

POPULAR Computing WEEKLY

FREE GAMES
CASSETTES

35p 22-28 September 1983 Vol 2 No 38

This Week

Spectrum software

John Scriven looks at some of the latest games for the Spectrum including *Manic Miner* and *Jumping Jack*. See page 16.

Logan's Run

David Kelly talks to Ian Logan about Z80 machine code and the ZX Microdrive on page 15.

Rings of Saturn

Maurice Gavin presents a simulation program of Saturn and its rings on 16K Spectrum. See page 20.

New releases

All the latest software games including *Devils of the Deep* from Richard Shepherd and *Beta Basic* from Betasoft. See page 46.

★ STAR
Connect 4 on
Commodore 64.
See page 10.
GAME ★

News Desk

An enterprising move from Elan

ELAN Computers last week announced details of its first two home computers.

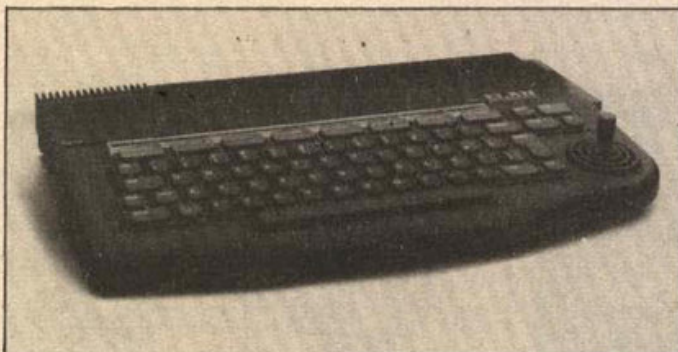
Called the Enterprise 64 and 128 — the two models differ only in Ram capacity — both will be in the shops in April 1984. Prices will be £199.95 and £299.95 for the two models.

The Enterprise is Z80A-based with 32K Basic Rom and either 64K or 128K Ram. Rom and Ram are both expandable to 3.9M. Main features of the machine are a full-travel keyboard, high-

resolution display in up to 256 colours, 8-octave four-voice stereo sound, built-in word-processing software and a built-in joystick for cursor control and games.

The Elan Enterprise has a complex system of 16 display modes which can be mixed on-screen. Explained Robert Madge, Elan's technical director: "I think everyone is going to be a bit bowled over by the speed of the machine's plotting." Text modes range from 42 × 28 characters to 84

Continued on page 5



Oric will compete with IBM Peanut

ORIC Products International will produce a new computer to compete with IBM's proposed low-cost Peanut computer.

"The IBM Peanut will be hugely successful and set a standard and we will be in there with it," said Oric's managing director Barry Muncaster. "Oric will produce a product which the Peanut will be compatible with," he added.

As usual with any new IBM product, secrecy surrounds its precise nature. A spokeswoman for IBM declined to comment on the new machine save to confirm its existence.

"It will be an 8086-based machine — that is our best guess at this point," said Tom Crotty of the US market analysts, Gartner Group.

"With IBM there is nothing sure until it is launched. There are a lot of rumours flying about that the Peanut will not be compatible with the 8088-based IBM PC.

Continued on page 5

Classified

Classified

Classified

Classified

6,000 free
tapes to
be given away
— see page 45

VALHALLA
SEE CENTRE SPREAD

SHADOW FOR THE BBC 32K

Shadow will allow you to make security back-ups of your valuable tape software.
★ Any OS ★ 100% machine code ★ Basic I and Basic II ★ 1200 + 300 baud ★ "Locked" programs
★ Files ★ Any length ★ Easy to use.
Shadow works with 99% of all known programs including "locked" programs or those containing sections at 300 baud.
FREE Inspector a very useful memory viewing program which displays memory in colour coded sections for ease. Worth £8 on its own. Shadow + Inspector £8 inclusive.
Cheque to:

Clares Micro Supplies
Dept PCW, 222 Townfield Road, Winsford, Cheshire
Tel: (06065) 51374

BBC MODEL B, 5 Acornsoft games, £350. Tel: Crewe, Cheshire 69205.
VIC20 + 16K + 2CN, cassette unit + 3K super expander + games cartridges + books and £150 of software + dust covers + joystick + guarantee and all fully boxed, £300 ono. Tel: Oswestry (0691) 656038 after 6 pm.

SHARP M280A plus software (including Database), as new, £350 ono. Ring 01-904 4343 ext 4219.
VIC20, 16K, + cassette, + 3K Super Expander, six cartridges, over 20 cassettes, six books, excellent condition, require £200 ono. Tel: 01-788 1753 after 5 pm.

ELKAN ELECTRONICS

NEW! NEW!

NANOS "quick-reference" cards — easier to use than the manuals!

DRAGON 32 £3.95
COMMODORE 64/VIC20 £3.95
SINCLAIR ZX81 £3.50

QUICK-SHOT self-centring joysticks — Improve your scores!

DRAGON 32 (specially developed by ELKAN) £14.95
ATARI 400/800 £12.95
COMMODORE 64/VIC20 £12.95
+ £1 p&p

ELKAN ELECTRONICS, FREEPOST,
11 Bury New Road,
Prestwich, Manchester, M25 6LZ.
Tel. 061-798 7613

Continued on page 40

★ ★ BRITAIN'S HOME COMPUTER WEEKLY ★ ★

DRAGON

BOOKS BY MELBOURNE HOUSE



This complete collection of books explains everything you need to know to get the most out of your Dragon 32. The most exciting games, the latest programming techniques and the most practical step-by-step instructions — everything necessary to make your Dragon roar.



Enter The Dragon

Thirty exciting programs that will turn your Dragon 32 into a complete arcade of action-packed games including Lunar Lander, Dragon Invaders and Meteor Storm. Includes many professional tips and hints. "Ambitious and intended to improve your grasp of computing in general and the Dragon 32 in particular."

— Personal Computing News

Dragon 32 Programmer's Reference Guide

The complete Dragon reference. From simple BASIC to advanced machine language routines including sound and



graphics. Each facility of the Dragon is fully explained with the aid of demonstration programs. A must for any owner who wants maximum performance from their Dragon 32.

Dragon Machine Language For The Absolute Beginner

Follow the logical steps and practical examples to complete mastery of Dragon machine language. Written in easy-to-follow, 'no jargon' style. Now you can write faster, more exciting programs. Takes you right from the beginning to full understanding in easy steps, each fully explained and illustrated with clear examples.

Melbourne House Publishers

Books

- ☐ Enter The Dragon New Low Price £4.95
- ☐ Dragon 32 Programmer's Reference Guide New Release £6.95
- ☐ Dragon Machine Language for the Absolute Beginner New Release £6.95

Cassettes

- ☐ Dragon 32 Hungry Horace £5.95
- Cassettes from the Book**
- ☐ Enter the Dragon Super Cassette A £5.95
- ☐ Enter the Dragon Super Cassette B £5.95
- ☐ Please send me your free 48 page catalogue.

All prices include VAT where applicable. Please add 80p for post and pack.

Orders to:

Melbourne House
131 Trafalgar Road
Greenwich London SE10

Correspondence to:

Melbourne House
Church Yard Tring
Hertfordshire HP235LU

Trade enquiries welcome

All Melbourne House cassette software is unconditionally guaranteed against malfunction. Access orders can be telephoned through our 24 hr ansafone (01) 858 7397.

I enclose my cheque/money order for £

Please debit my Access Card No.

Expiry date

Signature

Name

Address

Postcode

£

£ + p/p 80

Total

£

The Team

Editor

Brendon Gore

News Editor

David Kelly [01-734 2664]

Software Editor

Graham Taylor [01-734 2953]

Production Editor

Lynne Constable

Editorial Secretary

Sarah Owen

Advertisement Manager

David Lake [01-734 0840]

Advertisement Executive

Alastair Macintosh [01-734 3443]

Classified Executive

Diane Davis [01-734 2688]

Administration

Theresa Lacy [01-734 3454]

Managing Editor

Duncan Scot

Publishing Director

Jenny Ireland

Popular Computing Weekly,
12-13 Little Newport Street,
London WC2R 3LD

Telephone: 01-734 1051

Published by Sunshine Publications Ltd.

Typesetting, origination and printing by
Chesham Press, Chesham, Bucks

Distributed by S M Distribution

London SW9. 01-274 8611. Telex: 261643

© Sunshine Publications Ltd 1983

ABC

MEMBER OF THE AUDIT
BUREAU OF CIRCULATIONS
ISSN 0265-0509

How to submit articles

Articles which are submitted for publication should not be more than 3,000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your own program returned you must include a stamped, addressed envelope.

Accuracy

Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

This Week

News 5

Elan home computers

Letters 7

Print to plot

Star Game 10

Connect 4 on Commodore 64

Street Life 15

David Kelly talks to Ian Logan



Reviews 16

John Scriven looks at Spectrum software

Programming 18

Vic20 gameswriting — part VI

Spectrum 20

Rings of Saturn

BBC in education 24

Computer graphics

Commodore 64 27

Hi-res graphics

Dragon 29

Approximating functions

Open Forum 30

Five pages of your programs

Adventure 37

Tony Bridge's corner

New releases 45

Latest software programs

Competitions 47

Puzzle, Top 10, Ziggurat

Editorial

Sinclair's flat-screen tv may, or may not, do for television what the transistor radio did for wireless. It will certainly do a lot for Sir Clive's reputation as Britain's 'golden boy' of electronics.

The flat-screen tv is not a new idea — scientists have long been speculating about tv screens just a 1/2in thick which could be hung on walls. Pocket-sized flat-screen tvs have also been mooted for some time. But, until this year, no one had really been able to produce a commercially viable flat-screen tv for general consumption.

Sony pipped Sinclair to the post with its Watchman flat-screen tv, due in part to industrial trouble at Timex's plant in Dundee. But the Watchman, brainchild of Sony designer Yasuo Kuroki, is bulkier and more expensive than Sinclair's offering. Even the improved Watchman II will cost about \$200 in the US, compared to Sinclair's £79.95 in the UK.

Sinclair's flat-screen tv may not be the first, but it is the cheapest. It is also one of the most technically advanced, being able to receive signals in both the UK, US and Europe.

Once the problems of producing a colour flat-screen tv are solved, Britain's micro users will be able to dream of a new generation of computers that will be truly portable.

Next Thursday

Centipede, next week's star game for the 48K Spectrum, is a version of the arcade game and the object is to shoot all the bugs which attack you. By Jim Provan.

Subscribe to Popular Computing Weekly

I would like to subscribe to *Popular Computing Weekly*.

Please start my subscription from the issue.

UK Addresses: ☐ 26 issues at £9.98 ☐ 52 issues at £19.95

Overseas Addresses: ☐ 26 issues at £18.70 ☐ 52 issues at £37.40

Please tick relevant box

I enclose my cheque to *Popular Computing Weekly* for

Name

Address

.....

.....

Please send this form, and cheque, to *Popular Computing Weekly*, Subscription Dept., 12-13 Little Newport Street, London WC2R 3LD.

A new generation of Computer Games...



Vic-20/ Unexpanded,
Joystick or Keyboard,
£7.50



Vic-20/Unexpanded,
Keyboard only,
£9.50



Vic-20/Unexpanded,
Joystick only,
£7.50



Vic-20/Unexpanded,
Keyboard or Joystick,
£9.50



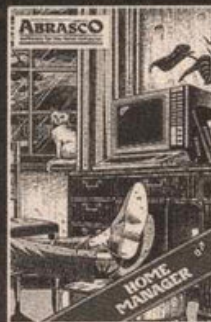
Vic-20/Unexpanded,
Joystick or Keyboard,
£7.50



Vic-20/Unexpanded,
Joystick only,
£7.50



Vic-20/CBM 64,
Vic-20 Unex., Key B. only,
64 Joy or Key B., £8.50



CBM 64, Disk £15.00,
Tape £12.50



CBM 64, Disk £27.00,
Tape £25.00



Dragon 32,
£8.50



ZX Spectrum 48K,
£6.95



ZX Spectrum 16/48K,
£6.95

.....placed at your fingertips by the ingenuity of Abrasco's wizardry. As the Fly Snatcher you have to catch flies to live on, while being hunted by an agile and determined weasel that leads to a rapid game of survival. Double Trouble creates a nerve racking world where your wits are mercilessly pitted against VIC, with only speed and accuracy to save you from Schizophrenic Spike and the ever increasing obstacles to your survival. Pursue the alien, kill his drones, avoid rogue asteroids, you're running out of fuel, the relentless pace is quickening even more-what chance is there of survival in Alien Hunter. Only skill comes between your threatened city and its total annihilation by persistent androids and their battlecruiser with its awesome warhead in Android Attack. Meter Mania provides entertaining hectic harassment while you try to beat the clock and four meter maids, with amazing hi-res graphic tricks in this machine code game. A ravenous shark awaits with eagerness and determination the descending parachutists, while only you and your boat are able to thwart his menu in Catcha Troopa. Vixplode & Vixplode-64 is the latest cult game where the computer pushes your brain into new realms of cunning and mind bending strategy as you attempt to gain control of the board.

Take it easy with this marvellous electronic brain and its extensive foolproof programs as it copes with the numerous problems of a Home Manager. Abrasco's miraculous Electronic Spreadsheet Abrascal provides instantaneous solutions to a multitude of complex problems, yet is simple to use and exceedingly good value. High seas adventure as Captain of a galleon scouring the seas for roaming pirates while avoiding falling off the edge of the world in this hi-res graphic game Pirate. Superb graphics compliment your skill and judgement as you prepare to pot the last ball to capture the championship in a blaze of glory, with Pool. Realistic simulation in Golf tests your golfing skills to the limits as you encounter bunkers, rough, trees and wind in an effort to win the round.

ABRASCO

A TOUCH OF MAGIC

Oric v Peanut

Continued from page 1

"I personally find it hard to believe that they would exclude themselves from all the PC's software.

"But, whatever. You can be sure that there will be artificial barriers in Peanut to make it non-upgradable to the PC," he added.



Barry Muncaster

The Peanut, Sinclair's new 'professional' computer and now Oric's planned computer are all aimed at an as-yet untested market — straddling the gap between home and business systems. Some industry observers believe that this new market will prove to be by far the biggest of the lot.

● Oric's disc system for the Oric 1 computer has been delayed. The company plans to build 1,500 units in December. Said Barry Muncaster: "Realistically there won't be many in the UK before Christmas. We now have it all working — it just depends on the quantities of drives which Hitachi can supply.

"The numbers we have been promised from January look very promising ramping up from 2,500 to 4,000 in three months."

Enterprising Elan

Continued from page 1

× 28. Up to four pairs (foreground and background) or colours chosen from the 256-colour pallet can be used in text modes.

Graphics modes go up to the highest resolution of 672 × 256 pixels with a limit of two colours on each horizontal line. The number of colours which can be used in one line from the 256 possible squares every time the number of pixels in a line is halved. For example up to 16-colours can be used in one line for a 168 × 256 display.

Commands exist in the Basic — Elan's own — for

Flat-screen unmasked by Sir Clive

SIR Clive Sinclair unveiled his flat-screen tv in London last week. Slightly larger than a cigarette packet, the black and white tv is the result of a six-year development programme which cost £4m.

The tv set runs off a lithium based flat battery developed by Polaroid, though it can also be run off the mains with the aid of an adaptor. Key to the new tv is a flat-screen cathode ray tube and a single integrated circuit, which allows the tv to work in the US and Europe as well as in the UK.

Priced at £79.95, including VAT, Sinclair's flat-screen tv is considerably cheaper than Sony's Watchman tv launched earlier this year.

Sinclair regards his flat-



screen tv as "a major breakthrough" and said, "I believe it, and its successors, can achieve for television what the transistor radio did for wireless."

Sir Clive is currently working on a colour flat-screen tv, but is unwilling to commit himself to any completion dates.

ZX81 and Spectrum taken to task

MULTI-TASKING on the ZX81 and Spectrum is now possible, thanks to a Poole-based outfit called David Husband.

The company is now offering a Forth multi-tasking Rom replacement for the ZX81 for £28.75. A Spectrum plug-in cartridge module is also on the way, in a couple of weeks for £63.56.

taking blocks of memory and loading them directly on to the screen.

The machine has a cartridge port capable of taking a 64K Rom pack, twin cassette ports, twin joystick ports, Centronic and RS423 interfaces, tv, monitor, cassette and headphone connections are also provided.

An expansion bus gives access to additional memory packs and twin 3½ inch micro-floppy disc drives or other peripherals. The Enterprise is CP/M compatible. Memory organisation on the Elan is in 16K pages. Additional memory can be stacked up in 64K units.

The Basic is organised such that extensions to the software to control peripherals are automatically hooked into the standard Basic when the additional module is connected. A 'base unit' — providing additional power — is howev-

"I'm hoping it will shake people up a bit," says company founder David Husband. "In the computer market the hardware has jumped forward while the software has stayed still.

"I see the Forth Rom as something fundamentally new — a very low cost multi-tasking system with a Z80 and 16K."

The 2K ZX81 Rom features a built-in editor with user-defined split screens and the multi-tasking which can schedule up to 10 tasks at pre-determined times. Machine-

er necessary to connect the first unit. The first of these peripheral units is scheduled for June 1984, two months after launch. Software for the Elan machines is being written by Intelligent Software and a number of other software houses have expressed interest in producing material. Lisp and Forth will both be available as alternative languages.

Elan Computers is a new company (see *Popular Computing Weekly*, August 17), formed by software house Intelligent Software and Hong Kong electronics manufacturers Domicrest. The Elan computers will be 75 percent manufactured and assembled at two factories in the UK.

The idea for Elan apparently came from an unnamed international finance consortium which then approached Intelligent and Domicrest to carry out the project.

Microcomputer owners will be disappointed to learn that it is not really feasible to link a micro with the new tv. The 2in screen is simply too small for program lines to be legible.

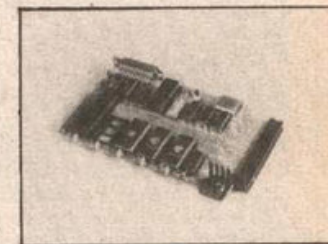
Initially, Sinclair's flat-screen tv will be available by mail order only. Application forms are available on request from Sinclair Research Ltd, TV Division, Stanhope Road, Camberley, Surrey (Tel: 0276 62111).

● Meanwhile, Japanese electronics giant, Matsushita has announced the development of a portable colour television set.

The device, about the size of a handbag, uses back projection on to a pop-up translucent screen 16cm across.

code definitions are automatically threaded into the Forth.

The Spectrum cartridge version is more ambitious — a 12K fig-Forth with multi-tasking and built-in RS232 and Centronics interfaces.



The ZX81 Rom replacement can be undertaken by the user but it involves removing the existing Basic Rom which is soldered in. ZX81s complete with the Forth Rom in place and 16K Ram pack can be bought from Densham Computers, 329 Ashley Road, Parkstone, Poole.

Details of either the ZX81 or Spectrum multi-tasking systems from David Husband, 2 Gorleston Road, Branksome, Poole.

Barbican goes personal

THIS year's 6th *Personal Computer World Show* kicks off next week at the Barbican Centre, London.

The Show is open to the public from Thursday, September 29 to Sunday, October 2. Times are 10 am to 7 pm every day except Sunday, which is 10 am to 5 pm. Entry is £3.

At last...

A joystick that works!

The
intelligent
Joystick

Cambridge Computing bring you the first **programmable** joystick~ at a price you can afford.

£29⁹⁰

JOYSTICK, INTERFACE
AND TAPE COMPLETE

Interface

- 1k on board memory
- Own rear edge connector — for printers etc.,
- Compatible with all standard joysticks



Joystick

- Self centring
- 8 Directional microswitched action
- 2 independent fire buttons

Tape

- Easy to use program enables the interface to work on ALL software
- Keeps a record of all your games — so you only need to tell it about each game once!



**CAMBRIDGE
COMPUTING**

1 Benson Street, Cambridge CB4 3QJ
Telephone 0223 322905

Please send me:-

Joystick, Interface and Tape at £29.90 ☐

Interface and Tape at £24.00 ☐

Joystick only at £7.00 ☐

For Spectrum

I enclose cheque / postal order* for £.....
made payable to Cambridge Computing Limited.

* delete as necessary.

LETTERS

Martian error

Before we lay the Martians to rest (my letter, *PCW*, 25-31 August) would you please point out to readers that the Martian word for 'yes' is *qwl* not *gwl*. Otherwise my remarks do not make sense.

A W Rowe
69 Longley Lane
Huddersfield HO4 6PR

Apologies. I am afraid that our knowledge of Martian is such that the spelling error slipped through unnoticed.

Speedy reviews

Having just been introduced to your excellent weekly computer newspaper, I would like to comment on the impressive speed of your reviews. How do you do it? The reviews are always interesting, quoting your Microdrive review as an example.

I always turn firstly to your reviews and then your informative letters page. I have just read Philip Crawley of Buckwell, Salop's letter and I would like to inform him of my high score for *Orbiter*, 651,910. The completion of this took just over two hours — beat that.

Paul Holden
110 Crescent Road
Great Lever
Bolton BL3 2JR

Play fair, Dragon

The long wait for the arrival of Dragon Data's discs is over. However, the speed in which the Premier Delta system came onto the market must have taken a large share of the dedicated Dragon user's, who now might want to run Dragon based disc software on their already bought 3in high Cannon drive.

It seems that, at first glance, Dragon Data has built a type of non-compatibility into its system — the one half height drive (with a location for the second) is a standard drive and can be run with the Delta controller, but only allows you 110 bytes, not the 185 allowed by the Dragon controller. What Dragon Data has in fact done is to put a small saw cut

into the disc side of the controller's connection board, which allows a small piece of plastic located in the connector of the controller/drive lead to mate up with, allowing only a Dragon lead to be used with a Dragon controller. This in fact can be removed and will fit onto the Delta controller.

Dragon has also moulded its controller cover so that you cannot get the Delta lead on the Dragon controller without having an extension board or cable made up. Another point is that Dragon Data appears to have no intention of selling the controller separately.

Come on, Dragon, play fair — sell the controller separately and save the dedicated user from unnecessary expense.

Hywel Francis and
Dave Barrell
TWM Software
8 Azalea Close
Cyncoed
Cardiff

Random statement

If any Dragon owners are upset with the apparent lack of a *Randomize* statement, or its equivalent, so that "random" numbers are always generated from the same starting point, resulting in the same game of *Mastermind* or whatever on power-up, try the following:

```
10 Input "Random number seed"; A
20 A = RND (-A)
```

Any numbers subsequently generated may be considered random and the same sequence can be generated by using the same "seed" value for A.

For an unrepeatable sequence, try:

```
10 A = RND (-Timer)
```

I hope this will be of benefit to any frustrated Dragon owners.

David Harcourt
34 Old Ballymony Road
Ballymena
Co Antrim
N. Ireland

Debugging exercise

The program from T Choy, *The Root of the Problem* (*PCW*, 8-14 September) was excellent stuff — can I put in a

plea for even more actually intelligent material, such as this and the recent astronomical programs, in future issues — preferably at the expense of the ceaseless round of Zaph-the-Alien drivel (may I also, en passant, add my vote to the requests for a Spectrum machine code series).

However, Mr Choy's program, as printed, contains a few bugs which prevent it, for example, from solving:

$$x^4 - 16 = 0!$$

Also, while it will tackle:

$$x^4 - 3x^3 + 3x^2 - 3x + 2 = 0 \quad (1)$$

successfully, the related equation

$$x^4 + 3x^3 + 3x^2 + 3x + 2 = 0 \quad (2)$$

whose roots are simply minus the roots of (1), has it completely flummoxed. Debugs follow:

(a) Omit line 538 entirely. Its only purpose is to prevent you demeaning the dignity of your machine by giving it trivial cubics to solve. The snag is that the cubic routine, as well as solving cubics in its own right, also gets called by the quartic routine; and a perfectly genuine request to solve a non-trivial quartic, can snarl up on the program's sense of

dignity as to what cubics are worthy of it.

(b) Line 620, as printed, will fail if R is negative, since the Spectrum uses logs to do this calculation. Change it to read:

```
620 LET X2 = -(B = SGN R * (ABS
R) ↑ T)/A:LET X3 =
-X2:GO TO 730
```

(c) Line 1018 is a classic *If...Then* snarl up. Amend to read:

```
1018 IF M < 1 THEN LET M = 1
1019 IF M > 2 THEN LET M = 2:
REM Whoops!
```

(d) (The big one) Line 850 includes *Let V = Sqr P2*. The snag is that the machine will always take the positive square root, while sometimes the negative root is required (this is why equation (2) fouls up). To debug, change line 857 to:

```
857 DIM A(2,2): IF 2 * U * V < > RD
- RM * Y1 THEN LET V =
-V
```

All in all, an excellent debugging exercise: I thoroughly enjoyed myself. However, something in my water tells me that was not what you had in mind when you published it.

Jim Hind
5 Park Street
Southend
Essex

Plot to print solutions

With regard to the query in *PCW* 25-31 August, in your Peek and Poke feature, relating to conversion of *Plot* to *Print*, I offer the following solutions. I'm not certain what your correspondent had in mind, but I hope these are of some help.

In the case of *Plot to Print*, care should be taken that there is room on the screen for what it is desired to do. In the case

of *Print to Plot*, the *Print* statement should be followed by ";".

With regard to the *Screen\$* query, this in fact returns a character, and not a numeric value as stated.

Michael Kirkland
20 Batey Avenue
Rainhill
Prescot
Merseyside L35 8LT

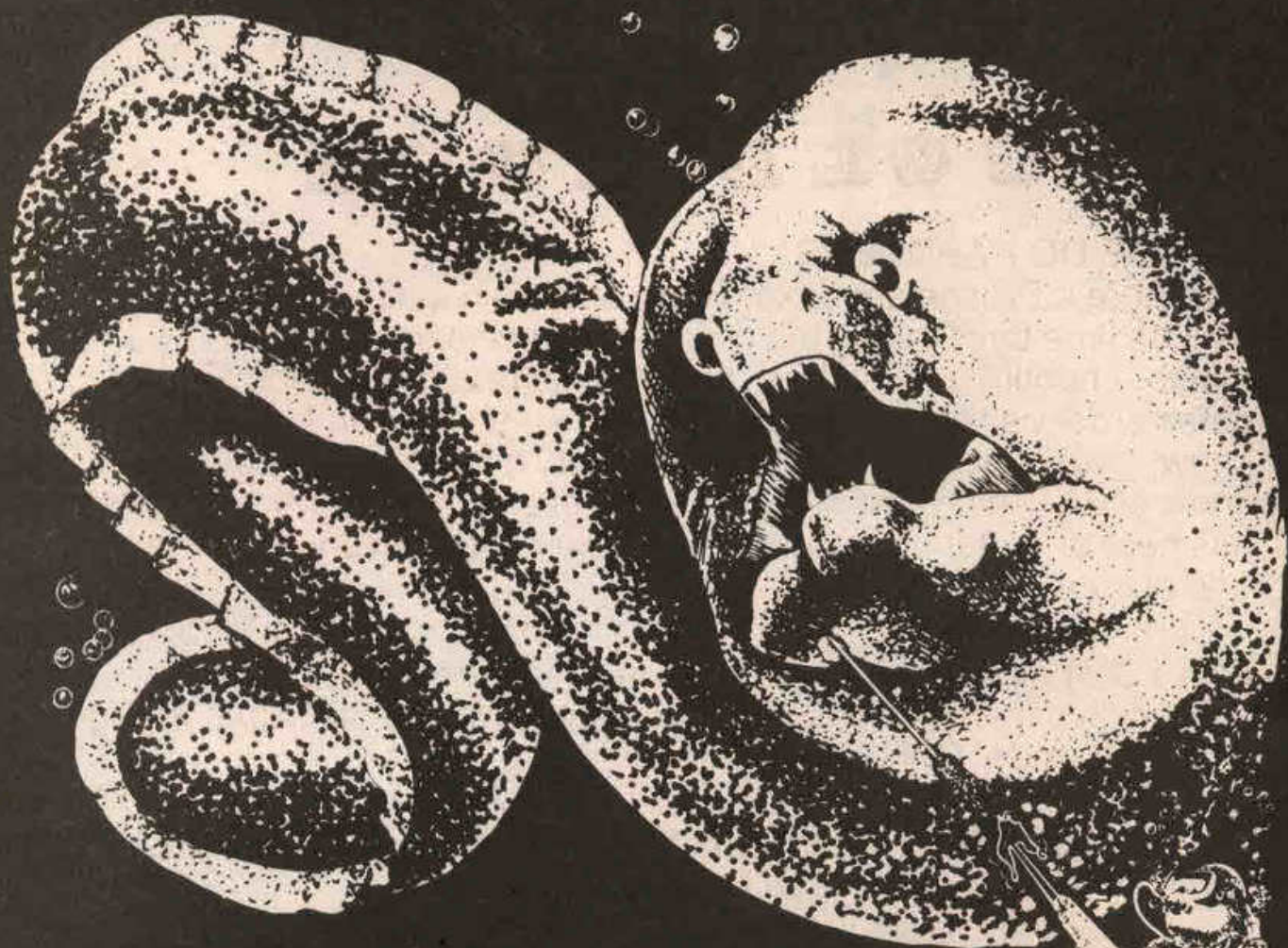
Print to Plot

```
10 REM GO SUB after any PRINT
statement. On exit, PLOT
position is at the bottom right
of last PRINT pixel, and is in
variables x and y.
1000 POKE 23677,7-PEEK 23688*8
1010 POKE 23678,(PEEK 23689-3)*8
1020 LET x=PEEK 23677
1030 LET y=PEEK 23678
1040 PLOT x,y
1050 RETURN
```

Plot to Print

```
10 REM GO SUB after PLOT or
DRAW statement. On exit, PRINT
at x,y
1000 POKE 23688,PEEK 23677/8
1010 POKE 23689,21-PEEK 23678/8
1020 LET x=PEEK 23688
1030 LET y=PEEK 23689
1040 RETURN
```


RICHARD SHEPHERD SOFTWARE



DEVILS OF THE DEEP

48 K Spectrum

£6.50.

Can you discover the fabled treasures of Atlantis, guarded by lethal crabs and menacing electric eels? Uncover the secrets of the Lost City as you wander among the timeless ancient columns. Explore the hundred deadly sectors of the treacherous seabed, each with its multitude of hidden dangers. 3-D graphics used as you've never seen before.

Full save routine.

Credit Card Hotline (06286) 63531

DEALER ENQUIRIES WELCOME — GENEROUS DISCOUNTS

Adventurous Programs always wanted. Please send sample — generous cash payments!

RICHARD SHEPHERD SOFTWARE

ELM HOUSE, 23-25 ELMSHOTT LANE, CIPPENHAM, SLOUGH, BERKS. TEL. (06286) 63531

YEP FOLKS — IT'S HERE

AVAILABLE NOW

Spectrum 48K
Dragon
Com. 64

CALIFORNIA

GOLD RUSH

HOWDE DO PARDNERS

This here's Prospector Jake, I sure am havin' one helluva time tryin' to peg ma claim with those damned Injuns a hootin' an a hollerin' all over this territory. Ma job gets harder as I move from one Gold Field to another. I know, that is me an' ma stubborn hornery ol' Mule here know of 24 rich an' I mean rich seams of pure Gold. All it needs to make this here ol' critter happy is that you help me peg every doggone last one of them claims.



Can YOU help Jake become rich, help him peg his claim, dodge the arrows, avoid the tomahawks, and plant the Dynamite in just the right place? . . . YOU CAN!!!

YIPPEE . . . Git yer Picks an' Shovels and join the CALIFORNIA GOLD RUSH . . . NOW

Amazing Arcade Action . . . Stunning Sound and Graphics
Available NOW for Commodore 64, Spectrum 48, and Dragon

£ 7.95 including P&P

SPECIAL OFFER

SPECIAL OFFER

SPECIAL OFFER

Order CALIFORNIA GOLD RUSH before August 14
and get a 10-game Cassette of terrific games . . .

FREE

COMING SOON

LEAPIN' LANCELOT: Medieval Machine Magic to enthrall you
GALACTIC SURVIVAL PAK: Every Astro-Traveller *must* have this!



We always need Dynamic Dealers
and Imaginative Writers

Please rush me CGR for (m/c)

TOTAL SUM INCLUDED £
Please make cheques and POs
payable to ANIK MICROSYSTEMS
30 KINGSCROFT COURT
BELLINGE, NORTHAMPTON

Name.....

Address.....

Connect Four

A new game for the Commodore 64 by Les Allan

Connect Four for the Commodore 64 utilises hi-resolution graphics to produce an on screen version of the popular board game of the same name. In order to make use of the full screen, each disc is made up of 4x3 characters and the graphics for the row numbers are arranged to be in the centre of each disc. Simon's Basic commands have been used throughout, but the program can be easily rearranged to run on the basic machine.

During play, the selected row for each disc is made by pressing keys 1 to 7. Pressing *F1* resets a game, whereas *F7* recalls the instruction page prior to the start of each new game.

Variables used are as follows:

T time delay
X disc position (vertical)

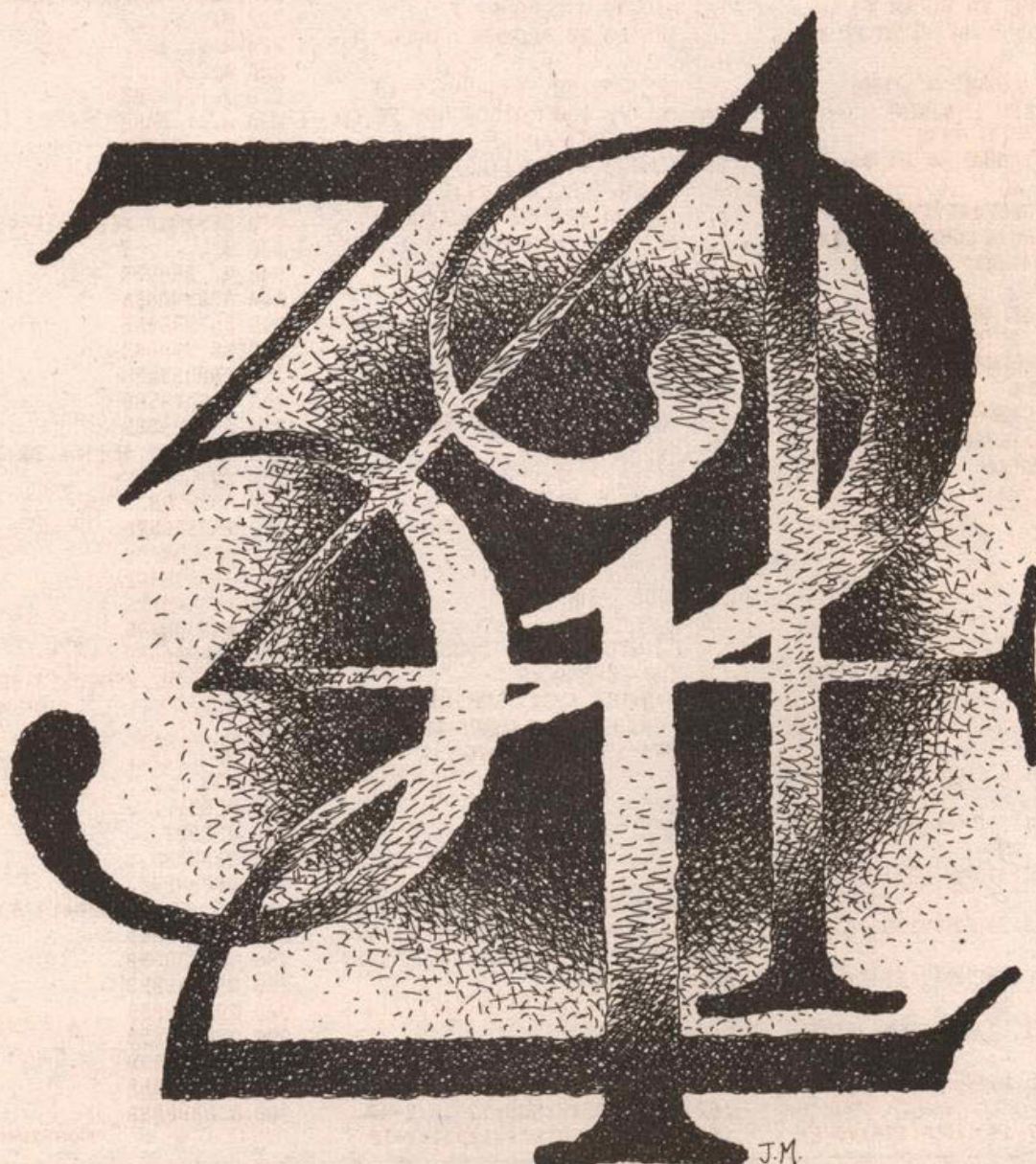
Y disc position (horizontal)
CS screen position at top of selected row
DL instruction delay
C\$ title C
E\$ title E
F\$ title F
N\$ title N
O\$ title O
R\$ title R
T\$ title T
U\$ title U
TIS timer

Rem statements and procedures within the program listing should provide a clear understanding of how the program works, but just in case here is a brief functional listing:

Notes

16 clear screen: colour black
18 highlight Simon's Basic: list every 22 lines
20 set timer to zero: instruction variable to 10

30-44 title characters
46-50 disc character and colour
60-88 print title page for first 18 secs.
90-124 print instructions for first 60 secs.
126 exec hi-res characters
136-140 set up game
150 keyboard entry
152 re-set game by pressing *F1*
154 re-calls instructions prior to new game
156 checks for valid keyboard entry
158-170 sets value of row and screen for key pressed
172 checks for free space at top of row
182-196 drop disc to one space above last position
202-208 delay procedure used during title
214-670 relocates screen memory and character set and generates user defined graphics
676-698 plays music at game start
704-720 plays extract at lower volume during play ■



Connect Four

Discs may be connected together
either horizontally, vertically
or obliquely to place 4 in a row.

Use keys 1-7 to select your row

[F1]resets a game
[F7]....recalls instructions

```

10 :
12 REM **** CLEAR SCREEN/COLOUR
BLACK ****
14 :
16 PRINTCHR$(147):COLOUR0,0
18 OPTION10:PAGE22
20 DL=10:TI$="000000"
22 EXEC MUSIC
24 :
26 REM **** TITLE CHARACTERS
****
28 :
30 C$="  XXXXX  X  X  X  X  X
X  X  X  X  "
32 O$="  X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X  X
X  X  X  X  "
34 N$="  X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X  X
36 E$="  X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X  X
38 T$="  X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X  X
40 F$="  X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X  X
42 U$="  X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X  X
44 R$="  X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X
X  X  X  X  X  X  X  X  X
46 X$="0123456789ABCDEFGHIJ"
48 Y$="  X  X  X  X  X  X  X  X
50 Z$=CHR$(150)
52 :
54 :
56 PROC PRINT TITLE
58 :
60 PRINTAT(0,3)CHR$(5)C$:EXEC
DELAY
62 PRINTAT(6,3)CHR$(28)O$:EXEC
DELAY
64 PRINTAT(12,3)CHR$(159)N$:EXEC
DELAY
66 PRINTAT(18,3)CHR$(156)N$:EXEC
DELAY
68 PRINTAT(24,3)CHR$(30)E$:EXEC
DELAY
70 PRINTAT(30,3)CHR$(31)C$:EXEC
DELAY
72 PRINTAT(36,3)CHR$(158)T$:EXEC
DELAY
74 PRINTAT(9,14)CHR$(129)F$:EXEC
DELAY
76 PRINTAT(15,14)CHR$(150)O$:EX
EC DELAY
78 PRINTAT(21,14)CHR$(153)U$:EX
EC DELAY
80 PRINTAT(27,14)CHR$(154)R$:EX

```

```

EC DELAY
82 PRINTAT(34,20)"BYXXXXXXXXX
MALLAN":EXEC DELAY
84 FORY=1TO10:EXEC DELAY
86 NEXT
88 IFTI$<"000018"THENPRINTCHR$
(147):CALL PRINT TITLE
90 IFTI$>"000060"THENCALL GAME
START
92 :
94 :
96 PROC INSTRUCTIONS
98 :
100 PRINTCHR$(147)
102 HIRES6,7:COLOUR7,7
104 TEXT20,20,"CONNECT FOUR",1,
6,16
106 TEXT250,50,"0000",1,2,13
108 TEXT20,100,"DISCS MAY BE CO
NNECTED TOGETHER",1,1,9
110 TEXT20,110,"EITHER HORIZONT
ALLY, VERTICALLY",1,1,9
112 TEXT20,120,"OR OBLIQUELY
TO PLACE 4 IN A ROW.",1,1,8
114 TEXT20,140,"USE KEYS 1-7 TO
SELECT YOUR ROW",1,1,9
116 TEXT50,160,"[F1] .....
RESETS A GAME",1,1,8
118 TEXT50,170,"[F7]....RECALLS
INSTRUCTIONS",1,1,8
120 REC5,5,310,190,1:REC10,10,3
00,180,1
122 BLOCK15,15,305,70,2
124 PAUSEDL:NRM
126 EXEC HI-RES DATA
128 :
130 :
132 PROC GAME START
134 :
136 PRINTCHR$(147):COLOUR0,0
138 X=0:CS=0:DL=2
140 PRINTAT(1,24)"XKLXXXX"CHR$
(150)"MNNNNLOPPPPPPRRRRRSTT
UU"CHR$(154)"VVVVVVVWXX";
142 :
144 :
146 PROC KEYBOARD
148 :
150 GETK$
152 IFK$=CHR$(133)ANDCS<>OTHENP
RINTCHR$(147):CALL PRINT TITLE
154 IFK$=CHR$(136)THENCALL INST
RUCTIONS
156 IFK$=""ORK$<"1"ORK$>"7"THEN
CALL KEYBOARD
158 IFK$="1"THENC5=52306:Y=0
160 IFK$="2"THENC5=52312:Y=6
162 IFK$="3"THENC5=52318:Y=12
164 IFK$="4"THENC5=52324:Y=18

```

```

166 IFK$="5"THENC5=52330:Y=24
168 IFK$="6"THENC5=52336:Y=30
170 IFK$="7"THENC5=52342:Y=36
172 IFPEEK(CS)<>32THENCALL KEYB
OARD
174 EXEC PLAY
176 :
178 REM **** DROP DISC ****
180 :
182 REPEAT
184 IFX>0THENPRINTAT(Y,X-1)Y$;
186 PRINTAT(Y,X)Z$X$;
188 X=X+1:CS=CS+40
190 FORT=1TO25:NEXT
192 UNTIL PEEK(CS+40)<>32
194 IFZ$=CHR$(150)THENZ$=CHR$(3
0):ELSE Z$=CHR$(150)
196 POKE198,0:X=0:CALL KEYBOARD
198 :
200 :
202 PROC DELAY
204 :
206 FORT=1TO75:NEXT
208 END PROC
210 :
212 :
214 PROC HI-RES DATA
216 :
218 MEM
220 DESIGN2,$E000+128*8
222 @.....
224 @.....
226 @.....B
228 @.....BB
230 @....BBBB
232 @...BBBBB
234 @..BBBBBB
236 @.BBBBBBB
238 DESIGN2,$E000+129*8
240 @.....B
242 @..BBBBBB
244 @BBBBBBBB
246 @BBBBBBBB
248 @BBBBBBBB
250 @BBBBBBBB
252 @BBBBBBBB
254 @BBBBBBBB
256 DESIGN2,$E000+130*8
258 @B.....
260 @BBBBBB..
262 @BBBBBBBB
264 @BBBBBBBB
266 @BBBBBBBB
268 @BBBBBBBB
270 @BBBBBBBB
272 @BBBBBBBB
274 DESIGN2,$E000+131*8
276 @.....
278 @.....
280 @B.....
282 @BB.....
284 @BBBB....
286 @BBBBB...
288 @BBBBBB..
290 @BBBBBBB.
292 DESIGN2,$E000+132*8
294 @.BBBBBB
296 @BBBBBBB
298 @BBBBBBB
300 @BBBBBBB
302 @BBBBBBB
304 @BBBBBBB
306 @BBBBBBB
308 @.BBBBBB

```

Continued on page 13



SAS

£6.95

NEW!



9 MINEFIELDS



ARMED PATROLS



ENEMY BASES



STUNNING SOUND



WIRE-GUIDED MISSILES



HELICOPTER GUNSHIPS



PERCUSSION GRENADES



NIGHT ACTION FEATURE

MINE-BLOWING HI-RES ACTION FOR THE DRAGON 32

LIONHEART £5.45 — Unique, two-part romp. Arcade-style action as you assemble your army, pursued by the ruthless Prince John, switches to colourful graphics adventure as you land in the Holy Land to mount your Crusade against the Sultan Saladin. Dragon 32.

DEATH'S HEAD HOLE £5.45 — The television crews are assembled at the entrance and your mother has sold her story to *The Sun*. The eyes of the nation are on you! Face the terrors of a Mendips pothole as you lead a mission of mercy to rescue a party of frightened cavers. The realism is astounding! Dragon 32, BBC B, 48K Spectrum.

DON'T PANIC £5.45 — Two classic adventures at an incredible price. Features Towers of Death and The Ice Kingdom. Villains and hazards galore. Dragon 32.

CHAMPIONS!

Take your team from the Fourth Division to the European Cup! Features 4 divisions, promotion, relegation, transfers, injuries, suspensions, weekly results and league tables, reserve team, crowd trouble, and all the fun, drama and frustration of managing a league club. **£6.95**
DRAGON 32, BBC B, 48K SPECTRUM.

CHAMPIONS! AND LIONHEART NOW FROM SELECTED BRANCHES OF ...



PEAKSOFT

7 HAWTHORN CRESCENT
 BURTON-ON-TRENT

HOW TO ORDER: Peaksoft products are available from software retailers nationwide, or by return of first-class post. Prices include VAT, postage and packing to any address, anywhere.

Yes, please rush me

.....

Name

Address

.....

Computer..... PCW

RETAILERS: We are represented by major wholesalers, or you can order direct — telephone 0283 44904.

PROGRAMMERS: We welcome top quality programs for the Dragon, BBC, Oric or Spectrum.




```

310 DESIGN2,$E000+133*8
312 @BBBBBBBB
314 @BBBBBBBB
316 @BBBBBBBB
318 @BBBBBBBB
320 @BBBBBBBB
322 @BBBBBBBB
324 @BBBBBBBB
326 @BBBBBBBB
328 DESIGN2,$E000+134*8
330 @BBBBBBB.
332 @BBBBBBBB
334 @BBBBBBBB
336 @BBBBBBBB
338 @BBBBBBBB
340 @BBBBBBBB
342 @BBBBBBBB
344 @BBBBBBB.
346 DESIGN2,$E000+135*8
348 @.BBBBBBB
350 @..BBBBBB
352 @...BBBBB
354 @....BBBB
356 @.....BB
358 @.....B
360 @.....
362 @.....
364 DESIGN2,$E000+136*8
366 @BBBBBBBB
368 @BBBBBBBB
370 @BBBBBBBB
372 @BBBBBBBB
374 @BBBBBBBB
376 @BBBBBBBB
378 @.BBBBBBB
380 @.....B
382 DESIGN2,$E000+137*8
384 @BBBBBBBB
386 @BBBBBBBB
388 @BBBBBBBB
390 @BBBBBBBB
392 @BBBBBBBB
394 @BBBBBBBB
396 @BBBBBB..
398 @B.....
400 DESIGN2,$E000+138*8
402 @BBBBBBB.
404 @BBBBBBB..
406 @BBBBBB...
408 @BBBB....
410 @BB.....
412 @B.....
414 @.....
416 @.....
418 DESIGN2,$E000+139*8
420 @BBBBBBB.
422 @BBBBBBB..
424 @BBBBBBB...
426 @BBBBBBB....
428 @BBBBBBB.....
430 @BBBBBBB.....
432 @BBBBBB.....
434 @BBBBBBB...
436 DESIGN2,$E000+140*8
438 @.BBBBBBB
440 @.BBBBBBB
442 @.BBBBBBB
444 @.BBBBBBB
446 @.BBBBBBB
448 @.BBBBBBB
450 @...BBBBB
452 @BBBBBBB
454 DESIGN2,$E000+141*8
456 @BBBBBB..
458 @BBBBBB..B

```

```

460 @BBBBBBB
462 @BBBBBBB
464 @BBBBBB..
466 @BBBBBB..B
468 @BBBBBB...
470 @BBBBBBB
472 DESIGN2,$E000+142*8
474 @..BBBBBB
476 @B..BBBBB
478 @B..BBBBB
480 @..BBBBBB
482 @BBBBBBB
484 @BBBBBBB
486 @...BBBBB
488 @BBBBBBB
490 DESIGN2,$E000+143*8
492 @BBBBBB..
494 @BBBBBB..B
496 @BBBBBBB
498 @BBBBBBB
500 @BBBBBBB
502 @BBBBBB..B
504 @BBBBBB..
506 @BBBBBBB
508 DESIGN2,$E000+144*8
510 @..BBBBBB
512 @B..BBBBB
514 @B..BBBBB
516 @..BBBBBB
518 @B..BBBBB
520 @B..BBBBB
522 @..BBBBBB
524 @BBBBBBB
526 DESIGN2,$E000+145*8
528 @BBBBBBB
530 @BBBBBBB
532 @BBBBBBB.
534 @BBBBBB..B
536 @BBBBBB...
538 @BBBBBBB
540 @BBBBBBB
542 @BBBBBBB
544 DESIGN2,$E000+146*8
546 @B..BBBBB
548 @...BBBBB
550 @...BBBBB
552 @B..BBBBB
554 @...BBBBB
556 @B..BBBBB
558 @B..BBBBB
560 @BBBBBBB
562 DESIGN2,$E000+147*8
564 @BBBBBB...
566 @BBBBBB..B
568 @BBBBBB..
570 @BBBBBBB
572 @BBBBBBB
574 @BBBBBB..B
576 @BBBBBB..
578 @BBBBBBB
580 DESIGN2,$E000+148*8
582 @...BBBBB
584 @BBBBBBB
586 @..BBBBBB
588 @B..BBBBB
590 @B..BBBBB
592 @B..BBBBB
594 @..BBBBBB
596 @BBBBBBB
598 DESIGN2,$E000+149*8
600 @BBBBBB..
602 @BBBBBB..B
604 @BBBBBB..B
606 @BBBBBB...
608 @BBBBBB..B

```

```

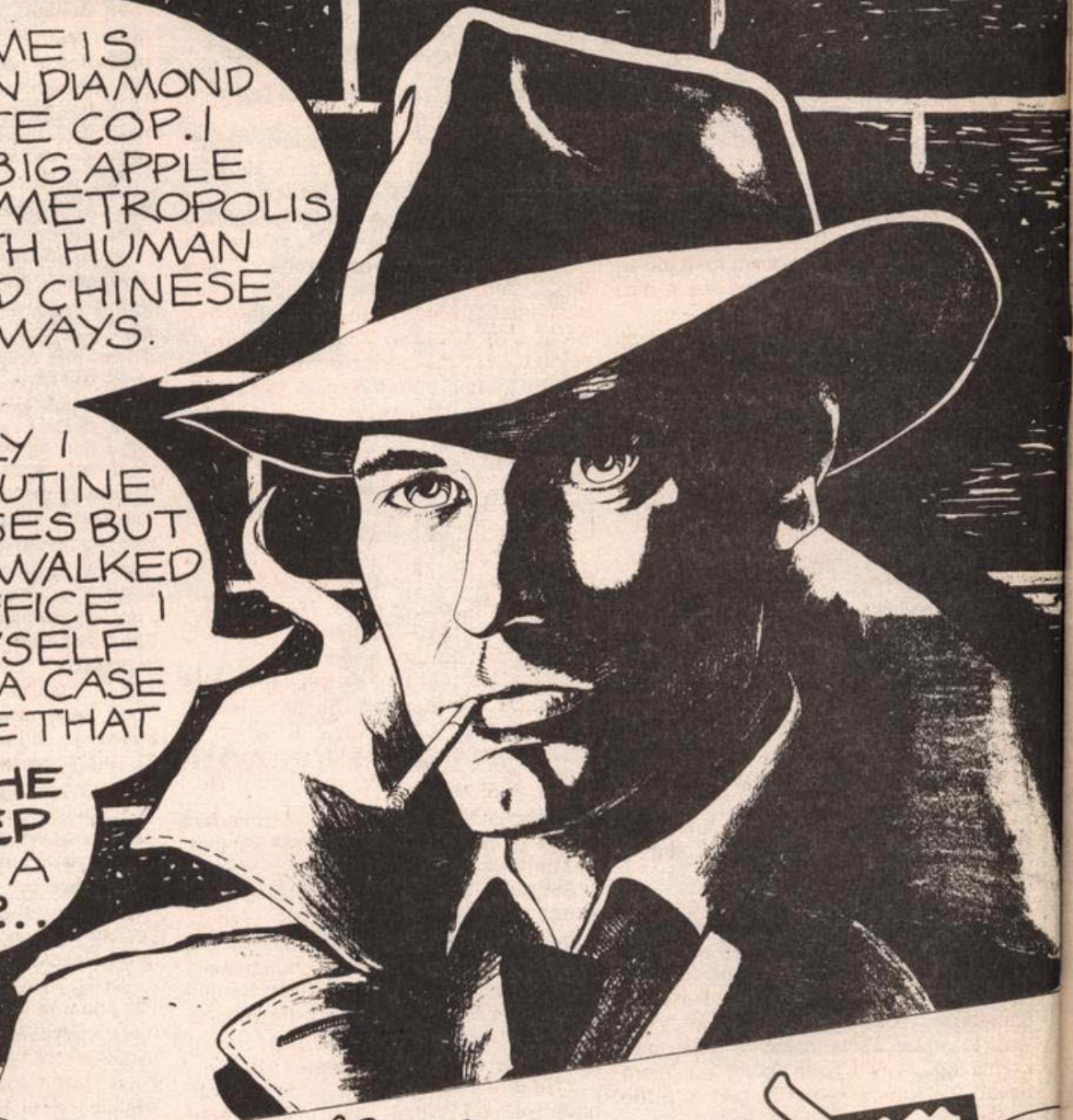
610 @BBBBBB..B
612 @BBBBBB..
614 @BBBBBBB
616 DESIGN2,$E000+150*8
618 @..BBBBBB
620 @B..BBBBB
622 @BBBBBBB
624 @..BBBBBB
626 @B..BBBBB
628 @B..BBBBB
630 @..BBBBBB
632 @BBBBBBB
634 DESIGN2,$E000+151*8
636 @BBBBBB...
638 @BBBBBB..B
640 @BBBBBBB
642 @BBBBBBB.
644 @BBBBBBB.
646 @BBBBBBB.
648 @BBBBBBB.
650 @BBBBBBB
652 DESIGN2,$E000+152*8
654 @...BBBBB
656 @B..BBBBB
658 @..BBBBBB
660 @.BBBBBBB
662 @.BBBBBBB
664 @.BBBBBBB
666 @.BBBBBBB
668 @BBBBBBB
670 END PROC
672 :
674 :
676 PROC MUSIC
678 :
680 VOL15
682 WAVE1,00010000
684 ENVELOPE1,8,8,8,0
686 M1$="J1Z0C5E5F5"
688 M2$="050C5E5F5030C5E5F5
005E50C5E50505E5050C50C5"
690 M2$=M2$+"E5035035F50F5E5F
5005E50C505050C50C5E5F5"
692 M3$="C50C503"
694 MUSIC8,M1$+M2$+M2$+M3$
696 PLAY2
698 END PROC
700 :
702 :
704 PROC PLAY
706 :
708 VOL3
710 WAVE1,00010000
712 ENVELOPE1,8,8,8,0
714 P$="J1Z0C5E5F5035E50C5E
5050C5"
716 MUSIC8,P$
718 PLAY2
720 END PROC
722 :
724 :
726 REM #####
728 REM #####
730 REM #####
732 REM #### CONNECT FOUR ####
734 REM #### COMMODORE 64 ####
736 REM #####
738 REM #### SIMON'S BASIC ####
740 REM #####
742 REM #### LES ALLAN ####
744 REM #### 26TH AUG 1983 ####
746 REM #####
748 REM #####
750 REM #####
READY.

```


MY NAME IS
DIAMOND, DAN DIAMOND
I'M A PRIVATE COP. I
WORK THE BIG APPLE
A SEETHING METROPOLIS
FILLED WITH HUMAN
MISERY AND CHINESE
TAKEAWAYS.

NORMALLY I
ONLY DO ROUTINE
DIVORCE CASES BUT
WHEN **SHE** WALKED
INTO MY OFFICE I
FOUND MYSELF
INVOLVED IN A CASE
SO STRANGE THAT

IT MADE THE
BIG SLEEP
LOOK LIKE A
CAT NAP...



NEWS HUNT WINS GRAND PRIX

At yesterday's Monaco Grand Prix, a hunting party strayed onto the track at the climax of the race. Cars were halted as the hounds rampaged around the circuit. "The whole place has gone to the dogs," one driver was reported as saying. The race was restarted, riders and drivers battled bitterly around the course before the Hunt thundered past the finishing line to take the chequered flag (it hasn't been seen since).

PLAYER WINS OPEN

Eagle eyed spectators were privileged to see score a



Salamander SOFTWARE

17 NORFOLK ROAD - BRIGHTON - BN1 4AA - SAE FOR FULL CATALOGUE

PRIVATE DETECTIVE DISAPPEARS

Police are baffled by the disappearance of Dan Diamond. He was last seen approaching the eerie edifice known as Franklin's Tomb, but the authorities are completely unable to find any trace of him. Citizens are asked to report any information relating to his disappearance immediately. For further details, buy FRANKLIN'S TOMB, a new adventure game for the DRAGON 32 and 48k ORIC-1. This adventure comes complete with a 24-page illustrated Case File. £9.95 from BOOTS, SPECTRUM, COMPUTERS FOR ALL, WEB-STORE and all other purveyors.

BANANA DICTATOR IN THE UP

2 DEAD IN EVEREST TRAGEDY

The Everest Expedition ended in tragedy yesterday as Carl and plunged down a to a grisly death. the expedition was quoted as "Yuk". Continued

COLD WAR XARG ESCA Thousands dead in Ice Storm Muduras the

Logan's run . . .

David Kelly talks to Ian Logan, author and machine code expert

Despite an enviable reputation as an authority on Z80 machine-code, Ian Logan still regards himself as an amateur enthusiast.

A graduate in medicine from Sheffield, he qualified as a GP. But, his first attempt to get involved with computers was, a failure — he was turned down for a job as a doctor for ICL. "They gave me a nice lunch, but I didn't get the job."

After that, he spent nine years working as a GP — still with a faint hope of somehow, someday, becoming involved in computers.

In 1980, he joined the Lincolnshire Microprocessor Society. Through the group he met people who had Pets and Tandys. "I borrowed a Pet for a fortnight — and it sat on the table downstairs. I didn't really know what to do with it."

Then he bought a ZX80. "Bob Maunders of Linsac put an advertisement in one of the magazines, saying he wanted ZX80 programs," says Ian. "I phoned him up and discovered I knew more about the machine than he did."

The two decided to produce a book for the machine — which became Ian's first book. A small spiral-bound handbook called *The ZX80 Companion*. Ian wrote about one third of it — the rest was written by Bob and another writer, Terry Trotter. It came out in September 1980.

All of Ian's knowledge of the ZX80 is self-taught. Back in 1980 there were no introductory tutorial books on machine code programming, such as there are now.

"At that time, I always used to think that somebody, somewhere, knew all there was to know about machine code programming. Now I have found out there never were any — there still are no experts."

Bob Maunders was unable to publish Ian's next book, on ZX80 machine code, and suggested he try to find another publisher. "There I was, a week after the ZX81 was launched, going round this micro show trying to get someone to publish a manuscript written for the ZX80."

"After a couple of people turned me down, I answered an advertisement from Melbourne House.

"I got a phone call from Australia when I was over at the village hall mowing the lawn and my wife came running across to tell me. The call was from Fred Milgrom and that is how I started writing for Melbourne House."

Fred Milgrom asked Ian to convert his book for the ZX81: "Melbourne House apparently made a lot of money out of some sensational book published in Australia about female sex hormones. But Fred has a great interest in computers — and in particular he loves adventure games."

"And he has some very good program-

mers out there with him now — like Philip Mitchell who wrote *The Hobbit*."

Ian's first book for Melbourne House was published in September 1981 — almost exactly a year after his first.

Next came a chance meeting with Frank O'Hara — a government statistician. "Frank thinks and lives numbers," says Ian. "And he understands all the mathematics which I don't." Together they wrote *Understanding Your ZX81 Rom*. "I started ZX81 disassembly from the front, and he started from the back. We met in the middle."

Then the Spectrum came out — Ian and Frank have recently written *The Complete Spectrum Rom Disassembly* for it. "The book is doing very well — because nobody else has attempted anything like it."

For the last couple of months Ian has been preparing yet another book: *The Spectrum Microdrive Book*. This book is a departure for Ian — for the first time he is writing about his own work.

From Christmas until Easter, Ian worked two days a week for Sinclair, writing software for the Interface 1, which is necessary to connect the Microdrive to the Spectrum.

Ian's book on the Microdrive and Interface 1 will be published in either late September or early October.

Since working on, and writing a book about, the Microdrive, Ian has become something of an authority on the device. "People don't seem to be as excited about the networking possibilities as I thought they would be — there is no reason why you cannot join up Spectrum Net to other computers. Networking is great fun."

"The other thing people don't seem to have realised is that you can pass anything on the RS232 and store it on Microdrive — if you are prepared to use the

Spectrum as a controller. You could easily save software from a BBC onto Microdrive.

"It remains to be seen if anyone will build Microdrive controllers for other machines to use them direct. Although not difficult technically, it might be difficult to manufacture it at a low enough price — the Microdrive has a big ULA in it, doing a lot of work."

One of the most interesting things Ian has discovered is the existence of a set of software 'hooks' to enable users to access routines in the Interface Rom. This means that anyone can now add new commands to the Spectrum. "You can add what you like — add new languages if you want." These can only be written in Ram but, if stored on Microdrive, they could be loaded in each time before using the machine.

When Ian was working at Sinclair, he met Scott McCourt. Scott was in charge of writing the system software for the Timex 2000 machine, the US Spectrum equivalent. He asked Ian to help — to go over to the US and write software for them.

"They wanted to add new commands to the Spectrum," says Ian. "The machine was a 1981 design and requirements for a 1983 computer have evolved since then. They were going to have to redo the Spectrum printed-circuit board for the TS2000 to satisfy the US FCC regulations, and to make it compatible with the NTSC tv standard. So, while they were about it, they decided to produce an enhanced version, with extra commands."

"I'm not sure if Timex made the right decision — maybe they should have just put out the Spectrum, more or less as it is and got it out over there earlier."

During his two weeks stay with Timex, Ian showed them how to add new commands and routines. He extended the syntax checking and corrected some of the small bugs in the Spectrum's own Rom. "I wouldn't want to make too much of the Spectrum's faults. It is a very successful machine," he says. "After all, it is not often you need to use the number — *Int65536*."

After the Microdrive book comes probably a TS2000 version of Ian's best-selling *Complete Spectrum Rom Disassembly*, again with Frank O'Hara. "I don't know what I will do next — at the moment I'm sort of drifting from one thing to another. I had a Vic20 all last winter — the plan was to write a book for it — but I got so frustrated at the way the machine software was organised."

"Perhaps I ought to sit down and write some programs — but I don't like writing games very much. I am going to have to learn a bit about 16-bit machine language. That's going to be all the rage next year."

"What I have found is that I like problem solving. I enjoyed my work with Sinclair and Timex — and I'd like to do more. I'd like to continue to be involved with the computer industry and I don't feel as though I am at present. People like me don't get employed by a company if they can do it themselves."



Hitchcockian nightmare

John Scriven picks his way through another selection of Spectrum software

In the months since the Spectrum first nosed its way on to the market, there has been a drastic improvement in the available software.

The first games were mainly coloured copies of ZX81 favourites, with a lot of slow Basic programs thrown in for good measure. When programmers had got the hang of smooth movement in machine code, the standard began to improve. Even without the definition of the BBC and the sprite facilities of the Commodore 64, there is probably now a larger selection of good Spectrum software on the market than for any other machine.

Having spent several months with other machines, it was a pleasant surprise to be presented with a pile of games software for the Spectrum that was generally of a good standard. Although the old favourites were there and some novel but ultimately boring games, there was some of the best TV entertainment since Anne Diamond first graced my early morning screen.

Invaders from Artic includes the copy-right notice and instructions on the loading screen, a good idea that many companies seem to employ nowadays. There are options at the start to choose game difficulty (1-9), the number of players (1-2) and game variation (1-4). This latter choice can provide you with mutant invaders and bombs from different angles. Should you be one of the seven people left in this country without your own copy of this game, then you will find this version reasonable enough, and with plenty of varieties to keep you amused for some time.

Gobble-a-Ghost from CDS Micro Systems and *Muncher* from Silversoft are both *Pacmen* in slightly different guises. *Gobble-a-Ghost* with four ghosts and four power pills provides instructions in the packaging but nothing on screen to help you. The controls used are 1 and Q for up and down, and 9 and O for left and right, a comfortable combination and slightly preferable to *Muncher's* use of N for down and K for up. At least manufacturers seem in the main to have stopped using the cursor control keys, apparently logical, but in fact the worst choice.

Gobble-a-Ghost is reasonably difficult in the first frame, but there are no little extras that we have come to know and love, such as cherries, strawberries and names for the ghosts. *Muncher* has all these and a beautiful demonstration game at the start. Unfortunately, although the program loaded with no difficulty, the game itself refused to start, so I can't say how good it was in action.

Jawz from Elfin Software started off with some promise. The title page is good, and you can select the number of players and

the difficulty level. The game is set off the coast, with a view from the seabed to the surface. You are provided with a base that can be moved left and right across the sand, firing at sharks that swim between you and the surface. Hanging just below the water-line are jelly-fish that drop poison pellets on to you.

The idea itself is novel and could have resulted in an interesting game. However, the sharks only swim left and right and you can even control how close to the surface they swim. Once you've destroyed one layer, another appears. Perhaps I missed some hidden subtlety, but the game rapidly became boring and yawningly predictable. If you suffer from insomnia this could be the ideal program for you.

Firebirds from Softek produces waves of flapping cosmic vultures that either crash into your base or drop unpleasant things (!?) on your head. If you kill enough of them, white motor-cycle helmets progress down the screen and generally get in the way. Apparently, a mother-ship makes an appearance at some stage if you can put up with this Hitchcockian nightmare.

The screen has a wrap-around feature which is irritating; although the vultures zoom off to the left and reappear on the right, you cannot do the same. There are pretty little multi-coloured displays in between individual games and this package is probably worth considering if you like alternative versions of space-zapping. If you prefer the real thing, try riding round Trafalgar Square on the back of a moped for half an hour...

Embassy Assault from Sinclair/ICL is another game that starts off with much promise. "You are one of the country's best agents and have been given the task of acquiring some top secret codes from the strong-room of a foreign embassy."

3D views inside the building are displayed, although not in great detail, and the game is rather slow, particularly in generating the maze of rooms (20 seconds for level one and three minutes for level nine). There are maps positioned on some of the walls, and stairs lead you to three other storeys.

When you reach the code room, there is an envelope on the wall. You don't have to

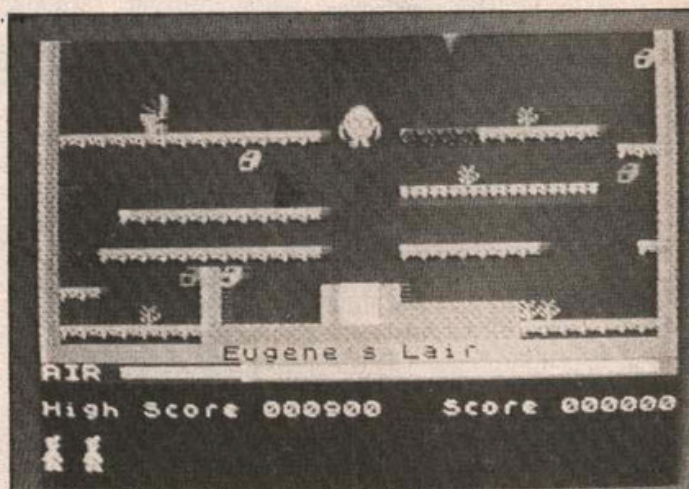
pick it up, open it, decode it, or in fact, do anything — you simply retrace your footsteps and leave the building. There are no guards to stop you and the only thing you play against is the clock, so there is little challenge in this game.

Yet another program that appears to offer a great deal at the start is *Schizoids* from Imagine. The cassette blurb invites you to be a space dustman and to help shove all the galaxy's garbage into the nearest black hole with your Space-dozer. The main disappointment is in the display, which is in black and white. Not an easy game to master, it is reminiscent of *Asteroids* in the type of controls you have for your craft; eg, rotate left and right, thrust, etc.

Usually, you end up being splatted by some strange-shaped piece of rubbish, or else fall into the black hole yourself. One wonders which unfortunate part of the galaxy is at the receiving end for all this junk (come to think of it, I seem to have seen something like it in PCW's offices — perhaps that's why they've changed their address recently).

Sentinel from Abacus is original and entertaining if you like space arcade games. A cross-shaped mother ship appears in the centre of the screen containing four rockets that you can launch and use to protect the main base. You can fire missiles and photon cannons as you steer the mini-rockets round the screen. There is even a force field that will temporarily repel invading aliens. Fast-moving and using clear, high-resolution graphics for the space-craft, this game proved to be above the usual standard of space games.

Another game that shows evidence of



careful thought is *Spectra Smash* from Romik Software. Although it is only a version of *City Bomber*, it can be played with a variety of joysticks. There are nine different levels, not to mention anti-aircraft fire.

The buildings that have to be bombed away before you can land are much too pretty — they look like a typical street in Amsterdam, complete with gable ends. If

you succeed in clearing the screen, you can make your touchdown in what must be the Dam square. A fuel truck comes to your assistance and lets you take off to attack yet another area of Amsterdam (I know the Dutch are generous, but this is ridiculous).

Although illogical in concept and dubious in morality, it's fun to play. Also included is a copy of *Breakout*, which is just as boring as it was when it first appeared in pubs six or seven years ago — but one shouldn't complain about a freebie game, even if you'll rarely want to play it, unless you're feeling nostalgic.

Having looked at a rather weak game from Imagine, it was a pleasure to find one of theirs that has appeared on the market more recently called *Jumping Jack*. This is great fun, original in concept and very addictive.

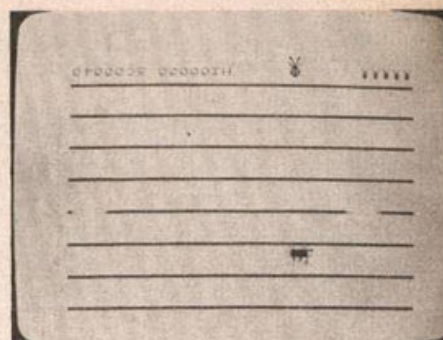
On the surface a simple game, at higher levels it requires great concentration and the ability to keep a straight face while being pursued across the screen by a dinosaur, a jumbo-jet and a person with a shot-gun. There are eight moving lines on

the screen, each one containing gaps that move in both directions. You start at the bottom of the screen with eight lives and have to jump through the gaps to the next level.

Although the holes are essential for moving up the screen, they also drop you back should you be running in the wrong direction. If you fall to the bottom you lose a life. Each time you reach the top, a fresh screen appears, identical except for the addition of a hazard (jumbo-jets, etc). Each screen cleared results in an extra hazard to avoid, so the 20th screen has 19 of these things rushing about. To make it more interesting, in between screens two lines of a verse appear.

I greatly enjoyed this game and would recommend it whole-heartedly to anyone who can face frustration and horror as poor *Jumping Jack* misses the gap and crashes his head against the ceiling. I suppose this is only to be expected — after all, *Jumping Jack* and *Yossa Hughes* both originate from Liverpool.

I have left until last what must be the most intricately conceived piece of software for the Spectrum since the first



Horace game appeared on the market. *Manic Miner* from Bug-Byte has an amusing setting — Miner Willy has found a hidden mine in south London and has to bring out all the treasure that he discovers there. Willy can walk to the left and right and also jump. This last movement is most essential, for the system is full of unpleasant creatures just out to get him.

The first cave is the central cavern, and jumping from level to level up the display (while negotiating one-way conveyor belts and disintegrating floors) enables him to collect several keys positioned in awkward places. Should you manage to guide him to success before his air supply runs out, he has to make his way to the bottom of the screen again and exit through a flashing door.

If the game had been limited to this, it would have provided a few hours fun and would have been as good value as several other cassettes reviewed here. However, on passing through the door, poor Willy enters another cave — the Cold Room, with different levels and angry penguins guarding it. Leaping over them is the only way to achieve success. This cave is by no means the last however — and there is a total of 20 different screens, each one with different creatures and different techniques to solve before they can be mastered.

The names chosen for the caves are very tongue-in-cheek and will be instantly recognised by arcade freaks — *Attack of the Mutant Telephones* and *Wacky Amoebatrons* being two examples. My favourite cave is called *Eugene's Lair*, clearly aimed at a certain well-known programmer. This cave is full of malevolent WC's, complete with flapping seats.

In addition to the excellent game format, there is on-screen scoring, a musical opening title with moving piano keys and a demonstration of all the caves in the system. Accompanying music can be turned off at any time.

This game is so original, amusing and habit-forming, it will probably be voted No 1 Spectrum game this year. If I ever meet Matthew Smith, the author of this game I shall complain most bitterly about the program being released during the summer. Were it not for this game, I would certainly be more sun-tanned than I am at present!

Supplier	Program	Price	Value (1-10)
Artic Computing Main Street Brandesburton Driffield YO25 8RG	<i>Invaders</i>	£4.95	4
Bug-Byte Mulberry House Canning Place Liverpool L1 8JB	<i>Manic Miner</i>	£6.95	10
CDS Micro Systems 10 Westfield Close Tickhill Doncaster S Yorkshire DN11 9LA	<i>Gobble-a-Ghost</i>	£5.95	7
Abacus Programs 716 Llangyfelach Road Swansea SA5 9EL	<i>Sentinel</i>	£5.00	8
Elfin Software Hudsons House Battery Road Great Yarmouth Norfolk NR30 3NN	<i>Jawz</i>	£4.95	5
ICL/Sinclair Stanhope Road Camberley Surrey GU15 3PS	<i>Embassy Assault</i>	£4.95	5
Imagine Software Masins Buildings Exchange Street East Liverpool Merseyside L2 3PN	<i>Schizoids</i> <i>Jumping Jack</i>	£5.50 £5.50	6 10
Romik Software 272 Argyll Avenue Slough S11 4HE	<i>Spectra Smash</i>	£6.99	6
Silversoft London House 271/273 King Street London W6	<i>Muncher</i>	£5.95	—
Softtek 12/13 Henrietta Street London WC2	<i>Firebirds</i>	£5.95	7

Single ship combat

Peter Bartley presents Alien Destroyer in the final part of his gameswriting series

To round off the series, here is a games program utilising many of the ideas we have been considering over the past few weeks.

The object of the game is to destroy as many of the alien fleet as possible in single ship combat. You have a limited fuel supply and need one unit of energy to get back to your home base. However, your laser is solar-powered and hence uses none of the ship's energy (ie: you have unlimited firing). A five second warning sounds before you have to retire from the game.

Your ship's sensors can give you certain information: a tone sounds and the sights align when the enemy ship is within firing range. When the ship can be hit, the vulnerable portion is illuminated in green. The ship turns red when in line of fire, but cannot be hit. When you are close enough to the enemy ship, your navigation system will take over the aiming for you and "lock-on".

The controls of your ship are difficult to master. They are: P=up, L=left, colon=right, full stop=down, K=fire, @=track (tracking mode: the ship will always be moving in the last direction indicated, unless in tracking mode, when the ship will remain relatively stable). The difficulty lies in the fact that the motion of your craft is relative. For example, if you

made the ship veer left, the enemy would appear to move right, and so on. It's easier to just think of hitting the key which corresponds to the relative position of the enemy on the screen.

The first program is a "loader" — it simply defines the characters we'll be using in the game. Run the "loader" first, then New it and Load the second program (though not before Saving them both first, of course). Line 10 reduces the amount of memory Basic thinks it has, and line 20 reads the character data.

The second program is the game itself. Lines 10-110 are the initialisation. The reversed H in line 10 is a special print character: for those who missed the section in the fourth article of the series, here's how to obtain it. When typing the line for the first time, leave a space where the H should be. Return the line, and move the cursor up and onto the space you left. Type "[RVS ON]" and then hit H. A reversed H should have appeared. This character prevents lower case letters from being printed by accident. Line 20 defines the direction array for the enemy ship. Line 110 colours the lines of fire and starts the timer. Lines 120-310 are the main loop.

Many of the lines in this program can be considered as working in pairs. Lines 130 and 300 sound the alarm when the fuel is used up, lines 170 and 200 move the ship and lines 205 and 290 move the direction arrow. There are three subroutines (although two only are true subroutines). They are lines 400+ (final routine and

highscore), 500+ (firing routine) and 600+ (the "lock-on").

Other lines of importance: 210 checks whether there is a target in the sights. Lines 540-590 create the explosions. I always prefer it when print statements are explained so: line 140 has three spaces and three [CSR BACK]s in it. Line 640 is:

```
"[10 CSR RT][3 CSR DN][SHIFT @][SPACE]
[SHIFT L][CSR DN][3 CSR LFT][3 SPACES][CSR
DN][3 CSR LFT][SHIFT P][SPACE][SHIFT O]"
```

Line 670 is:

```
"[10 CSR RT][3 CSR DN][SPACE][SHIFT -]
[SPACE][CSR DN][3 CSR LFT][SHIFT ***][CSR
DN][3 CSR BK][SPACE][SHIFT -][SPACE]"
```

Note that both lines have [RVS ON] commands contained in them. This is true of all the Print statements in the program, except those contained in any of the lines 400-470 (remember the third article: we haven't read their character data into Ram, only our data from the loader program).

Main variables: A gives the position of the ship, F the position of the guidance arrow and B is the "general-purpose" variable.

This program shows how simple ideas can produce a very playable game — try to add "little extras" to it and then get to work on your own "pet" ideas.

If you do have a playable game, or simply an interesting routine, please don't hesitate to send it to *Popular Computing Weekly*, following the instructions given at the beginning of each Open Forum. Think of all those other Vic users out there, starved of programs. And if that doesn't warm your heart, there's always the chance to make a bit of ready cash from your effort. You have nothing to lose but your postage. ■

Program 1

```
10 POKE52,27:POKE56,27:CLR
20 FORA=7168TO7231:READB:POKEA,B:NEXT
30 FORA=7424TO7431:POKEA,0:NEXT
40 DATA16,56,16,16,16,16,56,16
50 DATA60,66,153,231,165,153,90,60
60 DATA2,4,6,5,5,6,4,2
70 DATA64,32,96,160,160,96,32,64
80 DATA0,0,66,255,66,0,0,0
90 DATA0,0,0,193,34,20,8,0
100 DATA0,32,66,255,66,32,0,0
110 DATA52,65,181,66,149,132,105,86
```

Program 2

```
10 POKE36879,8:POKE36878,15:PRINT"J"
20 POKE36869,255:D(0)=-22:D(1)=22:D(2)=-
1:D(3)=1:TI$="000000"
100 PRINT"J":A=7702+INT(RND(1)*484):
POKE7701,230
110 FORB=38643TO38662:POKEB,2:NEXT:
POKE38653,5
120 POKE7911,0:POKE7955,0:POKE38421,INT
(RND(1)*7)+1
130 IFVAL(TI$)>=55THENPOKE36874,200:IFTI
```

```
$)="000100"THENGOTO400
140 PRINT"ENERGY: "60-VAL(TI$)
150 PRINT"TAB(11)"HITS:"SC
170 POKEA,32:POKEA-1,32:POKEA+1,32
180 A=A+D(INT(RND(1)*4))+E:IFA<7680+22
THENA=A+484
190 IFA>8164+22THENA=A-484
200 POKEA,1:POKEA-1,2:POKEA+1,3
205 F=INT((A-7680)/22)*22+7701:IFA+1<0
FANDR<FANDR-1<0FTHENPOKEF,6:POKEF
+30720,4
210 IFPEEK(7933)<32THENPOKE36876,240:
POKE7911,4:POKE7955,4:POKE36876,0
215 IFPEEK(7933)=1THEN600
220 P=PEEK(197)
230 IFP=13THENE=22
240 IFP=45THENE=-1
250 IFP=37THENE=-22
260 IFP=21THENE=1
270 IFP=53THENE=0
280 IFP=44THENGOSUB500:IFX=1THENX=0:
GOTO100
290 POKEF,32:POKEF+30720,1
300 IFVAL(TI$)>=55THENPOKE36874,0
310 POKE198,0:GOTO120
```



```

400 POKE36874,0:FORB=0T0253:POKE7933+B,
170:POKE38653+B,5:POKE7933-B,170:
POKE38653-B,5
410 NEXT:POKE198,0:POKE36869,240:PRINT"
7300 YOU SCORED: "SC
420 IF SC>HSTHEN HS=SC:PRINT"7000 YOU HAVE THE
HIGHSCORE700 PLEASE TYPE YOUR NAME":IN
PUTC$
430 PRINT"700 C$" HAS THE"
440 PRINT"700 HIGHSCORE WITH"HS
450 PRINT"7000 HIT A KEY TO RESTART "
460 GETA$:IFA$=""THEN460
470 SC=0:GOTO20
500 FORB=0T08
510 POKE7923+B,5:POKE7942-B,5:POKE36876,
241-B:NEXT
520 FORB=0T08:POKE7923+B,32:POKE7942-B,32
POKE36876,241-B:NEXT:POKE36876,0
530 IFPEEK(7933)=32THENRETURN
540 A$=TI$
550 FORB=0T09:POKE36877,141-B:POKE7933+B,
7:POKE7933-B,7:POKE7933-22*B,7:
POKE7933+22*B,7

```

```

560 POKE7933+B,32:POKE7933-B,32:POKE7933
-22*B,32:POKE7933+22*B,32:NEXT
570 SC=SC+50:X=1
580 FORB=15TO0STEP-.1:POKE36877,150-B:
POKE36878,B:NEXT:POKE36877,0:
POKE36878,15
590 TI$=A$:RETURN
600 B$=TI$
610 FORB=0TO8:POKE7923+B,4:POKE7943-B,4:
POKE38643+B,1:POKE38663-B,1:POKE
36877,22.5+B*2
620 POKE7923+B,32:POKE7943-B,32:NEXT:
POKE7931,4:POKE7935,4:POKE36877,0
630 PRINT"      4=LOCKED ON"
":POKE36876,0:FORB=1TO20:NEXT
640 IFINT(G/5)=G/5THENPRINT"#####
#####  "
650 IFPEEK(197)=44THENGOSUB500:SC=SC-20:
TI$=B$:X=0:GOTO100
660 PRINT"
":POKE36876,240:FORB=1TO20:NEXT
670 IFINT(G/10)=G/10THENPRINT"#####
##### | ##### | "
680 G=G+1:GOTO630

```



SIMPLE
TO USE

You want to program your own Arcade Games?

SoftwareSTUDIOS Games Designer

Now you can! Produce your own SPRITE BASED MACHINE CODE Arcade Games

NO programming knowledge needed
EIGHT pre-programmed games included

48K SPECTRUM
£14.95

The rings of Saturn

Maurice Gavin presents the rings of Saturn for 16K Spectrum

Through the telescope, Saturn is the beautiful ringed planet that never fails to impress — be it beginner or expert alike. This program does the next best thing and probably represents the most accurate computer simulation of Saturn ever attempted on a home micro. It is possibly superior to many mainframe efforts, with the known exception of NASA's Planetary Laboratories!

It features a full screen solid image, with all hidden lines deleted and the globe and ring system drawn accurately to scale. The user may tilt the planet and ring system at any angle up to 90°. If 0° is *Input*, the planet is drawn as viewed directly over its equator with the rings shown edge-on. If 90° is *Input*, a polar view is presented with the ring system completely encircling the planet. You may select a northern or southern aspect for the tilt. An *Input* of *s* will show the underside of the rings and the equator and visible pole correct for this aspect.

The sequence of drawing the planet is as follows:

- 1) Check image size; rescale if tilt > 43°
- 2) Draw globe correcting apparent oblateness for tilt
- 3) Draw equator correcting apparent oblateness for tilt
- 4) Draw semi-transparent ring system
- 5) "Trace" nearest edge of rings across globe according to N/S aspect
- 6) Draw Cassini Division through ring system: clockwise for N aspect

- 7) Delete Cassini Division if "behind" planet
- 8) Plot visible pole position correcting apparent oblateness for tilt

The program contains an option to *Copy* the completed picture to the ZX printer or to *Save* the image onto tape with the *Screen* command. The latter is simplicity itself — it is only necessary to press "p" (for picture) and start the recorder to *Save* the picture you have created. The angle of tilt is automatically *Saved* in the file name; eg, "sat -23.4". To recreate the picture, enter *Load* "sat -23.4" *Screen* and the Spectrum will search and display the appropriate image off of tape.

Unlike some uninformed computer presentations of this planet, the globe is not circular (except for the polar view) and so the *Circle* command cannot be used to draw the planet. This oval (or correctly termed oblate spheroid) shape is due to Saturn's rapid axial rotation in 10h 14m (Saturn's day), causing the equatorial "bulge" and polar "flattening". The Spectrum *Draws* the globe and ring system via the *Plot* command, using a rapid ellipse routine. In the case of the globe, the reduction in oblateness, as it is called, from 10 percent to zero (full circle) is applied progressively through the change of tilt from 0° to 90°. Similarly, the position of the equator and visible pole are correctly located according to the tilt of the planet

and the oblateness as presented.

As seen from Earth, the appearance of the planet is limited to a maximum tilt of 26.73° (ie, Saturn's axial tilt to its orbit about the Sun) in both north or south directions, plus or minus 0.49° depending on the relative positions of Earth and Saturn in their orbits at the time. Thus, any tilt in excess of 28° will represent a viewpoint other than from Earth!

The Rem statements show the general structure of the program. In the case of *Drawing* the globe and rings, it is only necessary to calculate the outline of one quadrant of the ellipse and to mirror this in the remaining three quadrants by *Drawing* each quadrant sequentially. Such a routine ensures the *Drawing* is executed rapidly, with the minimum of calculation to slow the program down. In the case of the routine to *Draw* the Cassini Division in the ring system, I have chosen to *Plot* one complete ellipse and you will note how relatively slow, though satisfying, this proves to be.

Because the whole of the above programs relies on the ability to *Draw* ellipses rapidly I have included as an addendum routine the short program called *Solid Ellipse*. It can easily be incorporated into your program if you wish to *Draw* these precise shapes. The variable *y* is used here to control both the vertical *y* coordinate *Plot* position and the maximum radius of the ellipse (called the semi-major axis). The routine is short enough to "tinker with" and find out precisely how it works, perhaps with your own value in place of *y* in lines 110 and 120. ■

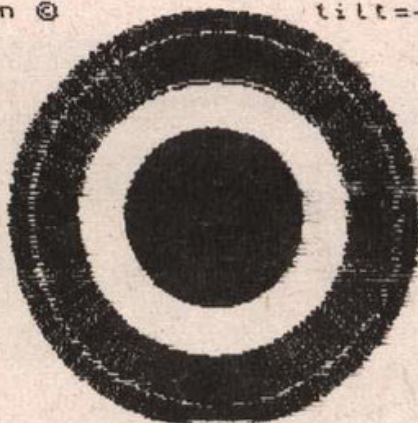
Saturn ☉

tilt=11.5°



Saturn ☉

tilt=-90°



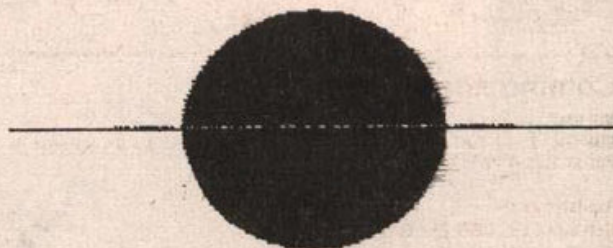
Saturn ☉

tilt=-45°



Saturn ☉

tilt=0°



10 REM The Rings of Saturn ©
by Maurice Gavin

```

-----
20 LET sc=1: BORDER 0: PAPER 0
: INK 6
30 CLS: PRINT "Saturn 0";
40 INPUT "tilt(0 to 90)";z
50 IF z>43 THEN LET sc=.66
60 INPUT "n or s tilt(n/s)";a$
70 LET ob=1.1z/180
80 LET oe=.89+(.11*ob)
90 IF a$="s" THEN LET z=-z
100 PRINT TAB 21;"tilt=";z;CHR$
130
110 LET e=1/SIN ((.1+z)/180*PI)
115 LET p=COS ((.1+z)/180*PI):
IF a$="s" THEN LET p=-p
120 LET x=255/2: LET y=88
130 LET r=54*sc: LET h=126*sc
140 GO SUB 350
150 REM draw ring system
160 FOR f=0 TO 1.58 STEP .01
170 LET c=INT (SIN f*h)
180 LET d=INT (COS f*h/e)
190 PLOT x+c,y+d
200 DRAW -c/3,-d/3
210 PLOT x-c,y+d
220 DRAW c/3,-d/3
230 PLOT OVER 1;x-c,y-d
240 DRAW c/3,d/3
250 DRAW OVER 1;0,1
260 PLOT OVER 1;x+c,y-d
270 DRAW -c/3,d/3
280 DRAW OVER 1;0,1
290 NEXT f: GO SUB 460
300 REM menu-COPY/CONT/SCREEN$
310 PRINT #0;"Press x to COPY, c
to CONTINUE"
320 PRINT #1;TAB 6;"s to SAVE "
"sat ";STR$ z;"": PAUSE 0
330 IF INKEY$="x" THEN COPY: I
NPUT "": GO TO 310
340 IF INKEY$="s" THEN INPUT "
: SAVE "sat "+STR$ z:SCREEN$: IN
PUT "": GO TO 310

```

```

350 RUN
360 REM draw oblate globe
370 FOR f=0 TO 1.420 STEP .019
380 LET a=INT (SIN f*r)
390 LET b=INT (COS f*r*oe)
400 PLOT x+a,y+b: DRAW 0,-b*2
410 PLOT x-a,y+b: DRAW 0,-b*2
420 NEXT f
430 REM draw equator
440 FOR f=PI*.5 TO PI*1.5 STEP
.1: PLOT OVER 1;x+SIN f*r,y+COS
f*r/e: NEXT f: RETURN
450 REM draw Cassini Division
460 LET cd=2.1
470 FOR f=0 TO PI*2 STEP .03: P
LOT OVER 1;x+SIN f*r*cd,y+COS f*
r*cd/e: DRAW OVER 1;2,0: NEXT f
480 REM delete CD behind globe
485 IF ABS z>26 THEN GO TO 570
490 FOR f=0 TO 1.42 STEP .01
500 LET a=INT (SIN f*r)
510 LET b=INT (COS f*r*oe)
520 IF a$="s" THEN LET b=-b
530 PLOT x+a,y: DRAW 0,b
540 PLOT x-a,y: DRAW 0,b
550 NEXT f
560 REM plot visible pole
570 PLOT OVER 1;x,y+r*p*oe
580 RETURN
9990 SAVE "saturn1"

```

```

5 PRINT "solid ellipse 0"
10 REM by Maurice Gavin
-----
20 INPUT "tilt";z: PRINT "tilt
=";z;" "
30 LET e=SIN ((.1+z)/180*PI)
40 LET x=255/2: LET y=175/2
100 FOR f=0 TO PI/2 STEP .012
110 LET a=INT (SIN f*y)
120 LET b=INT (COS f*y*e)
130 PLOT x-a,y+b: DRAW 0,-b*2
140 PLOT x+a,y+b: DRAW 0,-b*2
150 NEXT f
200 OVER 1: PLOT 0,y: DRAW 255,
0: PLOT x,0: DRAW 0,175: OVER 0

```

RED SHIFT

APOCALYPSE

A new concept in computer gaming.
A multi-player game of strategy and diplomacy,
designed to be expanded and manipulated, the game
places YOU in POWER. Each game contains four
maps. The BBC version is over 68K of program and
data and the Spectrum totals over 90K.
PLAY IT BEFORE YOU'RE IN IT!

£9.95
inc. VAT
and P&P

Apocalypse
THE WAR GAME

SPECTRUM 48k

BBC Model B 1.205

Coming soon:

VOLUME 1 — 6 new maps.
VOLUME 2 — 4 historical scenarios — specialist rules cover the collapse of the
Roman Empire, WW II, 1984 and the Napoleonic Wars.

Available from
RED SHIFT Ltd, DEPT BRENDA
12c Manor Rd, Stoke Newington, London N16. Tel: 800-1333
Produced under licence from Games Workshop Ltd, London



THE ORIC-1 COMPANION

by Bob Maunder

ISBN 0 907211 03 8
173 pages. Price £6.95

THE
ORIC-1
COMPANION



Bob Maunder

A thorough reference
guide for those Oric-1
owners who want to get
to know and use the
machine in depth.

Section 1: BASIC Summary
Section 2: Keywords Guide
Section 3: Screen Display
Section 4: Program Organisation
Section 5: The ROM
Appendices including the MCP-40
Printer

This is the latest in the Companion series,
acclaimed by *Your Computer* as 'far and
away the best for serious users'.

Send your cheque for £6.95
(UK p&p free) to

LINSAC

68 Barker Road
Middlesbrough TS5 5ES

INCLUDES FULL
ROM DIS-
ASSEMBLY

Circular logic

Michael Batty shows how to draw circles and ellipses in the first of a three-part series on computer graphics

Let's begin with some ideas about how to draw regular shapes such as circles and ellipses which comprise the basic elements of computer art. The usual way to draw a circle is to calculate points around its circumference and draw between them. The X, Y co-ordinates of each point are given by the formulas

$$X = R \cdot \cos(TH) \text{ and } Y = R \cdot \sin(TH)$$

where R is the radius and TH the angle from the horizontal measured counter-clockwise. If we vary TH regularly from 0 to 360 degrees (or $2 \cdot \pi$ radians), we trace out the points which lie on the circumference.

A circle is really a special form of ellipse where the vertical and horizontal axes are the same length. If we change these lengths by replacing R in the above formulas by XX, the 'radius' of the X axis and YY, the 'radius' of the Y axis, we generate points defining an ellipse. Program 1 en-

ables you to do this.

Try values for XX and YY between 100 and 300 to start with. If you wish to leave each image on the screen, delete line 180.

Program 1 is really too slow for computer art where speed is of the essence. This is because the sine and cosine functions have to be evaluated for each set of X, Y co-ordinates. It is possible, however, to compute these functions only once for a small fixed angle (DT) and to then use a recursive formula based on trigonometric addition rules to generate the sequence of X, Y values. This technique is used in Program 2. Run it and see that the same shapes are drawn over three times as fast as in Program 1.

We now need to paint or fill these shapes and we can make use of the triangle fill command `PLOT85` of BBC Basic. If you insert line 120 `MOVE 0,0` and replace line 150 with `PLOT85,X,Y` in Prog-

ram 1 and 2, these programs become the conventional ellipse filling algorithms used in most simple graphics.

However, these are also too slow and a faster technique is to fill the shape in the same way you might shade it manually, using vertical up and down strokes. In Program 3, this technique is used. Note that the fill is from right to left, as though you were left handed, because of the way circular angles are measured.

Also, observe that only the points defining the top half of the shape are computed. Faster fill routines exist even in Basic, but this technique is necessary for later work.

We now have quite a fast method for filling an ellipse and we can already generate some interesting computer art. Program 4 paints random sized ellipses in random colours at random positions on the screen, and the illustration shows what can be achieved. To get some weird and wonderful effects, alter the operation of the `Gcol` statement in line 90 and use `MODE2` to generate 16 colours.

Next week, we will show how these shapes can be rotated to generate more formal designs. ■



PROGRAM 1

```

10 REM Slow Ellipse Drawing
20 MODE1
30 VDU29,640;512;
40 REPEAT
50   INPUT "RADIUS OF X AXIS = ",
      XX
60   INPUT "RADIUS OF Y AXIS = ",
      YY
70   TIME=0
80   N=60:DT=2*PI/N
90   MOVE XX,0:TH=0
100  FOR I%=1 TO N
110    TH=TH+DT
130    X=XX*COS(TH)
140    Y=YY*SIN(TH)
150    DRAW X,Y
160  NEXT I%
170  PRINT "TIME TAKEN = ";TIME
180  A=GET:CLS
190  UNTIL FALSE
200 END

```

PROGRAM 2

```

10 REM Fast Ellipse Drawing
20 MODE1
30 VDU29,640;512;
40 REPEAT
50   INPUT "RADIUS OF X AXIS = ",
      XX
60   INPUT "RADIUS OF Y AXIS = ",
      YY
70   TIME=0
80   N=60:DT=2*PI/N:A=XX/YY
90   X=XX:Y=0:MOVE X,Y
100  C=COS(DT):S=SIN(DT):SS=S/A:
      S=S*A
110  FOR I%=1 TO N
130    T=X*C-Y*S
140    Y=Y*C+X*SS:X=T
150    DRAW X,Y
160  NEXT I%
170  PRINT "TIME TAKEN = ";TIME
180  A=GET:CLS
190  UNTIL FALSE
200 END

```

PROGRAM 3

```

10 REM Fast Draw, Fast Fill
20 MODE1
30 VDU29,640;512;
40 REPEAT
50   INPUT "RADIUS OF X AXIS = ",
      XX
60   INPUT "RADIUS OF Y AXIS = ",
      YY
70   TIME=0
80   N=30:DT=PI/N:A=XX/YY
90   C=COS(DT):S=SIN(DT):SS=S/A:
      S=S*A
100  X=XX*C:S=YY*S
110  MOVE XX,0:MOVE X,Y:PLOT85,
      X,-Y
120  FOR I%=2 TO N-1
130    T=X*C-Y*S
140    Y=Y*C+X*SS:X=T
150    PLOT85,X,Y:PLOT85,X,-Y
160  NEXT I%
170  PLOT85,-XX,0
180  PRINT "TIME TAKEN = ";TIME
190  A=GET:CLS
200  UNTIL FALSE
210 END

```

PROGRAM 4

```

10 REM Random Ellipses
20 REM (C) Michael Batty, 1983
30 MODE1
40 VDU19,0,4;0;19,1,5;0;
50 VDU19,2,6;0;19,3,7;0;
60 VDU5
70 DT=PI/30:C=COS(DT):S=SIN(DT)
80 REPEAT
90   VDU29,RND(1279);RND(1023);
100  GCOLOR,RND(3)
110  XX=20+RND(150):YY=20+RND
      (150)
120  PROC SHAPE(XX,YY,C,S)
130  UNTIL FALSE
140  END
150 DEF PROC SHAPE(XX,YY,C,S)
160  A=XX/YY: SX=S/A: SY=S*A
170  X=XX*C: Y=YY*S
180  MOVE XX,0:MOVE X,Y:PLOT85,X,-Y
190  FOR I%=2 TO 29
200    T=X*C-Y*SY
210    Y=Y*C+X*SX:X=T
220    PLOT85,X,Y:PLOT85,X,-Y
230  NEXT I%
240  PLOT85,-XX,0
250  ENDPROC

```


WALL

48K SPECTRUM



VALHALLA

**MOVI
SOFT**



VALHALLA is supplied on a 48K Spectrum program cassette, with VALHALLA player manual and presentation box. As VALHALLA uses the full 48K RAM, microdrives and full-size printers are not supported. ZX printer optional.

VALHALLA will be despatched in the week commencing October 2nd. If, for any reason we are unable to fulfill your order within 14 days of receipt, we will notify you.

VALHALLA cassettes carry an unconditional lifetime replacement guarantee.

TO ORDER: (UK Orders Only) Simply complete the coupon, and FREEPOST with your cheque/P.O. made payable to LEGEND (UK Mail Order). Credit Card Orders: By phone 9-5.30 Mon to Fri, stating name and address. Card No. and item(s) required.

RETAILERS: Please contact your regular distributor or LEGEND (Trade Distribution) at the address below.

LEGEND (UK Mail Order) FREEPOST
1 Milton Road, Cambridge CB4 1UY
(0223) 312453

MOVISOFT OPERATING SYSTEM UNDER LICENCE

Post to:- LEGEND (UK Mail Order) FREEPOST
1 Milton Road, Cambridge CB4 1UY

Please send me..... Copy/copies of
VALHALLA for the 48K Spectrum.

I enclose cheque/P.O. for £.....

(£14.95 each incl. VAT and P&P).

Or I wish to pay by Access/Barclaycard/Visa

Card No.....

Please print name and address

Name.....

Address.....

Credit Card holder's signature.....



PCWK 38



The best books for the Dragon 32



The Working Dragon 32

A library of practical sub-routines and programs. ISBN: 0 946408 01 7

- "There clearly is a need for books of this kind which provide more than just games" — *Practical Computing*, Sept 1983.
- "It's a good one" — *Personal Computer News*, May 20 1983



The Dragon Trainer

Written as a combined manual and beginners course on the power of Dragon Basic. It is aimed at the beginner and assumes no previous experience of computing. ISBN: 0 946408 09 2



Dragon 32 Games Master

Learn how to write your own top level games. ISBN: 0 94068 03 3

- "If you can't write a half way decent game after this then it will be down to your own lack of imagination. I would recommend the Brains book as the best of this selection." *Which Micro* — Sept 83



Advanced Sounds & Graphics for the Dragon Computer

All the major aspects of the sound and graphics capabilities of this machine are covered in extensive detail. ISBN: 0 946408 06 8

Plus Sunshine Software



Cruising

Quick thinking and dexterity are required to master this high speed chase game.

Look out for the Sunshine range in W.H. Smith's, Boots, John Menzies, other leading retail chains and through our national network of bookshops and specialist stores.

Dealer enquiries:
01-734 3454.

Please send me

- ☐ The Working Dragon 32 at £5.95 each
- ☐ The Dragon Trainer at £5.95 each

- ☐ Dragon 32 Games Master at £5.95 each
- ☐ Advanced Sound & Graphics at £5.95 each
- ☐ Cruising at £6.95 each

I enclose cheque/postal order for £_____ made payable to: Sunshine Books: 12/13 Little Newport St., London WC2R 3LD

Name _____

Address _____

Signature _____

We can normally deliver in 4/5 days.



The best books for the Micro Adventurer



Spectrum Adventures

A major work by Tony Bridge and Roy Carnell which details the growth and development of Adventure gaming and then presents a full graphic Adventure game called 'The Eye of the Star Warrior' ISBN: 0 946408 07 6



Commodore 64 Adventures

A blueprint for the construction and playing of Adventure programs based on a full text Adventure. ISBN: 0 946408 11 4

*** PUBLISHED JANUARY 1984**
Atari Adventures
A guide to playing and writing your own adventures by Tony Bridge & Roy Carnell

Look out for the Sunshine range in W.H. Smith's, Boots, John Menzies, other leading retail chains and through our national network of bookshops and specialist stores.

Dealer enquiries: 01-734 3454

Please send me

- ☐ Spectrum Adventures at £5.95 each
- ☐ Commodore 64 Adventures at £5.95 each

I enclose cheque/postal order for £_____ made payable to: Sunshine Books: 12/13 Little Newport St., London WC2R 3LD

Name _____

Address _____

Signature _____

We can normally deliver in 4/5 days.

A bit-mapped screen

The first in a two-part series on hi-res graphics

Though the possibilities provided by user-defined characters and sprites are almost limitless, the 64 does provide yet another major graphics mode, bit-mapped graphics. What this means is that rather than being able to address a minimum of one of the 1,000 character squares on the normal screen, the user is able to set any individual pixel (short for picture element) or dot on the screen. In this mode line drawings and curves can be drawn on the screen, though to make the fullest use of it you will need to get hold of the graphics extension cartridge for the 64, which will provide you with a variety of flexible graphics commands.

To understand the program given here it is necessary to know a little about the way the bit-mapped screen is set up. The screen itself contains 320*200 separate positions, a total of 64,000. In order to store each of these separately, 8,000 bytes of memory are needed, providing 64,000 individual bits. Each of the standard character positions requires eight bytes (the 8*8 grid that we used for user-defined graphics). Starting from the top left-hand corner of the screen, the first 8 (0-7) bytes of the screen memory are used to create what would be on the normal screen the first character position. The second eight bytes form the second 8*8 grid and so on along the line. Since there are 40 character positions in a line, each line takes 320 bytes. In actual fact, because the bit-mapped mode enables individual pixels to be addressed, this line of 8*8 grids is capable of holding eight single pixel thickness lines (though if you drew them all it would look like a solid bar).

The 8K of memory necessary to hold the bit-mapped screen is obviously not storable in the normal 1K screen memory nor, in fact, can it even use that area as a part of its area, since 1024 to 2023 is used to store colour information for the bit-mapped screen. The solution adopted in the program that follows is to locate the screen beginning at 8192, leaving 6K of memory for the Basic program, with the option of relocating Basic if the program is developed and lengthened. Using the program given here you will be able to use the bit-mapped screen as a sketch-pad, using either the cursor move arrows or a simple line-drawing algorithm to create a design on the screen.

Hi-Res: Table of Variables

DX	Distance between ends of line along X axis.
DY	Distance between ends of line along Y axis.
FN PE	The value that must be POKed into PP to erase pixel X,Y.
FN PP	The location of the byte in which pixel X,Y falls.
FN PV	The value that must be POKed into PP to set pixel X,Y.
MO	The current mode of the program.
SC	Start of screen.
SL	The slope of the line to be drawn.
X1,X2	X co-ordinates of ends of line to be drawn.
Y1,Y2	Y co-ordinates of ends of line to be drawn.

Module 3.4.1

This module configures the screen memory for the bit-mapped mode, defines some useful functions and clears the high resolution screen.

Commentary

Line 10025: The POKes in this REM statement are not necessary for the running of this program. They are included in order that if you wish to expand the program in such a way that it may overrun

the screen at 8192 and onwards, you will have the necessary information to relocate Basic. As with the Sprites program, the POKes should be included in a loader program which is run BEFORE the main program. The program as given here works happily within the 6K of memory up to 8192 — there is no necessity even to set a limit to the top of Basic.

Lines 10027-10029: The use of these functions is given in the table of variables. Line 10030: 53272 is the register normally used to control where the VIC II looks for character data, in this case it will dictate the beginning of the bit-mapped screen. POKing 8 in here sets the screen start to 8192. POKing 53265 with 32 sets the bit-mapped mode.

Lines 10035-10040: In Line 10022, the user was given the option of clearing the screen. During the development of the program, when the program is stopped and RUN-RESTORE pressed, alterations can be made to the program without affecting the contents of the screen at all. On running the program again it saves time not to have to clear the 8000 bytes. Line 10050: This line clears the normal screen memory area, which is now employed to hold the colour data for each of the 1000 normal character positions.

Testing Module 3.4.1

On first running the program, the screen should immediately fill with garbage. Gradually this will clear, leaving a screen which may still be covered with coloured squares corresponding to the position of characters on the normal mode screen. These too should then begin to clear and the screen be set to white. When the module is finished, press RUN and RESTORE to return to normal mode. ■

Continued next week

This is an extract from *The Working Commodore 64* by David Lawrence, published by Sunshine Books.

MODULE 3.4.1

```

10000 REM*****
10010 REM INITIALISE HI-RES SCREEN
10020 REM*****
10022 CL$="": INPUT "DO CLEAR SCREEN (Y/N)
:": CL$
10025 REM POKE 44,64:POKE 43,1:POKE 1638
4,0:CLR
10027 DEF FNPP(X)=SC+320*INT(Y/8)+8*INT(
X/8)+(Y AND 7)
10028 DEF FNPV(X)=PEEK(FNPP(X)) OR (2*(7
-(X AND 7)))
10029 DEF FNPE(X)=PEEK(FNPP(X)) AND (255
-2*(7-(X AND 7)))
10030 POKE 53272,(PEEK(53272))OR 8:POKE
53265,PEEK(53265) OR 32:SC=8192
10035 IF CL$="N" THEN 10050
10040 FOR I=SC TO SC+7999:POKE I,0:NEXT
10050 FOR I=1024 TO 2023:POKE I,6*16+12:
NEXT
10060 MO$(0)=2:MO$(1)=5:MO$(2)=10

```


SOFTWARE FOR THE DRAGON all machine code

MAURICE MINOR — NEW

Out for a quiet drive in your Morris Minor when, you inadvertently wander on to a race track and find yourself in the middle of a Grand Prix. To turn back against the other cars would be suicide. The only thing to do is grit your teeth, grip the wheel, put your foot down and make for the finishing line and safety. If you can avoid the crash barriers and oil slicks, drive fast enough to avoid being run over by Mario and Nelson behind you, then you can think about overtaking the cars in front. Can you make it before your car falls to pieces? Another superb Arcade style game with animated high resolution colour graphics and sound. Requires one joystick.

A very fast action with accelerator, damage report, timer, six levels of skill and hall of fame.

SUPPLIED ON CASSETTE £6.95

EDITOR/ASSEMBLER + DISASSEMBLER + MONITOR

Two pass global type. Supports labels of six characters. Directives: ORG, RMB, FCB, FDB, FCC, REM. Hexadecimal Arithmetic. Powerful debug Monitor includes 14 commands plus set break points, selection of useful sub-routines and Disassembler.

Altogether a powerful program package with information for the serious user or interested beginner. Supplied on cassette.

PREVIOUSLY SOLD SEPARATELY FOR OVER £40. Now substantial sales let us bring the price down to only £19.95

Cheques/POs payable to
J. MORRISON (MICROS) LTD.
(Dept PCW9)

2 Glensdale Street, Leeds LS9 9JJ

ALL ORDERS DESPATCHED BY
RETURN FIRST CLASS POST.

Callers and Trade enquiries welcome.

Tel: (0532) 480987

AVAILABLE FROM SPECTRUM AND OTHER GOOD SOFTWARE DEALERS

J. MORRISON (MICROS)

CRUSADER. NEW

A superb arcade-style game with animated high resolution colour graphics and sound. In quest of the Holy Grail you, our intrepid hero, have to overcome seven increasingly difficult stages to reach your goal, scale the city walls to reach the inner sanctum, swinging across pits, crossing enchanted lakes while avoiding deadly scorpions and devilish dwarfs. None of our testers has yet managed to get past Screen 5. Will YOU be the one to reveal the secret of the final screen?

SUPPLIED ON CASSETTE £6.95

DROIDS — (OPTIONAL JOYSTICK)

Stop the Droids removing lead shields to release the bombs which will destroy the world. Very fast game. Excellent Hi-Res colour graphics and sound.

SUPPLIED ON CASSETTE £6.95

CHESS

Hi Res display of board and pieces. 8 selectable levels of skill. CURSOR control move selection (No numbers/letters to enter). Supports CASTLING and EN PASSANT.

SUPPLIED ON CASSETTE £7.95

VULTURES — (uses one joystick)

FAST MOVING GALAXIAN TYPE GAME in full colour with Hi-Res graphics and sound. A flock of vultures guard their eggs. As they swoop towards you try to kill them, but watch out. Just when you think you have killed them all, the eggs hatch!

SUPPLIED ON CASSETTE £6.95

BONKA

ADDICTIVE Arcade style game in full colour. Climb the ladders and dig holes to trap the "Meanies" before they kill you. 4 selectable speeds and choice of 1 to 9 Meanies to start. NO JOYSTICKS NEEDED.

SUPPLIED ON CASSETTE £7.95

A QUALITY LIGHT PEN

SUPERIOR PERFORMANCE

- ★ Absolutely insensitive to ambient lighting.
- ★ Responds to different colours and screen intensities without any adjustment of TV or monitor.
- ★ Red LED readout showing that data is available.

- ★ Switch for program control (allows pen to approach the screen without erroneous data capture)

- ★ All features are program accessible



SUPERIOR PROGRAMS

- ★ Good Documentation
- ★ Tape storage of your work
- ★ User routines provided on tape and printout
- ★ 'Freehand' drawing program
- ★ 'Library menu' drawing program (define your own library of shapes)
- ★ Example programs illustrating uses of the pen and its features

£25

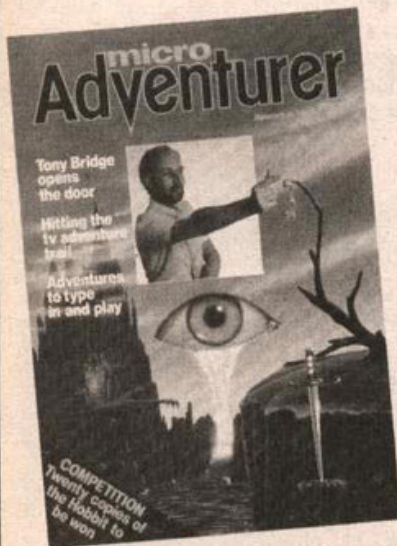
inclusive of P&P.

Please state Dragon, BBC or Vic20 when ordering. Send cheque or PO to: Dept ICW, Datapen Microtechnology Ltd., Kingsclere Road, Overton, Hants.

Please enclose SAE if requesting technical literature
We welcome enquiries from dealers willing to demonstrate our product

Datapen Microtechnology Limited

INTRODUCING



If you've ever been killed by the evil goblin, flamed by a dragon, or turned to stone by a wizard, then *Micro Adventurer* is the magazine for you. Each issue is packed with stimulating features, such as advice on how to write your own adventures, reviews of the latest games, help for those in need and adventures to type in and play.

And if you want to make the most of your Commodore computer, you need *Commodore Horizons*. Each issue features: competitions with £200 in prizes, pages of program listings, in-depth hardware evaluations and reviews of the latest software.

Micro Adventurer will be launched in October, followed by *Commodore Horizons* in November. And you can get your first copy free by subscribing now. For only £10, 13 issues of either magazine will be mailed to you direct — the normal rate is £10 for a year's subscription (12 issues).



Fill in this form and send it to **Micro Adventurer**,
Subscription Department, 12/13 Little Newport Street,
London WC2R 3LD — along with a cheque or postal
order made payable to **Micro Adventurer**. The special UK
subscription rate is £10 for 13 issues, overseas it is £16.

Name:

Address:

Signature:

Date:

Fill in this form and send it to **Commodore Horizons**,
Subscription Department, 12/13 Little Newport Street,
London WC2R 3LD — along with a cheque or postal
order made payable to **Commodore Horizons**. The
special UK subscription rate is £10 for 13 issues, overseas
it is £16.

Name:

Address:

Signature:

Date:



Functioning well . . .

David Prins presents a numerical analysis technique for approximating functions

This program uses a numerical analysis technique, known as the Newton polynomial interpolation method, in order to approximate a function by a polynomial.

In general, if data is known about a function at N different points, then a unique polynomial exists of degree $(N - 1)$, which models the function exactly at the N given points and approximately at other points. This approximation is very good for functions which are 'well behaved' (ie, continuous, polynomial-like) and works best in the neighbourhood of the given data. But, if data is only known at, for instance, $x = 1, 2, \dots, 10$, you should not rely too much on the polynomial approximation at say $x = 1000$, which is nowhere near the given points.

The data points you enter will probably have been obtained from a science experiment of simulation, but the program can also be used to answer school maths questions regarding straight lines and quadratic curves which pass through given points.

It is important to note that approximations given by the program are only useful for "well behaved" polynomial or polynomial-like functions and for approximations in the region where the original data was given. Also, you must not enter any point more than once in any one set of data.

Program notes

40-210 Set up required arrays and input the known data

220-340 Make any corrections required
500-610 Calculate the polynomial coefficients, checking that all points entered are different
620 Call the evaluation subroutine
630-650 See if another evaluation is required — if yes, then Goto 620, else Stop
700-790 The Evaluation subroutine — this asks for input of the evaluation point and prints the result
1000-1010 Simple subroutine to get "Y" or "N" from the keyboard

Variables

N Number of data points given
X(N), F(N), C(N) Arrays to hold data points, function values at data points and polynomial coefficients respectively
I, J Used as loop counters and array subscripts
AS Holds result of INKEY\$
X, F Hold correction data — X is later re-used as the value at which approximation occurs
L, D Used in polynomial coefficient calculation
V The value which is the result of the program

```

10 REM APPROXIMATION USING INTER
  POLATING POLYNOMIALS.
20 REM ALL POINTS ENTERED MUST BE
  DIFFERENT.
30 REM
40 CLS:PRINT"HOW MANY DATA POINTS"
50 PRINT"DO YOU WANT TO ENTER";
60 INPUT N
70 CLS:PRINT"WHEN PROMPTED, ENTER A
  POINT AND"
80 PRINT"THE VALUE OF THE FUNCTION AT"
90 PRINT"THE POINT, SEPARATED BY A
  COMMA.":PRINT
100 PRINT"FOR EXAMPLE, TO ENTER THAT
  THE"
110 PRINT"FUNCTION HAS THE VALUE
  4.2 AT"
120 PRINT"THE POINT 2.0"
130 PRINT"ENTER 2.0,4.2":PRINT
140 PRINT"IF YOU MAKE A MISTAKE YOU
  CAN"
150 PRINT"CORRECT IT AT THE END."
160 REM
170 DIM X(N), F(N), C(N)
180 FOR I=1 TO N
190 PRINT:PRINT"POINT NO.":I;
200 INPUT X(I), F(I)
210 NEXT I
220 PRINT:PRINT"DO YOU WANT TO MAKE"
230 PRINT"ANY CORRECTIONS? (Y/N)":
  GOSUB 1000
240 IF AS="N" THEN 500
250 PRINT"WHEN PROMPTED, ENTER
  CORRECTIONS"
260 PRINT"BY TYPING THE NO. OF THE
  POINT"
270 PRINT"YOU WANT TO CORRECT AND ITS"
280 PRINT"CORRECTED VALUE AND
  FUNCTION"
290 PRINT"VALUE, SEPARATED BY COMMAS.
  ":PRINT
300 PRINT"TO END CORRECTIONS,
  TYPE 999,0,0"
310 PRINT:PRINT"POINT NO.":
320 INPUT I,X,F
330 IF I=999 THEN 500
340 X(I)=X:F(I)=F:GOTO 310
500 FOR I=1 TO N:C(I)=F(I):NEXT I
510 IF N=1 THEN 620
520 FOR I=1 TO N-1
530 L=C(I)
540 FOR J=1 TO N-I
550 D=X(I+J)-X(J)
560 IF D=0 THEN PRINT"YOU ENTERED THE
  POINT",X(J);"MORE THAN ONCE.":STOP
570 C(J)=(C(J+1)-L)/D
580 L=C(J+1)
590 NEXT J
600 C(N-I+1)=L
610 NEXT I
620 GOSUB 700
630 PRINT:PRINT"DO YOU WANT ANOTHER
  EVALUATION"
640 PRINT"USING THE SAME DATA POINTS?
  (Y/N)":GOSUB 1000
650 IF AS="Y" THEN 620 ELSE STOP
700 CLS:PRINT"ENTER THE VALUE AT
  WHICH YOU"
710 PRINT"WANT TO APPROXIMATE THE
  FUNCTION":
720 INPUT X
730 V=C(1):IF N=1 THEN 770
740 FOR I=2 TO N
750 V=C(I)+(X-X(I))*V
760 NEXT I
770 PRINT"APPROXIMATE FUNCTION VALUE"
780 PRINT"AT";X;"IS";V
790 RETURN
1000 AS=INKEY$:IF AS="" THEN 1000
1010 IF AS="Y" OR AS="N" THEN RETURN
  ELSE 1000

```


Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the *Program of the Week* double our new fee of £6 for each program published.

Target Practise

on Dragon

This is a simple target shooting game in which a cowboy has to fire at a moving target. The target randomly moves from top to bottom and vice-versa. Both the cowboy and the target are stored in arrays

'A' and 'B' respectively, since using the command 'Poke 65495,0' to speed up the game disables the cassette interface. Unless you escape from the program in the method allowed within the program itself you will have to press the reset button before using the interface to either save or load programs directly after playing.

There are 20 targets to hit and you are marked according to how many you manage to hit. The up/down arrows move the cowboy up and down. The 'shift' keys are used to fire. It does not matter if you let the target pass, as it will reappear again with no penalty. If your Dragon will not accept the *Poke* leave it out.

Variables

S	Speed of the target
F	Determines direction of target travel
H	Number of target
K	Score out of 20
X,Y	Co-ordinates of cowboy
O,G	Co-ordinates of Bullet
P,T	Co-ordinates of target
ARRAY A	Cowboy
ARRAY B	Target

```

10 REM
20 REM
30 REM
40 REM
50 REM
60 REM
70 REM
77 CLS
80 PRINT @ 64, "SHOOTING PRACTICE":PRINT
  @ 128, "BY D. HASWELL"
90 SCREEN 0,1
100 FOR T = 1 TO 2000:NEXT
110 CLS8:PRINT @ 64, "THE UP AND DOWN
  ARROWS MOVE THE
  COWBOY":PRINT:PRINT "TRY TO HIT THE
  MOVING TARGET":PRINT:PRINT "YOU ONLY
  HAVE 1 SHOT PER TARGET":PRINT:PRINT
  "THERE ARE 20 TARGETS TO HIT"
  :PRINT:PRINT "YOU NEED NOT HIT THE
  TARGET FIRST TIME!", "THERE IS NO
  PENALTY FOR LETTING IT
  PASS.":PRINT "USE
  'SHIFT' TO FIRE."
130 SCREEN 0,1
140 FOR T = 1 TO 8000:NEXT
150 POKE 65495,0
160 K = 0
170 DIMA(20,38)
180 DIMB(30,30)
190 PMODE,1:PCLS
200 DRAW "BM3,5;R5D2L7R9L2D6L5NU6L2D10
  R7U10D3L4R10L2U2R4BM2,24;
  R3D12R3L6U12"
210 GET(0,0) - (17,40),A,G
220 PCLS
230 CIRCLE(10,10),3
240 GET(0,0) - (30,30),B,G
244 REM BOTH COWBOY AND TARGET NOW
  STORED
250 PCLS
260 SCREEN 1,1
270 FOR H = 1 TO 21
280 PCLS
290 LINE(4,4) - (250,186),PSET,B
295 REM BORDER
300 X = 8:Y = RND(50) + 50:P = RND(100) + 50
310 O = 17
320 L = 0:F = RND(10000) - 5000
330 F = F/1000

```

```

340 REM DETERMINE DIRECTIONS OF TARGET
350 IF F < 0 THEN L = 190 ELSE L = 0
370 S = RND(3) + 3
380 S = (SGN(F) * S)
390 FOR T = L TO ABS(L + (-190))
400 PUT(X,Y) - (X + 17,Y + 40),A,PSET
410 IF PEEK(135) = 10 THEN Y = Y + 3:PLAY
  "T155O3C"
420 IF PEEK(135) = 94 THEN Y = Y - 3:PLAY
  "T155O3C"
430 IF PEEK(65280) = 191 THEN L = 1:G = Y +
  14:PLAY "O5T155V30GV25FV20EV15DV10
  CV5C"
440 IF PEEK(65280) = 255 THEN POKE 135,0
450 IF L = 1 THEN PSET(O,G)
460 IF Y > 144 THEN Y = 144
470 IF O > P - 2 AND O < P + 25 AND G > T AND
  G < T + 18 THEN K = K + 1:CIRCLE(P,T),10:
  CIRCLE(P,T),15:PLAY
  "T20O1V30GV25FV20EV15DV10
  CV5C":PCLS:NEXTH:GOTO 560
480 IF Y < 6 THEN Y = 6
490 IF O > 250 THEN O = 17:L =
  0:PLAY "O1T155CCCC":NEXTH
500 PRESET(O,G)
510 IF L = 1 THEN O = O + 15
520 PUT(P,T) - (P + 30,T + 30),B,PSET
530 IF H = 21 THEN 560
540 NEXTT
550 GOTO 320
560 CLS
570 PRINT @ 64, "YOU SHOT" K "TARGETS OUT
  OF 20!"
577 PLAY "T30V20CDEFGAB"
580 IF K < 10 THEN PRINT "YOU WOULD NEVER
  LIVE IF YOU HAD", "TO DRAW FOR YOUR
  LIFE!"
588 IF K > 16 THEN PRINT "YOU DRAW 'EM GOOD
  COWBOY!"
590 FOR J = 1 TO 2000:NEXT
600 PRINT @ 480, "HIT ANY FOR ANOTHER
  GAME.", "OR HIT 'E' TO END."
610 POKE 135,0
620 A$ = INKEY$:IF A$ = "" THEN 620
640 IF A$ = "E" THEN POKE 65494,0:END
650 RUN

```

Target Practise
by D Haswell

OPEN FORUM

Maze

on Vic20

The program prints a random maze and the player takes the form of a diamond at the top of the screen. The object is to reach the ball at the bottom of the screen without colliding with a wall in the least number of moves.

On most mazes that the computer forms

it is impossible to reach the ball without pressing the 8 key; when this is pressed the maze immediately surrounding the diamond is demolished. However, using this feature increases your number of moves by four.

This function can only be used three times so that a level of skill is required from the player. When you reach the ball you are informed of your score and the lowest number of moves it has been

completed in so far.

The program incorporates good colour and sound.

Program notes

10-160 Set screen, draw maze
176-300 Move player, play note
551-570 Plays musical notes if you hit a wall
600-640 Congratulates you when you have traversed the maze
1000-1046 Destroys maze
1049-2000 Plays music
All cursor controls are in lower case.

```

1 rem*****maze*****
2 rem written by a.morris
3 rem date:28/2/83
5 rem
6 rem
7 rem
8 rem set variables
9 rem*****
10 print"█":s=100000
20 v=0:m=0
30 e=int(22*rnd(1)+7702)
40 h=int(22*rnd(1)+8164)
49 rem print heading
50 print"*****Maze*****"
60 print" n:-down u:-up"
70 print" h:-left j:-right"
75 print" 8:-demolish"
80 print"*****"
90 fort=0to5000:nextt:print"█"
99 rem draw maze
100 poke36879,0
110 for a=1to250
120 b=int(462*rnd(1)+7724)
130 pokeb,91
140 nexta
150 pokeh,81:gosub1100:geta$
151 pokeh,81:geta$
160 pokee,90
170 if a$="n" then g=22:goto250
180 if a$="u" then g=-22:goto250
190 if a$="h" then g=-1:goto250
200 if a$="j" then g=1:goto250
210 if a$="8" then gosub1000
220 goto151
250 m=m+1
251 poke36878,15:poke36875,215
252 fort=1to200:next:poke36878,0
260 pokee,32:e=e+g
270 if peek(e)=91 then 551
280 pokee,90
290 if e=h then 600
300 goto151
551 poke36878,15:for w=1to6
552 readn:poke36875,n:for r=1to200:
next
553 data135,143,147,151,159,163
556 nextw
557 poke36878,0:restore
558 poke36879,27
559 print"█you hit a wall!"
560 input"another game(y/n)":g$
570 if g$<>"y" then print"█thanks for

the game":end
580 print"█"
590 goto20
600 poke36879,27:print"██████████
well done!you made it!"
601 poke36878,0:poke36878,15
602 ford=1to20
603 hj=int(rnd(1)*50)+175
604 poke36875,hj:poke36879,hj
605 fort=1to100:nextt
607 nextd
608 poke36878,0
609 poke36879,27:print"█well done!
you made it!"
610 print"in "m" moves."
620 if m<sthens=m
630 print"least moves="s
640 fort=1to1000:next:goto560
1000 if v<3 then goto1020
1010 goto151
1020 pokee+1,32:pokee-1,32
1021 pokee+22,32:pokee-22,32:v=v+1:
m=m+4
1022 poke36878,15:poke36875,255
1023 fort=1to400:nextt
1024 poke36878,0
1040 return
1049 rem*****
1050 rem*play tune****
1051 rem*****
1100 forty=1to27
1110 poke36878,15
1120 readc,z
1130 poke36875,c
1140 fort=1toz:nextt
1150 poke36878,0
1160 nextty
1170 restore:return
1180 data217,400,213,400,223,400
1190 data227,200,234,200,230,400
1200 data227,200,234,200,230,400
1210 data223,400,227,400,217,400
1220 data213,600
1230 data223,400
1240 data227,200,234,200,230,400
1250 data227,200,234,200,230,400
1260 data223,400,227,400,217,400
1270 data213,600,227,400,217,400,
213,600
2000 end
3000 rem***** Maze
by A Morris

```


Harrier Pilot

on Spectrum

The cockpit of the aircraft is filled with rows of flashing lights, silently signalling their vital messages to you, but your steel blue eyes are darting from your Artificial Horizon/Altimeter to your Radarscope as you fight for control of your £7m craft. Your fuel gauge indicates that you have only 60 seconds fuel remaining and the cross that indicates the ship's position, only 85ft below you, won't keep steady.

Only 20ft altitude now, and your breath quickens as your Artificial Horizon/Altimeter shows you to be steady, level and slowly dropping. Suddenly your eyes widen in disbelief; your Radarscope shows that a gust of wind has blown you to one side, can you bring your Harrier back above the small ship before you crash into the sea...?

Program notes

40 Zero best score
50-100 Draw screen display
110 Set variables
120-170 Read keyboard

180 Erase previous screen image
190-200 Wind random factor
210-250 Set new values for new screen display
260 Fuel gauge
270-320 Check for end game
330 Print new screen image
340-370 Set new incr/decr factors
380-410 Screen image subroutine
420-510 Different endings to game.

Variables

fu — fuel
rd — rate of side drift
m — x (Radarscope)
n — y (Radarscope)
ra — rate of ascent
p — degree of tilt
(0-level)

```

5 REM *****
10 REM *** HARRIER PILOT ***
20 REM *** BY CS JONES ***
30 REM *****
40 LET bs=0
50 BORDER 0: PAPER 0: INK 7: C
LS
60 RESTORE 70: FOR c=21 TO 0 STEP -2: READ a$: PRINT AT c,6;a$
: NEXT c
70 DATA "=000=", "-010-", "-020-",
"-030-", "-040-", "-050-", "-060-",
"-070-", "-080-", "-090-", "-100-"
80 PLOT 135,0: DRAW 0,175: DRAW 120,0: DRAW 0,-175: DRAW -120,0
90 PLOT 136,83: DRAW 118,0: PLOT 195,0: DRAW 0,174
100 FOR a=10 TO 12: PRINT AT a,23;" ": NEXT a
110 LET fu=21: LET rd=0: LET m=190: LET n=83: LET ra=0: LET cy=140: LET p=0: GO TO 230
120 LET a$=INKEY$
130 IF a$="" THEN GO TO 180
140 IF a$="5" THEN GO TO 350
150 IF a$="8" THEN GO TO 340
160 IF a$="6" THEN GO TO 360
170 IF a$="7" THEN GO TO 370
180 GO SUB 360
190 LET z=INT (RND*100): IF z<30 THEN LET p=p-.05: LET rd=rd-1
200 IF z>60 THEN LET p=p+.05: LET rd=rd+1
210 LET m=m-rd
220 LET cy=cy+ra
230 LET x=103+15*(COS (p+2*PI))
240 LET y=cy+15*(SIN (p+2*PI))
250 LET a=103-x: LET b=cy-y
260 LET fu=fu-.17: INK 2: PRINT AT 21-fu,15: INVERSE 1;" " : INVERSE 0: INK 7
270 IF y+2*b<0 THEN LET y=0
280 IF y<=1 AND m<185 OR y<=1 AND m>195 THEN GO TO 490
290 IF y<=1 AND ra<-2 THEN GO TO 420
300 IF y<=1 THEN GO TO 430
310 IF m<135 OR m>245 OR n<10 OR n>165 THEN GO TO 480
320 IF fu<=0 THEN GO TO 500
330 GO SUB 360: GO TO 120
340 LET p=p+.05: LET rd=rd+1: GO TO 180
350 LET p=p-.05: LET rd=rd-1: GO TO 180
360 LET ra=ra-1: GO TO 180
370 LET ra=ra+1: GO TO 180
380 PLOT OVER 1;x,y: DRAW OVER 1;2*a,2*b: DRAW OVER 1;b,-a
390 PLOT OVER 1;x-72,y: DRAW OVER 1;2*a,2*b: PLOT OVER 1;x-72,y: DRAW OVER 1;b,-a
400 PLOT OVER 1;m,n: DRAW OVER 1;10,0: PLOT OVER 1;m+5,n+5: DRAW OVER 1;0,-10
410 RETURN
420 INVERSE 1: CLS: PRINT " YOU CRASHED INTO THE SHIP ": BEEP 2,5: GO TO 510
430 LET fu=INT fu: PAPER 2: INK 6: FLASH 1: CLS
440 PLOT 0,0: DRAW 255,175: PLOT 255,0: DRAW -255,175: FOR a=20 TO 80 STEP 10: BEEP .1,20: CIRCLE 127,87,a: NEXT a: PRINT AT 10,13:"LANDED";AT 11,13:"SAFELY": FLASH 0
450 FOR a=1 TO 20: BEEP .1,20: BEEP .1,30: NEXT a
460 PAPER 0: INK 7: INVERSE 1: CLS: PRINT " YOU LANDED SAFELY ": PRINT: PRINT " SALVAGE COSTS AGREED AT £7m. ": IF fu>bs THEN LET bs=fu
470 GO TO 510
480 INVERSE 1: CLS: PRINT " YOU HAVE MOVED OUT OF RANGE ": BEEP 2,5: GO TO 510
490 INVERSE 1: CLS: PRINT " YOU HAVE CRASHED INTO THE SEA ": BEEP 2,5: GO TO 510
500 INVERSE 1: CLS: PRINT " YOU HAVE RUN OUT OF FUEL ": BEEP 2,5
510 PRINT: PRINT " YOUR BEST SCORE IS NOW ";bs;" ": PRINT: PRINT " ANOTHER TRY ? ": INVERSE 0: INPUT b$: IF b$="y" THEN GO TO 50

```

Harrier Pilot
by Colin Jones

Colour Sin

on Oric

This program illustrates how impressive graphic effects can be achieved with only a few lines of program.

```

10 HIRE$
20 FOR I=1 TO 199: CURSET0,1,0
25 IF I<100 THEN FILL 1,1,18
30 FILL 1,1,17
35 NEXT
40 FOR A=-PI TO PI STEP .01
50 CURSET A*38+120,SIN(A)*99+99,1
53 IF A>.5*PI AND A<0 THEN FILL 1,1,18:
GOTO60
54 IF A<PI AND A>.5*PI THEN FILL1,1,17:
GOTO60
55 FILL 1,1,RND<1>*5+19
60 NEXT

```

Colour Sin
by Allison Dowey

Space Eggs

on BBC Micro

This type of program has been around for quite a long time. The idea is to destroy the

eggs before they land. If they land many aliens come out of the eggs and destroy you. The eggs fall from the sky, first one at a time, and then several at a time. You control a fast-moving gun base, but you will still only get one shot at each alien

In entering the program the main problem will be getting the character definitions exactly right. To make it easier to type in, the program has been renumbered, so that the *Auto* command may be used.

PROGRAM OF THE WEEK

```

10 REM *****
20 REM ***
30 REM ***      SPACE EGGS      ***
40 REM ***      32k BBC        ***
50 REM ***      BY Eddie Hold   ***
60 REM ***
70 REM *****
80MODE4
90NUM=0
100 QW=0
110ON ERROR RUN
120DIMAX%(10),AY%(10)
130PROCINIT
140CLS:MODE 7:PROCINSTRUCT
150 MODE4
160PROCTUNE
170PRINTTAB(12,0)"0000"
180PRINTTAB(5,0)"SCORE"
190VDU 23;8202;0;0;0;
200PROCBASE
210PROCWAIT(100-SC%*2)
220PROCALIEN
230PROCBULLET
240PROCBASE
250ON ERROR GOTO 10
260PROCBULLET
270PROCBASE
280GOTO200
290DEFFPROCINIT
300BX%=19:SC%=0:YB%=0:XB%=-1
310FORCO%=1 TO 10
320AX%(CO%)=1+RND(36):AY%(CO%)=3
330NEXT
340AY%(1)=-20
350VDU23,224,0,0,0,0,127,127,127,127
360VDU23,225,16,56,124,254,255,255,255,255
370VDU23,226,0,0,0,0,252,252,252,252
380VDU23,250,15,31,63,255,255,63,31,15
390VDU23,251,240,248,252,255,255,252,
    248,240
400VDU23,227,16,16,16,16,56,16,56
410VDU23,228,1,3,7,15,255,255,255,240
420VDU23,229,255,255,255,255,255,255,
    255,255
430VDU23,230,128,192,224,240,255,255,
    255,15
440VDU23,231,240,255,255,255,157,3,1
450VDU 23,232,255,255,255,255,195,255,
    255,255
460VDU23,233,15,255,255,255,240,224,192,
    128
470ENVELOPE2,1,-2,0,0,100,0,0,0,0,0,0,0
480ENVELOPE1,2,0,0,0,0,0,0,9,0,-2,-2,
    120,80
490ENVELOPE3,129,2,4,6,28,14,7,0,0,0,-80,
    80,80
500ENDPROC
510DEFFPROCBASE
520B1%=BX%
530IF A$<>"K" THEN IF ADVAL1>44000 AND
    BX%>1 BX%=BX%-1
540IF A$="K" THEN IF INKEY(-26)AND BX%>1
    BX%=BX%-1
550IF A$<>"K" THEN IF ADVAL1<2200 AND
    BX%<37 BX%=BX%+1
560IF A$="K" THEN IF INKEY
    (-122)AND BX%<37 BX%=BX%+1
570PRINTTAB(B1%-1,31);SPC(3);
580PRINTTAB(BX%-1,31);:VDU224,225,226
590ENDPROC
600DEFFPROCBULLET
610 IF A$<>"K" THEN GOTO650
620IF YB%=0 AND NOTINKEY(-1) ENDPROC
630IF YB%=0 XB%=BX%:SOUND0,1,7,5:SOUND1,
    2,20,9
640 GOTO670
650IF YB%=0 AND NOT ADVAL0 AND 1 ENDPROC
660IF YB%=0 XB%=BX%:SOUND0,1,7,5:SOUND1,
    2,20,9
670PRINTTAB(XB%+1,30-YB%);:VDU127,11,227
680IF YB%=28 THEN YB%=0:VDU127,11:ENDPROC
690YB%=YB%+1
700ENDPROC
710DEFFPROCALIEN
720SOUND2,-8,((SC%+1)DIV4)MOD255,1
730FOR N1%=1 TO SC%/10+1
740IF ABS(XB%-AX%(N1%))<2 AND ABS(30-YB%
    -AY%(N1%))<2 PROCSHOT
750IF AY%(N1%)<3 THEN 780
760PRINTTAB(AX%(N1%)-1,AY%(N1%));CHR$250;
    CHR$251:PRINTTAB(AX%(N1%)-1,AY%(N1%)-
770IF AY%(N1%)>30 THEN PROCALMOVE:
    PROCDEAD
780AY%(N1%)=AY%(N1%)+1
790NEXT
800ENDPROC
810DEFFPROCSHOT
820PRINTTAB(AX%(N1%)+2,AY%(N1%)-1);:VDU
    127,127,127,11,9,9,9,127,127,127
830SC%=SC%+1
840AY%(N1%)=-RND(50):AX%(N1%)=RND(36)+1
850PRINTTAB(XB%,30-YB%);SPC(1):YB%=0:
    XB%=-1
860SOUND3,3,50,10
870PRINTTAB(14,0);SC%:"0"
880ENDPROC
890DEFFPROCWAIT(WT%)
900FOR WAX%=1 TO WT%:NEXT
910ENDPROC
920DEFFPROCDEAD
930SOUND0,-10,7,25
940FOR C1%=150 TO 1 STEP -5:SOUND1,-
    7,C1%,1:NEXT
950 PROCTUNE
960PRINTTAB(9,15)"Another game?"
970*FX 15,1
980A1$=GET$
990IF A1$="N" CLS:END
1000CLS
1010GOTO 140
1020PROCTUNE
1030PRINTTAB(12,0);"0000"
1040BX%=19:YB%=0:XB%=-1:SC%=0:N1%=10
1050FOR CO%=1 TO 10
1060AX%(CO%)=1+RND(36):AY%(CO%)=3
1070NEXT
1080AY%(1)=-20
1090ENDPROC
1100DEFFPROCINSTRUCT
1110PRINT TAB(14,3)CHR$141;"SPACE EGGS"
1120PRINTTAB(14,4)CHR$141;"SPACE EGGS"

```


WHAT IS JUMBLY?



YAHTCEE . . . This traditional dice is for one or more players and features superb graphics to enhance your enjoyment. YAHTCEE is Fascinating, Absorbing and Challenging

SPECIAL OFFER

Order YAHTCEE today for only £7.95 incl. and get a 10-game cassette FREE



30 KINGSCROFT COURT
BELLING, NORTHAMPTON

TICK BOX FOR YOUR REQUIREMENT

COM 64	SPECTRUM 48	DRAGON 32
NAME		
ADDRESS		
ENCLOSED TOTAL SUM		

UPGRADE YOUR SPECTRUM to 48k

with an EASY TO FIT
DELTA-RAM KIT

SPECTRUM
1 **£33**

SPECTRUM
2 **£26**

Each kit contains step by step instructions for easy, trouble-free installation within your Spectrum case.

Prices include p. & p. and V.A.T.

FREE with every order the UNIQUE DELTA CHIPCHEK Memory Diagnostic Cassette worth £3.50

All you need to do is cut out this coupon, tick the appropriate box, enclose your cheque or Access/Barclaycard No. and we'll do the rest.

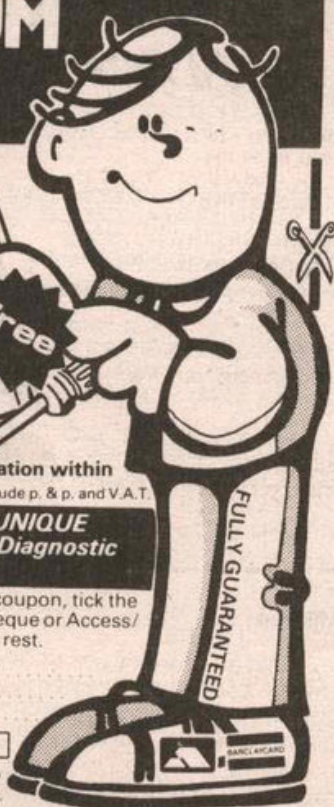
Name
Address

Postcode

Access or Barclaycard Number

Make cheques payable to Servodata Ltd.

DELTA RESEARCH LIMITED
10a The Broadway, Newbury, Berkshire RG13 1BA
Tel: 0635 45373



HIRE ZX81/SPECTRUM PROGRAM TAPES

Make the most of your Sinclair ZX81 or Spectrum computer by hiring tapes from the original software library—NOW IN OUR SECOND YEAR with over 2,000 satisfied members!

- Over 950 tapes stocked, offering more than 130 different programs from 40 suppliers (all with their permission)—many of the best currently advertised, plus some specially commissioned—and the range is constantly updated!
- Adventure, arcade and simulation games, many business and other practical programs, utilities, graphics education and much more besides
- Descriptive list makes choice easy
- FREE** quarterly, illustrated magazine includes tips from a professional programmer, DIY plans, reviews, letters, discount offers—plus our **Top 40 Tapes** chart averaged from thousands of members' scores
- Full-time staff offer you a really friendly, efficient welcome & service
- A fortnight's hire from just £1.20 including VAT and first class p/p—hire just what and when you like
- NEW! Overseas branches** now operating. **Benelux:** Jacobsmitlaan 75, B-2400 MOL, Belgium (mem. fee 44 & 49 Guilders/790 & 890 Bfr); **Elre:** Soften, 120 South Circular Rd., Dublin 8 (£12.50 punt); **South Africa:** P.O. Box 1769, Manzini, Swaziland.
- All tapes guaranteed loadable
- You may switch from ZX81 to Spectrum at any time if you upgrade
- Don't make do with second best! Join the original and biggest library.

YOUR FIRST TAPE FREE if you use this month's coupon!



The SINCLAIR OWNERS' SOFTWARE LIBRARY DEPT (PCWK)
Warren Road, Liss, Hants GU33 7DD.

SPECIAL OFFER THIS MONTH! Join using this coupon and receive your first tape hire (of our choice) **FREE** with your welcome package of magazine, tape catalogue, order forms etc. State main interest:.....

NAME.....

ADDRESS.....

Enclose cheque/P.O. for £7.50 for a guaranteed year's membership (ZX81) or £9.50 (Spectrum). Overseas £2 extra unless with local branch.


```

1130PRINTTAB(14,5)CHR$141;"-----"
1140PRINTTAB(14,6)CHR$141;"-----"
1150PRINTTAB(1,8)"The Earth is";
1160PRINT" being invaded by eggs "
1170PRINT" that are being dropped from an
alien"
1180PRINT" spacecraft that is out of
sight."
1190PRINT" Only you can save the ";
1200PRINT" Earth by using "
1210PRINT" the following"
1220PRINT" A laser gun - press 'SHIFT'
to use"
1230PRINT" Use the cursor keys ";
1240PRINT" to move left/right"
1250PRINTCHR$136;CHR$146" WARNING";CHR$
135;CHR$137" - If the eggs land";
1260PRINT" aliens "
1270PRINT" run out of them and kill you
instantly."
1280PRINT" So be warned!"
1290PRINT" "Press"CHR$133;CHR$136;" "K";
1300PRINTCHR$135;CHR$137" for keyboard or
";CHR$133;CHR$136;" "J";CHR$135;CHR$1
37;"for joystick to start"
1310*FX15,1
1320A$=GET$:IF A$="K" THEN CLS:ENDPROC
1330IF A$="J" THEN CLS:ENDPROC
1340 GOTO 1320
1350ENDPROC
1360DEFPROC TUNE
1370RESTORE 1460
1380FOR Q=1 TO 6
1390READA,B
1400READC,D
1410SOUND1,-15,A,B
1420SOUND2,-15,C,D
1430NEXT
1440FOR C=1 TO 3700:NEXT
1450ENDPROC
1460DATA129,10,33,10,149,5,53,5,145,5,49,
5,129,10,33,10,149,10,53,10,129,20,33,
20
1470DEFPROC TUNE
1480FOR W=1 TO 4000:NEXT
1490RESTORE 1570
1500FOR Q=1 TO 7
1510READE,F
1520READG,H
1530SOUND1,-15,E,F
1540SOUND2,-15,G,H
1550NEXT
1560ENDPROC
1570DATA149,5,53,5,129,5,33,5,137,5,41,5,
145,5,49,5,149,5,53,5,157,5,61,5,149,2
0,53,20
1580DEFPROC CALMOVE
1590VDU23,254,60,126,219,255,126,60,36,66
1600FF=1
1610FOR CF=1 TO 30
1620PRINTTAB(AX%(N1%)-CF,29)CHR$254;
1630 NEXT
1640LET FF=FF+1
1650PRINTTAB(AX%(N1%)+FF,29)CHR$254;
1660IF (AX%(N1%)+FF)>38 THEN ENDPROC
1670GOTO 1640
1680ENDPROC

```

Space Eggs
by Eddie Hold

6,000 FREE TAPES TO BE GIVEN AWAY



Sunshine is giving away 6,000 software tapes — for free. All you have to do is cut out and fill in this coupon, together with the coupons in the next four issues. As soon as you have collected five coupons, post them to:
Popular Computing Weekly Tape Offer
12-13 Little Newport Street, London WC2R 3LD
But, remember you are limited to one tape per person and there is a limit of 1,000 tapes per game.

Rules

- 1) Each entry must consist of five coupons cut from the magazine
- 2) You may only order one tape per person
- 3) There is a limit of 1,000 tapes per game
- 4) No correspondence will be entered into
- 5) No employees of Sunshine Publications Ltd, or their families, will be eligible to enter



try to forget anything in the rest of the title. Merely program all the details of

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an adventure and cannot progress any further, write to: Tony Bridge, Adventure Corner, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

Adventure.....

Problem.....

Name.....

Address.....

DIAND SOFTWARE

DRAGON SOFTWARE

SNAKEBITE (by David Elliott). A colourful, tuneful and gripping keyboard oriented game. Your snake grows longer by eating numbers, so watch out for obstacles and sharp turns while manoeuvring it, or it will die! Seven screens of increasing difficulty. Can you reach the seventh screen? We haven't yet!
Cassette tape £7.95

SKETCH-A-PUZZLE (by David Elliott). Your computer sketch pad enabling you to draw and 'paint' four-colour pictures AND there's a twist! Turn your picture into a sliding block puzzle. Shuffle the blocks, then use your skill to re-arrange them into the correct positions. NOT EASY!! Save your pictures on tape for future use. 5 pictures included with the program for the less artistic. Hours of creative fun!
Cassette tape £7.95

CAT 'N' MOUSE AND SPACE MAZE (By David Elliott). Terrific value, two exciting maze games on one tape! CAT 'N' MOUSE. Don't let the cat get you! Confuse it by darting through one of the randomly placed mouseholes! SPACE MAZE. Featured in 3D. You find yourself in a vast Labyrinth on the planet ZYGON. Can you find your way out?
Cassette tape £7.95

ORIC SOFTWARE

SPACE INVADERS (by Andrew and Roger Thomas). A super version of the traditional arcade game, highlighting the graphic capabilities of the Oric computer. Can you exterminate the aliens before they land? 4 levels of skill.
Cassette tape £5.95



DIAND SOFTWARE, Well Park, Kneilton, Reynoldston, Swansea, West Glamorgan, SA3 1AR.

Name
Address
Please allow 28 days for delivery
Postage and package is included (for U.K. only)

Please send me
☐ SNAKEBITE ☐ SKETCH-A-PUZZLE
☐ CAT 'N' MOUSE AND SPACE MAZE
☐ SPACE INVADERS
I enclose a cheque/postal order value £.....
payable to DIAND SOFTWARE

ZX80/ZX81 and Spectrum



Fair

AT

on
Saturday
1st October

PUDSEY CIVIC CENTRE

DAWSONS CORNER, STANNINGLEY
NR LEEDS
(midway between Leeds and Bradford)

Admission: Adults 75p, Children 50p
10 am till 5 pm

HARDWARE, SOFTWARE, BOOKS AND
MAGAZINES - EVERYTHING FOR ZX USERS

For tables contact Mike Donnachie 0532-552854
after 4 pm

Dragon Dungeon



DRAGON USERS CLUB

Why is the User Club at the Dungeon the biggest in existence, with members in 23 countries?

Is it the fact that *Dragon's Teeth*, the club's monthly magazine, is packed with news, information and advice? Or is it the fact that members easily save their subscriptions on just a few of the special membership offers?

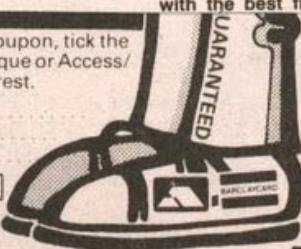
All you need to do is cut out this coupon, tick the appropriate box, enclose your cheque or Access/ Barclaycard No. and we'll do the rest.

Name
Address

Postcode

Access or Barclaycard number

Make cheques payable to
Servodata Ltd.



DRAGON STICKS

If you want the latest switch-type, self-centring joysticks (best for the up/down, left/right arcade games), we've got them at £19.95 per pair.

If you want the famous "Quick-Shot" aircraft-type sticks (no expensive adapter required), we've got them at £15.95 each.

But if you want the ultimate analogue sticks, with the best fire button available, then you

LATEST BEST SELLERS FOR THE DRAGON 32

PACDROIDS (Programmer's Guild) £8.95. Combine 'Pacman' with 'Defender' and add destructo mines and superbombs and you begin to get some idea of this 100 per cent machine game. Money-back warranty.

DRAGRUNNER (Cable) £8.75. Our favourite 'Frogger'-type game (this one fires back).

CAVE FIGHTER (Cable) £8.75. At last a good 'Skramble'-type game for the Dragon! 100 per cent machine and miles and miles of caves.



The SINCLAIR OWNERS'
SOFTWARE LIBRARY DEPT (PCWK)
Warren Road, Liss, Hants GU33 7DD.

SPECIAL OFFER THIS MONTH! Join using this coupon and receive your first tape hire (of our choice) FREE with your welcome package of magazine, tape catalogue, order forms etc. State main interest:

NAME

ADDRESS

Enclose cheque/P.O. for £7.50 for a guaranteed year's membership (ZX81) or £9.50 (Spectrum). Overseas £2 extra unless with local branch.

Tony Bridge's Adventure Corner



Dungeon Master

This week, a Spectrum review (yes, another, I'm afraid, but I have to reflect in this column the popular feeling, which at the moment is toward Adventure programs for the good old Sinclair machine — outselling others by a factor of, I'd guess, 10!)

Many of the letters we receive are from D & Ders. This section of the Adventuring community are those souls who once used to sit around a large piece of graph paper, with other like-minded people, indulging in Role-Playing Games (RPGs for short). The best-known of these was, and is, Dungeons and Dragons, hence D & D.

Created by the venerable Gary Gygax and Dave Arneson in the 1970s, this game is played, typically, by several people, who attempt to solve the mysteries of a complex of Dungeons (originally, but as often as not, nowadays, a network of streets in post-nuclear New York, or a spaceship in the staggeringly distant future, or . . .). This complex is the brainchild of the Dungeon Master, who maps out the playing-area before the players arrive, and populates the complex with Monsters, Treasures, Traps, and so on. He takes no part in the exploring of the caves, except as a divine presence, giving the players guarded information as to what they can currently see, or how they are faring in battle. A large amount of information, rules, and scenarios has been built up over the years, until now a whole world of details may be experienced when playing RPGs.

It seems a fairly obvious area of exploration, as far as computer games are concerned — the computer, after all, would be the most unbiased referee, and the least likely to forget anything in the heat of the battle. Merely program all the details of

your latest creation into the computer, and then lean back and let it take over as mediator.

Software companies seem to have been very slow in taking up the challenge, however, and the only real D & D program that I have seen is *Dungeon Master*, from Crystal Computing. Several other programs, from other companies, take certain aspects of the D & D rules, and incorporate them into programs, but *Dungeon Master* is a system which the budding Dungeon Master can use to create his or her own Dungeon.

The first program on the tape is the eponymous *Dungeon Master*. Once Loaded, the program will ask the player if a previously created character is to be introduced to the system. If not, the *Dungeon Master* will create one for you. The attributes, in true D & D fashion, are constructed from parameters such as Strength, Intelligence, Agility and Charisma (there are a couple of others). Then the player ventures into the Dungeon set up by the program. In the Dungeon, the usual Adventure commands, such as *Look*, *Keep*, *Drop*, and so on are recognised, and the Adventure continues as usual.

The Dungeon on this side of the tape is merely an example, however. The second side of Crystal's tape contains a program called *Dungeon Creator*, which is as good as its word, in allowing the user to create a Dungeon of their own.

This program is really powerful, and a great boon to anyone vaguely interested in D & D. *Dungeon Creator* provides all the facilities you need to enter and modify, or edit, your customised Dungeon for use with *Dungeon Master*. The menu contains: *Create*, *Inspect*, *Extend*, *Modify*, *Append*, *Load*, *Save* and *Quit*.

These are all fairly obvious — *Create* assumes that the user has, first of all, planned the Dungeon on paper. The program asks how many rooms, or locations the user requires, and then goes on to set up the exits and then contents of the rooms, all at the user's instigation. A list of Monsters, in degree of nastiness is presented, and the user may stipulate which Monster he wishes to appear in each room. The same procedure is adopted with weapons and potions.

A part from the Monsters and Potions, Spells may also be put into each room, and these range from the Astral Escape Spell, through the Rod of Annihilation to the Curse Scroll, each of which have a different degree of difficulty.

Having thus created the Dungeon, the user may then *Inspect* each room, and modify or edit as necessary. Another option is to *Append*, or add, yet more rooms, in a 3D matrix if required. Finally, the created Dungeon may be *Saved* to tape, and then Loaded into the *Dungeon Master* and explored.

The system, from Crystal Computing, will prove to be a welcome friend to the D & D enthusiast who may well be making his first foray into the world of micros. *Dungeon Master/Creator* is from the same stable as *The Halls of the Things*, which I enthused about a few weeks ago, and although the people behind Crystal Computing are rather deprecatory of *Dungeon Master*, I very much enjoyed using the system. It's probably a bit too complex to be anything other than an amusing way of filling a few spare moments, but the characters that can be created would be easily transportable to your own Dungeon.

Next week, I shall be looking at more of your problems. ■

Are you stuck in an adventure? Are you faced by a problem that seems insurmountable? *Adventure Helpline* may be the answer.

Adventure Helpline is, quite simply, designed to put adventurers in touch with one another. Where you may be stumped by a baffling puzzle, a fellow adventurer may be able to help. By the same token, you may be able to help other people with their problems.

If you are having difficulties with an adventure, fill in the accompanying coupon and send it to:

Adventure Helpline
Popular Computing Weekly
12-13 Little Newport Street
London WC2R 3LD

We shall publish *Adventure Helpline* entries each week in their own special column.

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to: Tony Bridge, Adventure Corner, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

Adventure Helpline

Micro

Adventure

Problem

Name

Address

NOW YOU CAN LIFT STATIC DRAWINGS, PHOTOGRAPHS, ETC, RIGHT OFF THE PAPER AND BRING THEM TO LIFE INTO YOUR PROGRAM!

TWO POTENT FEATURES COMBINE TO BRING YOU UNIQUE NEW POWER OVER YOUR SPECTRUM GRAPHICS!

FROM PAPER TO SCREEN...
...AND INTO YOUR PROGRAM.

POWER GRAPHICS

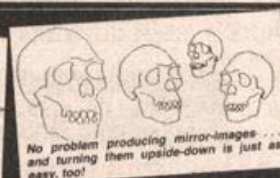
ACTION-TRACER + **GHOST-WRITER**
IMAGE-TRANSFER SYSTEM PROGRAM COMPILER

● **ACTION-TRACER** Gives you the power to transfer drawings, photographs, paintings, lettering — in fact ANY paper-based images into full colour line-drawings on your Spectrum screen, with astonishing ease and an accuracy that rivals expensive digital tracers. But this time you get more than just a static on-screen design that has to be laboriously drawn on and off tape, because...

● **GHOST-WRITER** Interprets your on-screen design into the precise sequence of basic instructions needed to EXACTLY reproduce it, and then writes the program for you, directly into memory! New program lines appear in your listing which are indistinguishable from ones you might have written yourself. When you've finished, POWER-GRAPHICS will 'self-destruct', leaving behind only your new program lines ready to use.

TOGETHER THEY'RE DYNAMIC!

The new program captures your design DYNAMICALLY, giving you instantly the power to MOVE it anywhere, to SHRINK it down to a single pixel, or EXPAND it to fill the screen. You can SQUEEZE or STRETCH it into weird distortions, flip it UPSIDE DOWN or MIRROR-IMAGE it, ROTATE it in the plane of the screen... in other words MANIPULATE IT UNDER YOUR FULL CONTROL!



MANIPULATION OR ANIMATION — GHOST-WRITER ALWAYS WRITES EXACTLY THE PROGRAM YOU NEED!
You can tell GHOST-WRITER to program selected parts of your design with their own special line numbers, allowing you to call them as separate sub-routines. Thus you can add or remove parts at will — like the Bunsen burner in this chemistry diagram.



INSTANT FORGERY!
How would you like to write a program that signs your name exactly as you do yourself?
John Smith
It's just a few minutes' fun with POWER-GRAPHICS!



Animating the lips of this well-known newsreader (recognise her?) is just as simple — and thanks to POWER-GRAPHICS' ability to produce high-speed curves when needed (which draw as fast as straight lines) her curved lips can be animated in real time!
POWER-GRAPHICS is fun to use, simple in operation, and for beginners and advanced users alike is an important new programming tool that extends the Spectrum's potential for imaginative graphics into exciting new regions.
IF YOU WANT PICTURES YOU CAN USE, IT HAS TO BE POWER-GRAPHICS.

ZX SPECTRUM
FOR 16K OR 48K
ONLY £8.95



BUTTERCRAFT SOFTWARE
14 Western Avenue, Riddlesden, Keighley, Yorks. ENGLAND
PLEASE ASK FOR OUR ILLUSTRATED LIST OF GUARANTEED-QUALITY TRS80/VIDEO GENIE SOFTWARE

OVERSEAS
CUSTOMERS
ADD £1.00
EXCESS POSTAGE

POPULAR Computing WEEKLY Back Issues

Almost all the copies of PCW that you missed can still be bought as back issues for only 50p, including postage and packing.

An index of the contents of the 36 issues published in 1982 is now available from the Publishers for only £1.20. It includes full details of all the programs, routines, reviews and news that you might have missed.

Please send me the following back issues at 50p each:

_____ Total £ _____

Please send me a copy of the 1982 PCW Index at £1.20 ☐

I enclose a cheque/postal order for £ _____

Name _____

Address _____

Please return to Back Issues, PCW, 12-13 Little Newport Street, London WC2R 3LD.



WIN THE POOLS?

48k

SPECTADRAW 2

A Pools Prediction Program for the 48K ZX Spectrum microcomputer. The program looks at the recent form of the teams playing in each week's English and Scottish football league matches and then refers to a large database to see what has happened in the past when teams with similar form met. It can then identify the matches which are likely to yield draws and output suitable predictions.

The program is supplied complete with a database tape containing data on over 7,500 matches and a comprehensive instruction manual.

For £12.95 inclusive (cheques/POs payable to B. S. McAlley).
SPECTADRAW, 1 COWLEAZE, CHINNOR, OXFORD, OX9 4TD

ZX81, SPECTRUM, DRAGON BBC AND VIC

SOFTWARE LENDING LIBRARY

We have for hire from 50p (including postage) programs for your computer.

£5 for life membership (less than the cost of a single game) brings you the Software Lending Library membership kit including catalogue, newsletter.

All tapes lent with full manufacturer's permission.

Send a cheque or postal order for £5 to **Software Lending Library**, PO Box 3, Castleford, West Yorks stating name, address, and computer type.

VCS ATARI 400/800 Vic20 • PHILIPS INTELLIVISION CARTRIDGE LIBRARY

AUTHORISED DEALER

- All the latest games
- Fortnightly or monthly hire
- Fast reliable service
- p&p inc. in hire charges
- Life membership now £10
- Discounts on purchases for members (hardware and software)

HIRE CHARGES: 2 WKS £3.00 — 4 WKS £5.00

JOIN NOW ON MONEY BACK APPROVAL

OR SEND SAE FOR DETAILS

To: MDM, HOME COMPUTER SERVICES, DEPT 5
20 NAPIER STREET, NELSON, LANCS BB9 0SN

FIGARO II NUMERIC DATABASE

Whether you are involved in management, sales, marketing, education or research FIGARO II will help you make sense of those masses of numbers in a way not seen before on a micro. You need no knowledge of statistics or maths to master the powerful facilities which are available through easy-to-use menus. Fast data entry routines are backed-up by built-in seasonal forecasting, statistics, data handling utilities and superb colour graph and chart plotting. The extensive manual contains a complete worked example for you to follow. Available NOW for 48K Spectrum and soon for the Commodore 64.

For a 'serious' micro FIGARO II would be cheap at the price — *Home Computing Weekly*.

Also available for 48K Spectrum, fully documented

FLEXICALC — you decide how many rows and columns, 2,000-cell capacity £9.95

FLEXIGEN — produce printed reports from your FLEXICALC files, and end to screen copying plus consolidation facility £6.95

FLEXIGRAF — full colour graphs and charts from FLEXICALC or FLEXIGRAF files, choose from six flexible formats £9.95

All THREE FLEXI's together for £19.95

The three programs are excellent value — *Popular Computing Weekly*.

Access, Barclaycard and telephone orders welcome
Dealers — send for our dealer sales demonstration cassette

SAXON COMPUTING

3 St Catherine's Drive, LECONFIELD, Beverley, Humberside HU17 7NT.
Telephone 0401 50697

WANTED ORIGINAL PROGRAMS FOR HOME COMPUTERS

WE NEED PROGRAMS
FOR MICRO PUZZLES AND GAMES
WE WILL PAY CASH FOR
ACCEPTED PROGRAMS

PLEASE CALL
DAVID DAVIES ON

01-466 1119

37 SUNDRIDGE AVENUE, BROMLEY, KENT

● STOP ● ● LOOK ● ● LISTEN ●

● **STOP** searching for a top quality back-up copier for the SPECTRUM (16K/48K). **TAPE COPIER** is the MOST ADVANCED package available.

● **LOOK** at ONLY SOME of its features:

- ★ Copies up to 47.7K (15.7K for 16K Spectrum)
- ★ Verifies/Repeat copies. Auto + Abort + Stops.
- ★ Loads CONTINUOUSLY (not just one part at a time like most copiers!)
- ★ Copies HEADERLESS and virtually ALL programs.
- ★ Very user friendly.

● **LISTEN** to this. **FULL MONEY BACK GUARANTEE** if not fully satisfied. £3.95!

LERM

(Dept W), 16 Stonepit Drive, Cottingham
Market Harborough, Leicestershire

POOLS PREDICTION

"POOLSWINNER"

The most sophisticated Pools Prediction Aid available. Gives probabilities of score draws, draws, homes or aways, based on two databases holding over 20,000 matches (databases included with program).

The databases are automatically updated as results are entered.
Can be used in simple mode, or with parameter adjustments to develop your own unique forecast method.

Fully documented, available now for Apple II, Iie, Spectrum (48K), Dragon, ZX81 (16K), BBC 'B' and LBM 64 (others — please enquire).

£15.00 (discs/tapes)

"POOLSDATA"

Complete record of all English Football League matches 1978-83. Teams, scores and dates of 10,000 matches held in simple format, ready for your analysis. Starter analysis programs and full documentation included. Available for Apple, Spectrum, ZX81, BBC, Dragon, Commodore series.

Discs (5 year) £15.00
Tapes (5 year) £12.50
Tapes (2 year) £6.70

all prices
(p&p included)

SELEC SOFTWARE (PCW)

37 Councilor Lane, Cheadle, Cheshire. 061-428 7425

VIDEO GALAXY

NO. 1 FOR HOME COMPUTERS AND SOFTWARE

Commodore 64	only £199.95	100s of games, books
Dragon	only £164.95	and accessories
VIC20	only £133.95	available for all
Spectrum	only £98.95	popular home computers
Spectrum 48K	only £127.95	including BBC.

VIDEO GALAXY

293 CHISWICK HIGH ROAD
LONDON W4

TEL: 01-994 4947

OWL TECHNICAL SERVICES LTD

C15 HOME COMPUTER CASSETTES

EACH CASSETTE COMPLETE WITH SIDE LABELS
INDEX CARD AND LIBRARY BOX

10 Cassettes.....	£4.80 (P+P £0.95)
50 Cassettes.....	£23.30 (P+P £2.00)
100 Cassettes.....	£48.00 (P+P FREE)

Cheque/PO payable to:

OWL TECHNICAL SERVICES LTD

PROGRAM DUPLICATION SERVICE ALSO AVAILABLE

Trade enquiries welcome

121 Northcote Road, London SW11
Tel: 01-223 7347

M & J SOFTWARE

DRAGON fig-FORTH £12. A cassette-based implementation of FORTH which includes a powerful text editor and a 6809 macroassembler. All the power of Basic is retained by being able to access Basic commands from FORTH. Do not be fooled by the low price of this package — it represents unbeatable value for money and comes complete with extensive documentation. We have tried to provide as much technical information as possible so our documentation is not aimed at teaching the language.

fig-FORTH ASSEMBLY SOURCE LISTINGS £7 each. Available for the following processors: 6502, Z80, 6809, 8080, 1802, 9900, 6800, 68000, 8086/88 and PDP11.

MVP-FORTH ASSEMBLY LISTINGS £7 each. Available for 6502, 8086/88 and 8080 processors. These listings provide the source for an implementation of FORTH up to 79 standard.

fig-FORTH INSTALLATION MANUAL £5. A complete "how to do it" guide to the implementation of FORTH from the above listings. This manual contains the FORTH source written in FORTH, an editor, an extensive glossary and lots more.

ALL ABOUT FORTH by Haydon £7.95. An excellent reference book with cross references to fig-FORTH the FORTH-79 standard and Starting FORTH. This book should be next to every FORTH programmer's computer.

6809 and 6502 MACROASSEMBLERS £5 each. Written in fig-FORTH, these listings require the minimum of alteration for any fig implementation. Copies on tape can be supplied for Dragon and Microtan users at £1 extra.

DRAGON COMPANION £4.95. The DRAGON COMPANION has been well received by thousands of Dragon users throughout Europe. Its author has an honours degree in computer science from Keele University. Packed full of useful information — including a listing of a 6809 disassembler — this publication is a must for any serious Dragon user.

Cheques and POs to: M & J SOFTWARE, 34 GRAYS CLOSE, SCHOLAR GREEN, STOKE-ON-TRENT ST7 3LU. Tel: (0782) 517876

ULTRASOFT

BETTER SOFTWARE AT BETTER PRICES

31 KEITH PARK ROAD
UXBRIDGE, MIDDLESEX UB10 0QR

DRAGON	VIC20
MICRODEAL: Android Attack, The King, Alcatraz, Defense, Escape, Shuttle, Invaders Revenge, Galactic Ambush, Frogger, Scarfman. RRP £8.00 Our Price £7.75	IMAGINE: Arcadia, Catcha Snatcha, Frantic, Wacky Waiters, Bewitched. RRP £5.50 Our Price £4.95
COMMODORE 64	INTERCEPTOR: Galaxians, Alien Attack, Crazy Kong. RRP £6.00 Our Price £5.00
INTERCEPTOR: Frogger, Crazy Kong, Spteman, Panic, Scramble, Star Trek. RRP £7.00 Our Price £6.00	SPECTRUM
LLAMASOFT: Gridrunner. RRP £5.00 Our Price £4.80	ULTIMATE: Jet Pack, Psst, Cookie, Trans Am. RRP £5.50 Our Price £5.00
Laser Zone, Matrix, Mutant Camels. RRP £7.50 Our Price £6.50	IMAGINE: Arcadia, Jumping Jack, Ah Diddums, ZZoom 48K, Zip-Zap 48K, Schizoids. RRP £5.50 Our Price £4.95

SEND CHEQUE or POs or
Send SAE for List Stating Machine

WHY PAY MORE?

CLASSIFIED

Semi-display — £5 per single cc
Trade lineage — 20p per word
Private lineage — 10p per word

CALL DIANE DAVIS ON 01-734 2688 FOR SEMI-DISPLAY ADVERTISING

GAMES SOFTWARE

GREAT GAMES FOR VIC20 and ZX Spectrum from Imagine Softek, Sumlock, Solar, Mr Micro etc at discount prices. Tel: Colchester 851068 (Essex).

VIC20 Adventure 8K plus Space Sickness, the ultimate trial, only £4.95. Home Services, 15 Falconers Green, Burbage, Hinckley, Leics.

ACE SOFTWARE, 3K, GTI, 7 games, £4. 19K Hawkeye, £6. Spacehop, £6. Mr Peckish, £6. Federation Software, 56 Rawley Crescent, New Duston, Northampton.

48K ORIC-1 SUPERFRUIT

Simulates a real fruit machine and features — HOLD, two-way NUDGE, GAMBLE or COLLECT WIN. Full colour GRAPHICS, SOUND and SKILL LEVELS.

PO/Cheque for £4.95 to:

TOWERSOFT

3 Rudland Road, Bexleyheath
Kent DA7 6BD

DISCOUNT PROGRAMS

for Vic20 (Imagine), Arcadia, Bewitched, Catcha-Snatcha, Frantic, Wacky Waiter. Only £4.95 each, two for £9, three for £14, four for £17, five for £20. Cheques to: Romoco Enterprises, 33 Victoria Road, Timperley, Cheshire.

OVER 10% OFF

Selected Spectrum Games from Ultimate and Imagine

JET PAK **AH DIDDUMS**
TRANS AM **JUMPING JACK**
ARCADIA **ZZOOM 48K**

£4.90 each (normal price £5.50)

Post and Packing Free

Cheque or POs to:

LANAMAN SOFTWARE
PO Box 169
Reading RG5 3PQ

DID SOMEONE SAY CAPTAIN PHOENIX?

ZX SPECTRUM SOFTWARE

We are offering 10% off one or more tapes in a range of software for the ZX Spectrum.

Telephone or SAE for list.

We are also offering Jetpac, Pssst, Trans-am and Cookie by Ultimate, Play-the-game for £5 each inclusive of postage and packing!

RULE COMPUTERS

30 Tylers Acre Road,
Corstorphine, Edinburgh,
EH12 7HZ

Tel: 031-334 7261

SPECTRUM 16K. "Raquel" presents her two for one game for age 16 and over only, state age when ordering, still only £2.95. I. Brooks, 17 Malvern, Coleman Street, Southend, Essex.

Avalon Computing

A COMPREHENSIVE RANGE OF
SOFTWARE TITLES: SPECTRUM
16K/48K, VIC20, DRAGON, ORIC,
COMMODORE 64, BBC, ATARI 400/800

EG: Jet Pack (Spectrum) £5.49
Krazy Kong (Vic20) £5.99
Zzoom (Spectrum) £5.49
Oric Chess, Zodiac

(RRP £9.99) £6.49

(incl VAT)

Plus 100s more titles at competitive prices.
Send a large SAE for catalogue. P&P 50p per
order or free for two tapes+.

AVALON COMPUTING, 14 CLIFF ROAD
HORNSEA, N. HUMBERSIDE HU18 1LL
Tel: 04012 2791

SORD M5

Gamestape 1 for the Sord CGL M5 with Basic 1 and joypads. Five quality games for only £5.95 including P&P. Cheques/POs to: FARNSOFT, Dept. PCW, 22 Great Austins, Farnham, Surrey GU9 8JQ.

RUNESMITH

for BBC (32K) MICRO
Alter the story. Sci-fi, erotic, philosophical, or fill the gaps. Be magic with words, or feed in your own stuff. Send £9.50 cheque or PO for complete RUNESMITH package. Abraxas Software, 13 Copthall Gardens, London NW7 2NG.

SPECTRUM PROGRAMS

Night Flite £5.95
Heathrow £7.95
3D Tunnel £5.95
Escape £4.95
Arcadian £4.95
Gnasher £4.95
Spec Vaders £4.95
Maze Chase £4.95

Many others. SAE for list.

Prices including VAT and P&P

Cheques/POs crossed, payable to:

VYAJYS, H-K, 11 Margaret Avenue
St Austell, Cornwall



ROBOT PANIC

for your 16/48K

SPECTRUM

Big hit at the Microfair — now available to you! Zap the aliens before the walls crush your robot. £5 from retailers (ask) or direct (24-hour despatch)
Soft Mill, 20 Station Road, Haddenham, Ely, Cambs. CB6 3XD

SPECTRUM, 16/48K. "Raquel" presents her game for age 16 and over only (state age when ordering), still only £2.95. I. Brooks, 17 Malvern, Coleman Street, Southend, Essex.

ORIC OXYGEN MONSTERS, arcade game, bury the monsters before running out of oxygen. 16/48K, £3. D. Townsley, 114 Stratford Road, Warwick.

HARDWARE

BBC, ORIC, LYNX CASSETTE LEADS

WITH MOTOR CONTROL
DIN to DIN or
DIN to JACKS

£2.95

Orders to: (Dept. PCW)
Clare, 222 Townfields Road,
Winsford, Cheshire CW7 4AX
Tel: Winsford 51374

TEXAS TI 99/4A CASSETTE LEADS £4.95

INCLUDING POST AND PACKING

Single Recorder only
Orders to: (Dept. PCW)
Clare, 222 Townfields Road,
Winsford, Cheshire CW7 4AX
Tel: Winsford 51374



VIC20 OWNERS! Our Rampack adaptor allows standard software to be run on your expanded system without removing the Rampack. Simply switch your extra memory on or off as needed. Prevents wear to computer Rampack terminals, £12.45 inc. p&p. L. W. Staines & Co., Unit 2, Roding Trading Estate, London Road, Barking, Essex. Tel: 01-591 2900.

ZX81 + 16K + MEMOTECH KEYBOARD + cassette player, manuals + tapes, excellent condition, £100 ono. Tel: Telford 606596.

DRAGON WITH JOYSTICKS, 10 cassettes, 2 cartridges, manual, 2 books, swop Spectrum, similar cash adjustment. Tel: 0475 673757 (Ayrshire).

SPECTRUM 48K, complete with 100+ games and applications, plus books, magazines and cassette recorder, all boxed, as new, £200. Tel: Watford 46955.



PROM SERVICES

ZX hardware specialists
micro system design and development

NEW products for ZX micros: —
3 output analogue converter £27

8 input analogue receivers in three ranges of resolution, with or without I/O control lines from £23.95

I/O cards — three types available 24 or 32 lines with or without LED indicators, A/D or D/A facilities from £14.50

Still available — a range of EPROM boards and EPROM software.

NEW EPROMS now in stock — SAE for details

Motherboards, audio and graphics generators autostarts, clocks and counters, Edge cards 75p Edge connectors £2.50p Ribbon cable 75p/P&P.

EPROM SERVICES
3 Wedgewood Drive, Leeds LS8 1EF
(0532) 667183 326/6

CLASSIFIED ADVERTISING RATES:

Line by line: For private individuals, 10p per word, minimum 10 words.

For companies, traders, and all commercial bodies, 20p per word, minimum 20 words.

Semi-display: £5 per single column centimetre, minimum length 2 cm. (Please supply A/W as PMT. Or supply rough setting instructions.)

Conditions: All copy for Classified section must be pre-paid. Cheques and postal orders should arrive at least two weeks before the publication date.

If you wish to discuss your ad, PLEASE RING Diane Davis 01-734 2688.

Here's my classified ad.
(Please write your copy in capital letters on the lines below.)

Please continue on a separate sheet of paper

I make this words, at per word so I owe you £

Name

Address

.....

.....

Telephone

Please cut out and send this form to: Classified Department, Popular Computing Weekly,
12-13 Little Newport Street, London WC2R 3LD.

ZX81 KEYBOARD, full size computer keyboard, typewriter layout, 42 keys including spacebar, sturdy 11in x 8in x 2in case, ZX81 and power pack, fits inside, plug-in. Connectors, only £25 including money back guarantee. Tel: 0602 474973.

VIC20 + 16K + 3K super expander + joystick + Omega Race cartridge + Mastering the Vic + much software, including 10 top arcade games + 3 adventures, 12 months old, cost £250, sell for £150 ono. Tel: 0253 726850.

FOR HIRE

TO HIRE A COMPUTER from ZX81 upwards, ring or write to Business and Computer Services, 292 Caledonian Road, London N1 1BA. Tel: 01-607 0157.

UTILITIES

SPECTRUM KOPYKAT

IMPROVED PERFORMANCE

Simply the best. Copying any program is now as easy as LOADING and SAVING your own programs. Any ZX Spectrum program can be backed-up onto a fresh tape. Even programs that cannot be stopped can now be copied. 100 per cent machine code. Copies headerless files. Prints file name. SPECTRUM KOPYKAT uses no program area so full size programs over 41.7K (9K for 16K machines) are easily duplicated. PLUS FREE Header Reader program. Immediate despatch by first class return of post.

Send cheque/PO for £4.95 to:

MEDSOFT

61 Ardeen Road, Doncaster, DN2 5ER
IT CAN EVEN COPY ITSELF

AUTOKOPY COPIES any type of Spectrum tape (16/48K), even programs full 16K or 48K long, the best available, machine code, simple to use, full guarantee, £3. B. Tidd, 160 Howlands, Welwyn Garden City, Herts.

SPECTRUM 64 PRINT. Amazing software that gives 64 characters per line instead of 32. Prints anything from your Basic program, cassette, 48K or 16K, £2.90. K. Ahmed, 28 Maggie Hall Lane, Bromley, Kent.

SPECTRUM NOSEY, reads your tapes and prints out program name, length, start address and auto start line. Machine code and Basic, £2 or send £3.95 for Nosey plus Copyall Kopykat. ZX-Guaranteed. 29 Chadderton Drive, Unsworth, Bury, Lancs.

THE KEY

THE ULTIMATE SPECTRUM BACK-UP COPIER FREE HEADERLESS COPIER

100% machine code — very simple to use, does not use any program memory. Multi-section programs copied in one go. Sold to over 18 countries worldwide.

Order **THE KEY** for any ZX Spectrum ONLY £5.95 — IMMEDIATE DESPATCH (Europe — £6.75, Outside Europe — £7.50)

KEYSOFT, DEPT PCK 2
6 BRUCE GROVE, LONDON N17 6RA
The programs of this tape are sold subject to the condition that only one back-up is made of any commercial program. This back-up must be for personal use only.
DEALER ENQUIRIES WELCOME

BBC "UNLOCK". Removes locks on latest software, for use only to make back-up copies, £5.80. Peter Donn, 33 Little Gaynes Lane, Upminster, Essex RM14 2JR.

BBC BACK-UP COPIER for OS1.2, send cheque/PO for £4.50 including P&P to N. Rodgers, 25 Medlock Crescent, Sheffield S13 9BD.

BBC (B) KOPYCAT and File Clone. A complete back-up package for £3!! including P&P. M. A. Paris, 38 Wooburn Manor Park, Wooburn Green, High Wycombe, Bucks.

SOFTSAVE for the Vic20 is a 100 per cent machine code utility program which allows you to back-up most software on to a new tape cassette with instructions, £4.95 from Softsave, 248 Evelyn Street, London SE8 5BZ.

VIC20. Create 60 Hi-Res characters the easy way with "Super Kit", two programs with instructions, £4.50. R. McQuade, 55 Shaftsbury Drive, Heywood OL10 2PH.

TELETEXT ON YOUR SPECTRUM. Create your own 900-page teletext system with "ZXTEXT", full colour, graphics, flashing, 24-hour clock with alarm, free sample system, it's all here! cassette £4.95. Iain Stewart, 17 Torry Drive, Alva, FK12 5NQ.

SOFTSAVE FOR THE VIC20 is a 100 per cent machine code utility program which allows you to back up most software on to a new tape. Cassette with instructions, £4.95 from Softsave, 248 Evelyn Street, London SE8 5BZ.

ZON X-81 SOUND GENERATOR for ZX81 or Spectrum (with interface), new condition, £20 ono. Tel: Aberdeen (0224) 35695.

VIC IMITATOR. Copies most Vic20 cassette-based programs, £6. Send cheques/POs to Ian Waite, Dept PCW, 11 Hazlebarrow Road, Sheffield, S8 8AU.

SOFTWARE

ORIC SOFTWARE. Zodiac Chess, £8.95 each, Munch only £7.35. Send SAE for further details: Stag Software, 10 Fairacre, Maidenhead, Berks.

SPECTRUM AND VIC20 SOFTWARE for sale or swap, various titles for both machines. For details ring Skelmersdale 32376 (after 5 pm), (private sale).

SPECTRUM SOFTWARE. Hobbit, £8. Psion Flight, £8. VU3D, £8. Timegate, £3. Hungry Horace, £3. H Goes Skiing, £3. Transilvania Tower, £3. Arcadia, £3. Private sale. Guaranteed. Tel: Crayford 526697.

DRAGON CRUNCHER

First cassette-based conversion program for Tandy Color programs to Dragon 32 and vice versa. Ideal for "Rainbow" readers. Only £7.95.

ELKAN ELECTRONICS, FREEPOST, 11 Bury New Road, Prestwich, Manchester M25 6LZ. Tel: 061-798 7613

BBC USERS. Save yourself hours use "Soft-keys". It sets function keys to provide 10 valuable facilities, also supplied template for key reference. Send cheque/PO for £2.95 to: A. J. Hawkins, 15 Godwin Road, Bromley, Kent.

ZX81 16K

POOLSTER IS MORE THAN A POOLS FORECAST PROGRAM. BASED SOLELY ON SCORED DRAWS, IT ALLOWS YOU TO ANALYSE 6 YEARS' PAST RESULTS AND PLOT YOUR OWN STRATEGY. WRITTEN IN MACHINE CODE, IT PERMITS VARIOUS PERMUTATIONS/COMBINATIONS OF YOUR PLAN. ALSO AVAILABLE FOR THE SHARP PC1500/TANDY PC2 (+8K). £9.99.

NAIGRAM SOFTWARE
SOHO SYNTH-HOUSE
18A SOHO SQUARE
LONDON W1V 5FB
NB: SOON AVAILABLE FOR THE SPECTRUM!

STOP! LOOK! LISTEN!

STOP searching for a TOP QUALITY back-up copier for the SPECTRUM (16/48K).

"TAPE COPIER"

we are certain is the MOST ADVANCED package available. Does any other copier come near?

LOOK at ONLY SOME of its options.

- * Copies up to approximately 47.7K (15.7K for 16K Spectrum).
- * Verifies, Repeat Copies, Auto. Abort, and STOPS programs.
- * Loads CONTINUOUSLY (not just one part at a time like most copiers) even without pressing a key!
- * Copies HEADERLESS and ALL programs that we are aware of!
- * Very user friendly and simple to use.

LISTEN to this. We are so convinced you will be delighted with our product that we can offer a FULL MONEY BACK GUARANTEE if not fully satisfied. Cost ONLY £4.50

LERN, Dept PW, 16 Stonepit Drive, Cottingham, Market Harborough, Leics.

SPECTRUM OWNER wishes to sell software due to change of machine, value £200, reasonable offers, may split. 01-574 4122.

£230 WORTH of 16/48K Spectrum games cassettes for £90, also 16K ZX81 rampack, £12. Phone 021-525 5380.

SPECTRUM BASIC PROGRAMS made 100 per cent breakproof, £6. Send program on tape to A. H. Ibrahim, 54 Beresford Road, Longsight, Manchester M13 0QT.

ZX81 16K software. Write to: G. Spiteri, 49 Abela Street, St Venera, Malta.

JONEL INDUSTRIES — computer and electronic repairs, Sinclair specialist. Send sae to: 25 Milford Close, Marshalswick, St Albans, Herts AL4 9BQ.

SEEN MY CAT? Post free Spectrum software from the two writers; independent assessments. FREE offers and more in my catalogue. **SOFTWARE (P)**, 20 Gordon Avenue, Bognor Regis, Sussex (02403) 822561.

BBC quality inexpensive program printout service. SAE details. Mr Small, 8 Cherrytree Road, Chinnor, Oxfordshire, OX9 4QY.

FREE OFFER. 16K ZX81 owners send SAE to Pacsoft (Dept FO), 26 Stray Road, Burnholme, York, for details.

SPECTRUM PROGRAM SWAP, send tape with instructions. I will return a tape with equal number of comparable quality programs. Richard Hasty, Hegel Str 13D, 652D Worms, West Germany.

ZX SOFTWARE — for our free catalogue of practical programs, send SAE to: Dept P, SD Systems, PO Box 24, Hitchin, Herts. Prompt despatch.

CLUBS

BBC/SPECTRUM SWAPSHOP! Membership free, send now for membership or details to: M. A. Paris (Swapshop), 38 Wooburn Manor Park, Wooburn Green, High Wycombe, Bucks.

SOFTWARE EXCHANGE. Swap your used software via our club. Free membership, £1 per swap. Most computers. SAE for details, UKSEC, 15 Turnwell Greave, Sheffield S5 9GB.

EDUCATIONAL SOFTWARE

EDUCATIONAL SOFTWARE for 48K Spectrum. GCE O/CSE Physics six programs, £6.50; Chemistry six programs, £6.50; or both tapes £12. Think Tank, Dept PCW, 35 Wellington Road, Wimbledon Park, London SW19 8EQ.

SPECTRUM. Draw Hi-Res graphs of mathematical functions on calibrated axes. Listing £1. Cassette £2. M. Poyner, 5 Manor Park, Tewkesbury, Glos.

SPECTRUM 16K/48K PRIMARY SCHOOL mathematics coaching program, teaches times tables, addition, subtraction, multiplication, division, on-screen timing to monitor your child's improving performance, includes scoring, skill level options and sound effects. Price £5.95 including P&P. Eric Lindley, 4 Laurel Court, Ossett, West Yorkshire WF58 8QA. Tel: 277416.

At last!

Educational software developed and proven in schools

OUR NEW RANGE INCLUDES 5 EXCELLENT PROGRAMS FOR 32K BBC

SPELLLEVEL — All you need to develop spelling skills

COUNTON — Develops and teaches counting techniques

SUMBALANCE — A great help in mastering number bonds

PRISMS — Develops and shows calculation to surface area and volume

BEARINGS — Improves skill in estimation of angles

ALL PROGRAMS £7.50 EACH
Discount for schools and bulk ordering

Send for details to:

MICRO concept

22 Allenby Ave., GRIMSBY, Humberside

MULTIMATHS for the Dragon 32, a tables test, great value at only £1.60. Send cheques or POs to P. Perris, 88 Poplar Crescent, Shipley, West Yorkshire BD18 2HH.

DEALERS

SOFT MACHINE

A selection of the very best Software, Books and Accessories available for ZX81, Spectrum, BBC, Dragon, Vic20 and Commodore 64 Microcomputers.

3 Station Crescent
Westcombe Park
London SE3
Tel: 01-305 0521

or send SAE for free catalogue (state which computer)

ROCHESTER SOFTWARE AND COMPUTER CENTRE

38 Delce Road
Rochester
Kent

OPENING
12 September 1983

TEL: 0634 408 305

FOR ALL COMPUTERS,
SOFTWARE AND
PERIPHERALS

COMMODORE 64

£164 (excl. VAT)

64 Programmers Ref Manual £9.00 + £1.50 p&p

Tel: Chris Gurney, Dave Walsh or Floyd Patterson

Tel: 01-969 4658/7527 or send SAE
Image Science Micro Computers Ltd
189 Freston Road, London W10 6TH
or cheques PO (add 15% VAT) and £8
for p&p Securicor delivery
Prestel Frame 4820000 (a) for latest software
and hardware information and prices. Full
after-sales maintenance on all Commodore
Equipment bought from us.

A RETAILER for Sinclair accessories in
the North of England. We are situated
near the M1 and M62 motorways. As well
as a complete range of hard and soft-
ware, our service department can repair,
modify or fit a wide range of accessories.
Hours of business 10 am — 8 pm
Tuesday to Saturday inclusive.

TELEPHONE PHILIP COPLEY ON
0924 272545

6 WESTLEY ST, OSSETT, W. YORKS

PLEASE RING FOR DETAILS OF OUR
MAIL ORDER SERVICE

LANCASHIRE MICROS

CRAZY BALLOONS for the Commodore 64
£4.95. **TRAINS** for the unexpanded Vic
£3.95. **ZOMBIES** for the unexpanded Vic
£3.95. Three great addictive games of
strategy and skill! **SPECTRUM GOLF/MUT-
IES/CITY BOMBER**, three games for the 48K
Spectrum now all on one cassette! £4.95.
Available from **LANCASHIRE MICROS**, 51
Queen Street, Morecambe, Lancs. Tel:
(0524) 411435.

CARVELLS OF RUGBY LTD

3/7 BANK STREET, RUGBY
Tel: 0788-65275

Vic20 Starter Pack Computer and C2N
Tape unit, intro to Basic Pt1 and 4
games. Only £134, usually £139.95.

Atari 800 + software, £250. 48K Ram
+ Basic — plus the best of the US
software in stock.

We also stock BBC B, Electron, CBM
64, Spectrum and software books.
Phone or visit soon!

ACCESSORIES

**DO YOU USE COMPUTER STATION-
ERY?** Then don't buy more than you
need. We will provide as little or as
much as you require. Listing paper,
labels, etc. HCL, 19 Greenland
Road, Kemsing, Sevenoaks, Kent. Tel:
Orford 2918.

FLOPPIES, cassettes, paper, ribbons,
labels, I/Cs, bits etc. SAE for prices.
Dept MO, MMS, 28 Poplar Road,
Cleethorpes DN35 8BQ.

MAGAZINES



DRAGON USER

To make the most of your Dragon you need
Dragon User — the independent magazine for
Dragon owners. To make sure that you
receive a copy of Dragon User regularly
subscribe direct to us. A year's subscription
costs £8 for 12 issues or subscribe for two
years for £14.40 and receive a free copy of
either **The Working Dragon** or **Dragon
Gamesmaster** (overseas rates available on
application). Send a cheque or postal order
made payable to Dragon User, and accompa-
nied by your name and address, to Dragon
User, Subscriptions Department, Oakfield
House, Perrymount Road, Haywards Heath,
Sussex RH16 3DH.

EXCHANGE

software exchange centre

TO ALL ZX SPECTRUM EPSON
HX-20 PROGRAM WRITERS

- Obtain 100s of programs without cost for
your computer
- No Copyright No Royalties
- All the latest programs continually being
added
- Start your own software house and make
a profit
- HX-20s for sale with free software

For more details
Tel: (0293) 544322 at all times

FOR SALE

VIC GOODIES, multisound synthesiser,
£4.50; Blitz, £2; Boss Chess, £9;
Super Lander cartridge, £4; Vic
Graphics Book, £3.50. Tel: Ruislip
35588, 8 pm.

DATA DYNAMICS TTY 33 RS232 with
paper tape reader punch, £50. Tel:
01-445 0921, evenings.

DRAGON, as new, £67-worth of soft-
ware + joystick, worth £252, price
£165. Tel: Exeter (0392) 54149.

VIC20, 3 months' guarantee, 16K
expansion. Games, joystick and cas-
sette recorder, £175 ono. Tel: (0908)
55340, after 4 pm.

BBC (B) 1.2 OS, boxed, as new, 16
programs, £380. Tel: 01-599 1019.

NASCOM II 16K in case, £95 ono. Tel:
0604 846441, evenings.

ATARI VCS + joystick, cables and 12
cartridges, including: Frogger, ET, Mis-
sile Defender, at £180. A super bargain.
Tel: 01-937 3057, after 5 pm.

DATA RECORDING matrix printer,
Model 6330, complete, little used, £65
ono. Tel: 01-669 4528, evenings.

INTELLIVISION CONSOLE, 16 car-
tridges, excellent condition, worth
£450, will sell for £250 ono. Tel: Down-
land 51191

DRAGON 32, joysticks, light pen, soft-
ware, Forth assembler, £155; Delta
disk cartridge and disk, software, £70;
Caanon D/S drive, £225; ZX81 16K,
Fuller keyboard, £50. Tel: Upholland
632149 (Lancashire).

ATOM, 12K + 12K, floating point,
PSU, software, £85 ono. Tel: (0604)
720374 evenings.

VIDEO GENIE 3003 integrated cas-
sette, 16K Ram, all manuals, leads,
sound box, £110 ono. Tel: 021-773
7533.

RECRUITMENT

PHOENIX SOFTWARE

Are looking for Machine-
Code Arcade-quality
games. We have an idea
which could make your
game the best seller in
Europe.

Send your program to

PHOENIX SOFTWARE

Spangles House

116 Marsh Road

Pinner, Middx.

or Tel:

01-868 3353

NOW!!!

WANTED

WANTED

Quality Games and utility programs for
any Micro. All programs considered.
Instant cash plus royalties, on all
programs accepted with a view to
distribution in UK, USA and Europe.

Dream Software PO Box 64
Basingstoke, Hants RG21 24B
Tel: Basingstoke (0256) 25107

WANTED! Non-working Spectrums
(for parts), absolutely any condition.
Will pay £15 for 16K, £20 for 48K plus
your postage. Send to: Richard Hasty,
Hegel Str 13D, 6520 Worms, West
Germany.

PROGRAMMERS WANTED (Basic/
Machine) for most home micros to
develop own and house progs. Write
Computer Shop Software, PO Box 29,
London, SE3 7AU.

WANTED Vic20 cartridges, Submarine
Commander and Outworld, also soft-
ware to swap. Tel: (0706) 44003 or
353719.

PROGRAMS WANTED urgently for
Spectrum, must have interesting
graphics, excellent prices, royalty paid
on acceptance. M. Ram, 10 Boscombe
Road, SW17. 01-672 1094.



is seeking authors for new titles to add to its
highly original and successful book range.
Experienced and first time authors are invited to
submit manuscripts, ideas or fields of interest.
Full details of what we can offer from **David
Lawrence, Book Editor, Sunshine**, 12-13 Little
Newport Street, London WC2R 3LD.

Sunshine: Publishers of Popular Computing and
Dragon User.

Computer Swap 01-734 3454

Free readers entries to buy
or sell a computer.
Ring 01-734 3454 and give
us the details.

ZX81s for sale

ZX81 + 16K + over £40 of software +
manual, leads, etc, excellent condition,
£50. Tel: Paul on 01-394 0083 (even-
ings).

ZX81 16K, leads and manuals, maga-
zines, complete with console and
keyboard, £80 ono. Tel: 01-505 1720.

FULLER ZX81 KEYBOARD, few
months old, hardly used, offers; £26 of
magazines, for £12. Tel: 041-632 9325
(5 pm).

ZX81 GAMES, £2 each, Sinclair Ram
pack, boxed, £20. Tel: Boldon 372943
(after 5 pm).

ZX81 + 16K Ram, magazines, pro-
grams, pre-recorded games cassette,
including Flight Simulator. All boxed
and in very good condition. Reason for
sale — upgrading to bigger system —
£45. Tel: Southampton 454979.

ZX81 16K + £10 worth magazines +
Scramble software, £45 ono. Tel: 0332
670468.

ZX81 1K, tape recorder, magazines,
still boxed, £30. Tel: Cockermouth
824202.

ZX81, 16K, leads and manual, £30
software, recorder, magazines, £70
ono. Tel: Newton Abbot 60077 (6 pm).

ZX81 16K, sound pack, £50 software,
plenty of mags, sell for £75. Tel: Roch-
dale 352966.

COMPUTER SWAP

Computer Swap entries are li-
mited to 30 words. Either fill in
the accompanying form and send
it to Computer Swap, *Popular
Computing Weekly*, 12-13 Little
Newport Street, London WC2R
3LD or telephone 01-734 3454.

All software offered through com-
puter swap must be in original
condition and for private sale
only.

Warning: It is illegal to advertise
pirated software.

COMPUTER SWAP

Please write your copy in capital letters on the lines below.

Name.....

Address.....

Telephone.....

ZX81, Memotech 64K memory, DKTronics keyboard, Q Save, Batt-pack, machine code manual, sell for £60. Tel: 01-801 3019.

ZX81 16K, with soldered Ram pack, hence no program crushers. Complete with leads, manual, etc., + graphics manual and film, + games books, + six cassettes, including Flight Simulation, 3D Monster Maize, 3D Defender, £65. Tel: 968 7556.

ZX81, 16K Ram pack, sound bi-pak, two books, £15 worth of magazines, £80 software (15 tapes), leads, manual, etc., very good condition, worth £250 will sell for £105 ono. Tel: Basingstoke 58522.

ZX81, 16K Ram, two manuals, offers over £30, also games cassettes. Tel: 0725 20289 after 5 pm.

ZX81, 16K Memotech keyboard, AGF joystick, 18 pre-recorded cassettes, two books, graphics jotter, £95 ono. Tel: 01-301 0422.

ZX81 16K, computer, PSU, Ram and motherboard, fully cased in DKTronics keyboard, includes over £60 software, book, manual, and leads. Altogether cost over £200. Reasonable offers. Tel: Chesterfield (0246) 863035.

Commodores for sale

VIC20 + two slot mother boards (8K) + joystick + £1,500-worth of software and cassette deck, £350 ono. Tel: 01-840 63610.

VIC20 + cassette + joystick, £95: 16K switchable Ram pack, £25. All in good condition and boxed. Tel: Heathfield (East Sussex) 3857 (evenings and weekends).

VIC20 + C2N cassette deck + 16K Ram pack + super expander cartridge + two joysticks + three games cartridges (including Jelly Monsters) + £100-worth of other software + many books and magazines for Vic, only £225 ono. Tel: 01-551 2708.

Adventure competition

THE winner of our recent adventure competition is C Woodward with his program *The Falls of Shalor*. Although a text only adventure, it was sufficiently imaginative to just beat off the competition. C Woodward receives a Commodore 64.

A Vic20 was also awarded to Mrs K Hildick-Smith for her adventure scenario set on board a space ship orbiting an unknown planet.

VIC20 + cassette unit + 16K Ram pack + £200-worth software including Garf and Omega Race + two others + books, great condition, cost over £800, sell for £200 ono. Tel: Ashford (Middlesex) 55378.

VIC20 + C2N, joystick, 32K, £200 of software, both Ram and Rom + magazines, £180 ono. Tel: Cheltenham 45021.

VIC20, C2N, £90 of software, joystick, Introduction to Basic manual, boxed as new, £125 ono. Tel: Thetford 5665.

Acorns for sale

ACORN ATOM, fully expanded + games + books and magazines, £80 ono. Tel: Nottingham 224066.

BBC MODEL A + 32K. All offers considered for this excellent package, including monitor, cassette recorder, software, books etc, all as new, worth £550. Tel: Kidlington 6880 (phone John, evenings).

BBC MODEL B + twin floppy drives, word processing monitor + lots of software + Rom-based software, £1,000. Tel: Stevenage (0438) 68624.

Dragons for sale

DRAGON 32, two weeks old, hardly used, guarantee card, Pac-man, two cassette games, joystick, books, £140 ono. Tel: 01-776 1033 (6 pm).

DRAGON 32, boxed as new, still under manufacturers guarantee + joysticks + £60 worth of software, £135. Tel: 556-5482 (after 6 pm).

DRAGON 32, manuals, PSU, one month, joystick, £50 of software, books, £100+ magazines, including Dragon User 80 + listings, large b/w television, blank cassettes, proven cassette recorder, £225 ono. Tel: 0908 616840.

UNUSED DRAGON 32, tape recorder, joysticks, M/C book, 30 programs, book, cassettes, Donkey King, Shuttle, Planet Invasion, Black Sanctum, Defence + others, worth over £290, will accept £240. Tel: Little Wick Green 2518.

Ataris for sale

ATARI 800 48K BASIC, manuals, joystick, £285. Tel: 01-560 7749.

ATARI 400 computer for sale + basic, 3 months old, £110. Tel: 907 1582.

ATARI 400 48K BASIC cartridge, £200 ono. Tel: 267 8636.

ATARI 400 16K, in box with warranty, £105 ono. Tel: Whitney (0993) 75479.

ATARI 800 48K, six months, in box, £210 ono. Tel: Whitney (0993) 75479.

ATARI VCS with four cartridges plus paddles and joysticks, will sell for £50, less than third of cost price. Will delivery anywhere in London. Phone Vince on 01-886 2931.

ATARI VCS, nine cartridges, keyboard cont, hardly used, worth £300, sell for £90. Tel: 01-337 8080 (5 pm).

ATARI 800 48K BASIC CARTRIDGE + 810 disc drive, manuals + joystick + two disc software + recorder, six cartridges, brand new, one year guarantee, quick sale, £550. Tel: 864 5613.

Spectrums for sale

SPECTRUM 48K, still under guarantee + printer, £120 ono. Tel: Tonbridge (0732) 361920.

SPECTRUM 48K, mint condition, hardly used + software, only £100. Tel: 051 3365537.

SPECTRUM 48K, £80. Tel: John on 01-941 4761 (Hampton).

SPECTRUM 48K, manuals, ZX Printer, seven paper rolls, custom case, tv to Spectrum changer. Good software including Hobbit, Time Gate, Hungry Horace, good condition, £150. Tel: 0206 240426.

SPECTRUM 80K with boxes — Fuller keyboard + tape recorder + approx 50 games including Hobbit, Penetrator, Time Gate + amplifier + five books and magazines, £240. Tel: Uxbridge 53521.

Tandys for sale

TANDY TRS 80 16K extended basic colour computer + books, leads, cover etc, cost over £300, sell for £225. Tel: Sheffield 454739.

TANDY TRS 80 LEVEL I, 16K with software, light pen and manuals, any reasonable offer. Tel: 01-692 8095.

TRS 80 LEVEL 2, 16K green monitor + numerous tapes and books, £160 ono. Tel: Leamington Spa 26506.

TRS 80 MODEL 3, 48K, two drive model with internal monitor with 20 discs and much software and magazines, cost £1,700 in November 1982, sell for £975 ono. Tel: 01-572 2917. Ask for Bill (upgrading).

For sale

TO SELL OR SWAP. Planet of Death, Planetoids, Set Pac, Tranz Am, Cookie, Jumping Jack, Ah Diddums, Schizoids, Football Manager, Horace Goes Skiing, 3D Tunnel and loads of magazines. Write to: 13 Ward Avenue, Cleveleys, Lancs FY5 1BL (private sale).

SWAP YOUR USED SOFTWARE. Tel: Merstham (07374) 2824.

JUPITER ACE 3K, with all leads and manual, demonstration tape and software, £55. Tel: Watford 30218.

SPECTRUM GAMES, £3 EACH: Time Gate (48K), Meteorstorm (16K), Spectral Invaders (16K), Orbitor (16K), Arcadia (16K), Scramble (16K). Tel: 06076 60927 (after 4 pm) (private sale).

Wanted

WANTED. Hardback carrying case for the Vic20 where the computer can be worked without removing from case. Tel: 061-7738426.

SWAP five volumes of *Knack* magazine for Vic20 motherboard or any other add-on extra. Tel: 061-7738426.

WANTED. Single 100K disc drive for BBC, must be in good condition. Tel: Hull 849517.

WANTED. BBC compatible printer and disc drive, will pay £100 for each item. Tel: Harpenden 69152.

CB plus Ariel plus Microphone plus SWR metre plus power pack, swap for 16K Spectrum. Tel: Nottingham 875117.

WANTED. Zoom (cassette by Imagine Software), swap for KNOT in 30, Terrordaktil 40. Tel: Adam, Chesham 785285.

WANTED. BBC Model A, will pay £200. Tel: 0278 732355.

OWL TECHNICAL SERVICES Ltd.

C15 HOME COMPUTER CASSETTES

EACH CASSETTE COMPLETE WITH SIDE LABELS, INDEX CARD AND LIBRARY BOX

10 Cassettes.....£4.80 (P+P £0.95)

50 Cassettes.....£23.30 (P+P £2.00)

100 Cassettes...£48.00 (P+P FREE)

Cheque / P.O. Payable to OWL TECHNICAL SERVICES Ltd.

PROGRAMME DUPLICATION SERVICE ALSO AVAILABLE
Trade enquiries welcome

TEL: 01-223 7347

121 Northcote Road, London SW11

ISL



INCENTIVE SOFTWARE LTD — 54 LONDON STREET
READING RG1 4SQ — (0734) 591678

LOOK WHAT'S TURNED UP!

SPLAT an original 48K ZX Spectrum challenge by the author of *Mined-out*. Objectives: Exploration, survival and eating grass!!

Zippy, Plums, Rivers, A massive 21K play area, 7 levels to explore. User defined controls, also Kempston & AGF joystick compatible, £500 High Score Competition. **SPLAT** evolution by Ian Andrew and Ian Morgan.

Price: £5.50 — post free

Also available from all good computer shops
Dealer enquiries welcomed



for LYNX, DRAGON, SPECTRUM
and ZX81 Software

SULTAN'S MAZE by Christopher Hunt. Enter the 3D Maze in search of the Sultan's jewels, but beware, your strength may run out, or, you may come face to face with the Mad Guardian. A multi-difficulty game with fantastic graphics and sound. Price (LYNX & DRAGON) £7.95.

MONSTER MINE by W. E. MacGowan. Escape from the mine with as much money as you can, but don't get closed in or caught by the prowling monsters. An addictive machine code game, with superb graphics and save facility. Price (LYNX & DRAGON) £7.95. Price (SPECTRUM & ZX81) £4.95.

GOLF by Pete Allen. An excellent Basic program, giving you an 18-hole course, with handicaps and choice of clubs. A golfing weakness must be specified. Amazing graphics and sound!! Price (LYNX & DRAGON) £7.95.

CHATEAU by Pete Allen. A new type adventure, in which you must wander the Count's old mansion in search of treasure! Of course, when the Count hid his treasure, then died, he left lots of unpleasant surprises for those brave enough to try and seek out his riches!! Come face to face with Ghouls and Ghosts, Vampires and Trolls; do you run or fight? Will the mysterious Travel Agent suddenly appear and whisk you away to far off places? Where can you find the key or the lamp? Is the clock booby-trapped? Will you die a cold and lonely death, or will you win through to claim the fantastic treasures of The Chateau? Price (DRAGON) £7.95.

GAMES PACK III by Christopher Hunt.

REVERSI. Pit your wits against the Lynx with this easy to learn, yet extremely demanding board game. Five skill levels, from novice to grand master.

SNAKE. Guide the snake to the food, but watch out, he will grow and must not eat the wall or himself.

PONTOON. An excellent implementation of a favourite card game in full colour with sound. Lynx is a mean Banker. Price (LYNX) £7.95.

GEMPACK IV by W. E. MacGowan. Two great machine code games, with full colour graphics. In **Sea Harrier** you must land your plane on the aircraft carrier, after dispersing the clouds with chemical bombs, but don't hit the ship! In **Sub Chase** you must depth charge the wolf pack without being sunk. Both with four levels of play from easy to kamikaze! Price (LYNX & DRAGON) £7.95.

GEM SOFTWARE

UNIT D, THE MALTINGS, SAWBRIDGEWORTH, HERTS

Telephone: (0279) 723567

TRADE ENQUIRIES WELCOME - PLEASE RING FOR DEALER PACK

TOWN NATHAN

Dragon Byte

Home Computers
Software and Games

51a Queen Street
Morley
Leeds

Tel: 0532 522690

ZX SPECTRUM
now under £100

Ring for more information

Last Chance

10 Ash Road
Headingley
Leeds 6
Tel: 744235

Home computers, software
board games, role-playing
games and books

At Last's place we make
you offers you can't refuse...

We're worth a visit because:

- ★ We've probably the best range of software in the North — and we're improving all the time.
- ★ We've a growing range of computers, peripherals, upgrades and books.
- ★ We've the biggest range of Citadel figures for leagues around.
- ★ We've board and adventure games for all ages from TSR, Games Workshop, Avalon Hill, Victory Games, GDW, Yaquinto, etc, etc.

**PROGRAMMERS — Assassin Software needs
your marketable programs. Give us a call**



ROSE SOFTWARE

EDUCATIONAL SOFTWARE FOR THE
16K or 48K SPECTRUM

1. "O" Level Maths Revision — GEOMETRY — 6 programs
2. INTERMEDIATE MATHS 2 — Areas, Perimeters, Simple Equations, Percentages, Sets, Venn Diagrams
3. YOUNG LEARNERS 1 — Abacus, Telling the Time, Shopping, Snakes
4. QUAZER — 4 quizzes plus maze, a challenge for any teenager

We have a large selection of educational programs for the Spectrum. Cassettes £5.95 each (inc. p&p), or send sae for catalogue to:

ROSE SOFTWARE

148 Widney Lane, Solihull, West Midlands B91 3LH

(ZX81 programs also in stock)

ATTENTION

ATTENTION

ATARI 400/800 OWNERS MIDLAND GAMES LIBRARY

Do you want to join a long established library?
Are you looking for a fast efficient and friendly service?
Would you like to select from well over 400 cassettes, cartridges, discs and utilities?
Would you appreciate approximately 25 new additions per month?
Are you interested in interactive club schemes?
Before writing to the rest, try the BEST.

ALSO, SPECIAL INTRODUCTORY OFFER

Various permutations where two games may be hired at once.
Send large SAE for details.

M.G.L.

48 Read Way, Bishops Cleeve, Cheltenham
(0242-67) 4960 6 pm—9 pm

All our games are originals with full documentation

NEW

Another winner from CDS!

SPECTRUM

POOL

THE LATEST GAME IN A GREAT RANGE OF
SPECTRUM AND ORIC SOFTWARE INCLUDING
REVERSI · LEAPFROG · BOZY BOA · GOBBLE A
GHOST · CATERPILLAR · 3-D PAINTER
(U.K. Rec. Price £5.95 each)

Available from W. H. Smith,
Boots, John Menzies and
other leading computer stores



CDS Micro Systems

P.O. Box 93, Doncaster, South Yorks DN4 5LX

TRADE ENQUIRIES WELCOME

SEE US ON
STAND F201
HALL A UPPER LEVEL
PERSONAL
COMPUTER
WORLD SHOW

NEW RELEASES

HALF THE SIZE

Apart from finding different subjects for books, publishing houses seem also to be producing different sizes of book to distinguish theirs from all the others and keep prices down.

As part of its Q+A series Newnes technical books has issued *Basic Programming* by Peter Lafferty.

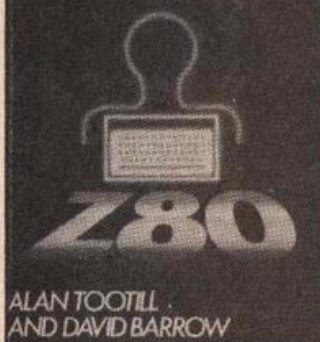
Without criticising the actual content the book has two things to distinguish it, the fact that it is about half the usual size of a book, and its format.

The latter is interesting — a general introduction to Basic is given in the form of Questions and Answers. Eg, What is a loop? What are User defined characters? This should make it easier for people to get a specific point answered without searching through a mass of text.

Book *Basic Programming*
Price £2.50
Micro General
Publisher Newnes Technical Books
Borough Green
Sevenoaks
Kent TN15 8PH

MACHINE CODE

Z80 MACHINE CODE FOR HUMANS



If you look at *Popular Computing Weekly's* book charts (and I'm sure you do) you will have noticed that it's actually the more technical computer books that are selling well — everyone, it seems, wants to learn machine code.

The problem is, of course, that machine code is not easy and, particularly to begin with,

most people find the going pretty tough.

With *Z80 Machine Code for Humans* Granada is trying to simplify the task without being machine specific. The book is designed for the novice — it gradually builds up machine code skills by using short routines.

Book *Z80 Machine Code for Humans*
Price £7.95
Micro General (Z80 processor)
Publisher Granada Publishing
PO Box 9
Frogmore
St Albans
Herts AL2 2NF

INSOMNIAC

Ian Sinclair's output is astonishing; every week we seem to get another book — does the man ever sleep?

The latest addition is *Inside Your Computer* which is designed to introduce novices to the bits and pieces 'under the bonnet' of their machine.

Chapters discuss The Basic Interpreter, Inputs and Outputs and the Microprocessor.

One useful section illustrates the correct way to add additional chips to your computer (a 48K upgrade on your Spectrum, for example) which can be surprisingly difficult, and infuriating if you get it wrong.

Book *Inside Your Computer*
Price £4.95
Micro General
Publisher Granada Publishing
PO Box 9
Frogmore
St Albans
Herts AL2 2NF

NOVICE

The Epson HX-20 tends to be forgotten amongst all the Spectrums, Dragons and BBCs of this world, but it has sold well.

Getting Started with the Epson HX20 is actually one of only a few books on the machine.

As the title suggests it is intended for the absolute novice. The various terms of Basic are introduced and illustrated — in view of the fact that the Epson was first sold as a portable business machine, it is perhaps not surprising that

the examples and programs are geared towards serious uses rather than games.

Book *Getting Started with the Epson HX20*
Price £5.95
Micro Epson HX20
Publisher Phoenix Publishing
14 Vernon Road
Bushey
Herts WD2 2JL

ADVENTURES



The first of what is likely to be a veritable surge of books on Adventure games has been issued by ... well, by us actually.

Tony Bridge, grand inquisitor and elf most high of our adventure department, has written a book called *Spectrum Adventures*.

The first section of the book examines the history of adventures and discusses the themes common to all of them. Subsequent sections take you through the development of your own graphic adventure, constructing mazes, creating monsters, and so on.

I should add that the 48K program contained within the book was programmed by Roy Carnell.

Book *Spectrum Adventures*
Price £5.95
Micro Spectrum (Adventure needs 48K)
Publisher Sunshine Books
12-13 Little Newport Street
London WC2R 3LD

EXPENSIVE

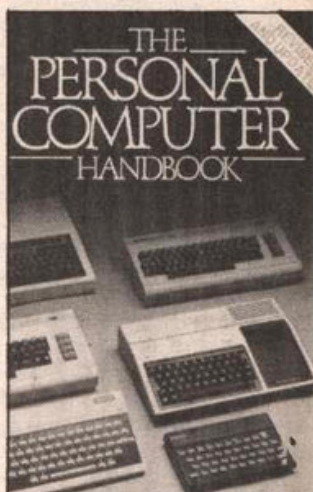
Whatever else American-produced computer books are, they are expensive — £15.95 for 214 pages and only black and white diagrams is quite a price.

Pascal programs for games and graphics consists of 22 programs designed for the Apple with UCSD Pascal.

The author Tom Swan has written a number of books specialising in Pascal and in this book his intention is to teach the language through the games — perhaps if you have a 64K Apple and twin disk drives (which is more or less the minimum requirement) you may not find nearly £16 for a book so hard to bear.

Book *Pascal Programs for Games and Graphics*
Price £15.95
Micro Apple 64K + Disc + Pascal
Publisher John Wiley & Sons
Shipney
Bognor Regis
West Sussex PO22 9SA

INTRODUCTION



The Personal Computer Handbook is designed both to be a general introduction to the subject of what a computer is and also a practical buyers' guide to what's on the market and how they compare.

If that weren't a large enough subject, it ends with some programs and various lists of computer clubs and other books.

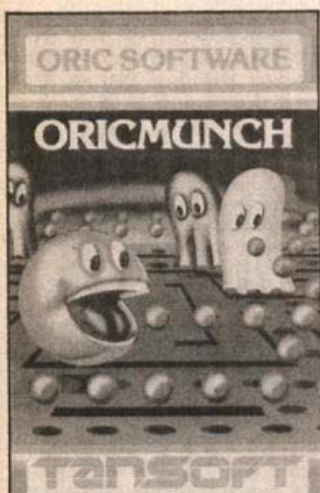
Obviously, it's not possible to go into very much depth — the machine reviews are two pages each — and there are some surprising omissions and more inevitably errors of fact.

Perhaps the disparate elements look a bit cobbled together, but it's cheap and potential buyers may find it useful.

Book *The Personal Computer Handbook*
Price £3.95
Micro General
Publisher Virgin Books
61/62 Portobello Road
London W11 3DD

NEW RELEASES

MONSTERS



Believe it or not there was no version of *Puckman* for the Oric — until now.

Oricmunch appears to offer all the features of the original arcade game, including the prizes for good scores like cherries and lemonade.

Although usually you have a fighting chance against the monsters, should you eat two of them they double in speed. The game is the first of an intended series of arcade games to be released by Tansoft over the next few months.

Program *Oricmunch*
Price £7.95

Micro Supplier Oric 16/48K
Tansoft
3 Club Mews
Ely
Cambs CB7 4NW

SADISTIC

Brilliant software is a company specialising in adventure games. *Way Out West* is for the Dragon 32.

Your task is to make your fortune in a gold mine, armed only with your trusty 32 and an enigmatic clue "Having a sadistic nature helps".

The game is said to be highly complex and so a Save instruction is included.

Program *Way Out West*
Price £6.95
Micro Dragon 32
Supplier Brilliant Software
10 Newlands Drive
Gedling
Nottingham NG4 3HU

KEYWORDS

A whole range of additional Keywords to Spectrum Basic are made available by *Beta Basic* from Betasoft.

The program includes 26 new Keywords and 10 new Functions. The Keywords include *Alter*, for extensive manipulation of the attributes

file, *Dpoke* for a double *Poke*, *Rnum* to renumber the program, etc.

The Functions allow for decimal/hex conversion and number formatting.

All Keywords are simple entry, with full syntax check on entry. The program, which also provides for a Trace facility, comes complete with an extensive manual.

Program *Beta Basic*
Price £11.00
Micro Spectrum 48K
Supplier Betasoft
92 Oxford Road
Moseley
Birmingham B13 9SO

VICIOUS

The first part of a "multi-player fantasy adventure game" is called *Usurper* and is for the 48K Spectrum.

The game is for up to 10 players who compete (viciously) against one another until one becomes strong enough to tackle the King.

As each player spins out their Machiavellian plots, instructing the computer where to move, who to kill, fate may intercede in the dread form of Vampires, ghouls and other beasts.

Program *Usurper*
Price £6.00
Micro Spectrum 48K
Supplier Assassin Software
10 Ash Road
Leeds LS6 3JF

LILY LIVERED

If the gory cover and the warning "Parental guidance recommended for children under 16 years" are anything to go by, *Hells Temple* (excuse the pun) is one hell of a program.

The game claims to have over 70 monsters, the setting is *Hells Temple* where "only courage, sorcery and a strong sword arm rules" (can you imagine an adventure game where lily liveredness, running away and quaking with fear hold sway?).

Within *Hells Temple* are various riches as well as the aforesaid monsters — at each stage your computer gives you a 3D view of the Temples catacombs. The producers of the game have incorporated a nice idea — they have set up a club for *Hells Temple* enthu-

siasts to correspond together, swap notes, etc.

Program *Hells Temple*
Price £12
Micro Oric 1 48K
Supplier Kenema Associates
1 Marlborough Drive
Worle
Avon SB22 0DQ

GNASHERS



Richard Shepard Software has produced games which have consistently been in the top ten Spectrum charts.

The latest program is described as a "3D graphic adventure" and is entitled *Devils of the Deep*. You must explore the lost city of Atlantis, locate its treasure and bring it back to your boat.

The games boasts 100 screens, each depicting a different section of sea bed. The monsters of the title are giant electric eels whose one weak spot is their gnashing jaws.

Around the ocean bed are various objects including a harpoon gun, harpoons, spade and a knife. Sophisticated game players may have to face giant crabs.

Program *Devils of the Deep*
Price £6.50
Micro Spectrum 48K
Supplier Richard Shepard
Elm House
23-25 Elmshott Lane
Cippenham
Slough
Berks

New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

LOSERS meets the
ABOMINABLE
SNOWMAN



Ziggurat



Study studies

My comments a few issues ago, about the "child", and 'A' levels, prompted one particularly interesting response.

The reader, about to choose his 'A' levels, commented: "Your saying that Computer Science 'A' level has no real use has only made me more confused about a confusing subject — the types of jobs in computing and the qualifications required for each."

My correspondent asked if I would discuss what jobs, opportunities and qualifications exist in computing, as he would like to work with computers. He is starting 'A' levels this September.

Incidentally, the academic renegade saw my piece, recognised himself, and still disagreed.

Many of the jobs I might have wanted as a youth no longer exist. When I was "deciding" (or having decided for me) my 'O' level subjects, there were no more than 200 computers in Britain, and I had not heard of any of them.

Within two years, in personal computing, we have seen the rise of the software house whose output is basically games. We have recently seen the promise (if "promise" be the correct word) of cable software, and software over the telephone. The opportunities are changing all the time.

My 'O' levels fitted me perfectly for the computer age, even though the "computer age" was not to come for several years. The reason they fitted so well was the range of subjects I had to take.

We all had to take Mathematics, one foreign language, English Language, and English Literature. Those four subjects should be the basis of any selection of 'O' level subjects. I then took two science subjects, and two arts subjects.

These 'O' levels enabled me to pick and choose from any subject at 'A' level, not based on some silly idea that I was either a "science" or an "arts" person, because of my 'O' levels. It also meant that I was not already funnelled into some career at an incredibly early age.

Given the syllabus of most of the Computer Science 'O' level courses I have examined, the value of the subject as a preparation for 'A' levels in general seems almost nil. The academic content of Computer Science 'O' levels appears far too low.

What is usefully learnt with 'O' level Computer Science that cannot be learnt from playing with computers, and reading magazines?

A very similar attitude should influence your choice of 'A' levels. At 'A' level you have a chance to study fewer subjects in greater detail. How you study, and what you study, are influenced by how you see education.

If you see education merely as a means to an end, the end being a job, then I think that is being short-sighted. The Government's "training" initiatives are of this nature, youngsters — who do not know better — foregoing education to be trained in "vocations" which might not last beyond a few years.

Education should be about helping people to learn to be adaptable, to learn to think, and learning a basis of knowledge which will help, whatever the future might bring.

Essentially, choose the subjects at 'A' level which interest you, as long as the subject has a strong academic (usually non-vocational) content. If you are interested in languages, take languages at 'A' level; if you are interested in the humanities, take humanities 'A' levels; or, if, as I was, you are interested in maths and the sciences, take those 'A' levels.

Computer Science 'A' level is basically a non-academic, vocational subject, and is not a preparation for computing. Indeed, it is not accepted on many computer science degrees.

There again, computer science degrees are no easy way into computing either.

If you are interested in computing, then compute. Write programs, and try to sell them; try to extend your knowledge by reading widely; and try to see if you can use a computer to do new things, other than zap.

In computing, and related areas, you are judged by what you know and what you can do — not by your qualifications.

Boris Allan

Puzzle

Eight divided by four

Puzzle No 74

"What's eight divided by four?"

This unexpected question from my daughter came as a bit of a surprise. "Two of course!" I replied and then instantly realised this was no ordinary question. "No!" she exclaimed "eight divided by four is three."

And so it was, as she was able to demonstrate. By writing down the division sum in words it was possible by substituting digits for the letters to make the sum correct:

$$\begin{array}{r} \text{EIGHT} \\ \text{FOUR} \end{array} = 3$$

Each of the letters represents a different digit, but no zero is used. Also 'eight' and 'four' are (of course) both even numbers.

Solution to Puzzle No 69

There is one slight catch in the problem. By convention, 0! is equal to 1, not zero as might be supposed.

Consequently, line 210 of the program treats any zero as though it were a 1 (thus having a factorial value of 1).

One program which gives the right answer is:
10 LET N = 1 20 LET NS = STR\$ N 30 LET T = 0 40 FOR A = 1 TO LEN NS 50 LET M = VAL (NS(A)) 60 GOSUB 200 70 IF T > N THEN GOTO 100 80 NEXT A 90 IF T = N THEN PRINT N 100 LET N = N + 1 110 GOTO 20 200 LET Q = 1 210 IF M = 0 THEN LET M = 1 220 FOR P = 1 TO M 230 LET Q = Q * P 240 NEXT P 250 LET T = T + Q 260 RETURN

This program produces the only other number, apart from 1, 2, and 145, which is the sum of the factorials of its digits. This number is: 40,585.

Winner of Puzzle No 69

The winner is: Francisco Santos, Rua Bartolomeu Dias, 2900 Setubal, Portugal, who receives £10.

Top 10

- Atari**
- (1) Miner 2049er (Big Five)*
 - (2) Diamonds (English)
 - (4) The Curse of Crowley Manor (Adventure International)
 - (5) Paris in Danger (Avalon Hill)*
 - (6) Golden Baton (Channel 8)
 - (7) Astro Chase (First Star)*
 - (10) Zaxxon (DataSoft)
 - (8) Jumpman Junior (Epyx)*
 - (9) Mountain King (CBS)*
 - (10) The Blade of Blackpool (Sirius)
- *Cartridge. †32K cassette. ‡48K disc. §32K disc.
- (Figures compiled by Calisto Computers, Birmingham 021-632 6458)

Top 10

- BBC***
- (1) Hunchback (Superior)
 - (3) Danger UXB (Program Power)
 - (1) Felix in the Factory (Program Power)
 - (6) Starship Command (Acornsoft)
 - (7) Centipede (Superior)
 - (8) Snooker (Acornsoft)
 - (9) Frogger (A + F)
 - (5) Great Britain Limited (Simon W Hessel)
 - (10) Alien Swirl (Program Power)
 - (10) Chess (Computer Concepts)
- *All model B.
- (Figures compiled by Micro Management, Ipswich 0473 59181)

Top 10

- ZX81***
- (1) Chess (Psion)
 - (2) Space Raiders (Psion)
 - (4) Flight Simulation (Psion)
 - (6) Football Manager (Addictive Games)
 - (5) Fantasy Games (Psion)
 - (8) QS Scramble (Quicksilver)
 - (9) Asteroids (Quicksilver)
 - (3) Espionage Island (Artic)
 - (9) Defender (Quicksilver)
 - (10) Ship of Doom (Artic)
- *All run in 16K.
- (Figures compiled by Boots & Co, London)

Top 10

- Dragon**
- (1) The King (Microdeal)
 - (2) Frogger (Microdeal)
 - (3) Talking Android Attack (Microdeal)
 - (6) Space War (Microdeal)
 - (4) Night Flight (Salamander)
 - (8) Ring of Dark (Wintersoft)
 - (10) Planet Invasion (Microdeal)
 - (8) Quest (Dragon Data)
 - (7) Morocco Grand Prix (Microdeal)
 - (9) Dragon Trek (Wintersoft)
- (Figures compiled by Boots & Co, London)

Spectrum

- (1) Tranz Am (Ultimate)
 - (8) The Hobbit (Melbourne House)*
 - (1) Jet Pac (Ultimate)
 - (2) Scrabble (Psion)*
 - (3) Flight Simulation (Psion)*
 - (6) Horace Goes Skiing (Psion/Melbourne House)
 - (7) 3D Tanx (DK Tronics)*
 - (4) Horace and the Spiders (Psion/Melbourne House)
 - (9) Ah Diddums (Imagine)
 - (10) Test Match (Computer Rentals)*
- *Requires 48K.
- (Figures compiled by W H Smith and Sons, London)

Books

- (4) Structured Programming with BBC Basic, Atherton
 - (1) Commodore 64 Programmer's Reference Guide, Commodore
 - (4) Assembly Language Programming for BBC Micro, Birnbaum
 - (1) Complete Spectrum Rom Disassembly, Logan and O'Hara
 - (1) Programming the 6502, Zaks
 - (2) Basic Programming on the BBC Micro, Cryer
 - (2) Commodore 64 Machine-code Master, Lawrence and England
 - (10) Anatomy of the Dragon, James
 - (5) Complete Forth, Winfield
 - (8) Spectrum Hardware Manual, Dickens
- (Figures compiled by Watford Technical Books, Watford 0923 23324)
- (Last week's position in brackets)

Vic20

- (1) Aracadia (Imagine)
 - (3) Wacky Waiters (Imagine)
 - (2) Sky Hawk (Quicksilver)
 - (8) Cosmiads (Bug-Byte)
 - (9) Catcha Snatcha (Imagine)
 - (4) Cosmic Crunch (Commodore)
 - (5) Grid Runner (Llamasoft)
 - (7) Sargon II Chess (Commodore)
 - (10) Frantic (Imagine)
 - (6) Panic (Bug-Byte)
- *Cartridge.
- (Figures compiled by Boots & Co, London)

DRAFT SCRIPT FOR TELEVISION ADVERTISEMENT FOR AUTOMATA.

Ripov, Forkqueu and Buxket.
BY SAATCHI AND SAATCHI

Dorothy's Woolshop

Scene is a high-tech ultra-smooth office and showroom. Enter camera-left Glenda two dicks dressed as the Piman and Groucho Marx. Jackson, Norman Tebbit, Archbishop of

Canterbury and Barry Manilow, all laughing.

Happily, they play Automata games together.

Camera pans across serried ranks of pulsing monitors, potted palms, erotic dancers, the choir of Westminster Cathedral and members of the Royal Family. Music swells to a

DELETE

great throb, illegal subliminal words pulse on screen, reading: "SEND AUTOMATA ALL YOUR MONEY NOW, OR YOU WILL CONTRACT HERPES...."

VOICE OVER "Hurry! Hurry! Hurry! to the AUTOMATA JANUARY SALE. Just fill in the coupon! AUTOMATA... we put some Ting in computing!" (yawn).

HOW DO WE GET A COUPON IN A TV ADVERT, PIMAN.....? errr, gee boss, I never thought of th-that.....

LURCH! GEDDIM!!!!!!Hmmm, does this mean we have to advertise on the back page of Popular Computing Weakly yet again. Lurch! GEDDIM AGAIN!!!!!!!!!!!!!!



HERE IS A
PIC. OF CLAIR
THE SINCLIVE
AND PIMEN
to fill up the
space.



January Sale Coupon

DEAR PIMAN, WOW! I MEAN HOW CAN I RESIST YOUR ADVERTISING. PLEASE SEND ME THE FOLLOWING...

TITLE	COMPUTER	NORMAL PRICE	SALE PRICE
GO TO JAIL. (Spectrum48K)		£6	£5
PIMANIA... (Spectrum48K)		£10	£9
PIMANIA..... (Dragon32)		£10	£9
PIMANIA... (BBC Model B.)		£10	£9
PIMANIA (ZX81 16K)		£5	£4

I enclose the right money, TOTAL.....

or please charge my ACCESS CARD / EUROCARD / MASTER CARD
CARD NUMBER

my signature.....

my name.....

my address.....

POST CODE.....
send to AUTOMATA U.K. LTD, 27 HIGHLAND ROAD,
PORTSMOUTH, HANTS., PO4 9DA, ENGLAND.....
Valid until October 31st 1983. No Piman pounds
accepted with this coupon. Original coupons
only will be valid. Pimgongdiddewidddedonshh

GO TO JAIL: "The game has to be seen to be appreciated. The Spectrum outsmarted me." (PCN)

GO TO JAIL: "Smooth continuous display. Allows you to personalise the program." (YC)

GO TO JAIL: "This excellent simulation of the famous board game is unique! There are other versions, but this is real fun. A triumph of the programmer's art. Full marks. Another superb game from Automata." (PCWorld)

PIMANIA: "The best evidence that computer gaming has come of age. The complete entertainments package. An adventure enthusiast's dream." (C&VG)

PIMANIA: "A real treasure, dripping with gold and diamonds!" (PCN)

PIMANIA: "I have been reduced to a gibbering Pimaniac by a crazy cartoon character called the PiMan, and the free hit single by Clair Sinclive." (Interface)

PIMANIA: "THE BEST ADVENTURE GAME WE HAVE EVER REVIEWED." (SINCLAIR USER)

PIMANIA: "At last...the alternative to death and destruction games." (Which Micro)

PIMANIA: "Should carry a Government Health Warning - this game can damage your brain! Try it. You'll love it." (PCWorld)

PIMANIA: "A real life treasure hunt meets Monty Python. Well worth seeking out." (PCWeekly)

PIMANIA: "An all time Classic! Automata should be congratulated for their fantasies." (DB)

