

POPULAR Computing WEEKLY

35p 8-14 December 1983 Vol 2 No 49

This Week

Street Life

David Kelly talks to Bob Simpson of Program Power. See page 15.

Breakout

Les Allan presents his own version of the classic arcade game on page 31.

Fireworks

John Scriven and Patrick Hall demonstrate a program that explains the four rules of arithmetic. See page 24.

New Releases

All the latest software including *Ultima Zone* from Tansoft, *Choplifter* from Audiogenic and *The Warlock of Firetop Mountain* from Penguin Books. Page 68.

★ STAR
Diver on Spectrum.
See page 10
GAME ★

News Desk

New ITV venture to rival BBC?

ITV will decide at the start of next week whether or not it will go ahead to launch its own ITV micro, a rival for the BBC computer.

The Independent Television Companies Association (ITCA) will meet on Monday, December 12, to decide if it will adopt a machine designed by London-based Transam Computers as its own.

Transam's proposal for the ITV micro is expected to be a Z80-based CP/M machine with 64K Ram, Centronics and RS232 interfaces and built-in disc interface, selling for the same price as the BBC's computer: £399.

The independent television companies are known to have been interested in the idea of an ITV micro for some time — particularly for use in a range of new micro-computing programs they are developing, and in conjunction with ITV's teletext system, Oracle.

A number of ITV companies have expressed concern

at the plan. The problem is that the proposed computer represents a new departure for independent television, involving endorsement of a commercial product and a possible conflict of interest with advertisers.

Whether or not ITV decide to go ahead with the plan, Transam still intends to launch the machine. The computer was already under develop-

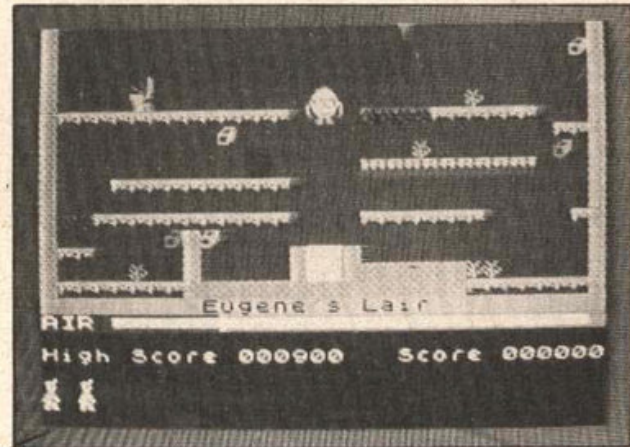
Continued on page 5

Bug-Byte loses claim to fame

A SPLIT at Bug-Byte means that the company will lose its claim to the top-selling Spectrum game *Manic Miner*.

Former Bug-Byte employee, Alan Maton, left the company in August to set-up a new software house Software Projects. *Manic Miner* author, Matthew Smith, who has a share in the new company, has revoked Bug-Byte's licence to produce the game, giving it instead to Software Projects.

Continued on page 5



Classified

Computer Swap
01-437 4343

Free readers entries to buy or sell a computer.
Ring 01-437 4343 and give us the details.

AQUARIUS
SEE PAGE 55

VALHALLA

Classified

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

PHILIPS TV GAME/COMPUTER, five cartridges, Pac-Man, Space Invaders, Air-Sea Battle, Videopacs 1+2, 18 months old, £75, or swap for Sinclair printer + software. Tel: Hesketh Bank (077 473) 4952, ask for Mike.

PRINZ TRONIC VC6000 colour TV, games machine + over £200 worth of cartridges, hardly used, in immaculate condition, bargain £100 ono. Tel: Mold (0352) 59884 after 6 pm or weekends.

Classified

Classified

TI994A, Space Invader module, Programme Book, 20 games tapes, nine months old, hardly used, £80 ono. Tel: 0273-731869. Will swap for Spectrum.

MATTEL INTELLIVISION UNIT + 13 cartridge, £170 ono. Brighton 699708.

MYRIAD by Rabbit Software. Excellent condition for Vic20 plus 3K expansion. Sell for £4. Tel: 0602 634293.

HEWLETT PACKARD HP41CV pocket computer + games pack worth £200. Sell for £120. Contact Nick 01-272 7205.

Continued on page 61

BRITAIN'S BEST-SELLING MICRO WEEKLY

COMMODORE

BOOKS BY MELBOURNE HOUSE

Here are four great books from Melbourne House to put you in total control of your Commodore 64 and VIC 20. Each is clearly written with step by step instructions, and fully illustrated. Now you can explore the full potential of your Commodore micro with exciting programs, brilliant new games and innovative programming techniques.

VIC 20 Exposed

First time computer owners or experienced programmers — get more out of your VIC 20. Understand all the facilities of your micro and get the maximum potential out of your programs: "VIC 20 Exposed" lets you understand exactly how this versatile home computer works, from BASIC right through to machine language — all in simple, straightforward language.

VIC Innovative Computing

Packed with exciting arcade, strategy and adventure games — these 30 easy to enter programs open a whole new dimension in computer game excitement. "If you were to ask me which books I would buy, I would take VIC Innovative Computing" — Practical Computing
"Good value for money with some fascinating type-it-yourself games. Even those with little experience of programming their VIC 20 should be able to make full use of these listings" — Educational Computing



Commodore 64 Games Book

Teach your Commodore 64 every trick in the book. 30 programs ranging from nerve shattering space games such as Galaxy Raid and Earth Defence, to real life adventures including Sea Harrier and Flight Simulator. You can enter them all yourself by simply following the easy to enter listings.

"For a Commodore 64 games enthusiast this book is a must" — Personal Computer News

Commodore 64 Exposed

The definitive book for the Commodore owner. A complete and comprehensive guide, that clearly explains every function of your Commodore 64, from BASIC to machine language. This book goes far beyond the data provided in the Commodore user's guide. Includes full details on advanced programming, graphics and sound, plus simple demonstration programs that can be entered in minutes.



Melbourne House Publishers

Books

<input type="checkbox"/> Commodore 64 Exposed	£6.95
<input type="checkbox"/> Commodore 64 Games Book	£5.95
<input type="checkbox"/> VIC Innovative Computing New Low Price	£5.95
<input type="checkbox"/> VIC 20 Exposed	£6.95

Cassettes from the Books

<input type="checkbox"/> Commodore 64 Super Cassette A	£6.95
<input type="checkbox"/> Commodore 64 Super Cassette B	£6.95
<input type="checkbox"/> VIC Innovative No. 1 New Low Price	£4.95
<input type="checkbox"/> VIC Innovative No. 2 New Low Price	£4.95
<input type="checkbox"/> VIC Innovative No. 3 New Low Price	£4.95

Game Software

<input type="checkbox"/> Commodore 64 The Hobbit	£14.95
<input type="checkbox"/> Commodore 64 Hungry Horace	£5.95
<input type="checkbox"/> Commodore 64 Horace Goes Skiing	£5.95
<input type="checkbox"/> VIC Games Pack	£5.95
<input type="checkbox"/> VIC The Wizard & The Princess	£5.95

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

Orders to:
Melbourne House
131 Trafalgar Road
Greenwich, London SE10

POP 2/12

Correspondence to:
Melbourne House
Church Yard
Tring, Hertfordshire HP23 5LU

Trade enquires welcome



All Melbourne House cassette software is unconditionally guaranteed against malfunction. Access orders can be telephoned through on 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

Software Editor

Graham Taylor

Production Editor

Lynne Constable

Editorial Secretary

Cleo Cherry

Advertisement Manager

David Lake

Advertisement Executive

Alastair Macintosh

Classified Executive

Diane Davis

Advertising Production

Lucinda Lee

Administration

Theresa Lacy

Managing Editor

Duncan Scot

Publishing Director

Jenny Ireland

Popular Computing Weekly

12-13 Little Newport Street,

London WC2R 3LD

Telephone: 01-437 4343

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

Registered at
the Post Office
as a newspaper

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

Dragon up-grade

Letters 7

Sinclair Microdrive

Star Game 10

Diver on Spectrum

Street Life 15

David Kelly talks to Bob Simpson



Reviews 16

Brian Cadge looks at Dragon software

Programming 18

Machine code routines on ZX81

Spectrum 20

Machine code by Trevor Toms

BBC and Education 24

Firework by John Scriven and Patrick Hall

Commodore 64 31

Breakout by Les Allan

Dragon 41

Abbreviated statements

Open Forum 45

Five pages of your programs

Adventure 57

Tony Bridge's Corner

Peek and Poke 59

Your questions answered

New Releases 68

Latest software programs

This Week 70

Top 10 plus all this week's software

Competitions 71

Ziggurat, Puzzle, Losers

Editorial

The runaway success of Coleco's Cabbage Patch Kids in the US should not be too surprising. After all, it is not that long ago that a similar enthusiasm for pet rocks and invisible fish swept the United States.

What is ironic is that Coleco is better known as the manufacturer of the Adam micro. However, with the \$700 Adam plagued by production problems, it is the Cabbage Patch Kids that are bringing in the money for Coleco. The company hopes to sell nearly 3m of the plastic dolls by the end of this year for an estimated \$46m.

The popularity of the Cabbage Patch Kids appears to be founded on their individuality — no two are alike — and their human-like persona. The idea of adopting the dolls, giving them names and sending them birthday cards, is designed to make them part of the family.

With the US home computer market still in a state of turmoil, it is not inconceivable that Coleco could try the same tactics with its micros. People who are apprehensive about new technology might well feel less threatened by a computer with a personality. Marvin the paranoid android from *The Hitch-hikers Guide to the Galaxy* is a familiar and likeable character precisely because he possesses human flaws to go with "a brain the size of a planet".

Anyone want to adopt a computer?

Next Thursday

You, as the last remaining computer on Earth, must guide the last four scientists to the mothership, avoiding asteroids. Abandon Earth — next week's star game for the unexpanded Vic20 (with joystick) by Mark Manns.

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

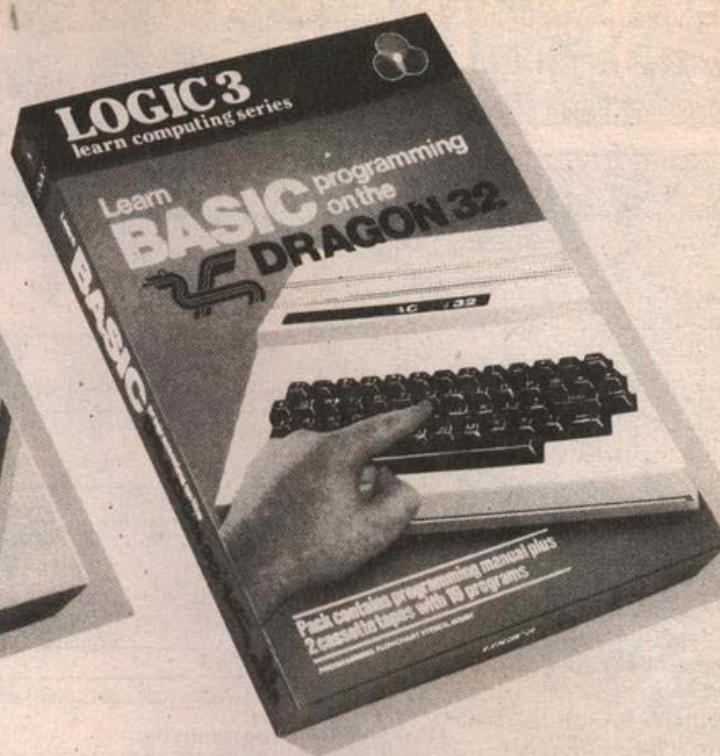
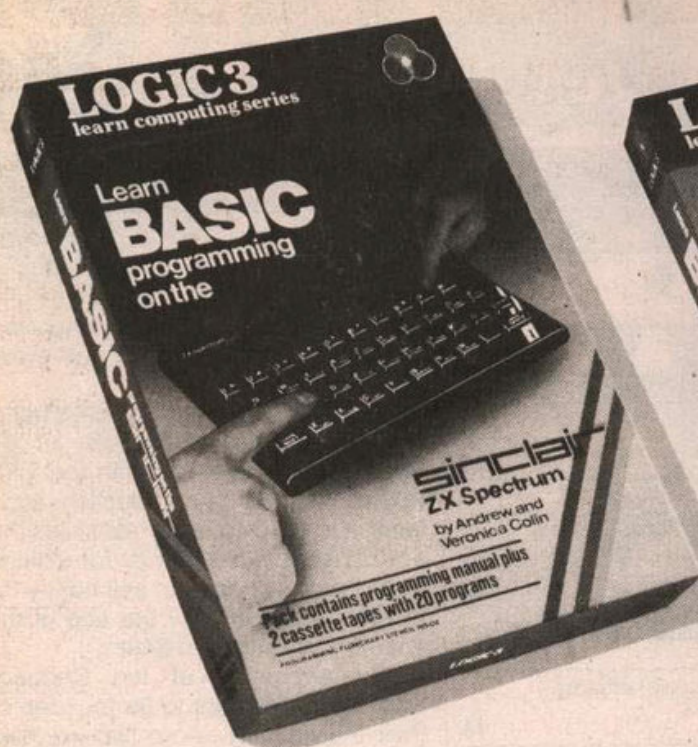
Please tick relevant box

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.



THERE'S NO PRESENT LIKE THE FUTURE.

THE WORLD'S FINEST PROGRAMMING TUTORIAL FOR ONLY £12.95.

Thousands who own, or would like to own home computers have yet to experience the feeling of discovery that comes when you write your own programs. Yet learning programming can be easy.

'Learn Basic' from Logic 3 is the ultimate development of the method first devised at Strathclyde University – a straightforward, easily understood tutorial written by Professor Andrew Colin and Veronica Colin, authors of Britain's best-selling tutorial package.

Using the method tested by university students and used successfully by over 200,000 home computer users, 'Learn Basic' runs on your own computer and explains everything in clear non-American English without jargon or computertalk. In a matter of hours, you will be writing programs that work.

Essentially, 'Learn Basic' and the rest of the 'Learn Computing' Series that will follow soon are designed for people who want to keep abreast of the computer age. For people who realise that understanding computers is the key to future success, at school, at work and as a parent.

Make your future, and your family's future, richer this Christmas.

Get 'Learn Basic' by Logic 3 – two tapes and a full-size manual for Spectrum or Dragon (others soon) at just £12.95.

At that price, it's a gift.

Buy the Logic 3 'Learn Computing' Series at computer shops and major retail stores all over Britain. In case of difficulty, write to Logic 3 in Windsor.

TO: Logic 3 Ltd, Mountbatten House, Victoria Street, Windsor SL4 1HE.

If you would like to know more about using and programming a computer in your home, send this coupon for your free copy of our 16-page explanatory booklet "100 things you wanted to know about computers."

It will help you cut through the jungle of computer jargon, and give you news about software developments – even games. ☐

Or send for our software catalogue (tick either or both). ☐

Name

Address

LOGIC 3

I have already intend to get a microcomputer
(delete as inappropriate)

— THE KEY TO THE WORLD OF TOMORROW. —

PCW 8/12

Bug-Byte

Continued from page 1

As of November 28, when the first of Software Projects versions of *Manic Miner* arrived in stores, both companies have been competing for sales of the title. This curious situation will continue until Bug-Byte, unable to manufacture any further copies of the game, runs out of its existing stock.

"We have about 50,000 cassettes which should last us over the Christmas period and into February," said Bug-Byte director Tony Milner.

Commented Matthew: "Bug-Byte are a bit peeved, but I cancelled their licence because it makes more sense for me to licence it to a publishing house in which I have my own share of ownership."

Matthew Smith's decision to switch to Software Projects has other implications for Bug-Byte.

Matthew's follow-up to *Manic Miner*, *Jet-set Willy*, for the Spectrum, will be launched this week by Software Projects, as will *Manic Miner* for the Commodore 64 machine. The company hopes to convert *Jet-set Willy* for the Commodore 64 before Christmas.

In *Jet-set Willy*, the diminutive hero, having made piles of money from digging underneath Surbiton, has joined the jet-set. He now lives in a huge 64-room mansion and frequently holds riotous parties. One night, after just one such debauched occasion, the last guest has just left and Willy prepared for bed, only to be stopped by his housekeeper Maria who insists that he must collect up all the glasses from the various rooms and return them to the kitchen.

ITV venture

Continued from page 1

ment prior to the approach to produce an ITV machine, and it is scheduled to be launched at the *Which Computer?* Show at the NEC in Birmingham in February.

● The new Transam computer is a low-cost development from its existing machine, the Tuscan. The Tuscan is a £1,700 64K C/PM business machine with a built-in twin 5¼-inch floppy disc drives.

Software projects is offering a prize to the first player of the game to correctly identify the number of champagne glasses to be collected. The winner will receive a set of six glasses and a bottle of champagne, together with "a taste of the jet-set life" — a spin around his or her locality in a Jet Ranger helicopter.

On his eighteenth birthday, in February next year, Matthew will become a director of Software Projects, owning a little less than one-third of the company. The other directors are Alan Maton and Tommy Barton, a Liverpool businessman.

So far Bug-Byte has sold 40,000 copies of *Manic Miner* earning Matthew around £10,000 in royalties.

Conversion of Matthew's games to the Commodore 64 for Software Projects is being carried out by Chris Lancaster, author of *Bewitched* published by Imagine.

Software Projects are located at The Bear Brand Complex, Allerton Road, Woolton, Liverpool L25.

First wrist computer from Seiko

JAPANESE manufacturer Seiko has announced what it claims is the world's first wrist-watch computer.

The device, which will go on sale in Japan in January, is in three parts: a wrist unit containing 2K Ram and a liquid-crystal display, a miniature keyboard not much bigger than a credit-card which communicates with the wrist unit via a remote electromagnetic link, a larger A4 paper size controller device.

The controller is used to program the computer using standard Microsoft Basic. Programs up to 2K in size can then be run using the keyboard and display units working independently of the controller unit.

Prices are Y19,000 (£55) for the wrist display, Y6,000 (£18) for the keyboard and Y29,800 (£80) for the controller.

Seiko UK hopes to sell a simplified version of the wrist-watch computer in this country in April next year.

Dragon upgraded to 64

DRAGON Data has at last announced its scheme to allow Dragon 32 owners to upgrade to a Dragon 64.

Since April, when the company first announced its intention to offer an upgrade, the cost has doubled and the way the offer will be carried out has changed.

It will now cost Dragon 32 owners £140 to end up with a Dragon 64, and the upgrade, not now in the form of a circuit-board swap, will be a straight part-exchange deal.

From mid-December, registered owners of the Dragon

32 will be able to return their machines to Dragon in Port Talbot and get an £85 discount off a brand new Dragon 64 computer.

A 64K machine is necessary in order to run the OS9 disc-operating system software now being offered by Dragon.

Although the offer is considerably more expensive than originally suggested, and comes six months later than planned, it is more than Sinclair offered ZX81 owners or Commodore gave to Vic20 purchasers.

Coleco adopts a doll

COLECO's continuing difficulties with manufacture of its much-heralded Adam computer may be eased by a controversial toy doll.

Amid reports of faulty Adam machines and serious shortages in the shops for Christmas — less than a third of the 400,000 units originally hoped for will be delivered — Coleco is struggling to cope with the runaway success of its Cabbage Patch Kids toy dolls.

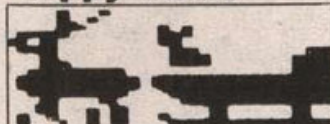
Around 2.5m of the toys will be sold this year, bringing Coleco a much-needed \$50m.

The Cabbage Patch Kids have provoked an astonishing reaction from American shoppers with fights breaking out in stores scrabbling for the few remaining toys.

In this country the hysteria has continued with Harrods reporting 200 yard queues of hopeful Cabbage Patch owners waiting to be parted with £24 a head.

The reason for their success

Happy Xmas



THE computer Christmas card has been invented.

Elm Computers are selling a range of three animated seasonal greetings on cassette for the BBC machine.

The Christmas programs are priced at £2.50 each (all three for £7), available from Elm Computers, 59 Bateman Road, East Leake, Loughborough, Leicestershire.

is two-fold. First, every Cabbage Patch is different — individually designed by computer to ensure it is unique.

Secondly, no Cabbage Patch is purchased. Every Cabbage Patch Kid delivered from the Babyland General Hospital, complete with an injection of TLC (Tender Loving Care), is waiting to be adopted. Each 'parent' completes adoption papers and names the Kid. On the Patch Kid's first birthday it will receive a card wishing it a fine day from Coleco.

Micro Shows

The BBC Micro User Show will be held at the Westminster Exhibition Centre, London SW1, from December 8 to 11. Entry is £3 and £2 and the show is open between 10 am and 6 pm on Thursday, Friday and Saturday, and between 10 am and 4 pm on Sunday.

The Young Computer Christmas Fair takes place at the Wembley Conference Centre a week later. Entry to this show is £2.50 and £1.50 and the opening hours are as follows: Thursday, December 15, 10 am to 6 pm; Friday, December 16, 10 to 8; and Saturday and Sunday, December 17 and 18, 10 to 6.

Romik Forth

ROMIK has developed a Forth language package for the Commodore 64.

The new Forth version has over 200 pre-defined command words, has a built-in editor, and is supplied with a 64-page manual. Romik Forth has been written by Brian O'Shaughnessy, is supplied in cassette form and costs £19.99.

LUNAR JETMAN - For the 48K

Sinclair ZX Spectrum

LUNAR JETMAN - The Ultimate Intergalactic G.A.S. (Graphic Arcade Simulation) Adventure Space Battle.

LUNAR JETMAN - Arcade standard, 100% machine code, incredible sound effects, amazing smooth high resolution graphics, the totally new addictive concept and all those extra features you expect from the **ULTIMATE** games people.

Design - The **ULTIMATE PLAY THE GAME** design team.

PSSST - 19/48K ZX

Spectrum



PSSST - 19/48K ZX Spectrum

These games can be available from **W.H. SMITHS, BOOTS, WHITMANS, LASKYS, SPECTRUM CENTRES**, other large department stores and all good major software retailers. Alternatively, send the coupon to **ULTIMATE PLAY THE GAME** for immediate dispatch by return, subject to availability.

£5.50 each including VAT, first class postage and packing within UK.

LUNAR JETMAN - 48K ZX

Spectrum



LUNAR JETMAN - 48K ZX Spectrum

COOKIE - 16/48K ZX

Spectrum



TRANS AM - 16/48K ZX Spectrum

ATIC ATAC - For the 48K Sinclair ZX Spectrum

ATIC ATAC - The super spooky 3D horror G.A.S. (Graphic Arcade Simulation) Adventure Game.

ATIC ATAC - Arcade standard, 100% machine code, incredible sound effects, amazing smooth high resolution graphics, the totally new addictive concept and all those extra features you expect from the **ULTIMATE** games people.

Design - The **ULTIMATE PLAY THE GAME** design team.

Dealer enquiries welcome. Phone (0530) 411485

For more information on the **ULTIMATE PLAY THE GAME** design team, please write to: **ULTIMATE PLAY THE GAME**, The Green, Ashby de la Zouch, Leics. LE65 3JU

Please tick the box(es) you are interested in:

☐ **LUNAR JETMAN** ☐ **ATIC ATAC** ☐ **JET PAC**

☐ **COOKIE** ☐ **TRANS AM** ☐ **PSSST**

☐ **JET PAC 19/48K Expanded VIC 20**

Please tick the box(es) you are interested in:

Name

Address

Postcode

ULTIMATE PLAY THE GAME is a Trade name of Ashby Computers & Graphics Ltd, The Green, Ashby de la Zouch, Leics. LE65 3JU

LETTERS

High standards

Congratulations. I must say that this is the best weekly (and second only to *Sinclair User* overall) I have ever read and boy I've read a lot. I have read just about every computer magazine at least once and a very small number come even close to your standards — none for as little as 35p.

As for the high score saga, I think you need ask for no proof as no matter what you come up with people could still beat it and other honest people (the majority by far) would not be able to give the required proof even with a legitimate score. At home, we keep a book of high scores for our friends and family and the only proof we demand is that the score is shown to one other witness.

Many magazines (eg, *Computer and Video Games*) have high score spots and ask for no photo of the screen or other proof, but trust the readers. I know there are some pranksters, but we could ignore any totally preposterous scores and put up with any of the stupid minority.

A high score spot would vastly improve this mag, so stop messing and get on with things at your end. Keep up the good work, guys.

S Kezik
13 Rutland Close
Kippax
Leeds

Stop and think

I appeal to everyone who will be buying, giving or receiving computer games this Christmas to stop and think before making their choices. I put it to you that encouraging young people to play games, the purpose of which is to kill, bomb, shoot, conquer, destroy and show as much aggression as possible, is as sick as forcing them to watch "video nasties" — in fact, it is sicker, because with computer games they must actively participate.

It is a tragedy that whilst British home micro software leads the world in technical quality, the vast majority of the themes of "games" appear to have been thought up by the

minds of mass-murderers to give pleasure to admirers of Adolf Hitler, Jack the Ripper and Attila the Hun. Look through the adverts in this magazine and feel shame.

We have allowed this to happen, and we are all responsible; programmers, advertisers, magazines and shops. We are using the greatest innovations of our age to teach kids that killing is OK. Pick your presents with care. Happy Christmas. Peace and goodwill to all mankind and aliens.

Mel Croucher
Automata

Ant attack

I would like to say sorry to D Claypole about his score of 33,106 on *Ant Attack*, as I have also rescued all 10 victims but in a shorter time which resulted in a score of 41,412. Can anyone beat that?

Bruce Vivers
Skiddaw
Carlisle Road
Annan
Dumfriesshire

A budding genius?

Although not wishing to get involved in a personal vendetta with any of your readers, I feel I must reply to Lance Rock's letter (*PCW* 24-30 November).

My first point is that having just attained my 13th birthday, my parents inform me that I should be on a continual ego trip for some years yet. However, being a budding genius, I had not realised this



"We're calling him Adam because my dad really wanted a home computer."

and I must thank them and Mr Rock for bringing this to my attention.

Secondly, not everybody, like Mr Rock, is a mature and avid reader of *PCW*. Unfortunately, there are some young members of the human race who are just becoming involved with computers and software, and also this magazine, and after being asked by several of them where they could buy *Vetpac* and *Tran-tam*, I felt it necessary for my ego to try to save *PCW*'s publishing team from answering five or six queries on the matter.

Thirdly, not wishing to pry into Lance Rock's private life, I was wondering if he could let us all know who Diane is.

Lastly, but not leastly, I must bless Lance's little cotton socks for taking the time and trouble to read and answer one of my humble letters. Rock on, Lance. Keep up the good work.

Craig Mitchell
28 Kirkstall Road
Hollin
Middleton

PS. If you think this letter is 'a waste of space', perhaps you would consider serialising it in four weekly parts.

Diane, for anyone who does not know, is Diane Davis, our classified executive.

Sinclair microdrive

I wonder if you could clarify me on a point which I am sure many readers will be asking themselves. Does the Sinclair Microdrive have an interface by which it can connect to non-Sinclair micros? I am sure many people would be more than willing to have this 'cheap' and versatile little peripheral for use with their own non-Sinclair micros.

I have asked in many computer shops and just received blank stares. I have never come across any advertisements for what I am sure would be a quick-selling interface, and not just for the Spectrum.

Also, do you know of any interfaces for the ZX printer to make it compatible with non-Sinclair micros? This low cost add-on is more than adequate for someone who just wants a

printer for program listings.

Patrick McDaid
31 Edge Fold Road
Worsley
Manchester

To the best of my knowledge, no one has produced an interface to link the Microdrive to non-ZX micros... yet. I am sure such interfaces will arrive, but not until you can buy the Microdrive in the shops as opposed to mail order.

However, there are a number of companies producing interfaces to link the ZX printer to other micros. Softex Computers of Bournemouth, for example, offer an interface and power supply for £20.95 to enable you to run a Sinclair printer on either the Vic20 or the Commodore 64.

A useful Poke

One of the most useful Pokes available on the Spectrum is *Poke 23613*, *Peek 23730-5*, which disables the Break key after program execution. This *Poke* traps all errors except 'Nonsense in Basic' and can cause a crash if others like 'Integer out of range' appear.

To stop people breaking programs whilst loading, the commonly used *Poke 23659,0* will cause a crash if the break keys are pressed — this is because the poke sets the number of lines in the lower half of the screen and error reports cause an irreversible black screen to appear. However, this *Poke* must be used with care, as it will take effect on any attempt to *Cls*. To avoid this, the location must be temporarily reset, eg: *Poke 23659,2:Cls:Poke 23659,0*...

Also, I thought I'd let you know of my current high scores: *Penetrator* — 237,650, *Manic Miner* — 497,313 (about 14 times round), *Chuckie Egg* — 437,100.

Finally, can I second the suggestion for a high score table over popular games, with concrete proof such as photographs or several independent witnesses.

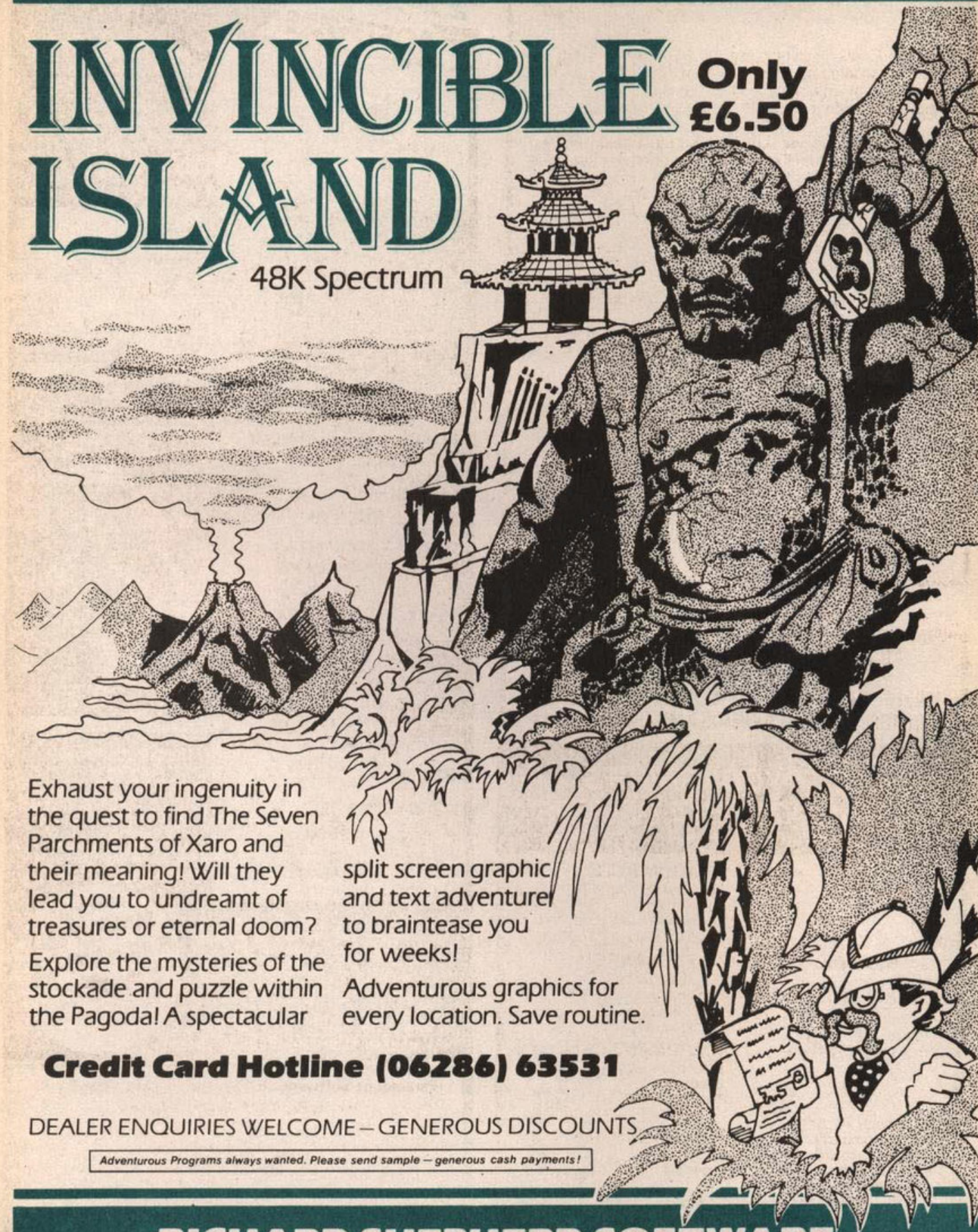
Carl Lyons
6 Hadrians Close
Salendine Nook
Huddersfield

RICHARD SHEPHERD SOFTWARE

INVINCIBLE ISLAND

Only
£6.50

48K Spectrum



Exhaust your ingenuity in the quest to find The Seven Parchments of Xaro and their meaning! Will they lead you to undreamt of treasures or eternal doom?

Explore the mysteries of the stockade and puzzle within the Pagoda! A spectacular

split screen graphic and text adventure to braintease you for weeks!

Adventurous graphics for every location. 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 ELM SHOTT LANE, CIPPENHAM, SLOUGH, BERKS. TEL. (06286) 63531

DENIS THROUGH THE DRINKING GLASS



Why did Denis Thatcher visit the Pope wearing a truss and a parachute and carrying a lawn mower?
What use is the cherry blossom?
Who is that strange tramp in the woods?

Only you can discover, but first you must deal with Ken Livingstone, Norman Tebbit and lots of other characters in this zany political adventure.

Written in humorous verse. 100% machine code — using the Quill from Gilsoft.

Losing is often funnier than succeeding — don't play it, play with it. — 48K Spectrum £5.50 incl. p&p.

ARCHIMEDES' MAGIC SCREW

Available mid-January — if the author can escape from his straight jacket and MI5.

Fresh from inventing the camel-driven date stoner, Archimedes is up to his neck in hot water again. Help him make new discoveries — help him discover the secret of the universe — help him find the soap.

WAIT FOR THE DENNIS SEQUEL! THE TEBBIT

APPLICATIONS

Dept. PCWK, 8 St. Paul's Road
Peterborough PE1 3DW

TOWN NATHAN

HOME COMPUTERS, SOFTWARE, BOARD
GAMES, ROLE PLAYING GAMES AND BOOKS

WEST YORKSHIRE'S LOCAL COMPUTER SHOPS

MORLEY —

DRAGON BYTE

51a Queen Street
Morley
Leeds 25
Tel: 0532 522690

HEADINGLEY —

LAST CHANCE

10 Ash Road
Headingley
Leeds 6
Tel: 0532 744235

CROSSGATES —

HIEROMANS DELL

89 Penda's Way
Leeds 15
Tel: 0532 641855

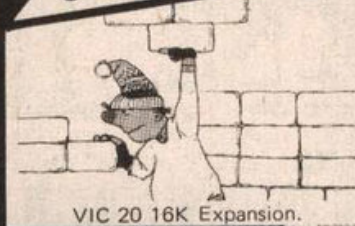
We're worth a visit because:

- ★ 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, Yaquina, etc, etc.

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

PARAMOUNT SOFTWARE

A Registered Trading Name
of Workstations Ltd.



VIC 20 16K Expansion.

CHOCABLOC — A fast moving, pure Machine Code action game, with Chocabloc our hero trying to sort out some Real Cool Choc Bars — until everything goes crazy and the action is on! Arcade standard. Fully featured. Excellent sound and graphics. Keyboard or Joystick.

£6.50

OUTBACK — Can you use the very sophisticated defence set-up to beat off the cunning Swagmen? How long will you survive? Pure Machine Code action. Fully featured. Superb colour and graphics. Agame A game with a difference. Joystick.

£5.50



Any VIC 20



VIC 20 8K or 16K Expansion.

COUNTDOWN — Time is important. Accuracy essential. Courage mandatory. But above all, Nerve is the prime attribute needed for your mission as an agent in the crack S.M.U. A Superb Arcade/Graphical Adventure. Keyboard or Joystick.

£5.50

MEGAWARZ — Where does your fantasy go when your mind leaves your body? Megawarz will take you there you can be sure. High resolution, multi-colour graphics. Sprite graphics. Synthysound. Pure Machine Code action. Arcade standard. A magical planetary trip. Keyboard or Joystick.

£7.50



Commodore 64



Dragon 32

CASTLE OF DOOM Fully implemented graphical adventure. A compelling and devious plot which retains excitement and interest to the end — if you ever reach the end! An experience in adventuring not to be missed. It's user friendly too!

£6.50

JOGGER — Truly a jogger amongst joggers. If you have trotted with the rest, now run with the best. Machine Code action. Superlative sound. Creative colour. A quality programme from Paramount. Joystick.

£5.50

Any VIC 20.

TRADE
ENQUIRIES

Tel: (0642) 604470

**WRITING
MARKETABLE
PROGRAMMES?**
Hitch your wagon to
PARAMOUNT. Send
for evaluation and
terms.

Paramount Software, 67 Bishopton Lane, Stockton,
Cleveland, TS18 1PU. (England)

Chocabloc	£6.50	<input type="checkbox"/>	Name.....
Outback	£5.50	<input type="checkbox"/>	Address.....
Countdown	£5.50	<input type="checkbox"/>
Jogger	£5.50	<input type="checkbox"/>
Castle of Doom	£6.50	<input type="checkbox"/>
Megawarz	£7.50	<input type="checkbox"/>

I enclose cash/cheque/P.O. for £.....

Overseas orders add £1.00 for airmail.

Diver

A new game for 16K and 48K Spectrum by John Durst

You find yourself in an underwater cavern, full of rocky stalactites. Dressed in full diving gear, you are dropped through a shaft into the cavern. Your task is to find — and bring back — the sunken treasure.

You carry a type of sonar: your diving suit changes colour depending on how close you are to the level of the treasure, so that, when your diving suit turns white, you know you must be roughly on the right level — although you cannot see the treasure. When you get quite close to it, you activate a transponder, which lights up a beacon on the treasure.

Moving about (using the Spectrum cursors), you must try and locate the treasure and get your arms round it, before heading for home.

But you don't have things all your own

way; there are Sting-rays lurking which will zap you with an electric shock, if you come within range. (You can't see them, either.) They don't do too much damage, but the shock bumps up your heart rate and you use up extra oxygen from your back pack.

Normally, you can't get through the rocks, but in an emergency you can use your blaster (by hitting "*"), which will smash the rock in your immediate vicinity. But this always wakes the sleeping Octopus, who will make a bee-line for you, emitting clouds of black ink! You had better have your route home planned, or he will catch you.

Scores are shown at the end and there's

the chance of another try in a different cavern.

Notes

This looks a tediously long program to enter, but it's not quite as bad as it seems. A number of lines are very similar and can be entered using the *Edit* mode to change line numbers and variables, after the first one has been entered.

The following are groups of similar lines: 35,50 70,71,72 85,86 216-219,220-225 230,231,232,233 240,241,242,243 1100-1140,1200-1240 2705,3035 3060,4100.

The cumulative score is *Poked* into *USR"T* and *USR"U*, in the User-Defined Graphics. These positions are normally blank (they code for the space between lines of print) and are not lost when the program is Run. It does, of course, mean that you can't use these two graphics. The letters in quotes in lines 215,227,2510,3020 are also UDGs.

Line 15 draws the Diver and the treasure. The main loop of the game is between 215 and 280: it is fairly complicated, so the game isn't very fast. But one can't move fast under water, anyway.




```

1 REM ███DIVER███
2 REM ███Initialise███
5 BORDER 0: PAPER 0: CLS
10 DIM a(32): FOR j=1 TO 32: L
ET a(j)=7: NEXT j
15 DATA 24,60,36,60,126,255,18
9,169,169,169,60,102,102,102,66
56,102,165,195,24,24,195,165,102
20 FOR j=0 TO 23: READ n: POKE
65368+j,n: NEXT j
25 LET t=PEEK USR "T"+256*PEEK
USR "U"
30 LET sc=0: LET st=0: LET oc=
3: LET oh=30: LET ov=20: LET tr=
7: LET at=22527
35 FOR j=1 TO 32: POKE at+j,a(
j): NEXT j
40 FOR i=2 TO 20
50 FOR j=1 TO 32: POKE at+j,a(
j): NEXT j
60 LET at=at+32
70 LET x=1+INT (RND*30): LET a
(x)=15: LET a(x+1)=15: LET a(x+2
)=15
71 LET x=1+INT (RND*30): LET a
(x)=15: LET a(x+1)=15: LET a(x+2
)=15
72 LET x=1+INT (RND*30): LET a
(x)=7: LET a(x+1)=7: LET a(x+2)=
7
80 NEXT i
85 FOR j=1 TO 64: POKE at+j,15
: NEXT j
86 FOR j=65 TO 96: POKE at+j,7
: NEXT j
90 GO SUB 1000
95 LET trx=5+INT (RND*25): LET
try=INT (RND*18): IF ATTR (try,
trx)<>15 THEN GO TO 95
96 IF ATTR (try-1,trx)<>7 THEN
LET try=try-1: GO TO 96
100 LET s$="....."
██████████
105 PRINT #1;AT 0,0: PAPER 1: I
NK 9;"Oxygen Supply:";TAB 32;s$:
PRINT #2;
110 LET q=32
160 REM ███Dig diver's shaft███
170 LET y=0
180 IF ATTR (y,4)=15 THEN GO TO
200
190 PRINT AT y,4: INK 7: PAPER
1;"": LET y=y+1: GO TO 180
200 REM ███Move diver███
210 LET x=3: LET y=0
215 PRINT INK 7-ABS (try-y)/4:
PAPER 8;AT y,x+1;"":AT y+1,x;"
A";AT y+2,x;"B";AT y+3,x+1;"
"
216 FOR j=1 TO 8: IF ATTR (y+1,
x-j)=7 THEN GO TO 220
218 IF ATTR (y+1,x-j)=10 THEN G
O TO 1100
219 NEXT j
220 FOR j=1 TO 8: IF ATTR (y+1,
x+j)=7 THEN GO TO 226
222 IF ATTR (y+1,x+j)=10 THEN G
O TO 1200
225 NEXT j
226 IF try=y+1 AND trx=x+1 THEN
LET tr=1
227 IF (ABS (try-y)<=3) AND (AB
S (trx-x)<=3) THEN PRINT AT try,
trx: PAPER 8: INK tr: BRIGHT (tr
=7): FLASH (tr=7):"C"
228 LET q=q-.2: LET s$(q)="":
PRINT #1;AT 1,0: PAPER 1;s$: PRI
NT #2;: IF q<1.5 THEN GO TO 3000
229 PAUSE 0: LET y$=INKEY$
230 IF y$="5" THEN LET x=x-1: I
F ATTR (y+1,x+1)<=7 OR ATTR (y+2
,x+1)<=7 THEN LET x=x+1
231 IF y$="6" THEN LET x=x+1: I
F ATTR (y+1,x+1)<=7 OR ATTR (y+2
,x+1)<=7 THEN LET x=x-1
232 IF y$="6" THEN LET y=y+1: I
F ATTR (y+2,x+1)<=7 THEN LET y=y
-1
233 IF y$="7" THEN LET y=y-1: I
F ATTR (y+1,x+1)<=7 THEN LET y=y
+1
240 IF x<0 THEN LET x=x+1
241 IF x>31 THEN LET x=x-1
242 IF y>18 THEN LET y=y-1
243 IF y<0 THEN LET y=y+1
250 IF x=3 AND y=0 THEN GO TO 4
000+(60 AND tr=7)
260 IF y$="*" THEN GO SUB 2500
265 IF oc=1 THEN GO TO 2600
270 BEEP .01,RND*10
280 GO TO 215
1000 REM ███Sting rays███
1010 FOR j=0 TO 10
1020 LET x=1+RND*29: LET y=RND*20
1025 IF ATTR (y,x)=7 THEN GO TO

```

```

1020
1035 PRINT AT y,x: PAPER 1: INK
2;"C"
1040 NEXT j
1050 RETURN
1100 PRINT AT y+1,x+1: PAPER 8:
INK 8: OVER 1: BRIGHT 1;" "
1105 FOR i=0 TO 9: PLOT INK 8: O
VER 1:(x-j)*8+4,163-y*8
1110 DRAW INK 8: OVER 1;8*j-1,0
1120 BEEP .01,2: NEXT j
1125 LET q=q-.5: LET s$(q)=" "
1130 PRINT AT y+1,x+1: PAPER 8:
INK 8: OVER 1: BRIGHT 0;" "
1140 LET st=st+1: GO TO 227
1200 PRINT AT y+1,x+1: PAPER 8:
INK 8: OVER 1: BRIGHT 1;" "
1205 FOR i=0 TO 9: PLOT INK 8: O
VER 1:(x+j)*8+4,163-y*8
1210 DRAW INK 8: OVER 1;-8*j+1,0
1220 BEEP .01,2: NEXT i
1225 LET q=q-1: LET s$(q)=" "
1230 PRINT AT y+1,x+1: PAPER 8:
INK 8: OVER 1: BRIGHT 0;" "
1240 LET st=st+1: GO TO 227
2500 REM ███Blast███
2505 IF x<=5 AND y<=18 THEN RETU
RN
2510 PRINT INK 7: FLASH 1: PAPER
1;AT y,x+1;"":AT y+1,x;"A";A
T y+2,x;"B";AT y+3,x+1;" "
2520 FOR j=0 TO 50: BEEP .01,0:
NEXT j
2530 LET oc=1: RETURN
2600 REM ███Chase███
2610 PRINT AT ov,0: PAPER 8: INK
0;" "
2615 LET oh=oh-SGN (oh-x): LET o
v=ov-SGN (ov-y)
2620 PRINT AT ov,oh: INK 0;"███"
2630 BEEP .1,-30: PRINT AT ov,oh:
PAPER 0: INK 6;"oo"
2650 IF oh=x AND ov=y THEN GO TO
2700
2660 BEEP .01,0
2670 GO TO 215
2700 PAPER 0: CLS: FOR j=40 TO
-20 STEP -1: BEEP .01,2+j: NEXT
j
2705 LET x=1: POKE 23560,0: POKE
USR "T",0: POKE USR "U",0
2710 PRINT AT ov,oh: INK 6;"oo"
2720 PRINT AT 18,1: INK 7:"TOO L
ATE! THE OCTOPUS GOT YOU";AT 20,
3;"ANY KEY FOR ANOTHER GAME"
2730 PAUSE 20: IF PEEK 23560<>0
THEN RUN
2740 PRINT AT ov,oh: INK 6;" "
2750 LET ov=ov+x: LET x=x-(ov>=1
7)
2760 PAUSE 20: BEEP .1,-30: GO T
O 2710
3000 REM ███Death███
3010 FOR j=y TO 19
3020 PRINT INK 6: PAPER 8;AT j,x
+1;"o"; INK 4;AT j+1,x;"A";AT
j+2,x;"B"
3025 BEEP .1,-10-j
3030 NEXT j
3035 POKE USR "T",0: POKE USR "U
",0
3040 PRINT AT 6,0: PAPER 8: INK
9:"TOO LATE! YOU DIE OF SUFFOCAT
ION"
3050 PRINT AT 18,4: PAPER 7: INK
0: FLASH 1:"ENTER FOR ANOTHER G
AME"
3060 IF INKEY$<>CHR$ 13 THEN GO
TO 3060
3070 RUN
4000 REM ███Win███
4005 FOR j=0 TO 21: PRINT AT j,0
: PAPER 1+RND*5;s$: BEEP .02,RND
*6: NEXT j
4010 PRINT AT 4,0: PAPER 1: INK
7: FLASH 1;"YOU GOT HOME WITH TH
E TREASURE!!""YOU HAVE""INT 0
""UNITS OF OXYGEN LEFT""THE S
TING-RAYS GOT YOU";st;" TIMES"
4015 PRINT AT 18,0:"YOU BRAVED THE OCTOPUS!" AND
oc=1)
4070 LET sc=INT 10*q-2*st+(100 /
ND oc=1): LET t=t+sc
4075 POKE USR "T",t-256*INT (t/2
56): POKE USR "U",INT (t/256)
4080 PAPER 7: INK 0: PRINT "YO
UR SCORE THIS GAME IS";sc
4085 PRINT "YOUR TOTAL SCORE IS
";t
4090 PRINT AT 20,5:"ENTER FOR AN
OTHER GAME"
4100 IF INKEY$<>CHR$ 13 THEN GO
TO 4100
4110 RUN

```


TURN YOUR PROGRAMME UPSIDE DOWN

Now you can add another dimension to your games.
Swap direction, swap functions, confuse your friends.
In fact you can add almost any twist to your games with
Stonechip's Programmable Joystick Interface.

You can also listen to them
with Stonechip's Echo Amplifier.



Programmable Joystick Interface. This also enables any Spectrum software to be used with a joystick, irrespective of which keyboard keys have been chosen for function.

Programming is easy using only a single switch. Switch one way to program and another way to play. No tapes to load or links to worry about — all programming is achieved by hardware. Used with Atari-compatible joysticks. Simply plugs into rear expansion port of ZX-Spectrum. No other connections to make, no additional power supply required.



Echo Amplifier. How would you like to listen to the sound output from your ZX-Spectrum without ear strain? The Stonechip Echo amplifier can do this for you as well as easing the tedium of saving or loading of tapes and enlarging the range of tape recorder compatibility with the computer. The amplifier has volume control over a range adequate for most uses, and a tone control for harsh or mellow sounds. A switched interface removes the need to swap leads during 'SAVE'ing or 'LOAD'ing. Leads are left connected all the time and the desired function is selected on the three position switch by the user. Use of the 'CUE' facility enables an audio cue to precede the program being 'SAVE'd' on tape, a decided advantage when searching through a multi-program tape. The Echo simply plugs into the Ear, Mic and Power sockets of the computer and does not require an additional power supply. The expansion port at the rear of the computer is left free for use with other peripherals and the unit is housed in an attractive case custom designed to complement the ZX-Spectrum.

**STONECHIP
ELECTRONICS**

Stonechip Ltd. Brook Trading Estate Deadbrook Lane Aldershot Hants. GU12 4XB. Tel: (0252) 318260

To: Stonechip Electronics, Unit 9, The Brook Industrial Estate, Deadbrook Lane, Aldershot, Hants.
Telephone: (0252) 318260.

Please forward me the following products:

Name _____
Address _____

All prices are inclusive of VAT. Post & Packing for U.K. deliveries (overseas add 15%).

DEALER ENQUIRIES WELCOME
Delivery approx. 14 days





VALHALLA



Unlock Your Imagination

SCOPE

Computer Graphics Language

- ★ A VERY POWERFUL, TRUE MULTITASK LANGUAGE
- ★ AS FAST AS MACHINE CODE
- ★ SIMPLER THAN BASIC

Write Machine Code in a fraction of the time currently required

SCOPE is available from most good quality dealers and selected branches of

WHSMITH

For details of how to get your games published commercially contact ISP Marketing

TECHNICAL DETAILS

SCOPE is a fully structured multitask language specifically for writing *graphics, animation and sound*. Being fully compatible with BASIC it is ideal for writing both arcade and adventure style games. Additionally, with SCOPE present in high memory it can be used as an assembler with SCOPE words as plain language mnemonics. Therefore no knowledge of machine code is required. The language is extremely easy to comprehend and is very powerful indeed providing many features not available from BASIC.

SCOPE HAS TO BE USED TO BE BELIEVED

48K SPECTRUM



CLIP THE COUPON NOW AND UNLOCK YOUR IMAGINATION
Post to: ISP Marketing Ltd, Crown House, 285 High Street, Godalming, Surrey
Tel: Godalming (04888) 24151 Please rush me _____ copies of the SCOPE computer
graphics language tape and instruction manual at £11.95 (p&p free).
(Cheques payable to ISP Marketing Ltd)

Block capitals please

Name _____

Address _____

Dealer Enquiries
Welcome

PRICE

£11.95

Power games

David Kelly talks to Bob Simpson of Micro Power

Micro Power, through its software division, Program Power, has been responsible for some of the best-selling games for the BBC computer — *Killer Gorilla* and *Escape from Moonbase Alpha*, to name but two.

Bob Simpson began it all as long ago as 1979 when he was still working as an accountant for a textile company. Having gained some programming experience through his work, he splashed out and bought a Nascom 2. "I noticed that nobody was doing anything on the programming side for the machine," explains Bob.

So, he joined the local Nascom club and decided to have a go. "We began by booking a £30 advertisement in *Practical Computing*."

Next, Bob met John Haig, now Micro Power's technical director. "John had bought an Acorn Atom and written nine or ten programs for it and we got together to sell them."

In July 1981 Bob gave up his job with the textile company and was joined by John — from then on Program Power became a full-time occupation. Carol Simpson also joined the company to handle marketing and distribution.

The combination worked. The number of Atom programs grew, so did the company. Eventually Program Power's Atom catalogue contained over 60 titles. Most successful of these was the *Programmer's Toolbox*. The 4K Eprom added useful Toolkit commands and additional Basic keywords to the Atom machine. The package was written by three of Program Power's by now considerable roster of freelance programmers.

In May 1982 the company applied for, and was granted, an Acorn dealership. This coincided with a move to new premises with a shop unit so that a computer shop could be set up. At this point Micro Power was formed as the retail outlet, with Program Power remaining the software development company.

"We started the shop off with 20 Atoms and some of Acornsoft's titles, as well as our own. It was a bit of a struggle to sell the machines, because the Acorn Atom was already on its way out.

"Then the first BBC machines came in and they sold out almost immediately — we had to wait until September for the next lot which also sold out. "Since then we have sold a hell of a lot of BBC machines."

Recently the company has moved again to larger shop premises and Micro Power now sells the Oric, Dragon and Spectrum, as well as the BBC computer. Last month the Electron was added. Next will be the Memotech computers.

The first BBC software titles from Program Power were out in June 1982.

Eighteen months, and over 50 BBC titles later, the process starts again with the Electron. Program Power has 12 programs

out for the new Acorn machine already and has sold 50,000 Electron tapes to W H Smith to sell alongside whatever stocks of Electrons they can lay their hands on.

W H Smith would appear to be confident the Electron will do well. Bob: "They bought from us at a time when they knew they wouldn't get many Electrons this year."

Bob could have warned W H Smith what they were letting themselves in for with the Electron. "In the past we have actually lost money at the shop with late delivery of Acorn products — pre-Christmas orders delivered in March, single disc drives arriving six months after being ordered.

"The most frustrating thing is we never know what is happening. If they told us it was going to be six months late we would know where we stood.

"Having said that, I cannot emphasise too much our approval of the Acorn products. When they are there, they are tremendous."

Just how long Micro Power will continue to sell home computers is not certain. "A dealer such as ourselves can offer a wealth of expertise that a high-street chain cannot match, but sales of the Spectrum in the major stores has shown that you don't need that back-up to sell a computer.

"In the same way that people go to a specialist shop to ask the technical questions about hi-fi, only to go down to Comet to buy, they are now beginning to do the same with computers.

"How long we will have an advantage over the big stores is not clear. Smith's, for one, is setting up some shops with bigger computer departments, staffed by people who do know what they are talking about.

"It may well be that in two years time Micro Power will not have a home computer hardware business. Margins on machines like the BBC are very slim and to think of carving it up to be competitive doesn't make sense."



Forseeing problems in competing with the high-street multiples has spurred Micro Power to diversify. The company is shortly to begin selling business micros and it seems likely that other companies in a similar position will also have to make the switch from home to business machines. The smaller retailer of home micros will be forced out by the big chains and when they go, so too will go a valuable source of help and advice.

Although Program Power — the software side — contributes slightly less than half of the £750,000 turnover of the whole company, Bob regards software as the mainstay.

Currently, Program Power has 43 titles for the BBC machine. Last month 15 new titles were added and 17 were removed from the catalogue. The titles discontinued were the older games. Since they were written, the quality of software on the BBC has improved so much that they were no longer considered to be earning their place.

In addition to the 12 titles which have so far been converted for the Electron, 20 more will be out before Christmas. From now on, each new title will appear simultaneously for both the BBC and Electron.

Converting programs from the BBC for the Electron is not always as straightforward as it might appear. *Moon Raider* and *Swoop*, the latter being one of Program Power's top-selling titles, were both written in Mode 2 on the BBC and both have had to be rewritten in Mode 5 for the Electron.

"The main problem with the Electron," says Bob, "is speed. In Mode 2 it runs at about a quarter the speed of the BBC." This has meant making compromises: "Sometimes this means we have had to have smaller characters or reduce the number of shapes on-screen at one time."

Program Power intends to continue to specialise in games software because they sell well. "For any new title now we are looking for minimum sales of 10,000 copies in six months."

Assuming the Electron sells at least half as well as the Spectrum, Bob reckons a top title next year ought to sell between 50,000 and 100,000.

Sales of the Electron itself will clearly depend on how Acorn brings down the price. The BBC machine might well have come down to £300 by now if keeping the price up had not been a condition of Acorn's agreement with the BBC. And Acorn would have sold so many more machines at £300 than £400.

"The Electron has most of the capabilities of the BBC and ought to do well. At the moment I can see no reason why Program Power shouldn't go on strongly for two or three years at least.

"We are looking at the Commodore 64 machine for software next. We will have to work quite hard, though, to establish ourselves as a Commodore 64 software house. It is strange but, even if you have quite a big name in software for one computer, people with other micros don't know you exist."

Empire of the Dragon

Brian Cadge looks at another batch of software for the Dragon

We begin this look at the latest Dragon software with a footnote to my review of *Personal Banking System* (PCW, 8 September) by Hilton Computer Services. As I said then, the program has a number of programming errors and oversights which might make it less suitable as a serious package. I am now pleased to say that since this review, Hilton has sent me a revised version of the program which seems to be totally error free and much more suited to its task.

Two other packages also came from Hilton to be included in this review, these are *Utilities No. 1* and *Disassembler*. Both are written in machine code and autorun on loading.

Utilities 1 contains three options selected from a menu on the screen. *Cassette Catalogue* will display the name and length of any programs on a cassette as well as "start" and "entry" addresses for binary files. The program also reports any block errors, but not the block number. *Cassette Copy* will automatically copy any standard format Dragon tape up to 22.5K, including protected software — it was only

The *Disassembler* from Hilton is a full 6809 disassembler which sits in the top 2K of reserved RAM. Output is either to screen or printer and is fully formatted in Hexidecimal and standard Motorola mnemonics. Little more can be said about a disassembler; this one at £5 is very good value and complements many assembler cartridges on the market very nicely.

Also available from Hilton is a Dragon memory map which lists in more detail than any other I have seen, most of the useful memory locations of the Dragon. It comes in the form of nine A4 photocopied sheets bound by a plastic spine — the price tag is rather high at £5, but dedicated machine code programmers may find it useful.

Yet another file handling program is available from Micro-de-Bug software — *Pro-file* comes on a cassette with a 56-page manual which explains in very great detail how to Create, Delete, Edit, Find, List, Load and Save files using the cassette system. The manual is one of the best of its kind that I have seen — ideal for the absolute novice to computing. Unfortunately, in the copy I have at least, there is no disk support — a disk version or routine would be an obvious advantage to a program of this kind. This piece of software carries the usual high price of "Professional" programs at £10.

After all those utilities, on to lighter things. *Chateau* from Gem software is a "new style" of adventure game. In fact, the usual things apply, you must roam the old Count's Chateau in search of treasures and clues, avoiding booby traps and fighting off the occasional monster,



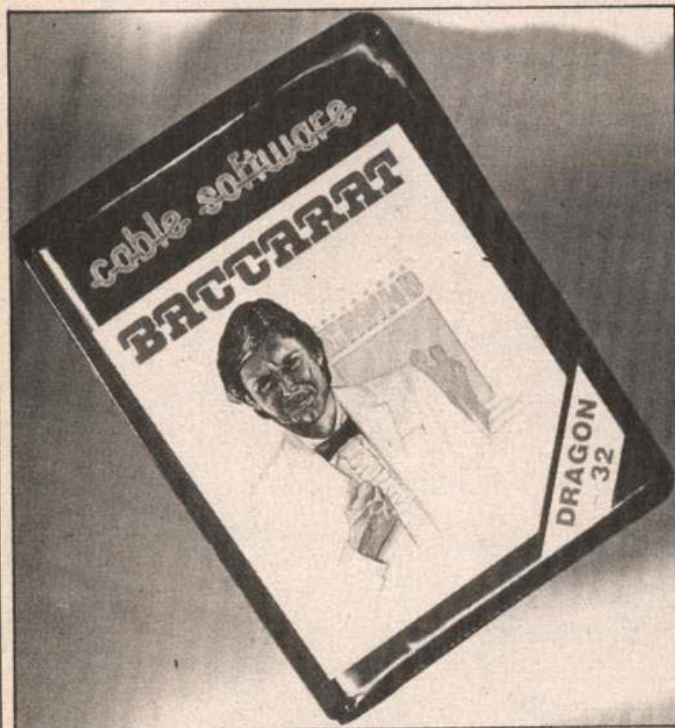
four floors to the chateau, all of which must be visited to gain all four clues. Occasionally, a travel agent appears and randomly moves you to a new location — sometimes this helps, sometimes it hinders. When all clues have been collected there is another section to the game, similar to *Mastermind* where you must guess the correct sequence of numbers. Get past this and you at last get the loot.

As the chateau's locations are randomly generated for each game, it is not possible to map out the locations as in most games of this type, but it does mean that you get a different game each time. As adventures go, this one is very enjoyable to play, with fast and often witty comments from the computer. Whether you like the menu method of entering commands is a matter of taste.

Cable Software's latest talking game is *Baccarat* — the card game. In case you're not familiar with the game it could be described as similar to Pontoon, but the object is to get nine, rather than 21. The high resolution graphics used for the cards are truly excellent, especially in colour; the sound effects are also good, although the only speech heard is "Banco", which is only recognisable as such after reading the instruction sheet. The cassette comes in Cable's usual full colour, mini-video box with a price tag of £8.75.

I have no grumbles about the program itself, but the choice of game is just not suited to a computer. Two cards are dealt by the computer — if the total is more than ten then ten is subtracted, if the total is then less than five another card is dealt, if more than five you have to stand (stick). As you will have gathered, this means there is no participation by the player at all unless he gets five, in which case you choose whether to draw or stand. The software may be good, but the game is very, very boring!

Hornet Software is a new name in the Dragon software market, their first offering is *Wormtube*, this is in fact another US convert from the Tandy Colour Computer. The idea of the game is to control your FTL (Faster Than Light) space craft as it flies down the wormtube created by such speed. Of course, you must avoid the



a matter of time before a "Copy-cat" type program was brought out for the Dragon.

The final utility will compress a Basic program removing all spaces and REM lines. Doing this certainly saves you memory (how many programs use all 32K, though?), but you would be advised to keep a normal copy of the program as it becomes difficult to follow and debug once compressed. Three utilities on one tape for only £5 is not bad value at all, I suspect that the *Cassette Copy* routine will sell the tape.

or run away from it as you wish!

The difference is that all communication with the program is via menu selection. I have seen this tried before without much success, but no such problems here; the concept works very well and makes the game particularly suitable for younger users who have difficulty typing in long commands correctly.

The game is a text only adventure, except for a plan which can be called up at any time and which shows your recent movements on the current level. There are

edges of the tunnel as well as shoot gold nodules which block your way; picking up gold pieces in your ship's jaws also gain extra points.

The scoring mechanism is rather strange, you begin with 3 million points and lose up to 50,000 points each time you crash. The controls are the right joystick to control the ship's movement, the F key to speed up, S to slow down, *Break* freezes the action — a useful feature — and P lets the next player have a go. Up to four players can take part and each can enter their name at the start of the game.

Using a graphics mode not available in Basic gives a black background with all eight colours and a reasonable level of graphics. For an American import, this game seems rather uninspired compared to those brought over by the likes of Microdeal. The packaging doesn't help — just a small instruction sheet. You will probably find the game enjoyable at first, but the novelty soon wears off.

War games are becoming ever more popular these days, especially those based on the original *Risk* board game. *Empire* from Shards Software is the newest. The Dragon Empire is a ruthless, aggressive power, intent on conquering the world through an uncompromising strategy of relentless attacking, says the scenario.

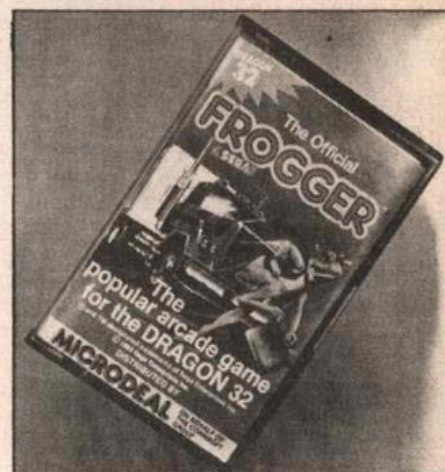
The game, in which you control the defending armies, has eight skill levels and is played entirely on a high resolution colour map of the world. You begin by choosing your territories and allocating

armies to each. When this is all done, the Dragon does the same. The war then begins; the display shows a close-up of the area involved as the Dragon makes its first attack. You can follow who's winning at the bottom of the screen. You then have 20 seconds to enter your attack; if victory is yours, you can move between one and nine armies to occupy the territory, you then continue attacking if you wish. There are also neutral armies involved which can be engaged if desired. The ultimate winner of *Empire* is whichever side completely destroys the other first.

The display is one of the game's strongest points — a very good world map with close-ups makes the game semi-educational. A complete war can take an hour or so to play, so this is the ideal game as the winter nights draw in. No joysticks are needed as all input is via a simple keyboard command. At only £7 this is one of the best tapes to come from Shards for a long time.

Finally in this review, to two pieces of software from Microdeal. *Frogger* is the official licensed version by Sega for the Dragon. The game is extremely accurate to the original, with full colour high resolution graphics and sound. Even the music at the start is the same as the original.

You can choose either keyboard or joystick control, fast or slow speed and one or two players. All the favourites are here; the lanes of moving cars and lorries, the snakes, diving turtles, logs, crocodiles and white frogs. However, although the instructions explain how to load and operate the program, they assume everyone knows all



the rules and features of the original *Frogger* game — a little more information would have been useful.

The game may be frozen or ended at any time, and you can freely change speed and keyboard/joystick control before each game. Bonus frogs are rather hard to come by, but they are occasionally given. The game gets harder the longer you survive and there is a bonus for each screen completed with some suitable and catchy music.

Altogether for £8, this game is fantastic value for money and will keep you amused for a long time to come — a must for all Dragon collections!

If you get jealous of the type of music produced by games like *Frogger* or *The King*, then the *Dragon Composer* from Microdeal is just what you need. This amazing program gives you not one but four channels of sound, each independently controlled with seven octaves, variable tempo and key and an optional *Kaleidoscope* graphics display as the music plays.

Once loaded you enter your music in Data statements from line 3000 onwards in simple note format; eg, *Data G4C3B4A2W*. Then run the program and a menu is displayed to allow loading and saving, testing and compiling or modifications to be made. Each set of notes takes one second to compile and any errors detected are reported. Once this is done and you are happy with the results, you save the music at a position independent machine code program. You can then load this back into your own programs and play the music with *Exec*.

All this is fully documented in a 28-page user manual which comes with the book sized package. Also included on the tape is *Jukebox*, which plays a number of demonstration tunes, including *The Mexican Hat Dance* and *Yellow Rose*. The sound produced by this program really has to be heard to be believed — four voices from a single channel source is a masterpiece of programming! Even though this is twice the price of Microdeal's other software at £15, it is well worth it and deserves the full ten-out-of-ten for value. ■

Firm	Program	Price	Value (1-10)
Hilton Computer Services Ltd	<i>Utilities 1</i>	£5.00	6
Dragon Division, 10 Jerome Road Larkfield Kent ME20 6UR	<i>Disassembler</i>	£5.00	8
Micro-de-Bug Consultancy 60 Sir Johns Road Selly Park Birmingham B29 7ER	<i>Pro-File</i>	£9.95	6
Gem Software Unit D The Maltings Sawbridgeworth Herts	<i>Chateau</i>	£7.95	7
Cable Software PSL Marketing 52 Limbury Road Luton Beds	<i>Baccarat</i>	£8.75	3
Hornet Software 10 Buckingham's Way Sharnford Leics LE10 3PX	<i>Wormtube</i>	£8.00	5
Shards Software 189 Eton Road Ilford Essex IG1 2UG	<i>Empire</i>	£6.95	8
Microdeal 41 Truro Road St Austell Cornwall PL25 5JE	<i>Frogger</i>	£8.00	9
	<i>Dragon Composer</i>	£15.00	10

A routine matter

Andy Wilson looks at machine code routines on the ZX81 in the second of a three-part series

I now intend to discuss the machine code routines themselves. If you feel you do not understand machine code, do not be deterred. Reading on will give you a much clearer idea of how the routines can, and cannot, be used. The code makes extensive use of the ZX81 systems variables, but if you are conversant with Z80 assembly language, it should be possible to convert the routines for use on the Spectrum.

The full assembly language listing is given in listing 6. This was produced using the Artic assembler and, if you own, or have access to one, the code can be entered directly. One thing to note, if you are using a different assembler, is that Artic always puts *Jp 7A3C* at the end of the program. This has been replaced with *3 Nops* in the hex-dump, in order to keep the line number addresses the same.

I will refer to the routines by the labels used in the assembler listing, starting with *Rept*. This routine uses its own *Stak* to keep track of nested loops. The spare systems variable at 16507 is used to *Point* to the low byte of the current *Stak* address. Rather than pointing to the next free byte, as does the Z80 stack pointer, it points to the current return address.

It works by storing the address from the systems variable *Nxtln* on the *Stak* (ie, the address of the next program line). If the *Stak* is full the error subroutine is called giving error code *R*.

Until works by looking at the repeat flag, or *Rflag*, which is *Poked* from Basic by the line *Poke Until* (condition), giving 1 or 0. If the condition is true, *Rflag* will be 1 and we just *Return* to Basic after resetting the *Stak Pointer*. If the condition is false, we need to

jump back to the appropriate *Repeat* statement. We take the address from the top of the *Stak* and *Poke* it into the systems variable *Nxtln*. Thus, when we return to Basic, the operating system is fooled into continuing from the line after *Repeat*.

If the *Stak* is empty it means there is no outstanding *Repeat*, so we call *Error* with code *U*. *Until* is called from Basic by *Rand Usr Check*, following *Poke Until* (condition).

You will notice that the error codes used are all in the range *N* to *U*. This is achieved by *Poking* a number between 16h and 1Dh into *Errnr*, which forces a halt when we return to Basic. *Error* is called with the number in question in the *A* register. We subtract from this 16h, giving us a number between 0 and 7.

All of the error messages are 16 characters long, so multiplying this number by 16 and adding the result to the address of the first message gives the address of the start of the message we are interested in. This message is downloaded on to the bottom line of the screen — then we *Return* to Basic, forcing a halt as described earlier. This routine could easily be adapted for use in other machine code programs.

Defp is the routine used to "define" procedures. A procedure that has been defined has the address of its first line stored in the variable used as the name. This means that there is no limit to the amount of procedures it is possible to define.

This part of the routine is simplicity itself. It takes up one instruction, *Ld Bc, (Nxtln)*. This is at the end of the routine and labelled *OK4*. It just puts the address of the next program line into register pair *BC* and,

when the *Usr* routine is evaluated in the instruction *Let Name=Usr Defproc*, this address is stored in *Name*.

That's easy enough, but what does the rest of the routine do? The problem is, when we encounter a procedure definition in Basic, we do not want to execute the whole procedure, just store the address and skip the rest. We do this by searching for an *Endproc* instruction, then jumping to the following line.

What the routine actually looks for is the pair of characters, *Usr E*. It goes through the Basic program character by character, until it finds the next *Usr*. It then looks to see if the next character is *D* or *E*. If it is *D*, it assumes this is a *Defproc* statement and gives *Error U*. If it is *E*, we calculate the address of the next line (address of *E+Len"Endproc"+1*), and *Poke* this into *Nxtln* immediately before *Returning* to Basic.

One problem was the floating point representation of numbers used by Sinclair. It might be possible for one of these five-byte numbers to contain the codes for the character pairs we are looking for. This is taken care of by *Calling* the subroutine *Fpnum*, which will be described later.

If we reach the beginning of the display file, ie, *Dfile*, without finding an *Endproc* it is obvious it has been left out and we call *Error* with code *Q*.

In order to prevent any possibility of causing a system crash, we check the address is really the start of a line by making sure it is preceded by a *Newline*, code 76h. If there are two *Newlines* in a row, then *Endproc* is the last line of the program, giving an *Error T*.

Fpnum is a subroutine used by *Defp* to check that *Usr D* or *Usr E* is not part of a floating point number. Fortunately all floating point numbers are preceded by a byte 7Eh, so we just need to check the previous four bytes for this character. If we find it, the Zero flag is set to 1, if not it is reset to 0. One thing worth noting, which confused

LISTING 6

ASSEMBLY LANGUAGE

REPEAT-UNTIL PROG

```
UNSTR=0EA7 ; ROM ROUTINES
STKBC=1510
POINT=107E ; PROGRAM VARIABLES
RFLAG=1070
CPOIN=1021
ERRNR=4000 ; SYSTEMS VARIABLES
OFILE=4000
DEST=4012
STKNO=4010
NXTLN=4029
VARS=4010
```

```
RSTAK 00 00 00 00 00
      00 00 00 00 00
```

```
RSTAK 00 00 00 00 00
      00 00 00 00 00
```

```
REPT  LD A, (POINT)
      CP BC
      JR NZ, OK1
      LD A, 1A
```

OK1

UNTIL

OK2

BACK

```
CALL ERROR
RET
INC A
INC A
LD (POINT), A
LD H, 40
LD L, A
LD DE, (NXTLN)
LD (HL), E
INC HL
LD (HL), D
RET
LD H, (POINT)
CP 02
JR NZ, OK2
LD A, 10
CALL ERROR
RET
LD A, (RFLAG)
CP 01
LD A, (POINT)
JR NZ, BACK
DEC A
DEC A
LD (POINT), A
RET
LD H, 40
LD L, A
LD B, (HL)
INC HL
LD B, (HL)
LD (NXTLN), BC
RET
```


me at first, is that *Djnz* does not set the Zero flag as you might expect.

Pcall — a slight departure from the order of the listing here — uses a *Stak*, identical to that used in *Rept*, to store the address of the next line, so we know where to return on completion of the procedure. Then we use another systems variable, *Dest*, to find the address of the variable containing the procedure address. Note that this should be in the variables area, so if *Dest* is less than *Vars* the variable has not been previously defined (*Dest* will be the address of the *Name* in the *Callproc* statement).

Now comes the tricky bit. As you will remember, we carefully stored the procedure address in the variable *Name*. Unfortunately, it is now in five-byte floating point

form and converting this to an integer is not an easy process. The way I have chosen to do it is to transfer the number to the calculator stack, and then use the Rom routine *Unstk* to convert it back to an integer in *BC*.

First, we need to save space on the calculator stack, using another Rom routine *Stkbc*. Note that it does not matter what is in *Bc*, as it will be overwritten anyway. We have already found *Dest*, which points to the byte before the number in the variables area. There is another systems variable *Stkend*, which points to the last byte of the number on the top of the calculator stack. We can now transfer the number to the stack by adding five to the value of *Dest* then using *Lddr*. It is now a simple matter to get the address we want

into *BC*.

We now *Poke* this address into *Nxtln* and when we *Return* to Basic, we jump to the first line of the procedure. Just in case we have inadvertently used the procedure name for some other purpose, we check the address is the start of a line as we did in the *Defp* routine.

Endp is a much simpler routine. The main part unstacks the address we stored in the *Pcall* routine, in the same way as we did in *Unstk*, then *Pokes* it into *Nxtln*. If the *Stak* is empty, there is something wrong.

Normally, the only way Basic can encounter an *Endproc* statement is when the procedure is called, otherwise it is skipped by the *Defproc* statement. Therefore, if the procedure *Stak* is empty, we must have left out a *Defproc*, error *P*.

```

;PRINT ERROR MESSAGES
MESSG "NESTED DEFPROC " : N
      "PROC STACK FULL " : O
      "ENDPR W/O DEFPR " : P
      "DEFPR W/O ENDPR " : Q
      "REPEAT STAK FULL " : R
      "UNDEF PROC NAME " : S
      "NO NEXT LINE " : T
      "UNTIL W/O REPEAT " : U
ERROR LD (ERRNR),A
      SUB 16 ;A=0 TO 5.
      LD HL,MESSG
      LD D,00
      AND A
      RLA
      RLA
      RLA
      LD E,A ;A=A+15
      ADD HL,DE ;HL=START
      PUSH HL ;OF MESSAGE
      LD HL,(DFILE)
      LD DE,0300 ;FIND LAST
      ADD HL,DE ;LINE OF
      EX DE,HL ;SCREEN.
      POP HL
      LD BC,0010 ;PRINT ERR
      LDIR ;MESSAGE.
      RET

; "PROCEDURE" PROGRAM
DEFPR LD HL,(NXTLN)
SERCH INC HL ;LOOK FOR
      PUSH HL ;ENDPROC.
      LD BC,(DFILE)
      AND A ;END OF
      SBC HL,BC ;PROGRAM
      POP HL
      JR C OK3
      LD A,19 ;YES...
      CALL ERROR ;ERROR=0.
      RET
OK3 LD A,(HL) ;IS THIS
      CP D4 ;"USA"?
      JR NZ SERCH
      INC HL ;YES...
      LD A,(HL) ;IS NEXT
      CP 29 ;CHAR "D"?
      JR NZ NOTD ;FP NUM?
      CALL FPNUM
      JR Z SERCH
      LD A,16 ;IT IS "D".
      CALL ERROR ;ERROR=N
      RET
NOTD CP 2A ;IS IT "E"?
      JR NZ SERCH
      CALL FPNUM ;FP NUM?
      JR Z SERCH
      LD BC,0008 ;ADDRESS OF
      ADD HL,BC ;NEXT LINE.
      LD A,(HL)
      CP 76 ;IS THERE A
      JR Z NOLIN ;NEXT LINE?
      DEC HL
      LD A,(HL) ;CHECK THIS
      INC HL ;IS START
      CP 76 ;OF A LINE.
      JR Z OK4
      LD A,1C ;NO...
      CALL ERROR ;ERROR=T
      RET
OK4 LD BC,(NXTLN) ;YES....

LD (NXTLN),HL ;GO THERE.
RET
FPNUM PUSH HL
      DEC HL ;SEE IF IT
      LD B,04 ;IS PART
      NONUM DEC HL ;OF A
      LD A,(HL) ;FLOATING
      CP 7E ;POINT
      JR Z NUM ;NUMBER.
      DJNZ NONUM
      POP HL
      RET
ENDP LD A,(CPOIN)
      CP 8C ;CHECK STAK
      JR NZ OK5 ;NOT EMPTY.
      LD A,18
      CALL ERROR ;ERROR=P.
      RET
OK5 LD H,40 ;TOP OF
      LD L,A ;PSTAK.
      LD E,(HL)
      INC HL ;"POP"
      LD D,(HL) ;CALLING
      LD (NXTLN),DE ;ADDRESS.
      DEC A
      DEC A ;RESET
      LD (CPOIN),A ;POINTER.
      RET
PCALL CALL STKBC
      LD HL,(DEST)
      PUSH HL
      LD DE,(VAR3) ;CHECK PROC
      AND A ;PREVIOUSLY
      SBC HL,DE ;DEFINED.
      POP HL
      JR C UNDEF
      LD DE,(STKND) ;TRANSFER
      LD BC,0005 ;FP NUMBER
      ADD HL,BC ;TO CALC
      DEC DE ;STACK, THEN
      LDDR ;INTO BC AS
      CALL UNSTK ;INTEGER.
      LD A,B
      CP 00
      JR Z UNDEF
      LD H,B ;CHECK THIS
      LD L,C ;IS THE
      DEC HL ;START OF A
      LD A,(HL) ;LINE.
      CP 76
      JR Z OK6
      LD B,00
      LD A,1B
      CALL ERROR ;ERROR=S.
      RET
OK6 LD DE,(NXTLN)
      LD A,(CPOIN)
      CP 96 ;STAK FULL?
      JR NZ OK7
      LD A,17
      CALL ERROR ;ERROR=0
      RET
OK7 INC A
      INC A ;MOVE STAK
      LD (CPOIN),A ;POINTER
      LD H,40
      LD L,A
      LD (HL),E ;"PUSH"
      INC HL ;CALLING
      LD (HL),D ;ADDRESS.
      LD (NXTLN),BC ;GOTO PROC.
      RET

```


A basic concept

Trevor Toms continues his six-part series on machine code

In the next two weeks we'll be looking at the way in which a Basic programmer can "translate" concepts into machine code. This may not be entirely the best way of writing some routines, but at least it gives the relative novice a chance to get going.

First of all, let's look at the machine code equivalent of variables. In Basic, data can be stored for later use by means of the *Let* command:

```
LET item = 27
```

In machine code, you need to consider several aspects before you can write an equivalent command. First of all, there is no inherent way of storing numbers less than -32768 or greater than 65535. Similarly, there is no simple method of storing values which have fractions (eg, *Let item = 1.5*). For mainly the second reason, most machine code routines are concerned with integer arithmetic and leave floating point calculations to Basic where it's much easier to control.

Now you need to decide the limits of the data item you are storing. If it never exceeds 255, you can use a single byte to store it, while larger values will need a word (16 bits, or two bytes) to hold the data. In most cases, you can play safe and always use 16 bits. Data areas can be reserved in assemblers by writing:

```
ITEM: DEFW 0 ;reserve one word
```

Some assemblers let you write:

```
ITEM: DEFS 2 ;reserve two bytes
```

but the second method does not initialise the data, it only reserves the space.

Now that you've got an area put aside, you can save any of the Z80 register pairs by using the instruction:

```
LD (ITEM),HL
```

where *Item* is the name of the data area reserved, and *HL* is the register pair whose current value is to be saved. *HL* can be replaced by *DE*, *BC*, *IX* or *IY*.

So the machine code equivalent of *LET item = 27* becomes:

```
LD HL,27 ;put value 27 into HL
LD (ITEM),HL ;place HL contents into ITEM
```

In order to retrieve the contents of the data area, you write:

```
LD HL,(ITEM)
```

which loads 27 (or whatever) back into *HL* (or *DE*, *BC*, *IX*, *IY*).

Simple stuff, you might say, but how do I use this data item meaningfully? Let's now consider a small example of program which keeps a score, adding in 10 every time a key is pressed. The routine uses a couple of ROM routines, which I'll explain — see listing 1.

First of all, the routine sets data item *Score* to zero (*LD HL, 0* and *LD (Score),HL*). Within the main loop, it uses the ROM routine at address 15D4h to await a key press, but notice that before any I/O routines can be called, a program

must select the appropriate device to be used. This is important if you intend to use the *RST 10h* output routine for printing — we'll cover this in a later article.

On exit from *Await\$ Key*, the corresponding key code is left in register A. Next, the print position is moved to line 10, column 12, by using the ROM "string printing" routine. Notice how *DEFB* commands have been used to declare the *Print* at string. The routine now loads the current

value of *Score*, adds 10 to it, then saves it again. Here, another ROM routine is used (at address 1A1Bh) to print the contents of register pair *BC* as a number on the screen. This routine will only handle values from 0-9999 since it is used to print the line numbers when a program is listed.

A check is now made to see if the *Break* key combination is being pressed, giving the user a chance to return to Basic. If not, the entire loop is started again.

I hope that some of the features of this program will have whetted your appetite — I will explore most of these and more in future articles.

So how about arrays? By reserving a

Listing 1

Addr	Hex	Op	Operands		
				FF74 2A0000	LD HL,(SCORE)
				FF77 110A00	LD DE,10
				FF7A 19	ADD HL,DE
				FF7B 220000	LD (SCORE),HL
				FF7E 44	LD B,H
				FF7F 4D	LD C,L
				FF80 CD1B1A	CALL PRINT\$NUM
				FF83 CD541F	CALL BREAK\$TST
				FF86 3BD6	JR C,LOOP
				FF88 C9	RET
				FF89	SCORE:
				FF89 0000	DEFW 0
				FF8B	ATLOC:
				FF8B 16	DEFB 22
				FF8C 0A	DEFB 10
				FF8D 0C	DEFB 12
					Symbols:
				AWAIT\$ 15D4	PRINT\$ 1A1B
				BREAK\$ 1F54	STR\$PR 203C
				SELDEV 1601	ENTRY\$ FF58
				LOOP FF5E	SCORE FF89
				ATLOC FF8B	
					No error(s)

Listing 2

Addr	Hex	Op	Operands		
				FF62 C9	RET
				FF63	GET\$ITEM:
				FF63 2100F0	LD HL,ARRAY\$BASE
				FF66 19	ADD HL,DE
				FF67 19	ADD HL,DE
				FF68 7E	LD A,(HL)
				FF69 23	INC HL
				FF6A 66	LD H,(HL)
				FF6B 8F	LD L,A
				FF6C C9	RET
					Symbols:
				ARRAY\$ F000	SET\$IT FF58
				GET\$IT FF63	

larger amount of memory — two bytes for every element of the array — you can set or get the value of any item in the array by using routines such as those shown in listing 2.

The array base address should be pre-set (here I have used address 0F000h), and register pair DE is assumed to hold the element number required. The *Get* routine leaves the current value of this element in HL, while the *Set* routine places the value of HL into this element. Compare these:

DIMz(20)

Z: EQU 0F000H

LET z(2)=27

LET score=z(13)

```
LD DE,2
LD HL,27
CALL SET$ITEM
LD DE,13
CALL GET$ITEM
LD (SCORE),HL
```

You can initialise an entire array by using a routine similar to that shown in listing 3. This example is a machine code equivalent to:

```
10 DIM z(20)
20 FOR x=1 TO 20
30 LET z(x)=x
40 NEXT x
```

A luxury of Basic is that any attempt to

use an array element which is "out of bounds" results in an error report 3. This does not occur in machine code unless you specifically write in checks that no item number is out of range — a rather arduous task — so there are probably going to be many occasions when your program will suddenly give spurious values for array data. In these circumstances you should check to see if the element values have gone out of bounds.

Next week, I'll show how you can evaluate expressions such as $Let\ x = 3 * b(4) + 2$ in machine code.

Listing 3

Addr	Hex	Op	Operands
FF58		ARRAY\$BASE:	
FF58		EQU 0F000H	
FF58		ITEM\$COUNT:	
FF58		EQU 20	
FF58		ENTRY\$POINT:	
FF58	2100F0	LD	HL,ARRAY\$BASE
FF58	110000	LD	DE,0
FF5E	0614	LD	B,ITEM\$COUNT
FF60		INIT\$LOOP:	
FF60	73	LD	(HL),E

```
FF61 23 INC HL
FF62 72 LD (HL),D
FF63 23 INC HL
FF64 13 INC DE
FF65 10F9 DJNZ INIT$LOOP
FF67 C9 RET
```

Symbols:
 ARRAY\$ F000 ITEM\$C 0014
 ENTRY\$ FF58 INIT\$L FF60

No error(s)

Spectrum 48k

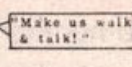
MAKE YOUR OWN TV FILMS!

WITH **LIVE ANIMATION**

& MUSIC

SAVE them...

& AMUSE FRIENDS AND FAMILY
WHEN YOU PLAY THEM BACK!



ORDER:
MACRO

CONSTRUCTION

& ANIMATION CASSETTE MCA

£7



- SPECIAL MACRO-PROGRAMMING TECHNIQUES ALLOW YOU TO:
 - CALL-UP ANY MEMBER OF CAST, INCLUDING UFO, HELICOPTER AND A HOST OF 'PERSONNEL' IN A CHOICE OF NEARLY 30 'CALLS'! MAKE EACH ANY COLOUR - LARGE ONES CAN BE IN TWO COLOURS!
 - THEY WALK, RUN, CLIMB & FLY.
 - BUILD HOUSES, CHURCHES ETC. IN A FLASH - & ERASE THEM UP TO 15 MINS. PER 'FILM', OR MORE IF YOU'RE A GOOD DIRECTOR!
 - MAKE CHARACTERS 'SPEAK' USING ANNOTATIONS AS IN STRIPS.
 - FULL COMPUTER-PROMPTING TO SAVE YOU MAKING ERRORS.
 - INSTANT PLAYBACK, EDITING AND DELETING AS YOU GO ALONG!
 - MOST COMMANDS ARE A SINGLE KEY-STROKE, WITHOUT 'ENTER'!
 - COMPOSE YOUR OWN TUNES USING THE SPECIAL THREE-OCTAVE CHROMATIC MUSIC COMPOSER, WHICH ALLOWS YOU TO LISTEN, CORRECT AND EDIT AT EACH NOTE ... IF YOU NEED TO!
 - STORE UP TO NINE 99-NOTE TUNES TO 'CALL-UP' AT ANY TIME IN A STORY ... COMPUTER GIVES EACH A NUMBER IN MEMORY.
 - CHANGE TUNES AT ANY TIME, EVEN WHILST MAKING A 'FILM'.
 - YOU CAN EVEN ADD PERSPECTIVE TO BUILDINGS, ROADS ETC.
 - NO SPECIAL SKILLS OR COMPUTER KNOWLEDGE NEEDED ... JUST IMAGINATION!



pinehurst data studios

69 PINEHURST PARK
WEST MOORS, WIMBORNE
DORSET BH20 0BP

IMPORTANT: FOR 48K SPECTRUM ONLY

SUPERCODE

—for 16K and 48K Spectrum

100+ ROUTINES

This is a superior machine code tool kit with one hundred machine code routines that are relocatable for use in your own BASIC and/or machine code programs, the combined user friendly BASIC program, 48k Spectrum only, gives easy access to all routines: ● Index of routines. ● Call up details of each routine including all information required to tailor the routine to your needs. ● Demonstration of how the routine works under software control, the demonstration is repeatable. ● Save and verify individual routines. ● Comprehensive user guide.

- | | | |
|---------------------------|--------------------------|----------------------------|
| 1. Block Memory Insert | 24. Sci-Fi Character Set | 47. Wait-Key |
| 2. Block Line Delete | 25. Memory Available | 48. Strings to Upper Case |
| 3. Chr\$ Swap | 26. Line Renumber | 49. Strings to Lower Case |
| 4. Chr\$ Scramble | 27. Uni-Note Sound-Gen | 50. Program to Upper Case |
| 5. Super-Renumber | 28. Dual-Note Sound-Gen | 51. Program to Lower Case |
| 6. 2 Byte Converter | 29. Uni-BEEP Simulator | 52. Confuse |
| 7. Dec->Hex Converter | 30. Multi-BEEP Simulator | 53. Clarify |
| 8. Hex->Dec Converter | 31. Screen Fill | 54. Space Saver |
| 9. Remkill Condenser | 32. Screen Store | 55. Screen Overprint |
| 10. On Error Goto | 33. Screen Exchange | 56. Screen Invert |
| 11. On Break Goto | 34. Protect Program | 57. Clear All |
| 12. Free-Scroller | 35. Block Copy | 58. Ink Change |
| 13. Non-Deletable Lines | 36. Contract | 59. Paper Change |
| 14. Border Effects | 37. Expand | 60. Flash On |
| 15. Screen Search | 38. Expand Rem | 61. Flash Off |
| 16. Variables Search/List | 39. Append | 62. Bright On |
| 17. 24-Line Printing | 40. Count Program | 63. Bright Off |
| 18. Star Draw | 41. Tape Header Reader | 64. Screen-Print |
| 19. Flash Switch | 42. Address | 65. Rand. Number Generator |
| 20. Bright Switch | 43. Checker-Board | |
| 21. Paint Shape | 44. Remove Colours | |
| 22. Record Sound | 45. Display Memory | |
| 23. Replay Sound | 46. Hex Loader | |

Routines 66-100: Screen routines

SUPERCODE £9.95

Also available at Boots, W.H. Smith and all good computer shops.

DELIVERY: UK—prices include VAT and postage & packing. Send SAE for Catalogue.

EUROPE—add 80p per program

ALL OTHER PLACES—for air mail add £2 for the first program and 50p for each subsequent program. Surface delivery add 80p per program.

CP software

Send Cheque, Postal Order or Access No. to:
 CP SOFTWARE, Dept PCW1A
 17 Orchard Lane, Prestwood,
 Bucks HP16 0NN



SPECTRUM JOYSTICK INTERFACE

STILL PLENTY OF
TIME FOR DELIVERY
BEFORE CHRISTMAS



£9.95
(TWO-YEAR GUARANTEE)



**ROBUST
JOYSTICK**
£9.75

**QUICKSHOT
JOYSTICK**



£11.95

**FROM: RAM ELECTRONICS (FLEET) LTD (PCW), 106 Fleet Road, Fleet
Hampshire GU13 8PA. (02514) 5858**

Send cheque or postal orders or ring with your Access or Visa card number

- *****
Enter quantity required in box
- ☐ Spectrum Joystick Interface @ **£9.95**
 - ☐ Robust Joystick @ **£9.75**
 - ☐ Quickshot Joystick @ **£11.95**
 - ☐ Interface + Robust Joystick @ **£18.50**
 - ☐ Interface + Quickshot Joystick @ **£19.95**
 - ☐ Vic 20 standard 16K ram pack @ **£27.95**
 - ☐ Vic 20 switched 16/3K ram pack @ **£34.95**
 - ☐ Vic 20 switched 32/16/3K ram pack @ **£49.95**

* ALL PRICES INCLUDE VAT *
* PLEASE ADD £1 p&p *
* (OVERSEAS ORDERS £3) *

I enclose £.....

Charge my Access/Visa £.....

Name.....

Address.....

.....

.....

***** Joystick Interface and ram packs carry an unbeatable two-year guarantee *****

TO: RAM ELECTRONICS (FLEET) LTD (PCW), 106 Fleet Road, Fleet, Hants GU13 8PA

(Credit card payment for goods by return post.)

CONGRATULATIONS!!

The fact that you're reading this magazine means that you've been sensible enough to realise the important part computers are going to play in your life from now on. Keep up your advantage — by keeping in touch with

the latest and best computer books available, packed with up-to-date information and new programming ideas and techniques. So go on — check out the sample of our comprehensive range of books below . . .

THE MICRO BOOK WAREHOUSE

SPECTRUM

Spectrum Machine Code for the Absolute Beginner.....	£5.95
The Complete Spectrum ROM Disassembly.....	£9.95
Beyond Simple BASIC — Delving Deeper Into Your ZX Spectrum.....	£7.95
Spectrum Microdrive Book.....	£5.95
Spectrum Hardware Manual.....	£5.95
Supercharge Your Spectrum.....	£5.95
Over the Spectrum.....	£4.94
Understanding Your Spectrum.....	£6.95
The Working Spectrum.....	£5.95
Master Your ZX Microdrive.....	£6.95
Spectrum Adventures.....	£5.95
Spectrum Machine Code Made Easy — Vol. 1.....	£5.95
Spectrum Machine Code Made Easy — Vol. 2.....	£5.95
Mastering Machine Code on Your ZX Spectrum.....	£9.95
Explorer's Guide to the ZX Spectrum & ZX81.....	£7.95
Easy Programming for the ZX Spectrum.....	£5.95
Further Programming for the ZX Spectrum.....	£5.95
Spectrum In Education.....	£6.50
Spectrum Machine Code.....	£5.95
Introducing Spectrum Machine Code.....	£7.95
The Spectrum Programmer.....	£5.95
The Sinclair Spectrum In Focus.....	£6.25

COMMODORE 64

Commodore 64 Exposed.....	£6.95
The Working Commodore 64.....	£5.95
Commodore 64 Machine Code Master.....	£6.95
Commodore 64 Adventures.....	£5.95
Mathematics on the Commodore 64.....	£5.95
Graphic Art for the Commodore 64.....	£5.95
Commodore 64 Programmer's Reference Guide.....	£16.95
Commodore 64 User's Guide.....	£11.00
Easy Programming for the Commodore 64.....	£6.95
Software 64: Practical Programs for the CBM 64.....	£5.95
Mastering the Commodore 64.....	£7.95

BBC

BBC BASIC for Beginners.....	£7.95
Functional FORTH for the BBC Computer.....	£5.95
Programming for Education on the BBC Computer.....	£5.95
Graphic Art on the BBC Computer.....	£5.95
The BBC Micro Revealed.....	£7.95
Let Your BBC Micro Teach You To Program.....	£6.45
Putting Your BBC Micro To Work.....	£4.95
The BBC Micro Book — BASIC, Sound & Graphics.....	£7.95
Advanced Programming Techniques for the BBC Micro.....	£7.95
Programming Tips for the BBC Micro.....	£6.95
Assembly Language Programming on the BBC Micro.....	£7.95
Games BBC Computers Play.....	£6.95
Creating Adventure Programs on your BBC Micro.....	£6.95
BBC Micro Assembly Language.....	£7.95
BBC Micro in Education.....	£6.50
Introducing the BBC Micro.....	£5.95
Discovering BBC Micro Machine Code.....	£6.95
The BBC Micro — An Expert Guide.....	£6.95

DRAGON 32

Dragon 32 Programmer's Reference Guide.....	£6.95
The Working Dragon 32.....	£5.95
Dragon 32 Gamesmaster.....	£5.95
The Dragon Trainer.....	£5.95
Advanced Sound & Graphics for the Dragon.....	£5.95

Making The Most of Your Dragon 32.....	£5.95
Dynamic Games for the Dragon 32.....	£4.95
Easy Programming for the Dragon 32.....	£5.95
Further Programming for the Dragon 32.....	£5.95
The Dragon 32 and How To Make The Most Of It.....	£5.95
The Dragon 32 Book of Games.....	£5.95
Dragon Graphics and Sound.....	£6.95
Introducing Dragon Machine Code.....	£7.95

VIC20

VIC Innovative Computing.....	£5.95
VIC20 Exposed.....	£6.95
50 Outstanding Programs for the VIC20.....	£6.95
Getting Acquainted with Your VIC20.....	£6.95
ZAPI POW! BOOM! (Games for the VIC20).....	£7.95
VIC20 Programmer's Reference Guide.....	£9.95
Kids and the VIC.....	£16.95
Get More From The VIC20.....	£5.95
The VIC20 Games Book.....	£5.95
The VIC20 For Children.....	£5.95
Problem Solving In BASIC — A Guide for Beginners (VIC).....	£4.95

ORIC-1

Meteoric Programming.....	£5.95
Dynamic Games for Your Oric.....	£4.95
Easy Programming for the Oric-1.....	£5.95
Games to Play on Your Oric-1.....	£4.95
The Oric-1 & How To Get The Most From It.....	£5.95
The Oric-1 Book of Games.....	£5.95

ZX81

Mastering Machine Code on Your ZX81.....	£7.50
Getting Acquainted with Your ZX81.....	£5.95
The Turning Criterion — Machine Intelligent Programs for the 16K ZX81.....	£5.25
Explorer's Guide to the ZX Spectrum & ZX81.....	£7.95

ELECTRON

The Electron Book — BASIC, Sound & Graphics.....	£7.95
21 Games for the Electron.....	£5.95

GENERAL

How To Computerise Your Business Successfully.....	£6.95
Giant Book of Computer Games.....	£7.95
Learn PASCAL on Your BASIC Micro.....	£5.95
BASIC & The Personal Computer.....	£11.50
The Little Book of BASIC Style.....	£6.50
PASCAL From BASIC.....	£6.95
PASCAL: A Problem Solving Approach.....	£8.25
Fundamentals of Interactive Computer Graphics.....	£17.95
Microcomputer Graphics.....	£9.95
Real Time Programming.....	£7.95
Microcomputer Interfacing.....	£11.95
Legal Care for Your Software.....	£11.95
Introduction to Electronic Speech Synthesis.....	£7.60
Brainteasers for BASIC Computers.....	£4.95
Machine Code & Better BASIC.....	£7.50
Z80 Machine Code For Humans.....	£7.95
Living with the Micro.....	£4.50
Software Secrets: Input/Output & Data Storage Techniques.....	£5.95
Successful Software For Small Computers.....	£6.95
Microcomputer Speech Synthesis & Recognition.....	£7.95
The Complete FORTH.....	£6.95

★★ Christmas and New Year Offer . . . £1 off order over £10;

£2 off orders over £20; etc . . . MERRY CHRISTMAS

MFM DATA SERVICES LTD, IGHTHAM, SEVENOAKS, KENT TN15 9BD



The Micro Book Warehouse

To: MFM DATA SERVICES LTD, Dept PCWK 4, Ightham, Sevenoaks, KENT TN15 9BD.

Please send me the following books:

Title	Price
1.....
2.....
3.....
4.....
5.....
+P&P.....	
Less discount.....	
TOTAL.....	

Or enclose cheque/money order for £..... made payable to MFM DATA SERVICES LTD, which includes P&P (see below). I understand that I may return the books, in good condition, within 7 days of receipt, for a full refund, if for any reason I am not satisfied.

Post & Packing:
UK — add 80p per order
Europe — add £1.00 per book

For a FREE CATALOGUE telephone (0732) 884732 (24 hours)

A display of fireworks

John Scriven and Patrick Hall present a firework game in the second of a two-part series

This program, *Firework*, is also based on a simple idea — offering examples of the four rules (add, subtract, multiply and divide). The incentive to do well here is the impressive display after five correct answers.

Each of the graphic routines is held in a procedure, and may be adapted to your own use or copied directly into a different program.

The names given to the procedures should make the supervisor between lines 30-150 self-explanatory. After *Procgraphics* and *Procinit* the *Repeat-Until* loops uses *Procsetup* to draw the rocket on the ground and *Procquestion* to test the child's arithmetic. *Proclaunch* then makes the rocket rise up the screen until it is at the centre.

Two tricks are used to create the impression that the rocket is continuing to travel upwards. First, *Procascend* makes the ground appear to fall away beneath the rocket. Then *Procmoon* moves the moon down the screen. After that the actual firework display is created by *Procburst*. The falling fragments of the rocket are shown moving down the screen and finally *Procfall* enhances the feeling of downward motion by moving the ground back up the screen.

Notes

Procgraphics: Characters 224-238 are re-defined by this procedure. Large plus, minus and divide signs are created by

224-226 (x, or Chr\$ 88, is used for the multiplication sign). The rocket's nose and body are built up from Chr\$ 227 and 228, while Chr\$ 229 and 230 make the fuse. Characters 231-233 form the rocket's exhaust flame and 234-237 are used to build up the composite character moon\$ at line 380.

Finally, Chr\$ 238 is used to form the character bomb\$, which, like moon\$, includes Chr\$ 32 to erase its path automatically on the screen.

Procinit: Line 450 is included in case the child types in a value for the variable 'answer' in *Procquestion* which causes the program to crash. The inclusion of such a line in any initialisation procedure will make a program far less prone to unexpected behaviour from the child using it! Array space is set up for the x and y co-ordinates of the bombs in *Procburst* by line 460. The procedure also switches off the auto-repeat and defines a suitable envelope for the sound effect of the stars when the rocket explodes.

Procsetup: Here the initial screen display is created with the rocket waiting on the ground with its fuse smouldering. Lines 520-560 select colours and set the flash rate for colour 10, which is used for the flickering end of the fuse. The ground is drawn by using Vdu 28 and CIs at lines 580, 590. The rocket is drawn by printing Chr\$ 227 and 228 in colour 2 and the *For*next loop between lines 650-670 draws the fuse. Finally, line 690 lights the end of

the fuse with colour 3.

Procquestion: All the text which appears on the screen is confined to a window set up by using Vdu 28 at line 730. Note how 760, and subsequent lines, include single apostrophes to space out neatly everything which is printed in the window. Line 770 delays the program with *Procpause*. Here the variable P is used to adjust the length of the pause. The questions given to the child are controlled by the *Repeat-Until* loop between lines 780-970. It can be seen that the test continues indefinitely until the child has achieved five correct answers.

Lines 800-840 choose at random whether the question will be addition, subtraction, etc, and also select suitable numbers for each. The routine between 860-960 accepts answers from the child. It can be seen, from the condition at line 950, that if the child types in an incorrect response the same question will be set again. This happens three times before line 960 tells the child what his answer should have been. Line 960 also rewards correct answers with *Procrigh*t.

Procpause: Because different length delays are required by separate parts of the program, the time taken to execute the empty *For-Next* loop at line 1030 is controlled by the value given to the variable P. Of course the value of P does not always have to be stated before summoning *Procpause* but only when the delay required differs from the last value given to P. Note that again I has to be declared as a local variable.

*Procrigh*t: This rewards correct answers by first increasing the value of 'score' at line 1070 and then shortening the fuse. To do this the text window is restored to the whole screen by Vdu 26 at line 1110. Line

```
10 REM Firework - Pat Hall, July '83
```

```
20
```

```
30 MODE 5
```

```
40 PROCgraphics
```

```
50 PROCinit
```

```
60 REPEAT
```

```
70 PROCsetup
```

```
80 PROCquestion
```

```
90 PROclaunch
```

```
100 PROCascend
```

```
110 PROCmoon
```

```
120 PROcburst
```

```
130 PROcfall
```

```
140 UNTIL FALSE
```

```
150 END
```

```
160
```

```
170 DEF PROCgraphics
```

```
180 REM Signs
```

```
190 VDU 23, 224, &18, &18, &18, &FF, &FF, &18, &18, &18
```

```
200 VDU 23, 225, &0, &0, &0, &FF, &FF, &0, &0, &0
```

```
210 VDU 23, 226, &18, &18, &0, &FF, &0, &18, &18, &0
```

```
220 REM Nose
```

```
230 VDU 23, 227, &0, &0, &18, &18, &3C, &3C, &7E, &7E
```

```
240 REM Body
```

```
250 VDU 23, 228, &7E, &7E, &7E, &7E, &7E, &7E, &7E, &7E
```

```
260 REM Fuse
```

```
270 VDU 23, 229, &0, &0, &0, &0, &0, &0, &0, &0, &FF
```

```
280 VDU 23, 230, &3, &6, &C, &18, &30, &60, &C0, &FF
```

```
290 REM Exhaust
```

```
300 VDU 23, 231, &10, &18, &1C, &1C, &38, &38, &18, &8
```

```
310 VDU 23, 232, &10, &18, &18, &1C, &3E, &3E, &77, &77
```

```
320 VDU 23, 233, &EE, &EE, &7C, &7C, &38, &18, &18, &8
```

```
330 REM Moon
```

```
340 VDU 23, 234, &1, &3, &F, &F, &1F, &1F, &3F, &3F
```

```
350 VDU 23, 235, &80, &C0, &F0, &F0, &F8, &F8, &FC, &FC
```

```
360 VDU 23, 236, &3F, &3F, &1F, &1F, &F, &F, &3, &1
```

```
370 VDU 23, 237, &FC, &FC, &F8, &F8, &F0, &F0, &C0, &80
```

```
380 moon$ = CHR$ 32 + CHR$ 32 + CHR$ 10 + CHR$ 8 + CHR$ 8 + CHR$ 234 + CHR$ 235 + CHR$ 10 +
```


1120 then overprints the end of the fuse with `CHR$ 230 + CHR$ 32`, thus decreasing its length whilst still leaving its flickering end. Line 1130 re-establishes the text window before the current score is printed as a prompt.

Proclaunch: Before the rocket is launched, the text window is completely removed by line 1200. The final part of the fuse is removed at 1220. Then the rocket's sound effect is switched on by line 1240. Motion up the screen is created by the *For-Next* loop between lines 1260-1440. The rocket's nose is printed by line 1300. Its body is printed by lines 1330 and 1350. Each line is preceded by a conditional statement which adjusts the background colour to match ground or sky.

The rest of the loop deals with the rocket's exhaust. Note that the colour of the exhaust is changed from green/magenta to black/white when it is no longer seen against the ground. This is controlled by line 1380. Finally, line 1450 increases the size of the rocket exhaust.

Procascent: The rocket never rises beyond mid-screen. However, the illusion of further upwards travel is produced by the *For-Next* loop between lines 1500-1530. Here line 1510 successively removes whole lines of the ground in a way which simulates the view which would be seen from the rocket itself. The final strip of ground is deleted by using the text window at lines 1540, 1550.

Procmoon: Further animation is produced in this procedure by moving the composite character, moon\$, down the screen using the *For-Next* loop between lines 1610-1640. The final position of moon\$ is erased by lines 1650, 1660.

Procburst: Line 1720 explodes the rocket by turning off its sound and clearing the screen. Lines 1730-1780 select suitable colours and sounds and immediately the two nested *For-Next* loops between lines 1800-1930 create the starburst explosion on the screen. The co-ordinates chosen for *Print Tab* between 1830-1910 build up a large symmetrical pattern. This display

continues for six seconds and is then replaced by five randomly located bombs which burst on the screen at co-ordinates determined by the loop between 1950-1980. The nested *For-Next* loops between 2100-2150 let the bombs fall gently down the screen until line 2160 clears the display completely.

Procfall: This procedure is the reverse of *Procascent*. The text window at line 2220 places the first strip of green ground at the bottom of the screen and then the *For-Next* loop from 2240-2270 builds up the rest in a way that suggests a gradual fall back to earth. The intention is that the eye is following imaginary debris from the explosion. Finally, exactly the same amount of green is present at the bottom of the screen as was there originally and the ground is ready for another rocket, and another five questions.

This is an extract from *Programming for Education on the BBC computer* by John Scriven and Patrick Hall and published by Sunshine Books.

```

CHR$ 8 + CHR$ 8 + CHR$ 236 +
CHR$ 237
390 REM Bomb
400 VDU 23, 238, &18, &7E, &7E, &FF,
&FF, &7E, &7E, &18
410 bomb$ = CHR$ 32 + CHR$ 10 +
CHR$ 8 + CHR$ 238
420 ENDPROC
430
440 DEF PROCinit
450 ON ERROR RUN
460 DIM xcoord( 5 ) : DIM ycoord( 5 )
470 * FX 11, 0
480 ENVELOPE 1, 1, 2, 3, 4, 15, 20,
15, 127, 0, 0, -1, 127, 127
490 ENDPROC
500
510 DEF PROCsetup
520 VDU 19, 1, 0, 0, 0, 0
530 VDU 19, 2, 4, 0, 0, 0
540 VDU 19, 3, 10, 0, 0, 0
550 * FX 9, 10
560 * FX 10, 10
570 REM Draw ground
580 VDU 28, 0, 31, 19, 20
590 COLOUR 129 : CLS : VDU 26
600 VDU 19, 1, 2, 0, 0, 0
610 REM Draw rocket on ground
620 COLOUR 2 : COLOUR 129
630 PRINT TAB( 10, 25 ) : CHR$ 227
640 PRINT TAB( 10, 26 ) : CHR$ 228
TAB( 10, 27 ) : CHR$ 228
650 FOR I = 11 TO 15
660 PRINT TAB( I, 27 ) : CHR$ 229
670 NEXT I
680 COLOUR 3
690 PRINT TAB( 16, 27 ) : CHR$ 230
700 ENDPROC
710
720 DEF PROCquestion
730 VDU 28, 4, 14, 15, 5
740 COLOUR 0 : COLOUR 130 : CLS
750 PRINT " FIREWORKS!"
760 PRINT " To launch"

" the rocket" " you must"
" get five" " correct"
" answers."
770 P = 10 : PROCpause : score = 0
780 REPEAT
790 REM Select question
800 type = RND( 4 )
810 IF type = 1 THEN A = RND( 100 )
: B = RND( 100 ) : C = A + B :
sign$ = CHR$ 224
820 IF type = 2 THEN A = RND( 100 )
: B = INT ( A * RND( 1 ) ) : C =
A - B : sign$ = CHR$ 225
830 IF type = 3 THEN A = RND( 100 )
: B = RND( 10 ) : C = A * B :
sign$ = CHR$ 88
840 IF type = 4 THEN B = RND( 10 ) :
A = B * RND( 100 ) : C = A / B :
sign$ = CHR$ 226
850 REM Present question
860 try = 0
870 REPEAT
880 try = try + 1
890 PRINT " What is"
900 PRINT TAB( 1 ) : A CHR$ 32 sign$
CHR$ 32 B CHR$ 32 CHR$ 63
* FX 15, 0
910 INPUT TAB( 1 ), answer
920 IF answer = C THEN
SOUND 1, -15, 150, 10 ELSE
SOUND 1, -15, 100, 10
940 PROCpause
950 UNTIL answer = C OR try = 3
960 IF answer = C THEN PROCright
ELSE PRINT " No," : C
970 UNTIL score = 5
980 PRINT " So we can"
" CELEBRATE"
990 PROCpause
1000 ENDPROC
1010
1020 DEF PROCpause : LOCAL I
1030 FOR I = 1 TO P * 300 : NEXT I
1040 ENDPROC

```

Continued on page 27

THE FABULOUS CASSETTE

50

FROM **cascade**

50 GAMES ON ONE GREAT CASSETTE

**ONLY
£9.95**

DON'T MISS THIS
INCREDIBLE OFFER

50 FANTASTIC
GAMES ON
ONE CASSETTE

ONLY £9.95 (INC. P&P and VAT)



EXPRESS DELIVERY - ORDER NOW

Please send me by return of post, Cassette 50 at £9.95 per tape. I enclose a cheque/postal order for made payable to Cascade Games. £

Name

Address

Post Code

Country

Dealers & Stockists enquiries welcome.

Please send me (tick appropriate box)

Spectrum ☐ VIC ☐



Cascade Games,
Suite 4, 1-3 Haywra Crescent,
Harrogate, N. Yorkshire, HG1 5BG,
England.
Telephone: (0423) 504526


```

1050
1060 DEF PROCright
1070 score = score + 1
1080 PRINT " Well done" " The fuse"
    " is getting" " shorter !"
1090 PROCpause
1100 REM Shorten fuse
1110 VDU 26 : COLOUR 3 : COLOUR 129
1120 PRINT TAB( 16 - score, 27 )
    CHR$ 230 + CHR$ 32
1130 VDU 28, 4, 14, 15, 5
1140 COLOUR 0 : COLOUR 130 : CLS
1150 PRINT " You have"
1160 PRINT: CHR$ 32 score " right."
1170 ENDPROC
1180
1190 DEF PROClaunch
1200 COLOUR 128 : CLS : VDU 26
1210 COLOUR 129
1220 PRINT TAB( 11, 27 ) CHR$ 32
1230 REM Sound of rocket
1240 SOUND 0, -15, 6, -1
1250 REM Move rocket up screen
1260 FOR I = 25 TO 15 STEP - 1
1270     REM Rocket's nose
1280     COLOUR 2
1290     IF I < 20 THEN COLOUR 128 ELSE
        COLOUR 129
1300     PRINT TAB( 10, I ) CHR$ 227
1310     REM Rocket's body
1320     IF I < 19 THEN COLOUR 128 ELSE
        COLOUR 129
1330     PRINT TAB( 10, I + 1 ) CHR$ 228
1340     IF I < 18 THEN COLOUR 128 ELSE
        COLOUR 129
1350     PRINT TAB( 10, I + 2 ) CHR$ 228
1360     REM Rocket's exhaust
1370     COLOUR 3
1380     IF I < 17 THEN
        VDU 19, 3, 8, 0, 0, 0
1390     IF I < 17 THEN COLOUR 128 ELSE
        COLOUR 129
1400     PRINT TAB( 10, I + 3 ) CHR$ 231
1410     IF I < 16 THEN COLOUR 128 ELSE
        COLOUR 129
1420     PRINT TAB( 10, I + 4 ) CHR$ 32
1430     P = 1 : PROCpause
1440     NEXT I
1450     PRINT TAB( 10, 18 ) CHR$ 232
        TAB( 10, 19 ) CHR$ 233
1460 ENDPROC
1470
1480 DEF PROCascent
1490 COLOUR 128
1500 FOR I = 20 TO 29
1510     PRINT TAB( 0, I ); SPC ( 20 )
1520     PROCpause
1530     NEXT I
1540 VDU 28, 0, 31, 19, 29
1550 COLOUR 128 : CLS : VDU 26
1560 ENDPROC
1570
1580 DEF PROCmoon
1590 VDU 19, 1, 3, 0, 0, 0
1600 COLOUR 1
1610 FOR I = 0 TO 28
1620     PRINT TAB( 3, I )moon$ : VDU 30
1630     PROCpause
1640     NEXT I
1650 PRINT TAB( 3, 29 ) SPC ( 2 )
1660 PRINT TAB( 3, 30 ) SPC ( 2 )
1670 VDU 30
1680 ENDPROC
1690
1700 DEF PROCburst
1710 P = 10 : PROCpause
1720 CLS : SOUND 16, 0, 6, 1
1730 VDU 19, 1, 9, 0, 0, 0
1740 VDU 19, 2, 10, 0, 0, 0
1750 VDU 19, 3, 11, 0, 0, 0
1760 SOUND &201, 1, 100, 120
1770 SOUND &202, 1, 100, 120
1780 SOUND &203, 1, 100, 120
1790 REM Print starburst
1800 FOR I = 1 TO 20
1810     COLOUR RND( 3 )
1820     FOR J = 1 TO 9
1830         PRINT TAB( 10+J, 16 ) CHR$ 42
1840         PRINT TAB( 10-J, 16 ) CHR$ 42
1850         PRINT TAB( 10, 16+J ) CHR$ 42
1860         PRINT TAB( 10, 16-J ) CHR$ 42
1870         IF J > 6 THEN 1920
1880         PRINT TAB( 10 + J, 16 + J )
            CHR$ 42
1890         PRINT TAB( 10 + J, 16 - J )
            CHR$ 42
1900         PRINT TAB( 10 - J, 16 + J )
            CHR$ 42
1910         PRINT TAB( 10 - J, 16 - J )
            CHR$ 42
1920         NEXT J
1930     NEXT I
1940 REM Select position for bombs
1950 FOR I = 1 TO 5
1960     xcoord( I ) = RND( 19 )
1970     ycoord( I ) = RND( 19 )
1980     NEXT I
1990 VDU 19, 2, 8, 0, 0, 0
2000 COLOUR 2 : CLS
2010 * FX 9, 5
2020 * FX 10, 15
2030 REM Explode bombs
2040 FOR I = 1 TO 5
2050     SOUND 0, -15, 6, 10
2060     PRINT TAB( xcoord(I), ycoord(I))
        bomb$
2070     P = 3 : PROCpause
2080     NEXT I
2090 REM Move bombs downwards
2100 FOR I = 1 TO 10
2110     FOR J = 1 TO 5
2120         PRINT TAB( xcoord(J),
            ycoord(J) + I ) bomb$ : VDU 30
2130     NEXT J
2140     P = 1 : PROCpause
2150     NEXT I
2160 CLS
2170 ENDPROC
2190 DEF PROCfall
2200 P = 2 : PROCpause
2210 VDU 19, 1, 2, 0, 0, 0
2220 VDU 28, 0, 31, 19, 29
2230 COLOUR 129 : CLS : VDU 26
2240 FOR I = 29 TO 20 STEP -1
2250     PRINT TAB( 0, I ) SPC ( 20 )
2260     PROCpause
2270     NEXT I
2280 ENDPROC

```


AGF

PROGRAMMABLE JOYSTICK INTERFACE

for Spectrum or ZX81

ONLY
32.95
+£100pp

MICRODRIVE
COMPATIBLE

ABOUT OUR INTERFACE

The AGF Programmable Joystick Interface is a unique design offering the use of any Atari-compatible joystick with absolutely all software, whether it is cassette or ROM cartridge, with the Sinclair Spectrum or ZX81.

The hardware programmable interface requires no additional software and accurately replicates the keys of the computer in a manner which is responsive to absolutely ALL key reading methods, both BASIC and Machine Code.

The interface does not interfere with key operation and can therefore be used simultaneously with the keyboard.

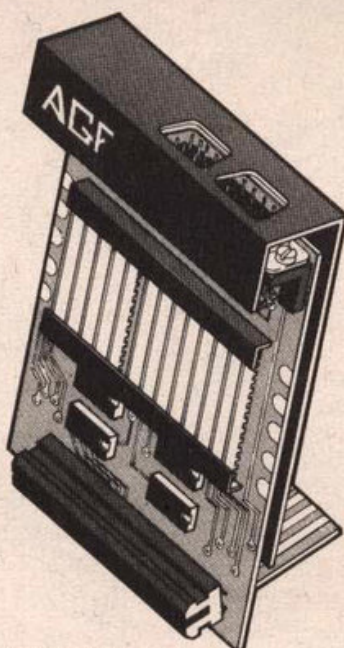
There is no need to remove the interface once fitted as the rear extension connector will accommodate further expansion, i.e. printers or RAM packs etc. This important feature avoids excessive wear to the expansion port.

The key replication principle pioneered by AGF means that your own programs can use eight directional joystick movement by utilising simple key reading BASIC.

Two joystick sockets are provided which share the same keys, for use with the majority of two player games. Several interfaces may be used on the same computer for multiple joystick applications.

The interface is programmed by a two digit code, which is looked up on a programming chart supplied, for each direction and firing button. The two numbers are then selected on a pair of leads which are clipped onto appropriately numbered strips on the interface.

Once configured this can be marked on a Quick Reference Programming Card for storing with the game. As the programming is *not* power dependent the interface retains the last configuration made and can be immediately used when next switched on.



KEY FEATURES

- ★ Programmable design gives TOTAL software support.
- ★ Accepts Atari, Competition Pro, Wico, Starfighter, Quick Shot, Le Stick etc.
- ★ Rear extension connector for all other add-ons.
- ★ Free demo program and instructions.

PACKAGE CONTENTS SUPPLIED

- Programmable Interface Module as illustrated, complete with clip-on programming leads.
- Self adhesive programming chart detailing how to define which key is simulated by UP, DOWN, LEFT, RIGHT, and FIRE. This can be fixed on to the case of your computer or if preferred the protective backing can be left on. The chart is made of a very durable reverse printed plastic and is extremely easy to read.
- One pack of ten Quick Reference Programming Cards for at-a-glance setting to your games requirements. The card allows you to mark the configuration in an easy to read fashion with space to record the software title and company name.
- Video Graffiti demonstration program which is written totally in BASIC to illustrate how all eight directions and fire can be read. This is also a useful high resolution drawing program.
- 12 months guarantee and full written instructions.

JOYSTICKS

CONTROLLERS

FOR USE WITH OUR INTERFACE
Module or VIC 20, Commodore 64,
Atari VCS, Atari 400, Atari 800

If you require extra Joysticks for our
original interface module mark order
'OLD' Joysticks

ONLY £7.54 inc VAT + P&P

FROM: MR/MRS/MISS

ADDRESS

SEND C.W.O. (NO STAMP NEEDED) TO: A.G.F. HARDWARE, DEPT. PW,

FREEPOST, BOGNOR REGIS, WEST SUSSEX, PO22 9BR

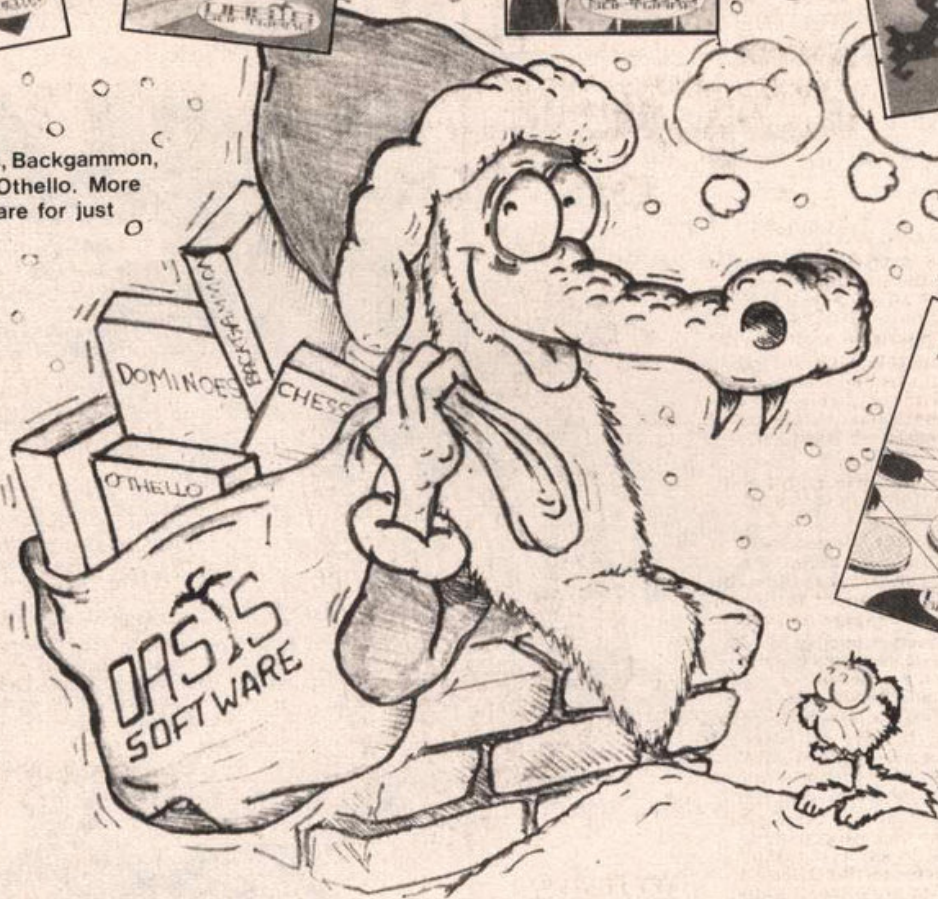
QTY	ITEM	ITEM PRICE	TOTAL
	PROGRAMMABLE INTERFACE	33.95	
	JOYSTICK(S)	7.54	
	PACK(S) QUICK REFERENCE CARDS	1.00	
ONE	VIDEO GRAFFITI	FREE	
ZX81 <input type="checkbox"/> ZX SPECTRUM <input type="checkbox"/>		Please tick	FINAL TOTAL
DEALER ENQUIRIES WELCOME		EXPORT PRICES ON APPLICATION	

NEW RELEASES FOR CHRISTMAS FOR THE DRAGON 32



MIND GAMES COMPENDIUM

Chess, Dominoes, Backgammon,
Invader Cube and Othello. More
than £30 of software for just
£19.95



BASIC COMPILER

SPRINT
Convert your BASIC programs into pure smooth
6809 machine code with 'SPRINT' - the fastest
complete integer compiler on the market.
SPRINT will handle all the DRAGON'S sound and
graphics commands. FOR-NEXT loops, arrays
strings - the lot! In fact, so that you can compile
even bigger BASIC programs, SPRINT will compile
your program straight from tape!
If you think £14.95 sounds too cheap to believe,
go along to your local dealer and ask for a demo,
before you buy.

ALL OASIS PRICES INCLUDE
VAT AND P&P AND EVERY
OASIS PRODUCT IS PROMPTLY
DESPATCHED AND INCLUDES
A LIFETIME GUARANTEE.

If your local dealer does not stock
these products then let us know his
address and we will contact him.

OASIS SOFTWARE, Dept (PC 48)
9a Alexandra Parade,
Weston-super-Mare. Tel. 0934 515265

Please send me
SPRINT £14.95 ☐
MIND GAMES COMPENDIUM £19.95 ☐
SINGLE GAME CASSETTE £ 9.95 ☐

I enclose Cheque/P.O. for £

NAME
ADDRESS



ACCESS ORDERS
TAKEN BY PHONE
24 HOURS A DAY



0934 515265

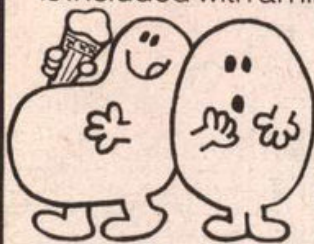
More than fun and games!

FIRST STEPS with the Mr. Men

by Primer Educational Software

The ever-popular Mr. Men help prepare young children for reading with four simple and absorbing games designed to exercise essential skills as well as entertain.

An easy-to-use, colour-coded key guide is included with an illustrated introductory book, featuring the Mr. Men. For ages 4 to 8 years. Available now on cassette for the BBC B (Spectrum 48K and Electron versions coming shortly.) **£8.95**



QUICK THINKING!

by Widgeit Software

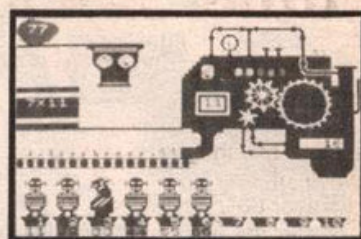
Two mind-stretching, space-age games to test mental arithmetic and nimble fingers.

In **Sum Vaders** alien robots invade the earth. Only quick thinking and fast reactions can prevent them. Several levels of difficulty and a two-player game with a handicap option make Sum Vaders equally testing for all family members, from 8 years to adult.

Robot Tables challenges the young player to make a series of perfect robots.

Knowing your multiplication tables is the key to controlling the robot-making machine. With a learning mode and a testing mode, Robot Tables is a fun way

for early learners, and more advanced children, to master an important and often neglected skill.



Available now on cassette for the Spectrum 48K and Commodore 64 (BBC B and Electron versions coming shortly). **£6.95**

CAESAR THE CAT

by Andromeda Software

Meet Caesar, a cheeky young cat on duty in a well-stocked larder. He's kept busy chasing a gang of hungry mice eating the family's food. Playing against the clock, you guide Caesar along crowded shelves to pounce on the mice.

A fast, colourful, all-action, arcade-style game with catchy music and a best-score record. Challenging for high-scoring arcade addicts as well as great fun to play for the novice.

Available on cassette for the Commodore 64

£8.95



Prices include VAT and post and packaging. MIRRORSOFT programs are available from selected branches of W.H. Smith and Boots, and other leading software stockists. Trade enquiries welcome: phone 01-822 3580.

MIRRORSOFT

SOFTWARE FOR ALL THE FAMILY

To MIRRORSOFT, PO Box 50, Bromley, Kent, BR2 9TT

Please send me the following (enter number required of each item in the space provided):

	Price	Spectrum 48K (01)	BBC B (03)	Commodore 64 (05)
First Steps with the Mr. Men (MM01)	£8.95			
Quick Thinking! (QT01)	£6.95			
Caesar the Cat (CC01)	£8.95			

I enclose a cheque/PO for £..... made payable to "Readers' Account: Mirror Group Newspapers Ltd".

Or please debit my ACCESS/BARCLAYCARD for the sum of £.....

PC 3

I understand that my remittance will be held on my behalf in the bank account named above until the goods are despatched.

Signature.....
Name.....
Address.....
Postcode.....

Offer applies to Great Britain and Eire only. Please allow up to 28 days for delivery in the UK. MIRRORSOFT is a registered trade mark of Mirror Group Newspapers Ltd., Co. Reg No: 156660. Reg. Office: Holborn Circus, London EC1.

Another brick in the wall

Les Allan presents his own version of the classic arcade game Breakout

Breakout for the Commodore 64, a revival of the classic arcade game, employs user defined graphics to replace the character set and construct the walls. Sprite graphics are used to create the title page and control the movement of the bat and ball.

Two machine code routines are used to construct each of the two walls, one for the

title page and the other for the walls used in the game itself. Movement of the bat and ball is also by machine code.

You are given four balls with which you have to dislodge bricks from the wall by repeatedly hitting the ball with your bat. Points are given for each section of the wall that is destroyed and an extra ball is awarded for each wall that is broken

through.

A score table routine is provided at the end of each game which lists the ten top scores against their names.

Variables

A	read data
J	value returned by joystick
T	general purpose
X	ball x
Y	ball y
Z	pointer for score table position
BA	balls left
BX	bat x
BY	bat y
BZ	sprite to character conversion
DX	ball increment x
DY	ball increment y

Continued on page 33

Address Decml Hex	Machine Code	Assembly Code Program
49152 C000	A9 02	LDRAIM 2
49154 C002	8D 84 03	STA 900
49157 C005	A2 FA	LDXIM 250
49159 C007	A0 00	LDYIM 0
49161 C009	9D FF D7	STAX 55295
49164 C00C	9D F9 D8	STAX 55345
49167 C00F	9D F3 D9	STAX 55395
49170 C012	9D ED DA	STAX 56045
49173 C015	98	TYA
49174 C016	9D FF 03	STAX 1023
49177 C019	9D F9 04	STAX 1273
49180 C01C	9D F3 05	STAX 1523
49183 C01F	9D ED 06	STAX 1773
49186 C022	AD 84 03	LDA 900
49189 C025	CA	DEX
49190 C026	F0 03	BEG 3
49192 C028	4C 09 C0	JMP 49161
49195 C02B	A9 20 00	LDRAIM 32
49197 C02D	A2 24	LDXIM 36
49199 C02F	9D B9 05	STAX 1463
49202 C032	9D E1 05	STAX 1503
49205 C035	9D 09 06	STAX 1545
49208 C038	9D 01 06	STAX 1585
49211 C03B	9D 59 06	STAX 1625
49214 C03E	9D 81 06	STAX 1665
49217 C041	9D A9 06	STAX 1705
49220 C044	9D D1 06	STAX 1745
49223 C047	9D F9 06	STAX 1785
49226 C04A	9D 21 07	STAX 1825
49229 C04D	9D 49 07	STAX 1865
49232 C050	9D 71 07	STAX 1905
49235 C053	CA	DEX
49236 C054	F0 03	BEG 3
49238 C056	4C 2F C0	JMP 49199
49241 C059	60	RTS
49242 C05A	A2 50	LDXIM 80
49244 C05C	A9 00	LDRAIM 0
49246 C05E	9D FF 03	STAX 1023
49249 C061	9D 4F 04	STAX 1103
49252 C064	9D 9F 04	STAX 1183
49255 C067	9D EF 04	STAX 1263
49258 C06A	A9 02	LDRAIM 2
49260 C06C	9D FF D7	STAX 55295
49263 C06F	A9 04	LDRAIM 4
49265 C071	9D 4F D8	STAX 55375
49268 C074	A9 06	LDRAIM 6
49270 C076	9D 9F D8	STAX 55455
49273 C079	A9 08	LDRAIM 8
49275 C07B	9D EF D8	STAX 55535
49278 C07E	CA	DEX
49279 C07F	F0 03	BEG 3
49281 C081	4C 5C C0	JMP 49244
49284 C084	A2 20	LDXIM 40
49286 C086	A9 A0	LDRAIM 160
49288 C088	9D BF 07	STAX 1983
49291 C08B	A9 0E	LDRAIM 14
49293 C08D	9D BF DB	STAX 56255
49296 C090	CA	DEX
49297 C091	F0 03	BEG 3
49299 C093	4C 86 C0	JMP 49286
49302 C096	60	RTS
49303 C097	AD 85 03	LDA 901
49306 C09A	8D 00 D0	STA 53240
49309 C09D	AD 86 03	LDA 902
49312 C0A0	8D 01 D0	STA 53249
49315 C0A3	AD 87 03	LDA 903
49318 C0A6	8D 02 D0	STA 53250
49321 C0A9	AD 88 03	LDA 904
49324 C0AC	8D 10 D0	STA 53264
49327 C0AF	60	RTS

Get compatible at Currys. You can't buy cheaper.

Choose your computer peripherals at Currys. There's a great range of top names to choose from. And with Currys Price Promise you can't buy cheaper.

SINCLAIR ▶

ZX Spectrum 48K
Powerful 48K home computer with 8 colour high resolution graphics, sound and full size moving keyboard.

CURRYS PRICE £129.99 Wide choice of credit terms available

Also available: **SINCLAIR ZX Spectrum 16K**

CURRYS PRICE £99.99

Satisfaction Guaranteed

* You can't buy cheaper thanks to Currys Price Promise. Buy any item from Currys then if you find you could have bought the same thing cheaper locally at the time of purchase call back within 7 days and we'll refund the difference.

* Wide choice of credit terms available. Details and written quotations from any Currys branch or from Currys Ltd, 46-50 Uxbridge Road, London W5 2SU. (Typical APR 39.9%).

* Up to £500 Instant Credit for most holders of recognized credit cards.



Recommended by the
Sinclair Users Club

FAMOUS NAMES — A GREAT CHOICE!

	Currys Price
Commodore C2N Cassette Recorder	£44.99
Atari 410/1010 Cassette Recorder	£49.99
Vic Joysticks (Usual Price £7.50)	£6.99
Atari Joysticks	£13.99
CBM 1541 Disc Drive	£229.99
CBM 1520 Printer/Plotter	£169.99
CBM 801 Printer	£229.99
Atari Disc Drive	£229.99
Atari Printer	£229.99

Stocks of some items are limited and may not be available in all branches particularly when demand is heavy. Items have been specially reduced but may not have been sold at the higher price for a period of 28 consecutive days in the previous 6 months.

TRIUMPH

CR-1610
Computer Compatible
Cassette Recorder
Compatible with most personal computers
for programme and data storage. Digital
tape counter. Automatic level control and
mains battery operation.

BEST BUY £29.99

Currys
The electrical people

PROGRAMMING AIDS AND LANGUAGES FROM ...

Audiogenic LTD

FOR COMMODORE VIC-20 AND 64!

VP052 BUTI PLUS - £39.95 - Basic Programming Aid Commands PLUS Machine Code Monitor PLUS 3K Expansion! Basic aids include - APPEND, AUTO, DELETE, DUMP, EDIT, FIND, HELP, RENUMBER, REPEAT, STEP, TRACE, UNNEW, VIC, and DEC to HEX. Monitor Commands - ASSEMBLE, DISASSEMBLE, CENTRONICS, FILL, GO, MEMORY, HUNT, REGISTER, PRINTED DISASSEMBLE, LOAD, QUICK EXECUTE, WALK CODE, SAVE, TRANSFER, EXIT.

VP074 MONITOR VIC - £19.95 - Monitor on its own. Commands as above.

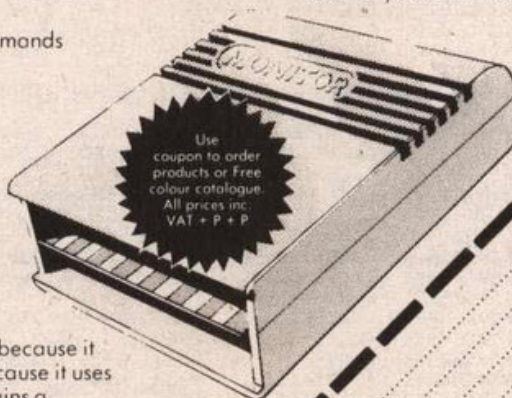
SS074 MONITOR 64 - £29.95 - 64 version. Commands as above.

VP078 MIKRO ASSEMBLER - £48.95 - Cartridge Assembler program for the VIC - Includes 3K extra memory. Write your machine language source code on Basic Lines which can be manipulated using the included toolkit commands. MIKRO uses standard MOS mnemonics, and features ASSEMBLER and DISASSEMBLER, plus TIM monitor commands, and special hi-res, sound, and joystick extensions.

SS076 FORTH 64 - £29.95 - Audiogenic Forth is very fast because it compiles right down to machine code, and very compact because it uses special screen compression routines. Audiogenic Forth contains a dictionary of over 200 Forth words, but the great thing about Forth is that you can define your own commands! Audiogenic Forth gives you full error messages (instead of codes), a full scrolling screen editor, and a comprehensive manual.

VP076 FORTH VIC - £24.95 - As above, but includes special VIC colour and sound commands. This version must be used in a motherboard with 8K+ expansion.

VP076/M FORTH VIC (with memory) - £39.95 - As VP076, but includes 3K expansion built-in so that you don't need a motherboard and expansion.



Use coupon to order products or free colour catalogue. All prices inc. VAT + P + P

(PRODUCT & CODE NO.)

PLEASE SEND ME
NAME ADDRESS

**AUDIOGENIC LTD.,
P.O. BOX 88,
READING,
BERKS.**

COMMODORE 64

RP repeat counter
SC current score
SU SUM of data used in error trap routine
VC video chip start address
AS "hme-crs dwn 25 times"
SCS score table name

Notes

14 clear screen: dimension arrays
16 video chip start address: screen black
18 generate AS (simulate PRINT AT)
20 generate strings for score table
22 screen message during data transfer
24 clear sound chip
26 volume to maximum
28 set up waveform and note for voice 1
30 set up waveform and note for voice 3
36 reserve memory
38 turn off keyscan interrupt timer
40 switch in character
42 read complete character set from ROM to RAM
44 switch in I/O
46 restart keyscan interrupt timer
52 clear variables
54 redefine @-Z
58 redefine 0-9
66 define BREAKOUT, bat and ball
74 set up machine code routine
76 error trap checks for correct data entry
82 set character pointer to 14336: extended background to light blue: title page machine code routine
84-90 text for title page
92 expand sprites in x and y
94-108 define shape, location and colour of sprite
110 switch in sprites 1 to 8
112 print in author's name
114 clear variables
116-122 switch in extended background (port 2)
124-128 start game if joystick used or recycle title
130 sprites to standard size
136 clear screen: set variables
142 machine code routine to set screen for game
148 define start of bat and ball
150-152 print balls left and score
154 start position and ball colour
156 start position and bat colour
158 clear msb of screen and sprite to character detection: sprites 1 and 2 on
164 ball increment
166 reverse direction if outside range
168-170 bat increment
172 clear sound chip
174 locate bat and ball position in RAM

176 machine code routine to move bat and ball
178 check for bat and ball hit: turn on voice 3
180 check for bat and ball miss
182 check for balls left
184 check for BREAKOUT
186 check for ball to wall hit
188 cal. character location of sprite and error trap routine for space
190 demolish wall
192 if ball on way up then reverse direction
194 turn on voice 1
196 print score: clear sprite to character detection
198 return to start of sequence
204 clear screen: colour cyan
206 turn off sprites 1 and 2
208-210 check position for current score
212 clear keyboard buffer
214-218 input for player's name
220 reduce length to 11 if greater than 11
222-224 reduce length to last character
226 if score less than lowest then print score table
228 rearrange score table position
234 enter current score to table
240-248 print score table
250 clear variables
252-254 flash joystick
256 check for joystick
258 repeat flash sequence if no joystick or less than 50 repeats
260 screen black: goto title page
268-514 data for character set and sprites
520-564 data for machine code

Machine code routine

49152 load accumulator with red (2)
49154 store contents of accumulator in 900
49157 load x with 250
49159 load y with brick (0)
49161 store red with x increment starting 55295
49164 store red with x increment starting 55545
49167 store red with x increment starting 55795
49170 store red with x increment starting 56045
49173 transfer brick to accumulator
49174 store brick with x increment starting 1023
49177 store brick with x increment starting 1273
49180 store brick with x increment starting 1523
49183 store brick with x increment starting 1773
49186 load accumulator with contents of 900
49189 decrement x register by 1
49190 branch forward 3 if 0
49192 return to 49161 until screen full
49195 load accumulator with space (32)
49197 load x with 36
49199 store space with x increment starting 1465
49202 store space with x increment starting 1505
49205 store space with x increment starting 1545

49208 store space with x increment starting 1585
49211 store space with x increment starting 1525
49214 store space with x increment starting 1665
49217 store space with x increment starting 1705
49220 store space with x increment starting 1745
49223 store space with x increment starting 1785
49226 store space with x increment starting 1825
49229 store space with x increment starting 1865
49232 store space with x increment starting 1905
49235 decrement x register by 1
49236 branch forward 3 if 0
49238 return to 49199 until complete
49241 return to basic program
49242 load x with 80
49244 load accumulator with brick (0)
49246 store brick with x increment starting 1023
49249 store brick with x increment starting 1103
49252 store brick with x increment starting 1183
49255 store brick with x increment starting 1263
49258 load accumulator with red (2)
49260 store red with x increment starting 55295
49263 load accumulator with purple (4)
49265 store purple with x increment starting 55375
49268 load accumulator with blue (6)
49270 store blue with x increment starting 55455
49273 load accumulator with orange (8)
49275 store orange with x increment starting 55535
49278 decrement x register
49279 branch forward 3 if 0
49281 return to 49244 until complete
49284 load x with 40
49286 load accumulator with reverse space (160)
49288 store reverse space with x increment starting 1983
49291 load accumulator with light blue (14)
49293 store light blue with x increment starting 56255
49296 decrement x register
49297 branch forward 3 if 0
49299 return to 49286 until complete
49302 return to basic program
49303 load accumulator with ball x
49306 store ball x in VC
49309 load accumulator with ball y
49312 store ball y in VC+1
49315 load accumulator with bat x
49318 store bat x in VC+2
49321 load accumulator with sprite msb
49324 store msb in VC+21
49327 return to basic program

Please note that standard abbreviations for basic keywords must be used to satisfy some line lengths that would otherwise exceed a total of 80 characters. These appear on pages 130 and 131 of the Users Manual.

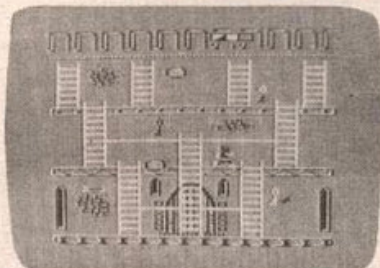
```
10 :
12 REM ##### CLEAR SCREEN / SET INITIAL VARIABLES #####
14 PRINTCHR$(147);DIMS(10);SC$(10)
16 VC=53248:POKEVC+32,0:POKEVC+33,0
18 FORT=1T025:AS=A$+CHR$(17):NEXT A$=CHR$(19)
  +A$:FORT=1T010:SC(T)=0
20 SC$(T)=CHR$(154)+CHR$(156)+CHR$(18)+
  64 BREAKOUT:CHR$(146)+CHR$(154)+
  "###":NEXT
22 PRINTLEFT$(A$,13)SPC(8);CHR$(5);"SETTING UP
  CHARACTER SET"
24 FORT=0T024:POKE54272+T,0:NEXT
26 POKE54296,15
28 POKE54276,32:POKE54277,24:POKE54278,40:POKE54273,
  8:POKE54272,147
30 POKE54290,16:POKE54291,136:POKE54292,
  129:POKE54287,6:POKE54286,147
32
34 REM ##### PROTECT MEMORY / TRANSFER DATA
  FROM ROM TO RAM #####
36 POKE52,48:POKE56,48
38 POKE56334,PEEK(56334)AND254
40 POKE1,PEEK(1)AND251
42 FORT=0T02048:POKE14336+T,PEEK(53248+T):NEXT
44 POKE1,PEEK(1)OR4
46 POKE56334,PEEK(56334)OR1
48
50 REM ##### SET UP CHARACTERS #####
52 T=0:SUM=0
54 READA:IFAC<0-1THENPOKE14336+T,A:T=T+1:SUM=SUM+A:GOTO54
56 T=0
58 READA:IFAC<0-1THENPOKE14720+T,A:T=T+1:SUM=SUM+A:GOTO58
60
62 REM ##### SET UP SPRITES #####
64 T=0
```

```
66 READA:IFAC<0-1THENPOKE12800+T,A:T=T+1:SUM=SUM+A
  :GOTO6658
70 REM ##### SET UP MACHINE CODE #####
72 T=0
74 READA:IFAC<0-1THENPOKE49152+T,A:T=T+1:SUM=SUM+A
  :GOTO74
76 IFSUM<99433THENPRINTCHR$(147);CHR$(5);TAB(5)
  "ERROR IN DATA STATEMENTS !!!":S
TOP
78
80 REM ##### START GAME #####
82 POKEVC+24,(PEEK(VC+24)AND240)OR14:POKEVC+17,91
  :POKEVC+35,14:SYS49152
84 PRINTLEFT$(A$,14)SPC(6);CHR$(123);"YOU
  HAVE FOUR BALLS TO BREAK"
86 PRINTLEFT$(A$,16)SPC(6);"THROUGH AS MANY WALLS AS"
88 PRINTLEFT$(A$,18)SPC(16);"POSSIBLE"
90 PRINTLEFT$(A$,21)SPC(5);CHR$(156);"USE JOYSTICK
  "CHR$(31);"[PORT 2]"CHR$(156);" T
  0 START"
92 POKEVC+23,255:POKEVC+29,255
94 POKE2040,200:POKEVC,67:POKEVC+1,75:POKEVC+39,1
96 POKE2041,201:POKEVC+2,97:POKEVC+3,75:POKEVC+40,3
98 POKE2042,202:POKEVC+4,127:POKEVC+5,75:POKEVC+41,4
100 POKE2043,203:POKEVC+6,157:POKEVC+7,75:POKEVC+42,5
102 POKE2044,204:POKEVC+8,187:POKEVC+9,75:POKEVC+43,7
104 POKE2045,205:POKEVC+10,217:POKEVC+11,75:POKEVC+44,10
106 POKE2046,206:POKEVC+12,247:POKEVC+13,75:POKEVC+45,13
108 POKE2047,207:POKEVC+14,22:POKEVC+15,75:
  POKEVC+16,128:POKEVC+46,14
110 SUM=0:FORT=0T07:SUM=SUM+21T:POKEVC+21,
  SUM:FORT=1T0100:NEXTTT,T
```

Continued on page 35

PRESENTING THE BEST GAME EVER
SEEN ON YOUR DRAGON 32

CASTLE ATTACK



£6.50
INCLUSIVE

AN EXCELLENTLY ANIMATED HIGH RESOLUTION ALL ACTION ARCADE STYLE GAME DESIGNED TO STRETCH YOUR MIND TO ITS ULTIMATE LIMIT. THE BEST EVIDENCE THAT COMPUTER GAMING HAS COME OF AGE FOR YOUR DRAGON 32. A SUPERB DEMONSTRATION OF DRAGON 32 SOFTWARE CAPABILITIES PUTTING OTHERS TO SHAME. A CLASSIC IN ITS OWN RIGHT. DON'T SEE ANOTHER COMPUTER GAME UNTIL YOU'VE SEEN CASTLE ATTACK. NO SOFTWARE COLLECTION SHOULD BE WITHOUT IT. AN EXCITING, FAST MOVING MACHINE CODE GAME YOU CANNOT AFFORD TO MISS. BUY IT.

FROM **M & D systems**

MAKE CHEQUES/PO PAYABLE TO M&D SYSTEMS
OF 24 MEADWAY, FRIMLEY, SURREY
NO JOYSTICKS REQUIRED.
DEALERS ENQUIRIES WELCOME.



New from **SUNSHINE** Master your ZX Microdrive

programs, machine code and
networking by Andrew Pennell

Master your ZX Microdrive contains all the information you will ever need to use the ZX Microdrive to the full. Clearly explained, with many examples, it is equally suitable for the relative newcomer to BASIC through to the experienced machine code programmer.

Andrew Pennell has also included a full database file handling program to let you put the ZX Microdrive to practical use with your Sinclair Spectrum.

Look out for the Sunshine range in W.H. Smith's, Boots, John Menzies, other leading retail chains and through our national network of book shops and specialist stores. Dealer Enquiries: 01-437 4343



ISBN 0 946408 19 X

Please send me

☐ Master your ZX Microdrive at £6.95 each

I enclose cheque/postal order for £_____ made payable to: Sunshine Books: 12/13 Little Newport St., London WC2 3LD.
Or 'phone your order through on Access Mastercard 01-437 4343

Name _____

Address _____

Signature _____

We can normally deliver in 4/5 days.

Turn your CBM64 into a sophisticated synthesiser, a piano, violin, organ, guitar or harpsichord. Woodwind, drums or cymbals and play along with your own or any of the preset rhythms.

You can compose pieces of music note by note, produce explosions, birdsong, trains, thunder, flying saucers and hundreds of other special sound effects for use in your own programs.

All this and an unbelievable range of special features:

4 Wave Forms: Triangle Wave, Saw Tooth Wave, Square Wave, White Noise. Glissando, Pitchbend, Modulation, Layering, Tempo Control, Pretab, Envelope Shaping, Synchronisation, Full Editing, Record, Playback Save, Transfer, 3 Voices, 6 Preset Rhythms and 2 User-Defined Rhythms. Full screen, easy to read, display of effects. Full, easy to follow instruction manual included.

QUICKSILVA

All games marketed exclusively by Quicksilva Ltd.

Quicksilva Mail Order P.O Box 6 Wimborne, Dorset BH21 7PY. Telephone (0202) 891744.

ULTISYNTH for the Commodore 64



£14.95

Supplied in box with extensive manual.

Other great games for the Commodore 64 include: **PURPLE TURTLES** - Go Turtle bobbing with the cutest Turtles ever seen! £7.95 • **AQUAPLANE** - Ski through Marine Maniacs and other Aquatic obstacles £7.95 • **RING OF POWER** - Search through the kingdom for the Mystical Ring £9.95 • **QUINTIC WARRIOR** - Stand alone against the sinister Crabman and other mangled mutants! £7.95.

COMMODORE 64

```

112 PRINTLEFT$(A$,9)SPC(32)CHR$(150)" LES
   "PRINTLEFT$(A$,10)SPC(32)"ALLAN"
114 T=0:RP=0
116 T=T+1:IFT=10THENPRINTLEFT$(A$,21)SPC
   (18)CHR$(18)CHR$(31)"[PORT 2]"
118 IFT=20THENPRINTLEFT$(A$,21)SPC(18)CHR$(146)
   CHR$(31)"[PORT 2]" :RP=RP+1:T=0
120 J=PEEK(56320)
122 IFRP<10ANDJ=127THEN116
124 POKEVC+21,0
126 PRINTLEFT$(A$,9)SPC(32)CHR$(28)"@@"
   PRINTLEFT$(A$,10)SPC(32)"@@"
128 IFJ=127THEN110
130 POKEVC+23,0:POKEVC+29,0
132
134 REM ##### SET UP GAME #####
136 PRINTCHR$(147):BA=4:SC=0
138
140 REM ##### NEW WALL #####
142 SYS49242
144
146 REM ##### NEW BALL #####
148 X=184:Y=159:DX=8:DY=8:BX=176:BY=215
150 PRINTLEFT$(A$,25)SPC(2)CHR$(31)
   CHR$(18)"BALLS LEFT"BA:
152 PRINTSPC(3)"SCORE"SC:"BREAKOUT":
154 POKE2040,209:POKEVC,X:POKEVC+1,Y:POKEVC+39,7
156 POKE2041,208:POKEVC+2,BX:POKEVC+3,BY:POKEVC+40,6
158 POKEVC+16,0:POKEVC+21,3:POKEVC+31,0
160
162 REM ##### MOVE BAT & BALL #####
164 X=X+DX:Y=Y+DY
166 IFX<320ORX>328THENDX=-DX
168 IFPEEK(56320)=123ANDBX<24THENBX=BX-12
170 IFPEEK(56320)=119ANDBX<320THENBX=BX+12
172 POKE54276,32:POKE54290,16
174 POKE901,XAND255:POKE902,Y:POKE903,
   BXAND255:POKE904,INT(X/256)+INT(BX/256)*2
176 SYS49303
178 IFY=BYANDX<BXANDX<BX+24THENDY=-DY:POKE54290,17
180 IFY=BYANDBA=0THENBA=BA-1:IFBA=0THEN148
182 IFBA=0THENBA=4:PRINTLEFT$(A$,13)SPC(14)
   CHR$(5)" GAME OVER " :FORT=1T02500:NE
   XT:GOTO204
184 IFY<31THENBA=BA+1:GOTO142
186 IF(PEEK(VC+31)AND1)<>1THEN164
188 BZ=(X-24)/8+(Y-39)/5:IFPEEK(1024+BZ)=32THEN164
190 POKE1024+BZ,32:POKE1064+BZ,32
192 IFDY=-8THENDY=-DY
194 POKE54276,33
196 SC=SC+1:PRINTLEFT$(A$,25)SPC(23)SC:POKEVC+31,0
198 GOTO164
200
202 REM ##### SCORE TABLE #####
204 PRINTCHR$(147):POKEVC+32,3:POKEVC+33,3
206 POKEVC+21,0:POKEVC+0:POKEVC+1,
   0:POKEVC+2,0:POKEVC+3,0
208 Z=0:FORT=1T010:IFSC>SC(T)THENZ=T:T=11
210 NEXT IFZ=0THEN240
212 POKE196,0
214 PRINTLEFT$(A$,7)SPC(9)CHR$(154)
   "ENTER TEXT FOR SCORE TABLE"
216 PRINTLEFT$(A$,13)SPC(11)"NAME .....":
218 FORT=1T013:PRINTCHR$(157):NEXT
   PRINTCHR$(31):INPUTN$
220 IFLEN(N$)>11THENN$=LEFT$(A$,11)
222 FORT=1T011:Z$=MID$(N$,T,1):IFZ$=CHR$(46)
   THENN$=LEFT$(N$,T-1):T=T+1
224 NEXT
226 IFZ=0THEN234
228 FORT=9T0ZSTEP-1:SC(T+1)=SC(T):SC$(T+1)=SC$(T):NEXT
   Z
232 REM ##### ENTER SCORE #####
234 SC(Z)=SC:SC$(Z)=CHR$(29)+CHR$(
   (29)+CHR$(18)+CHR$(32)+N$+CHR$(32)
236
238 REM ##### PRINT SCORE TABLE #####
240 PRINTCHR$(147):TAB(12)CHR$(154)"**CHR$(30)"
   SCORE TABLE "CHR$(154)"**CHR$(1
   7)
242 POKEVC+35,4:FORT=1T010
244 PRINTCHR$(30)CHR$(17)" BREAKER",T:
   TAB(12)CHR$(5):SC(T):TAB(22)CHR$(158):SC$(T)
   ):NEXT
246 PRINTLEFT$(A$,25)SPC(8):
248 PRINTCHR$(30)"USE "CHR$(5)"JOYSTICK"
   CHR$(30)" TO RE-START":
250 T=0:RP=0
252 T=T+1:IFT=10THENPRINTLEFT$(A$,25)SPC
   (12)CHR$(18)CHR$(5)"JOYSTICK"CHR$(146):
254 IFT=20THENPRINTLEFT$(A$,25)SPC(12)
   CHR$(5)"JOYSTICK":RP=RP+1:T=0
256 J=PEEK(56320)
258 IFJ=127ANDRP<50THEN252
260 POKEVC+32,0:POKEVC+33,0:GOTO82
262
264
266 REM ##### CHARACTER SET DATA #####
268 DATA231,231,231,0,126,126,126,0
270 DATA126,102,102,126,230,230,230,0
272 DATA124,102,102,124,230,230,252,0
274 DATA126,102,96,96,224,230,254,0
276 DATA120,108,102,102,230,236,248,0
278 DATA126,96,96,120,224,224,254,0
280 DATA126,96,96,120,224,224,224,0
282 DATA126,102,96,110,238,238,254,0
284 DATA102,102,102,126,230,230,230,0
286 DATA60,24,24,24,56,56,126,0
288 DATA60,24,24,24,28,220,252,0
290 DATA102,108,120,112,248,236,230,0
292 DATA96,96,96,224,230,254,0
294 DATA102,126,102,102,230,230,230,0
296 DATA102,118,126,110,230,230,230,0
298 DATA126,102,102,102,230,230,254,0
300 DATA126,102,102,126,224,224,224,0
302 DATA126,102,102,230,230,254,28,0
304 DATA124,102,102,124,248,236,230,0
306 DATA60,102,96,126,6,230,252,0
308 DATA126,24,24,24,56,56,56,0
310 DATA102,102,102,102,230,230,252,0
312 DATA102,102,230,230,230,60,24,0
314 DATA102,102,102,102,230,254,230,0
316 DATA102,102,60,24,60,230,230,0
318 DATA102,102,102,60,24,56,56,0
320 DATA126,70,12,24,240,226,254,0
322 DATA-1
324 DATA126,102,102,102,230,230,254,0
326 DATA24,24,56,24,56,56,126,0
328 DATA60,102,6,12,48,110,126,0
330 DATA60,102,6,28,6,118,124,0
332 DATA6,102,102,102,127,6,6,0
334 DATA126,96,124,6,6,230,252,0
336 DATA60,102,96,252,230,230,252,0
338 DATA126,102,12,24,56,56,56,0
340 DATA60,102,102,60,230,230,252,0
342 DATA60,102,102,62,6,118,124,0
344 DATA-1
346
348 REM ##### SPRITE DATA FOR TITLE #####
350 DATA255,192,0,255,224,0,240,112
352 DATA0,240,112,0,240,112,0,240
354 DATA112,0,255,224,0,255,224,0
356 DATA240,112,0,240,112,0,240,112
358 DATA0,240,112,0,255,224,0,255
360 DATA192,0,0,0,0,0,0,0
362 DATA0,0,0,0,0,0,0,0
364 DATA0,0,0,0,0,0,0,0
366 DATA255,192,0,255,224,0,240,240
368 DATA0,240,112,0,240,112,0,240
370 DATA240,0,255,224,0,255,192,0
372 DATA255,0,0,255,128,0,247,192
374 DATA0,243,224,0,241,240,0,240
376 DATA240,0,0,0,0,0,0,0
378 DATA0,0,0,0,0,0,0,0
380 DATA0,0,0,0,0,0,0,0
382 DATA255,240,0,255,240,0,240,0
384 DATA0,240,0,0,240,0,0,240
386 DATA0,0,255,0,0,255,0,0
388 DATA240,0,0,240,0,0,240,0
390 DATA0,240,0,0,255,240,0,255
392 DATA240,0,0,0,0,0,0,0
394 DATA0,0,0,0,0,0,0,0
396 DATA0,0,0,0,0,0,0,0
398 DATA15,0,0,63,192,0,240,240
400 DATA0,240,240,0,240,240,0,240
402 DATA240,0,255,240,0,255,240,0
404 DATA240,240,0,240,240,0,240,240
406 DATA0,240,240,0,240,240,0,240
408 DATA240,0,0,0,0,0,0,0
410 DATA0,0,0,0,0,0,0,0
412 DATA0,0,0,0,0,0,0,0
414 DATA240,240,0,241,224,0,243,192
416 DATA0,247,128,0,255,0,0,255
418 DATA0,0,254,0,0,254,0,0
420 DATA255,0,0,255,0,0,255,128
422 DATA0,247,192,0,243,224,0,241
424 DATA240,0,0,0,0,0,0,0
426 DATA0,0,0,0,0,0,0,0
428 DATA0,0,0,0,0,0,0,0
430 DATA63,192,0,127,224,0,240,240
432 DATA0,240,240,0,240,240,0,240
434 DATA240,0,240,240,0,240,240,0
436 DATA240,240,0,240,240,0,240,240
438 DATA0,240,240,0,127,224,0,63
440 DATA192,0,0,0,0,0,0,0
442 DATA0,0,0,0,0,0,0,0
444 DATA0,0,0,0,0,0,0,0
446 DATA240,240,0,240,240,0,240,240
448 DATA0,240,240,0,240,240,0,240
450 DATA240,0,240,240,0,240,240,0

```

Continued over the page

COMMODORE 64

```

452 DATA240,240,0,240,240,0,240,240
454 DATA0,240,240,0,127,224,0,63
456 DATA192,0,0,0,0,0,0,0
458 DATA0,0,0,0,0,0,0,0
460 DATA0,0,0,0,0,0,0,0
462 DATA255,240,0,255,240,0,15,0
464 DATA0,15,0,0,15,0,0,15
466 DATA0,0,15,0,0,15,0,0
468 DATA15,0,0,15,0,0,15,0
470 DATA0,15,0,0,15,0,0,15
472 DATA0,0,0,0,0,0,0,0
474 DATA0,0,0,0,0,0,0,0
476 DATA0,0,0,0,0,0,0,0
478 :
480 REM ##### SPRITE DATA FOR BAT & BALL #####
482 DATA0,0,0,0,0,0,0,0
484 DATA0,0,0,0,0,0,0,0
486 DATA0,0,0,0,0,0,0,0
488 DATA0,0,0,0,0,0,0,0
490 DATA0,0,0,0,0,0,0,0
492 DATA0,0,0,0,0,0,0,0
494 DATA0,0,0,63,255,252,63,255
496 DATA252,63,255,252,63,255,252,0
498 DATA0,0,0,0,0,0,0,0
500 DATA0,0,0,0,0,0,0,0
502 DATA0,0,0,0,0,0,0,0
504 DATA0,0,0,0,0,0,0,0
506 DATA0,0,0,0,0,0,0,0
508 DATA126,0,0,126,0,0,126,0
510 DATA0,126,0,0,0,0,0,0
512 DATA0,0,0,0,0,0,0,0
514 DATA-1
516 :
518 REM ##### MACHINE CODE DATA #####
520 DATA169,2,141,132,3,162,250,160
522 DATA0,157,255,215,157,249,216,157
524 DATA243,217,157,237,218,152,157,255

```

```

526 DATA3,157,249,4,157,243,5,157
528 DATA237,6,173,132,3,202,240,3
530 DATA76,9,192,169,32,162,36,157
532 DATA185,5,157,225,5,157,9,6
534 DATA157,49,6,157,89,6,157,129
536 DATA6,157,169,6,157,209,6,157
538 DATA249,6,157,33,7,157,73,7
540 DATA157,113,7,202,240,3,76,47
542 DATA192,96,162,80,169,0,157,255
544 DATA3,157,79,4,157,159,4,157
546 DATA239,4,169,2,157,255,215,169
548 DATA4,157,79,216,169,6,157,159
550 DATA216,169,8,157,239,216,202,240
552 DATA3,76,92,192,162,40,169,160
554 DATA157,191,7,169,14,157,191,219
556 DATA202,240,3,76,134,192,96
558 DATA173,133,3,141,0,208,173,134
560 DATA3,141,1,208,173,135,3,141
562 DATA2,208,173,136,3,141,16,208,96
564 DATA-1
566 :
568 :
570 REM #####
572 REM #####
574 REM #####
576 REM ##### 64 BREAKOUT #####
578 REM #####
580 REM ##### COMMODORE 64 #####
582 REM #####
584 REM ##### LES ALLAN #####
586 REM #####
588 REM ##### 9TH NOVEMBER #####
590 REM #####
592 REM ##### 1983 #####
594 REM #####
596 REM #####
598 REM #####

```



CHRISTMAS CATALOGUE



NEW RELEASES

JERICHO ROAD (Spectrum 48K): Full featured educational adventure set in biblical times. Explore southern Israel, meeting people and visiting places from the pages of the Bible. Ideal family Christmas present. **£5.75.**

HOOKED! (Dragon 32): Entertaining graphical fishing game for 1 or 2 players. Suitable for all ages. Many levels of play, with optional joysticks. **£5.75.**

MONSTER MATHS (Dragon 32): Maths education for 8-14-year-olds. Menu driven, with five functions and nine levels of difficulty. **£6.95.**

SCIENCE 1 (BBC B): Physics education for 11-16-year-olds. Covers, lenses, mirrors, balances, meters and thermometers. With full documentation. **£6.95.**

EMPIRE (BBC B): Exciting strategy game for all ages. With eight difficulty levels. Save the world from the evil Empire! **£6.95.**

ALSO AVAILABLE

DRAGON 32: Pettigrew's Diary (£7.95). "I have nothing but praise for this unorthodox adventure". *Micro Adventurer*, Empire (£6.95). "An extremely good game . . . Highly recommended". *PCN* November 17, 1983. Quiz Pack (£3.95), Infant Pack (£3.95), Junior Pack (£3.95), Puzzler (£6.95), Family Programs (£6.95), Fun and Games (£6.95), Live and Learn (£6.95), City Defence (£5.75), Fun to Learn (£6.95).

BBC B: Fun to Learn (£6.95), Monster Maths (£6.95).

LYNX: Grid Attack (£4.95).

SEE US AT THE WEMBLEY CHRISTMAS FAIR, December 15-18, STAND 259.

AVAILABLE NOW FROM SELECTED BRANCHES OF BOOTS AND ALL GOOD STOCKISTS
or send cheque/PO to **SHARDS SOFTWARE, 189 ETON ROAD, ILFORD, ESSEX IG1 2UQ**



Problem. Simulating an aircraft on a small microcomputer and depicting the 3-D world outside through the eyes of the pilot.



Problem. Turning the Spectrum's numerical abilities into powerful verbal skills combined with a huge vocabulary.

PSION HAVE BIG PROBLEMS.



Problem. Evaluating complex algorithms to provide sufficient depth of analysis in a short time.



Problem. Integrating cartoon-quality graphics with the realism of the ski-slope.



Problem. Creating cartoon-quality graphics in an entertaining and varied game.



Problem. Providing complex, sophisticated data handling through easy-to-use commands.



Problem. Modelling in 3-D on a small micro – performing some 7.5 million calculations for one hidden line drawing.



Problem. Balancing the number of strategic factors required with a complex series of rules for a classic game.

Psion have bigger, more ambitious software ideas for your Sinclair Spectrum. So naturally, our software is more of a problem to design.

Happily, we have all the right programming skills to match. In fact, Psion have one of the most advanced microcomputer software design facilities in the world. (Ask anyone who's seen a VAX 11/750 computer!)

That's why we can create the best software programs you'll ever see on a Sinclair Spectrum. (Remember – our 'Horizons' cassette was selected to introduce you to the Spectrum's capabilities.)

In all, there are 12 challenging titles, published exclusively under the Sinclair label. You can see the quality of eight of them alongside!

In addition, you can defend Earth from Space Raiders... destroy Planetoids... use VU-CALC in your business... even stroll in the park with Hungry Horace! And the Psion range is growing all the time – watch out for our latest program, 'Chequered Flag'.

Psion programs for the Spectrum:

- Flight Simulation (48K)
- Chess (48K)
- Space Raiders
- Planetoids
- VU-CALC
- VU-FILE
- VU-3D (48K)
- Hungry Horace
- Horace and The Spiders
- Horace Goes Skiing
- Backgammon
- Computer
- SCRABBLE® (48K)

'Horace' series produced in conjunction with Melbourne House. SCRABBLE® trademark and copyright licensed by Scrabble Schutzhrechte und Handels GmbH – A J W Spear and Sons PLC subsidiary.

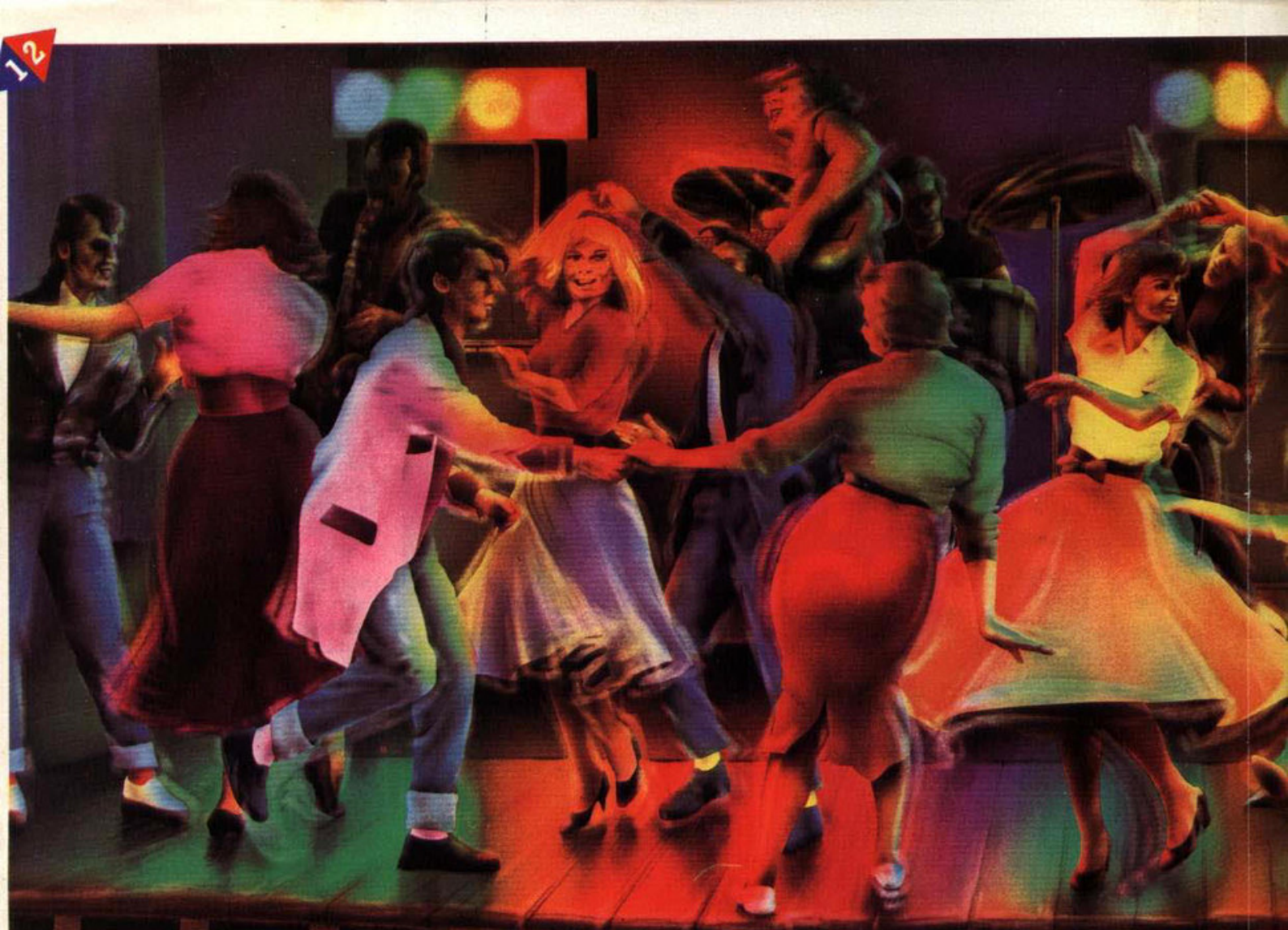
Whichever program you choose, you can be sure it's high-quality, and action-packed.

The popularity of our cassettes proves it. In a recent WH Smith chart of best-selling Spectrum software, no less than 7 of the top 12 were by Psion.

That means there's one good way to choose the best Spectrum software...

Just look for the Psion symbol on the cover of the cassette.

PSION





12

Once you've got to grips with the Rock 'n' Roll game, flip-over and get your teeth into Dracula.

New K-tel Doublesiders are great fun and great value which ever way round you look at them.

For only £6.95 you don't just get one top quality computer game, you get two.

When you've finished playing one side simply flip it over (just like a music cassette) and move off on a second totally different, equally gripping game.

Take your choice. Already there are five Doublesiders to choose



1 **It's Only Rock 'n' Roll** Can you become a superstar? A Rock 'n' Roll idol...Or are you just another has been? You've got a lot of energy, a bit of money and a great future. But can you stay the course, stand the heartbreaking disappointments, fraud, scandal, even arrest? Can you capture the hearts and wallets of the public and become a Rock 'n' Roll idol?

2 **Tomb Of Dracula** Darkness is falling...The vampires are hungry...You can't go back...Your only chance of survival lies ahead. The walls are cold and clammy. With each step you remember the horrors ahead; ghouls, zombies and pits of choking slime. In your hand you have but seven silver stakes with which to defend yourself...Dare you face the ultimate evil...and win.

from — three suitable for the ZX Spectrum and two for the Commodore Vic 20 — and there are more to come.

So hurry to the shops now and see for yourself how K-tel Doublesiders really do give you twice the fun with two on one.

K-TEL DOUBLESIDERS

Only
£6.95
EACH



12

Twice the fun with two on one.



MOGUL

THE HOTWARE PEOPLE

METAMORPHOSIS

VIC 20 • COMMODORE 64

You have stumbled into the nest of the Cyglorx and find yourself fighting off the Robot Tanks!

£7.95

KONGO KONG

VIC 20 • COMMODORE 64

Climb ladders, avoid the barrels thrown by the Crazy Ape—rescue the Damsel.

£6.95

ZEUS

COMMODORE 64

Your Cone of Cold protects you as you become the Wizard fighting off the Thunderbolts of the angry god—Zeus.

£6.95

EARTHQUAKE

VIC 20 • COMMODORE 64

A great adventure, you are in a shopping centre during an earthquake. To save yourself you must first help the others!

£6.95

CREATORS REVENGE

COMMODORE 64

Penetrate the depths of Robot City and kill the Creator. Destroy the robots—but watch out for new robots as they hatch!

£7.95

SUPER TREK

VIC 20 • COMMODORE 64 • ORIC

Commanding the bridge of your Starship, you explore the Galaxy. Fend off the Klingon attacks with your Phasers.

£6.95

ANNIHILATOR

VIC 20 • COMMODORE 64

Defend your Planet against Invading Aliens. All machine code makes for fast and furious arcade action!

£5.99

PYRAMID

VIC 20 • COMMODORE 64

T199/4A

A really tough adventure game as you try to ransack the Pyramid. However the builders have left clues everywhere.

£6.95

POLLYWOG

VIC 20

Help your Pollywog across danger to the safety of his home.

£6.95

ANNIHILATOR 2

COMMODORE 64

Another Great Game from the author of Annihilator and Metamorphosis—Mike Wacker.

£7.95

GREAT ADVENTURE PACK

VIC 20 • COMMODORE 64

Three Great Adventures in One Package. African Escape, Hospital Adventure, Bomb Threat. Great Action, Great Value, Great Fun.

£6.95

PLUS

Four Great Games for the Spectrum 48K

POTTY PLANTER • ADDER ATTACK • LAS VEGAS LADY • CRASH

All at £5.50

**AVAILABLE FROM ALL GOOD DEALERS
TRADE ENQUIRIES WELCOME**

MOGUL COMMUNICATIONS LIMITED • 90 REGENT STREET • LONDON W1R 5PT
Telephone 01-437 3156/7



Making a statement

Chris Woods presents a short machine code routine to abbreviate statement words

A time-saving facility which is available on some computers is the ability to abbreviate statement words, eg: L for List.

This short machine code routine makes it possible on the Dragon. The program uses the fact that every time the processor reads a statement, it jumps to location 377. This usually contains an RTS instruction so the processor returns to wherever it came from. Therefore, by changing the

contents of location 377, we can make it jump anywhere in memory.

When it jumps to location 377, Accumulator A holds the code of the instruction it is reading, unless the instruction does not exist, in which case it holds the ASCII code of the first character in the word.

So, all we have to do is recognise the character code and change it to the code of the statement we want it to represent.

(The instruction codes can be found in PCW, Vol 2 No 42.)

The Basic loader program is in listing 1 and the assembly version is in listing 2. Listing 1 will, when typed in the Run, poke in the machine code and execute it. Once the machine code program has been executed, the Basic program is no longer needed.

To use it, just type in the appropriate letter (see figure 1). In the case of instructions such as Audio, where more than one word is needed, type the other word as normal, eg: A On (Audio On).

The abbreviations may be used in a program as well as direct commands. Listing 3 shows an example program. ■

Figure 1

A-AUDIO	H-CLS	O-OPEN	V-PRESET
B-PLAY	I-INPUT	P-PMODE	W-PCLS
C-CLEAR	J-CLOAD	Q-SOUND	X-SCREEN
D-DRAW	K-CSAVE	R-RUN	Y-PCLEAR
E-EDIT	L-LIST	S-SKIPF	Z-RETURN
F-FOR	M-MOTOR	T-TRON	
G-GET	N-NEXT	U-PSET	

Listing 1

```

10 CLEAR 200,31999
20 FOR A=32000 TO 32062:READ H$:H=VAL("&H"+H$):POKE A,H:T=T+H:NEXT A
30 IF T<>7809 THEN PRINT"DATA ERRORS":STOP
40 DATA 8E,7D,0C,BF,01,7A,86,7E,B7,01,79,39,81,5A,22,14,81,41,25,10,BE,00,A6,E6,
01,C1,CB,27,07,80,41,8E,7D,25,A6,86,39
50 DATA A3,B8,96,B5,A7,80,B3,A0,89,99,9A,95,A1,8B,9B,B7,A2,8F,A5,A8,AC,AD,AB,AE,
AF,91
    
```

Listing 2

7D00	30	PRT	
7D00 8E7D0C	40	@START LDX #0TEST	LOAD ADDRESS OF PROGRAM
7D03 BF017A	50	STX 378	& STORE AFTER JMP INSTRUCTION.
7D06 867E	60	LDA #126	STORE JMP
7D08 B70179	70	STA 377	INSTRUCTION.
7D0B 39	80	RTS	RETURN TO BASIC.
7D0C 815A	90	@TEST CMPA #90	TEST
7D0E 2214	100	BHI @END	FOR
7D10 8141	110	CMPA #65	A
7D12 2510	120	BLO @END	LETTER.
7D14 BE00A6	130	LDX 166	CHECK
7D17 E601	140	LDB 1,X	THAT THERE
7D19 C1CB	150	CMPB #203	IS NOT AN =
7D1B 2707	160	BEQ @END	AFTER LETTER.
7D1D 8041	170	SUBA #65	CHANGE CHARACTER
7D1F 8E7D25	180	LDX #0DATA	CODE TO
7D22 A686	190	LDA A,X	INSTRUCTION CODE.
7D24 39	200	@END RTS	RETURN TO BASIC.
7D25 A3B896B5A780B3A0	210	@DATA FCB 163,184,150,181,167,128,179,160	
7D2D 89999A95A18B9BB7	220	FCB 137,153,154,149,161,139,155,183	
7D35 A28FA5A8ACADABAE	230	FCB 162,143,165,168,172,173,171,174	
7D3D AF91	240	FCB 175,145	
7D3F	250	END @START	

Listing 3

```

10 I "FREQUENCY";F
20 IF F>255 THEN PRINT"IT MUST BE LESS THAN 255":GOTO 10
30 F K=1 TO 10:Q F,1:N K
40 R
    
```


TNT

SOFTWARE



CENTIMUNCH

Special introduction offer
£5.95 (inc P&P and VAT)

FOR THE 48K SPECTRUM

An original game with on-screen scoring plus Hi-Score. Watch out for the Spider, mind the Bees don't confuse. Remember eat all your veg, a Super Carrot can improve your eyesight — now you can see the gate. Careful round those Rocks. Can you survive a full 12 months in a garden like this?

DEALER ENQUIRIES WELCOME —
RING 0229 27324

Please send Cheques or P/Os to:
T.N.T. Software, Dept B
Melton House, Lindal
Ulverston, Cumbria

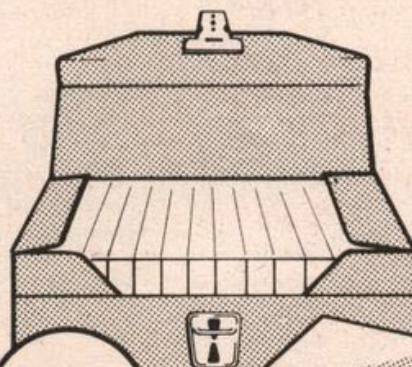
I ENCLOSE £.....

NAME

ADDRESS

PROTECT YOUR VALUABLE SOFTWARE MAGAZINES AND TAPES

*Designed specifically for the
protection of valuable cassettes and
magazines. Supplied in strong black
plastic.*

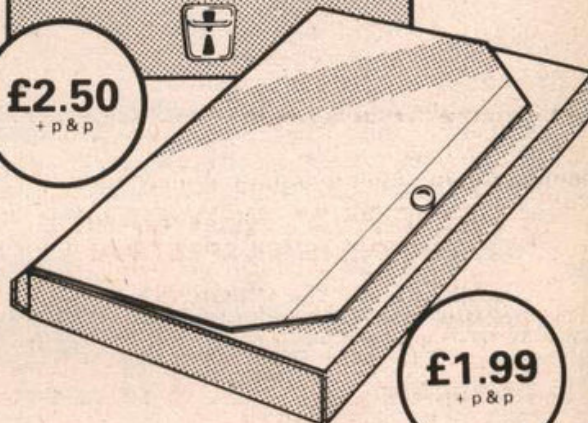


CASSETTE CASE

A must for the
storage of tapes.
Sized to hold 12
standard C type
cassettes.

£2.50

+ p & p



£1.99

+ p & p

MAGAZINE CASE (305 × 214 × 30mm). Stop searching for
those lost articles! Holds most weekly and monthly computer
magazines.

Mail with cheque/postal order to:

SSS

61 Upgate, LOUTH
Lincolnshire LN11 9HD

PLEASE ALLOW 28 DAYS FOR DELIVERY

QUANTITY	ITEM	PRICE	TOTAL
	CASSETTE CASE		
	MAGAZINE CASE		
Add 30p P & P/ITEM			

* Dealer enquiries welcome. Export prices on application

PLEASE PRINT CLEARLY

Name

Address

.....

.....

WARRIOR

FOR THE VIC 20 (3.5 K)

PILOT YOUR LIGHT CYCLE ACROSS THE GAMES GRID, TRAILING A 3 DIMENSIONAL WALL OF PURE ENERGY IN YOUR WAKE! RACE TO THE POWER POINTS OUT-MANOEUVRE THE COMPUTER CONTROLLED ROBOT WARRIOR! BEWARE OF THE ENERGY TRAILS AND HIGH VOLTAGE PYLONS!



- *** By using special W/C software techniques we have actually increased the size of the screen, giving an amazing 26 X 31 FULL SCREEN display !!
- *** Brilliant 3-D graphic effects !!
- *** Keyboard or Joystick operation !!
- *** Uses Machine Code for fast arcade type action !!
- *** 3 different skill levels !!
- *** Superb Hi-Res colour graphics and sound !!

ONLY

£5-99

(INC. P&P)

OTHER TITLES AVAILABLE :-

- BOMBER :** Bomb the city flat in order to land! £4-99
OTHELLO : Fascinating board game for one or two players. £4-99
MASTERMIND AND CONNECT 4 : One or two players. £4-99
GRAPHIX : Design your own Hi-Res. characters. £3-99
SNAKE : The more you eat, the longer you get! Uses full screen. £5-99

*** SPECIAL OFFER *** ANY 2 GAMES £9-00

ALL THE ABOVE PRICES INCLUDE FIRST CLASS POST BY RETURN MAIL & PACKING.

TRADE ENQUIRIES WELCOME.

ISCA SOFTWARE

56 WHITCHURCH AVENUE,
EXETER EX2 5NT.

ABACUS SOFTWARE-UK-LIMITED.
21 UNION STREET RAMSBOTTOM, Nr. BURY LANCs.

DRAGON32



MATHS TUTOR.

A SET OF PROGRAMS FOR TEACHING MATHS TO YOUNG CHILDREN (3-10 YEARS).

£5.00



MUSIC TUTOR.

LEARN MUSIC WITH THIS COMPREHENSIVE PACKAGE THAT USES HIGH-RES. GRAPHICS AND ALL THE DRAGONS MUSIC FACILITIES. THE PACKAGE INCLUDES DEMO. PROGRAMS.

£9.95

EDUCATION

ARTIST £5.00
CREATE PICTURES, DESIGNS AND PATTERNS THAT CAN BE REPLICATED, PAINTED OR STORED AT THE TOUCH OF A BUTTON

METRICAL £5.00
A CONVERSION PROGRAM FOR METRIC UNITS.

'O' LEVEL GEOGRAPHY £6.50
WEATHER MAP SYMBOLS
A TEACHING AID IN HIGH-RES. GRAPHICS THAT COVERS THE 'O' LEVEL SYLLABUS

TELL THE TIME £6.50
(IN ENGLISH, FRENCH OR GERMAN)
PROGRAM USES HIGH-RES. GRAPHICS AND SOUND TO TEACH CHILDREN HOW TO TELL THE TIME IN EITHER ENGLISH, FRENCH OR GERMAN

MEASURING INSTRUMENTS £6.50
A TEACHING AID FOR 'O' LEVEL PHYSICS USING 100% HIGH-RES. GRAPHICS TO DEMONSTRATE THE USE OF MICROMETERS, VERNIER SCALES ETC.

FIRST LETTERS AND WORDS £6.50
A PROGRAM DESIGNED TO HELP CHILDREN FORM LETTERS AND USE THEM IN SIMPLE WORDS AND SENTENCES.

MANY MORE PROGRAMS AVAILABLE.
SEND S.A.E. FOR DETAILS.



THE WATER OF LIFE

YOU ALONE CAN FIND THE WATER OF LIFE AND SAVE THE MIGHTY EMPIRE OF ONIN FROM THE EVIL FORCES.

£7.95



Splosh

JOIN THE MISSION AND DESTROY THE EVIL VIC SINCLAIR BEFORE HE DOMINATES THE MICRO MARKET.

£6.50

Tel, BOLTON 383839

GENEROUS DEALER DISCOUNTS

TWO GREAT NEW GAMES FOR THE 16/48K SPECTRUM

AMPERA FOR THE ARCADE ENTHUSIAST

The Amperas, aliens from another world, have invaded and are trying to drain the city's power. As the gridrunner, your job is to link the power lines to light up the city. But beware, the Amperas are highly charged and can kill!!!!

Ten levels, Demo mode (48K only) £5.90 each
(Keyboard or Joystick)

SPECTRAL REPEAT FOR THE WHOLE FAMILY

A mind teaser, based on the proven game Simon, but faster and increases in speed, taxing your wits to the full. Your score/high score facility

£4.90 each

TRADE ENQUIRIES WELCOME

PLAZASTAR LTD.

SEYWARD HOUSE, ABINGDON ROAD
NUFFIELD TRADING ESTATE, POOLE, DORSET

PRINTERLAND

QUALITY PRINTERS AT BRITAIN'S LOWEST PRICES

- EPSON RX80..... £199.95
EPSON RX80 F/T £249.95
EPSON FX80 F/T £336.95

ONE YEAR'S FULL WARRANTY: IMMEDIATE DELIVERY

CABLES/INTERFACES AVAILABLE FOR ALL MICROS

NEXT DAY DELIVERY £7.00

PLEASE ADD 15% VAT TO ALL PRICES

PRINTERLAND

29 MOORCROFT PARK
NEW MILL
HUDDERSFIELD
HD7 7NH

TEL: (0484) 687928

EDUCATIONAL/G'MENT/OVERSEAS ORDERS WELCOME



THE



RUN

IS COMING

NOW!! DELTAS FOR DRAGONS



The smooth control of a Voltmace DELTA sprung return joystick is now available to Dragon owners. Called the DELTA 3D it is a cut down version of our DELTA 14B handset. The same robust ball and socket jointed joystick but with the keypad blanked off to leave a choice of one of three fire buttons.

DELTA 3D joystick £10.00 each or £19.50 per pair

Seven-day money back guarantee if not satisfied
Price includes p&p and VAT

VOLTMACE LTD, PARK DRIVE, BALDOCK, HERTS
TEL: 0462 894410

Made in England. Callers welcome at the factory — Monday to Friday.
Trade terms available.



TELEPLUS 'POPULAR'

- ★ Sturdy all-metal frame in matt black or cream.
- ★ 27½" wide, enough to accommodate the largest home computer with tape or disc drive side by side.
- ★ Choice of three veneers — black, pine or dark oak.
- ★ Elevated TV shelf strong enough to carry even a 26" screen model.
- ★ Side mounted attachment for holding manual or magazine.
- ★ On castors for easy movement.
- ★ A modern piece of furniture for home or office.
- ★ Overall size 36" high x 28" deep x 27½" wide.

£49.95 inc. of Postage and Packaging



TELEPLUS 'COMPANION'

- ★ All-metal frame in matt black.
- ★ Inclined veneered top.
- ★ Use on floor or whilst in the comfort of your easy chair.

£18.95 inc. of Postage and Packaging
Both supplied in flat pack

TRADE ENQUIRIES WELCOME

QTY	FRAME	VENEER
Teleplus 'Popular' <input type="checkbox"/>	Black <input type="checkbox"/>	Black (ebony) <input type="checkbox"/>
Teleplus 'Companion' <input type="checkbox"/>	Cream <input type="checkbox"/>	Pine <input type="checkbox"/>
		Dark Oak <input type="checkbox"/>

Name.....

Address.....

Tel. No.....

Enclose cheque/PO payable to **TELEPLUS LTD** and send to: **TELEPLUS LTD., HAWTHORNS, NEW SPORLE ROAD, SWAFFHAM, NORFOLK. TELEPHONE ORDERS: SWAFFHAM (0760) 24394.**

Please allow up to 28 days for delivery

Experience CDS programs yourself

This is 'Spectrum Safari' a brand new Adventure game from CDS.

Just one of a new range of exciting programs....
Arcade action..
3D Space adventures
Education and pure fantasy....



ONLY £5.95 each at
W.H.Smiths, 'Boots,
John Menzies and other
leading Computer Stores, or...



Available direct from CDS Micro Systems
10, Westfield Close, Tickhill, Doncaster DN11 9LA.
Send Cheque or P.O. To CDS
Tel: (0302) 744129.

* Selected titles only

TASWORD TWO THE WORD PROCESSOR

64 CHARACTERS PER LINE ON THE SCREEN AND TO PRINTERS!
MICRODRIVE COMPATIBLE — instructions supplied

TASWORD TWO The Word Processor

Your Spectrum becomes a professional word processor with TASWORD TWO. TASWORD TWO gives you an amazing 64 characters per line on your screen. This is ideal for standard A4 paper and TASWORD TWO prints your text just as it appears on your screen.

Tasword Two drives the following interfaces:

Cobra RS232 I/O Port	Kempston Interface
Euroelectronics Interface	Morex Interface
Hiltebay Interface	Tasman Interface
Sinclair ZX Interface 1	

The same program drives these interfaces. A short easy to follow set of instructions takes you through setting up your Tasword Two to drive the interface you have or choose to buy. Tasword Two also drives the ZX printer.

£13.90 fully inclusive mail order price.

TASWORD TWO TUTOR

TASWORD TWO comes complete with a manual and a cassette. The cassette contains your TASWORD TWO and TASWORD TWO TUTOR. This teaches you word processing using TASWORD TWO. Whether you have serious applications or simply want to learn about word processing, TASWORD TWO and TASWORD TWO TUTOR make it easy and enjoyable.

TASWORD TWO £2 Demonstration Cassette

See for yourself the powerful features of TASWORD TWO. Send just £2 for the Tasword Two demonstration cassette. A voucher is included which gives you £1 off the price of TASWORD TWO.

TASWIDE — 64 characters per line!

A machine code utility program, TASWIDE doubles the information that your own programs can display. Make a simple change to your print statements and your output appears on the screen at 64 characters per line instead of the normal 32. Both print sizes can be mixed on the screen. 16K and 48K versions supplied on the same cassette.

£5.50 fully inclusive mail order price

TASMAN PRINTER INTERFACE

Plug into your Spectrum and drive any printer fitted with the Centronics standard parallel interface. Supplied complete with ribbon cable, connectors, and driving software. The cassette includes LLIST, LPRINT, and text screen copy software for all centronics printers and fast machine code high resolution screen copy software for Epson, Star, Seikosha, and Tandy Colour Graphic (in colour!) printers. Send s.a.e for sample print-outs and full list of printers supported by screen software.

£45 fully inclusive mail order price

All prices include VAT and post and packaging.

TASMAN SOFTWARE

Dept PCWK

17 HARTLEY CRESCENT LEEDS LS6 2LL



Send cheque/P.O. or Access number with order.
Telephone Access orders: Leeds (0532) 438301

48K
SPECTRUM

OPEN FORUM

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.

Forest Race

on Spectrum

In this game you must steer your way down a road through a forest. The screen

scrolls upwards as the game progresses and the road gets thinner making the game harder.

If you lose three lives the inevitable funeral march plays. This game is compatible with the Kempston Joystick.

Program notes

0-999 Main program.
2000-2499 Prints next line of trees, road scrolls one line.
2500 Crash routine.
5000-5040 Lost routine.
6000-6040 You won.
8000-9050 Data lines.
9500-9990 Sets up the graphics.
9994-9999 Save and verify.

Variables

Lives = Number of lives left.
Score = Score.
d = No of places for car to be printed along top.
a = No of places along road to be printed.
a\$ = Graphic of car.

```
0>REM Peter Brown,
1 REM 8, Mendham Close, Norwich
2 REM "Forest Race" 23/7/83
3 REM Compatible with Kempston
  Joystick.
graphics a=$ b=$ c=$ d=$
4 RESTORE 8000: GO SUB 9500
5 LET lives=3: LET score=0
6 POKE 23692,255
8 LET d=10: LET a$=""
10 BORDER 0: INK 7: PAPER 0: C
LS
20 PLOT 0,0: DRAW 255,0: DRAW
0,175: DRAW -255,0: DRAW 0,-175
23 LET p$="FOREST TRACK"
24 FOR a=LEN p$ TO 1 STEP -1
25 FOR l=1 TO a+a: PRINT AT 10
,l: INK 2: " "; PAPER 5: FLASH 1;
p$(a): BEEP .01,0: NEXT l
26 IF INKEY$="" OR IN 31=16 T
HEN PRINT AT 10,10: FLASH 1: INK
6: PAPER 2: "FOREST TRACK": GO T
O 30
27 NEXT a: PRINT AT 20,1: INK
0: PAPER 6: "Writer and designer
- P. Brown." FOR z=0 TO 2: FOR n
=0 TO 12 STEP .5: BEEP .01,n: NE
XT n: NEXT z
28 PRINT AT 18,1: INK 5: INVER
SE 1: "9" to go left, "0" to
go right: PRINT AT 19,1: INK 3;
INVERSE 1: "Compatible with Kemp
ston stick"
29 PAUSE 50: BEEP .5,0: PAUSE
2: BEEP .5,0: PAUSE 2: BEEP .25,
0: BEEP .25,3: BEEP .25,2: BEEP
.25,0: BEEP .7,2: BEEP .3,-2: BE
EP .5,-5
30 PRINT #1: FLASH 1: " Ple
ase press any key."
31 IF INKEY$="" THEN GO TO 31
32 IF IN 31=16 THEN GO TO 31
33 IF IN 31=16 THEN GO TO 50
34 IF INKEY$="" THEN GO TO 40
35 BORDER 3: PAPER 1: INK 5: C
LS
60 INK 7: PLOT 0,0: DRAW 255,0
: DRAW 0,175: DRAW -255,0: DRAW
0,-175
70 INK 4
80 FOR z=0 TO 200: NEXT z
100 POKE 23692,255
105 LET score=score+5
110 REM BEEP 5/2000,-1
112 PAPER 0
116 GO SUB 2000
117 IF INKEY$="" THEN LET a$=""
118 IF IN 31=0 THEN LET a$=""
120 IF INKEY$="" THEN LET d=d-
1: LET a$="M": IF d<0 THEN LET d
=0
125 IF IN 31=2 THEN LET d=d-1:
LET a$="M": IF d<0 THEN LET d=0
130 IF INKEY$="" THEN LET d=d+
1: LET a$="M": IF d>31 THEN LET
d=31
134 IF IN 31=1 THEN LET d=d+1:
LET a$="M": IF d>31 THEN LET d=3
1
138 PAPER 0
139 INK 2
140 IF ATTR (0,d)=12 THEN GO SUB
```

```
3 3000: GO TO 100
142 PRINT AT 0,d: INK 5: a$
143 BEEP .01,-20
145 PAPER 1
999 GO TO 100
1117 IF INKEY$="" THEN LET a$=""
2000 PAPER 1: INK 4: PRINT AT 21
0: "*****"
2010 READ a
2015 IF a=999 THEN RESTORE 9000:
GO TO 2010
2016 PAPER 0
2019 IF score=3000 THEN GO TO 50
00
2020 IF score>2000 AND score<300
0 THEN PRINT AT 21,0: " "
2021 IF score>1000 AND score<=20
00 THEN PRINT AT 21,0: " "
2022 IF score>0 AND score<=1000
THEN PRINT AT 21,0: " "
2025 PAPER 1
2030 PRINT
2499 RETURN
2500 PAUSE 0
3000 FOR n=0 TO 21: PRINT AT n,0
: OVER 1: FLASH 0: " ". PRINT AT 0
,d: INK AND 7: FLASH 1: OVER 0;
INVERSE 1: "X": NEXT n
3001 PRINT AT 0,d: INK 2: PAPER
5: INVERSE 1: FLASH 1: "X"
3003 NEXT n
3005 FOR n=0 TO -50 STEP -1: BEE
P .01,n: NEXT n
3010 PRINT AT 10,10: INVERSE 1;
FLASH 1: PAPER 7: INK 3: " You
Crashed!"
3020 FOR z=0 TO 250: NEXT z
3030 LET lives=lives-1
3035 IF lives=0 THEN GO TO 5000
3040 BORDER 3
3050 CLS
3499 RETURN
5000 PAPER 0: INK 7: BORDER 0: C
LS
5010 PRINT AT 10,0: INK 2: "I'm a
fraid that you have crashed once
too often, you have gone to the g
reat scrap-heap in the sky, with
a score of :-"; FLASH 1: INK 5; s
core
5015 BEEP 1,0: PAUSE 2: BEEP 1,0
: PAUSE 2: BEEP .2,0: PAUSE 2: B
EEP .8,0: BEEP .5,3: BEEP .5,2:
BEEP .5,2: BEEP .5,0: BEEP .7,0:
BEEP .3,-1: BEEP 1,0
5020 PRINT #1: FLASH 1: PAPER 2;
"PRESS ANY KEY TO PLAY AGAI
N"
5025 IF IN 31=16 THEN GO TO 5040
5030 IF INKEY$="" THEN GO TO 502
5
5040 GO TO 5
5000 PAPER 3: INK 7: BORDER 3
5010 PRINT AT 10,0: FLASH 1: "You
have completed the course wel
l done you're a good driver ."
INK 7: PAPER 4: "Score for this g
ame was: - "; AT 12,27: score
5015 FOR n=0 TO 2: FOR z=0 TO 12
STEP .5: BEEP .01,z: NEXT z: NE
```

**PROGRAM OF
THE WEEK**

SPECTRUM EXTENDED BASIC

—IMPROVE YOUR PROGRAMMING —EASE DE-BUGGING
—HELPS YOU ADD STRUCTURE TO YOUR PROGRAMS

The ten additional BASIC commands provided by Spectrum Extended Basic are considered an essential aid for most programming applications, so much so that many of these commands are standard features on other Basics.

The program is compact, occupying less than 5K memory, is user friendly—requiring only a two keyentry—and incorporates syntax checking.


The program commands are used and entered just like normal Basic keywords, the program operates bytrapping your usual keyboard input and testing for any of the ten additional commands.

The extra commands available are:

- AUTO auto line number, start and interval definable.
- CLOCK ON/OFF 12 hour clock, displayed on screen.
- DELETE Basic line/block delete.
- EXAMINE reads tape headers and displays information.
- FIND find specified string in Basic program.
- MEMORY displays memory status.
- RENUMBER full line renumber with GOSUBs and GOTOs
- SCROLL ON/OFF continuous scrolling.
- TRACE ON/OFF slows program execution, displays line and statement currently executed.
- VARIABLES displays variable names and contents.

48K Spectrum Extended Spectrum—£9.95

Also available at Boots, W.H. Smith and all good computer shops.
DELIVERY: Send SAE for Catalogue.
UK—prices include VAT and postage & packing.
EUROPE—add 80p per program
ALL OTHER PLACES—for air mail add £2 for the first program and 50p for each subsequent program. Surface delivery add 80p per program.

 software

Send Cheque, Postal Order or Access No. to:
CP SOFTWARE, Dept PCW1A
17 Orchard Lane, Prestwood,
Bucks HP16 0NN



THE BEST RANGE of SOFTWARE for HOME MICROS

Also
**VIDEO
GAMES**
for ATARI
COLECO
INTELLIVISION
VETREX

NOW IN STOCK:

Vast Number of Titles for

ATARI 400/800 · SPECTRUM ZX 81 · APPLE
BBC MICRO · VIC 20 · DRAGON · LYNX
ORIC · TEXAS T199 · COMMODORE 64

**THE LARGEST SELECTION
OF GAMES IN THE WORLD**

GAMES CENTRE

Branches: BRIGHTON 52 Western Road
NOTTINGHAM 31 Lister Gate
BIRMINGHAM 141 New Street
BOURNEMOUTH 60 Commercial Road
BRISTOL 15 Broadmead LONDON 22 Oxford Street

Send NOW for
**FREE
MAIL
ORDER
CATALOGUE**

Main Computer & Mail Order Branch:

22x Oxford St · London W1A 2LS

NAME _____

ADDRESS _____



SOFTWARE NEW RELEASES FOR CHRISTMAS

OH MUMMY!! Your party of archaeologists enter the pyramid in search of the mummies of the pharaoh's household. There are five burial chambers containing treasure, secret scrolls, keys, royal mummies and some nasty surprises. To pass from one chamber to the next, you must find the key and royal mummy, but beware, you may uncover a guardian, who will chase your group to avenge your desecration!! A Machine Code game for those with nerves of steel and great courage.

Price (LYNX) £7.95
Price (ZX81 and SPECTRUM) £4.95

TANK ATTACK. A machine code game for 1/2 players, defending supplies against computer controlled tanks. This game will stretch your reflexes to the limit as you battle with the enemy tanks. They won't be able to shoot back until they have supplies, but when they do, look out!! Joysticks required.

Price (BBC-B OS 1.0+) £7.95

CHRISTMAS SPECIAL OFFER (mail order only for DRAGON 32). Choose any three of the following titles for £15.90. A saving of £7.95

GAMES PACK I
ALIEN BLITZ

GAMES PACK II
GOLF

GAMES PACK III
SPACE MISSION

All prices include postage and packing. All cassettes despatched within 48 hours of receipt of order. Access orders welcome.

SPANNERMAN. Pete the Plumber has his work cut out! He's stuck in the boiler room and the pipes are leaking! Unless he can fix the leaks and stop the water rising he'll meet with a watery doom. To make matters worse, all sorts of nasties keep coming out of the woodwork!! A fantastic machine code game, that stretches you and your Lynx to the limit!!

Price (LYNX) £7.95

UTIL 1. Two very useful programs for your BBC-B. Both tested on OS 1.0 and above. **Character Define** gives you a very comprehensive and simple way to quickly create all manner of user defined characters. **Envelope Editor** will enable you to unravel the complexities of the Sound and Envelope commands, so that you can produce exactly the sound you require. The ship!! In SUB CHASE you must depth charge the wolf pack.

Price (BBC-B OS 1.0+) £9.95

GEM SOFTWARE

UNIT D, THE MALTINGS, STATION ROAD, SAWBRIDGEWORTH, HERTS
Telephone (0279) 723567/723518

OPEN FORUM

```

XT n
6020 PRINT #1; INK 2; PAPER 0; F
FLASH 1;"PRESS ANY KEY TO PLA
Y AGAIN"
6025 IF IN 31=16 THEN GO TO 6040
6030 IF INKEY$="" THEN GO TO 602
S
6040 GO TO 1
8000 DATA 16,56,124,56,124,254,1
5,16
8010 DATA 66,126,98,24,24,98,182
90
8020 DATA 0,231,66,190,190,66,23
1,0
8030 DATA 0,231,66,125,125,66,23
1,0
9000 DATA 10,10,10,11,12,13,14,1
5,16,17,18,19,20,20,20,20,19,
18,17,16,17,18,18,18,19,20,19,18
,17,16,15,14,13,12,11,10,9,8,7,6
,5,4,3,2,1,1,1,2,3,4,5,6,7,8,
9010 DATA 7,7,6,6,4,3,4,6,6,7,8,
9,10,11,12,13,14,15,16,17,18,19,
20,19,18,17,16,15,16,18,17,16,
,15,14,13,12,11,12,13,14,15,16,1
4,13,12,11
9020 DATA 10,10,10,11,12,13,14,1
5,16,17,18,19,20,20,20,20,19,
18,17,16,17,18,18,18,19,20,19,18
,17,16,15,14,13,12,11,10,9,8,7,6
,5,4,3,2,1,1,1,2,3,4,5,6,7,8,
9030 DATA 7,7,6,6,4,3,4,6,6,7,8,

```

Planet Invader

on Vic20

Yet another invader game. This one uses user defined graphics. One of the invaders

will require two hits to be destroyed. Each one you kill will be replaced by a faster one. Use space bar to fire.

Program notes

1-6 Set up characters.

10-15	Set up screen.
19-24	Move invader check for fire.
40-43	Explode alien.
50	Explodes missile.
60	Sets variables.
80	Game over

```

1 PRINT "J":POKE56,28:POKE36869,255:RESTORE
2 READA:IFA=999THEN10
3 POKE7424+B,A:B=B+1:GOTO2
4 DATA0,0,0,0,0,0,0,0,24,60,90,90,60,24,36,66
5 DATA8,8,28,62,28,62,62,127,8,8,8,8,8,8,8,0
6 DATA137,33,132,48,16,66,8,131,255,255,255,255,255,255,255,999
10 PRINT "XXXXXXXXXXXXXXXXXXXXX...../"
11 PRINT "J"
12 POKE8153,34:POKE36878,10:Z=40
13 POKE36879,8:PRINT "XXXXXXXXXXXXX"
14 PRINT "XXXXXXXXXXXXXXXXXXXXXXXXPLANET INVADERJ"
15 PRINT "JSCORE:"SC
19 D=0
20 GETA$:IFA$="" :ANDD=0THEN29
21 FORT=1TOZ:NEXT:POKE7745+C,32
22 POKE7746+C,33:C=C+1:POKE36876,200:POKE36876,0:IFC=298THEN80
23 IFD=0THEN19
24 IFD=1THEN30
29 E=0
30 IFPEEK(8087+E)=33THEN40
31 D=1:POKE8087+E,35:E=E-22
32 IFE<-352THEN50
33 POKE8109+E,32
34 GOTO21
40 POKE8087+E,36
41 FORT=254TO120STEP-1:POKE36877,T:NEXT:POKE8109+E,32:POKE8087+E,32
42 SC=SC+10:Y=Y+1:LZ=LZ+1:IFY>1THEN60
43 PRINT "JSCORE:"SC:GOTO19
50 POKE8109+E,36:FORT=1TO10:NEXT:POKE8109+E,32:GOTO19
60 PRINT "JSCORE:"SC:C=0:Z=Z-5:Y=0:GOTO19
80 PRINT "XXXXXXXXXXXXXXXXXXGAME OVER":FORT=1TO5000:NEXT:PRINT "J"
81 POKE36869,240
```

Planet Invader
by Stuart Elmes

HIRESPECTRUM SOFTWARE

CHOOSE FROM OUR VAST RANGE

FREE 20 page CATALOGUE with full details of our range of over 180 different programs for the ZX SPECTRUM. All hired with the consent of the publishers. Whether you prefer to ZAP aliens, get lost in an adventure game, EDUCATE your children, CALCULATE the family finances or COMPILE machine code programs WE HAVE THE RIGHT TAPES FOR YOU TO HIRE.

FAST SERVICE

We stock several manufacturers original copies of each tape, and can normally despatch your tapes the day we receive your order, and we always use first class post.

LOWEST PRICES

We believe our prices are the lowest of any library, yet we offer the LARGEST range of titles. TWO WEEKS HIRE OF ANY TAPE COSTS JUST 80p (plus 40p p&p).

FREE TAPE HIRE

For a limited period, we will send your first tape (your choice) FREE, so join our library now. You can't afford NOT to!!! If you've tried another library and are wary of our claims send a stamp and we'll gladly send you a copy of our catalogue - we're confident you'll join when you see it!!!



NATIONAL SOFTWARE LIBRARY

200 Mulgrave Road,
Cheam, Surrey SM2 6JT

I enclose cheque for £6.00 for LIFE MEMBERSHIP and I understand that my first tape hire will be FREE. If, within 28 days, I'm not delighted with your service you'll refund my membership fee.

Name _____

Address _____

(PCWK 1)

NEW

The complete
speech synthesis system

For use with
DRAGON 32
COMPUTER

SPEECH SYNTHESIS MODULE for the Dragon 32 computer

- Fully cased module plugs into cartridge port
- Unlimited vocabulary, using allophone-type, dedicated speech chip
- Approximately 250 words predefined; accessed by entering word required
- Complete control using five new BASIC commands
- Speech can easily be incorporated into existing BASIC programs
- Up to 40 words spoken from one command; speech can occur simultaneously with graphics
- £37.95 inclusive

Also available: SOUND EXTENSION MODULE for use with the Dragon computer — provides facility to play chords and harmonies over five octaves — easy to use via BASIC — built-in sound effects — music and graphics can occur simultaneously — two I/O ports — user manual — ONLY £34.95 inclusive

ACCESS/Cheque/PO to:

J.C.B. (MICROSYSTEMS)

29 Southbourne Road, Bournemouth, BH6 5AE

Tel: (0202) 423973

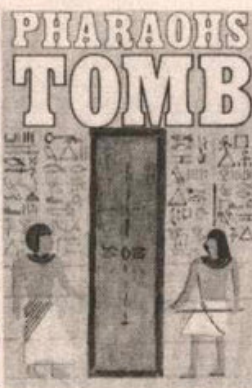
Write or phone for further details

ADVENTURE GAMES

48K SINCLAIR ZX SPECTRUM



You are a Knight of Camelot, searching for Merlin's lost treasure. On your way you will discover the Witches' Tower, rescue a Princess held by the wicked Wizard of Trill. £5.95



You discover the entrance to an ancient pyramid blocked by a rock. Once inside, you discover fire rooms, ice rooms and other traps set by the builders to protect the Pharaoh. £4.95



A rope above a rock fissure is the only way into this Magic Mountain, or is it? Legends tell of vast stores of treasure but also of poisonous spiders, lizards and magic at work. £4.95



You are Spectrasses, battling in the arena with Gorgon, whose stare can turn you to stone. To recover the lost chalice, you must also win a swordfight with Grang, inside his cave. £4.95



To find the Black Planet you need 7 pieces of the key each hidden on different planets, and requiring different puzzles to be solved. On the journey, you fight off the pirates who get steadily more desperate. £5.95

Send SAE for full list.

PHIPPS ASSOCIATES

Prices include postage (outside Europe add £1.00 per item).

Dept C FREEPOST EM463 (No stamp)
172 Kingston Road, Ewell, Surrey KT19 0BR
Telephone 01-393 0283. 24 Hour answering.

Access and Visa cards welcome



OPEN FORUM

Four Stroke Engine

on Dragon 32

This gives an accurate simulation of a four-stroke engine. The animation is achieved by the repeated printing of various strings of colour.

Program notes

1-10	Text
20-160	Set up the colour strings. The rest of the program prints these strings of colour each of which represents 1 strip of the cylinder block.

```

1 CLS:PRINT33," THE FOUR STROKE INTERNAL COMBUSTION ENGINE RUNS THROUGH A
2 CYCLE OF FOUR EVENTS. THE FULL CYCLE FOR ONE SEPARATE CYLINDER IS:-"
3 PRINT193,"A). COMPRESSION STROKE (PISTON RISING):PRINT257,"B).
4 POWER STROKE (PISTON DESCENDING):PRINT321,"C). EXHAUST STRO
5 KE (PISTON RISING):PRINT385,"D). INDUCTION STROKE"
6 PRINT421,"(PISTON DESCENDING)"
7 FOR J=0 TO 18000:NEXT J:CLS
8 PRINT33,"EVENT (A) THE PISTON COMPRESSESTHE AIR/PETROL VAPOUR (IGNITION ALSO
9 OCCURS):PRINT181,"EVENT (B) BURNING GASES DRIVE THE PISTON DOWN THE CYLINDER"
10 PRINT257,"EVENT (C) THE PISTON PUSHES OUTTHE BURNT GASES"
11 PRINT353,"EVENT (D) INLET OF NEW PETROL/ AIR VAPOUR OCCURS".FORJ=0 TO 12000:N
12 EXT J:CLS
13 PRINT38,CHR$(287):PRINT48,"~PETROL/AIR VAPOUR":PRINT134,CHR$(191):PRINT136
14 ,"~IGNITION OF GASES":PRINT230,CHR$(182):PRINT232,"~EXHAUST GASES":PRINT326,
15 HR$(223):PRINT328,"~PISTON":PRINT422,CHR$(175):PRINT424,"~CYLINDER BLOCK"
16 FOR J=0 TO 18000:NEXT J:CLS
17 PRINT129,"THE FOLLOWING EXAMPLE IS OF A FOUR CYLINDER, FOUR STROKE ENG
18 INE.HAVING A FIRING SEQUENCE OF 1,3,4,2."FOR J=0 TO 5000:NEXTJ:CLS:PRINT229,"P
19 RES 'BREAK' TO STOP".FOR J=0 TO 4000:NEXT J
20 CLS(1)
21 PRINT66,"FOUR STROKE CYCLE.
22 A4=CHR$(175)
23 B4=CHR$(128)
24 C4=CHR$(223)
25 D4=CHR$(191)
26 E4=CHR$(287)
27 F4=CHR$(182)
28 G4=A4+B4
29 H4=B4+B4+B4+B4
30 I4=B4+B4+B4+B4+B4
31 J4=C4+C4+C4+C4
32 K4=D4+D4+D4+D4
33 L4=E4+E4+E4+E4
34 M4=F4+F4+F4+F4
35 PRINT195,H4+H4+H4+H4+H4+H4
36 PRINT229,H4+H4+H4+H4+H4+H4+H4
37 PRINT134,CHR$(49)
38 PRINT268,A4+K4+G4+M4+G4+L4+G4+L4+A4
39 PRINT134,CHR$(143)
40 PRINT292,A4+J4+G4+M4+G4+L4+G4+J4+A4
41 PRINT324,A4+J4+G4+M4+G4+L4+G4+J4+A4
42 PRINT356,A4+I4+G4+M4+G4+L4+G4+I4+A4
43 PRINT388,A4+I4+G4+J4+G4+J4+G4+I4+A4
44 PRINT420,A4+I4+G4+J4+G4+J4+G4+I4+A4
45 PRINT268,A4+M4+G4+M4+G4+L4+G4+L4+A4
46 PRINT292,A4+M4+G4+M4+G4+L4+G4+L4+A4
47 PRINT324,A4+J4+G4+M4+G4+L4+G4+J4+A4
48 PRINT356,A4+J4+G4+J4+G4+J4+G4+I4+A4
49 PRINT388,A4+I4+G4+I4+G4+I4+G4+I4+A4
50 PRINT420,A4+I4+G4+I4+G4+I4+G4+I4+A4
51 PRINT268,A4+M4+G4+M4+G4+L4+G4+L4+A4
52 PRINT292,A4+M4+G4+M4+G4+L4+G4+L4+A4
53 PRINT324,A4+J4+G4+M4+G4+L4+G4+J4+A4
54 PRINT356,A4+J4+G4+J4+G4+J4+G4+I4+A4
55 PRINT388,A4+I4+G4+I4+G4+I4+G4+I4+A4
56 PRINT420,A4+I4+G4+I4+G4+I4+G4+I4+A4
57 PRINT268,A4+M4+G4+M4+G4+L4+G4+L4+A4
58 PRINT292,A4+M4+G4+M4+G4+L4+G4+L4+A4
59 PRINT324,A4+J4+G4+M4+G4+L4+G4+J4+A4
60 PRINT356,A4+J4+G4+J4+G4+J4+G4+I4+A4
61 PRINT388,A4+I4+G4+I4+G4+I4+G4+I4+A4
62 PRINT420,A4+I4+G4+I4+G4+I4+G4+I4+A4
63 PRINT268,A4+M4+G4+M4+G4+L4+G4+L4+A4
64 PRINT292,A4+M4+G4+M4+G4+L4+G4+L4+A4
65 PRINT324,A4+J4+G4+M4+G4+L4+G4+J4+A4
66 PRINT356,A4+J4+G4+J4+G4+J4+G4+I4+A4
67 PRINT388,A4+I4+G4+I4+G4+I4+G4+I4+A4
68 PRINT420,A4+I4+G4+I4+G4+I4+G4+I4+A4
69 PRINT268,A4+M4+G4+M4+G4+L4+G4+L4+A4
70 PRINT292,A4+M4+G4+M4+G4+L4+G4+L4+A4

```

[illegible]

Four Stroke Engine

by J Bateman

CLWYD PERSONAL COMPUTERS

[illegible]

Tel: 0223 313722



Admission Price
£2.50 Adults £1.50 Children

Organised by Reed Exhibitions Surrey House
1 Throley Way Sutton Surrey SM1 4QQ
Tel: 01 643 8040

OPEN FORUM

Shark

on BBC

This is a program to help young children

learn their tables. A picture is drawn of a man and a shark. You are asked 10 questions. Every time you get a question wrong the shark gets closer to the man, five wrong answers and the man gets eaten.

Program notes

100-160	Main program loop
170-210	Graphics characters
220-270	Instructions
280-390	Sets up screen
400-450	Procedure for correct answer
460-540	Procedure for wrong answer
550-680	Was man eaten?

```

10 DNERROG GOTO 30
20 PROCVAR
30 MODE 7
40 PROCINSTR
50 MODE 2
60 Q=0:S=6:CLS
70 PROCSCREEN
80 IF Q=10 PROCFIN
90 Q=Q+1
100 COLOUR 3:PRINTTAB(5,19)"QUEST
    ION ";Q
110 A=RND(12):B=RND(12)
120 PRINTTAB(13,22);"  "
130 PRINTTAB(5,22);A;" TIMES ";B
140 INPUT P:IF P=A*B THEN PROCCOR
    RECT ELSE PROCWRONG
150 PROCFIN
160 END
170 DEFPROCVAR
180 VDU 23,225,255,255,255,255,255,
    255,255,255
190 VDU 23,226,130,130,186,186,186,
    146,254,124
200 VDU 23,227,32,48,56,60,126,127,
    127,255
210 ENDPROC
220 DEFPROCINSTR
230 PRINTTAB(12,2)CHR$141CHR$133"
    S H A R K":PRINTTAB(12,3)CHR$
    141CHR$133"S H A R K"
240 PRINT"....."You will be asked
    10 multiplication sumsEvery
    time yo get one wrong the shark
    will get nearer your man.You
    must try tosave the man from be
    ing eaten by the  shark."
250 PRINTTAB(10,20)CHR$130"PRESS
    THE SPACE BAR":G$=GET$
260 IF G$=" " THEN 270 ELSE 260
270 ENDPROC
280 DEFPROCSCREEN:GCOL 0,3
290 MOVE 190,800:DRAW 1090,800:
    DRAW 1090,510:DRAW 190,510:DRAW
    190,800
300 COLOUR 6
310 FOR X=3 TO 16:PRINTTAB
    (X,11)CHR$225:NEXT
320 FOR X=3 TO 16:PRINTTAB
    (X,12)CHR$225:NEXT
330 FOR X=3 TO 16:PRINTTAB
    (X,13)CHR$225:NEXT
340 FOR X=3 TO 16:PRINTTAB
    (X,14)CHR$225:NEXT
350 FOR X=3 TO 16:PRINTTAB
    (X,15)CHR$225:NEXT
360 COLOUR 5:PRINTTAB(12,10)CHR$226
370 PRINTTAB(6,2)"S H A R K"
380 COLOUR 4:PRINTTAB(7,10)CHR$227
390 ENDPROC
400 DEFPROCORRECT
410 COLOUR 2
420 PRINTTAB(6,24);"CORRECT"
430 FOR T=1 TO 80 STEP 4:SOUND 1,
    -15,T,1:NEXT
440 FOR T=1 TO 1000:NEXT T:PRINTTAB
    (6,24);"  "GOTO 80
450 ENDPROC
460 DEFPROCWRONG
470 COLOUR 2
480 PRINTTAB(7,24);"WRONG"
490 SOUND 1,-15,50,5:SOUND 1,-15,
    2,20
500 FOR T=1 TO 1000:NEXT:PRINTTAB
    (7,24);"  "
510 COLOUR 4
520 S=S+1:PRINTTAB(S,10);"
    ";CHR$227
530 IF S=11 THEN 540 ELSE 80
540 FOR D=1 TO 2000:NEXT:ENDPROC
550 DEFPROCFIN
560 FOR T=1 TO 2000:NEXT T:COLOUR
    3:CLS:IF Q=10 PRINTTAB(1,10)
    "WELL DONE !" ELSE 620
570 COLOUR 6
580 PRINTTAB(1,12)"YOU SAVED
    THE MAN"
590 FOR T=50 TO 100 STEP 4:SOUND 1,
    -15,T,1:NEXT:FOR T=100 TO 50
    STEP -4:SOUND 1,-15,T,1:NEXT
600 COLOUR 3:PRINTTAB(3,20)"ANOTHER
    GO ?":G$=GET$
610 IF G$="Y" THEN 60 ELSE 600
620 PRINTTAB(1,10)"NOT VERY GOOD !"
630 SOUND 1,-15,60,10:SOUND 1,-15,
    30,10:SOUND 1,-15,15,12:SOUND
    1,-15,5,25
640 COLOUR 6
650 PRINTTAB(1,12)"THE MAN GOT
    EATEN"
660 COLOUR 3
670 PRINTTAB(3,20)"ANOTHER GO ?"
    :G$=GET$
680 IF G$="Y" THEN 60 ELSE 670

```

Shark
by Philip Woodley

OPEN FORUM

Hold

on Spectrum

This program provides a hold/copy feature. The program uses the Spectrum interrupts, as in Bill Longley's program on page 33, vol. 2, no. 24 of PCW. After

typing in and saving on tape, the program should be run. *Randomise Usr* 65120 should be entered to start the routine, and your program can then be loaded. To hold the program simply press *Caps lock* and H, and S to restart. Pressing *Caps lock* and C copies the current screen display by calling the ROM copy routine at

address 3756.

This program was written for the 48K Spectrum. To use the routine on a 16K Spectrum, change the *For-Next* loop to FOR g = 32339 TO 32395, and the second byte of code from 9 to 40. Also, if the program crashes, try removing any peripherals (excluding printer).

```
5 CLEAR 65120
10 FOR g=65120 TO 65176: READ
a: POKE g,a: NEXT g
15 DATA 62,9,237,71,237,94,201,
0,0,255,243,245,229,205,116,254,
225,241,251,201,62,254,219,254,
203,71,192,62,191,219,254,203,10,
3,40,9,62,254,219,254,203,95,40,
10,201,62,253,219,254,203,79,32,
246,201,205,172,14,201
```

"RANDOMIZE USR 65120 ACTIVATES
THE ROUTINE ON A 48K SPECTRUM"

"RANDOMIZE USR 32339 ACTIVATES
THE ROUTINE ON A 16K SPECTRUM"

```
65120 LD A,9
65122 LD I,A
65124 IM 2
65126 RET
65127 NOP
65128 NOP
65129 RST 56
65130 DI
65131 PUSH AF
65132 PUSH HL
65133 CALL 65140
65136 POP HL
65137 POP AF
65138 EI
65139 RET
65140 LD A,254
65142 IN A,(254)
65144 BIT 0,A
65146 RET NZ
65147 LD A,191
65149 IN A,(254)
65151 BIT 4,A
65153 JR Z,65164
65155 LD A,254
65157 IN A,(254)
65159 BIT 3,A
65161 JR Z,65173
65163 RET
65164 LD A,253
65166 IN A,(254)
65168 BIT 1,A
65170 JR NZ,65164
65172 RET
65173 CALL 3756
65176 RET
```

Hold
by Nicky King

Microradio

GW6JJN



Ideas forum

This column is a forum for your ideas as well as mine and a place where information is to be shared and the great cause of Microradio sustained. To this end I will deal with some of your input to the column.

I have received a letter from SP Electronics of 48 Linby Road, Hucknall, Notts, who tell me how wonderful the Microradio column is. They then mention the fact that they are amateur radio and computer dealers who offer servicing on a range of equipment in-

cluding radio equipment, Sinclair, Dragon and BBC computers. Since I have a lot of letters from people asking about RTTY equipment for their micros, it is nice to hear from a source.

SP stock a program suite for RTTY on the BBC and are working on one for the Sinclair and Dragon range. In addition, they stock a range of programs for the radio amateur which I will happily review if they care to show them to me. I would also like to review their RTTY system, all I need is a BBC computer and the software... this is asking a lot, still, one can dream. Their phone number is Nottingham 640377. Good on yer, Mick, Hilary and Rob.

Many of you are interested in RTTY and I have touched upon this subject in past issues. I hope to review some equipment when I can lay my hands on some. If any of you

run RTTY with a micro, please send me details of the system you use and the micro concerned. I would be pleased to learn how well or how badly it works. Anyone who has a system of their own, or market a system for RTTY, I would be happy to give it a review. Lots of people are interested. Not least me.

Some weeks ago I mentioned Ramtop whose address is The School, Wellingborough, Northants NN8 2BX (please send a SAE if you write to them). This is a very good users group for radio computing enthusiasts. They offer a monthly newsletter which contains some unbelievable goodies, as does the Sinclair Users Group (SAE to Sinclair Amateur Radio Users Group, 3 Red House Lane, Leiston, Suffolk IP16 4JZ). Programs for Sinclair radio enthusiasts are regularly contributed and this answers the

question that I am constantly asked, 'Where do I get the programs?' The latest Ramtop newsletter contains morse and RTTY programs to type in for the BBC computer as well as the TRS80 which is well supported. So now you know.

Ramtop is the group for all micros and Sarug is the Sinclair group. Both are affiliated to each other. These are non-profit making groups there to serve the computing radio enthusiast, just like Microradio.

Keep the input coming. I am still trying to answer all the letters and I'll get round to everyone sooner or later, so have no fear. See you soon. ■

Ray Barry GW6 JJN

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, hints and tips to share, or topics that you would like to see covered, write to: Ray Barry, Microradio, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

SOFTWARE FOR SPECTRUM AND ZX81

OUR POLICY

We aim to create programs which you will keep on using until your computer wears out. You won't find our programs in the top ten and you will look in vain for colour adverts and fancy packaging. Nevertheless we have built up a solid following of discerning users in all parts of the world. Read the reviews of our programs if you can find them. We have been consistently praised for quality, originality and value for money.

WHAT DO YOU GET?

The bulk of our cassettes are now made by the factory which produced the Horizons tape. Programs are recorded twice and carry on the reverse side an audio narrative to supplement the operating instructions. Where appropriate, cassettes are accompanied by a comprehensive and clearly written instruction manual.

48K SPECTRUM

"Day of the Match" £5.00

Fascinating and realistic simulation of an entire football season. Name your own teams if you wish (English league provided on cassette). Rate each team from one to nine in various success categories such as attack, defence, manager, etc. Watch the season unfold. Includes knock-out cup option.

"Ball by Ball" £5.00

Simulates a test match series or one day international series. Set up your own teams and pool of players (England v Australia provided). Rate each player's capabilities as batsman and bowler on a one to nine scale for qualities such as talent, effort, etc. Pick your teams and play the match. Electronic scoreboard shows progress of a match. Full supporting score card and series averages.

"Superplan Generator" £12.00

Spreadsheet type program with variable column width and variable number of columns. Lets you sacrifice columns you don't need to get more lines.

"Superplan Pack 1". Business Applications £7.00

Ready made applications programs for sales day book, purchase day book, cash book and petty cash book.

"Superplan Pack 2". Home computing £7.00

Ready made applications programs for home budgeting, nutrition tables, car running costs and bank statements.

"Superview" £5.00

Simple but effective information display. Up to 42 pages of text and low-res graphics. Access pages on demand or run in perpetual 'slide-show' mode. Full facilities to create your own pages and build up an information library on cassette.

16K SPECTRUM

"Superdraw" £5.00

Create full colour high-res pictures and store them on cassette for use as titles or background screens in other programs. Or just have fun doodling and build up a cassette library of your creations. Slide show option allows you to review pictures stored on cassette.

16K ZX81

Here is a selection of titles still available for ZX81. Send sae for illustrated catalogue. These are the ZX81 equivalents of the Spectrum programs described above. Although similar in concept the specifications fall short of the descriptions given for the Spectrum.

"FOOTBALL-LEAGUE" Forerunner of "Day of the Match" £4.00

"TEST-MATCH" Forerunner of "Ball by Ball" £4.00

"VIDEO-PLAN" Forerunner of "Superplan" £7.00

"VIDEO-AD" Forerunner of "Superview" £7.00

"VIDEO-SKETCH" Forerunner of "Superdraw" £7.00

Many independent computer shops now stock our products but we continue to supply by mail order on an off-the-shelf, immediate delivery basis. Prices include VAT, post and packing in UK. Add a bit for postage if you live in Outer Mongolia. (Note: "Day of the Match" not available until late October 1983.)

Video Software Ltd, Stone Lane
Kinver, Stourbridge, West Midlands
Telephone: 0384 872462



PAEAN systems

Quebec Marketing PC, Little Bealings
Woodbridge, Suffolk IP13 6LT. Tel: (0473) 623757

LIGHT CYCLES by Martin Thomas BBC/B £7.50

A fast reaction game for the fleet of hand and mind. Can you surround the enemy with your light trace and make them crash? The better you are, the more cunning the enemy become and they increase in number and speed. Extra features introduced to challenge the high scorer. An absorbing game with excellent graphics, sound and scoreboard. Keyboard.

SCAN by Colin Llewellyn BBC/B £7.50

An addictive card-based game with superb graphics. The player uses his skill and judgement to place 25 of his 26 cards on a 5 x 5 grid in positions which equal or are greater than the value of the computer's cards. The problem is that the computer only discloses its cards after the player has moved, and which card is it not going to play? Progressive levels of play will tax your skill. No sound. Keyboard.

ALL PRICES ARE FULLY INCLUSIVE

Please make cheques or POs payable to PAEAN Systems. PAEAN are hunting for high quality, imaginative and exciting programs for the BBC Micro to market in the UK and overseas.

If you have written an original games, educational or business program which you believe has commercial potential, send a cassette to PAEAN Systems and if we agree with you, we will offer you a contract. Don't forget to include your name, address and telephone number.

Still to be won:

A £50 note for the first response which correctly interprets the hidden significance of the PAEAN Logo.

NOW OPEN!

SOFT TOUCH OF LONDON

YOUR NEW SOFTWARE DEALER
IN NW5, CELEBRATES ITS
OPENING WITH A SPECIAL
INTRODUCTORY OFFER:
10% DISCOUNT
ON ALL
SOFTWARE PURCHASED

COME AND SEE US NOW AT:
12 DARTMOUTH PARK HILL
LONDON NW5
(100 yards from Tuffnel Park Tube)

NB. EFFICIENT MAIL ORDER AVAILABLE
SAE BRINGS LATEST LIST

Dragon Dungeon

GAMES PROGRAMS

Crystal Chalice. Advanced swords and sorcery adventure £7.95
Temple of Zoren. S.F. espionage adventure £7.95
Treasure Tombe. Real-time graphics adventure £7.95
Giants Castle. Introductory adventure for children 6-10 years £5.95
Bugged! Wave after wave of Killer Bugs, deadly bug nests, indestructible Indy-bugs and mass mutation from Screen 21 onwards! £4.95

EDUCATIONAL PROGRAMS

Maths-Trek. Boldly go where no mathematician has gone before! 7 years-adult £5.95
Oscar the Owl's Maths Test. Maths à la arcade 5-10 years £4.95
Oscar the Owl's Spelling Test. Spelling for early readers who can handle capital letters £4.95
Animated Alphabet. Takes the early reader from lower case to capitals and thence to the keyboard £4.95
Midas Maze. Motor skill practice for 5-9 years, with plenty of visual stimulus £4.95

SERIOUS STUFF

Cash-Flow. Money management for home and small business £8.75
Catalogue, Sort and Mail. File-handling program, with sorting and mailing list facilities £8.75
The Manager. Both of the above in double presentation case £14.95

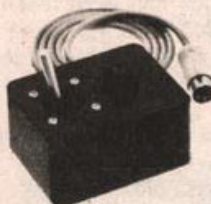
DRAGON GOODIES!

The Dragon Dungeon stocks over 400 programs, utilities and cartridges for the Dragon 32, together with plug-ins, add-ons and Dragonware designed to make life easier for the dedicated Dragon-Basher!

Send for current Price List

DRAGON STICKS

The ultimate Dragon/CoCo analogue sticks, with guaranteed fire button. £19.95 per pair, post free.



"The whole unit has a quality feel about it ... the fire button ... is the best of the batch reviewed. Perhaps I'm biased in favour of this joystick because I achieved my highest ever score of 48,700 on Racer Ball, compared to my previous high of 32,330 using other joysticks!"

— Dragon User™

DRAGON OWNERS CLUB

The Dragon Dungeon Club is a club run by Dragon 32 owners for Dragon 32 owners. Members receive the monthly newsletter **Dragon's Teeth**, which includes:

- Book reviews (Dragon literature) and news of forthcoming publications
- Hardware reviews (printers, disc drives, plug-ins and add-ons)
- Software reviews of games, utilities, business and educational programs
- Letters (cries for help, moans and gripes, astounding discoveries)
- Tips and advice (including prize 'Tip of the Month')
- Machine Code Corner
- A review of the US 6809 scene
- Competitions and Special Offers. 10% off all Dungeon purchases
- Members advertisements (free!)
- Free listing service (for members without printers)

The Dragon Dungeon Club also offers an advice service. If we can't help you with your Dragon problems, we'll try to put you in touch with someone who can!

Membership of the Club costs:

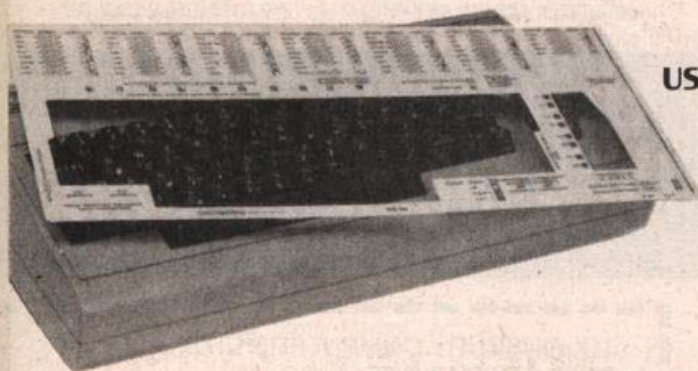
	UK	Overseas
Annual Subscription	£6.00	£8.00

FOR DEALER AND WHOLESALE DISCOUNTS PHONE 0335 42639

AVAILABLE AT GOOD SOFTWARE STORES OR BY MAIL ORDER.

DRAGON DUNGEON, MILTON HOUSE, ST JOHN STREET, ASHBOURNE, DERBYSHIRE DE6 1GH
 Telephone: Mail Order (0335) 42529. Retail Hours: 9.30 am to 5.30 pm.

Free yourself from the Handbook



USE MICROGUIDES

Immediate access to a prompt list placed exactly where you need it — saves hours thumbing through the manual. Order NOW for Christmas. 48-hour despatch.

Microguides KEYPLATES fit neatly over your computer keyboard. Features include: Easy to read alpha command list giving: Keywords and abbreviations, Syntax, Control Codes (Symbols and VDU): Use the 'clean wipe' pen provided for re-usable function key assignment in the space provided. FREE copy of "ERROR MESSAGES AND HOW TO DEAL WITH THEM" supplied for your computer: Let the KEYPLATES, made of durable plastic, increase your programming skills!

SPECIAL CHRISTMAS PRICES

VIC £4.95
 DRAGON 32 £4.95
 COMMODORE 64 £5.95
 BBC A and B MICRO £5.95

Add 75p post and package per order



CHEQUES OR POSTAL ORDERS WITH ORDERS TO

MICROGUIDES

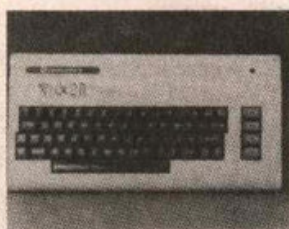
St., James House, 105-113 THE BROADWAY, EALING, LONDON, W13 9BL

"A first-class idea . . ." M.P., Staffs.
 "Just what I needed thank you!"
 A. H. T., Swindon

FINSBURY COMPUTER CENTRE

25-27 STROUD GREEN ROAD
LONDON N4 TEL: 01-263 0084/4481

**NORTH LONDON'S
LARGEST MICROCOMPUTER
CENTRE
BUSINESS COMPUTERS!
DUET 16 in stock**



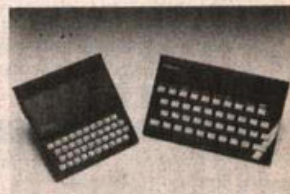
COMMODORE VIC20 £149.99
INCLUDING STARTERPACK
COMMODORE 64 £229.00



DRAGON 32 £175.00



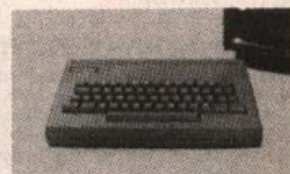
ATARI 400 £149.00
ATARI 800 £299.99



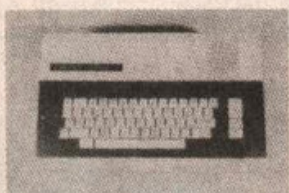
SINCLAIR ZX81 £45.00
SPECIAL OFFER
SPECTRUM 16K £99.95
SPECTRUM 48K £129.95



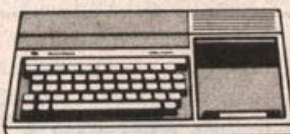
ORIC-1 48K £139.99



LYNX 48 £225.00



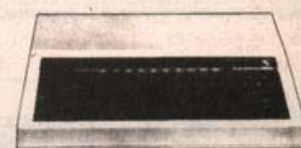
COLOUR GENIE 32K £168.00
SPECIAL OFFER



TEXAS TI 99-4A
£159.95



JUPITER ACE £69.95



BBC MODEL B £399.00

WE CARRY PROBABLY THE WIDEST RANGE OF SOFTWARE PROGRAMS IN STOCK PLEASE VISIT US FOR DEMONSTRATION ON ANY OF THE ABOVE COMPUTERS, DISK DRIVES, PRINTERS, CASSETTE RECORDERS, MONITORS, SPEECH SYNTHESISERS, LEADS, ETC., ALSO IN STOCK. ALL PRICES INCLUDE VAT. PRICES ARE CORRECT AT TIME OF GOING TO PRESS BUT ARE SUBJECT TO CHANGE.

We cannot list all the software we stock, so pick up the phone and ring 01-263 0084/4481 and ask. We'll be pleased to give you our prices.

Please send off the coupon or order by phone quoting your Access/Barclaycard No. Phone 01-263 0084/4481. Immediate despatch on receipt of order or cheque clearance.

FINSBURY COMPUTERS LIMITED
25/27 STROUD GREEN ROAD, LONDON N4

We open Monday, Tuesday and
Saturday from 9.30 to 6.00
Wednesday 9.30 to 1.30
THURSDAY and FRIDAY 9.30 to 8.00

TO: FINSBURY COMPUTERS LTD
25/27 STROUD GREEN ROAD
LONDON N4

Please supply.....

Please add £3 for p&p to cost

I enclose my cheque for £.....

or charge my
Access/Barclaycard No.

NAME.....

ADDRESS.....

..... SIGNATURE

Tony Bridge's Adventure Corner



Hall of fame

I have had several queries on the subject of the Scott Adams Adventures from frustrated Adventurers. The first Adventure in the series is *Adventureland*, in which 13 Treasures have to be found. Russell Buglass has located 12 of them, but is having a lot of difficulty with the last.

I think you may be looking for a necklace, Russell, and the only clue I can give you comes direct from Scott Adams himself, who is not known for his frankness! *Alladin was here??? Good the lamp!* If the Dragon is still asleep, use the mirror for a clue.

Number 2 is *Pirate Adventure*, which is also the subject of the Graphic Adventure we looked at at the start of this week's Corner and it is causing David Shepherdson some problems. When struggling to open the Pirate's Chest, some weird hieroglyphics appeared — *Psbl* and *Did*. I'm not quite sure how they were displayed, but David asks if anyone else has experienced the same bug (if bug it be!). Incidentally, David, if you're still having trouble with the chest, try pulling the nails!

It is *The Count*, however, which is causing the most problems. This is Adventure No. 5 in the series, and Philip Rayner's letter is typical. Only 64 moves are allowed, before sun sets, and Dracula comes for you...

Philip has done quite a bit of exploring, and has found, among other places, a Crypt, which seems to be a dead end — what use is the room, he asks. If there is a sign there, it might be an idea to read it, and note who wrote it.

This might also be an idea worth trying by Mr McBrealy of Cobham. He wants some help, but didn't tell me exactly where he was having trouble. He also points out that, in reply to a reader whose letter I quoted some weeks ago (*PCW*, 29 September-5 October), the program does not recognise *Roof*, but rather takes the first three letters and understands them as *Room*.

He also says that he cannot find any stairs as he keeps typing *Go stairs*. It might be worth trying *Climb stairs* in these circumstances, as the Adams Adventures quite often respond to this command rather than *Go* or *Up*. Another idea would

be to go outside the Castle and *Examine* it — you never know!

Mr R Dickenson of Worksop suggests that *Stairs* may be recognised by the program as *Stake* — good thinking. Incidentally, Mr Dickenson, like many other people, is having trouble keeping his cigarettes overnight — try finding a dusty old place where Dracula cannot go!

James Haluch, from the Isle of Arran, and Alex Wood from Barking both find trouble with the angry crowd outside the gate of the Castle — can anyone help them get past? Alex asks: what can you possibly do with daisies, and is there a flag on the flag pole? James would also like to know how to open the coffin. Remember the oven, James!

Finally, Mr Creswell, from Catford, in London, says that, when committing suicide by jumping from the bedroom window (that's what it says here!), he noticed, on the way down, a dark window. I think the best way to get there, Mr Creswell, is to remember how escapes are sometimes made — and there must be some sheets on the bed!

Browsing through one of the monthly's a couple of weeks ago, I came across a couple of references to an Adventure I had not previously heard of. The Adventure in question is *Hell's Temple*, written by Kenema Associates for the 48K Oric. Apart from a brief, but glowing mention elsewhere in the magazine, a letter appeared in the correspondence column, from the Hell's Temple Fan Club, of all things. No sooner had I decided to ask readers for a mini-review, than through the letterbox popped the very same, from the Fan Club! The Doppel-Ganger is the President of the outfit, and writes:

"*Hell's Temple* is the best Adventure for the Oric-1 computer... even better than *The Hobbit*! For one thing, it is original, being a mixture of strategy and luck: Strategy, in deciding which way to go, which monsters to fight, and generally what to do, and luck, in what objects you find to increase your Wealth, Strength and Spell-Power... and also if you have the misfortune to fall down a Pit! (Hang on, this sounds a bit like... TB.)

"It's basically in the 'Dungeons' style (Ah, that was it — but I thought this was, unlike *The Hobbit*, original? TB), and although there are no problems to be solved, a game can last for hours, weeks or even months, before you slay the great Morrigan (something I haven't done yet, and I'm President of the Fan Club!).

"Besides all that you have high-resolution graphics and 76 monsters in several different types."

Unless this is an elaborate hoax, you Oric Adventurers might find this worth looking for, if you are also a D & D'er.

Before getting on to another Hobbit Hall of Fame, another update — this time on the subject of high scores in Artic's *Inca Curse*, which I mentioned some time ago. In the same postbag, I received three letters from high scorers. The first was

Bruce Gavin (who is only eight — there's a great Adventuring career ahead of you!), who managed 9400 points.

Mr T D Frost wrote to inform me that in fact the highest possible score is 9950. In the same post came a letter from Billy McMillan, who assures me that 9990 is possible, the scoring reverting to 0 after this point. I've come nowhere near these exalted figures myself, so we will have to accept their comments — unless you know better.

On to HHOF:

Craig Stevenson with scores of between 75 percent and 59 percent.

Christopher John Fox, who is having trouble with Hewson's *Quest Adventure*. Your score of 85 (rating beginner) is a bit better than my Cave Crawler!

Steve Ellis, with 65 percent.

Simon Clark, Antony Minchin and Paul Gailey, with 62.5 percent.

Mark Bryan Nelson, who unfortunately didn't ask the program for his score.

Graham Andrew, with 89 percent.

C J Fox, who sent me a polaroid shot of the last message.

J C Wilkinson, with 52.5 percent and 65 percent.

Andrew Broome with 70 percent.

Simon Stokes and Philip Carter.

Andrew Warrington, who points out that reading the book is essential to solving the Adventure. He also says that none of the bugs mentioned in The Corner so far appear to affect his copy. There may well be a de-bugged version around, Andrew, but I have not seen anything from Melbourne House to confirm that.

G W Ballinger, who also mentions more Hobbitbugs — I'll go through them at a later date.

Dave Wood, with a low score of 35 percent.

Ian Moyse.

Mr and Mrs Carl Bozicek.

Simon Newell and Gavin Burrell, in three and a half hours, would you believe!

Chris and Andrew Taylor (who has also scored 1726 points playing *Hall of the Things*).

Mr X (he or she didn't give me a name), of Marple in Stockport. He or she managed to kill Smaug himself, which is unusual.

But I'm still waiting for the first BBC, Oric, or Commodore owner to complete *The Hobbit*!

That's it for this week, now answer this question: *Does a Zinger have to Zing with a ZORkestra?*

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.



Mastercode Assembler for the Commodore 64

Full Commodore 64 Assembler/Disassembler



£14.95
inc VAT

Mastercode is a substantial and complex program of use to anyone interested in writing machine code on the Commodore 64. Its features include:

- ☐ Machinecode monitor
- ☐ File Editor
- ☐ Disassembler
- ☐ Assembler

Mastercode is a full two pass assembler. It accepts labels, variables and equations within assembly language programs. It is possible to store programs anywhere in memory, even in parts occupied by the Assembler. Programs can be saved to either tape or disc.

The Machine Code Monitor includes:

- OUTPUT OF MEMORY TO SCREEN OR PRINTER ■ MODIFICATION OF MEMORY ■ EXECUTION OF MACHINE CODE PROGRAMS ■ SAVING OF MACHINE CODE FILES ON TO TAPE OR DISC
- LOADING OF MACHINE CODE FILES FROM TAPE OR DISC ■ STEP BY STEP TRACING OF THE EXECUTION OF A MACHINE CODE PROGRAM, INCLUDING DISPLAY OF REGISTER CONTENTS.

The Disassembler will translate into assembly language the contents of any area of memory, whether the 64's ROM or a user program. Output may be sent either to the screen or a printer.

The File Editor includes:

- ENTRY OF NUMBERED LINES OF ASSEMBLY LANGUAGE INSTRUCTIONS ■ LISTING, INDIVIDUALLY OR IN BLOCKS, OF PREVIOUSLY ENTERED LINES ■ DELETION, INDIVIDUALLY OR IN BLOCKS, OF EXISTING LINES ■ RENUMBERING OF EXISTING LINES ■ SAVING OF ASSEMBLY LANGUAGE FILES TO TAPE OR DISC ■ LOADING OF ASSEMBLY LANGUAGE FILES FROM TAPE OR DISC ■ ADDITION OF A BLOCK OF MEMORY SPECIFIED BY THE USER TO THE USER'S ASSEMBLY PROGRAM

The Assembler allows the translation of assembly language programs into machine code with full error checking, labelling and a range of assembler directives.

LOOK OUT FOR THE SUNSHINE RANGE IN
W.H. SMITH'S, BOOTS, JOHN MENZIES,
OTHER LEADING RETAIL CHAINS AND
THROUGH OUR NATIONAL NETWORK OF
BOOK SHOPS AND SPECIALIST STORES.

Please send me Commodore 64 Mastercode Assembler
@ £14.95 inc VAT. I enclose cheque/postal order for £_____ made
payable to Sunshine: 12/13 Little Newport Street, London WC2R 3LD.
Or telephone your order through Access/Mastercard on 01-437 4343

Name _____

Address _____

Signature _____



AMATEUR RADIO

Ian Henderson of Sussex Road, Dagenham, writes:

Q I have a Dragon 32. My brother is interested in amateur Radio (he hopes to take his test soon), can the Dragon be used in his new hobby?

A We already have a column running in *Popular Computing Weekly* for enthusiasts like your brother. However, the only program that I know of that probably might interest him is one for decoding RTTY. It decodes audio signals that are fed from the users receiver (Short Wave or VHF) directly into the cassette input on the Dragon. The program comes in a cassette version which costs £12 or a Rom cartridge version which costs £21. Both can be obtained from M. Kerry, 22 Grosvenor Road, Seaford, Sussex.

WHAT IS A ULA

L. Geach of Great Missenden, writes:

Q I was going to buy a Dragon 32, but a friend has told me that it does not have a ULA, and that this is a disadvantage. Is this true? What is a ULA?

A It will work as well as a Spectrum or BBC, or any other computer that has a ULA. The Dragon uses a pair of Parallel Interface adapter chips (6821 PIAs). Without going into complex electronics the difference between the two is that a ULA is customised, whereas the PIAs are off the shelf. In practice this means that there are more limitations when a PIA is used, and the actual way of handling the

various input and output systems of the computer is different.

A ULA is an Uncommitted Logic Array, or a Universal Logic Array. Essentially it is a chip that can be set up to act as the designer wants, of course this makes it more flexible. It does though, also bring some problems. The BBC and the Spectrum have both had ULA problems. In the Spectrum the main function of the ULA is to handle the screen, and some other input and output routines. As readers of *Popular Computing Weekly* know, an Issue 3 Spectrum with a new ULA has been bought out to solve problems of incompatibility between the Spectrum and some domestic television sets.

Before a ULA has been set to a specific specification it is 'uncommitted'. Once it has been set and is configured to a particular format it cannot be changed and is said to be 'universal'.

SPECTRUM PRINTER

Thomas Youger of Stretford, Manchester, writes:

Q I want to get a printer for my ZX Spectrum, which uses proper size paper. I have £250 at the most, and at the moment it will be some time before I can get an Interface 1, which I know can be used with a printer. Interface 2 seems to have the same type of ports as the Interface 1, though it uses them for joysticks. Do I need to wait for Interface 1 or do I just need Interface 2? What does Interface 2 do exactly?

A I have printers covered in quite a lot of detail. There seems, though, to be some confusion about the role of Interface 1 and Interface 2. Unfortunately, although they both have the same design of D port, that does not mean that they are compatible. The D design is standard and each manufacturer uses it as he wishes.

A lot of people wonder why Interface 2 is necessary at all. It should have been easy to add the single chip in Interface 2 to Interface 1. Whereas the Interface 1 seems an excellent buy and well worth the wait, I think that many people will find Interface 2 very limiting.

The expansion port on the back is only capable of taking a ZX Printer, and no other interface that I know of. The Rom slot is mapped into just 16K, the 16K used by the Rom. Thus only games and utilities that use less than 16K can be used. Additionally because it is mapped into the Rom space, useful utilities like Tasword, the word processor cannot be put into cartridge — exactly the sort of program you might want to put on it, but the program would overwrite the Basic in cartridge form.

TUNING UP

John Davies of Birkdale Avenue, Bispham, Blackpool, Lancashire, writes:

Q I am having a problem designing a guitar tuning program for my Spectrum. Originally I was going to simply match a tone from my computer with a guitar note. To improve on this, and to help people who are tone deaf, I was wondering if it is at all possible to use machine code to provide a display — I know that Basic would be too slow. My idea is to compare the guitar tone to the Spectrum, with a meter or something similar. If hardware is required could you publish a circuit diagram?

A This would take a dedicated article to answer properly. The main problem is finding a satisfactory way of reading the sound output from the guitar. Essentially what you are trying to do is turn your Spectrum into an oscilloscope, and even the Spectrum has its limits. You would need something like an A/D converter (analogue to digital). This would have to take a reading of the pitch over a measured time, say one millisecond, it would then take time to process this information. If you repeated this operation for about a second, you would then have about 500 values to even

out and display on the screen. If you wanted to display the information, then besides allowing time to process the information in the A/D converter, further time would have to be allowed to maintain the screen display. Every fiftieth of a second the processor stops whatever else it is doing and makes sure that the screen is displaying the correct information. There are also interrupts every fiftieth of a second to refresh the Ram. In effect you would probably only get about 250 values a second.

As someone who is tone deaf then I can appreciate anyone trying to help, but you might find it easier in the end to just get the Spectrum to play a BEEP at the right note for a certain length of time.

MEMORY EXPANSION

Peter Fewester of Victory Road, Wisbeach, Cambridgeshire, writes:

Q I have an unexpanded Vic20, and like many owners of this machine I am considering getting a memory expansion for it. What mystifies me is why should anyone buy a fixed memory expansion, when switchable memory expansions are available that will do the job of three separate memory units.

A It is very much a question of timing and market forces. If a company think they can sell a simple expansion for the same price as a switchable unit then they will, it will be cheaper to make. However, as with the question of price, market forces are such that with the growth in the Vic market that occurred until the advent of the Commodore 64, companies who were later onto the market had to offer more facilities in order to gain a market share. I would advise that all other things being equal, you would be much better advised to choose a switchable option.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem Peek it to Ian Beardsmore and every week he will Poke back as many answers as he can. The address is Peek & Poke, PCW, 12-13 Little Newport Street, London WC2R 3LD.

LYNX LYNX LYNX LYNX LYNX LYNX LYNX LYNX LYNX

REAL ARCADE ACTION — NOT JUST PRETTY BOXES

£6.95 VOOODOO TREASURE ISLAND. A fast game that demands courage, skill and a resolute will to survive. 48K and 96K.

£6.95 SPACE INVADERS. Fast and deadly real-time arcade action with full colour and sound. The most fantastic reproduction of the most successful arcade game ever in 100 percent Machine Code. 48K and 96K.

Both games fully extend the excellent colour, resolution and sound of the Lynx to its maximum and the action is the fastest you will ever see on your Lynx.

***£6.95 HOME ACCOUNTS SYSTEM.** Co-ordinate your income for a complete year. 48K.

***£6.95 TELEPHONE AND ADDRESS DATABASE.** Stores limitless number of entries. Query facility will find details when only part of the entry is known. Super fast search. 48K.

***£6.95 CASSETTE DATA FILE HANDLER.** Turn your Lynx into a powerful computer. Give it the powerful ability to save and load data files under program control. 48K.

Distribution on RAD Computer Cassettes with guaranteed load.

Send large SAE for free membership to Newsletters containing useful Lynx information.

SPECTRUM BBC CBM64 VIC20 ZX81 DRAGON TI ATARI APPLE

LYNX AQUARIUS SHARP ELECTRON TANDY GENIE

£6.95 TAPE HEAD ALIGNMENT CASSETTE. Solve your loading problems by correcting and maintaining the azimuth to the standard. Includes easy-to-follow instructions.

£6.95 BLANK C15 RAD COMPUTER TAPES — Pack of six. Highly reliable cassettes specifically designed for use with computers. Large S/N Ratio, Low Bias and Modulation Noise. High data reliability performance.

Send PO/Cheque to

17 Devonshire Hill Lane, London N17 8LJ
Overseas — Add 20 percent extra to cover P&P

**RAD
SYSTEMS**

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.

AT LAST — FOR THE BBC MICRO

A high performance compiler at a down-to-earth price. This BASIC compiler will turn your BASIC program into super-fast 6502 Machine Code at a touch of a button, and produce a program which will run about 40 times faster than the original BASIC program. The compiler handles over 50 BASIC keywords, 26 integer variables and full integer arithmetic. The machine code produced is suitable for many applications — games, utilities and real-time processing. The program is supplied on cassette with extensive documentation for BBC Model B with 1.2 O.S.

Send cheques/POs made payable to S. Parker for £14.95 to:

PARK SOFTWARE

26 Romilly Park Road, Barry, S. Glam, CF6 8RQ

★★ Dealer enquiries welcome ★★

LWS

**VIC20 CBM64
OWNERS!!!**

BUY DIRECT FROM THE MANUFACTURERS AND SAVE POUNDS!!!

4 SLOT SWITCHABLE MOTHERBOARDS, VIC20 £18.95 * CBM64 £19.50**

VIC20 RAM PACK ADAPTOR CARTRIDGES

Run 3.5K software on your expanded system without removing the Ram pack! A real must for the games player, many hundreds already sold. £12.45

NEW NEW NEW

ROBOT DRIVE INTERFACE

Plugs into the Vics or 64S user port and gives complete computer control of DC motors. Contains all the circuitry for stop start and reverse. Comes complete with software cassette giving full instructions and control program. £18.95

COMING SOON

WANT TO BUILD A DROID?

We are currently testing a large range of robot components that can be assembled in many different forms, ie. swivelling base units motorised arms gripper units, DC motor and gearbox drive units with optical encoders and much, much more!!!

All prices inclusive of VAT and P&P.

L. W. STAINES & CO, UNIT 2 RADING TRADING ESTATE
LONDON ROAD, BARKING, ESSEX IG11 8BU
Tel: 01-591 2900

NOW FOR THE 48K ZX SPECTRUM MULTI-COLOURED SPRITE-GRAPHICS

A new UTILITY program: Replace User Defined Graphics with Multi-Coloured Sprites and greatly improve your games.

FEATURES:

Demonstration program : Character Generator program : Instruction program.

Create any size characters up to full screen.

Choose colour, bright and flash for each character square.

Save character data : Create animated characters.

Beginners guide on how to use Sprites.

Remarkable Machine code routine prints Multi-Coloured Sprites instantly. Unprints Sprites Fully restoring background.

Only £6 including p&p.

From: **B. SIDES SOFTWARE**

4 Willesden Road, Cefn-Glas, Bridgend, South Wales CF31 4RE

MOTERING COSTS

PROGRAM FOR SPECTRUM 16/48K

A PROGRAM TO GIVE YOU WEEKLY
COSTING FOR ANY VEHICLE £5.75

SEND CHEQUES/POs to:
THE CHIP SHOP

59 SPARE ACRE LANE
EYNHAM
OXFORD OX8 1NL

ISCOM PRESENTS SPECTRUM SOFTWARE DEAL

(MAIL ORDER ONLY)

Ultimate, Attic Attack, Lunar Jetman, Cookie, Jetpack,

Pssst, Tranz Am. RRP £5.50 Our Price £4.80

Imagine, Zoom, ZipZap, Arcadia. RRP £5.50 Our Price £4.80

Bug Byte, Manic Miner. RRP £6.90 Our Price £6.10

Kong. RRP £5.90 Our Price £5.20

Melbourne, Hobbit. RRP £14.95 Our Price £13.50

Penetrator. RRP £6.95 Our Price £6.25

Legend, Valhalla. RRP £14.95 Our Price £13.50

Also Hunter Killer. RRP £7.95 Our Price £7.00

Harrier Attack, Flight Attack. RRP £6.95 Our Price £6.10

P&P 40p (3 tapes or more p&p free)

Send cheque/PO payable to:

ISCOM

9 WINCHESTER STREET, ACTON, LONDON W3 8PA

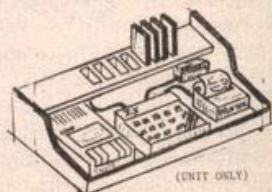
COMPUTERS

TO ALL SPECTRUM AND ZX80/81 USERS

Put away all those untidy wires with this new unit designed by a Sinclair user. Holds your cassette player, up to 8 cassettes, printer power pack, your Sinclair and most add ons.

Made of wood, coloured black or mahogany — please state which at £23.50 including VAT and P&P.

Mail order only — please send cheque/PO to:



(UNIT ONLY)

E. R. CAMERON & SON LTD
12 The Vineries, Enfield, Middx EN1 9DQ
ENQ ONLY: 01-607 2876

EST 1870. MAKERS OF FINE WOOD PRODUCTS

CLASSIFIED

Semi-display — £5 per single cc
Lineage — 20p per word

CALL DIANE DAVIS ON 01-437 4343 FOR SEMI/DISPLAY ADVERTISING

GAMES SOFTWARE

LYNX SOFTWARE

THE WORM Our best yet! Guide Wilberforce to the flowers without mishap. You will not want to stop! £5.95

REVERSALS Our version of popular board game Reversi in fast machine code. £4.75.

LABYRINTH — 3D Maze game. £4.75.

CHANCELLOR — Run the UK economy for 10 years. £4.75.

SPACE TREK — Zap the Klingons! £4.75.

DISASSEMBLER — Examine machine code programs in standard Z-80 mnemonics. £4.75.

(Add 10% for overseas orders).

Cheque/PO to:

QUAZAR COMPUTING, Dept. PCW,
67 Estcoats Drive, East Grinstead, Sussex.

Other programs available — send for details.

Dealer enquiries welcome.

ORIC GAMES. 5 fantastic games on one cassette, we dare you to play! Only £4.99 inc. p&p. System Software, 54 Otter Way, Eaton Socon.

BRAG — SPECTRUM 48K. Can you beat your computer at this classic game of bluff? At level 3 even its own programmer can't! Highly addictive — only £4.95. T. Lebon, Little Brays, Brays Lane, Rochford, Essex.

"KUBE-MAN" for 48K Spectrum — 3 multicoloured levels for only £4.45. Send cheque/PO to P. A. Dooley, 33 Blandford Close, Brannsholme, Hull.

SPECTRUM SOFTWARE. Ultimate games, £4.25; Imagine £4.00; Bugbyte £4.95; Softek £4.95; Valhalla £11.50; C.D.S. £4.95 from Megabyte, 13 Brunel Road, Cwmbran, Gwent.

FOOTBALL MANAGER. On Vic20 (plus 8K/16K), Spectrum 48K, Commodore 64. 88 teams, divisional tables, team strengths, injuries, etc. only £2.99. D. Spencer, 230 Lowgrange Avenue, Billingham, Cleveland.

48K SPECTRUM GAMBLING GAMES. Bandit, Highlow, Races, 21s. Good graphics and sound on one cassette, £3.50. Great for Christmas. R. R. Kidd, 20 Buckfast Close, Ipswich, Suffolk.

16/48K SPECTRUM "RAQUEL" presents her game for age 16 and over (state age with order), still only £3.50. I. Brooks, 17 Malvern, Coleman Street, Southend, Essex.

UTILITIES

RD DIGITAL TRACER, mounted, complete with software, instructions, etc., hardly used, £39. Tel: 01-883 1530.

BBC "UNLOCK" removes locks from locked software allowing back-ups, £3.80. P. Donn, 33 Little Gaynes Lane, Upminster, Essex, RM14 2JR.

SPECTRUM OWNERS! Your own personal tape copies. 100 per cent machine code, simple to use for any Spectrum, copies Basic, machine code, screens, files up to 47.85K or 15.85K. Loads, saves, automatic abort, multiple copies. Free header reader, prints file information, £4.30. J. A. Langley, Fron Farm, Llanfynydd, Wrexham, LL11 5HM.

SPECTRUM OWNERS

If you write your own games, this tape is a must. Contains machine code routines to move your objects one pixel at a time guaranteeing fast, smooth and flicker free movement. Gives a professional look to your software. £5.00

Trekward Ltd, c/o Swinton Hotel, Swinton Street, London WC1. Tel: 01-278 2033.

CBM 64 COPIER + header reader — make back-ups of most software currently available, supplied on tape or disk at £4.95/£6.95 including P&P. C. I. Foreman, 82 Hazelton Road, Colchester, Essex CO4 3DY (private).

COMMODORE 64 OWNERS

Assembler — Disassembler, Machine Code, Programming cassette — £7.50

Light Pen Editor — edit Machine Code programs using your Light Pen — £7.50

Light Pen Assembler/Disassembler — £7.50

PLEASE SEND FOR DETAILS TO:

MICRO & VIDEO,

3 BEATRICE STREET, LATCHFORD,

WARRINGTON, CHESHIRE

SPECTRUM AUTOKOPY 3

Make back-up copies of any Spectrum tape. Now more powerful than ever. The only copier really capable of copying programs the **FULL 16K OR 48K LONG!**

Even copies programs recorded from bottom of Rom to top of Ram.

IN ONE GO!

A massive 32K or 64K capability! Copies basic, machine code, headerless. Autoverifies and auto abort. No protection device too difficult.

USE AUTOKOPY FOR PROGRAMS

THE OTHER COPIERS WON'T COPY

Backed up by fast, friendly service. Autokopy modified to cope with any commercial program, on request (should you ever find one it won't copy!)

Send £3 only to B. Tidd,
160 Howlands, Welwyn Garden City,
Herts AL7 4RG

BREAKER BREAKER for the Commodore 64, makes back-up copies of most popular cassette programs. Protect your software investment, £3.95. C. Kent, 26 Northcape Walk, Corby, Northamptonshire.

SPECTRUM SPEEDYLOAD — Reduce your waiting time with this short program which lets you save and reload at 3000 baud on a standard cassette recorder. Easy to use with any tape command. Cassette (48K only) — £3.95. Ness Micro Systems, 100 Drakes Avenue, Inverness IV2 3SD.

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 Arden Road, Doncaster, DN2 5ER

IT CAN EVEN COPY ITSELF

DRAGON KOPYKAT on cassette. Makes back-up copies of most machine-code programs — including protected auto-run, £5.95. D. Gill, 82 Carlton Hill, London NW8 0ER.

£500 SPLAT!

HI-SCORE COMPETITION-CURRENT HIGH

James Tant 61195 points

(Subject to Competition Rules)

SPLAT THE 48K SPECTRUM CHALLENGE

AVAILABLE NOW £5.50 INCLUSIVE

INCENTIVE, 54 LONDON STREET,

READING RG1 4SQ

SPECTRUM & BBC models A & B

BBC ****

"CHASER" ... Fast snake game in full colour and sound, compulsive game.

"LEDGER" ... Excellent home ledger for all accounts, simple to use, store data on tape, 8 digits per col.

SPECTRUM ** machine code.**

"PAC-A-MAN" ... Tops the arcade game. Brilliant colours and sound.

"SPECTRACER" ... Racing car game in full colour and sound, nerve racking Tapes £5.95 each. Cheques or postal orders to Softron, 21 Ashbury Road, Bangor, Co Down, N. Ireland. Tel: 0247 59334.

Trade enquiries welcome.

GAMES SOFTWARE

SPECTRUM PROGRAMS

BACKGAMMON	£5.95
3D VORTE	£5.95
IQ TEST	£5.00
HEATHROW	£7.95
NIGHT FLITE	£5.95
INVADERS	£4.95
ESCAPE	£4.95
HOME BUDGET	£5.00

Many others. SAE for list.

Prices including P&P.

Cheque/POs crossed, payable to:

VYAJY'S H-K

11 MARGARET AVENUE,
ST AUSTELL, CORNWALL

CLASSIFIED ADVERTISING RATES:

Line by line: 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.

FOR THE DRAGON 32

MOVIE PRODUCER SPECIAL OFFER

£6.95

New Original Game.

Can you survive the movie business?

With 3D packaging and free red/green glasses

CHEQUE/P.O. to: ED 40, 249 HIGH ST, STRATFORD, LONDON E15 2LS

SUPERB CHARACTER-DESIGNER

— unique cassette. Construct, save, load own graphics, 16K/48K Spectrum. Cheque/PO £5.50 (p&p), to: "Chibur", 3 Lonsdale Street, Leicester LE2 1BP.

DAVID SHACK SOFTWARE

Over 150 games for the Spectrum and 100 for the Vic20. Also BBC, CBM 64, Dragon, Atari. Software sold at 10% discount.

SAE for lists to:

294 ROMFORD ROAD, FOREST GATE, E7
Telephone 01-555 9383

★ ★ TAPE COPIER ★ ★

The most advanced BACK-UP COPIER for ANY SPECTRUM available. MICRODRIVE COMPATIBLE. Does any other copier come near?

LOOK at only SOME of its options:

- ★ Maxcopy makes working copies of the full 16K or 48K!
 - ★ Verifies. Repeat copies. Automatic abort. 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. We are so convinced that you will be pleased with our product that we offer a **FULL MONEY BACK GUARANTEE** if you are not fully satisfied. Cost only £4.50.

LERM. DEPT PW
16 STONEPIT DRIVE,
COTTINGHAM
MARKET HARBOROUGH. LEICS

ATARI GAMES CARTRIDGES SPECIAL OFFER. £10 each post paid.

Asteroids, ET, Raiders of the Lost Ark, Missile Command, Maze Craze, Warlords, Berzerk, Video Pinball and Night Rider. Cheque/PO payable to ETB Wholesale, 47 Croftmead Drive, Milnrow, Rochdale OL16 3UE.

MICRO CHIP POSTER

40 x 50cm poster featuring Motorola MC68000 16-bit microprocessor chip in die form showing fine circuit details at a magnification of 150x.

SATELLITE POSTERS

41 x 60cm Landsat poster showing whole of UK.
48 x 70cm Meteosat poster showing whole of earth.

All posters in full colour available now at just £1.75 each or £4.50 for any three inc VAT. Add 55p p&p per order. Send cheques/PO to: Climax Computer Systems Ltd, 17a Broad Street, South Molton Devon EX36 3AR. Tel: 07695 2314

ZX81 astronomical calculators, two programs, 40 functions. Send SAE for details or cheque for £3.50 to D. J. Allan, 19 Edenbank Road, Cupar, Fife. **AMPLIFIERS FOR ZX SPECTRUM.** Ideal Christmas gift. Amplifies sound and loading plus saving built-in radio. Javed, 2 Tandelhill Road, Kilbarchan, Renfrewshire, PA10 2DQ, Scotland.

DISCOUNT SOFTWARE

	R.S.P.	Our price
Jumping Jack (Imagine)	£5.50	£4.50
Hobbit (Melbourne)	£14.95	£11.99
Ant Attack (Quicksilver)	£6.95	£5.95
Vaihalia (Legend)	£14.95	£13.25
Manic Miner (Bug-Byte)	£5.95	£4.95
Heathrow (Hewson)	£7.95	£5.95

C.W.O. P&P 55p 1 tape, 2 or more post free. S.A.E. for 9-page catalogue, to: Discount Software, 45 Brunswick, Bracknell, Berks.

SPECTRUM TAPE COPIER, copies all tapes, full instructions, easy to enter listing, £2, on tape £3.50. G. Sim, 95 Harbourn Avenue, Paignton, Devon.

48K SPECTRUM KEYDEFINE

Incredible KEYDEFINE gives you 35 user-definable FUNCTION KEYS. Define your own keys using the DEFINE option or use with the functions pre-defined:

SINGLE-KEY FUNCTIONS include:

- ★ SINGLE KEY
- ★ RENUMBER
- ★ COMPRESS
- ★ DPEEK
- ★ AUTO LINE
- ★ FREEMEMORY
- ★ HEX-DEC
- ★ DPOKE
- ★ DATALINE
- ★ RESET
- ★ DEC-HEX
- ★ PEEKLOOP
- ★ RUNCODE

Any Basic code you can write can be instantly called with a single key press. It will even save itself with your routines. **FULL MONEY BACK GUARANTEE** if you are not delighted with KEYDEFINE. Immediate despatch by first class return of post. Only £4.95 from:

SCIENTIFIC SOFTWARE
37 COTTESMORE ROAD
HESSLE, N. HUMBERSIDE



ROBOT PANIC for your 16/48K SPECTRUM

Zap the aliens before the walls crush your Robot. Five rooms of escalating infestation — can you keep up? £5 from retailers (ask) or direct (24-hour dispatch)

Soft Mill 20 Station Road
Haddenham Ely, Cambs CB6 3XD

SYPHAX FOR 48K SPECTRUM. 100 different screens of jokes, quizzes, puzzles, British and world information, conversion charts, programming aids etc. For the whole family. Adaptable for your own use. £3.50 including p&p. Rosetta Software, 2 Rosetta Close, Wivenhoe, Essex.

BBC "CLONE-2"

Tape back-up package — ★ Any O/S ★ Any Basic ★ Files
★ Locked progs Only £4.00 with free 8-colour Simon game! M. A. Paris, 38 Woodburn Manor Park, Woodburn Green, High Wycombe, Bucks.

VIC IMITATOR

Copies virtually all Vic20 cassette-based programs, including basic machine code, multipart programs and programs using various protection techniques. Written in machine code. Easy to use, works on any memory size. For a quick delivery, send Cheques/POs for £6 to:

IAN WAITE, Dept. PCWK,
11 Hazlebarrow Road, Sheffield
S8 8AU

HARDWARE

LYNX LYNX LYNX COMPLETE KEYBOARD PACKAGE OF A DATA STAND PLUS DATA CARDS

- Quality DATA STANDS to help in typing in programs
 - DATA CARDS contain full keyboard information
 - Keyboard entry of user defined graphic characters.
 - Also a new approach to number conversion.
- Avoid those '0's & '1's. RRP £14.95 inc. p&p

Dealers enquiries welcome. **PERIPHERAL PRODUCTS** 209 KENTON LANE, KENTON, MIDDX. Tel: 01-907 3406

SOFTWARE

PENNINE COMPUTER CENTRE

£1 OFF ALL TITLES OVER CHRISTMAS PERIOD

(ALL MACHINES)

Send for free catalogue
Free p&p

36 WILLOW STREET
ACCRINGTON, LANCASHIRE
Tel: 0254 390424

BLANKS, BLANKS, BLANKS. Computer grade leaderless cassettes, 10 x C10s (2 x 5) minutes £3.80 plus p&p; 10 x C15s (2 x 7½) minutes £4 plus p&p. P&P 50p. Cheques/POs to Stewart (Discount) Electronics, 4 Russell Street, Ashton, Lancs OL6 9PX.

TRY US FOR CBM64 SOFTWARE.

We don't offer discounts but we have a Unique Buy-Back trade system, eg. Motor Mania (with trade) £4.50. Monopoly (with trade) £3. Send SAE to Jaycee Software, Freeport (no stamp), Forres, IV36 0BR.

"YOUR OWN SOFTWARE BUSINESS"

Start your own full/part time Home Based Software Business. Specially written Manual covers all you need to know including all Legal/Practical aspects. Advertising, Accounts, Sign Writers, Supplies, etc. etc. Order Now! Send £3.99 to: T.M.B. (PC), 15B Kingsward Road, Prestwich, Manchester.

SECONDHAND SOFTWARE for sale, most popular machines. Wanted: Software, any type, any machine, must be originals. Katrina, 81 Openshaw Drive, Blackburn, Lancs. BB1 8RB.

VII SOFT COMPUTER SERVICES THE FRIENDLIEST SOFTWARE AROUND

— SPECTRUM OWNERS —

★ SPECIAL OFFER ★

BUY ONE ★ GET ONE FREE ★

— YOUR CHOICE —

EACH TAPE COSTS £6.50 inc P&P

SUPER SNOOKER

Skill and judgement needed here

For 1 or 2 players

LORD OF THE UNDER WORLD

A deep and difficult adventure

You'll need nerves of steel

HOUSE OF CARDS

You build — the computer knocks down

You'll need patience for this

SEMAPHORE TUTOR

Teaches a useful language

and there's a word game to play

DON'T DELAY — SEND TODAY

3 MORETON WAY, MOTTRAM, HYDE

CHESHIRE SK14 6RG

TRY US FOR CBM64 SOFTWARE

We don't offer discounts but we have a UNIQUE BUY-BACK trade system. e.g. MOTOR MANIA (with trade) £4.50. MONOPOLY (with trade) £3.00. Send SAE to JAYCEE SOFTWARE. FREEPOST (no stamp), FORRES IV36 0BR.

EDUCATIONAL SOFTWARE

JIVE SOFTWARE. Two educational maths programs for Spectrum 48K, only £5.75. (1) Dartscore teaches addition, subtraction, multiplication. (2) balance teaches problem solving. They make maths fun. 76A The Hill, Wheathampstead, Herts.

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.

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!!!**

Opportunity for enthusiast to become an Office Manager

Must have flair, a good knowledge of word-processing, and be able to relate to a sales force West End location

Write with CV and salary requirements to:

BNLA
Holly Bush Manor, Potten End, Herts

DEALERS

CHRISTMAS SPECIAL OFFERS

Quickshot Joysticks £8.50
Program Data Recorders £23.00
C15 Blank Data Cassettes for 55p, boxes of ten
BBC Model B £399.95
+ Free Tape Recorder

All prices incl. of VAT and P&P. Cheques/POs crossed, payable to Jayson's.

JAYSON'S
20 CHESSINGTON AVENUE
LONDON N3 3DR
Tel: 01-349 3638 2498
ANYTIME FOR A 5-STAR SERVICE
TRADE ENQUIRIES WELCOME

BIG DISCOUNTS BY MAIL

SPECTRUMS 48K only £120.95
ORICS 48K just £129.95
COMMODORES 64K £210.00
BBC B MODELS just £385.00

All prices inc VAT + delivery by Securicor

Cheques/POs crossed, payable to: Mr T. Pryle, 70 Carlyle Road, Edgbaston, Birmingham, W. Midlands

LANCASHIRE MICROS

ACORN/BBC, SINCLAIR, COMMODORE, DRAGON + LYNX PERSONAL COMPUTERS. We have a very wide range of software, books and accessories, including over 200 titles for the Spectrum alone. Send for free list of software to:
51 QUEEN STREET,
MORECAMBE
Tel: 411435

COMMODORE 64 £164 (Excluding VAT)

Disk drives and cassettes also available
Tel: Floyd Patterson; Tel: 01-969 0819
or send SAE

Image Science Micro Computers Ltd
189 Preston Road, London W10 6TH
or cheques/PDs (add 15% VAT) and £8 for
p&p Securicor delivery

Full after-sales maintenance on all
Commodore equipment bought from us

**CONTACT ANGLIA COMPUTER
CENTRE** for the Spectrum 16K plus
48K, Vic20, Dragon, Lynx, Vic and
Epson HX-20. Tel: (0603) 667-036.
(Unbeatable prices.)

SOFT MACHINE

OPEN MON-SAT, 10.30-6

We offer a selection of the
Finest Books and Software
currently available for: Oric,
ZX81, Spectrum, BBC, Dra-
gon, 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)

FOR SALE

VIC20 AND CASSETTE UNIT. Intro-
duction Book, Programmer's Refer-
ence Guide, dust cover, carrying case,
Avenger cartridge, arcade-style joy-
stick and software, £100 or swap for
Spectrum. Tel: Gillingham (0634)
360468.

SHARP MZ80K 48K memory, inter-
face and P3 printer including software,
word-processor and machine code,
Pascal and assembler languages,
£350. Tel: Bristol 791972.

VIC GOODIES, Chess 8K+, £7.
Learning to use Vic20 book £2.50, 12
issues Vic Computing, £4, joystick
£3.50. Tel: Ruislip 35588.

APPLE II+ 48K RAM. Japanese copy.
Original cost over £700. This is a
bargain at £350, with documentation.
Tel: 55515 0474 (Kent).

ATARI 400 16K, 410 Recorder, Basic
cartridge, manual, six months old, £90.
Ideal for Christmas. Tel: 01-936 2747
daytime, Ruislip 77599 evening.

DRAGON 32, 4 months old, boxed with
leads, manual, books, cover, joysticks,
multitude of games, worth £350+,
£165. Phone 01-440 1291.

48K ZX SPECTRUM, as new + two
books + 8 games tapes, value £250,
bargain £100. Tel: Cuffley 875789.

SPECTRUM 48K ISSUE 2, 10 months
old, over 4 years insurance left, perfect
working order, £95; software and
books available; Kempston Centronics
interface and software to suit Epson,
Seikosha, etc, as new, £25. Ring
Peacehaven 81184 or 3161.

NEW T199/4A for sale or swap, offers if
interested. Tel: Hornchurch 57487.

BBC 'B', January '83, with joysticks
and Tandy computer tape recorder,
hardly used, £400. Tel: Sneath, Coven-
try (0203) 74019.

ZX81 16K. Four Database programs
on one cassette: Stars, Sentences,
Dinosaurs and Speed-Learn. Send
£3.95 to R. Frost, 52 Hillcrest Road,
Rookley, Isle of Wight.

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, Perrywood Road, Haywards Heath,
Sussex RH16 3DH.

WANTED

SUNSHINE

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

USED MICROS WANTED

FOLLOWING PRICES PAID:

Spectrums 48K..... £65.00
Orics 48K..... £75.00
Commodores 64K..... £95.00
BBC models..... £275.00

Please include leads and send by recorded
delivery for cash by return, to:

Mr T. Pyle, 70 Carlyle Road,
Edgbaston, Birmingham, W. Mid-
lands

We also buy Apples, Lynx,
Genies and Texas.

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

ACCESSORIES

SPECTRUM DUSTCOVERS Only £1.75 (inc. P&P)

Smart top quality Blue 'Galaxy' PVC
with silver Spectrum 'flash'. Unique
design permits leads and most inter-
faces to remain connected.

PDQ Software, 'Parsley Rye'
Hilders Lane, Edenbridge, Kent
Dealer enquiries welcome

SELF-ADHESIVE CASSETTE LABELS
50 for only £1.30, 100 for £2.20, 1,000 for
£15.60.

INLAY CARDS — 10 FOR JUST 48p

50 for £2.00, 100 for £3.65.
COMPUTER CASSETTES
(2 YEAR WARRANTY)
C-5 — 34p, C-12 — 37p, C-20 — 42p.
p&p — 50p.
To: P.G.A.P. 32 Lakelands Drive, Bolton,
Lancs.

VIC20/CBM64

VINYL DUST COVER WITH LOGO
£2.25 including VAT + p&p, old and new
style cassette unit covers £1.95

A. K. PEARCE 'MICRO-PART'
29 Longleat Drive, Reading RG3 6YY

adapt electronics

The answer to 'Wobbly Rampack'. Suitable
for ZX80 and 81..... £7.50
● Spacer Kit — to use RAMLOK with ZX
Printer..... £1.50
● 23W+23W Female Connectors for ZX80
and 81..... £2.00
● Cassette Leads — Standard Sinclair type
..... £1.50 pair
● 8K Basic ROM for ZX81 — can be used on
ZX80..... £2.00
● Sinclair ZX81 Programming Instruction
Manual..... £2.80
● 16K RAM Pack for ZX81 (made by Sinclair)
..... £20.00
● Video Output Adaptor — for any ZX and
Spectrum — provides composite video
through phono socket. Full instructions.
NO SOLDERING NECESSARY..... £2.75
● Spectrum RS232 Leads — same as
Sinclair..... £10.90
Send SAE for further details.
Please add 50p P&P per order.
20 Starling Close, Buckhurst Hill,
Essex IG9 5TN

AQUARIUS

BUNCH OF FIVE CASSETTE (Snake, Master-
guess, Symon, Bomber, Hi-Lo)..... £4.95
CASSETTE RECORDER LEAD..... £1.95

SPECIAL OFFER

Order both: get £1 off total

SPECTRUM Save wear and tear on your power socket with our own
RESET SWITCH £3.95

PROCESSOR LTD.
A.O.S. House
1 Willow Parade
CRANHAM
Essex RM14 1DZ

SPECTRUM SPECTRASOUND £9.00
Audio through your TV
+ 60p p&p

SAE for further details
MAIL-ORDER ONLY

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.....

SERVICES

GOOD CBM 64 PROGRAMS required, royalties by arrangement. Send programs to A.M. Computers, 56 Qualitas, Roman Hill, Bracknell, Berks. SAE.

ZX81 — SPECTRUM

We can now offer out-of-guarantee repairs by our Computer Dept. Our engineers have had over three years' experience servicing Sinclair Computer products. Price including p&p, ZX81 — £11.50; 16K Ram — £9.95; Spectrum — £18.75. Send with cheque or P.O. T.V. Service of Cambridge Ltd, French's Road, Cambridge CB4 3NP. Tel: (0223) 311371.

EDUCATIONAL SOFTWARE

SPECTRUM TEACHER DATA

MARK PROCESSOR 48K SORT
GRAPH, GRADE
"Genuinely useful" £5.20

BRIAN FARRIS
8 THOMPSON ROAD
BOLTON

CLUBS

SPECTRUM OWNERS! Our software club has a complete range of cassettes from Imagine, Quicksilver, Ultimate, etc. Plus hundreds of pounds worth of other games and business programs. No rental charges. For more information send 50p p&p to Spectrumette, Windermere, Cherrywood Road, Loughlinstown, County Dublin, Ireland. **F.C. COMPUTERS CLUB**, 28A High Street, Lurgan, N. Ireland. Under 20s: Tuesdays and Thursdays. Adults: Wednesdays 7 pm to 9 pm. Nightly membership 50p. Tapes and computers sold.

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

Computer Swap 01-437 4343

Free readers entries to buy or sell a computer.
Ring 01-437 4343 and give us the details.

Spectrums for sale

SPECTRUM SOFTWARE for sale, titles available include: Hobbit, Lunar Jetman, Pssst, Arcadia, Jetpac, TimeGate, Pool, Cookie, Jumping Jack, Ah Diddums, Football Manager and more. Tel: Canterbury 60776 after 6 pm.

SPECTRUM GAMES FOR SALE. Cookie, Manic Minor, Knot-in, 3D Super Spy, Tranz AM, Molar Maul, Jumping Jack and many more. Tel: Matthew on 0444 452720.

SINCLAIR SPECTRUM programs for sale, £3 each. Tel: 051-430 0905.

48K SPECTRUM, one month old plus £220 of software and joystick, £200. Tel: 311 5054 evenings.

48K SPECTRUM, as new plus £400 of software, sell for £230 ono. Tel: 01-286 7220 anytime.

SPECTRUM GAMES TO SELL including Red Weed, Jaws Revenge, £4.50 each; Cybo-Tron, Wizard Warriors, Go to Jail, Great Britain Ltd., The Orb, £4 each; Mind Out, Horace Goes Skiing, Galaxions, Usurper, £3.15 each. Tel: Longfield 4364, after 4.30 pm.

SPECTRUM MASTER tool kit, address manager (OCP). Original only wanted, original software to swap, will consider purchase. Tel: Graham 0293 (Crawley) 541988.

48K SPECTRUM and tape recorder, both under guarantee, workstation, over £300 of software and loads of magazines, £250, or swap for CBM 64 plus C2N tape unit.

48K ZX SPECTRUM. Good condition. All leads and manuals plus printer (new), five rolls of paper, vast amount of software. Tel: 01-807 6644 after 4 pm.

SPECTRUM 48K, three months old, guaranteed, boxed, manual, etc., £55 software including Hobbit and Jet Pack, £110 ono. Tel: Longfield 4108 after 6 pm.

48K SPECTRUM, joystick, interface, with 10 games, swap for Atari 810 disk drive. Tel: (Poole) 686423.

SPECTRUM ORIGINALS for sale. Orbiter the Orb, Terror-Daktil, VU-File, Flight Simulation, Biorhythms, Cruising, £3.50 each. Tel: 01-348 3924.

SPECTRUM SOFTWARE, as new, including Games Designer £8, Cookie £3 and Frenzy £2, £11 the lot or will swap all for the Quill. Tel: Lewes 3095 after 5 pm, ask for Chris.

SPECTRUM 48K, unused (unwanted gift), light pen, quick shot joystick and interface, £100 of top games including: Hobbit, Valhalla, Penetrator and tape recorder £230. Tel: 061-881 4496.

STACK 40/80-COLUMN CARD for Vic20, £30. Tel: 051-430 0905.

VIC20 plus C2N, super expander, 16K Ram, voice synthesiser, motherboard, Krazy Kong and Introduction to Basic, £250. Tel: Brentwood 213769.

VIC20, 16K, plus two cartridges with 13 games and joysticks, cost over £270, sell for £200. Tel: 04862 73234.

VIC20 plus C2N plus 8K Ram cartridge, brand new Vic Book, Jelly Monsters and Super Lander, lots of tape software, including Arcadia and Matrix, will split or offers for the lot. Tel: Harlow (0279) 37629.

COMMODORE 64 C2N cassette recorder, sell for £200. Tel: Northampton 29622, ext. 331 (day), 412077 after 6 pm.

ZX81s for sale

ZX81, 16K boxed, with all leads and programming manual plus seven 16K software cassettes, £45. Tel: Leicester 693589 after 4 pm.

ZX81 16K 460 KEYBOARD, learning lab, 22 games cassettes plus eight edited cassettes, £120. Tel: 021-357 4525.

ZX81, 16K plus £80 of software including machine code test tool plus keyboard, leads and manual, excellent condition, £100 or will swap for Spectrum. Tel: 041 423 4867 after 5 pm.

16K ZX81 plus £20 worth software, £35. Tel: Guildford 570162.

ZX81, 16K, boxed, as new, manuals, leads, £30 of software, quick sale. £45. Tel: Yateley 878280.

ZX81 BOOKS for sale, Peek, Poke, Byting Deeper, Mastering Machine Code, also three tapes, Pimania, 3D Monster Maze, Orwin's Cassette Four, £2.50 each or £12 the lot. Tel: 0282 20244 evenings.

ZX81, 16K Ram, Filesixty keyboard, £70 worth of software including Black Crystal, Flight Simulation, etc., £20 worth of books, good condition, worth £160, will sell for £70. Tel: 304-1640.

Commodores for sale

VIC20, 16K, C2N cassette deck, joystick, £75 software, £175. Tel: 01-205 8701.

VIC20, + 3K super expander, cassette unit, game paddles, programmes reference guide, software + magazines, excellent condition, worth £300, sell for £170 ono. Tel: 0303-77135.

VIC20, cassette deck, 16K Ram, super expander, joystick and stack light pen, £40 worth of software plus books and magazines, worth over £300, offers around £180. Phone: 031-440 1191.

VIC20 8K RAM, £140 software for £100. Tel: Southend 584383.

VIC1515 GRAPHICS PRINTER, six months old with two blue ribbon cartridges, offers invited or will swap for Seikosha GP100 printer. Tel: Saeed, 061-633 4887, after 4 pm.

VIC20 with cassette deck + 8K Ram, super expander cartridges, magazines + books, many tape games + Commodore joystick, any offers? Tel: Harlow (0279) 37629.

VIC20, cassette unit, 32K fully switchable, Ram pack, software, book and magazines, all under guarantee, worth approximately £275, accept £220 ono. Tel: West Lothian, Scotland, 70022, any day after 5 pm.

VIC20 + cassette + Introduction to Basic Parts 1 and 2 + super expander + Gorf + joystick + Program Reference Guide, all for £100. Tel: 01-856 6802.

VIC20 16K, loads of games, C2N cassette recorder, three books, excellent condition, only £200. Tel: Rustington 73235.

COMMODORE 64 SOFTWARE, Annirrog, Grid Runner, Mutant Camels, Matrix, Husslers, Frogger, £4 each; also Neutral Zone (American game). Tel: 0274 673237 for availability.

VIC20 + cassette unit, all boxed, super expander, three games cartridges including Chess, Space Battle, Alien, tapes include Arcadia, Blitz, Programmers Reference Guide + lots of books. Tel: Rochdale 524 732.

VIC20 COMMODORE COMPUTER, Vic1515 printer + cassette recorder, manuals + home education + games software, joystick, 16K and 8K Ram pack, £350. Tel: 0705 738606, evenings only.

VIC20 + C2N cassette unit + software, books, Program Reference Guide, magazines + cassettes, £100. Tel: Steve, 01-328 1848.

COMMODORE CASSETTE UNIT, £25, C64 games, Rox, Tank Attack, £4 each, brand new Spectrum games designer, 48K, £10. Tel: 01-828 2333, ext 249 (office hours).

VIC20 with cassette deck + software, £20. Tel: 01-989 8253.

COMMODORE 8032 C2N CASSETTE, six months old, Basic guide + manual, £350 ono. Tel: Worthing 209 720.

VIC20, guaranteed, £75. Tel: Reigate 43905.

COMMODORE 64 CASSETTE DECK, programs, reference manual worker, £300, sell for £220 ono. Tel: Maidenhead 76863.

VIC20 + cassette + books, £95 ono. Tel: 01-958 3634.

VIC20 + cassette deck, 3K expansion cartridge, two games cartridges, 15 commercial software games and adventures + joystick, magazines + books, all boxed, as new, worth £350, will sell for £165 ono. Tel: Fleetwood 77585.

COMMODORE PEY 3032, with disk interface and Computhink dual drive, 400K disk unit. All looks as new, hardly used. Accept £450 ono. Tel: Chester 675717.

VIC20 + cassette + super expander + Basics Parts 1 and 2 + books + some software + joystick, still under guarantee, cost £200, accept £150 + postage (cannot deliver). Contact: Maria Tee, 2 Holmfirth Walk, Corby, Northants.

VIC20 AVENGERS CARTRIDGE with instructions, £7. Tel: Harpenden 69038.

WANTED: 16K, 32K or 48K Ram modules. Tel: Harpenden 69038.

VIC20 + cassette unit, joystick, super expander, Buti Plus, Mission Impossible cartridge, four games tapes and Vic Innovative Computing, £160 ono. Tel: Motherwell 69350, after 6 pm.

COMMODORE 64 MACHINE CODE PEN PAL wanted to exchange routines and ideas. Interested? Contact: Gary Foreman, 82 Hazelton Road, Colchester, Essex C04 3DY or telephone 0206 864650 (age 17).

VIC20, cassette unit, Commodore joystick, £33 of software, Jelly Monsters cartridge, as new condition, fully boxed, includes all manuals, genuine reason for sale, £115. Tel: Fleet 21440.

VIC20 + cassette deck + four-slot motherboard + Ram packs (3K + 16K) + Programmers Aid cartridge + Programmers Reference Guide + Introduction to Basic Part 1 + various software + magazines + Adventure cartridge, worth over £350, sell for £200. Tel: Chelmsford 442018.

VIC20 + C2N cassette recorder + 16K Ram pack + games including Jelly Monsters and Ratrace, etc + books including Programmers Reference Guide and magazines, £135. Tel: Warrington, Cheshire (0925) 66912.

VIC20 SOFTWARE to sell or swap. Tel: 01-950 0685 (Deser) or 01-954 8479 (David) after 5 pm.

VIC20 SOFTWARE plus books and magazines. Also Rampack, various items, etc. All half price. Tel: 01-578 2302 evenings.

VIC20 plus cassette deck plus 16K Ram and Introduction to Basic Parts I and II and Mastering the Vic20 plus £100 software for £220. Tel: Chorleywood 3719 after 6 pm.

COMMODORE, VIC20 plus C2N cassette unit plus 16K Ram pack and joystick plus reference guide and cartridges (Rat Race and Spider of Mars) plus cassettes of software (Donkey King, Frantic, Arcadia), etc and magazines. Guaranteed. Worth £350, sell for £195 ono. Tel: Coventry (0203) 333310.

VIC20 games, expandable plus 16K to swap or sell. Tel: 958 8643 (Edgeware), Andy between 4 pm and 6.30 pm.

VIC20 under guarantee. Cassette unit, joystick, two cassette games, Alien, Star Battle, machine code program games including Wacky Waiters Character, Panic. Also books including Vic reference guide, £110. Tel: Radlett 7506, Johnathan.

VIC20 C2N cassette unit, Introduction to Basic Part 1, Reference Guide, Gorf, Rat Race, cartridges, five games, cassette Spectravisor, joystick. Boxed, under guarantee, cost over £240, sell for £130 ono. Tel: Southend 711549 after 6 pm.

VIC20 GAMES including Wacky Waiters, Krazy Kong, Frog, Arcadia, Race, all under £3 or £10 the lot. Tel: Maidstone (0622) 871735, ask for John.

COMMODORE 64, unwanted gift, plus joystick and software, £160, buyer collects. Tel: 01-854 3350 after 7 pm.

VIC20 C2N CASSETTE DECK and over £100 software including books, 4 Roms, Sargon, Chess, Omega, Race, Super Expander, Monitor. All for £220. Tel: Dereham 860293 after 6 pm. Also joystick.

VIC20 SUPER EXPANDER. Boxed as new, with instruction book, £20. Tel: 0602 634293.

VC20 plus 3K, cassette unit, super expander, Rat Race, Avengers, Omega Race and Mission Impossible cartridges, joystick and many accessories including books and magazines, much software. Sell for £120. Tel: Tatsfield (09598) 656.

VC20 plus C2N tape and many games plus 20 magazines plus 15 blank tapes. Must sell, £120 ono. Tel: 0268 412549.

COMMODORE PET 32K, cassette, professional keyboard, Basic II, soundbox, numerous books. Tansoft software. All reasonable offers considered. Tel: 01-803 4733.

VC20 plus cassette deck, 16K Ram expansion, six cartridges, 27 cassette games and books. Tel: Uxbridge 53509.

VC20 SOFT SWITCH. Never used, £18. Tel: Alridge 51923.

VC20 SOFTWARE to sell or swap. Tel: Canterbury 730394 after 5 pm.

VC20 + C2N unit + spare expander + 16K + books + magazines + many good software titles. Original price £400, will sell for £200, or swap for Commodore 64. Tel: 0889 270926 after 4 pm.

VC20 + 3K, datassette, joystick, Super Expander and four games cartridges, many cassettes, lots of magazines and four books, worth £320+, sell for £125 ono. Tel: Tatsfield (09598) 656 (evenings).

VC20 C2N, cassette deck, + 16K memory expansion, lots of software, books, magazines, £170 ono. Tel: 021-784 5319.

VC20 Adventure Land cartridge swap for any other Scott Adams or sell for £9, also Pixel's trader swap or sell for £10. Tel: Romford 24348.

VC20 with 12 games, £80. Cartridges £15/£20 each. Tel: 01-589 5886.

ASTRO CLASH for the unexpanded Vic20. Can you get past the Astroids. Why not try. Send £1.20 to 32 Grange Road, Stroud, Kent, including packaging and postage.

VC20 + cassette recorder, intro to Basic, and a cassette, £115, also Vic revealed, £7, loads of tapes, Arcadia, Skramble, Frog, Nightcrawler, Grid Runner. Highest offer, phone 01-688 1692.

CBM 64 software for sale, Simons Basic, £30, Macro Assembler disk, £18. Tel: 01-769 1401.

VC20 + cassette recorder + joystick + 8K 2 slot motherboard + 16K cartridge + £150 of software, £150 ono. Can sell separately, call or write to Mr J. W. J. Baldock, 39 Oaktree Road, Ashford, Kent TN23 2QP.

VC20 CARTRIDGES for sale. Jelly Monster, Star Battle, Super Lander. Tel: Leatherhead 378689.

VC20 plus C2N and Programmers Aid cartridge and 3K super expander, Programmers Reference Guide, Learn Computer Programming, light pen, Voodoo Castle and lots of software including: Frogger, Space Storm, Flight Simulator, etc, hardware alone worth more than £290, sell for £200 ono. Tel: Robert, 01-455 1132 after 6 pm.

VC20 16K CASSETTE UNIT, motherboard, super expander, speech synthesiser, two adventure cartridges and books plus 11 tapes, sell for £170 or swap for Spectrum. Tel: Stoke-on-Trent 334024.

VC20, 12 months old plus 8K and 16K Ram and five cartridges and seven cassettes plus books, £150. Tel: Long Eaton (36) 66808 after 6 pm.

Dragons for sale

DRAGON FROGGER, two weeks old, £5-£7 or swap. No adventure games, J Morrison or Microdeal games considered. Tel: 0234 7500856 after 4 pm.

DRAGON 32. Excellent condition, two joysticks plus Donkey King, Planet Invasion, Dragon magazines, etc., £120 ono. Tel: Mr Whitton Hatfield 71703.

DRAGON 32, with Pye model 9110 cassette player, with joystick, lots of software including: Dragon Composer, Donkey King and a phonetic speech cassette and many more games, £155. Tel: 0253 852339.

DRAGON 32 with Pye cassette player, with joystick and lots of software including: Dragon Composer, Donkey King, Computer Voice, many others, with cassette holder, manuals and book, lots of magazines, boxed. For details telephone (0253) 852339.

DRAGON 32, two joysticks, cassette recorder, software including Composer, Frogger King and Ninja, books and magazines, £150, or will separate. Tel: 01-854 9767 after 4 pm.

Ataris for sale

ATARI 400, 32K plus Basic, recorder and 16 programs, machine code, games, sound speech synthesiser and more including three cartridges, Donkey Kong, Defender, Star Raider, B key keyboard fitted, only £250, all boxed. Tel: Niel (0442) 832625.

ATARI VCS plus half-price cartridges including ET, Raiders of the Lost Ark, will separate. Tel: 0978 822505 during office hours.

ATARI PAC MAN, £20. Tel: 01-969 9392 after 5 pm.

ATARI 400, 16K, with keyboard and recorder plus joysticks and Basic with games and manual, swap for Commodore 64 plus recorder. Tel: 01-807 9746.

ATARI VCS plus eight cartridges, Phoenix, Vanguard, Jungle Hunt, Galaxions, Raiders, Star Raiders. Hardly used, £150 the lot or will separate. Tel: 0908 662826.

Wanted

WANTED BADLY. 16/48K Spectrum with manuals. With or without software £70-£90 paid plus postage costs, also wanted. Quality software. Send offers to Jan Erik Borge. Box No. 423135 Torød, Norway.

THE COUNT to swap for Pirate Cove or Voodoo Castle (Vic20). Tel: 0642 762475.

SWAP ATARI 400, two joysticks, three cartridges for a Vic20 with tape recorder and games or any other reasonable offer. Tel: Seaford 890122 and ask for Martin after 6.15 pm.

SWAP MY VIC SUPER EXPANDER CARTRIDGE (boxed), for Thorn EMI Medieval Joust or Tank Commander or sell for £21. Tel: Stevenage (0438) 811634 after 7 pm.

WANTED. Atari 400 keyboard and recorder. Tel: 0454 311479.

COMMODORE CASSETTE UNIT wanted desperately, will even consider older type. C2N model preferred. Good working order. Tel: Chester 675717.

SIMON BASIC wanted for Commodore 64 or any business and utilities software. Tel: St Albans 61203.

SPECTRUM SOFTWARE will swap or sell. Top quality games also to swap or sell. Tel: Towcester 51202, ask for John after 5 pm.

WANTED. BBC disc owner to swap software. Tel: Harpenden 69152 for details, call anytime.

WANTED. BBC micro model B, 1.2 O/S software required. Tel: 061-652 5486.

WANTED. Practicalc or Simplicalc (cassetted based) for Vic20. Tel: (0438) 811634 after 7 pm.

WANTED. 16K Spectrum. Tel: 0622 673259 after 4 pm. Ask for Jason.

SPECTRUM SOFTWARE to swap. Send SAE to 5 Cohen Close, Arnold, Nottingham NG5 6RL. Games like Valhalla, Jet-Man, M. Minor, Hunchy, etc.

SPECTRUM OWNERS WANTED to swap software (no exchange fee). Send your lists and a SAE to Mike, 5 Bon Accord Road, Swanage, Dorset BH19 2DN.

SPECTRUM SOFTWARE, swap/sell, Jumping Jack, Gobble a Ghost, Vecman, Hungry Horace, Spookyman, Winged Avengers, Sentinel and Meteor Storm. Contact Ian Carroll, 4 Trentbrooke Avenue, Hartlepool, Cleveland TS25 5JN. Tel: (0429) 75676 after 6 pm.

SPECTRUM 48K with manuals and recorder and joystick if available. Tel: 0509 64321.

ZX SPECTRUM 48K, with sound chip and manuals and programming your ZX Spectrum, Mastering Computers, five tapes, home-made stand with sockets and magazines, £130. Tel: 01-821 0701.

WANTED. Intel 8271 disk controller for BBC Micro, will pay about £15. Tel: 021-308 2467 after 5 pm weekdays.

WANTED. Replacement ZX81 keyboard, sensible prices only. Donald Hindmoor, 3 Langdale Drive, Cocker-mouth, Cumbria CA13 9JB. Tel: Cockermouth 823820.

WANTED. Spectrum 48K. Tel: Clacton 426670.

WANTED. Any computer with lots of hardware disc-drive, also Spectrum, Dragon, ZX81, Commodore with or without hardware, incomplete, not working, broken, anything considered. W.H.Y. Cash waiting. Tel: Weymouth 787747 after 6 pm.

SWAP MY VIC20 recorder, joystick plus £80 of software and rest of starter pack, plus 16K plus one cartridge for Commodore 64 plus recorder or sell for £65. Tel: Andy 061-761 4143 after 4 pm.

BUGBYTE manuals for sale or swap for Asteroids. Tel: Banbury (0295) 720640, Adrian.

SWAP NEW FUTABASE gold series radio control equipment plus four servos and windbag flying parapil with 0535 engine and extras worth over £350 for BBC B or CBM 64 with cassette. Tel: Hitchings 731249.

WANTED. BBC software to exchange (disks preferred). Tel: Harpenden 69152. New programme power, superior software and Acornsoft particularly wanted.

SPECTRUM SOFTWARE to swap. Joust!, Starship Enterprise, Galaxians, Espionage, Island, Games 4, The Pyramid. Wanted, Monopoly, Ant Attack, Chukie Egg, Great Britain Ltd, VU3D. Tel: Cardiff (0222) 615579.

SPECTRUM SOFTWARE to swap. Joust!, Galaxians, Starship Enterprise, Espionage Island. Wanted: Any three above for Valhalla or any two above for Groucho or Pimania. Tel: Cardiff (0222) 615579 after 4 pm.

EXCHANGE. Philips G7000 with five cartridges for a 48K Spectrum without accessories. Tel: (051) 722 6170 (Oxford).

WANTED. ZX Spectrum micro drive order form. Tel: 0437 67256 evenings after 5 pm.

WANTED. 48K Spectrum, must be good condition and preferably series 3. No tape recorder/software needed, although would be acceptable. Offering around £70 to £80. Tel: Jonathan on 0636 815196.

WANTED. Ocean Trader by Q'Silva and/or black crystal by Carnell and will sell Pimania for £3. Tel: Robert on Southwell 812782 after 4.15 pm.

WANTED. Spectrum 16(48K), reasonable price. Tel: 01-573 6442.

WANTED. BBC micro model B, preferably with tape recorder but not software. Offering around £330 to £340. Tel: 0636 815132 (Nottinghamshire).

WANTED. Printer suitable for BBC GP 100A or Sinclair, £150. Tel: 0278 732355.

SPECTRUM GAMES to swap or sell, over 100 titles including Valhalla, Jetman, Hunchy, M. Minor, Cookie. Tel: Manchester (061) 440 0909 or (061) 449 8385.

SWAP. Spectrum programmes, Easy-speak, Cambridge Collection, Cursing on Broadway, for either Hobbit or the Masterfile. Contact Master by letter for further details. Avon House, C.T.I., 360-366 Oxford Street, London W1N 0AY.

Acorns for sale

BBC MICRO, Model B, OS1.2, complete with joystick, dust cover and software, all leads, sell for £395. Tel: 061-432 4631.

ACORN-LOOK DISC DRIVE, with £300 worth of disc software, including: business and games, sell for £195. Tel: 01-574 4122.

BBC MICRO B, 32K and compatible tape, £380 ono. Acorn GP 100A printer plus BBC printer interface, £180 ono. Excellent condition. Tel: 01-521 1058.

BBC MODEL B, only nine months old, 4.2 operating system, £300 ono. Tel: Mr Chua between 10 am and 5 pm. Tel: 0382 23181, extension 435.

BBC MODEL B, £325, Acorn AP-100A printer, £125 or both for £425, both as new, with unopened "Welcome" tape and original packaging, delivery included. Mr. M. Clark, "Jardinet", Oakland Park, Falmouth, Cornwall.

For sale

ORIC 1 48K, complete with manuals, power supply unit and all leads, Forth language cassette plus manual and assembler/disassembler cassette and games, £120. Tel: 0245 50432.

EPSON FX80, two months old, 160 EPS, £300. Tel: 01-736 7832 anytime.

TRS80, 16K Cedos computers, level II, two games, £110. Tel: 01-455 8832.

EPSON FX80, brand new, unwanted present, £385. Tel: 01-266 8794.

DRAGON SOFTWARE, Salamander's Dragon Trek, swap for Microdeal's Shuttle or Cuthbert in the Jungle. Tel: 01-950 2882.

MATTEL INTELLIVISION plus 28 cartridges and voice module and two voice cartridges. All reasonable offers considered. Tel: High Wycombe 38984 evenings/weekends.

GAMES TO SELL OR SWAP, adventure games wanted (private sale). Tel: 01-958 8643 after 4 pm.

NEWBRAIN MODEL A, Zenith green screen, hi-resolution monitor. Hardly used, guaranteed, £325. Tel: 0273 832564 evenings and weekends only.

CASSETTE RECORDER. Full working order, compatible with all Sinclair computers, complete with manual, £15 ono. Tel: Worthing (0903) 37100 after 4 pm.

SWAP. CB radio Fidelity 2000 and extras, power pack, aerials, SWR meter and antenna matcher, power microphone for 48K Spectrum with cassette player and games or Col-eurovision with games. Tel: 01-958 8643 after 4 pm.

SPECTRUM SOFTWARE, cost £600, sell for £200 or swap utilities. Tel: 4282 863644.

STEREO RADIO cassette, LED and tuning output metre, Dolby NR meter tape, 15 watts output, £130 or swap for 16K Spectrum and software. Tel: 01-213 7532 during office hours.

48K LYNX. Condition as new, software, manual PSU, all leads, boxed, Lynx users magazines, £190. Tel: 01-572 1738 after 5 pm.

SOFTWARE ASSEMBLER plus games and filler box, with joystick and paddles for ZX Spectrum. Sell to best offer. Tel: 01-455 0289 after 4.30 pm.

JUPITER ACE, 16K, leads, manuals, £65 ono. Tel: 01-650 7916 after 4 pm.

PROGRAMMERS AID CARTRIDGE for Vic20, unused, £25 ono. Tel: Rush-ton 0933 316246.

£500 SPECTRUM SOFTWARE to sell or swap. Ask for Matthew, 050 270 339.

ORIEG SPECTRUM CASSETTE, Racing Manager, Lojix, Cruising, £7 the lot. Tel: Stevenage (0438) 811634 after 7 pm.

FOR SALE. 1.2 O/S chip, £10. Tel: 0278 732355.

NEWBRAIN A. Six months old, £200 ono plus BBC Guide. Tel: Brighton 607928.

JUPITER ACE, £50. CGL Sord MS, brand new, £130. Tel: 061-485 4360.

TRS80 16K, extended Basic, Coco joysticks, software, lots of magazines, £200 ono or swap for Spectrum 48K with some extras. Tel: 0275 885478 (Bliton, Nr Bristol) after 6 pm.

INTELLIVISION plus six cartridges, £100. Tel: Dunstable (0582) 607969 after 6 pm.

AMBAT 2400, one month old, suitable for a Dragon or BBC, £65 ono. Tel: 021-326 9501.

ORIC-1 48K plus four Oric owners (two to come), two manuals, Oric base, cassette recorder and leads, £120, printer, lead £12 extra. Tel: Waltham Cross 38965 after 5 pm.

EIGHTY COMPUTER MAGAZINES including 45 Popular Computing, all in good order, buyer to collect, first £10. Mr D. Oldfield, 50 Albion Terrace, Lymington, Nr Morpeth, Northumberland NE61 5TA.

SOFTWARE. Large amount of BBC and Spectrum software, all originals at low prices, including: Defender, Snapper, Lisp, Jet Pac, Manic Miner, Hobbit. Send SAE for list. A. Swinburne, 1 Marine Parade, Penarth, South Glamorgan.

C199 4A FOR SALE plus joystick and cartridge and two cassettes of programs, worth £150, sell for £110 ono or swap for Sord MS, Oric 1 or Atari 600X. Tel: Hornchurch 57487.

INTELLIVISION with nine cartridges. Very good condition, £170. Tel: (Belvedere) 01-310 8109.

SHARP MZ80K, 48K memory built in screen and cassette including interface and Sharp P3 printer plus software, eg, wordpro pascal machine language, £430 ono. Phone: Bristol (0272) 791972 (evenings).

SHARP MZ80 + built in screen + tape recorder manual + users guide, basic tape + forth, £250 of software. Offers. Tel: 01-455 6641.

DK'TRONICS light pen for Spectrum with books and tape, price £14. Tel: 0204 885283, Bury, Lancs.

JOYSTICK INTERFACE and joystick colour control for Spectrum, £10. 021 360 1421.

ICL VIDEO keyboard built on monitor. Offers. Phone: Sean 061 652 1012.

ORIC 1 48K and £60 software, £130. Tel: 01-843 1092, Southall.

SHARP MZ80K in excellent condition, hardly used, over 150 programs, games, educational and utilities, suitable beginner or small business, £265 ono. Bexleyheath 01-303 4173 anytime.

GAMBLE (all original) only £2, Quasar Attack £1.50, both £3. Send SAE with money and 24p p&p to 19 Ambleside Road, Flixton Urmston Manchester M37 3PL (for Vic20).

SHARP MZ80K 32K Ram plus crystal basic and manual, £150. Phone: Newick (082572) 2848.

ASR33 teletype printer with RS232 interface, £70 ono. Telephone Waltham Cross 27730.

SEIKOSHA PRINTER GP 250X, five months old. As new plus cable for BBC, £230. Tel: 01-575 1676.

ORIC 48K, two months old plus cassette recorder and leads plus software, £140. Tel: 061 366 8634.

LYNX 48K. Excellent condition. Complete with box, five months guarantee. Extra book, £180 ono. Tel: 804 6585 after 5 pm.

SMALL BUSINESS accounting game for Pet, used as demonstrator. Details from Cat, 9 Queens Terrace, Cardigan, Dyfed.

SWAP 280A with assembler and disassembler plus forth and some software, £380 ono. Tel: Mr Dandekar 0224 571968 after 6 pm.

100 BMX plus TV game, £50. Tel: 01-504 0948.

TRS80 plus 32K interface and monitor and three double density disk drives and software, £950 ono. All as new, must sell quickly. Write to: Dave Milburn, 8 Queenswalk House, Queenswalk, Ealing W5.

LYNX 48K micro computer, eight months old, still under guarantee, £175 ono. Tel: 01-806 7709.

TEXAS TI99/417 home computer with two joysticks, cassettes, lead, software and books, £99. Tel: Downland 53157 (Croydon area).

ALTOS computer system — ASC8000/15E. Any reasonable offer considered. Tel: 031-556 2618 any time for details.

ORIC 48K plus £40 of software, £145. Also 7- to 5-pin Din Jack. Tel: Codsall 3507 after 6 pm.

LYNX 48. Excellent condition with peripherals, box, all leads and software. Under guarantee. Lynx user inclusive, £190. Tel: 572 1738.

LYNX 48K, brand new, unopened, £150 ono. Tel: Mr Pyatt, Orpington 20281 (after 8 pm).

STACK 40/80 Colour Card for Vic20, £30. Tel: 051-430 0905.

FULLER QRATOR. Add speech to your Spectrum, hardly used, still under guarantee. Need cash for BBC. Cost £40, accept £30. Tel: 01503 0675, ask for Pete.

NEW BRAIN AD 32K handbook, guarantee, £200 ono.

SHARP MZ 80K Ram, in excellent condition £150 ono. Tel: 0458 43079.

PRINZTRONIC 5,500 TV game + Plus Stunt Cycle, Super Wipeout, Grand Prix and Super Star, all in colour + sound, £50 ono. Tel: Southend 710266.

MATTE INTELLIVISION TV game plus 11 cartridges. Good condition, £160 ono. Tel: Warrington 51753.

96K EXPANDED NEWBRAIN AD with 200K disk drive plus cpm hi-res screen and extra Newbrain A software manual, printer, cables. Cost over £1,600, accept £1,350 ono. Printer also. Tel: Hastings 421072.

TRS 80 MOD III 48K integral disk drives and monitor with 20 discs and much software, £850 ono. Tel: Bill 01-572 2917 (cost £1,700+ November 1982), includes manuals, leads, cassette drive and all original packing.

FULLER MASTER UNIT for Spectrum with sound and speech synthesiser, amplifier, joystick port, better cassette interface and demonstration cassette. Perfect condition, three months old. Bargain at £40. Tel: 0324 20275.

LYNX 48K, mint condition, hardly used + Homerider software, £165 or swap for Spectrum 48K + software + many supplements. Tel: Swansea (0792) 891578.

APPLE 2 + 48K, six months old, perfect condition, £295. Tel: Home, 01-207 2185. Office: 01-207 5950.

FULLER MASTER UNIT for Spectrum, has sound and speech synthesiser, amplifier, joystick port, cassette interface, complete with demonstration cassette and box, £45 ono. Tel: 01-777 5935 evenings.

BLABY GAMES Chopper Rescue for the 48K Spectrum. Tel: Lancashire (02572) 66678.

QUICK SETUP SPEAKEASY for the 48K Spectrum. Tel: Lancashire (02572) 66678.

25IN CUSTOM-BUILT BOB JACKSON CYCLE, cost £460, plus 48K Spectrum (August 1983), swap for recent BBC Model "B", plus extras.

Write for details. M. O'Donnell, 5 Worthington Close, Palacefields, Runcorn, Cheshire.

TRS80 MODEL 1, level 2 16K, with 100+ programs, £99, also ZX80 with ZX81 chip/keyboard and 4K Ram £20, both with manuals. Write: Courtis, 31 Longmoore Street, SW1V 1JQ, London (Victoria). Tel: 01-834 5592 evenings.

SWAP my Cannon AI camera (top of the range) plus electronic flash, worth £350, for Commodore 64, preferably with Simon's Basic. Tel: 0702 529431.

LYNX 48K. Excellent condition, still under guarantee plus software, user magazines and printer interface, £190 ono. Tel: (0524) 415436 after 5 pm.

Will swap for Commodore 64 plus cash adjustment. Tel: 0524 415436.

FOR SALE. 4K ZX81 plus one game (chess) and a nine-month guarantee. All for £40. Tel: 671-1815.

SPECTRUM SOFTWARE worth over £85, sell for £50; £15 of games, 16 and 48K including Football Manager, Time Gate, Penetrator, Night Flight, 16K games sell £3, 48K games £4.50. Tel: 0682 384126 (private sale) for more details.

APPLE 2 EUROBUS 48K, 16K Ram, 12-inch monitor, dual disc drives, 80 colour card, CPM and DOS operating systems, Wordstar, Datastar, Calcstar, Visicalc, Languages basic, Cobol, Pascal, General Leisure, Accounts, Fixed Assets, Depreciation, £2,200. Tel: 0639 885136.

BBC CASSETTE LEADS of all kinds from £1.50 to £3.00 and BBC games to sell or swap. Tel: 574 2576.

SHARP PROFESSIONAL POCKET COMPUTER PC1 500 with all options for colour printer, Nicade rechargeable battery, mains charger unit, extra 8K Ram pack, internal back-up battery, fitted all leads, leatherette carrying case, desk console case, 3 instruction manuals, 12 rolls of printing paper, 2 dozen printer pens, all in pristine condition, sell or swap around £400 value. No junk given or expected. Tel: 01-989 6741.

VIC20 16K RAM PACK, £33; various software, offers. Tel: 0904 704151.

VIC1515 PRINTER + Vicwriter and 1,000 sheets paper, £180; Arfon expansion unit with switched sockets and cover, £60. Tel: 0258 55420 (after 5 pm).

SHARP MZ 80K, interface and printer plus software, with a word processor and data system. Been upgraded to 48K, £575. Tel: 04493 7898.

TWO IMAGINE GAMES. Catcher Snatcher, £4, and Arcadier, £4, Romic Space Attack, £5. Tel: Kent 730394.

BBC B OSI.2, 14 inch colour monitor, joysticks, cassette recorder, leads, Acornsoft games, Forth, Lisp, books, all Beebug magazines, £499. Tel: East Grinstead (0342) 311861.

LYNX 48K, month old, manual, introduction tape, Numerons game, Lynx Computing Sinclair book, all leads, £185 ono. Tel: Huddersfield 39295.

EPSON PRINTERS FX80 AND RX80, boxed, unused, unwanted, guaranteed one year, £423 and £300 respectively. Tel: 0494 775850.

SOFTWARE FOR SALE or swap Spectrum. I have lots. Tel: 886 2931 after 4.30 pm, ask for Vince.

JUPITER ACE, £45 ono. Includes manual and leads. Tel: Pointon (0625) 878683.

CASIO CT 1000, the flight case and 30 watt amplifier for a BBC Model B micro. Tel: Livingston Scotland 413837 after 5.30 pm.

UK101, 8K, cased, with leads and manual, good condition, £50 ono. Tel: 021-3504748.

PET 32K, cassette player and many tapes: Green screen, large keyboard, Disk-o-Pro chip, computer manual, Pet companion book, amazing value at £280, only just serviced. May deliver, first offer confirmed sale. Tel: 01-398 6963 (after 6 pm).

SINCLAIR PRINTER (nearly new), £25 ono, two books for 1K ZX81, £4. Lots of computer magazines. Ring for details. Coventry (0203) 615593.

JUPITER ACE, 19K ZX printer interface, compatible cassette recorder, books, magazine articles and software, £75. Tel: Stafford 664796.

TANGENT MICROTRON 65 computer, 7K memory, proper keyboard, full Microsoft Basic, assembler/disassembler and can be expanded, £150. St Ives (0480) 66086.

MATTE INTELLIVISION and 3 cartridges, £70 or swap for 16K ZX Spectrum. Ring 675110 Bristol after 4 pm.

SPECTRUM ORIGINALS, swap Jetpac, Arcadia, Splat, Chuckie Egg, 3D-Tunnel, Pyramid, Androids, Styx, Spectral INV, Aquarius for Kempston joystick interface or ZX printer. Sell £3 each, £5.50 pair, £25 the lot. Tel: 01-949 2053.

SIMON'S BASIC for Commodore 64, unused, £35 ono. Tel: 0705 376563.

PARTLY UPGRADED BBC "A", 32K, IC69, OS1.2, £280 ono. Tel: Walton on Thames 244538 after 6 pm.

16K ZX81, as new, good quality software including: Pimania Manual and leads included, price £45. Tel: Melinda 0306 885774 after 6 pm.

MCP 40 PRINTER. Colour printer plotter. Perfect condition, two months old. Boxed, two rolls of paper. Sell for £130. Tel: Stevenage (0438) 356404.

SHARP PC 1500 complete with extra memory, 8K module, CE150 printer, cassette, interface, main adaptor, replacement pens, manual and easi-file data base software. Unused, £433 new. Sell for £270. Tel: 01-949 0812.

£17 WORTH OF ZX MAGAZINES. Sell for £5 or swap for any Spectrum utility program. Tel: David on Coalbridge 0236 29808.

BBC MODEL B, two months old, £90 of software, as new. £400. Tel: 644 9661.

2B BASIC for your micro £2, Mastering your computer, £2, Lynx Computing £3, Oric 1 and how to get the most from it! £2.50, Enter the Dragon £2. Tel: David 0236 29808.

INTELLIVISION VIDEO GAME plus six cartridges, all in perfect condition, worth over £200. Accept £120. Tel: 0424 441469.

FIDELITY mini century chess computer with advanced cast, £42+. Tel: Hornchurch 57881 after 6 pm.

SPECTRUM SOFTWARE, swap of sell. Arcadia, Spectrus, Space Raiders and many more. Tel: 01-789 5728.

SWORD MS COMPUTER plus Basic 1 cartridge, three months old, hardly used, with Sprite Graphics, three voice sounds unit plus excellent basic features, easily expandable, £135 ono. Tel: 01-660 3813.

Tread The Path of Adventure with GILSOFT

FOR THE 48K SPECTRUM



MAGIC CASTLE £5.95

Try to rescue the princess from the castle, but beware of booby traps and vampires! A gripping adventure for the 48K Spectrum.



THE QUILL
£14.95

THE QUILL is a major new utility written in machine code which allows even the novice programmer to produce high-speed machine code adventures of superior quality to many available at the moment without any knowledge of machine code whatsoever. Using a menu selection system you may create well over 200 locations, describe them and connect routes between them. You may then fill them with objects and problems of your choice. Having tested your adventure you may alter and experiment with any section with the greatest of ease. A part formed adventure may be saved to tape for later completion. When you have done so *THE QUILL* will allow you to produce a copy of your adventure which will run independently of the main *QUILL* editor, so that you may give copies away to your friends. *THE QUILL* is provided with a detailed tutorial manual which covers every aspect of its use in writing adventures. For the 48K Spectrum



DIAMOND TRAIL £5.95

RECOVER THE SINCLIVE DIAMOND AFTER A DARING ROBBERY. FIRST YOU MUST OVERCOME MANY PROBLEMS IN A CITY TRAUGHT WITH DANGER AND INTRIGUE. THIS IS OUR LATEST ADVENTURE FOR THE 48K SPECTRUM.



TIMELINE & TASKS £5.95

A superb 16K adventure in which you must locate your time machine to return to the present. Plus a collection of mind stimulating puzzles.

Our Software is now available from many computer shops nationwide, or direct from us by post or telephone.

SAE for full details of our range.

Dealer enquires welcome.

GILSOFT
30 Hawthorn Road
Barry
South Glamorgan
CF6 8LE
☎(0446) 736369

Credit Card Order line
Personally manned for 24 hours
☎0222 41361 Ext430



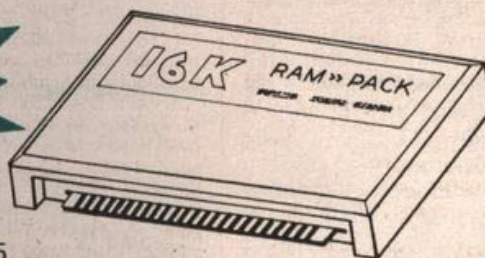
Home
Computer
Centre



29 Millcroft, Crosby, Liverpool L23 9XJ
Tel: 051-727 8050

**Special
Offer**

VIC 20 and CBM 64 are reg'd trade marks
Commodore Business Machines



- VIC 20 16K STANDARD RAM PACK — £27.95
- VIC 20 16K SWITCHABLE RAM PACK — £35.95
- VIC 20 32K SWITCHABLE RAM PACK — £49.95

**16K STANDARD
£27.95**

ALL RAM PACKS CARRY 12 MONTHS GUARANTEE

- VIC 20 4 SLOT SWITCHABLE MOTHERBOARD — £28.95
- CBM 64 4 SLOT SWITCHABLE MOTHERBOARD — £29.95

ASTERFRET TRADING LTD. INCORPORATES HOME COMPUTER CENTRE.

Please allow up to 21 days for delivery.
All prices include V.A.T., postage and packing.

If you wish to be added to our mailing list,
please tick the appropriate box

PLEASE SEND ME

Name _____
Address _____

- | | | |
|---------------------------------|---------------------------------------|--|
| <input type="checkbox"/> VIC 20 | <input type="checkbox"/> Dragon 32 | <input type="checkbox"/> 16K Std. Ram Pack |
| <input type="checkbox"/> CMB 64 | <input type="checkbox"/> TI99/4 | <input type="checkbox"/> 16K Switchable Ram Pack |
| <input type="checkbox"/> BBC | <input type="checkbox"/> ZX Spectrum | <input type="checkbox"/> 32K Switchable Ram Pack |
| <input type="checkbox"/> Lynx | <input type="checkbox"/> Electron | <input type="checkbox"/> VIC 20 4 Slot Motherboard |
| <input type="checkbox"/> Oric | <input type="checkbox"/> Colour Genie | <input type="checkbox"/> CBM 64 4 Slot Motherboard |

I enclose Cheque/PO for £ _____

Home
Computer
Centre



PCW

NEW RELEASES

BEST-SELLING



Few people can have been left in any doubt that *Popular Computing Weekly* as a whole, and Tony Bridge in particular, thought *Halls of the Things* by Crystal Computing was a pretty wonderful program.

The follow-up to that program has now been issued, not by Crystal, but by Puffin Books. Called *The Warlock of Firetop Mountain*, it is based on the best-selling children's adventure book of the same name.

This program is designed in much the same format as the *Halls of the Things*. A maze is randomly generated by the computer and you move a little figure around it opening doors, looking in chests and fighting baddies. The range of commands available, as well as some of the themes, owe a debt to adventures but the action is all arcade.

Setting the maze in the labyrinth from the book beneath *Firetop Mountain* is a nice way of linking the two elements of book and program.

The game is fast and furious. The only criticism I would make is that it is a bit similar to *Halls of the Things* — still, at £5.50, it's good value. You can also buy the program in a package together with the book for £6.95 and, as such, it could solve a Christmas present difficulty.

It will be interesting to see how many bookshops stock the program/book package.

Program *The Warlock of Firetop*

Price £6.95
Micro Spectrum 48K
Supplier Penguin Books
536 King's Road
London SW10 0UH

SOPHISTICATED

Password is a sophisticated machine code utility program for the Dragon 32.

Fundamentally a disassembler, it also allows you to create and debug your own routines. It is the mode of execution of the instructions that is really unusual. Each instruction is executed, in sequence, line by line through the routine. The program uses multi-screens and has a printer dump facility for those that have a printer.

A leaflet detailing the various commands available from *Password* is included and the whole package looks very useful. Some previous experience with machine code programming would be helpful, though, to get the most out of the program.

Program *Password*
Price £6.00
Micro Dragon 32
Supplier B Franklin
4 Church Circle
Farnborough
Hants

MULTI-SCREEN



Ultima Zone is to the Oric what *Penetrator* was to the Spectrum — just about the most sophisticated, multi-screen kill-the-aliens attack game ever.

It would be ludicrous to describe the plot, if that is

what it has. Suffice to say that if you destroy one nasty thing, you can be sure that something else even nastier will take its place.

Later stages in the game feature obstacles to be avoided, as well as (of course) yet more and more aliens. As is usual with Oric programs, there are two versions of the game on the tape, one saved fast and the other slow. Is there anyone out there who bothers with the slow version? It cannot be thrilling sitting around for 20 minutes waiting for a program to load.

Program *Ultima Zone*
Price £8.50
Micro Oric 1
Supplier Tansoft
Units 1 and 2
Techno Park
Newmarket Road
Cambridge

MANIPULATE

If you have the *Hisoft* or *Picturesque* assemblers then you could find the *Spectrum Screen Editor* very useful.

The purpose of the program is to enable you to manipulate source code in very much the same way as a word-processor manipulates text.

This means that, for example, blocks of code can be moved, a four-way cursor allows for all the assembler code to be manipulated, and a search facility means any given string can be inserted, deleted or replaced.

The program comes with a manual explaining the main features and commands — it's not for novices though.

Program *Spectrum Screen Editor*
Price £5.00
Micro Spectrum
Supplier K R Sheppard
76 Harmanwater Road
Bracknell RG12 3NY

BELEAGUERED

Choplifter is a game whose reputation has produced substantial sales in this country. Audiogenic has now released it on the Commodore 64 and it is graphically superb.

You control a helicopter and must use it to rescue beleaguered troops trapped in a building behind enemy lines.

Under joystick control you guide your helicopter through

the enemy territory and attempt to save as many commandos as possible. It's exciting stuff and technically the game is superb.

Just one problem though — it is available only on cartridge, priced at £29.95. Why is this? Commodore manages to sell its Rom software at under £10.

Program *Choplifter*
Price £29.95
Micro Commodore 64
Supplier Audiogenic
PO Box 88
Reading
Berks RG1 2SN

A CUT ABOVE



Sinclair has just released a range of educational programs in conjunction with Macmillan, the educational publishers.

Whilst some of the programs are not far removed from the normal drill/routine exercises (albeit with some imaginative graphics), others are definitely a cut above the norm.

Survival caters for the older pupil and aims to teach the main ideas of the theory of evolution in an interesting way. Using high-resolution graphics, the program enables you to choose what kind of animal you'd like to be, each with its own strengths and weaknesses, and then makes you face the dangers that animal would face. The object of the program: survival.

You must decide what your animal must do to survive (within its limitations) and in doing so learn some Darwinian theory. Quite fascinating. It's a pity that one of the options isn't to be a human

being, that could be riveting. Neiszsche eat your heart out!

Program *Survival*
Price £9.95
Micro *Spectrum 48K*
Supplier *Sinclair Research*
Stanhope Road
Camberley
Surrey GU15 3PS

DEBUGGING

Modem 80 is a cheap and effective assembler/disassembler for the Lynx computer — one of only a few such packages for the machine.

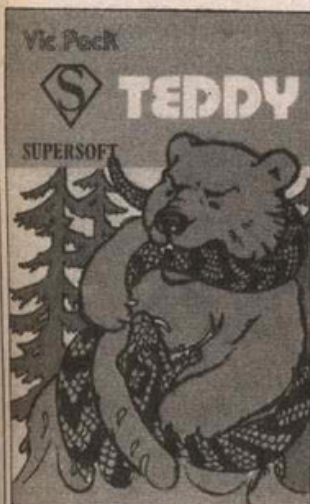
The program is in machine code which means that it will not interfere with existing Basic programs and also makes it easy to call machine code routines from those programs.

The program has all the essential features of this type of system: it can handle the complete Z80 instruction set and all the *Ascii* characters; it will dump to screen, printer or tape; and it has a set of error messages to help with debugging.

The main commands of the program are listed in the fold-out insert that comes with the cassette.

Program *Modem 80*
Price £6.95
Micro *Lynx*
Supplier *Seven Stars*
15 Gloucester Avenue
London NW1 7AU

SNAKE EATER



Teddy is a machine code arcade style game for the Vic20 with a bizarre plot. The

rather unpleasant theme is that Teddy has to eat all the snakes in his wood.

Teddy, it seems, is having all his picnic basket food eaten by Lake snakes. Eschewing diplomacy, Teddy sees eating the snakes as the only answer.

There is though, a right and wrong way to eat a snake — a posterior munch will kill it immediately, head-on it's Teddy who will be the dinner. Snakes bitten in the middle merely break in two, doubling Teddy's problems.

Other features in the game include various objects that appear randomly, some of which Teddy can eat for further points. It's funny, but somehow I never associated Teddies with nasty things like eating snakes.

Program *Teddy*
Price £5.95
Micro *Vic20 (8K)*
Supplier *Supersoft*
CO Audiogenic
PO Box 88
Reading
Berks

OLD FAITHFUL

As Commodore 64 software supply clicks into ever higher gears, the major arcade games are starting to be covered.

In fact, the 64 is technically advanced enough to allow more or less perfect imitations of the arcade hits of a couple of years back — ignoring legal considerations, of course — so you should be able to have your very own *Pacman* or *Galaxians* at home, complete in every detail.

Solar Software has just released both of these old faithfuls on cassette.

Munch Man has all the features of the original *Pacman* complete with bonus fruits, two-player options, and bonus munchers. The game, for anyone out there who may have been asleep for five years, involves steering your muncher around a maze eating dots. Four ghosts chase you and your only defences are your ability to duck and dodge the ghosts and four power pills located in each corner, which will enable you to temporarily munch the ghosts.

Of such things megabucks are made.

Program *Munch Man 64*
Price £7.95
Micro *Commodore 64*
Supplier *Solar Software*
51 Meadowcroft
Radcliffe
Manchester M26 0JP

ON-SCREEN



Griffin Software have launched a range of educational packages for the BBC and Spectrum that look a cut above the usual standard of such software.

For one thing, all the programs are nicely packaged in large colourful boxes. For another, much effort has gone into the on-screen presentation using large well-defined letters and graphics.

Wordspell contains 116 separate word tests although you can alter the range and difficulty of the words tested by adding your own lists.

Other programs in the series teach sets, multiplication, division and tables.

The BBC programs are priced at £9.95 and the Spectrum ones sell for £7.99.

Program *Wordspell*
Price £7.99
Micro *Spectrum*
Supplier *Griffin Software*
Frederick Street
Birmingham B1 3HP

HIGH SEAS

Pirate is an adventure game aimed at younger children. It features graphics with animation and sound rather than the incomprehensible connundrums beloved of more adult text adventures.

The game is divided into two sections. Part 1 places you on the high seas battling it out

with other ships and steering your way through scattered islands to the shore. In this section you may find hidden treasures, but you must keep clear of the rocks and reefs.

There's more treasure to be found in Part 2. This is set on dry land — you must solve various mysteries and collect valuable jewels. Aside from your own wits, your only real help may come from the ship's mysterious, lucky black cat.

Program *Pirate*
Price £9.25
Micro *BBC B/Spectrum 48K*
Supplier *Chalksoft*
37 Willowslea Road
Worcester WR3 7QP

INTER-RELATED

Runelord is an adventure game for the Oric 1. It is the first module of a planned series of releases to enable you to build a collection of inter-related adventures.

The game is very much in the *Dungeons and Dragons* mould, with the option of choosing and developing the main features of your character. Parts of the game are illustrated with maps and drawings.

Modular Concept Peripherals — authors of the game — plan to produce later sections incorporating speech using the MCP Speech Synthesizer and the *Runelord* Speech chip.

It sounds like bliss for the hardened adventurer or war-games player. Enough information to get you started is contained inside the cassette box, but you are largely on your own.

Program *Runelord*
Price £7.50
Micro *Oric 1*
Supplier *Modular Concept*
Peripherals
13 High Street
Clydach
Swansea

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.

This Week

Program	Type	Micro	Price	Supplier
3D Graphics	Ut	BBC B	£9.95	Alien
Acheron's Rage	Arc	Oric	£6.95	Softtek
Adventuremania	Ad	Texas	£5.95	Intrigue
Android Two	Arc	Spectrum	£5.95	Vortex
Bengo	S	Vic20	£6.90	Mr Micro
Birds and the Bees	Arc	Spectrum	£5.95	Bug-Byte
Bloc Head	Arc	Dragon 32	£7.95	Dragon Data
Body Snatchers	Arc	Spectrum	£6.50	Crystal
Bowls	S	Spectrum	£5.00	Lotus Soft
Brain Train	Ed	Spectrum	£4.95	Camel Micros
Cavernfighter	Arc	Spectrum	£5.95	Bug-Byte
Cimeron Moon	Ad	Dragon 32	£7.95	Dragon Data
Confrontation	S	Spectrum	£7.95	Lothlorien
Cranky	Ed	Dragon 32	£10.95	Dragon Data
Cruise Attack	Arc	Spectrum	£6.95	Micro Gen
Defence Force	Arc	Oric	£7.95	Tansoft
Defender	Arc	Spectrum	£6.95	Micro Gen
Dracula's Revenge	Arc	Oric	£6.95	Softtek
Dreadnought	Arc	Spectrum	£5.95	Lothlorien
Earth Defence	Arc	Spectrum	£5.95	Artic
Forth	Ut	Commodore 64	£29.95	Audiogenic
French is Fun	Ed	Spectrum	£5.95	CDS
House of Death	Art	Oric	£9.99	Tansoft
Humphrey	Arc	Commodore 64	£6.90	Mr Micro
Jigsaw	S	Spectrum	£5.95	Artic
Jumpjet	Arc	Dragon 32	£7.95	Dragon Data
Knockout	Arc	Spectrum	£6.95	Micro Gen
Land of Sagan	Ad	Spectrum	£6.95	Micro Gen
Laserwarp	Arc	Spectrum	£6.95	Micro Gen
Lets Count	Ed	Dragon 32	£10.95	Dragon Data
Maths 2	Ed	Dragon 32	£19.95	Ampalsoft
Maths O Level	Ed	Dragon 32	£19.95	Ampalsoft
Micro Mouse	Arc	Spectrum	£5.95	Lothlorien
Millimon	Arc	Spectrum	£5.95	Artic
Motoring Costs	Ut	Spectrum	£4.95	Chip Shop
Naanas	Arc	Spectrum	£5.95	Micro Gen
Paradroids	Arc	Spectrum	£6.95	Micro Gen
Pat the Postman	Arc	Spectrum	£6.95	Micro Gen
R Nest	Arc	Commodore 64	£6.95	Audiogenic
Red Baron	Arc	Spectrum	£4.95	Lothlorien
Rommel's Revenge	Arc	Spectrum	£6.50	Crystal
Runelord	Ad	Oric	£7.50	Modular Concep
SAS Assault	Arc	Spectrum	£6.95	Micro Gen
Scram 20	Arc	Vic20	£5.95	Artic
Shaft	Arc	Dragon 32	£7.95	Dragon Data
Shuttlezap	Arc	Dragon 32	£12.95	Dragon Data
Spectrum Safari	Ad	Spectrum	£5.95	CDS
Star Trek	Arc	Spectrum	£4.95	Micro Gen
Stolen Lamp	Ad	BBC B	£6.95	Lothlorien
Strike Attack	Arc	Spectrum	£6.95	Micro Mart
Super Meteors	Arc	Oric	£6.95	Softtek
Super Spy	Ed	Dragon 32	£19.95	Ampalsoft
Synther 7	Ut	Dragon 32	£10.95	Dragon Data
T Kingdom Valley	Ad	BBC	£9.95	Bug-Byte
Tank Battle	Arc	Vic20	£5.95	Artic
Tee Off	S	Dragon 32	£7.95	Dragon Data
The Island	Ad	Spectrum	£7.50	Crystal
Three Dee Graphics	Ut	Dragon 32	£7.95	New Dimension
Two Gun Turtle	Arc	Oric	£6.95	Lothlorien
Ultisynth 64	Ut	Commodore 64	£14.95	Quicksilva
Viking	S	Dragon 32	£7.95	Dragon Data
Zorgon's Revenge	Arc	Oric	£8.50	IJK

Book Ends



HONEST

Well, at least *Megabucks from your Microcomputer* is honest. The book's one aim: to explain how, directly or indirectly, you can make money from computers.

At £3.35 for a book of only 66 text pages with large drawings I think that what we have here is an example of recursion. The book exemplifies its own principles perfectly.

Book *Megabucks from your Microcomputer*
Price £3.35
Micro General
Supplier Prentice/Hall International
 66 Wood Lane End
 Hemel Hempstead
 Herts HP2 4RG

USEFUL

For anyone with a BBC and a disc drive, *The BBC Microcomputer Disk Companion* looks like the only book you'll need to get the most out of your system.

The book describes how discs work, and how to configure existing equipment to run with the BBC micro. Different sections deal with disc handling and disc commands.

The book also includes a number of programs to use with your disc drive, some involving assembly language.

A useful book.

Book *The BBC Microcomputer Disk Companion*
Price £7.95
Micro BBC (+ Disk)
Supplier Prentice/Hall International
 66 Wood Lane End
 Hemel Hempstead
 Herts HP2 4RG

PRACTICAL

Sometimes justifying the fact that you have just spent a couple of hundred pounds on what looks like a small box with typewriter keys on it can be difficult. "But what use is it?" cry all your relatives in unison.

A book that might help you answer the question is *Using Your Home Computer* by Garth W. P. Davies. It contains nothing but practical ideas for "real" uses you might find for your micro.

The book tries to show you how to think about using a computer for specific tasks rather than actually giving you programs to type in.

A little paperback book, but rather thin — 80 text pages for £3.50.

Book *Using Your Home Computer*
Price £3.50
Micro General
Supplier Macmillan Press
 4 Little Essex Street
 London WC2R 3LF

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to: This Week, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

Key: Ad — adventure/Arc — arcade/Ed — education/
 S — strategy-simulation/Ut — utility

Top 10

BBC*	
1 (1) Rocket Raid	(Acornsoft)
2 (4) Hopper	(Acornsoft)
3 (4) Swoop	(Program Power)
4 (7) Alien Swirl	(Program Power)
5 (3) Planetoids	(Acornsoft)
6 (6) Monsters	(Acornsoft)
7 (—) White Knight Mk II	(BBC)
8 (—) Castle of Riddles	(Acornsoft)
9 (—) Business Games	(Acornsoft)
10 (—) Sphinx Adventure	(Acornsoft)

*All Model B.
 (Figures compiled by Micromanagement, Ipswich 0473 59181)

Top 10

Atari	
1 (3) Planet Fall	(Infocom)†
2 (—) Hard Hat Mack	(Electronic Arts)†
3 (—) Sons of Egypt	(Datascop)†
4 (—) Deadline	(Infocom)†
5 (1) Zaxxon	(Datascop)†
6 (2) Pooyan	(Datascop)†
7 (8) Zork III	(Infocom)†
8 (—) Fire Fleet	(English)†
9 (—) Sea Dragon	(Adventure International)
10 (5) Preppie	(Adventure International)

†32K cassette. ‡32K disc. §48K disc.
 (Figures compiled by Calisto Computers, Birmingham 021-632 6458)

Top 10

Vic20	
1 (4) Arcadia	(Imagine)
2 (1) Wizard and the Princess	(Melbourne House)
3 (2) Wacky Waiters	(Imagine)
4 (—) Laser Zone	(Llamasoft)
5 (10) Matrix	(Llamasoft)
6 (—) Skidrunner	(Salamander)
7 (5) Skyhawk	(Quicksilva)
8 (—) Zargon II Chess	(Commodore)
9 (—) Money Man	(Commodore)
10 (3) Panic	(Bug-Byte)

(Figures compiled by Boots & Co Websters)

Top 10

ZX81*	
1 (6) Defender	(Quicksilva)
2 (1) OS Scramble	(Quicksilva)
3 (7) Asteroids	(Quicksilva)
4 (2) 1K Chess	(Artic)
5 (9) Space Raiders	(Psion)
6 (8) Fantasy Game	(Psion)
8 (—) Inca Curse	(Artic)
9 (—) ZX Forth	(Artic)
10 (—) Maths Rension	(Sinclair)

*All run in 16K.
 (Figures compiled by Boots & Co Websters)

Spectrum

1 (1) Lunar Jetman	(Ultimate)*
2 (—) Kong	(Ocean)*
3 (10) 3D Ant Attack	(Quicksilva)*
4 (—) Chequered Flag	(Psion)*
5 (9) Manic Miner	(Bug-Byte)*
6 (—) Jet-Pac	(Ultimate)*
7 (—) AticAtac	(Ultimate)*
8 (—) Flight Simulation	(Psion)*
9 (6) ZZoom	(Imagine)*
10 (—) Splatt!	(Incentive)*

*Requires 48K
 (Figures compiled by W H Smith and Son, London)

Books

1 (1) Advanced User Guide for the BBC Micro, Bray, Dickens and Holmes	(Cambridge Micro Centre)
2 (3) 30 Hour Basic, Prigmore	(NEC)
3 (6) Spectrum Hardware Manual, Dickens	(Melbourne House)
4 (—) Spectrum Microdrive Book, Logan	(Melbourne House)
5 (—) BBC Micro Disk Companion, Latham	(Prentice-Hall)
6 (8) Using the 64, Gerrard	(Duckworth)
7 (2) One Hundred Programs for the BBC Micro, Gordori	(Prentice-Hall)
8 (10) Advanced Graphics for the ZX Spectrum, Angell and Jones	(Macmillan)
9 (—) Spectrum Interfacing and Projects, Bishop	(McGraw-Hill)
10 (4) Commodore 64 Programmer's Reference Guide, Commodore	(Commodore)

(Figures compiled by Watford Technical Books, Watford 0923 23324 Prestel 28824)
 (Last week's position in bra)

Dragon 32

1 (3) Mined Out	(Quicksilva)
2 (10) Pettigrew's Diary	(Shards)
3 (—) Night Flight	(Salamander)
4 (1) Ring of Darkness	(Wintersoft)
5 (—) Dragonfly 2	(Hewson)
6 (—) Gridrunner	(Salamander)
7 (5) Champion	(Peaksoft)
8 (—) Lionheart	(Peaksoft)
9 (6) Frogger	(Microdeal)
10 (—) Morocco Grand Prix	(Microdeal)

(Figures compiled by Boots & Co Websters)

Ziggurat



Replacement person

Do you know what robots are?

Apart from many other things, a "robot" is a set of traffic lights in South Africa. When traffic lights were first introduced into this country, they too were called "robots".

A robot in this sense is a straight replacement person — here it is replacing a police officer on point duty.

Are all robots replacement persons?

Nolan Bushnell, the designer of the first video game, *Pong*, has invented a robot called Topo — is Topo really a robot? Bushnell's firm is called Androbot, and a spokesperson for Androbot (UK) claims, or the press release says, a robot is basically a computer on wheels plus some software, so anyone with a home computer of reasonable power already owns the first half of a robot.

Topo the robot — so we discover — is essentially another computer-driven device, and one which is only capable of movement. Topo, thus, is as much a robot as the Jessop turtle or the BBC buggy which are used in schools. Neither the turtle nor the buggy are robots, so the implication is that Topo is not a robot either.

Are remote control cars, planes, and boats robots? Most people would say not. Just because the machine is driven by a computer under a program, this does not suddenly make turtles, buggies or Topo into robots. They are "simple" machines.

A "simple" machine is an extension to the human: eg, an aeroplane or a power drill. The direction of the machine is under the immediate control of a human, though there may be aspects which operate without human intervention.

A machine which operates without any human intervention (such as a Jacquard loom, a cardsorter, or an automatic press) is the next stage of the development of machines. An "automatic" machine is not, however, a robot.

There are those who are willing to argue that any automatic machine is effectively a simple robot, but such argument seems to contradict commonsense — or at least my commonsense. There seems to be something missing from a machine to fill bottles, something I feel should be there for a robot.

I think there are three main aspects to a robot: machine, power, control.

Machine: any robot must consist of machinery and in this a robot is no different from any other machine — a robot is a machine.

Power: for any machine to work there must be a power source, but, as before, this does not differentiate the robot from any other gadget.

Control: the operations of the machinery have to be controlled, and it is the form of control which differentiates the robot from the simple or automatic machine.

In a robot the control of the workings of the robot have to be programmed. By programmed I mean "not human directed" and I do not mean "repetitive". For example, a computer program is programmed, but it is not always repetitive.

A computer program can produce novel results and often the novelty derives from the response to differing inputs. It is a poor computer game which always repeats itself, independently of the users responses. It is a poor robot (but a typical automatic machine) which cannot accommodate to some change in the relevant environment.

It is a poor industrial robot/welder which, when the metal to be welded is akimbo, welds thin air. A robot has to respond to the environment and thus has to have ways of sensing that environment.

To sense the (relevant) environment requires some "intelligence" in the sensing mechanisms. To use that information derived from the environment, requires "intelligence" in the control program. It has to be a control program, and it has to be performed by a computer, as no other device with those kinds of abilities exists.

Once we talk about computers and intelligence we are in familiar territory...

Boris Allan

Puzzle

Three digits

Puzzle No 85

Egbert was thinking of an unusual number which is the answer to this puzzle.

It has three digits. The sum of the first power of the first digit, plus the second power of the second digit, plus the third power of the third digit gives the number back again.

1st 2nd 3rd

If Egbert had been in an obliging mood he would have been thinking of 175 because $175 = 1^1 + 7^2 + 5^3$, and then we would have printed both the question and the answer at the same time, making the puzzle a trifle easier than usual.

Unfortunately he wasn't. Which number, or numbers, might he have been thinking of?

Solution to Puzzle No 80

The program assigns each firework price to the array A(5). Every possible combination of five fireworks is then selected, and if the total cost is equal to exactly one pound, the result is printed.

```
10 DIM A(5) 20 LET A(1) = 12 30 LET A(2) = 14 40
LET A(3) = 18 50 LET A(4) = 32 60 LET A(5) = 48 70
FOR B = 1 TO 5 80 FOR C = B TO 5 90 FOR D = C
TO 5 100 FOR E = D TO 5 110 FOR F = E TO 5 120
LET T = A(B) + A(C) + A(D) + A(E) + A(F) 130
IF T = 100 THEN PRINT A(B); " "; A(C); " "; A(D); " ";
A(E); " "; A(F) 140 NEXT F 150 NEXT E 160 NEXT D
170 NEXT C 180 NEXT B
```

This prints out three sets of values, but only one includes the price of a *Golden Waterfall* and only one the price of a *Depth Charge*.

Therefore, the fireworks chosen by each of the group were:

Jamie — 3 Golden Waterfalls, 2 Mine of Serpents.

Sue — 2 Golden Waterfalls, 2 Krakatoa Cascades, 1 Depth Charge

Ben — 1 Krakatoa Cascade, 3 Fairy Fireglows, 1 Mine of Serpents.

Winner of Puzzle No 80

The winner is: G L Godman, Shuthonger, Tewkesbury, who receives £10.



DEAR AUTOMATA, PLEASE RUSH ME THE FOLLOWING

"THE PIMAN'S CHRISTMAS STOCKING", including
"THE PIMAN'S GREATEST HITS" STEREO L.P. CASSETTE,
THE PIMAN 1984 CARTOON CALENDAR BOOK plus
THE PIMAN'S OWN BLANK C20 COMPUTER CASSETTE. £5

"MY NAME IS UNCLE GROUCHO, YOU WIN A FAT CIGAR"
(48K SPECTRUM) "Not so much a game, more a way
of life. Excellent, excellent." (Your Computer)
with CONCORD-QE2-HOLLYWOOD PRIZE & FREE SINGLE! £10

"PIMANIA" "The best adventure 48K SPECTRUM £10
game ever reviewed" (Sinclair B.B.C. 32K £10
User) With £6,000 PRIZE and DRAGON 32 £10
FREE TERRIBLE HIT RECORD!! 16K ZX81 £5

"GO TO JAIL" (48K SPECTRUM) "A triumph of the
programmers art. Full marks. Another superb
game from Automata" (Personal Computer World) £6

"YAKZEE" (DRAGON 32 and 48K SPECTRUM) "Bruddy
wonderfurr game of ruck and skirr!" (Confucious) £5

"MORRIS MEETS THE BIKERS" (ANY SPECTRUM) Arcade
challenge, with an outrageous FREE HIT SINGLE! £6

I ENCLOSE THE RIGHT MONEY, TOTAL £
OR PLEASE DEBIT MY ACCESS / EURO / VISA / MASTER CARD

CARD NUMBER:

MY SIGNATURE

MY NAME

MY ADDRESS

POST CODE

NO EXTRAS! ALL OUR PRICES ARE INCLUSIVE OF VAT AND DELIVERY

SEND TO: **Automata U.K. Ltd.**

27 HIGHLAND ROAD, PORTSMOUTH, HANTS., PO4 9DA, ENGLAND.....



* **CHRISTMAS HOTLINE**
24-hour mail-order service
Telephone (0705) 735242

THE TIME: THE PRESENT. (TO US, 10 MINUTES
PAST MIDNIGHT... TO YOU, AS YOU READ THIS,
WEEKS LATER... HECK, HOW SHOULD WE KNOW?!)
LOOK AT YOUR FLIPPING WATCH!!)
THE PLACE: THE ALLY PALLY MICROFAIR.
THE FAT CHAP WITH BEARD: SANTA CLAUS,
LOOKING FOR IDEAS FOR PRESENTS

