TX
610LDY TY
620JSR Plot
630LDX HX
640LDY HY
650LDA#224
660DEX
670STX HX
680JSR Plot
690JSR Edge
700JSR Tail
710RTS
720.Right JSR Testch
730LDA#32
740LDX TX
750LDY TY
760JSR Plot
770LDX HX
780LDY HY
790.LDA#224
800INX

```

SOFTWARE FILE

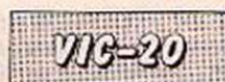
```

810STX HX          1230JMP TestX          1650DEX          2070INX          2490LDY TY
820JSR Plot       1240.Ret LDX Dir       1660 .Readch STX TempX 2080JMP ReadX    2500INX
830JSR Edge       1250CPX#0          1670STY TempY       2090.Xup LDX HX  2510STX TempX
840JSR Tail       1260BEQ Chleft      1680JSR Read        2100LDY HY       2520STY TempY
850RTS            1270CPX#1          1690CPX#128        2110DEY          2530JSR Read
860.Up JSR Testch 1280BEQ Chrightr    1700BEQ Dead2      2120JMP ReadX    2540JSR Jump
870LDA#32         1290CPX#2          1710RTS            2130.Xdown LDX HX 2550RTS
880 LDX TX        1300BEQ Chup        1720.Dead2 JMP Finish 2140LDY HY       2560.Jump CPX#128
890 LDY TY        1310CPX#3          1730.Chrightr LDX HX 2150INY          2570BEQ Testn
900JSR Plot       1320BEQ Chdown      1740LDY HY         2160JMP ReadX    2580RTS
910LDX HX         1330RTS            1750INX            2170.Edge CPX#0  2590 .Testn LDX TempX
920LDY HY        1340.Oleft LDX HX   1760JMP Readch     2180BEQ Dead3    2600LDY TempY
930LDA#224       1350LDY HY          1770.Chup LDX HX   2190CPX#39       2610CPX HX:BEQ TestY
940 DEY          1360DEX            1780LDY HY         2200BEQ Dead3    2620CPY HY:BEQ TestX
950STY HY        1370.Read0 STX TempX 1790DEY            2210CPY#3        2630.Reta DEY
960JSR Plot       1380STY TempY       1800JMP Readch     2220BEQ Dead3    2640JSR Read
970JSR Edge       1390JSR Read        1810.Chdown LDX HX 2230CPY#29       2650STX#70
980JSR Tail       1400CPX#129        1820LDY HY         2240BEQ Dead3    2660LDX TempX
990RTS           1410BEQ Increase    1830INY            2250RTS           2670LDY TempY
1000.Down JSR Testch 1420JMP TestX      1840JMP Readch     2260.Dead3 JMP Finish 2680INY
1010LDA#32        1430.Increase LDX TempX 1850.TestX LDA Dir 2270.Tail LDX TX 2690JSR Read
1020LDX TX        1440LDY TempY       1860CMP#0          2280LDY TY        2700CPX#128
1030LDY TY        1450LDA#224        1870BEQ Xleft      2290DEY           2710BEQ Comp1
1040JSR Plot       1460JSR Plot        1880CMP#1          2300STX TempX    2720.Testleft LDX TempX
1050LDX HX        1470STX HX          1890BEQ Xright     2310STY TempY    2730LDY TempY
1060LDY HY        1480STY HY          1900CMP#2          2320JSR Read     2740DEX
1070LDA#224       1490INC Len        1910BEQ Xup        2330JSR Jump     2750JSR Read
1080INY           1500RTS            1920CMP#3          2340LDX TX       2760STX#70
1090STY HY        1510.Oright LDX HX 1930BEQ Xdown     2350LDY TY       2770LDX TempX
1100JSR Plot       1520LDY HY          1940JMP Ret        2360INY           2780LDY TempY
1110JSR Edge       1530INX            1950.Xleft LDX HX  2370STX TempX    2790INX
1120JSR Tail       1540 JMP Read0     1960LDY HY         2380STY TempY    2800JSR Read
1130RTS           1550.Oup LDX HX    1970DEX            2390JSR Read     2810CPX#128
1140.Testch LDX Dir 1560LDY HY         1980.ReadX STX TempX 2400JSR Jump     2820BEQ Comp2
1150CPX#0         1570DEY            1990STY TempY     2410LDX TX       2830JMP Newtail
1160BEQ Oleft     1580JMP Read0     2000JSR Read       2420LDY TY       2840.Comp1 CPX#70
1170CPX#1         1590 .Odown LDX HX 2010CPX#130       2430DEX           2850BNE Testleft
1180BEQ Oright    1600LDY HY         2020BEQ Dead1     2440STX TempX    2860RTS
1190CPX#3         1610INY            2030 JMP Ret       2450STY TempY    2870.Comp2 CPX#70
1200BEQ Odown     1620JMP Read0     2040.Dead1 JMP Finish 2460JSR Read     2880BNE Newtail
1210CPX#2         1630.Chleft LDX HX 2050.Xright LDX HX 2470JSR Jump     2890RTS
1220BEQ Oup       1640LDY HY         2060LDY HY         2480LDX TX       2900RTS
2900.TestY CPY HY:BNE Reta:RTS
2910.TestX CPX HX:BNE Reta:RTS
2920.Newtail LDX TempX
2930LDY TempY
2940STX TX
2950STY TY
2960PLA:PLA
2970RTS
2980.Finish LDA#1:STA#71:PLA:PLA:RTS
2990.Counter DEC Count:BEQ Change:RTS
3000.Change LDX X:LDY Y:JSR Read:CPX#128:BEQ End:LDA#
226:LDX X:LDY Y:JSR Plot:.End RTS:]
3010NEXT
3020A=GET
3030MODE4
3040PRINT"" "Do you want instructions?(Y/N)"
3050A=GET#:IFA#="Y"THENPROCINSTRUCT
3060PROCSETUP
3070PROCDEFINE
3080CLS:COLOUR129
3090PRINTTAB(0,3);"
";TAB(0,29);"
"
3100FORI=3TO29:PRINTTAB(0,1);CHR#32;TAB(39,1);CHR#32:
NEXT
3110COLOUR128:COLOUR1
3120CALL Dsnake
3130CALL Dtarget
3140CALL Snake
3150CALL Counter
3160IF?#71=1THENGOTO3310
3170IFINKEY(-66)THEN?Dir=2
3180IFINKEY(-98)THEN?Dir=3
3190IFINKEY(-86)THEN?Dir=0
3200IFINKEY(-102)THEN?Dir=-1
3210FORN=0TO50:NEXT
3220IF ?Count=0 THEN PROCNEW
3230IF?Count=128THENGOTO3130
3240GOTO3140
3250DEFPROCNEW
3260SDUND1,1,100,5
3270?X=RND(38):?Y=RND(24)+4
3280X=?X:Y=?Y:IF (USR(Read)AND&FF00)DIV&100=128 THE
N GOTO 3270
3290?Count=128
3300ENDPROC
3310PRINTTAB(1,4);"You are dead"" You grew to a leng
th of "?Len
3320SDUND1,1,0,10
3330PRINT"" "Do you want another game(Y/N)"
3340*FX15,1
3350A=GET#
3360IF A#="Y"THENGOTO3030
3370END
3380DEFPROCDEFINE
3390VDU19,0,3,0,0,0:VDU19,1,1,0,0,0
3400VDU23,8202;0;0;0;
3410VDU23,224,231,231,231,24,24,231,231,231
3420VDU23,225,226,54,127,127,127,62,28,8,0
3430VDU23,226,8,28,62,127,62,28,8,0
3440ENDPROC
3450DEFPROCSETUP
3460?HX=10:?HY=15
3470?TX=12:?TY=15
3480?Count=128
3490?Len=3
3500?Dir=0
3510?X=RND(38):?Y=RND(24)+4:IF (USR(Read)AND&FF00)DIV
&100=128THENGOTO3510
3520?#71=0
3530ENDPROC
3540DEFPROCINSTRUCT
3550CLS
3560PRINT"" "*****SNAKE*****"
3570PRINT"" "You are a snake in a garden."
3580PRINT"" "You must eat the strawberries, "CHR#225" w
hich eventually mutate into poisonous fruit, "CHR#226
" which you must not eat"
3590PRINT"" "You also die if you crash into the wall or
eat yourself"
3600PRINT"" "A-UP N-LEFT""Z-DOWN M-RIGHT"
3610PRINT"" "Press any key to continue"
3620A=GET
3630ENDPROC

```

The Sirius Grid

Andrew Farlow,
Widley,
Portsmouth.



THIS GAME FOR the Vic-20 requires 3K expansion and a joystick. The instructions are

as follows:

A choice of skill is available before you start.

You have been sent to the grid, where you will be required to collect the light discs, which will be in each of the four corners of the grid — if you have chosen an easier level of skill there will only be light discs in the top corners of the grid.

Growing horizontally from the middle left

and right of the grid and vertically from the top of the grid, there is a living wall. The horizontal walls will grow towards the centre of the grid; you will lose a life if either of the horizontal walls reach the centre of the grid.

If the vertical wall reaches the white cross lower down the grid you will also lose a life — the white cross will be placed according to the current skill level. The higher the skill level

(continued on page 177)

ZX MICROFAIR

**DON'T
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ON APRIL
28th**

See the best and see it ALL at Ally Pally on 28th April 1984. The ideal day out for every Sinclair Computer owner!

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Saturday 28th April.

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Oric 1 computers 48K £143 (£141) £151. Oric colour printer £134 (£123) £140. New Sinclair QL Computer £495 (£455) £475. New Sinclair QL Computer £495 (£455) £475. Sinclair Spectrum 48K £131 (£131) £143. Spectrum 16K £101 (£105) £117. Microdrive £70 (£65) £75. RS232 interface £70 (£65) £75. Blank microdrive cartridges £8 (£8) £9. 32K memory upgrade kit for 16K Spectrum (issue 2 and 3 only) £31 (£28) £30. Fuller Master Unit for the Spectrum including speech unit, sound synthesizer, amplifier and joystick port £56 (£56) £62. Fuller full sized FDS keyboard for the Spectrum with proper space bar £52 (£52) £62. Spectrum printer interfaces with cables: - Centronics £57 (£53) £58. RS232 £35 (£33) £38. ZX printer £41 (£40) £50. 5 printer rolls £13 (£16) £21. ZX81 computer £45 (£44) £54. ZX81 16K ram packs £28 (£25) £30.

COMMODORE COMPUTERS

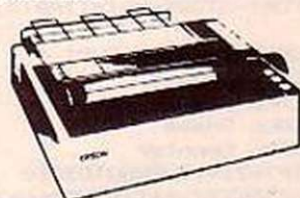
Commodore 64 £204 (£184) £204. Vic 20 £104 (£97) £117. Converter to allow most ordinary mono cassette recorders to be used with the Vic 20 and Commodore 64 £10.95 (£11) £13. Bargain package: - cassette converter + compatible cassette recorder £37 (£38) £44. Commodore cassette recorder £43 (£44) £50. Centronics printer interfaces for Vic-20 and Commodore 64 £45 (£44) £50. RS232 printer interface £45 (£44) £50. 1541

Disc drives £233 (£209) £234. 1525 Printer £235 (£220) £245. 1526 Printer £350 (£330) £360.

ACORN COMPUTERS

Electron £203 (£209) £229. BBC Model B £404 (£357) £487. 14" Colour monitor £228 (£229) £319. Kenda double density disk interface system for beeb £139 (£125) £135. 3" Floppy disc drive £178 (£160) £190. 80 track double sided 5.25" drives: - Single 400/800K £245 (£230) £250. Dual 800/1600K £455 (£420) £450.

PRINTERS



Brother HR5 £185 (£171) £190. Epson RX80 £306 (£271) £302. Epson RX80F/T £346 (£316) £346. Shinwa CTI CP80 £225 (£218) £248. Epson FX80 £440 (£408) £438. Epson MX100/3 £494 (£465) £495. Oki Microline 80 £213 (£197) £238. Oki Microline 84 £831. Combined matrix printers and electric typewriters: - Brother EP22 £173 (£168) £186. Brother EP44 £258 (£235) £260. Smith Corona TP1 Daisy wheel printers £252 (£225) £255. Oric colour printer £134 (£123) £140. Interfaces to run the above printers from Vic and the Commodore 64 £45 (£44) £50. We can supply interfaces to run the above printers from Sharp computers £58 (£52) £55.

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SOFTWARE FILE

(continued from page 175)

the higher the white cross, and so the less time you have to collect the discs.

Another difficulty is a laser, which will

move from left to right along the bottom of the grid. This will randomly fire a laser bolt which is lethal.

When you have collected all the discs you

must go down to the bottom of the grid, where this is a door — marked D — there you must wait until you are let in. You will then go onto the next grid skill level.

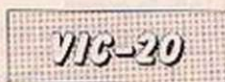
```

1 POKE36879,93:POKE36878,15
3 PRINT"U"
5 POKE37879,255
7 POKE36869,255
10 FORB=7424T07432:POKEB,0:NEXT
20 UD=7168
25 FORN=210T0250:FORE=NTON+4:POKE36876,E:NEXT
30 FORT=0T05:NEXT
40 READD
45 POKEUD,DD
50 UD=UD+1
55 NEXT:POKE36876,0
100 DATA0,24,E0,126,66,126,126,60
110 DATA126,126,126,126,36,100,4,6
120 DATA126,126,126,126,36,36,38,96
130 DATA0,56,56,16,124,16,48,68
140 DATA0,0,255,129,185,149,149,165,129
200 POKE36878,15
210 PRINT"          "
230 PRINT"  WHICH GRID DO YOU"
240 PRINT"  WISH TO ATTEMPT "
250 PRINT"  THE LOWER THE GRID "
260 PRINT"  THE EASIER I "
270 PRINT"  PRESS A KEY FROM(1-9):"
280 GETSR$:IFSR$=""THEN280
310 SR=VAL(SR$):SR$=""
320 POKE36879,172
340 REM COPYRIGHT ANDREW FARLOW(C)1983
350 PRINT"  THE SIRUS GRID "
360 PRINT"  LEVEL:"SR
370 CS=0:SI=SR*10/2:L1=3:SM=8166:LC=1
380 YD=0:130-SR*22
390 L1$="CCC"
400 GOSUB1220
410 PRINT"  GRID:"SR
420 PRINT"  LIVES:"L1$
430 POKE36874,0
440 POKE36874,4
450 IFSR<2THENPOKE7770,209:POKE7787,218
460 IFSR<1THENPOKE7770,209:POKE7787,218:POKE8122,211
470 IFSR<2THENPOKE7770,209:POKE7787,218:POKE8122,211:POKE8139,193
480 X1=7900:Y1=7756:X2=7921
490 SH=7910:AV=1
500 POKEYD+36720,1
510 GOSUB710
512 POKE5H,0:POKESH+22,LC
515 IFLC=1THENLC=2:GOTO520
517 IFLC=2THENLC=1
520 PRINT"  LIVES:"L1$
530 POKE36874,4
540 PRINT"  SCORE:"SC
550 SM=SM+1:POKESM,230:POKESM-1,219
560 IFSM>8182THENPOKESM,219:SM=8167
570 IFL=17THENL=0:GOSUB900
580 IFPEEK(7770)<209ANDPEEK(7787)<218THENCJ=17
590 IFCJ=17ANDPEEK(8122)<211ANDPEEK(8139)<193THENCJ=0:POKE36876,
200:D=D+0.5:CB=17
600 IFD=INT(D)THENPOKE36876,0
620 IFPEEK(36876)=200ANDPEEK(SH+22)=4THEN1070
640 IFX1<7900THENPOKEK1,218:X1=X1+1
650 IFX2<7922THENPOKEK2,219:X2=X2+1
660 IFY1<7734THENPOKEY1,219:Y1=Y1+22
660 POKEINT(X1),230:POKEINT(Y1),230:POKEINT(X2),230
670 X1=X1+0.14:X2=X2-0.14:IFAV=INT(AV)THENY1=Y1+22
680 IFX1>7911ORY1>YDORX2<7911THEN1180
690 IFRND(0)<0.2ANDCB<0.17ANDSM<0.174THENGOSUB1470
700 AV=AV+0.25:GOTO510
710 POKE37139,0:POKE37154,127:U=PEEK(37137):U0=<<(UAND4)=0>>
720 U1=<<(UAND0)=0>>:U2=<<(UAND16)=0>>:U4=<<(UAND32)=0>>
730 W=PEEK(37152):U3=<<(WAND128)=0>>:POKE37154,255
740 IFU0<0ANDPEEK(SH-22)<230ANDPEEK(SH-44)=219THENSH=SH-22:
F1=-22:POKESH+22,219:CF=17
750 IFCF=17THENCJ=0:POKESH+44,219
760 IFU1<0ANDPEEK(SH+66)<230THENSH=SH+22:F1=22:POKESH-22,219:CF=17
770 IFCF=17THENPOKESH-44,219
780 IFU2<0ANDPEEK(SH-1)<230ANDPEEK(SH-2)<235THENSH=SH-1:CJ=17
790 IFCJ=17THENCJ=0:F1=-1:POKESH+1,219:POKESH+23,219
800 IFU3<0ANDPEEK(SH+1)<230ANDPEEK(SH+2)<243THENSH=SH+1:CJ=17
810 IFCJ=17THENCJ=0:F1=1:POKESH-1,219:POKESH+21,219
820 IFU0<0ANDU2<0THENF1=-23
830 IFU0<0ANDU3<0THENF1=-21
840 IFU1<0ANDU2<0THENF1=21
850 IFU1<0ANDU3<0THENF1=23
860 IFU4<0THENL=17
870 RETURN
880 M=SH
890 FORH=8T08
890 POKEM,174
910 POKE36877,200-H
920 FORT=0T010:NEXT
930 IFM=INT(X2)THENX2=X2+1:POKEM,230:GOSUB1360:GOTO1060
940 IFM=INT(X1)THENX1=X1-1:POKEM,230:GOSUB1360:GOTO1060
950 IFM=INT(Y1)THENY1=Y1-22:POKEM,230:GOSUB1360:GOTO1060
960 IFM<7760THENPOKEM,219:GOTO1030
970 POKE36877,200-H
980 POKESH,0:POKESH+22,LC
990 POKEM,219
1000 M=M+1
1010 IFPEEK(M+1)=235ORPEEK(M-1)=235THEN1030
1020 NEXT:POKEM-F1,219
1030 IFSR<2THENPOKE7770,209:POKE7787,218
1040 IFSR<1THENPOKE7770,209:POKE7787,218:POKE8122,211
1050 IFSR<2THENPOKE7770,209:POKE7787,218:POKE8122,211:POKE8139,193
1060 POKE36877,0:POKE36876,0:RETURN
1070 POKE36876,0:PRINT"  JELL DONE "
ADVANCE TO LEVEL":SR+1
1080 YD=YD-22:CB=0
1090 PRINT"  SR:SR+1:SC=SC+500:SI=SR+10/2:GOTO400
1100 L1=L1-1:IFL1=0THEN1370
1110 IFL1=2THENL1$="CC"
1120 IFL1=1THENL1$="C"
1130 PRINT"  "
1140 IFL1=1THENPRINT"  LIFE LEFT:"GOTO1160
1150 PRINT"  LIVES LEFT "
1160 FORS=1T05
1170 FORR=200T0180STEP-1:POKE36876,R:NEXT
1180 FORR=100T0200:POKE36876,R:NEXT
1190 NEXT:POKE36876,0
1200 GOSUB1220
1210 GOTO440
1220 FORE=200T0230:FORN=ET0E+5:POKE36876,N:NEXT:NEXT:POKE36876,0
1225 PRINT"  "
1230 A$=" "
1240 FORA=0T020:PRINTA$:POKE36877,200:NEXT:PRINT"  "
1250 POKE8184,192:POKE30904,6:POKE8185,192:POKE38905,6
1260 B$="++++"
1270 FORA=0T020:PRINTB$:NEXT
1280 PRINT"  "
1290 POKE8184,219:POKE30904,6:POKE8185,219:POKE38905,6
1300 POKE36877,0:FORT=0T040:NEXT:FORE=200T0170STEP-2:POKE36877,E:
NEXT:POKE36877,0
1310 FORE=100T0190:POKE36875,E:NEXT:POKE36875,0
1320 FORP=760T08165STEP22:POKEP,235:NEXT
1330 FORP=770T08185STEP22:POKEP,243:NEXT
1340 PRINT"  GRID:"SR
1350 RETURN
1360 POKE36877,0:FORN=180T0200:POKE36876,N:NEXT:SC=SC+51:RETURN
1370 POKE36869,240:PRINT"  GAME OVER "
1380 PRINT"  YOU SCORED:"SC
1390 FORN=230T0100STEP-1:FURG=NTON-4STEP-1:POKE36876,0:NEXT:NEXT
1400 FORN=200T0190STEP-1:POKE36876,N:NEXT
1410 POKE36876,0
1420 PRINT"  PRESS THE FIRE "
1430 PRINT"  BUTTON TO "
1440 PRINT"  PLAY AGAIN "
1450 WAIT37137,32:WAIT37137,32,32
1460 RUN
1470 GOSUB710
1480 POKE36875,140
1490 POKESH,0:POKESH+22,LC
1500 FORKL=SMT0SM-418STEP-22:POKEKL,219
1510 POKEKL,194
1520 IFPEEK(SH)=194THENPOKE36877,0:GOSUB1580
1530 NEXT
1540 FORKL=SMT0SM-418STEP-22:POKEKL,219
1550 NEXT
1560 POKE36875,0
1570 RETURN
1580 FORT=0T0100:NEXT
1590 POKE36875,0:POKE36877,150
1600 E1=SH-1:E2=SH+1:E3=SH-22:E4=SH+22:E5=SH-23:E6=SH+23
1610 POKEE1,81:POKEE2,124:POKEE3,90:POKEE4,125:POKEE5,70:POKEE6,112
1620 POKEE1,219:POKEE2,219:POKEE3,219:POKEE4,219:POKEE5,219:
POKEE6,219
1630 E1=E1-1:E2=E2+1:E3=E3-22:E4=E4+22:E5=E5-23:E6=E6+23
1640 IFE3=SH-132THEN1660
1650 GOTO1610
1660 FORE=150T0240:POKE36877,E:NEXT
1670 FORT=0T0200:NEXT
1680 FORE=240T0200STEP-1:POKE36877,E:NEXT
1690 POKE36877,0:GOTO1100

```

Back-up

John Chippendale,
Basingstoke,
Hampshire.



THIS PROGRAM will enable you to make back-up copies of practically all Basic and most

machine code programs.

Load the program and when finished it will run itself. To get out of this press Run/Stop, this should cause a sound to be heard. This can be stopped by pressing the Run/Stop and Restore keys. When all is ready the program can be Run and first time round the computer will show:

PRESS PLAY ON TAPE
OK

The computer will not display Searching although it is really. It will also only load the first part of a program if the program is in two or three parts. When it has loaded the first part, another sound will be heard. This means the computer is waiting for the original cassette to be replaced with a blank cassette. After this the screen will show:

PRESS PLAY ON TAPE
OK

(continued on page 179)

You're going to a computer class.
 You have a computer in one hand,
 a tape, plug, leads, and two manuals
 in the other . . . and it is raining.
 It is a half mile to the the 'bus stop.'

Now ask yourself one important question . . .



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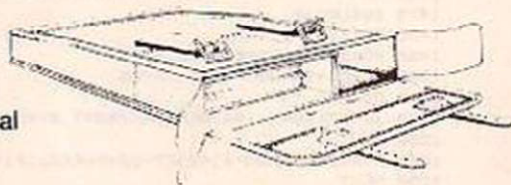
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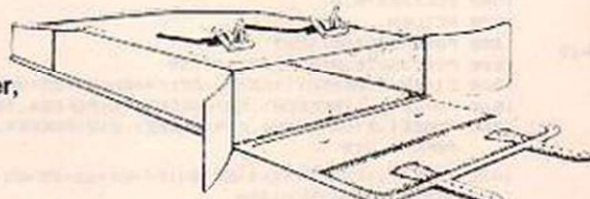
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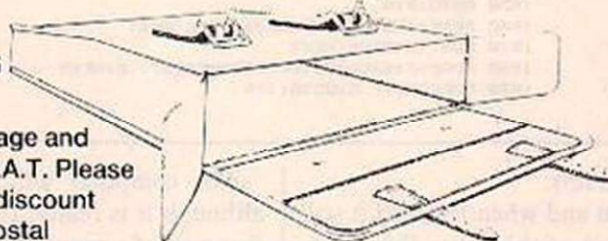
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SOFTWARE FILE

(continued from page 177)

The screen should not change at all. When the cassette is in press Play and Record and then press Return. The sound will then stop and the computer will Save the program that has been loaded. When it has finished the screen will be cleared and Ready appears.

If Run is typed in, the computer will run the program it has just loaded, this is why SYS256 must be used to re-run the program. The display this time will be different and also a beep will not be heard unless Poke 36878,15:SYS256 is entered to re-run it. This time the screen will show:

```
PRESS PLAY ON TAPE
OK
SEARCHING
FOUND abcdef
LOADING
```

When the program has loaded, replace the original cassette again and press Play and Record again not forgetting Return, the screen will then show:

```
SAVING abcdef
```

The screen will go blank when it has finished and to re-run use the instructions as above.

Sometimes on loading a program the screen might be filled/half-filled with random characters. This is nothing to worry about because the program will still work.

Utilities

T P Love,
Portsmouth,
Hampshire.



THIS PROGRAM provides two utilities to liven the Dragon's text screen; the inverting of any rectangle and the wrap-around of any rectangle. Run the program and press any of the keys to see them in action. To use these utilities in your own programs you need only add lines 10, 20 and the data statements to what you have already. Then if you want to inverse, for example, the box with T.L. corner at 170 and BR corner at 340 type:

```
PRINT@170"";USR01(340)
```

Using this method you can get all the inverse numerals and punctuation that is unavailable directly via the keyboard.

Vic Back-up.

79 POKE36878,15	121 DATA74
80 FORX=0T087:READY:POKE256+X,Y:NEXT	122 DATA168
85 SYS256	124 DATA169,1
90 DATA162,1,160,255,32,186,255,169,	126 DATA162,1
0,32,189,255,162,255	130 DATA32,186,255
100 DATA160,255,32,213,255	132 DATA162,128
104 DATA169,200	134 DATA160,1
105 DATA141,12,144	140 DATA169,65
106 DATA32,228,255	150 DATA32,189,255
107 DATA201,13	160 DATA173,61,3
108 DATA208,249	170 DATA133,0
109 DATA141,12,144	180 DATA173,62,3
111 DATA162,70	190 DATA133,1
112 DATA189,65,3	200 DATA169,0
113 DATA157,128,1	210 DATA174,63,3
114 DATA202	220 DATA172,64,3
115 DATA16,247	230 DATA32,216,255
120 DATA173,60,3	240 DATA0

Dragon utilities.

```
10 CLEAR200,32562:DEFUSR1=&H7F33:DEFUSR2=&H7F37
20 FORI=1T0179:READX$:X=VAL("&H"+X$):T=T+X:POKE32562+I,X:NEXTI
30 IF T<>20751 THENPRINT"ERROR":END
40 CLS6:PRINT@201,"DEMONSTRATION";:PRINT@236,"PROGRAM";:PRINT@76,"TESTING";:PRINT@105,"1..2..3..4..5";
50 IFINKEY$=""THEN50ELSE PRINT@39,"";:I=USR01(152)
60 IFINKEY$=""THEN60ELSE PRINT@202,"";:FORJ=1T013:PLAY"PB6":I=USR02(246):NEXTJ
70 GOTO50
80 DATA10,8E,0,1,DC,8B,FD,7F,E8,7F,7F,EA,BD,8B,2D,C3,4,1,B3,7F,E8
90 DATABE,0,1,10,83,0,20,2D,7,83,0,20,30,1,20,F3,F7,7F,EB,BF,7F
100 DATAEC,10,BC,0,1,26,23,10,BE,7F,EB,A6,A4,8B,40,A7,A0,5A,26,F7
110 DATABC,0,1,27,6A,1F,20,C3,0,20,B3,7F,EA,1F,2,F6,7F,EB,30,1F
120 DATA20,E1,10,BE,7F,EB,31,A5,31,3F,8E,7F,EE,F6,7F,ED,A6,A4,A7
130 DATAB0,5A,27,5,31,AB,20,20,F4,BE,7F,EC,F6,7F,EB,5A,31,3F,A6
140 DATAA0,A7,A4,31,3F,5A,26,F5,8C,0,1,27,12,1F,20,83,0,21,F3,7F
150 DATAEA,1F,2,F6,7F,EB,30,1F,5A,20,DE,10,BE,7F,EB,8E,7F,EE,F6
160 DATA7F,ED,A6,80,A7,A4,5A,27,5,31,AB,20,20,F4,FC,7F,EB,DD,8B,39
```

Clock.

```
5 DEF FNA(X)=INT(X/10)*16+(X-INT(X/10)*10)
6 POKE792,193
10 AD=49152
20 FORC=0T091:READH$
30 L=ASC(LEFT$(H$,1))-48
40 R=ASC(RIGHT$(H$,1))-48
50 POKEAD+C,(L+(L>8)*7)*16+(R+(R>9)*7)
60 NEXT
70 DATA2,00,AD,0B,DC,29,7F,20,00,00,A2,03,AD,0A,DC,20,00,00,A2,86,AD,09,DC
80 DATA20,00,00,AD,0B,DC,29,7F,20,00,00,A2,03,AD,0A,DC,20,00,00,A2,86,AD,09,DC
90 DATA4C,31,EA,48,29,F0,4A,4A,4A,4A,18,69,B0,9D,00,04,68,29,0F,18,69,B0
100 DATA9D,01,04,AS,07,9D,00,08,9D,01,08,60
110 DATA78,AS,08,9D,14,03,AS,08,8D,15,03,58,60
120 SU=AD+48:SH=INT(SU/256):SL=SU-SH*256
130 JH=INT(AD/256):JL=AD-JH*256
140 POKEAD+8,SL:POKEAD+9,SH
150 POKEAD+16,SL:POKEAD+17,SH
160 POKEAD+24,SL:POKEAD+25,SH
170 POKEAD+81,JL:POKEAD+86,JH
175 POKE56334,PEEK(56334)OR128
180 SYSAD+79
185 POKE56335,PEEK(56335)AND127
190 INPUT"HOURS":H:POKE56331,FNA(H)
200 INPUT"MINUTES":M:POKE56330,FNA(M)
210 INPUT"SECONDS":S:POKE56329,FNA(S):POKE56328,0
220 NEW
```

Clock

P Brett,
Pasturefields,
Stafford.



THIS PROGRAM FOR the Commodore 64 displays a clock at the top of the screen while other programs are running. It uses a built-in hardware clock, locked into the mains frequency, which provides BCD outputs.

Line 5 defines a function to convert decimal to BCD — binary coded decimal. Line 6 disables the restore by pointing the NMI vector at a RTI instruction in the kernel ROM.

Line 10 defines the starting address of the machine code — this can be altered as the program sorts out any relocating.

The program should be saved before running as it news itself on running.

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MARCH'S COMPETITION offered adventure addicts the chance to escape from the confines of the text and the TV screen. In conjunction with Melbourne House we are sending eight finalists to Peckforton Castle where they will act out a real adventure.

The problem we set was part of an adventure game that has yet to be played, and there was considerable argument among our panel of experts as to what the solution should be. We finally decided that the best item to drop would be the bread while the most useful object to pick up would be the bunch of keys.

Keep the torch

Clearly you could not afford to drop the torch; adventure locations are often badly lit so some source of light is vital. Water was thought to be more valuable than bread on the grounds that you can survive longer without food than drink. Jabbarl's own suggestion that the bread should be retained for use in laying a trail was dismissed as less relevant.

Since the immediate objective is to open a door the bunch of keys were given preference over the dagger and staff. Choosing between the three characters was, however, more difficult. The consensus of opinion among experienced adventure gamblers was that magicians are rarely trustworthy. Observant readers will have noticed that Chron has the power to magically change his name — to Chron — in the course

ADVENTURE

of a single article — a piece of sneakiness that does not inspire confidence. Elthin and Jabbarl, by contrast, seem both stout-hearted fellows likely to give their all in a scrap.

Our own preference was for Elthin — his smaller stature makes him more suitable for those twisty little passages commonly found in adventure games. But Jabbarl would undoubtedly be useful in battering down doors which the keys failed to open.

In view of how evenly matched these two are we decided not to rule out entries whose choice did not agree with our own. Anyone who selected the right objects was in the running for a place in the final.

The tiebreaker asked competitors to give their reasons for enjoying adventures. A common theme was that adventures provide an escape from the burdens of reality. John Brooman-Wrexham gave the reason: "escapism from the real world and income tax". Marcus Groan, Bristol, made the same point with "one fifth of my dole buys me an escape and a goal".

Others simply enjoy the challenge

Competition RESULTS

of adventures. Gerry Lovell, Weston-Super-Mare, admitted candidly, "I realise my potential for guile, stealth, imagination, cunning and plain nastiness"; while as Mike Lewis, London, put it, "if you're a thief, magician, or an assassin, there's no fun like monster bashin".

Runners-up prizes

This last entry is to be sung to the tune of the Thompson Local advertisement — if you remember it. Alan Berg, Wardley, was equally tuneful with "to live the impossible dream, to beat the unbeatable foe . . ."

All these gain a visit to Peckforton Castle. The last three places in the

final go to Alan Berg, Lancing, for "drowned, tortured, lost, but still at least I'm back in time for tea; so S J Rhodes, Luton, for "intellectual stimulation beats arcade simulation"; and to Carole Holmes, Relford, who summed it up with "enjoyable adventures contain matchless mysterious, mind-boggling locations, and a magnificent climax".

For the runners-up there were ten Melbourne House adventure games. These were won by the following competitors: C Wong, S Olsen, A Lucas, G Edwards, M Sly, K Ross, A Cerezo, N Olnor, R Collinson, A Cameron.

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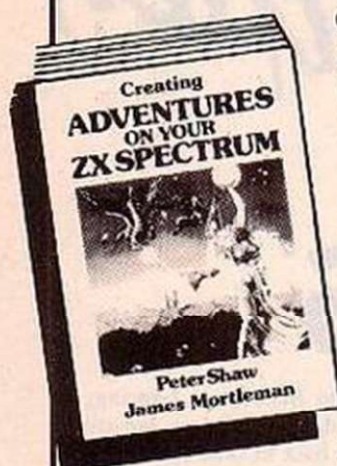
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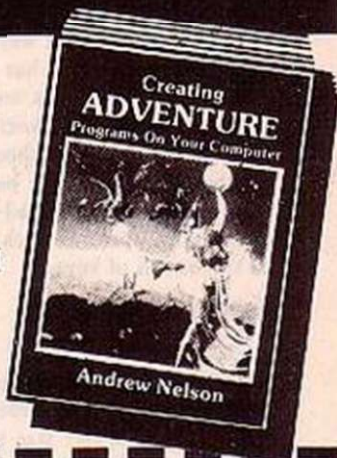
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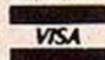
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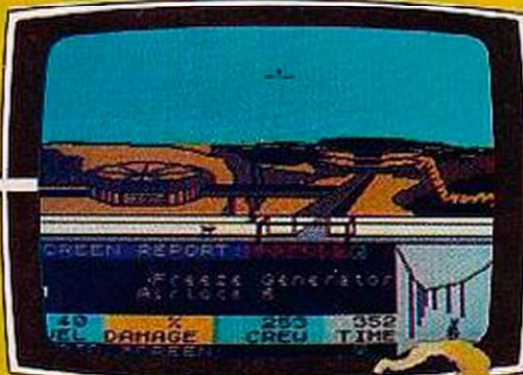


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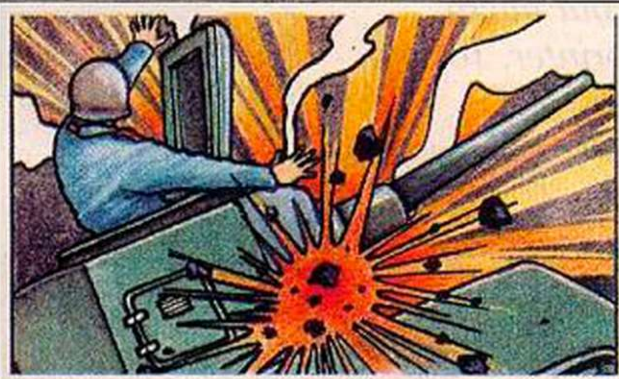
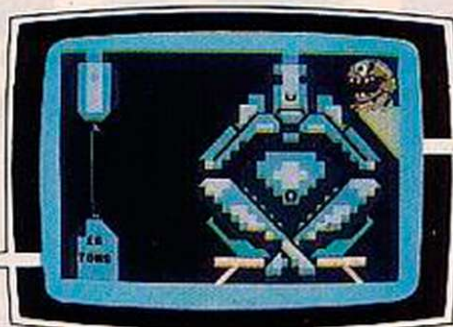
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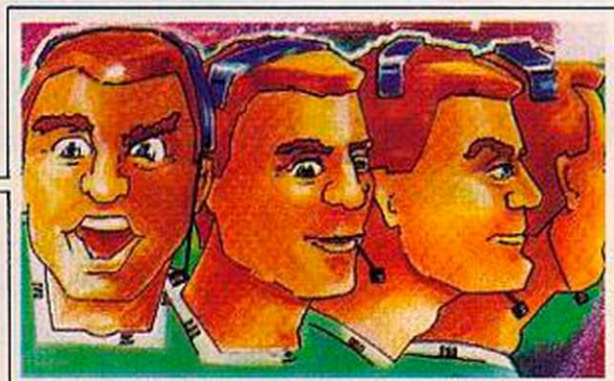
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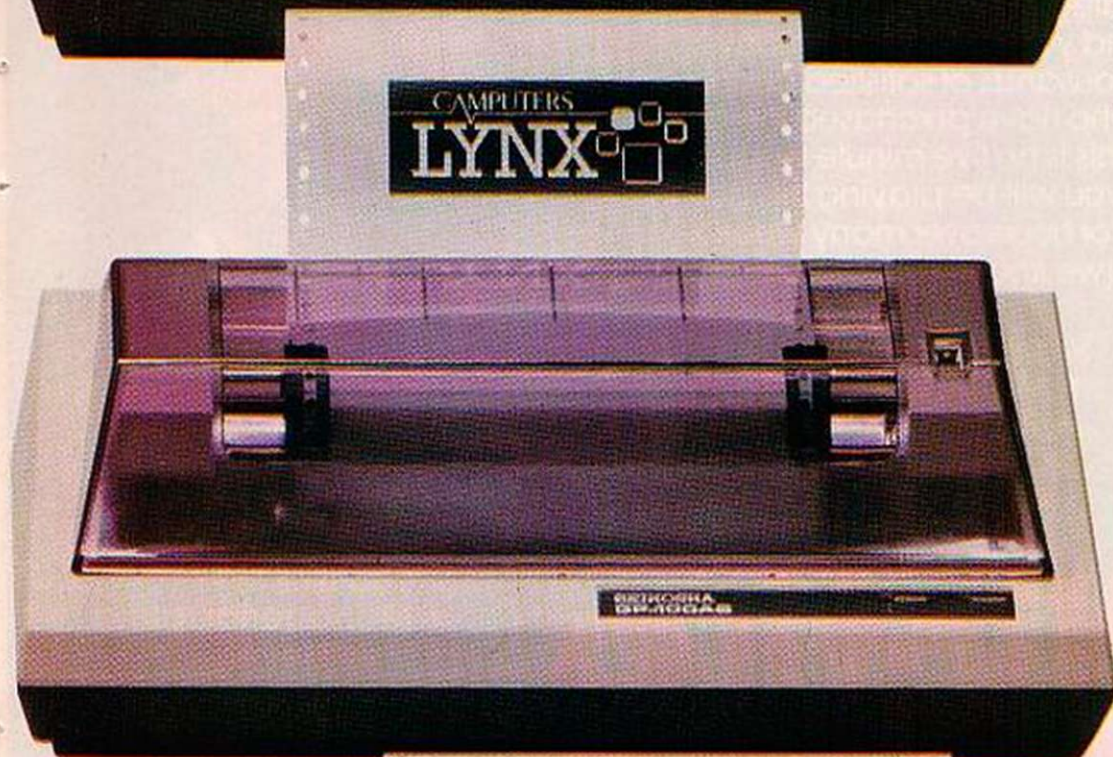
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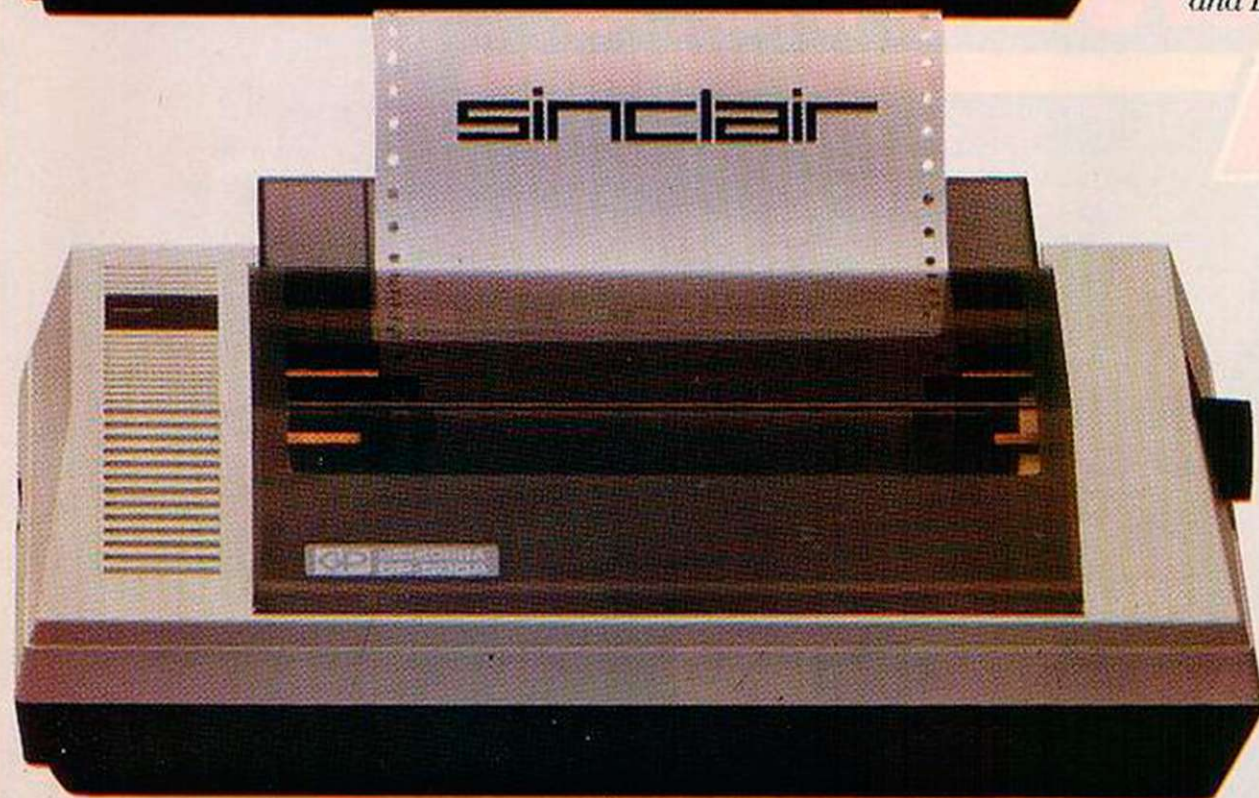
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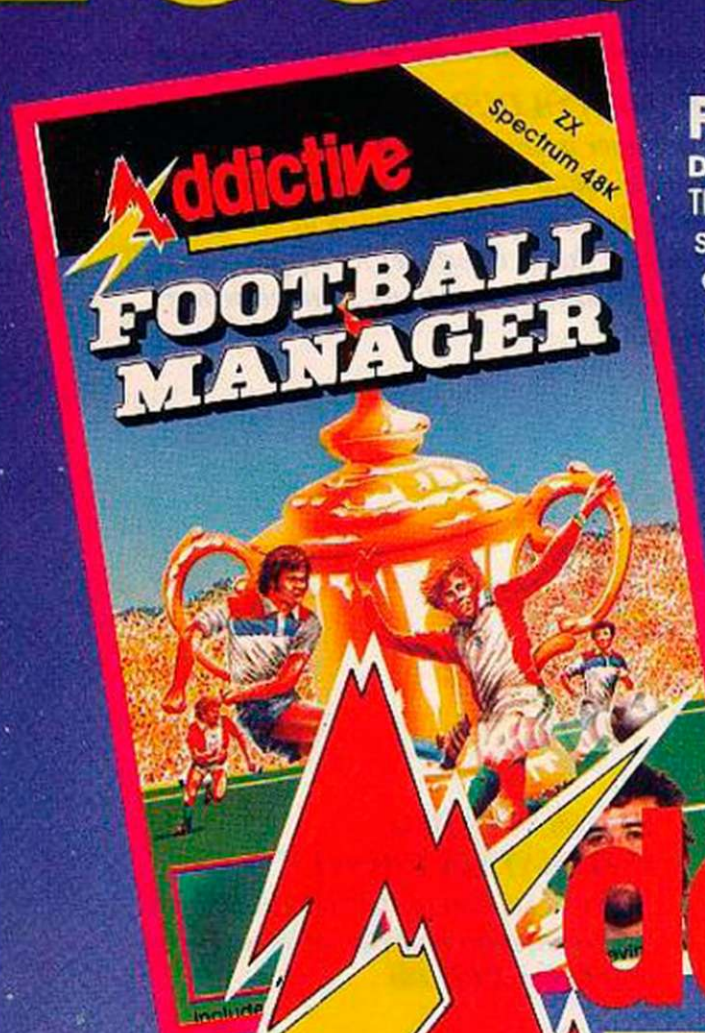
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- ★ Pick your own team for each match
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- ★ Managerial rating
- ★ 7 skill levels
- ★ Save game facility

Addictive

*ZX81 Chart, Home Computing Weekly 16.8.83

Comments about the game from press and our customers

"FOOTBALL MANAGER is the best game I have yet seen on the Spectrum and my personal favourite of all the games on any micro... To the ordinary person it is an excellent view of what can be done in the field of computer games... The crowning glory of this game is the short set pieces of match highlights which show little stick men running around a pitch, shooting, defending and scoring... It is a compulsive game but people who cannot take game sessions of 9 hours or so, which happened on one happy Sunday, will be grateful to know that there is a 'save to tape' option. FOOTBALL MANAGER has everything it could... The

originator, Addictive Games, certainly deserve the name." Rating: 19/20 (Practical Computing – August 1983).

"When I first received this game I spent the best part of the weekend playing it. Since then I have returned to it more often than any other. The truly addictive quality of this game is the remarkable way it mirrors the real football manager's problems... "(Personal Computer Games – Summer 1983)

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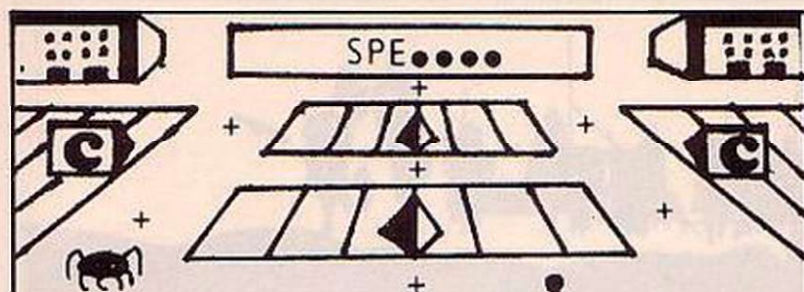
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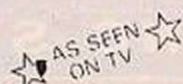
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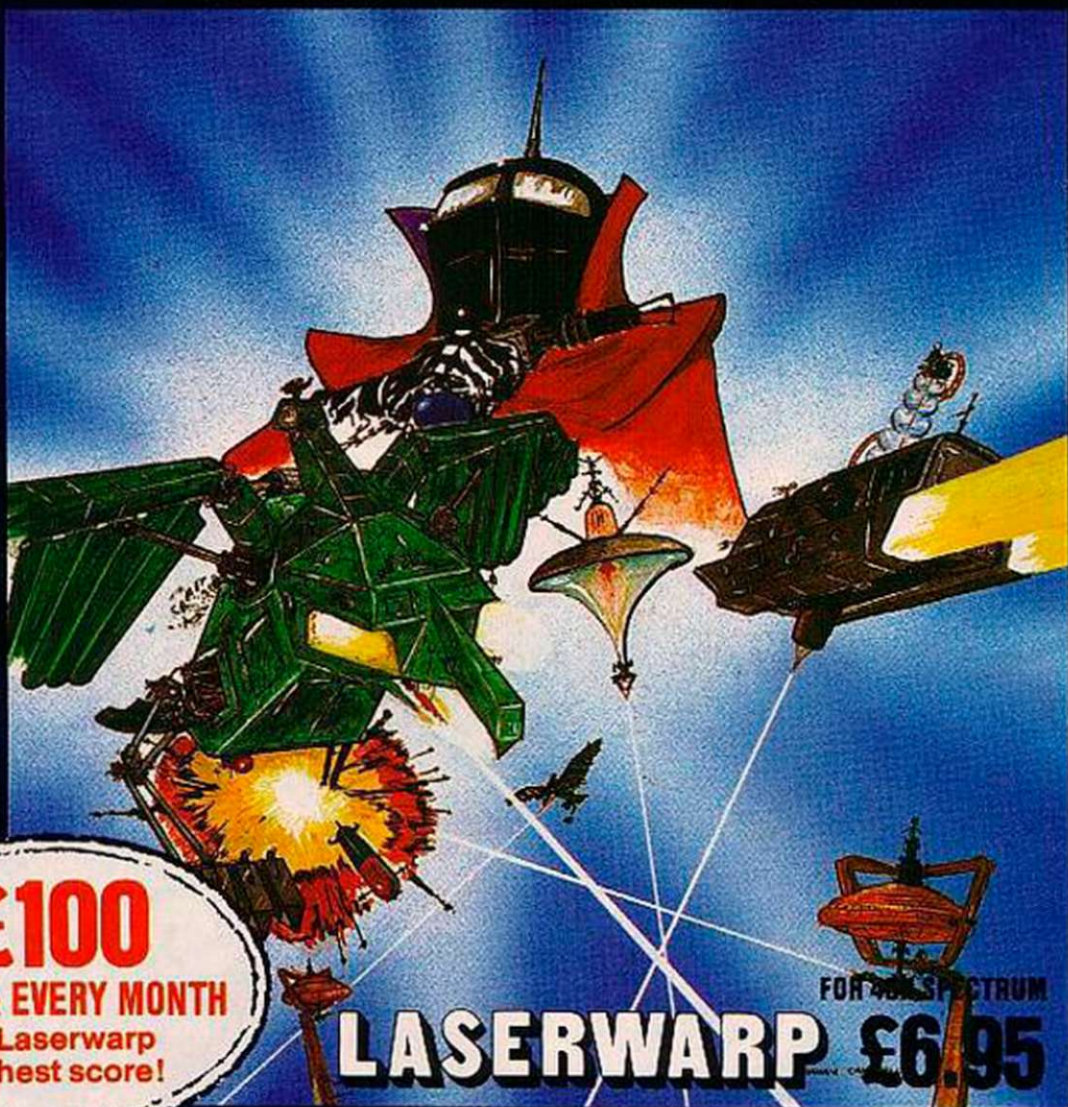
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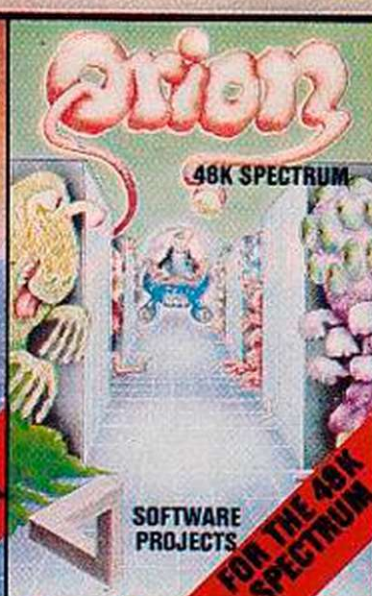
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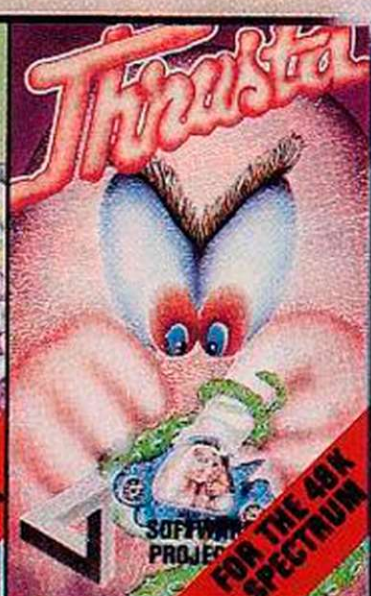
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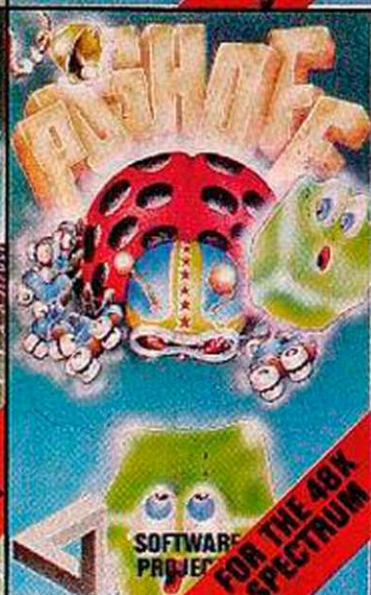
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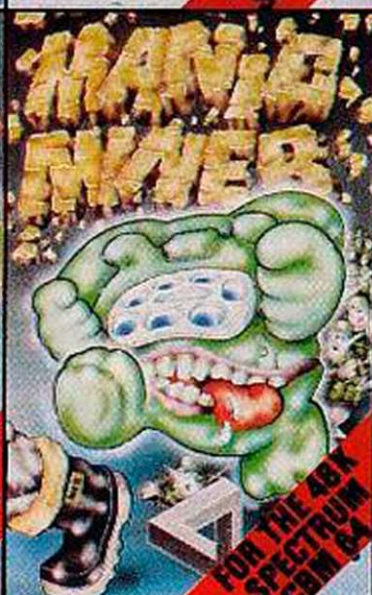
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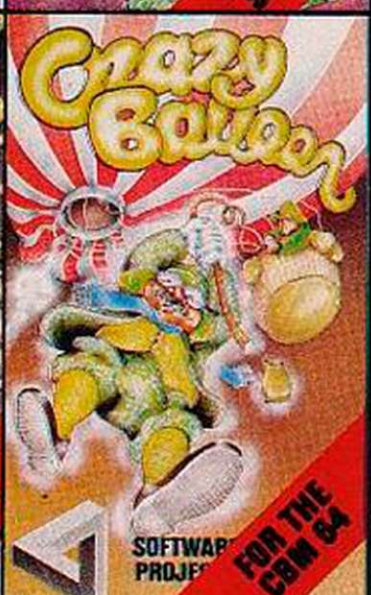
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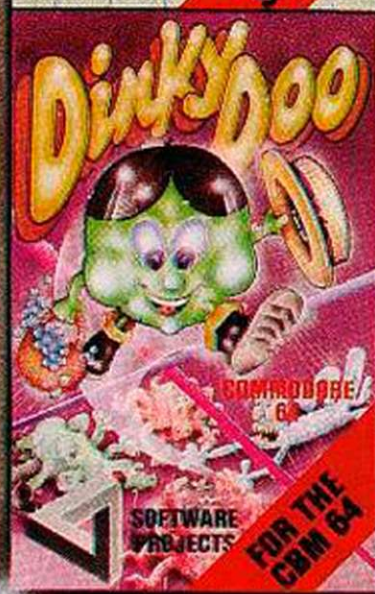
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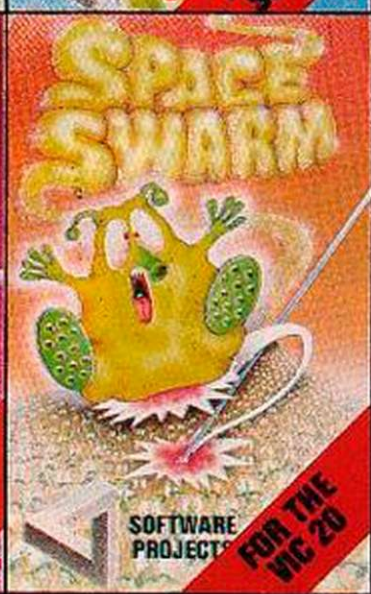
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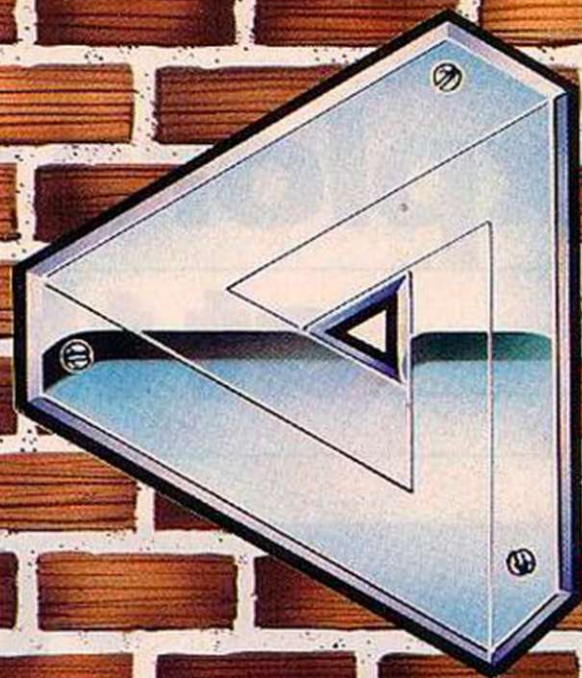
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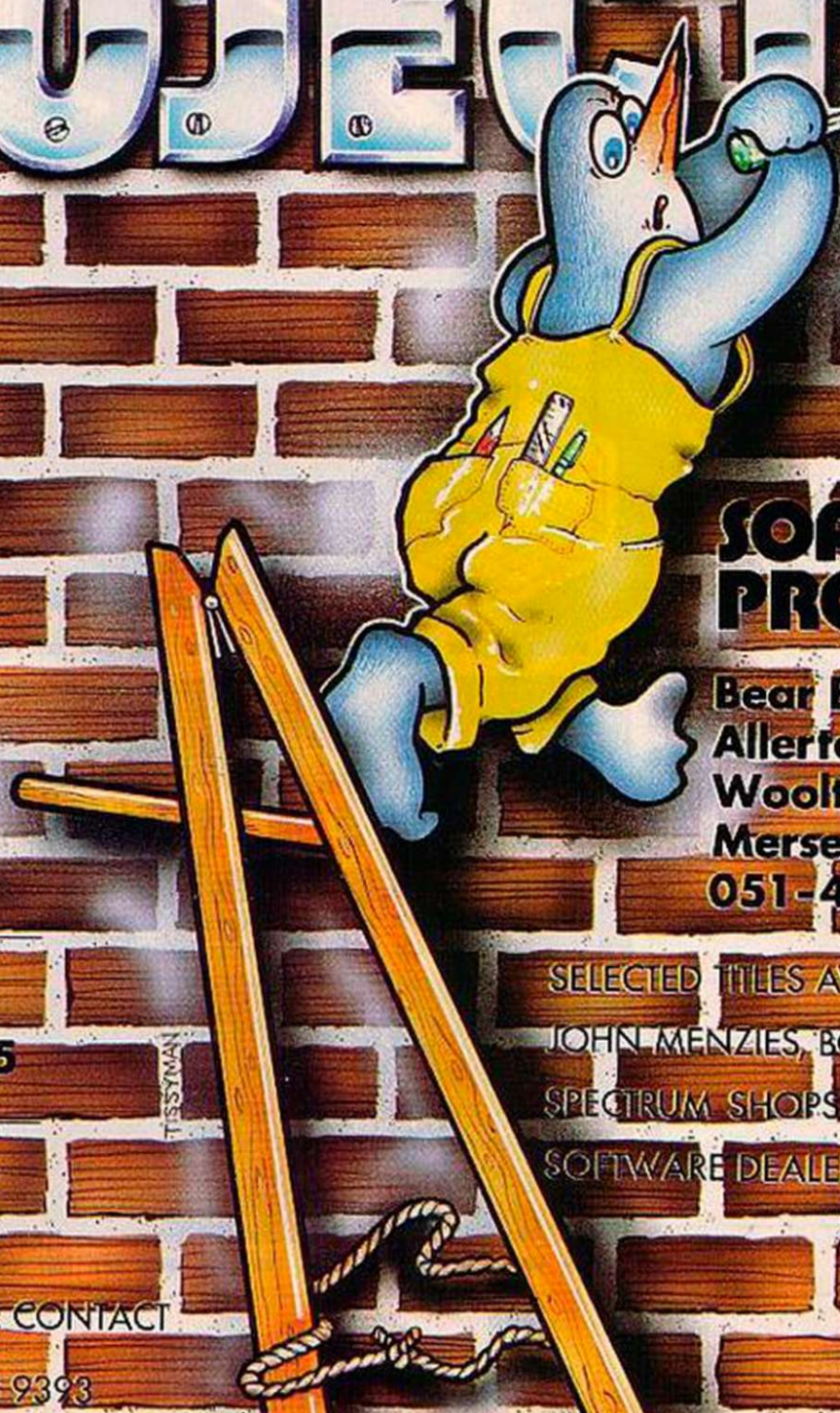
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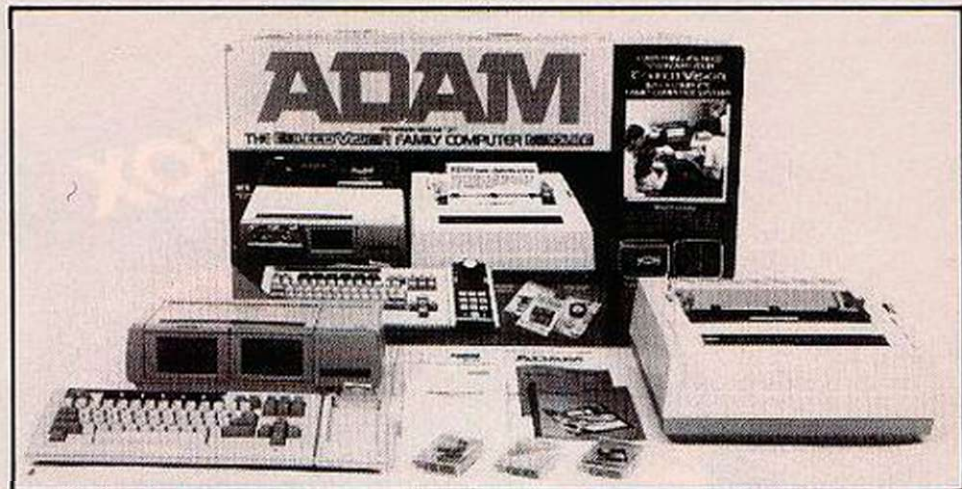
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MEMORY CONSOLE/DATA DRIVE: The heart of the Adam system is the 40K ROM and 64K RAM memory console which combines with the 32K ROM and 16K RAM in Colecovision to give you a total of 72K ROM (including 24K cartridge ROM) and 80K RAM (expandable to 144K). Built into the memory console is a digital data drive which accepts Adam's digital data packs, a fast and reliable mass storage medium that is capable of storing 256K of information, that's about 250 pages of double spaced text! The console is also designed to accommodate a second optional digital data drive.

FULL STROKE KEYBOARD: The Adam keyboard has been designed as a professional quality keyboard that combines ease of use with an impressive array of features. It is stepped and sculptured for maximum efficiency and has 75 full stroke keys which include 6 colour coded Smart Keys which are redefined for each new application; 10 command keys which are dedicated to the word processing function, and 5 cursor control keys for easy positioning of the cursor at any point on the screen. You can attach a Colecovision controller to the keyboard to function as a numeric keypad for easy data entry. It can also be held like a calculator, a feature which makes working with numbers particularly easy. The joystick part of the hand controller can be used in the same way as the cursor control keys, to move the cursor around the screen.

LETTER QUALITY PRINTER: The SmartWriter letter quality daisywheel printer is a bi-directional 80 column printer which prints at a rate of 120 words per minute. It uses standard interchangeable daisywheels, so a variety of typescripts are available. The printer has a 9.5 inch wide carriage for either single sheets or continuous fan fold paper and uses standard carbon ribbons. It is comparable to many printers which cost as much as the total Adam package. The printer can be used either with the Adam's SmartWriter word processing program or as a stand alone electronic typewriter.

BUILT-IN WORD PROCESSOR: Adam comes with SmartWriter word processing built-in. This program is so easy to use that you only have to turn the power on and the word processor is on line and ready to go. Detailed instruction books are not necessary as the Computer guides you step by step, working from a series of Menu commands. It enables you to type in text, then completely edit or revise it with the touch of a few keys. Changes are readily made and a series of queries from the computer confirm your intentions, so that you can continuously double check your work as you type.

COMPATIBILITY WITH COLECOVISION: By using high speed interactive microprocessors in each of the modules, the Coleco Adam is designed to take additional advantage of both the 32K ROM and 16K RAM memory capability in the Colecovision. If you do not already own a Colecovision Console (£99 inc VAT), then you will need to purchase this when you initially purchase your Adam Computer package (£499 inc VAT), making a total purchase price of (£598 inc VAT).

WHAT IS COLECOVISION: Colecovision is one of the worlds most powerful video game systems, capable of displaying arcade quality colour graphics of incredible quality on a standard Colour TV set. The console (see picture bottom left) accepts 24K ROM cartridges such as Turbo and Zaxxon and is supplied with the popular Donkey Kong cartridge and a pair of joystick controllers. Colecovision has a range of licenced arcade hits available such as: Gorf, Carnival, Cosmic Avenger, Mouse Trap, Ladybug, Venture, Smurf, Pepper II, Space Panic, Looping, Space Fury, Mr Do, Time Pilot, Wizard of Wor and many others. So there you have it, Adam plus Colecovision the unbeatable combination. Send the coupon below for your FREE copy of our 12 page Colour brochure giving details on the complete Adam system.

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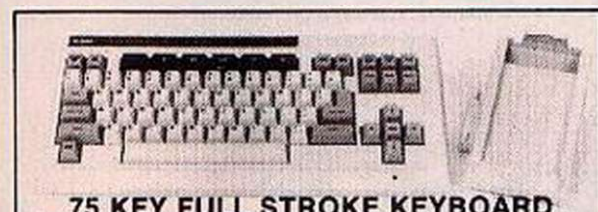
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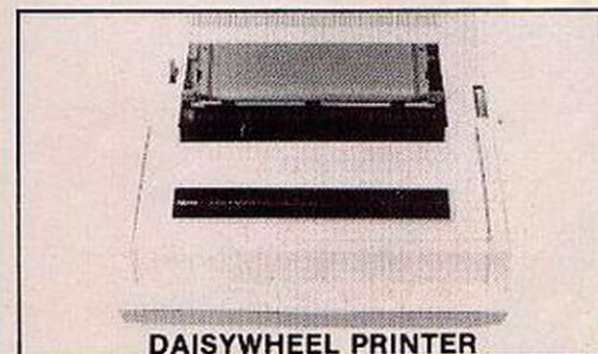
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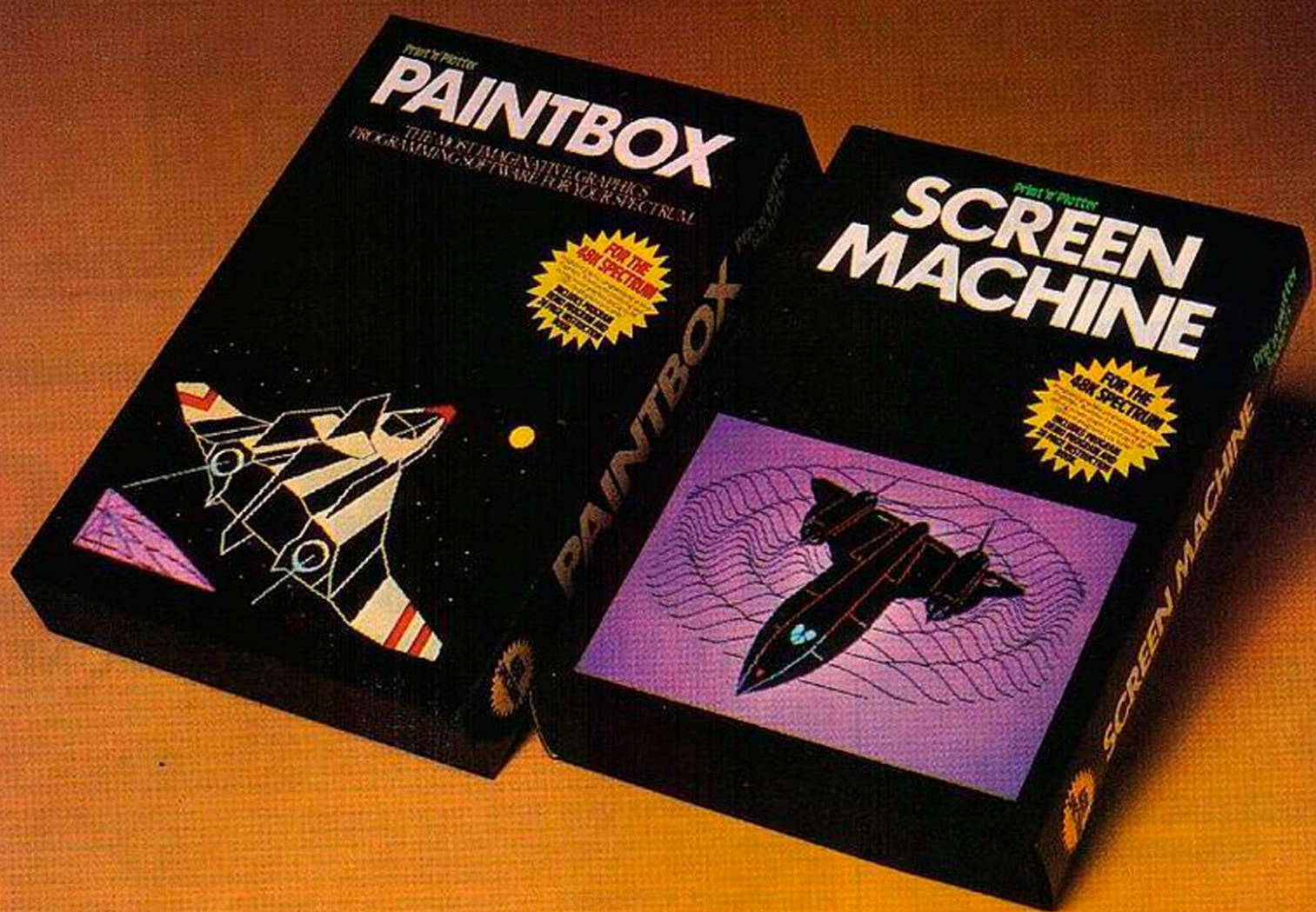


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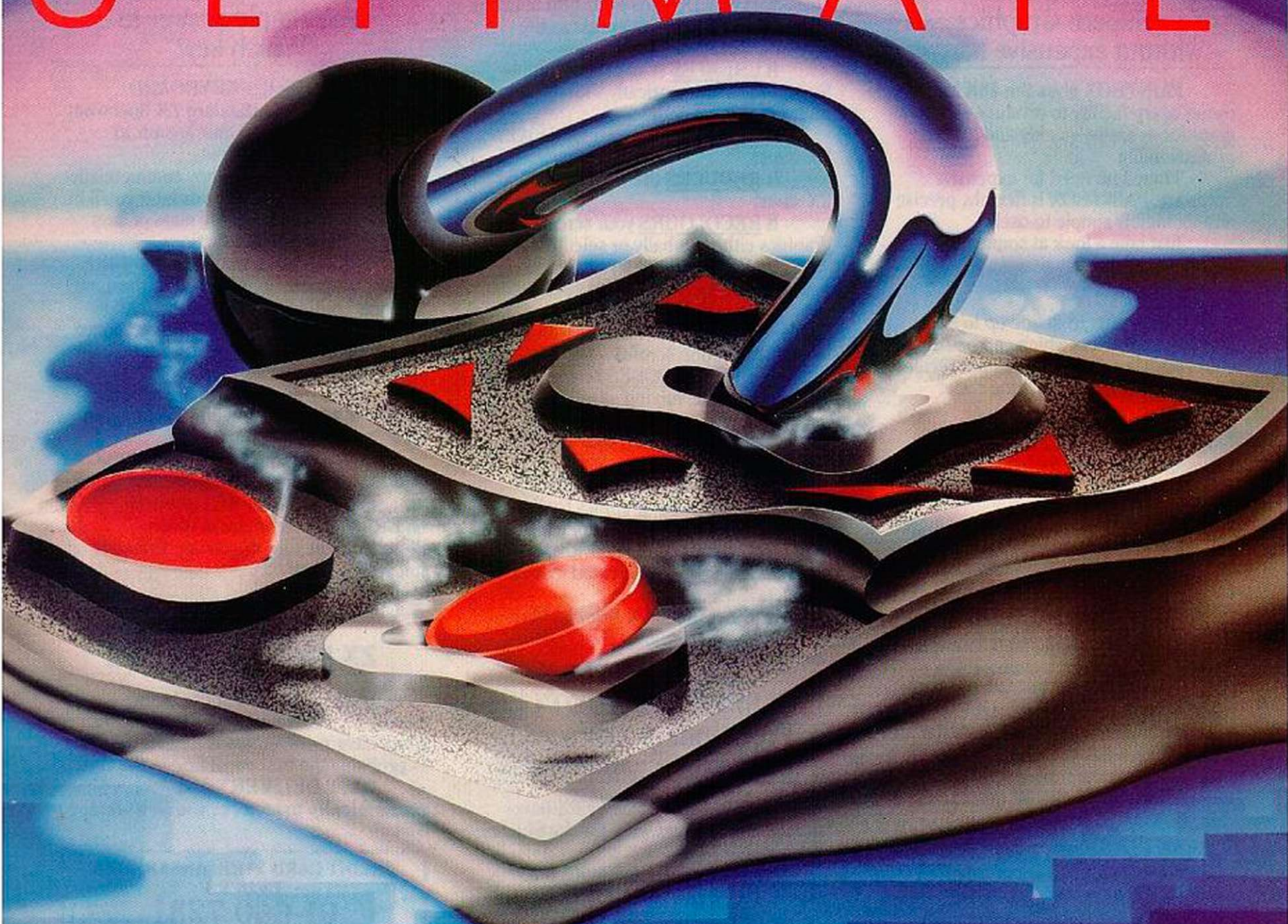
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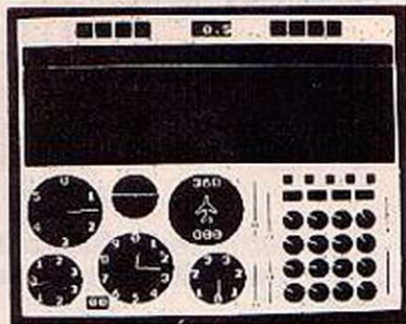
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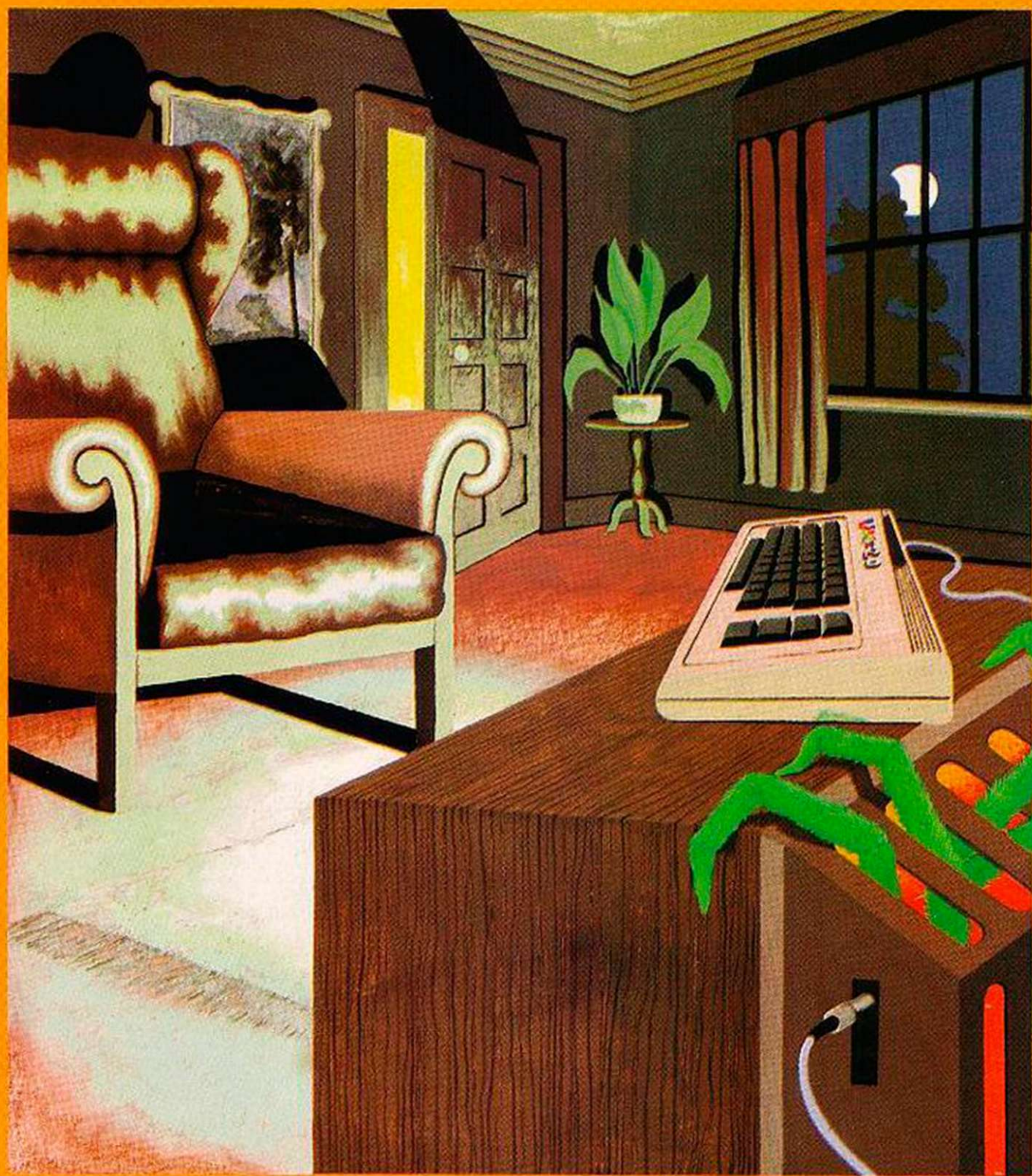
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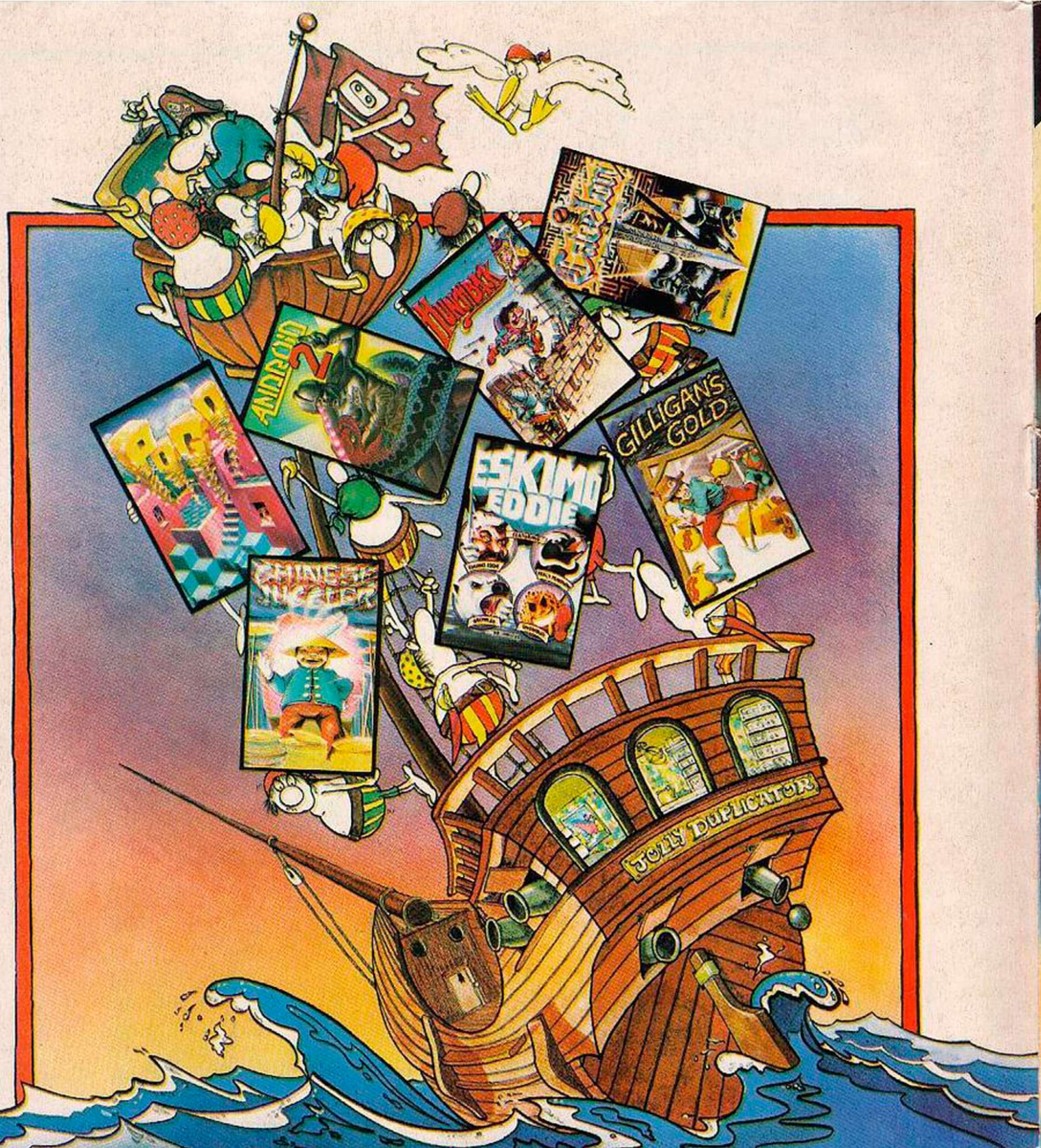
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