

40 Lock

POPULAR Computing WEEKLY

35p

24-30 March 1983 Vol 2 No 12

This Week

Chess machines

John White looks at some of the latest chess machines to come on to the market and compares them with the "Big Three". See page 12.

Psion

David Kelly talks to Psion managing director David Potter. See page 10.

Spectrum m/c

Deborah Annette presents two machine code routines to control sound and print on the Spectrum on page 29.

Dragon games

Keith and Steven Brain explain how to add cursor control to your own programs in the last of their current series on Dragon games. See page 31.

★ STAR
Escape on 16K
Spectrum by John
Durst. See page 8.
★ GAME

News Desk

Software companies fight Buy'n Try scheme

by David Kelly

BUY'n Try is the name of a program exchange scheme launched by the Software Centre on Friday March 11.

Commercial software for nearly every home micro can be bought from the London-based centre — either by mail-order or over the counter — and then repeatedly exchanged for other programs.

Any program returned within six months of purchase is bought back by the Centre for 80 percent of its original purchase price — this is given in the form of a discount against a subsequent purchase.

Some software manufactur-

ers have condemned the Software Centre's scheme and are considering backing their complaints with legal action. One has already done so.

The first action has been taken by Quicksilver who applied to the High Court last Friday for a temporary injunction to stop the Software Centre from exchanging its tapes. The application — heard with only Quicksilver present — was turned down. As we go to press, another hearing, where the Software Centre will also be able to put its case, should take place on Tuesday March 22.

"I think we have a good chance to stop them," said Quicksilver's Managing Director Nick Lambert. "If we don't try, we might as well all pack up and go home now."

Weekly four-page advertisements from the Software Centre show over 300 titles on offer with material from Sin-

Continued on page 5



Classified

Computer Swap 01-930 3266

Free readers entries to buy or sell a computer. Ring 01-930 3266 and give us the details.

SPECTRUM FORTH on cassette. Most timings actually faster than the Jupiter Ace. All Forth structures. Colour, high resolution graphics. Comprehensive instructions. Immediate despatch. No previous knowledge required. Order as SP16F (16K) or SP48F (48K) £5.95 to Mike Hampson, 7 Hereford Drive, Clitheroe, Lancs, BB7 1JP.

Classified

ORIC 1 CASSETTE LEADS

WITH MOTOR CONTROL
DIN to DIN or
DIN to JACKS

£2.95

Orders to:
Clares, 222 Townfields Road,
Winsford, Cheshire CW7 4AX
Tel: Winsford 51374



VIC20 (UNEXPANDED), super arcade action games tapes! Colour graphics and sound! Games tape No. 1: Punkman, Black Knight, Cavern Shoot, Grand Prix, Side Shoot, Amaze, all 6 for £5 inc p&p. Games tape No. 2: Froggy, Bomber, Breakout, Nibbles, Bank Robber, Space Gobblers, all 6 for

Classified

TEXAS TI 99/4A CASSETTE LEADS

£4.95
INCLUDING POST
AND PACKING

Single Recorder only

Orders to:
Clares, 222 Townfields Road,
Winsford, Cheshire CW7 4AX
Tel: Winsford 51374



£4.95 including p&p. Fast delivery, from: Starraker, 21 Hoyle Road, Hoylake, Wirral L47 3AG.

ATARI 400 SI cassette, £10, or swap for other, also recorder for Spectrum/BBC, very good condition, £15. Tel: 01-989 8138 (after 6 pm).

Classified

DRAGON 32 or TANDY TRS-80 Colour? Lots of programs — lots of useful hints and information EVERY single month in "RAINBOW", an exciting new 200-page magazine from USA. Send £1.95 (plus large 56p s.a.e.) for sample issue to **ELKAN ELECTRONICS** (Dept. PCW), FREEPOST, 11 Bury New Road, Prestwich, Manchester M25 6LZ or telephone 061-796 7613 (24-hour service).

DRAGON 32, boxed. Working Dragon, colour graphics, tapes and dust cover, all for £160 ono. Tel: 01-669 0622.

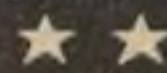
16K ZX81 + Flight Simulation + magazines, listings, £80. Tel: Dartford 27861 after 6 pm.

VIC20 + 8K Ram + super expander + lots of books, manuals, £200 ono. Tel: 01-258 5631 after 6 pm.

Continued on page 34



BRITAIN'S HOME COMPUTER WEEKLY

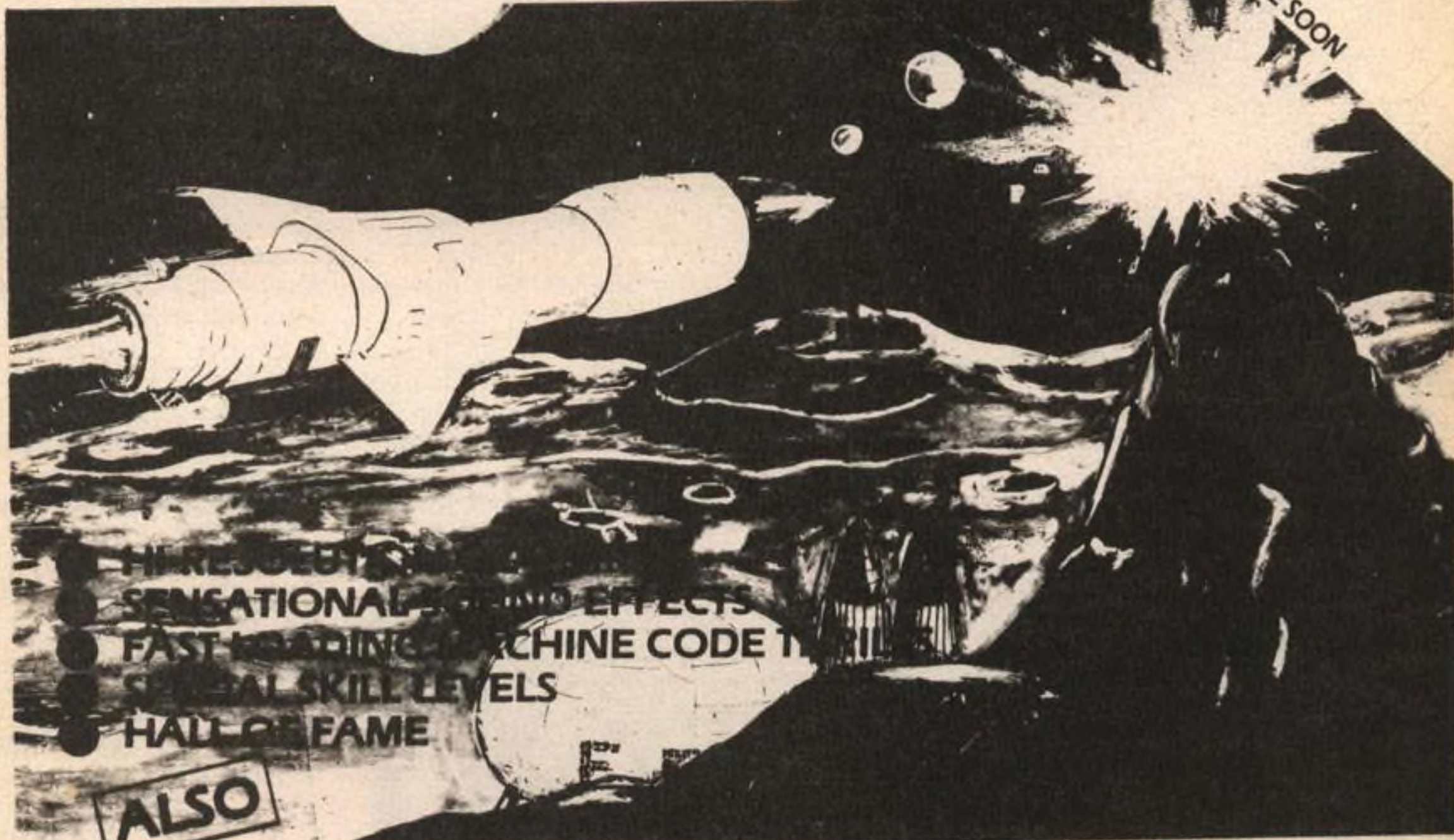


SPECTRUM games

The World's Greatest Arcade Games

MISSILE ATTACK

THE ULTIMATE EXPLOSIVE CHALLENGE

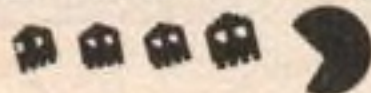


- HI RESOLUTION
- SENSATIONAL SOUND EFFECTS
- FAST LOADING MACHINE CODE TURBO
- SEVERAL SKILL LEVELS
- HALL OF FAME

ALSO

MONSTER MUNCHER

Ghosts energizers and a secret escape




Hopper

authentic arcade action

ANY GAME JUST £5.50

INCLUDES V.A.T. AND 1st CLASS POST AND PACKING

ANY FAULT, YOUR GAME WILL BE REPLACED COMPLETELY FREE

SPECTRUM GAMES
FREEPOST MANCHESTER M3 8BB
SAME DAY CREDIT CARD SALES
061-832 9143. (24 HOURS)
DEALER ENQUIRIES INVITED



FOR ZX81 (16k)



(16k or 48k)
ZX SPECTRUM



VIC 20 (ANY MEMORY)



GAMES FOR ORIC & DRAGON AVAILABLE SOON

£2.00 OFF
ANY TWO
GAMES

POST COUPON NOW TO

SPECTRUM GAMES
FREEPOST Manchester M3 8BB

PLEASE RUSH ME A COPY OF

	ZX SPECTRUM (16k or 48k)	ZX81 (16k)	VIC 20 (Any Memory)
MONSTER MUNCHER	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HOPPER	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MISSILE ATTACK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

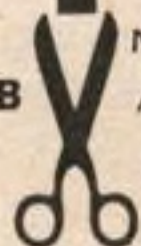
SPECIAL OFFER - SAVE ON TWO!!
SAVE £2.00 ON ANY 2 GAMES PAY ONLY £9.00

I enclose a cheque/P.O. for £.....
or please debit my Access Card.

No.

NAME

Address



FREE POST - NO STAMP NECESSARY

The Team

Editor
Brendon Gore

News Editor
David Kelly [01-930 3271]

Software Editor
Graham Taylor [01-839 2504]

Production Editor
Lynne Constable

Sub-editor
Ninette Sharp

Editorial Assistant
Theresa Lacy [01-930 3266]

Advertisement Manager
David Lake [01-839 2846]

Advertisement Executive
Alastair Macintosh [01-930 3260]

Classified Executive
Diane Davis [01-839 2476]

Managing Editor
Duncan Scot

Publishing Director
Jenny Ireland

Popular Computing Weekly,
Hobhouse Court, 19 Whitcomb Street,
London WC2 7HF
Telephone: 01-839 6835
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

Subscriptions
You can have *Popular Computing Weekly* sent
to your home:
UK Addresses
26 issues £9.98
52 issues £19.95
Overseas Addresses
26 issues £18.70
52 issues £37.40

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 maga-
zines 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 submit-
ted article or program, so please keep a copy. If
you want to have your 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
Software Centre, new Dragon machines, Tandy/Dragon converter.	
Escape	8
A new game for 16K Spectrum by John Durst.	
Street Life	10
David Kelly talks to David Potter of Psion.	
	
Reviews	12
John White looks at some of the latest chess machines.	
Open Forum	15
Six pages of your programs.	
Adventure	25
Tony Bridge's adventure corner.	
BBC in education	27
Peter Donn shows how light passes through a convex lens.	
Spectrum	29
Deborah Annette presents two m/c subroutines.	
Dragon	31
How to write your own games (4) by Keith Brain.	
Peek & poke	38
Your questions answered.	
Competitions	39
Puzzle, Top 10, Ziggurat, Losers.	

Editorial

There can be few people now who fail to recognise ET. Even if you have not seen Stephen Spielberg's blockbuster film, there have been so many newspaper reports, posters and cartoons, that you would have to be a hermit not to have come across this friendly Extra Terrestrial.

However, the search for ET's home is not confined to the realms of cinematographic fantasy. The search for alien life is on for real.

Project SETI is a US-based operation designed to monitor the Milky Way for radio emissions of intelligent origin. Paul Horowitz of Harvard, part of the SETI team, has developed a prototype radio receiver which can be linked to a computer to distinguish between intelligent signals and natural radio waves. When linked to a radio telescope, the SETI system will tune in to 128,000 possible channels and should be able to pinpoint radio signals up to 1,000 light years away.

The US Congress has recently agreed to allocate project SETI \$1.5m from within the 1983 NASA budget.

The search for alien life is not a new idea. But, this is probably the first time a computer has been used for such a purpose. If the search is successful, I will lay odds that the computer makes contact with another computer.

ET come home — all is forgiven.

Next Thursday

Can you avoid the rampaging lion, the ferocious hippo, and get from one side of the island to the other? Try it next week in April Fool Island — a new game for the BBC B by Nick Wilson.

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., Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Northern
Premier
Exhibitions

DEALERS — WE HAVE
A FEW TABLES LEFT

Contact:

MIKE DONNACHIE
0532-552854 after 4 pm

proudly announce a

ZX fair

on
Saturday, 26th March
10 am till 5 pm
Admission: Adults 75p
Children 50p

PUDSEY CIVIC CENTRE,
DAWSONS CORNER, STANNINGLEY,
NR. LEEDS.
(midway between Leeds and Bradford)

Hardware, Software, Books and Magazines —
everything for the ZX User.
This Fair is exclusively for ZX Computers,
so come and enjoy A DAY OUT among friends.

TERMINAL SOFTWARE

— THE GAMES YOU'VE
BEEN DYING TO SEE!

FOR THE UNEXPANDED VIC20

TVIC 3 Skramble! £7.95
TVIC 4 Terminal Invaders £5.95
TVIC 5 Meteor Blaster £5.95

THIS WEEK ONLY, REDUCED FROM £7.95

TVIC 6 Gridder for just . . . £4.95!
TVIC 7 Line Up 4/Reversi £7.95
TVIC 8 Get Lost! (3D Maze) £5.95

ADVENTURES FOR THE VIC20 WITH 16K EXPANSION

TVIC 9 The Curse of the Werewolf £9.95
TVIC 10 Rescue from Castle Dread £9.95

FOR THE DRAGON 32

TDRAG1 Line Up 4 £4.95

Dealer Enquiries welcome.

Machine Code Programmers Wanted!

We will pay up to £1,000 for good, original programs for any of the popular micros.

DEMAND our games at all good computer shops, or buy mail order from:

Terminal Software, Dept. PCW,
28 Church Lane, Prestwich,
Manchester M25 5AJ

C★TECH SOFTWARE

ZX Spectrum Software

FROGGER AND SPECMAN

FROGGER AND SPECMAN. Two excellent games for the price of one!

SPECMAN is probably the best version of its type with great machine code graphics and sound effects with three to five ghosts, power pills and a real munchie man who munches away in all directions unlike cheaper versions!

FROGGER, is a two screen superb representation of this arcade classic and has full colour Hi-Res Frogs, Cars, Roads, Logs, Turtles and Riverbank. Plus Super sound effects.

Both on one cassette for the Spectrum, price £5.00.



CENTIPEDE

CENTIPEDE AND PAINTER. By the time you read this our latest release for the Spectrum should be available.

CENTIPEDE is a full colour machine code arcade game where the object is to defend yourself with your Laser against a fast moving centipede which weaves in and out of the mushroom patch. There are other versions of this game but we think you'll prefer ours because we always strive for an extra dimension of realism, which makes all the difference!

PAINTER, is another well loved Arcade game, here you must paint in between the numbers on a multicoloured screen before you have to overlap. Price for the Spectrum is £5.00.



GORFIAN

GORFIAN INVADERS. A superb four screen machine code program with Invaders, Galaxians, Firebird and



Flagship. Multicoloured Hi-Resolution graphics and Sound Effects. For the 48K Spectrum, price £5.00.

KRAZY KONG

KRAZY KONG. Another 100 per cent machine code program, featuring three screens of Hi-Res Gorilla, Barrels, Fireballs, Lifts and a Running and Jumping man who must rescue his girlfriend from the enraged KONG! For the Spectrum, price £5.00.

DRAGON

FIGHTER PILOT/ CITY BOMBER



FIGHTER PILOT is an ingenious program for the Dragon 32. It begins with a briefing session giving details of the fire attack waves and shows you pictures of the aircraft which include Messerschmidt and Junkers. You have to get the aeroplanes within your sights and shoot them down. There are five different screens including a parachuting sequence. It makes full use of Hi-Res graphics, colour and sound.

CITY BOMBER involves bombing buildings whilst your plane flies lower and lower towards them. All this for the unbelievable price of £5.00.

HOW AND WHERE TO GET C★Tech Software PRODUCTS

There are three ways to get the tape that you require. Firstly you can go to one of around 50 retailers in the UK and some more overseas, there is at least one in every town and several in major cities.

Secondly you can ring our Telesales on 061-366 8223 and Alison or Shirley will take your order and tell you of any other games you might be interested in.

Last the most popular way is to simply clip the coupon and send it to us at:

C★Tech, 184 Market Street, HYDE, CHESHIRE, SK14 1EX.

PLEASE SEND ME THE FOLLOWING:

MASTERCARD
VISA



MY NAME AND ADDRESS IS:

Postcode.....

I ENCLOSE

£.....

Software Centre furore

Continued from page 1

clair Research, Commodore, Dragon Data, and just about every other major supplier.

Commodore UK's software manager, Gail Wellington said "A big commercial venture like the Software Centre could well put many smaller software houses out of business. We are big enough to take it, but it could well cause us to move into Rom software. For us that would be a very sad decision to have to make and it would very considerably increase the cost of our programs."



Nick Lambert of Quicksilva.

In addition to the mail-order facility, the Software Centre has a retail outlet for its Buy 'n Try service just off Oxford Street. Two more shops are planned in the next three weeks and the company is considering expanding as a franchise operation.

The exchange venture has been set up by Bill Cannings, founder of the Byte Shop chain, who formed a company called Computer Aided Systems in November 1979. "We have been planning the scheme for over a year," he said. "People who buy mail-order are often unhappy with what they are sent and for the first time we are offering people a chance to buy with confidence — if they don't like it they can send it back."

"I don't think there are even the same dangers to the software manufacturers as there are in normal retail selling — we make it very clear that all the material is copyright, which is more than most retailers do."

"It will be obvious if someone is copying tapes at home, because they will be turning them round every couple of weeks. In such cases we shall inform the manufacturers,

though I don't know what they can do about it."

Don Malham is manager of the first Buy 'n Try store. He says: "We have had an incredible response from the public. Obviously we have had a certain amount of flack from some of the software houses, but they are battling upstream. They think their sales will drop. What we are discovering is that people are going for more expensive programs which they perhaps would not otherwise have bought."

"We will not make any money on a program until about the third or fourth sale," he commented.

Quicksilva claims that software for the Centre has been bought by Computer Aided Systems as a normal dealer, with no indication given that the Buy 'n Try offer was on the cards.

One possible method software houses will be considering combating the exchange deal involves the way the stock was bought. It is Quicksilva's hope that buying material without disclosing the fact that it was intended for exchange will nullify the original contract of sale.



Bill Cannings — Software Centre head.

This approach is being followed up by Bug-Byte. They have given the Software Centre seven days to return all stocks of Bug-Byte programs. If the Centre does not comply, Bug-Byte will also bring proceedings for an injunction.

Imagine's Dave Lawson was "horrified" when he saw the advertisements. "They pose such a threat that we don't care how much it will cost to stop them," he said.

Dragon Managing Director, Tony Clarke commented "We have sent the advertisement to



Dragon to launch two computers in 1983

DRAGON Data plans two new major machine launches this year.

The machines will be aimed at very different sectors of the market and both will be more expensive than the existing Dragon 32 machine.

The lower priced machine will compete with the BBC Model B machine, according to Dragon's Managing Director Tony Clarke.

"It will have a lot more memory than the BBC," he said, "and in its high resolution mode it will still have 64K of user Ram for programming."

"With the BBC in its highest resolution mode you are down to only 3 or 4K of user memory," he added.

Rotten apples overturned

THE reversal of a 52-year-old court ruling by the Taiwan High Court has effectively cleared the way for Apple to continue its fight against so-called "rotten-apples" — unauthorised copies of its computers.

This legal technicality, prohibiting certain foreign com-

our solicitors. We are totally opposed to any form of hiring.

"We are not seeking any sort of injunction at the moment, but we will be if the people involved do not take our advice and stop."

"There are games in their list that we have not even produced yet — *Breakout/Middle Kingdom* for one."

A spokesman for Sinclair Research commented on Friday "As of this morning we are investigating." He declined to comment further.

"We haven't costed it out fully yet, but we are hoping for a target price of under £400." Like the Dragon 32 the machine will require a separate TV or monitor.

The second machine will be substantially more expensive. "It will be a competitor for the IBM PC or Sirius," he said.

Dragon will offer this more-up-market machine in a range of configurations — but all models will include built-in discs and a monitor.

The most expensive will feature a colour display and Winchester hard discs, and will have a price tag in excess of £3000. The least expensive option will be monochrome with floppy disc drives, and will sell for around £1200.

panies from initiating criminal proceedings in Taiwan, has previously halted Apple's attempts to take action against two companies, which, it was alleged, had infringed copyright in Apple computers.

● Apple (UK) has reacted to the proposed sale of an Apple software compatible micro-computer — the Peanut — reported in *Popular Computing Weekly*, March 10. Solicitors Clifford Turner, acting on behalf of Apple (UK), are investigating to see if the Peanut infringes patents or copyright registration on Apple computers.

CTA meeting

THE venue for the next meeting of the Computer Trade Association has now been fixed.

It will be at the Spider's Web Motel on the A41 at Watford (Junction 5 off the M1) on March 29 at 11 am.

At last . . .
Exciting AND Challenging Computer
Games for Two Players.

CONFLICT A total war for two players involving both the machinery (armies, missiles, warships) and finance (stock market, oil, piracy) of conflict. "I enjoyed this strategy game" (Computer and Video Games).

GALAXY CONFLICT Raise a fleet of Battle Eoncruisers then move from bridge to bridge taking full control and responsibility in this battle for the heavens. Born galactic rulers will do well. "Galaxy battle sets new trend" (Sinclair User).

Games Include — ZX81 (16K) and Spectrum (48K) programs on ONE cassette. Full size professionally printed board. Counters and markers. Two pads disposable maps (Conflict only). Comprehensive instructions/rules.

- *Professionally packaged in high quality attractive box.
- *Each game only £11.95 inc. Postage or £22 for both games.
- *Available from W. H. Smith, Buffer, Games Centres and many other retail outlets or mail order from:

martech games

9 Dillingburgh Road, Eastbourne
East Sussex BN20 8LY



FOX ELECTRONICS



PRODUCTS FOR THE ZX81 SPECTRUM,
VIC20 AND JUPITER ACE

SPECTRUM

UPGRADE KIT. Upgrades your machine to 48K, without soldering. Issue 2 machines only. **£24.50 incl p&p.**

SPECTRUM

A 42 key full travel keyboard. Simply unscrew the ZX printed circuit board and screw it into the keyboard case. No soldering required. **£29.95 + £2.00 p&p.**

VIC-20

The VIXEN RAM CARTRIDGE for the Vic 20. Switchable between 16K or 8K & 3K. Gives you the option of full 16K Ram or 8K and 3K Ram in one package. Simply plugs into the rear expansion port and fully compatible with all motherboards and modules available. No re-addressing of existing BASIC programs needed. **£39.95.**



ZX81

A replacement keyboard with a calculator type feel. Peel off backing and press to fit. Incredibly low price of **£10.00 incl p&p.**

ZX81

The unique ZX-PANDA the professionally produced 16K RAM PACK that is expandable to 32K simply by plugging in our expansion module. Solidly built, attractively cased to fit perfectly on to ZX81 without wobble. Includes LED power indicator.

16K expandable RAM **£22.50 + £2.00 p&p**
16K expansion module **£18.00 + £2.00 p&p**
or full 32K **£38.00 + £2.00 p&p**
or the really big one 64K at **£44.00 + £2.00 p&p**



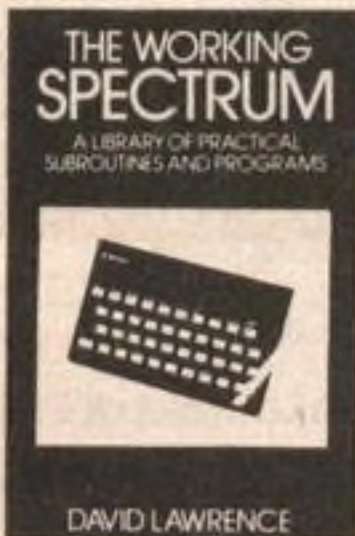
ITEM	QUANTITY	PRICE	TOTAL

Name.....
Address.....

FOX ELECTRONICS
141 Abbey Road, Basingstoke
Hants RG21 9ED

**OVERSEAS CUSTOMERS PLEASE
ADD £2.50 POST AND PACKING**

**ALL PRODUCTS FULLY GUARANTEED
FOR ONE YEAR.**
Deliveries 10 days from receipt of order



The Working Spectrum

(228 page book)
The first well-documented collection of serious programs for the ZX Spectrum. Programs include a Basic Renumber which can handle Gotos and Gosubs, a character dictionary, a file-handler, several utility programs and a few games. Each program is built up out of re-usable subroutines.

£5.95*



The Working Dragon 32

This is a companion volume to The Working Spectrum and includes several new features such as a Text Editor and a Music Composer and Editor. Other programs help you use the Dragon 32 as an accountant, for more advanced high resolution graphics, as a home tutor for education and for playing games. Each of the programs and subroutines is explained line by line to help develop your own programming skills.

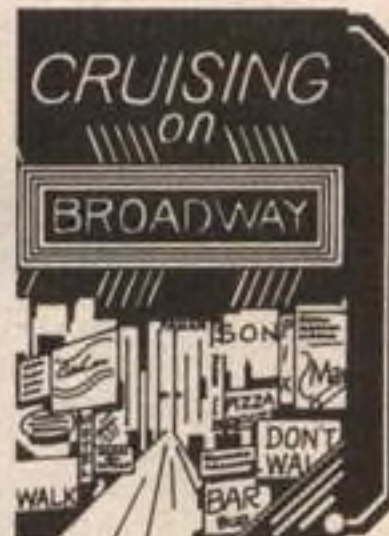
£5.95*



Best of Popular Computing Weekly

Cassette
Four of the top Spectrum and ZX81 games from Popular Computing Weekly are recorded on this one cassette. The games are Laserchase for the 16K & 48K Spectrum, Kong's Revenge for the 16K & 48K Spectrum, Robot Control for the 16K ZX81 and Alien Attack, a Space Invaders type game for the 1K ZX81.

£4.45



Cruising (on Broadway)

cassette
Behind the wheel of your machine. Cruising on Broadway — tearing up the strip. You look mean. People stop to stare. Suddenly a black-and-white pulls on to the Broadway behind — its light flashing and siren wailing. The chase is on! Cruising on Broadway is a tyre-burningly fast machine-code game for the 16K & 48K Spectrum. The further you can get the more difficult it becomes — cash prizes in Popular Computing Weekly for the highest scores.

£4.95*

Please send me

Qty:

- The Working Spectrum at £5.95 each
- The Working Dragon 32 at £5.95 each
- Best of Popular Computing Weekly at £4.45 each
- Cruising (on Broadway) at £4.95 each

I enclose a cheque/
 postal order for

£
 payable to

Sunshine Books
19 Whitcomb Street,
London WC2 7HF

Name

Address

Signed

We can normally deliver in four to five days.

*Available through W. H. Smith and computer dealers.

A New Range From Sunshine Books

Dragon/Tandy software converter

DECODE is a cartridge from Compusense which will convert software from the Tandy Color Computer to run on the Dragon 32 and vice versa.

The two machines are internally very similar and both use the same version of Microsoft Basic. However, although programs keyed into either machine will Run, because of variations in the input/output routines, programs recorded on tape are not compatible.

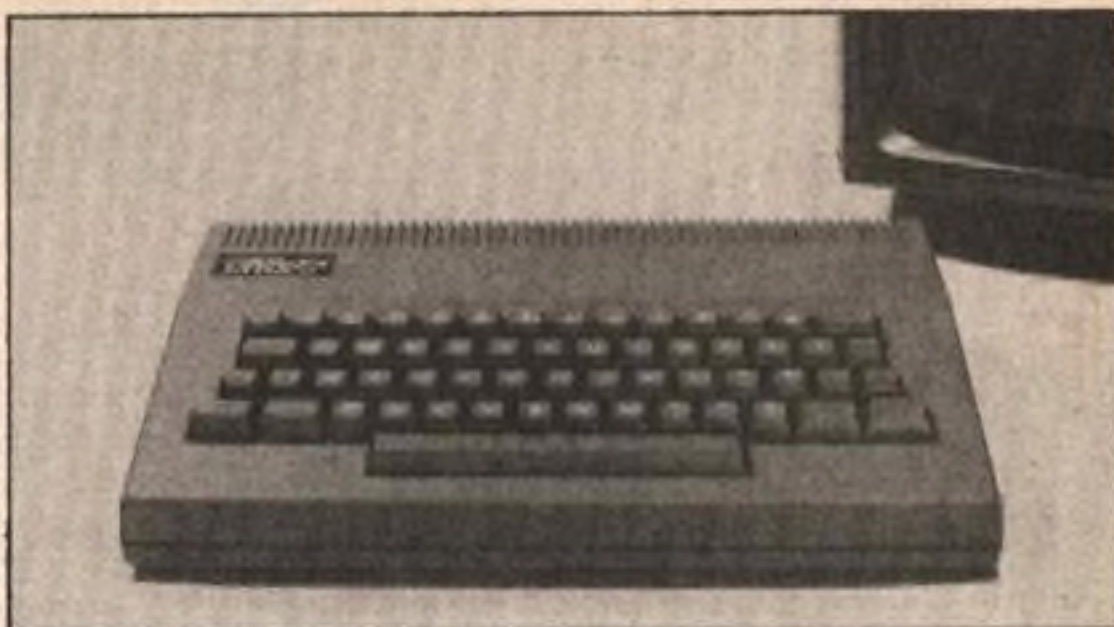
The new *Decode* Rom offers a solution to this problem — giving the Dragon access to the wealth of software available for the Tandy in the US and also giving the Tandy access to British material being developed for the Dragon.

In both computers, Basic keywords are represented by a

series of what are called 'tokens'. When a Basic word — for example, *Goto* or *Print* — is keyed in or read off tape, it is converted by the computer into a token, unique to that keyword. The problem with software conversion is that in some cases the two machines use *different* tokens to represent the same keyword. So when a program for one machine is read off tape by the other it sees the wrong Basic statements.

What the *Decode* cartridge does is to go through the program after it is loaded from tape and unscramble the tokens so that it will run.

Decode costs £18.95. More details from Compusense, PO Box 69, Palmers Green, London N13 5XA.



Lynx micros — production stepped up

LYNX microcomputers are now beginning to filter through to the shops, but the machine is still only available from a limited number of outlets.

"Dixons are still interested, but it is a bit academic with Laskys and Spectrum stores taking up our full production,"

said a spokesman for Lynx manufacturer Computers.

Only 900 machines were manufactured in the month to the end of February. "Production is being stepped up, but it has taken rather longer than expected," he said.

Computers has now sold over 2,000 Lynx machines.

Younger than he looks

WITH somewhat peculiar logic *The Guardian* has selected Clive Sinclair as Young Businessman of the Year.

Clive Sinclair, who is 42, founded Sinclair Research only four years ago. The company turned in profits of over £13m last year and, following a recent shares issue, his personal stake in the company has been valued at almost £130m.

He is the 13th person to



receive the award, given each year in acknowledgement of a significant contribution to British business.

Mattel adopts aggressive approach to software market

MATTEL is showing signs of a new aggressive approach to the software market.

In late May, the company will launch a range of software titles for the Atari 2600 games machine.

"What we intend to prove is that we can write the best software," said Mattel's European Marketing Manager, Peter Fitters. "We are making sure of the future — when people begin to consider buying a new machine we want them to think of us."

The decision to launch a range of Atari programs is a development of an earlier scheme in the US called M-Network.

Like Atari, Mattel has been

hit by competition in the video games market. It made a £13.5m loss in the financial quarter to the end of January.

Trans-atlantic exchange

MANCHESTER-based Terminal Software has concluded a product exchange deal with Microdigital of Webster, New York.

Under the arrangement, the American company has an exclusive right to distribute Terminal's *Skramble* and *Gridder* Vic20 games in the US. In return, Terminal will soon be distributing Microdigital's *Pinball* game, also for the Vic20.

Free ports boost to micro industry

THE decision to allow a number of British free ports, announced in the Budget last week, will give a boost to the UK microcomputer industry.

By accepting the recommendations of a recent Treasury working party report that two or three experimental free ports should be established, the Chancellor Sir Geoffrey Howe has given British manufacturers a chance to make their goods more competitive overseas.

At present companies assembling microcomputers in this country must pay a 17 per cent import duty on semiconductor chips. This duty has been heavily criticised and has been the reason for many UK companies manufacturing overseas. Acorn's Managing Director, Chris Curry, for example, has called it "thoroughly unacceptable".

By setting up free ports the government has provided a loop-hole. No duty will have to be paid on goods imported — providing they are subsequently exported.

What has still to be decided is the number of free ports that will be allowed, and their locations.

In a letter to *The Times* in February, Clive Sinclair

argued for the setting up of a free port in Dundee, where his ZX81 and Spectrum machines are manufactured by Timex.

● In a separate Budget announcement the government pledged an additional £15m over the next three years to its software development grants scheme.

Game designers, not programmers

REDSHIFT is a new software house — with a different approach.

"We are the only company made up of games designers, not programmers," explained the company's Julian Fuller.

Three titles have so far been released by the North London group: *Time Lords*, *Shiva Inferno* and *Murder Ball*. Each has been developed from original board-games designed by Redshift.

Julian, who studied board-game design at college, commented: "We have a great dislike of arcade games — the micro is being done to death by people producing ever more complex versions of *Space Invaders*."

Redshift can be contacted at 12c Manor Road, Stoke Newington, London N16.

Escape

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

You have just jumped over the wall of the dreaded Stalag ZX and find yourself in the bottom right-hand corner of the Killing Area — the free fire zone between you and freedom.

You have been roughed up by the appalling Hardwehr guards and their murderous dogs, which have taken some nasty bytes out of you: bits are falling off you all the time. You have only a short time to reach help before the final Reset button in the sky is pressed . . .

There are four fences between you and your Resistance friends. (If you can once reach the Resistance, you will be Ohm and dry.)

Holes have been cut by the Resistance in the fences, but you do not know where they are. Meanwhile, the Hardwehr are raking the area with searchlights and machine-gun fire. If you get caught in the beam, you are done for — but you depend on the light to spot the holes in the fences. Your only chance is to jump into one of the round pits, scattered around the terrain; if you are in one of them, the searchlight cannot pick you out.

You stumble, crouching, on your way — helped by the keyboard cursors . . .

Notes

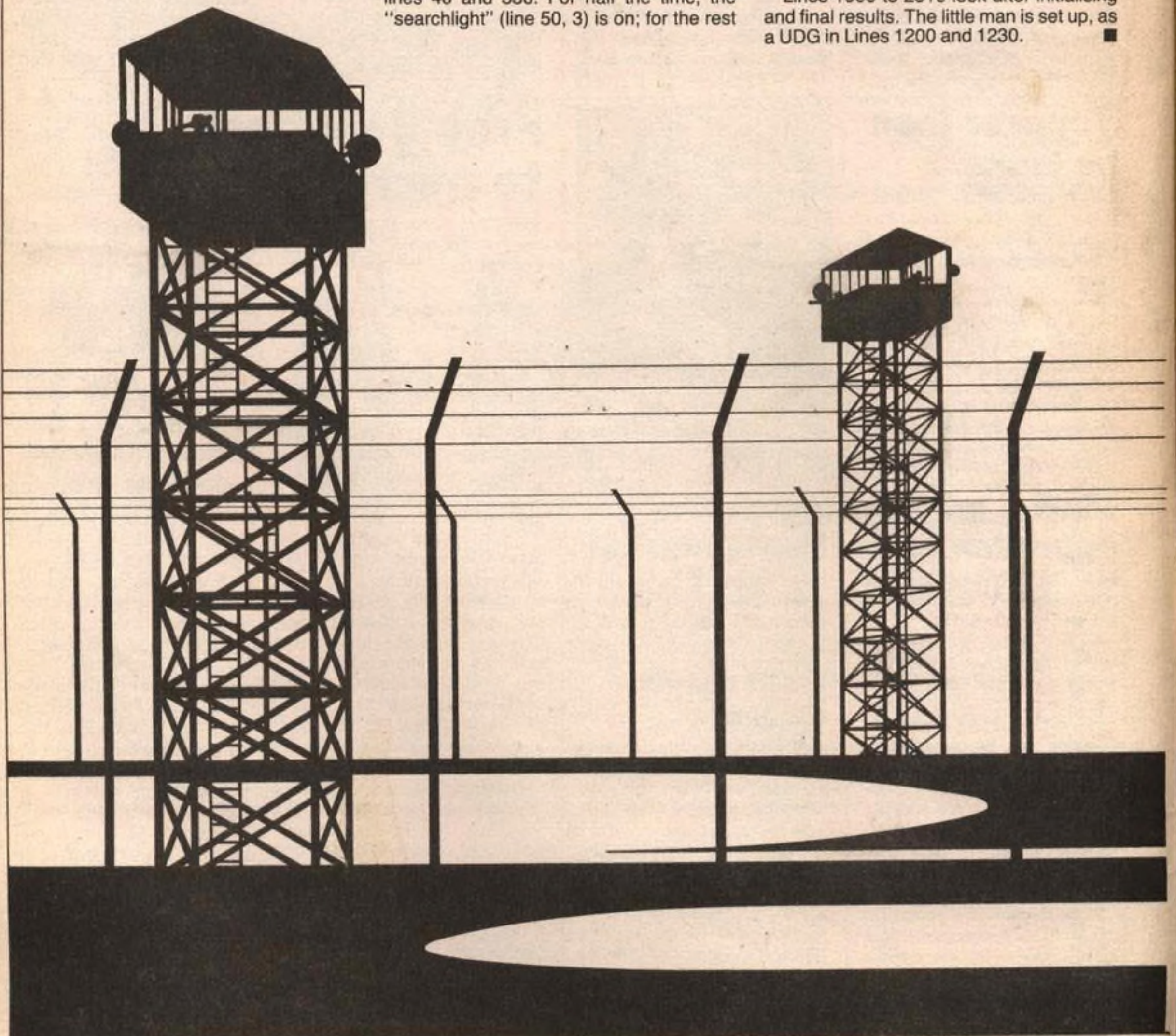
The game is in the form of a loop, between lines 40 and 330. For half the time, the "searchlight" (line 50, 3) is on; for the rest

of the time (line 60, 3) it is off. The loop cycles 40 times in this period, at each cycle sampling the keyboard (Lines 100, 110, etc) for the player-symbol's moves, made at line 90. Blotting out of previous positions is done at lines 220, 320, 325.

Every 40 cycles, when $X=0$, the loop jumps back to line 40, which sets up a new "searchlight" position. This is coded in lines 120, 230 and 330.

Jumping into holes and stopping movement through the fence is done using *Screen\$* at those lines where the symbols appear. The loop has to be as short as possible, so that the game does not become hopelessly slow.

Lines 1000 to 2510 look after initialising and final results. The little man is set up, as a UDG in Lines 1200 and 1230. ■




```

1 REM      ESCAPE!
2 BORDER 1: PAPER 1: CLS
3 DIM e$(32)
5 LET x=0: LET t=20
6 LET l=20: LET c=31
10 GO SUB 1000
40 LET y=3*INT (RND*6)+1
50 LET x=x+1: BEEP .01*(x>
=20),-10: IF x=20 THEN PRINT
OVER 1: INK 8; PAPER 7;
BRIGHT 1; AT y,0; e$;e$;e$
60 IF x=40 THEN LET x=0:
LET t=t-1: PRINT AT 0,12;
INK 7;t;" "; AT y,0; OVER 1;
INK 8; PAPER 1; BRIGHT 0;e$;
e$;e$
65 IF t=0 THEN GO TO 2200
70 IF SCREEN$(l,c)="0"
THEN PAUSE 2: GO TO 100
80 IF ATTR (l,c)=126 THEN
GO TO 2000
90 PRINT AT l,c; PAPER 8;
BRIGHT 8; INK 6;"A"
100 IF INKEY$="5" OR
INKEY$="8" THEN GO TO 200
110 IF INKEY$="6" OR
INKEY$="7" THEN GO TO 300
120 GO TO 50-10*(x=0)
200 IF SCREEN$(l,c-(INKEY
$="5")+ (INKEY$="8"))="X"
THEN GO TO 220
210 LET c=c-(INKEY$="5")
+(INKEY$="8")
215 IF c=0 THEN GO TO 2500
217 IF c>30 THEN LET c=30
220 IF SCREEN$(l,c+(INKEY
$="5")-(INKEY$="8"))<>"0"
THEN PRINT PAPER 8; BRIGHT 8;
AT l,c+(INKEY$="5")-(INKEY$
="8");" "
230 GO TO 50-10*(x=0)
300 IF SCREEN$(l-(INKEY$
="7")+ (INKEY$="6"),c)="X"
THEN GO TO 320
310 LET l=l-(INKEY$="7")
+(INKEY$="6")
315 IF l<2 THEN LET l=2
317 IF l>20 THEN LET l=20
320 IF SCREEN$(l-1,c)<>
"0" THEN PRINT PAPER 8;
BRIGHT 8; AT l-1,c;" "
325 IF SCREEN$(l+1,c)<>"0"
THEN PRINT PAPER 8; BRIGHT
8; AT l+1,c;" "
330 GO TO 50-10*(x=0)
1000 PRINT AT 0,0; INK 7;
"SETTING UP..."
1005 FOR i=0 TO 3
1010 LET q1=1+INT (RND*3):
LET q2=7*INT (RND*3)
1020 LET g=3+INT (RND*15)
1030 FOR j=1 TO g-1: PRINT
AT j,i*7+q1; INK 1;"X":
NEXT j
1040 FOR j=g+2 TO 21: PRINT
AT j,i*7+q1; INK 1;"X":
NEXT j
1080 NEXT i
1100 FOR j=1 TO 20
1110 LET x=INT (RND*25)+2:
LET y=INT (RND*18)+1
1120 IF SCREEN$(y,x)="X"
THEN NEXT j
1150 PRINT AT y,x; INK 0;"0"
1160 NEXT j
1200 DATA 192,248,60,28,124,
72,207,0
1210 FOR j=0 TO 7
1220 READ d
1230 POKE USR "A"+j,d: NEXT j
1240 PRINT AT 0,0; INK 7;
"Time left:
1250 RETURN
2000 PRINT AT l,c; OVER 1;
FLASH 1; PAPER 2;" "
2020 FOR j=0 TO -20 STEP -1:
BEEP .005,j: NEXT j
2030 PAUSE 100: PAPER 7: CLS
: PRINT AT 10,0;"The guards
got you!" "Your time was ";
20-t
2040 PRINT AT 19,0;" ""ENTER""
for another go..."
2050 INPUT y$: RUN
2200 PAPER 7: CLS : PRINT AT
10,0;"TIME HAS RUN OUT!" "
"You die of exhaustion..."
2210 GO TO 2010
2500 PAPER 7: CLS : PRINT AT
10,0;"You got away!" "You
beat the guards!" "Your time
was ";20-t
2510 GO TO 2010
5000 SAVE "escape" LINE 5010
5010 RUN

```


House of the rising Psion

David Kelly talks to Psion's managing director, David Potter.

Last week Psion announced the sale of its millionth cassette tape. Not bad for a company formed less than three years ago — with an annual turnover that is now more than £5m.

Yet Psion keeps a fairly low profile — it does not court publicity and its exclusive agreement with Uncle Clive has meant the Sinclair banner dominates the packaging of their cassettes.

Reformed academic David Potter started the company up from scratch in 1980. Previously a lecturer in Microcomputer Applications at the University College of Los Angeles and Imperial College, London, David — now in his late thirties — was drawn by the energy of a new industry. "I think it is hugely exciting — computers used to be locked away for only an elite to understand — now everyone will have one. I think it is tremendously rewarding to be involved in that process and I thought it was about time I got my hands dirty!"

Psion originally produced some material for the Acorn Atom. Then came the first Sinclair programs. "We did quite a lot of stuff in the early stages for the ZX81 which was marketed mainly abroad — in Australia, France, Israel and Canada.

Psion also has a sales and distribution arm in Southern Africa. "We are the second biggest microcomputer distributor in South Africa, Zimbabwe and Botswana.

"Psion is still a very young company. Several students came with me from Imperial — and on the software side we now have a very powerful team using facilities which, I believe, are second to none."

The company now employs 16 full-time programmers — many of whom have outstanding academic careers behind them — three PhDs and five with first class honours degrees. Their specialist areas vary considerably: graphics, programming, electronics data-storage.

"I think, in contrast to some other software houses, we are a highly professional team — we don't have their schisms!"

It is certainly true that few companies can boast the programming facilities offered at Psion. The first floor of Psion's headquarters — a smallish mews warehouse just off Baker Street — is dominated by the minicomputer system used for programming. The whirr of its air-conditioning lends the white-walled room the feel of a laboratory.

"I'm sad to say we don't develop software on micros — we use our Vax system." This — a 32-bit Digital Vax II/750 costing over £130,000 — is a 10-terminal, time-sharing system with 121 megabyte hard disc storage and has been the most significant investment for Psion.

"On it we have specialised software that

can simulate most of the common micro-processors. We can even simulate the working of a chip while it is still in the designer's mind and develop software for a new machine before its launch!

"We can target the machine-code written on the Vax down into the microcomputer. In the States Microsoft has this type of facility, but I don't know of anyone in the UK who does.

"To assemble our *Flight Simulation* program on the Spectrum in machine-code takes about an hour. To do the same thing on the Vax takes less than a minute." When the code is loaded from the Vax to the Spectrum and run it is controlled from the Vax. "You can actually interrupt the Spectrum from the Vax keyboard and reload from the Spectrum into the Vax to find out what is going wrong. In this way the program is very far advanced before it is tested in the actual environment of the Spectrum.

"With the Vax system we are not restricted to writing in machine-code either. Where speed is not essential in the running of the program, we can write in a high-level language. We like *C* for example. The code in *C* is then portable — whatever code we write can be applied to machines with different processors: Z80, 6502 or 68000 even."

As a result of the early ZX81 material which Psion produced and was marketed by Sinclair, the two companies now enjoy a close relationship.

"Programming is in our blood — we are code junkies!"

"We have an exclusive agreement with Sinclair — it has sole marketing rights to our ZX software. Psion has a good and strong relationship with Sinclair. We have gone out of our way to produce a very wide range of software, both for the ZX81 and the Spectrum, at the soonest possible moment. This has helped Sinclair by providing an early software base and it helps Psion by giving us a wide distribution."

The first Spectrum for software development went to Psion. "We were working at the earliest stages on the Spectrum — we had a huge amount to do." The first thing Psion wrote was the *Horizons* welcome tape. "That was at Sinclair's suggestion and it is one program we feel very pleased about.

"Apart from *Horizons* we have to produce a whole range of 11 or 12 items — games and utilities — within a very short space of time. At that time we didn't have the programming capacity, so we suggested to Melbourne House that they might like to participate. At that time we conceived a game which turned out to be



Hungry Horace and Melbourne House implemented the code in consultation with us."

Psion does not use any freelance programmers — all the software is developed in-house. "We are a wildly enthusiastic company," says David. "Nobody has ever left Psion — programming is in our blood — we are code junkies!"

Software development is carried out in groups — typically three with a project leader. The detailed design — as far as possible *a priori* for each product — is conceived by the more experienced members of the company. A team is then selected for the actual programming. "As the program evolves, the project leader oversees the detailed execution of the software. Everyone inside the company gets a chance to see it and put in their ideas. Nobody is writing in a void — the feedback is essential.

"One of the things we are always trying to do is to extend the limits of the software as the hardware develops. When the Spectrum came along it was suddenly possible to implement ideas previously considered unworkable — *Vu-3D* or the Spectrum version of *Flight Simulation* could not have been contemplated on the ZX81.

"That is how we get a lot of our ideas — the approach is 'Here is the hardware. Now, what can we do on it that would have seemed crazy before?'"

Psion has recently concluded a licencing agreement with Spears to produce a home computer version of *Scrabble*. "That's an example of the sort of project that wouldn't have been possible on the ZX81. For a start the program needs a dictionary of 10,000 words. The challenge is how to get 50,000 letters into a 48K Spectrum — not to mention the board display on the screen and the complex logic needed for the move generators.

"Yet our *Scrabble* version is going to be better than the Apple version — even with its disc storage — and have a dictionary substantially greater than 10,000 words.

"When we come up with an idea there are two important questions: What ingredients, from the user's point of view, make it an exciting game — reactivity, 3-dimensionality, strategy — and what is possible within the constraints of the hardware?"

"Space Invaders is a good early example of reaching the best compromise — it is exciting to play and technically the game was easy to program because the invaders move in rows in a regular fashion. Random motion is much more difficult — and a Horace-type game is even more so."

"That the hardware is still developing at such a fast rate — and therefore that our products become out of date — is good. I think it would be very boring if the hardware stopped moving forward because on the software side it would no longer be possible to be creative and innovative."

"We have a whole range of Horace games"

"It will be very interesting to see where software will go in the future. My own view is that there are a whole range of game-types which in turn verge on education and on business — adventure games and simulations. And things from artificial intelligence which we can learn are very important — programs which understand English and have a dialogue with the user. In-house we have a program called *The Psychiatrist* based on Chomsky's idea that syntax is more important than semantics."

"All it does is ask you questions based on what you have already told it. It seems remarkably intelligent — of course it's a trick, but it tells us a lot. There is a whole range of artificial intelligence material that we can use in games."

"Reactive, strategic adventure games — combining the basic features of adventure games in real-time with graphics. Having to think on your feet. This kind of thing is only just becoming possible."

"Also it is a step along a long road that *Horace* has taken — interactive cartoons — Mickey Mouse where you are *actually* Mickey. We have a whole range of *Horace* games coming along. He has a chance of turning into quite an important character."



I want to see him on a billboard somewhere — up in lights — or maybe on the milk bottle brought in to breakfast by the kids."

"The earliest computer games were a development from the arcades — with a big element of killing stuff from outer space. That has a place but I would be horrified to see that as a main stream. I don't think killing is a creative area! And less enduring too. People go on wanting to play a game like *Flight Simulation* because it has some subtlety. The book equivalent of a space-zap game would be like a Mickey Spillane novel — pretty hard to read more than once. We have also shown that there is a big market for applications software — *Vu-File* or *Vu-Calc*. *Vu-File* is the top US seller for the TS1000."

"It is the challenge of doing something well, I suppose, which is attractive. Without being pompous about it, we are an expanding company, we are getting people working and we export a huge amount. We are part — and pleased to be part — of one of the few industries that is growing."

"Shortly we will sell versions of our *Vu-File* and *Vu-Calc* programs for the BBC machine. And a very major part of our effort at the moment is work on an integrated suite of business applications packages. Also we will continue to push the Spectrum."

"We have grown up in a modest span of time and we suffer growing pains like anybody else. We have a lot to do and we must pick and choose our projects. We would dearly like to do material for the Dragon. But it is better to do just a few things really well."

"Even in the last nine months, everything has moved on significantly. You need a lot of capital — the Vax, for example — and a very high degree of skill at every level of the company."

"Sinclair, for all the criticisms, has done well. He is the dominant force in Britain. In the US there are four companies — Timex/Sinclair, Atari, Commodore and Texas Instruments — all pretty substantial organisations. There is a real fight developing and it looks now like Texas has a policy of selling at a small loss to gain a market share."



"Psion has a close relationship with Timex. Our TS1000 software has done extremely well over there. Our impression was that the TS2000 was coming out in April — but now it looks as if it has been delayed until the middle of the year — and we will lose a lot of the market. The Spectrum is a tremendous machine — but it will not always be so. In a couple of years it will be superseded."

"One of the great strengths of Sinclair has been its ability to move very rapidly — and this is why the likes of Sinclair and Apple have been the forerunners and not Timex and IBM. They cannot move fast enough."

"For ourselves, we intend to become the Microsoft of Europe — that is the way we want to proceed. We intend to be in there producing good programs and flights for a long period of time yet."

"As part of that commitment, we have just set up a new company — Psion Processors — which will develop dedicated software for specific hardware applications. As hardware becomes cheaper and cheaper it makes sense to have machines for dedicated purposes. I think we will see big changes in the next five to six years."

"Our whole approach is a disciplined one but we are still small so we don't have bureaucracies, hierarchies or that sort of nonsense. Everyone has a sense of involvement and works hard. But there is the freedom to work at any time — people can be in here working at two in the morning — and sometimes they are!"

"We will stop being interesting as a company if we lose that good feeling — that sense of involvement. Frankly, for myself, I have never had so much fun in my life before."

"When I did my PhD, I used an English Electric KDF9 computer which took up the whole room and had to be protected from dust, temperature variations and humidity changes. Now the 48K Spectrum is very close in power to it. You could say I've been through the mill!"

"I don't write much of the code anymore — and I miss it. I am very knowledgeable of both hardware and software — but not with that honed edge. That worries me. My worth will disappear when I no longer realise just what it is possible to achieve. If I lose that I'm not much use."

Check-mate!

John White looks at some of the latest chess machines and compares them with the "Big Three".

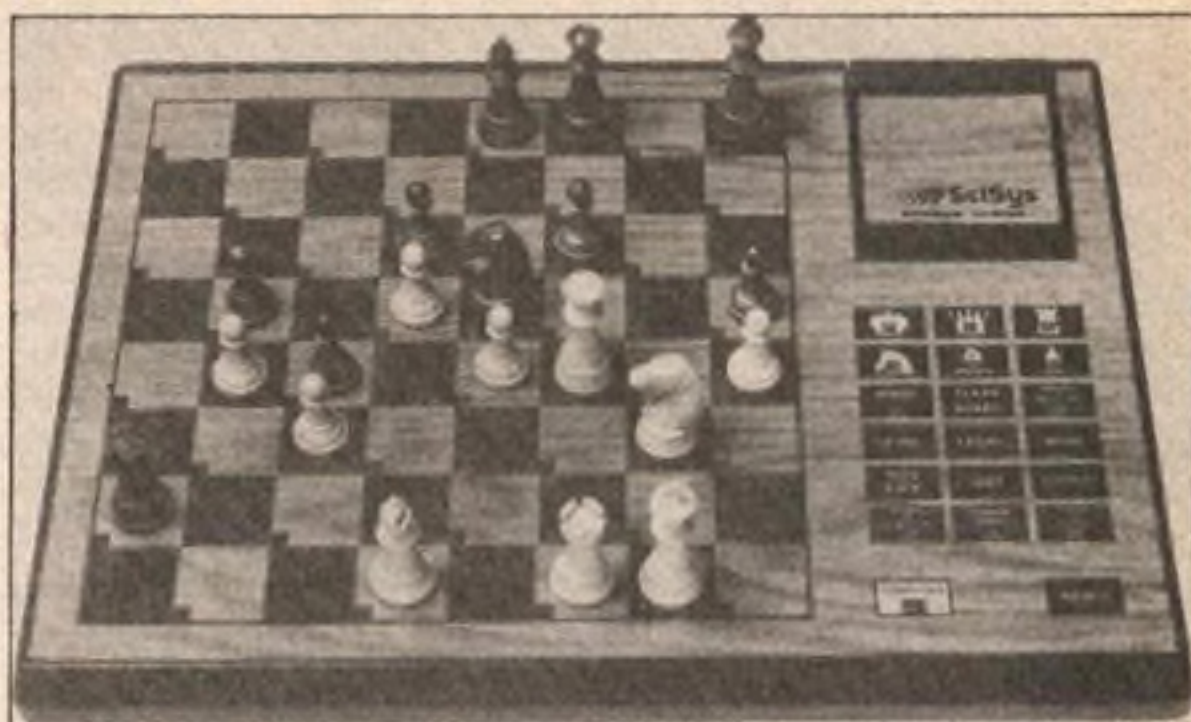
In March 1982, the Silica Chess Computer Symposium pitted two teams of human players against the best chess computers that were then available, the *Champion Sensory Challenger*, the *Chess Champion Mk V* — Philidor program — and the *Great Game Machine* with Morphy, Grunfeld and Capablanca cartridges. The *Champion Challenger* performed best, with a British Chess Federation grading of 133, the others obtaining a highly respectable grade of 122-124. An *Elite Challenger* also made a brief appearance — it did not play enough games for a grading, but scored an amazing 70 per cent success rate in five games.

Since last March, a number of new chess machines have been launched to challenge the dominance at the top end of the market of the "Big Three" machines for playing strength.

The *Mephisto II* is manufactured by the German company Hegener and Glaser and is a continuation of the older model I. *Mephisto* was launched in a blaze of publicity suggesting that it was the strongest machine on the market, a claim essentially based on games between itself and other computers. The basic price is only £200, although it is also possible to plug the machine into an electronic sensor board for an additional £250.

The *Mephisto* unit is well constructed and offers all the normal facilities that one expects these days, including a book opening library. In addition, the machine will randomly select between moves of roughly equal merit, has a quiet beep tone and permits memory storage of positions, using battery or mains operation. There are seven normal playing levels, which take from a few seconds to 20 minutes, a deep search for postal chess and a special mate-finder, which can find mates in up to five moves.

The program "thinks" while its opponent is making his move, and can provide hints for human players. *Mephisto* is undoubtedly one of the new generation of "super-fast" chess computers. It searches to a depth of four half moves at tournament speeds, searching deeper into some lines



and in the end-game. A minor omission is the "chopper" mechanism which ensures that automatic moves — ie, where only one legal move exists — are made at once. *Mephisto* examines all the consequences of its one move before making it.

Mephisto contains 280 opening lines. This compares with the 490 lines in the latest Grunfeld opening cartridge used with the *Morphy* program, or the nominal 64 opening lines of the *Champion Challenger*; the actual number of lines depends on how you count the sub-variations. *Mephisto's* openings can be selected in a somewhat tedious manner (it is easier with Grunfeld or CSC), and the opening lines are mostly traditional ones, rather than the odd lines found, for example, in the *Champion Mk V*. Overall, the opening library is good, and the sensor board adds a further 40 lines.

Mephisto's tactical play is very strong. It passes my standard test positions with flying colours, with one of the best scores I have yet recorded. These tests measure the effectiveness of the operating system, and the speed and depth to which the program looks in mid and end-games.

Mephisto's mid-game positional play is somewhat suspect; probably the evaluation function needs improvement. It made some weak moves at tournament speeds, including some inane king moves. *Mephisto* is also prone to suffering from isolated doubled pawns, a severe strategic weakness.

Mephisto is unusual in preferring bishops to knights — *Morphy* is the only other major program with this preference. The others prefer to swap their bishops for enemy knights; in the case of the *Challenger*, generally at the first opportunity.

Mephisto generally performs pretty well in the end-game, being a little better than the *Morphy* end-game and a little worse than *Capablanca*. *Mephisto* cannot win the standard king-bishop-knight versus king ending; as far as I know the *Champion Mk V* is the only program which can.

In tournaments against humans under the standard conditions of the Silica Chess Computer Symposium, *Mephisto* has done much less well than the "Big Three". But it can still be recommended as a very strong program at a moderate price.

After various tribulations, the Hong-

Kong based Novag's products are now distributed in the UK by Studio Ann Carlton, who also handle the *Great Game Machine*. The present Novag range consists of *Microchess*, a small portable machine, the *Sensory IV*, an 8K program very similar to the Sci-Sys *Sensor Chess*, and the top of the range *Savant*.

The *Savant* uses a 24K program, developed from the American David Kittinger's famous *Mychess* program, with 4K of Ram for calculations. The central CPU is a Z80A running at 6MHz, faster than any of its competitors.

A very important feature is the unit's large, touch-sensitive, LCD chess board. All the pieces are displayed under a piece of clear plastic. Touching the location of any piece and a second square will move the piece to that square.

On the sample I tested, this worked very well, but I noticed two disadvantages. First, the human has to hunch over the display to avoid parallax problems in seeing the pieces. Secondly, light shining in from a window may obscure part of the screen.

The *Savant* offers all the standard features expected of a modern chess computer. It can search to a depth of 14 ply at the highest levels and gives good results playing at normal tournament speeds. There are 10 levels of play, with random selection between moves of equal merit.

"Thinks" while it is waiting

The *Savant* "thinks" while it is waiting for its opponent to move and can give hints as to what you should do. Other features include a *Cmos* memory, which will store moves without a power supply for up to three months — the *Savant* can demonstrate "Classic Games" played by grandmasters similar to the "Great Games" offered by the *Champion Challenger*.

The book opening library is quite good with 850 moves — although not in the same class as its main competitors — and the program will find forced mates in up to seven moves. Optional extras include a chess printer for the moves and a quartz chess clock which will also serve to monitor play between two humans.

The standard of play is very good, but,



like *Mephisto II*, not quite in the same class as the "Big Three". In fact, the *Savant* is also a little weaker than *Mephisto*, and is therefore the weakest of the "First Division" chess computers. In the end-game, the *Savant* permits pawn promotion to a knight as well as to a queen, unlike most of its competitors.

At £400 it is difficult to recommend the *Savant*, unless you are keen on the touch-sensitive LCD board. Readers should note that an earlier and weaker version of the *Mychess* program is also available for the Tandy and Apple microcomputers.

Sci-Sys W's *Sensor Chess* — £90 — consists of a 4K program in a replaceable Rom module, fitted into a sensory board with a fast 6502 microprocessor. Designed by the American Master Julio Kaplan, it offers eight levels of play, one of which solves mate in up to four move problems. The top normal playing level is level five, which takes an average of 2-3 minutes per move, although captures tend to be much faster. It is very likely that the program uses a different operating system to that employed by the other programs, only sketchily evaluating the higher levels after a detailed evaluation at the lowest level.

Pawn promotion can be to any piece and the machine recognises draws under the three-move repetition and 50 move rules. Most of the normal chess computer facilities are offered, but a timer is lacking, as is a move counter, an indication of the move the machine is thinking about and the ability to think on the opponent's time.

The basic module has no book openings, but will choose randomly between a few different opening moves. The module is rather a good one and its end-game play, although not outstanding, is superior to that of many similar-priced competitors. The advance of pawns is quite accurate throughout the game and the king becomes very active at the end.

The play can be improved by purchase of replacement modules. At present, these include *Hypermodern* and *Classical* — £20 each — and *Strong Play* — £15. The first two contribute a variety of shallow book openings and slightly alter the style of the play of the basic module, but otherwise there is little difference.

Strong Play, however, is a 6K program which contributes a series of book openings and greatly improves the end-game play. This module is a marked improvement over the other three and represents the strongest play presently available from a machine up to £120. It has been claimed to be as strong as the Morphy program, standing alone in the Morphy Encore, on the dubious basis of games between them. This claim is not substantiated by its performance in my tests and by play against me; Morphy is markedly stronger.

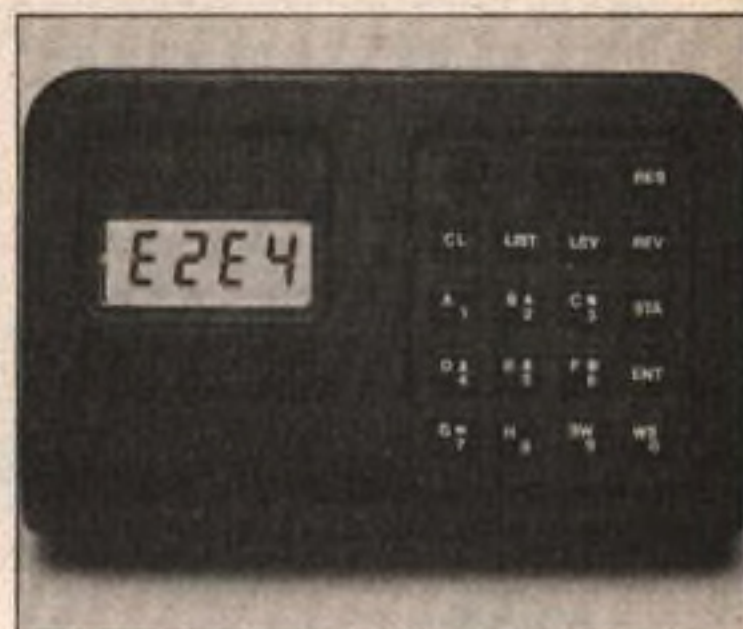
During play, *Strong Play* is somewhat prone to suffering from doubled pawns and resembles Morphy in its preference for bishops over knights. It cannot win the standard king-bishop-knight versus king ending, but deals comfortably with a king-rook versus king ending.

The sensor board of *Sensor Chess* is quite sensitive, but slow to react. Overall, *Sensor Chess* with *Strong Play* module must be accounted very good value indeed at £105. A good "second division" program.

The *Elite Challenger* is a magnificent Fidelity-Spracklen (Sargon-derived) program, very similar to the *Champion Challenger* but running at twice the speed with a 4 MHz 6502B CPU. Physically, the machine also closely resembles the *Champion*, except for the "Elite" logo, a few more book openings and a slightly improved program. The *Elite* scored a 70 percent success rate in the Silica Symposium against human players graded at BCF 110-160. But — the price at £680 is ridiculous.

Lacks the infamous Fidelity voice

The *Elite* was always in limited supply, and is now set to be overtaken by Fidelity's new *Prestige Challenger* at £860 which employs the superb auto response board — a hand-crafted wood unit — with an updated *Elite* program. The *Prestige* uses a 6502C microprocessor. I do not have space for all its features, but they are very comprehensive, and the program is modular so that it can be improved in the future. An interesting feature of the new *Prestige* program is its dynamic reassessment of the relative values of knight and bishop as the game proceeds.



The existence of Fidelity's *Challenger 9* makes the price of the *Elite* even more absurd. At only some £160, a program virtually indistinguishable from the *Elite*'s has been coupled with a sensory board and a 6502 CPU to give the *Challenger 9*. This machine plays much the same as the *Champion Challenger*, with a slightly improved program and with a good book opening library, which can be increased by inserting extra plug-in modules. But it lacks the infamous Fidelity voice found on the more expensive models.

The *Challenger 9* undoubtedly offers the best strength play for the least price of any machine presently on the market; it has no real weaknesses. Potential buyers should note that *Challenger* programs tend to be the most obviously machine-like of chess programs, as well as the strongest. In a quiet position, the program will often just move a piece backwards and forwards. However, their tactical play is second to none and the end-game play of all Spracklen-designed *Challenger* programs is outstanding.

Conclusions

★ The *Prestige Challenger* is the strongest on the market. At £860, it can only be recommended to millionaire grandmasters.

★ The *Champion Sensory Challenger* is still one of the best machines available. At £330, the purchaser gets a sensory board and the Fidelity Voice.

★ The *Challenger 9* is outstanding value at £160. It lacks the voice of the *Champion* and also has no chess clock.

★ Sci-Sys W's *Chess Champion Mk V* — £280 — remains a very strong machine, and a new *Mk VI* program is available for existing purchasers on a replaceable cartridge.

★ The *Great Game Machine* with upgraded opening and end-game modules is still one of the top machines, but rather pricey at around £470.

★ The *Mephisto II* — £180 — is good value at the price, but weaker than the machines above.

★ The Novag *Savant* — £400 — has a touch-move board display, but is rather expensive for the standard of play.

★ Sci-Sys W's *Sensor Chess* with *Strong Play* module is excellent value at only £105.



SPECTRUM 48K : ZX81 16K SIX PART ADVENTURE



BLACK CRYSTAL THE QUEST IS ABOUT TO BEGIN

The ultimate role-playing adventure for the SPECTRUM/ZX81. You can become a warrior, elf or wizard on a quest to find and use the rings of creation: to destroy the Black Crystal and defeat the Lords of Chaos. Held within six programs lies a land of fabulous treasures and mythical monsters. Journey through the land of Beroth, explore the castle of shadows, descend into the Shaggoths lair, search for diamonds in the sea of sand but beware of sand sharks! Confront the fire demon in his temple, battle against the Lords of Chaos and win your way to the Black Crystal.

By splitting Black Crystal into six programs we can provide more variety and detail than any other adventure for the Sinclair computers.

Real time monster battles. Superb graphics. Save game feature. All six parts are supplied together on cassette, boxed with instruction booklet.

**SPECTRUM 48K: 180K OF PROGRAM
IN SIX PARTS — ONLY £7.50**
**ZX81 16K: OVER 100K OF PROGRAM
IN SEVEN PARTS — ONLY £7.50**
**WHY PAY MORE FOR LESS OF AN
ADVENTURE**



To: CARNELL SOFTWARE, DEPT 2, 4 STAUNTON RD. SLOUGH. SL2 1NT.
Please send me: Black Crystal for my:

Spectrum 48K.....	£7.50
ZX81 16K.....	£7.50

I enclose a cheque/postal order (payable to Carnell Software) for £

NAME

ADDRESS

TRADE ENQUIRIES WELCOME

BEFORE
YOU BUY A
CHESS COMPUTER

buy



Chess Computer News

CHESS COMPUTER NEWS is a full 32-page report on the leading chess computers, with the latest test results, full lists of the different features of each machine, the recommended best buys for different needs, and lowest prices. Current issue 95p (plus 25p P&P by return post)

TO GET YOUR CHESS COMPUTER NEWS FAST

★ Call in and pick up your copy — and see the computers at the same time — at our London showroom, COMPETENCE, The Chess Computer Specialists, 263A Eversholt Street, London NW1 1BA (one minute south of Momington Crescent tube station) Mon-Fri 10am-5pm, Sat 10am-3pm.

★ Or we'll get your copy to you by return post if you telephone us your Access or Barclaycard number on 01-380 0666, or mail your cheque or PO with the form below.

For any information about chess computers you can call us on 01-380 0666. Remember, only Competence offers you 21 days to thoroughly judge the machine for yourself at home. If you return the machine within 21 days, Competence will refund you the full purchase price. And, we can get your computer to you by return post with our special Competence Mail Order Service. Cut out this ad for future reference and to show to interested friends

NAME

PCW

ADDRESS

DATE

I enclose cheque/PO for £1.20 (current issue). OR please debit my Access/Barclaycard number:

We teach you the secret language of tomorrow's world



Since you appreciate the impact computers are making on tomorrow's world, you'll appreciate the key role Camp Beaumont can play in your future.

Because Camp Beaumont's computer boffins using structured courses (basic, advanced and intensive) teach you the secret language that'll give you a head start in tomorrow's high-tech world.

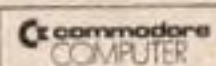
But without tears. Because at Camp Beaumont (for 9-17 year olds) there are over thirty physically stimulating activities also available to help you escape from computer fatigue.

These include:
tennis, soccer, cricket,
swimming, riding, fencing,
canoeing, golf, shooting, judo,
archery, gymnastics, fishing, sailing,
wind surfing, the creative arts etc. All under the supervision of university-qualified directors, instructors and monitors. And uniquely-equipped public school or country mansion locations in the Lake District, Devon, Dorset and around London and Manchester. Camp Beaumont also run day camps for younger children (5-15 years) offering over thirty play-as-you-learn activities including computers, robotics, and psychobionics. Write for comprehensive brochure to Camp Beaumont,

Dept. PC/1, Beaumont House,
73 Upper Richmond Road,
London SW15 2SZ.
Tel: 01-870 9866.

**CAMP
BEAUMONT**

Brings out the computer in you.



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.

Blitz

on Spectrum

The object of the game is to bomb the buildings by pressing any key to land safely. If you do this you are given another

city to bomb.

Hint: Bomb the larger buildings first, don't lean on the keyboard.

Variables

u-If bomb is dropped u=1 if no u=0
s-Score hs-High Score

t,r-Line and column of plane
c,d-Line and column of bomb
j-no of parts of a building destroyed by a bomb

Program notes

20-210 Main program loop, prints plane and bomb
1001-1050 Prints random height buildings
2000-2060 Moves bomb
3000-3010 When plane crashes prints flashing plane
5000-5040 Prints instructions
6000-6060 Prints landed plane
6100-9040 Sets up user definable graphics
Lines 30, 3000, 6000; user graphics a,b,c for plane
6020, 6040; user graphics m and n
50; user graphic o
1030 user graphic h

Spec Blitz © Peter Holt

```

1 PAPER 5: INK 1: BORDER 5: L
ET u=0: LET s=0: LET hs=0
2 GO TO 5000
3 GO SUB 1000
4 LET j=0
5 FOR t=1 TO 20: FOR r=1 TO 2
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21 IF u<>1 THEN LET c=t+1: LET
d=r
22 PRINT AT 0,1: INK 0;"SCORE
";s;TAB 18;"HIGH SCORE ";hs
23 IF ATTR (t,r+2)<>41 OR ATTR
(t,r+1)<>41 THEN GO TO 3000
24 PRINT AT t,r-1;" "
25 BEEP .003,0
26 IF u<>0 AND c<>21 THEN PRIN
T AT c,d;" "
27 IF u=1 THEN LET c=c+1
28 IF c=21 THEN LET u=0
29 IF c=21 THEN LET j=0
30 IF c<>21 AND t<>20 AND INKE
Y$<>" " THEN LET u=1
31 IF u<>0 AND c<>21 AND ATTR
(c,d)<>41 THEN GO SUB 2000
32 IF u=1 THEN PRINT AT c,d; I
NK 2;" "
33 NEXT r
34 PRINT AT t,29;" " : NEXT t
35 GO TO 6000
1000 GO SUB 7000
1001 PAPER 5: INK 1: BORDER 5
1002 CLS
1003 PRINT AT 21,0; PAPER 6;" "
1010 FOR i=3 TO 29
1020 FOR e=20-INT (RND*6) TO 20
1030 PRINT AT e,i; PAPER 6; INK
0;" "
1040 NEXT e
1050 NEXT i
1060 RETURN
2000 LET j=j+1
2010 IF j>(3+INT (RND*3)) THEN L
ET u=0
2015 IF j=0 THEN LET u=0
2020 IF j=0 THEN RETURN
2040 LET s=s+1
2060 RETURN
3000 PRINT AT t,r-1; FLASH 1;" "
3010 BEEP 5,2
3020 GO TO 5000
5000 PAPER 7: INK 1: BORDER 7
5010 CLS
5015 PRINT AT 19,7;"YOUR SCORE
";s
5017 IF s>hs THEN PRINT ""
NEW HIGH SCORE"
5018 IF s>hs THEN LET hs=s
5019 LET s=0: LET u=0
5020 PRINT AT 0,10;"B L I T Z";
INK 2;TAB 10;"-----"
5030 PRINT " " INK 2;"You mus
t bomb the city to land
ny key to drop a bomb. Press a
hit one of the buildings If you
be killed instantly!!"
5032 PRINT " " INK 1;" PRESS A
KEY TO PLAY BLITZ "
5035 IF INKEY$="" THEN GO TO 505
5
5040 GO TO 5

```

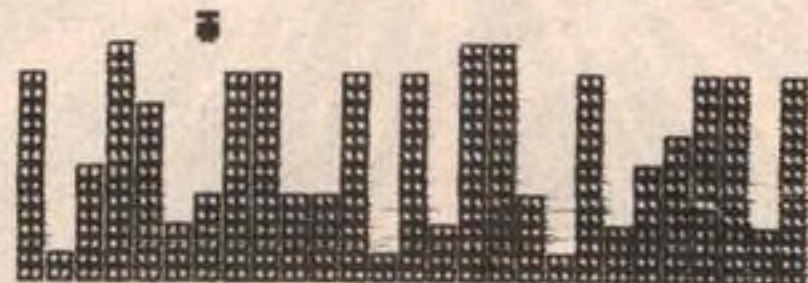
```

5000 PRINT AT 20,27;"* "
5010 FOR q=1 TO 10
5020 PRINT AT 20,27;"*"
5030 PAUSE 40
5040 PRINT AT 20,27;"X"
5050 PAUSE 30
5060 NEXT q
6100 PAPER 7: INK 1: BORDER 7
6110 CLS
6120 PRINT " " "YOUR SCORE IS ";
s;" " "PRESS A KEY TO PLAY BL
ITZ"
6130 IF INKEY$="" THEN GO TO 613
0
6140 GO TO 5
7000 FOR y=0 TO 7
7010 READ e: POKE USR "h"+y,e: N
EXT y
7020 FOR y=0 TO 7
7030 READ e: POKE USR "o"+y,e: N
EXT y
7040 FOR t=0 TO 23
7045 READ e: POKE USR "a"+t,e: N
EXT t
7050 FOR t=0 TO 13
7060 READ e: POKE USR "m"+t,e: N
EXT t
7099 RESTORE
7100 RETURN
9000 DATA BIN 01111111,BIN 01001
001,BIN 01001001,BIN 01111111,BI
N 01111111,BIN 01001001,BIN 0100
1001,BIN 01111111
9010 DATA BIN 01111110,BIN 01111
110,BIN 00011000,BIN 01111110,BI
N 01111110,BIN 01111110,BIN 0111
1110,BIN 00111100
9020 DATA 12+16,14+16,15+16,15+1
6,15+16,15+16,4,8,15,2,31,255,25
5,255,16,127,252,9,157,255,255,2
53,129,224
9040 DATA 16,56,16,254,16,40,68,
68,16,186,84,56,16,40,68,68

```

SCORE 0

HIGH SCORE 0



Blitz
by P Holt



COMPUSERSE LTD

286D Green Lanes, PO Box 169
Palmer's Green, London N13 5TN

Tel: 01-882 0681 01-882 6936

SOFTWARE FOR DRAGON 32

- 1. DASH Machine Code DRAGON cartridge £18.95**
A true 6809 assembler for the DRAGON computer. Assembly statements are entered in BASIC mode and can be intermixed with BASIC statements. Use BASIC for load and save and for editing source — simple and no time wasted learning new commands. A sophisticated product for a demanding task.
- 1. HI-RES Machine Code DRAGON cartridge £25.30**
Tired of that 32 x 16 display? HI-RES replaces the standard DRAGON display with a full 51 character by 24 line display. Ten different character sets (including most European languages). User definable characters. Mix High Resolution graphics and text on the same screen. Return to the standard mode at any time. A must for the serious programmer and essential for business programs. We repeat that this replaces the BASIC input/output routines — BASIC runs in 51 by 24 mode! (Available end March.)
- 3. DECODE Machine Code COLOR/DRAGON cartridge £18.95**
This cartridge could save you a small fortune! DECODE converts TANDY COLOR programs to DRAGON format or vice versa. Load a TANDY COLOR tape on your DRAGON, or a DRAGON tape on your TANDY COLOR, and run DECODE to convert the program into the other BASIC! (Prove it works — convert it back again!) Now all you COLOR computer owners can take advantage of all that lovely DRAGON software!
- 4. DEMON Machine Code Monitor COLOR/DRAGON cartridge £18.95**
A complete system for entering machine code programs, as reviewed in *Popular Computing Weekly* Vol. 2 No. 4 — "easy to use ... a useful tool ... reasonably priced".
- 5. SPACE RACE Machine Code 16K COLOR/DRAGON cartridge £18.95 cassette £7.95**
Action packed arcade game. Chase around the track destroying hordes of aliens — watch out for the mines! Uses keyboard or Joysticks. 15 skill levels, high resolution graphics, sound. Addictive!
- 6. C-TREK BASIC 16K COLOR/DRAGON cassette £7.95**
Super space adventure game, graphics and sound, destroy the Klingons before they get you.
- 7. DESERT GOLF BASIC 32K COLOR/DRAGON cassette £7.95**
High resolution display and good sound effects.
- 8. POKER BASIC 16K COLOR/DRAGON cassette £7.95**
Fast action, excellent graphics and sound, machine code assisted for speed!
- 9. PIRATES AHoy BASIC 32K COLOR/DRAGON cassette £7.95**
An adventure game. Solve the puzzles to find all the treasure — absorbing.
Authorised Distributors for Spectral Inc. USA, TSC Inc. USA, CSC Inc. USA

Order by ACCESS/VISA or cheque by telephone or post. 24-hour answephone service.

**campbell
systems**

THE VERY BEST IN MACHINE CODE
FOR THE ZX SPECTRUM & ZX81

All programs supplied double-recorded and mailed
1st class by return. Prices include VAT and postage
within Europe. SAE for full list.

for 48K Spectrum **MASTERFILE** business/domestic filing and reporting system. So flexible that it is equally usable for your mailing lists, catalogues, stock control, text extracts ... applications are endless. Fully user defined data and report display formats, dynamic variable-length file, records and data items. Fully menu-driven with powerful search facilities, sorting, total/average, update, multiple independent files, printing. Yes, we aim to support microdrive when Uncle delivers. Nearly all the 8K we use is machine code, so you get 32K per file. Comes with example file and 22 page manual. £15.00

NEW Masterfile-16 for 16K Spectrum owners.

We have produced a subset version of MASTERFILE called MASTERFILE-16. It has most of the features of big MASTERFILE, with 7 pre-defined report formats and 6 pre-defined fields e.g. name, address, etc., and we have found a useful 4500 bytes of file space. MASTERFILE and MASTERFILE-16 are fully 'file-compatible' and will happily process each other's files, so that 16K owners who upgrade to 48K can use their old files immediately. Complete with 12-page manual, priced at £8.95.

PLEASE REMEMBER TO STATE CLEARLY WHICH VERSION OF MASTERFILE YOU REQUIRE.

for 16K Spectrum **GULPMAN** game of the 'man' variety with 15 mazes, 4 chasers, laser defence, 9 grades, 9 speeds, demo mode, choice of joystick control. "An extraordinarily good program" raves Boris Allan for *Popular Computing Weekly*. We think you will agree. £5.95

for 16K ZX81 **GULP 2** almost identical spec to GULPMAN. £4.75

for 16/64K ZX81 **THE FAST ONE** is the predecessor to MASTERFILE and is in use all over the world now. Specification is very similar to MASTERFILE. £12.00

Campbell Systems, Dept. (PW),
15, Rous Road, Buckhurst Hill,
Essex, IG9 6BL, England.
Telephone: 01-504-0589



SPECTRUM GOES

£14.95

FORTH

WITH ABERSOFT

The affordable FORTH

- Forth:** A full implementation of this very fast running language. Ideal for writing fast moving arcade type games. Allows the full colour and sound facilities of the Spectrum to be used. Future Microdrive enhancements will be made available. 48K Spectrum only. **14.95**
- Chess 1.4:** 10 levels m/c. Graphic screen display. 16K ZX81 only. **8.95**
- Invaders:** Very fast m/c action. Includes mystery ship and increasingly difficult screens. 16K ZX81 only. **4.45**
- Mazeman:** A fast action m/c game that reproduces the spirit of the original. The Spectrum version includes excellent graphics and sound. 16K ZX81 and 16/48K Spectrum. **ZX81 4.45 4.95**
- Adventure 1:** Based on the original game by Crowther, this game was the start of the Adventure craze. Reviewed *Sinclair User*, Iss.2. Features save game routine as the game can literally take months to complete. 16K ZX81 and 48K Spectrum. **ZX81 8.95 9.95**

ABERSOFT

7 MAES AFALLEN, BOW ST, DYFED, SY24 5BA

24 hour Ansaphone for Access orders on 0970 828851



HOME PROGRAMMERS

wanted

VIC 20/64
LYNX
ORIC
ATARI

SPECTRUM
NEWBRAIN
DRAGON
BBC

A Computer Awareness project requires programmers living within 100 miles of London. Knowledge of machine code not essential but involvement in education would be an advantage.

Please write giving brief details of yourself, available spare time and type of computer.

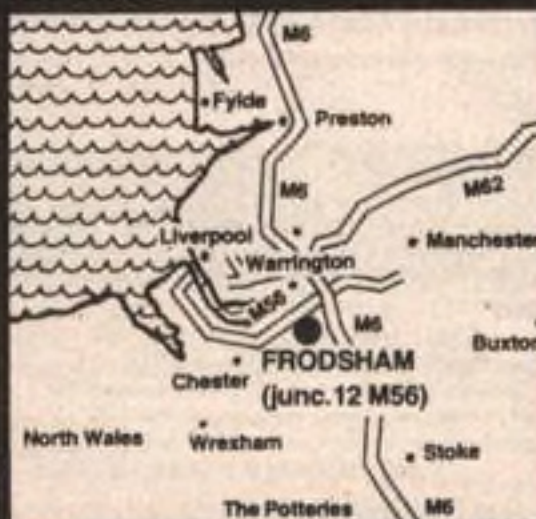
"Computer Awareness Project"
Room 309
16 Brune Street
London W1

northern computers

micro computer systems for all applications

education and training division

location



For Educational and Training Institutions only:

Apple II, III
BBC (Free Econet Interface)
Newbrain
Green Monitors £79
Colour Monitors £199
Seiksha Printers £207
Epson Printers £289
NETWORKS
Coming soon:
Acorn Electron

we supply everything to meet the requirements of secondary schools, colleges and universities, whether it be small B.B.C. computers, Apple IIe computers, or Apple III school administration and accounting systems.

please contact: Gareth Littler or David Horsfall
EDUCATION & TRAINING DIVISION

Northern Computers, Churchfield Road,
FRODSHAM, CHESHIRE WA6 6RD Tel: (0928) 35110

Salamander Software

DRAGON AND BBC MODEL 'B' SOFTWARE

DRAGON AND BBC MICRO 'B' SOFTWARE

DRAGON 32 SOFTWARE

DRAGON-TREK

A real time version of the classic space game featuring full colour tactical, status and long-range scanner displays, hyperprobe, the Faerie Queen, Klingons and Klingon commanders, tractor beams, enemy movement, black holes and much more. Choose from ten levels of difficulty and three sizes of galaxy. Comes complete with 16-page flight manual. JOYSTICK (1) REQUIRED. Dragon Data Approved

£9.95

WIZARD WAR

A game of magical combat between the Wizards of the Tri-Suns for supremacy of the planet Xarg. Both dexterity and deduction are needed in order to outwit your opponent as spell is traded against spell. Comes complete with 12-page illustrated spell book. JOYSTICKS (2) REQUIRED. Dragon Data Approved

£7.95

GOLF

An accurate interpretation of the game of golf written by a keen club player. Allows match play between two players or one player may play using the Stableford points system widely used for competition golf. Features full club selection, hazards, out of bounds and player handicaps. Dragon Data Approved

£7.95

GRAND PRIX

Do you have the potential to be a champion Formula One driver? Find out, when your race on these 8 famous grand prix circuits from around the world. For 1 or 2 players. JOYSTICKS (2) REQUIRED. Dragon Data Approved

£7.95

GAMES COMPENDIUM D1

Six great games for the whole family — Donkey Derby, Blackjack, Kingdom, Hunt the Wumpus, Noughts and Crosses and Lunar Lander. Dragon Data Approved

£7.95

VULCAN NOUGHTS AND CROSSES

A three-dimensional game of noughts and crosses for one or two players. Also includes a zero player option where the machine plays itself. Can you out-think your Dragon? Dragon Data Approved

£7.95

THE EDG GRAPHICS PACKAGE £24.95

FOR THE BBC MODEL 'B' microcomputer

An advanced picture drawing system developed by a firm of consulting engineers to the oil and utility industries world-wide. Uses cassette tapes for software and picture storage and is controlled entirely by normal keyboard input — no extra hardware required. The main system features are:

- ★ Picture drawing in model 0, 1 or 2
 - ★ Actual and Logical colour changes at any time
 - ★ Drawing functions:
Lines, boxes, circles, arcs, text, shape repetition
 - ★ Drawing aids: Grid, elastic band, save and home cursor (5 positions)
 - ★ Colour fill
 - ★ Text window showing x,y cursor position, length, angle, colour menu and current colour
 - ★ Saving and Loading of picture using cassette tapes
 - ★ Multi-file pictures facilitating very complex drawings
 - ★ Flashing cross-hairs cursor
 - ★ User instructions/prompts
- This package comes complete with a spiral bound manual.

Send SAE for catalogue of our full range of Dragon and BBC model B software. Cheques or postal orders payable to Salamander Software, 27 Ditchling Rise, Brighton, East Sussex BN1 4QL. Tel: 0273 771942.

Please add 50 pence P & P to all orders.

Dealer enquiries welcome. Programmers wanted: Good royalties paid.



NOW IN YOUR HIGH STREET SHOPS

FOOTBALL MANAGER 3D

by Addictive Games

for SPECTRUM 48K AND ZX81 16K



➔ This superb game is **now available** from branches of **W. H. SMITH** and **BOOTS THE CHEMIST**.

Manage your own team in this exciting game of skill which vividly captures the drama and excitement of real football.

FEATURES INCLUDE:

- ★ 4 DIVISIONS ★ F.A. CUP ★ PROMOTION & RELEGATION ★
- ★ TRANSFER MARKET ★ TEAM SELECTION ★
- ★ SAVE GAME FACILITY ★★ AND MUCH MORE! ★★

WHAT THE PRESS SAY ABOUT IT:—

➔ *IF YOU have always wanted to manage a football team, FOOTBALL MANAGER, from Addictive Games, is for you — The game is ideal for a football fanatic but the most interesting thing for us was the 3-D graphics used to create the goalmouth action — the game is a winner.*
SINCLAIR USER FEBRUARY 1983

➔ *Although I'm no great football fan, I really enjoyed playing this game — excellent use is made of colour and user-defined graphics. The game is very logically put together, so that the development of strategy and tactics has a real effect. For example, one of my teams got through to the fourth round of the F.A. Cup where it was beaten by a second division side. This upset morale and meant that our promotion bid failed. Perhaps I should have given up the F.A. Cup run and held some good players back — the possibilities are endless. Brian Clough had better watch out!*
ZX COMPUTING FEB/MARCH 1983

ALSO AVAILABLE FROM THE FOLLOWING SHOPS
BUFFER MICRO SHOP (London)
MICROWARE (Leicester)
ANIRGO COMPUTERS (Hemel, Surrey)
SUCCESS SERVICES (Walsall)
THE COMPUTER SHOP (Newcastle)
DRAGON BYTE (Leeds)
AND OTHER GOOD COMPUTER SHOPS

PRICES:
FOR THE SPECTRUM 48K £6.95, ZX81 16K £5.95
3D GRAPHICS ONLY IN SPECTRUM VERSION
To Order send Cheque/P.O. payable to
ADDICTIVE GAMES, Dept. PC, P.O. Box 278,
Canniburn, Milton Keynes MK14 7NE
PLEASE STATE COMPUTER

MAKE MONEY FROM YOUR HOBBY

TOP ROYALTIES PAID FOR SPECTRUM AND ZX81 SOFTWARE

ORIGINAL GAMES EDUCATIONAL AND BUSINESS PROGRAMS WANTED

SEND TO OR PHONE

GALAXY SOFTWARE

62A WEST STREET
HARWICH
ESSEX
HARWICH 52446

SOFTWARE LIBRARY

FOR

SPECTRUM

Low-cost weekly hire of Games, Adventures, Utilities and Educational Programs.

We have a large selection of software in our free catalogue for Popular Computing Weekly readers.

- Membership only £6 for 12 months.
- Program hiring from only 80p (plus 25p p&p).
- New titles constantly being added.
- All titles with publishers permission and royalties paid.

Join today by clipping the coupon below or send for your free catalogue and see for yourself our fantastic range of software.

- YES, please send me my free catalogue and selection sheet. I enclose my £6 cheque/Postal Order.
- I enclose a 15½p stamp, please rush me your free catalogue.

NAME.....

ADDRESS.....

..... TEL.....

Send to:

KERNOW SOFTWARE LIBRARY
(Dept PCWK)
55 ELIOT DRIVE, ST GERMAN'S
SALTASH, CORNWALL PL12 5NL

THE DRAGON DUNGEON

TAKE INVENTORY



DRAGON OWNERS CLUB

The Dungeon vaults are filled with peripherals, software, books and other goodies exclusively for the Dragon 32 owner — from cassette recorder leads to editor assembler — from arcade games to Database Management Systems.

Our stock of software is selective, rather than extensive, since we believe in value for money. Feed your Dragon on the best programs!

Best selling game Salamander's "Dragon Trek" £9.95.

Best-selling book "The Working Dragon 32" £5.95. Now in stock "Dragon Companion" £4.95.

We now have the widest selection of Dragon Software available in the UK (games, education, business and utilities). Send for catalogue.

The Dragon Dungeon Club monthly newsletter, *Dragon's Teeth*, is packed with news, reviews and information for the dedicated Dragon-basher. The March issue of *Dragon's Teeth*, now out, includes both hardware and software offers and Club Members registering before March 31 will be eligible to purchase Dragon badges and sweatshirts at very special prices. **Annual membership, including *Dragon's Teeth*, £6 (six-month trial subscription £3.25).**

THE DRAGON DUNGEON
PO BOX 4, ASHBOURNE, DERBYSHIRE DE6 1AQ
Tel: ASHBOURNE 44626

OPEN FORUM

Meteor

on Ace

You are in a Space Ship where you have accidentally plunged into a meteor storm and as the Space Ship Commander you have to navigate through the storm.

The ship can withstand the impact of two meteorites and is destroyed by the third. A score is then displayed on the screen with random beeps from the computer.

The program can be run in fast or slow mode and the speed can be adjusted by

altering the *Beep* in the world *Game*. The word *Point* can be useful in other programs requiring two numbers on the stack and replaces it by the ascii value of the character occupying that square.

The program is started by entering the word *Game*. The spaceship is moved from side to side using the 5 and 8 keys. After completion of the game press *Break* to stop the *Bleeps*. To play again enter *Game*.

If the program does not work and the ship does not move correctly, the error will be in the words *Ship* and *Move*. If the

UFO's do not move up the screen, you will most probably have left the CR's off the end of the word *UFO*.

The game requires a random number generator. A routine is included from the Ace manual. The words *Seed*, *Seedon*, *Rnd* and *Rand* are used.

First set up the following characters:

```
: GR 8 * 11263 + DUP 8 + DO I C I - 1 + LOOP ;
: SHIP 40 124 84 124 254 186 146 0 1 GA ;
: METEOR 28 62 127 255 255 254 124 56 2 GR ;
```

This program should be tested, saved and verified, then use *Forget Gr* to allow sufficient memory for the main program.

```
: POINT AT 152388 @ C@ ;
: MOVE INKEY DUP 53 = IF x @ 1- x ! THEN 56 = IF x @ 1+ x ! THEN ;
: END 10 10 AT ." SCORE:"S @ . BEGIN 100 RND 20 + 50 BEEP 0 UNTIL ;
: SHIP 0 x @ POINT 2 = IF L @ 1- DUP L ! 0 = IF END THEN 300 300
BEEP 200 150 BEEP 250 150 BEEP 300 300 BEEP 400 700 BEEP CLS
THEN 1 EMIT ;
: UFO 22 32 BND AT 2 EMIT CR CR ;
: SET 3 L ! 0 S ! 15x ! CLS ;
: GAME SET BEGIN MOVE SHIP 1000 20 BEEP S @ 1+ S ! UFO 0 UNTIL ;
```

The following variables need to be initialised before typing in the main program:-

```
15 VARIABLE X
3 VARIABLE L
0 VARIABLE S
```

Meteor
by G E Richards

Multiply

on Spectrum

This program calculates all the digits of large powers of two — up to 65535 for the 48K Spectrum and about 44500 for the 16K Spectrum.

The digits are stored from memory location 26000 in groups of two, the last two being at 26000.

The program first asks what power you

want — this is then stored in locations 25996 and 25997. A machine code multiplication routine starting at 23760 is then called. When this is finished you are asked if you want to *Lprint* the result, *Print* the result or *Clear* the memories (this must always be done before a new calculation). If the last option is chosen the memories from 26000 to the number held in 25998 and 25999 are cleared; the program then starts again.

Powers up to 9200 are done in less than

five minutes and the largest known prime number + 1* in less than two hours.

The machine code works by taking all the digits of the number held from locations 26000 in turn in groups of two, doubling them and adding the carry from the previous result. Every time the number increases in size by another two digits an extra memory is allocated. When the whole number has been doubled the computer checks if the specified power has been reached; if not it doubles again.

```
1 REM .....
.....
2 DATA 243,17,144,101,33,0,0,
200,35,34,144,101,0,0,33,143,101,
305,125,135,128,5,0,254,100,55,1
1,214,100,229,6,1,237,02,225,56,2
1,19,119,157,229,237,02,225,56,2
27,25,35,229,215,237,01,140,101
1,237,02,209,56,211,237,03,142,10
1,225,251,201
3 FOR i=23760 TO 23825: READ
k: POKE i,k: NEXT i
4 INPUT "Power?";p: POKE 2599
7,INT (p/256): POKE 25996,p-256*
PEEK 25997: PRINT "2^";p: RANDOM
IZEUSR 23760: GO TO 10
5 CLS: LET #=PEEK 25996+256*
PEEK 25999: PRINT "2^";p,2*#-519
02-(PEEK #/10):" Places"
6 PRINT: FOR i=# TO 26000 ST
EP -1: LET a=PEEK i: IF a>=10 TH
EN PRINT a;: GO TO 8
7 PRINT "0";a;
8 IF PEEK 23889=3 AND PEEK 23
888=1 AND i=1 THEN COPY: CLS
9 NEXT i: IF i=1 THEN COPY
10 PRINT: PRINT: PRINT "Lea
r / Print / Print?"
11 LET e$=INKEY$: IF INKEY$=""
THEN GO TO 11
12 LET l=(e$="l"): IF e$="p" 0
R e$="l" THEN GO TO 5
13 IF e$(">")"c" THEN GO TO 11
14 FOR i=26000 TO #: POKE i,0:
NEXT i: CLS: GO TO 4
Org 23760
23760 F3 di
23761 11 90 65 ld de,26000
23764 21 00 00 ld hl,0
23767 E5 push hl
23768 23 inc hl
23769 22 90 65 ld (26000),hl
23772 06 00 ld b,0
```

```
B loop
23774 21 8F 65 ld hl,25999
S loop
23777 23 inc hl
23778 7E ld a,(hl)
23779 87 add a,a
23780 80 add a,b
23781 06 00 ld b,0
23783 7E 64 cp 100
23785 38 0B jr c,Carry
23787 06 64 sub 100
23789 E5 push hl
23790 06 01 ld b,1
23792 ED 52 sbc hl,de
23794 E1 52 pop hl
23795 38 01 jr c,Carry
23797 13 inc de
23798 77 ld (hl),a
23799 A7 and a
23800 E5 push hl
23801 ED 52 sbc hl,de
23803 E1 52 pop hl
23804 38 E3 jr c,S loop
23806 E1 52 pop hl
23807 23 inc hl
23808 E5 push hl
23809 05 push de
23810 ED 5B 8C 65 ld de,(25996)
23814 ED 52 sbc hl,de
23816 01 52 pop de
23817 38 D3 jr c,B loop
23819 ED 53 8E 65 ld (25998),de
23823 E1 53 pop hl
23824 7B ei
23825 C9 ret
```

Multiply
by S Muth

OPEN FORUM

Ovals

on BBC Micro

This program is for Model A or B.

What the program does is draw ovals. When you run the program you are asked for the width of the oval using the graphics planning sheet on page 495 of the user guide, then input the height. Ovals may be drawn on top of one another.

To clear the screen change 130 to *Goto* 40 after you have drawn one oval.

Bomber

on Dragon 32

Bomber is, as its name suggests, a program in which you have to bomb some nuclear reactors and thus devastate the enemy territory.

The reactors are the white cup shaped forms at the bottom of the screen, and to successfully destroy them your bomb must hit the bottom of it, not the sides. The ascending figure at the top left of the screen is the time you have taken, and the constant figure is the time you are allowed.

Take it easy with your bombs (which you release by pressing the spacebar, your only control), as each one puts the timer on by 20 units. When you have successfully bombed two sites, everything (including the timer) speeds up. When all sites are fallen you resume your task,

but with less time to complete it.

Sound easy? It's not. There is a cloud of pink radioactive dust hovering above the sites and if your bomb strikes it, it is rendered useless. You must aim for the break in the cloud for your bomb to get through.

Your score is calculated according to how long you have left in each screen. So hurry — and good shooting!

Program notes

10-110 SET UP VARIABLES
120-220 DRAW SCREEN
230-460 MOVEMENT LOOP
470-500 END OF SCREEN ROUTINE
510-630 END OF GAME ROUTINE

Variables

DD = Screen number

FS = Final score
SC = Number of bases intact
LIMIT = Time allowed for screen
TT = Timer
AERO = Aeroplane's position
CHECK = Check if a bomb is visible
BOMB = Bomb's position
BARR = Position of break in cloud barrier

The variables have been given easy to spot names so that those interested can dissect the program. Note the little trick used in line 210 where I have filled the sites with *Chr\$* (144) — a black square, the same as the rest of the screen but very distinct to the computer. All you need to do then is tell your Dragon to look for it, as I did in line 310. I would advise you to remember this little trick as it can come in very useful.

```
10 REM ****CIRCLE/OVAL****
20 REM *****BY*****
30 REM ****DAVID DALE****
40 MODE 1
50 UDU 29,640;512;
60 INPUT A,B
70 MOVE COS1*(A/2),SIN1*(B/2)
80 FOR X=1 TO 139 STEP 6
90 DRAW COSX*(A/2),SINX*(B/2)
100 SOUND 1,-15,255,0.25
110 NEXT
120 UDU 30
130 GOTO 50
```

Ovals
by D Dale

```
0 ****BOMBER*** (C) . A. DOWEY ***
15 **POPULAR COMPUTING WEEKLY**
20 DD=1
30 FS=0
40 SC=5
50 LIMIT=2250-250*DD
60 TT=0
70 POKE65494,0
80 CLS0
90 A=1024
100 AERO=1024+32
110 BARR=1024+252
120 FORI=224 TO 255
130 POKEA+I,239
140 NEXTI
150 FORI=454 TO 473 STEP2
160 POKEA+I,207
170 NEXTI
180 FORI=0T02
190 FORJ=486 TO 502 STEP 4
200 POKEA+I+J,207
210 POKE A+J-31,144
220 NEXTJ,I
230 **
240 TT=TT+1
250 IF TT>2250-250*DD THEN 510
260 PRINT@0,TT;"/";2250-250*DD;
270 IF CHECK=0 AND INKEY#="CHR$(32) THEN BOMB=AERG
+32;CHECK=1;TT=TT+20
280 IF CHECK=1 THEN POKE BOMB,128;BOMB=BOMB+32
290 IF BOMB>A+511 THEN CHECK=0
300 IF PEEK(BOMB)<>128 AND PEEK(BOMB)<>144 THEN
CHECK=0;PLAY"T10001CCCCC";BOMB=A+511
310 IF PEEK(BOMB)=144 THEN CHECK=0;POKE BOMB,223;
BOMB=A+511;SC=SC-1;PLAY"T10003CDEFGABAGFEDC"
320 IF SC=0 THEN PRINT@224,"YOU DID IT IN ";TT;
"TIME UNITS";SCREEN0,1;GOTO470
330 IF SC<4 THEN POKE65495,0
340 IF CHECK=1 THEN POKE BOMB,210
350 AERO=AERO+1
```

```
360 BARR=BARR-1
370 IF AERO>A+62 THEN POKEAERO-1,128;POKEAERO,
128;POKEAERO-3,128;POKEAERO-2,128; AERO=A+34
380 IF BARR<228+A THEN POKEBARR+1,239;POKEBARR+2,
239;POKEBARR+3,239;POKEBARR+4,2
39: BARR=BARR+23
390 POKE AERO-1,147
400 POKE AERO+1,147
410 POKEAERO-2,155
420 POKEAERO-3,128
430 POKE AERO,159
440 POKE BARR+4,239
450 POKE BARR,128;POKE BARR+1,128;POKE BARR+2,128
460 GOTO230
470 FS=LIMIT-TT+FS
480 DD=DD+1
490 FORYY=1T02000;NEXTYY
500 GOTO40
510 PRINT@233,"GAME OVER";:SCREEN0,1
520 FORYY=1T02000;NEXTYY
530 CLS8;PRINT@34,"YOU SCORED ";FS;" POINTS.";
540 IF FS>HS THEN HS=FS
550 IF HS=FS THENPRINT:INPUT"THATS THE HI-SCORE
WHAT'S YOUR NAME?";
560 CLS8
570 PRINT@34,"YOUR SCORE- ";FS;
580 PRINT@98,"HI-SCORE-> ";HS;
590 PRINT@162,"BY ";NAME#;
600 PRINT@452,"PRESS A KEY TO PLAY";
610 SCREEN0,1
620 IF INKEY#="" THEN 620
630 GOTO20
```

PROGRAM OF THE WEEK

Bomber
by Alison Dower

Map

on Vic20

This program allows the use of hi-resolution on the unexpanded Commodore Vic20. It uses the Vic's inbuilt facility for hi-res graphics.

The program will first draw a map (I hope everybody will recognise my country) and then will turn it in hi-resolution.

Will any British turn it to Great Britain? Just a bit of programming is necessary to do so. Good luck!

The program will first draw a map (I hope everybody will recognise my

Just a bit of programming is necessary to do so. Good luck!

```

5000 POKE52,24:POKE56,24:CLR
5010 PRINT"3"
5020 PRINT"      AB"
5030 PRINT"      CDE"
5040 PRINT"      FOQH"
5050 PRINT"      IJ0000KL"
5060 PRINT"      MNOP000000QR"
5070 PRINT"      SOTU0000000V"
5080 PRINT"      WX000000000Y"
5090 PRINT"      Z[0000000002"
5100 PRINT"      ]00000000~"
5110 PRINT"      |0000000"CHR$(34)
5120 PRINT"      @0000000%"
5130 PRINT"      &000000'"
5140 PRINT"      (000000)*"
5150 PRINT"      +000000,-"
5160 PRINT"      .000000/0"
5170 PRINT"      1000000023"
5180 PRINT"      4000000005"
5190 PRINT"      60000789:;"
5200 PRINT"      <=>07-0"
5210 PRINT"      |~"
5220 G=6144
5230 DIM C(52)
5240 FOR K=0TO 52:READ C(K):NEXT
5250 FOR R=0TO68
5260 READ A$
5270 FOR L=0TO7
5280 K=ASC(MID$(A$,L+1,1))-64
5290 IF K>26THEN K=K-102
5300 POKE0+8*R+L,C(K)
5310 NEXT:NEXT
5320 POKE36869,254
    
```

```

5330 GOTO5330
5400 DATA0,1,3,7,11,12,13,14,15,19,25,27,31,
      35,63,64,71,95,96,111,120,124
5410 DATA127,128,140,142,143,144,158,159,
      160,176,190,192,194,198,199,204
5420 DATA223,224,226,228,230,236,239,240,
      243,244,248,252,253,254,255
5430 DATA "00000000",AHLNNVVV,"00000W~",
      VVVNNVVV,"0X|00000","0000W|",00ABCHLV
5440 DATA "V0000000","|//| | |","^UTTUUN",
      "0ABC0AI","0W|0| |0","0000R\00"
5450 DATA 0000000A,0000000CQ,"000000W|",LLNLL
      LLL,"/000000","00|0|0X",BCHHCABC
5460 DATA "IΓ-00000","LZ\00000","XX000000",
      0AHBAAAA,"00000VVN","0\\| | |"
5470 DATA HBAAAA0A,"00000VHH","| | \\\\",HLJ
      BCB0B,"| | | |00X","\00000000"
5480 DATA 00000000,DBCC000A,"X0000\\|",A0000
      000,"00VKB00PS","|WWWY|_","CBMIICHH
5490 DATA " | |0000 | |",CB00000FF," |0000000",
      0000W|W",FF000HLL,"0 | |X0000",W00000000
5500 DATA LLNHLLLL,"00000 | | |",0WWW0000,LLLL
      LNN," | |000000","0000B~|00","NNNVVVV0
5510 DATA "0X00\\| |",0ABA0000,"00000 |X0",
      "0000B000","00L-NHHA","00 | |000X"
5520 DATA W0000000,NCCCC000,"00000VVN","0000
      0VLB","\\| | | | |",A0000000,"~0000000"
5530 DATA B0000000,"0VVVVNNB","\\| | | |W000"
    
```

Map
by C Aubry

Cassette

on ZX81

A program for the ZX81, or Spectrum with printer, with 16K of memory.

The Sinclair printer's paper is just the right width to fit into an ordinary cassette holder.

prompts within the program.

The program produces a sleeve to fit into a holder, printed on which are the main title, artist's name, and the song titles for both sides of the cassette. All inputted by

The sleeves can be used either for sound cassettes or computer programs. In both cases a collection of cassettes looks much neater if the sleeves are printed in this way.

```

1 REM SLEEVE PRINTER.
  P.HARLAND.
2 CLS
5 PRINT AT 11,0;"INPUT ARTIST
SIDE 1"
10 INPUT 0$
15 PRINT AT 11,16;"2"
20 INPUT U$
25 PRINT AT 11,0;"INPUT NUMBER
OF TITLES SIDE 1"
30 INPUT S0
35 PRINT AT 11,26;"2"
40 INPUT ST
45 LET Z=50
50 IF ST>50 THEN LET Z=ST
51 IF Z>18 THEN LET Z=18
55 PRINT AT 11,0;"INPUT TITLES
ON SIDE 1"
60 DIM O$(Z,15)
65 FOR F=1 TO 50
70 INPUT O$(F)
75 NEXT F
76 PAUSE 50
80 PRINT AT 11,21;"2"
85 DIM T$(Z,15)
90 FOR F=1 TO ST
95 INPUT T$(F)
100 NEXT F
105 CLS
110 PRINT AT 11,0;"INPUT MAIN T-
ITL SIDE 1"
115 INPUT A$
    
```

```

120 PRINT AT 11,22;"2"
125 INPUT B$
130 LET T=2
135 GOSUB 250
140 LPRINT 0$,U$
145 LPRINT "-----"
150 LPRINT
155 FOR F=1 TO Z
160 LPRINT O$(F),T$(F)
165 NEXT F
170 LET T=18-Z
175 GOSUB 250
180 LPRINT "SIDE 1) ";A$
185 LPRINT
190 LPRINT "SIDE 2) ";B$
200 LET T=12
205 GOSUB 250
210 CLS
215 PRINT AT 11,0;"PRESS (N/L)
FOR NEXT SLEEVE"
220 PAUSE 4E4
225 GOTO 1
250 FOR F=1 TO T
255 LPRINT
260 NEXT F
265 RETURN
    
```

Cassette
by P B Holland

GEM SOFTWARE

PROGRAMS FOR THE DRAGON 32

MONSTER MINE by W. E. MacGowan

Escape from the mine with as much money as you can, but don't get closed in or caught by the prowling monsters. An addictive machine code game, with superb graphics and save facility. Price £7.95.

GOLF by Pete Allen

Over 20K of Basic giving you full 18-hole golf course with handicaps, choice of clubs. Golfing weakness must be specified. Full colour graphics and sound, including score card. Price £7.95.

SPACE MISSION by W. E. MacGowan

Launch from lurid base, flight your way through the asteroid belt to do battle with the enemy fleet. Multi-level space combat game, sets new standards in graphic excellence and attention to detail. Price £7.95.

CHARACTER GENERATOR by John Line

A program for the programmer, allowing creation and saving of character sets/shape tables and subsequent inclusion into users basic program. Demonstration program and full ASCII character set included. Price £9.95.

GAMES PACK I

SPACE WARS by John Line. A game for two scout ship pilots. SHEEPDOG by Erik Pattison. Pen the wayward sheep, if you can! TORPEDO by Erik Pattison. Sink the enemy fleet. SNAKE by Chris Hunt. Eat the food but not yourself. Price £7.95.

GAMES PACK II

LANDING by Peter Chase. A 3-part flight simulator. HANGMAN by Chris Hunt. The old favourite, with lots of words. SPEEDBOAT by Peter Chase. Hit the markers, but not the bank! BATTLESHIPS by C. Castle. A classic game, with a difference. Price £7.95.

GAMES PACK III

REVERSEI. Pit your wits against the Dragon with this easy to learn yet extremely demanding game. Five skill levels from novice to grand master. PONTOON. An excellent implementation of a favourite card game in full colour with sound. Dragon is a mean Banker. Price £7.95.

LYNX PROGRAMS

Please write or phone for details. All available by mail order from:

GEM SOFTWARE

UNIT D, THE MALTINGS, SAWBRIDGEWORTH, HERTS

Telephone: (0279) 723567

TRADE ENQUIRIES WELCOME - PLEASE RING FOR DEALER PACK
Access orders welcome

ADVENTURES WITH OVER 4000 LOCATIONS

SPACE ADVENTURE ROLE PLAYING ADVENTURE SINGLE PLAYER ADVENTURE

Over 4000 locations on one adventure cannot be done on one tape! The first tape contains the graphics, the instructions, the preparation for travel and the first adventure. As soon as this first adventure is finished you can order the next part. Please note that every part gives you at least two if not four different exits.

You can stop the game any time you like. It is, however, not possible to skip parts because data are recorded and you need these to continue. There is always an option to continue when you have found an exit, thus allowing you to find all the exits in any one module.

TYRANT OF GRAHIM: an adventure in outer space. Try and find your way to the planet Shrahaim. The approaches are heavily guarded but if you can get through you will find eternal life and the conquest of the universe is yours. Maybe (but we doubt it) you will find the way to another universe, but only if you enter the right black hole . . .

TREASURES OF MOSHT: a single player adventure in the most fabulous country ever put on computer. Try and stay alive in a place where everything seems to go against you . . .

TRAVELS IN RASHAN: a role playing adventure situated on earth before the cataclysms which happened before the Precambrium era, some 600 million years ago. Travel through this ancient civilisation with its uncanny laws, stay alive and gather treasure. Then try and get back to your own time . . .

EACH ADVENTURE, Module 1, £4.50

Each further module also £4.50

Please add 50p per order for p&p

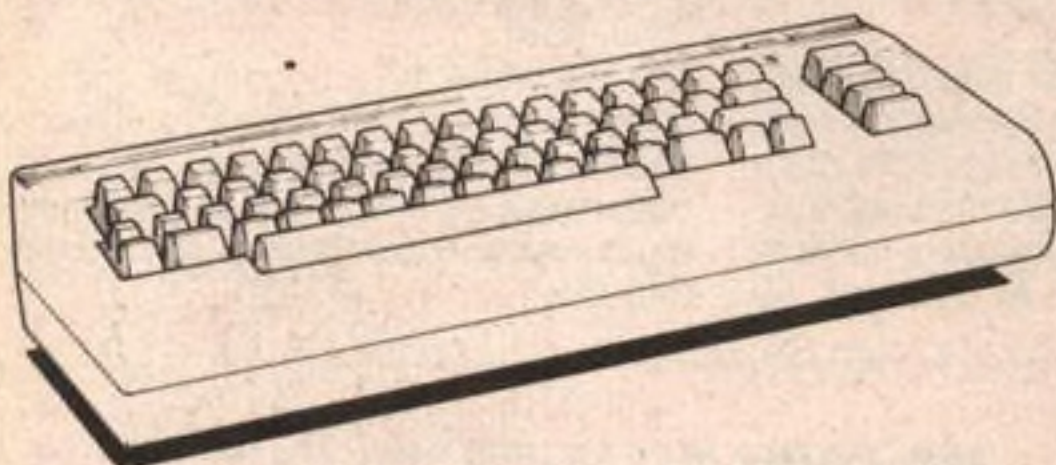
Available now for Spectrum 16K/48K and Atari 400/800

Available in May for Dragon and Oric-1

VENN SOFTWARE

133A High Street, Acton, London W3 6LY

SPECIAL OFFER



Vic-20 Computer £129.99 (incl. VAT)

The Vic Centre has London's most comprehensive range of Vic-20 and Commodore 64 hardware and software. Telephone or call at The Vic Centre, 154 Victoria Road, North Acton, London W3 (opposite North Acton tube station) just off the A40.

Telephone: 01-992 9904

Monday-Saturday 10.00am-5.00pm

VISA, ACCESS, AMEX

SOFTWARE FROM MR. CHIP

For the unexpanded VIC20

- QUACKERS** Step right up, and welcome to the shooting gallery £9.99
- KRELL** Defend the poor Zymwatts from the evil Tharg, but can you fend off his guardians £9.99
- ORBIS** Defend your Uranium fuel dumps, from invading Zylons by laying space mines in their path £9.99
- GALACTIC CROSSFIRE** Deadly Sligon phasers are above and below, firing at your land-craft £9.99
- ALIEN SOCCER** So you think you can play football? Play against the wierdest alien team £9.99
- SPACE PHREEKS** Voyage across the Universe and face many alien creatures known only as Space Phreeks £9.99
- ADVENTURE PACK** (Contains) Moon Base Alpha and Computer Adventure, £9.99
- DATABASE** Create your own custom files £7.50
- BANK MANAGER** Computerise your bank account £5.00
- CHARACTER EDITOR** With our own window facility £4.50
- M/C SOFT** machine code monitor and disassembler, any memory size £7.50

Full catalogue available on request.

CHEQUES/POs TO:

MR. CHIP, Dept HCW, 1 Neville Place, Llandudno Gwynedd LL30 3BL. Tel: 0492 49747

WANTED: GOOD QUALITY SOFTWARE, TOP ROYALTIES PAID

OPEN FORUM

Library

on ZX81

This is a program for all those who (like myself) gratefully snap up machine code subroutine listings in magazines such as your own to incorporate in other programs. This program allows you to set up a library which will alphabetically list the routines available and allow you to sample them within the library program.

PCW includes a subroutine on how to draw boxes in its October 7th issue. To put this into your library, load the program, request *Add*, and make an entry which reads: BOXES: PCW, 07.10.82 : 16514
Now input M/C and the ZX will ask you for a starting address for the hexloader. Input the address included under the entry above, and enter the machine code in the usual way. When you next *View* the library, an entry of 16514 will draw the box.

Program notes

Lines 1-9 are to hold machine code as required. Lines 10-240 are a standard bubble sort, modified by lines 250-390 which allow the original set of items to be increased on future occasions. Lines 550-560 allow the 5 digit address forming part of the library listing to call the required subroutine. Lines 1020-1110 form a standard hex-loader.

1 REM
2 REM These lines should contain as many full stops as you can bear to put in.
3 REM

```

10 PRINT "TO SET UP A NEW FILE, INPUT
    ""S/U"" "
11 PRINT "TO ADD FURTHER ITEMS, INPUT
    ""ADD"" "
12 PRINT "TO VIEW CONTENTS, INPUT
    ""VIEW"" "
13 INPUT QS
14 IF QS = "S/U" THEN GOTO 19
15 IF QS = "ADD" THEN GOTO 250
16 IF QS = "VIEW" THEN GOTO 221
17 GOTO 13
18 STOP
19 INPUT X
20 CLS
22 PRINT X ; " ITEMS"
25 LET J = 0
30 DIM AS(X,32)
40 FOR N = 1 TO X
50 INPUT AS(N)
60 PRINT AS(N)
70 NEXT N
155 FAST
160 CLS
165 FOR N = 2 TO X
170 IF AS(N-1) > AS(N) THEN GOSUB 185
175 NEXT N
180 GOTO 205
185 LET Z$ = AS(N-1)
190 LET AS(N-1) = AS(N)
195 LET AS(N) = Z$
200 RETURN
205 FOR N = 2 TO X
210 IF AS(N-1) > AS(N) THEN GOTO 165
215 NEXT N
220 SLOW
221 CLS
225 FOR N = 1 TO X
230 PRINT AS(N)
235 NEXT N
240 GOTO 500
250 INPUT Y
251 LET j = 1
255 PRINT Y ; " MORE ITEMS"
260 DIM BS(X+Y,32)
270 FOR N = X+1 TO X+Y
280 INPUT BS(N)
290 PRINT BS(N)
300 NEXT N
305 CLS
310 DIM CS(X+Y,32)
312 FOR N = 1 TO X
315 LET CS(N) = BS(N)
370 NEXT N
380 LET X = X + Y
381 DIM AS(X,32)
382 FOR N = 1 TO X
383 LET AS(N) = CS(N)
385 NEXT N
390 GOTO 155
500 PRINT AT 17,0 ; "TO ADD MORE ITEMS,

```

```

INPUT ""ADD"" "
510 PRINT "TO SELECT ITEM, INPUT 5 — DIGIT
    CODE"
515 PRINT "TO ENTER M/C CODE,
    INPUT ""M/C"" "
520 INPUT Z$
530 IF Z$ = "ADD" THEN GOTO 250
540 IF Z$ = "M/C" THEN GOTO 1000
550 IF LEN Z$ = 5 THEN LET Z = VAL Z$
560 RAND USR Z
570 GOTO 500
999 STOP
1000 CLS
1010 IF J = 0 THEN LET K = 16514
1020 PRINT "START ADDRESS?(FIRST FREE
    BYTE = "K;")"
1030 INPUT K
1040 LET IS = ""
1050 LF IS = "" THEN INPUT IS
1060 POKE K, 16 CODE IS + CODE IS(2) - 476
1070 PRINT AT 20,0 ; K ; " ; IS(TO 2)
1080 K = K + 1
1090 SCROLL
1100 LET IS = IS (3 TO)
1110 GOTO 1050

```

Library
by T. Gale

Kaleidoscope

on Spectrum

The screen slowly fills with dots, meanwhile, the computer happily beeps away. The dots are randomly placed but it mirrors the dot opposite.

```

1 BORDER 1: PAPER 1:
  INK 7
2 PRINT FLASH 1;INK,
  6; "KALEIDOSCOPE"
10 LET N=INT
  (RND*500)+1000
20 FOR A=1 TO N
30 LET V=INT (RND*
  150)
40 LET H=INT (RND
  *210)
50 LET RV=21+(100
  -V)
60 LET RH=31+(1209
  -H)
65 BEEP .100,7
70 PLOT H,V 1
80 PLOT RH,V 1
85 BEEP .100,3
90 PLOT RH,RV
100 PLOT H,RV
110 NEXT A
120 PAUSE 9999

```

Kaleidoscope
by D Wallin

Cruising Challenge

£10 to
be won

Can you beat
the new
high score?

First there was *Space Invaders*, then there was *Pacman* — now there is *Cruising*. This all-action, machine code, arcade type game, will test your powers of co-ordination to the limit. Never before has a game asked you to think so quickly, or move so fast.

Achieving a high score on *Cruising* takes considerable skill, and not a little practice. Getting through the first four levels is not easy, and that's just the beginning.

Now you can make that skill work for you. *Popular Computing Weekly* is offering £10 each month to the player with the highest score on *Cruising*. All you have to do to enter this month's competition is send a print-out of your highest score, together with your name and address, to:

Popular Computing Weekly
Cruising Challenge
Hobhouse Court
19 Whitcomb Street
London WC2 7HF

Each month we will publish the name of the winner and the new *Cruising* high score. Are you good enough to accept the *Cruising Challenge*?

The highest score sent in so far this month is 7743 from *Martin Shepherd* of 76 Dulverton Avenue, Westcliffe-on-sea, Essex. If you have a higher score, you could still win this month's £10 — but hurry, entries close on March 31.



Notes

- 1) Each entry must consist of a ZX printout and your name and address.
- 2) Closing date for this month's *Cruising Challenge* entries is March 31.
- 3) The highest score each month will receive £10.
- 4) High scores cannot be transferred from one month to another.
- 5) The judges' decision is final.
- 6) No employees of Sunshine Publications Ltd, or their families, will be eligible to enter the *Cruising Challenge*.
- 7) *Cruising (on Broadway)* for the 16K and 48K ZX Spectrum is available through W H Smith and leading computer stores for just £4.95. It is also available mail-order from Sunshine Books Ltd, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

DRAGON 32 SOFTWARE

EDITOR/ASSEMBLER+MONITOR
Assembler functions include ORG, FC8, FDB, FCC, EQU, RMB and Hex or Decimal addition/subtraction. The ASSEMBLER is of the Two pass Global type. Monitor contains useful routines enabling the user to write and run machine code programs. Supplied on cassette + user manual £27.65

D.G.T.1
Contains five super games. OTHELLO, BREAKOUT, AWARI, MOONLANDER and RAFFLES.

Fascinating entertainment for all the family. Only £5.75

D.G.T.4 M/code.
PTERODACTYL. Destroy all the Eggs before they hatch. Beat off the attacking PTERODACTYLS.

TORPEDO RUN. Similar to the ARCADE version. 3D perspective. Ships further away give higher points.

HORNETS. Very fast game. Kill the HORNETS as they emerge, but beware when any they

swoop down firing 'stings'. All three games only £6.95

DISASSEMBLER
The ideal tool to have around. Disassemble the BASIC to see how it works. Make use of subroutines, etc.

Supplied on cassette £11.85

D.G.T.2
M/Code games. **SNAKES.** Kill them before they kill you. Up to 12 giant snakes at one time.

LANDER. Land your craft on the Lunar surface.

INVADERS. 35 Invaders, mother ship, 3 defenders, 9 skill levels. All three games in HI-RES + sound. £6.95

CHESSE M/Code.
8 Selectable levels of play. HI-Resolution display of board and pieces. Cursor control 'move' selection. Specific pieces may be set up to solve chess problems.

Supplied on cassette + instructions. £7.95

ALL ORDERS INCLUSIVE. SAME DAY DESPATCH. SEND S.A.E. FOR LIST
J. MORRISON (MICROS), 2 GLENSDALE STREET, LEEDS LS9 9JJ

Callers welcome please phone (0532) 480987

M & J SOFTWARE

DRAGON COMPANION BOOK £4.95

Study the workings of BASIC with the disassembler
Discover 7 extra graphics modes
Take complete control of video memory mapping
Increase the processor speed (not a hardware mod)
Append programs from tape
Incorporate useful routines from BASIC in your machine programs
Add commands to BASIC

DRAGON IMPLEMENTATION OF FORTH £15.00

This is a cassette based implementation and is fully documented

FORTH LISTINGS £7.00

6502, 8080/Z80, 6809, 6800, 1802 in stock

INSTALLATION MANUAL £5.00

Necessary for implementing FORTH and its editor

All prices inclusive of postage and packing
Cheques and POs made payable please to:

M & J SOFTWARE

34 Grays Close, Scholar Green, Stoke-on-Trent ST7 3LU
Tel: (0782) 517876

VICTAGRAPH

VICTAGRAPH PLOT WINDOW is produced with silk screened details onto clear PVC sheet with easy to read calibrations and numbers on each side, leaving a large area clear for your designs. A thicker sheet in white is provided as a base.

NOW AVAILABLE FOR

ZX SPECTRUM

A SPECIAL window has been developed to find Spectrum's DRAW offset co-ordinates. Place your drawing in the Victagraph and you are ready to PLOT using the window mask and DRAW using the offset co-ordinate window, with it's EASY FINDER designed to make Spectrum's negative and zero numbers quicker to program. PLOT, DRAW, CIRCLE is easy with VICTAGRAPH PLOT WINDOW.



ZX SPECTRUM

Spectrum total price £7.50 inc p&p in tube.
Atari 4/800 .. £7.00 ..
Cheque payable to Victa Ceramics.

VICTA CERAMICS (ZAP), 6a BOW STREET, RUGELEY, STAFFS. WS15 2BT. UK ONLY
Tel: 08894 (2426) UK ONLY

SOUND & VISION

The monthly home entertainments fair

FROM EDISON TO SINCLAIR
EVERYONE WILL MEET THERE

SUNDAY MARCH 27 10 am—5 pm
Hempstead Valley Shopping Centre
Gillingham, Kent

Admission and parking free : STALLS FROM £10
Organisers: Tel: Maidstone (0622) 76506/7
Organisers — Tel: Maidstone (0622) 76506/7

BUSINESS or GAMES SOFTWARE REQUIRED

Reliable, original software required for
VIC20 / CBM64 / ZX81 / SPECTRUM

Copyrights either purchased for cash
or high royalties paid

Send samples for prompt evaluation and payment to

Jeff Sears, Navajo Software
28 Strathmore Drive
READING, Berks RG10 9QT

TEMPEST SOFTWARE

PRESENTS:
SPACE
CITY
DEFENDER

ADDRESS: TEMPEST SOFTWARE,
BECCLES ROAD,
HALESWORTH,
IP19 8NG

(DELIVERY BY RETURN OF POST)

BBC Micro 32K

VIEW THE 'SPACE CITY' as the onslaught of marauding Aliens descend upon it. Defend it with your Stratoblaster Shuttle. A superb game/simulation, both graphically and audibly, each fleet of Aliens has its own colour, sound and movement. Features include: more than 30 different types of Aliens, full hiscore, tunes, amazing sound effects, extra life every 10,000 points scored, and brilliant mode 2 colour graphics.

This game utilises the BBC 'B's amazing capabilities, pure addiction!!!
For the BBC model 'B' or 'A'+32K

Price: £6.95 (Disk)

£4.95 (Cassette)

Price includes VAT and P&P.

(Disk version includes total graphical instructions)

"AND WHERE THE DRAGON'S TEETH
FELL ARMED MEN SPRANG UP"

Dave Town and Keith Nathan announce

SON OF DRAGON BYTE

LAST CHANCE

10 ASH ROAD, HEADINGLEY
LEEDS 6

Tel: LEEDS 744235

A LOT MORE ROOM FOR A LOT
MORE COMPUTER SOFTWARE,
BOARD GAMES AND BOOKS

THE NATIONAL ASSOCIATION OF VIC20 OWNERS

A USERS GROUP DEVOTED TO THE SERIOUS OWNER

- Software Library. The best programmes on the market, for hire from 40p per fortnight (All programs lent with full manufacturers guarantee).
- Monthly newsletter packed with all the relevant information concerning the Vic20.
- Monthly gamestape. Five top quality programmes on cassette.
- Programme swap service. No charge for swapping programmes.
- Free information and advice.

Annual subscription to this unique club is £10 (£6 for under 16s).

Send cheques/POs (payable to The NAVO) stating name, address, hardware and software interests, to:

The NAVO
21 CHACELEY WAY, SILVERDALE
NOTTINGHAM

Or SAE for further details

Tony Bridge's Adventure Corner



Swamped!

Last week, we saw an adventure, written for the Atari machine, that relied mostly on graphics for its appeal. Now let's put the Sinclair ZX81 to the test, and see how it faces the challenge of graphic adventuring.

While traditional adventure games rely mostly on the "logical" approach, "graphic" adventures require a more basic response from the player — a response from the reaction level, rather than the intellectual. This is not to say that they do not test the player's reasoning powers — they often do — but that reflexes are probably more important. All generalisa-

tions, of course, can be proved to have one or two exceptions.

Let's consider a couple of the earliest programs to be offered by Sinclair's catalogue. Psion, before it became one of the first independents to come under the Sinclair banner, produced a little tape containing two adventure programs, *Sorcerer's Island* and *Perilous Swamp*. They are both "graphic" adventures, and illustrate two different facets of the genre.

Perilous Swamp is a pure board game, taking place on an unchanging map, using the chunky graphics of the ZX81 to delineate the landscape. Somewhere on the board is located the Princess, and your "X's" task is to rescue her and bring her off the board at the Exit. You may not move over the grey (swamp) squares.

The adventurer is catered for by the monsters that are met at every other move. You must do battle with these — or bribe them into ignoring you! You will find that your Life Points ebb away each time you move. The only way to get out of the swamp is by planning your moves well in advance, to use the least number of steps. Quickly played, and addictive.

Sorcerer's Island is a much more complicated program. You are put down somewhere on a mysterious island, and your task is to find the Sorcerer's secret. A map of the whole island is available to you, and the immediate surrounding landscape is always on display as you move about.

At every move, it seems, a monster, be it

Dragon or Balrog, confronts you. A decision must be made to fight, run or bribe your way out of trouble. Bribing is accomplished with the various bits of treasure you are always stumbling across. Unfortunately, your staggering around the island is not unlimited — your Life Points, as in *Perilous Swamp*, decrease each time you move. There is, however, a little hut to which you may return if you feel faint.

Although the drawing of the map at each move is rather slow, and neither program is of arcade quality, nevertheless, these are two very good programs, and very good value for money at £4.75 for the pair. Recommended as a change from the more cerebral adventures. Another look at "graphic" adventures at a later date.

In the meantime, keep your ideas, views, likes and dislikes coming in — I hope to start giving them an airing soon. Don't forget: *Orc is just another name for ... AAARRRGGGHHH!*

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*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

WANTED URGENTLY

Arcade-type games programmes for Spectrum, ZX81, Vic20, Oric, Dragon, BBC Micro and Lynx.

We pay top royalties or buy your copyright for cash. National mail order and dealer sales ensure you get the best reward for your genius.

Write or call into

NORTHWISH LTD

THE GROUND FLOOR, RALLI BUILDINGS
STANLEY STREET, MANCHESTER
M3 5FD

or Phone 061-832 9143



We Pay Hard Cash for Software

ZX81 GRAPHICS

ZX81 GRAPHICS STARTER PACK £4.95
Four 1k Graphics programs on cassette with twelve page illustrated explanatory manual.

ZX81 (16k) MULTIGRAPHICS £6.90
Cassette and 20 page illustrated manual.
Prepare screen displays mixing graphics (created with an 8-directional sketch pad) and 3 sizes of text, including lower case lettering. Animation. Two SAVE procedures, output to ZX Printer etc.

"An outstanding program ... I am discovering more in it all the time." Dr. B. L., London.

Send s.a.e. for further details.
From leading computer stores or by mail order
Prices all inclusive. Full money-back guarantee

Dept. PZ, BRIDGE SOFTWARE,
36 Fernwood, Marple Bridge,
STOCKPORT, Ches. SK6 5BE

Bridge
Software

GAMES CENTRE

THE LARGEST SELECTION
OF GAMES IN THE WORLD

We stock the BIG NAMES
in Computers including

ATARI 400/800
SINCLAIR ZX 81
ZX SPECTRUM
VIC-64
DRAGON MICRO
and a wide range of
independent
SOFTWARE

Main Computer Branches: 22 OXFORD STREET, London W.1.
439 OXFORD STREET, London W.1.
52 WESTERN ROAD, BRIGHTON.

Also at: 184 REGENT STREET, London W.1.
254 REGENT STREET, London W.1.

ZX81, SPECTRUM, DRAGON BBC AND VIC SOFTWARE LENDING LIBRARY

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

£5 for life membership (less than the cost of a single game) brings you the Software Lending Library membership kit including catalogue, news letter and free hire of 1st programme/game.

All tapes lent with full manufacturers permission.

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

MONSTER SOFTWARE CLUB SOFTWARE LIBRARY FOR THE DRAGON 32

OVER 70 TOP-QUALITY CASSETTES FOR HIRE. ALL TAPES USED WITH THE MANUFACTURERS PERMISSION (WE PAY ROYALTIES)

ANNUAL MEMBERSHIP FEE £8.00

Tape hire £1.50 per fortnight plus 40p p & p (this includes a pre-paid return envelope)

SPECIAL TRIAL OFFER

3 months membership for just £3.00

PLEASE NOTE: Two tapes may be hired at the same time Further tapes by return post

SAE for details

MONSTER SOFTWARE CLUB

32 LENNOX DRIVE, LUPSET PARK,
WAKEFIELD, WEST YORKS

DON'T MISS THIS INCREDIBLE OFFER! 50 GAMES



YES, 50 GAMES! on cassette for all the following:

FOR YOUR MICRO

GALACTIC ATTACK	MAZE EATER	SUBMARINES
SPACE MISSION	ORBITTER	ROCKET LAUNCH
LUNAR LANDING	MOTORWAY	PLANETS
PLASMA BOLT	FORCE FIELD	BLACK HOLE
STARTREK	NIM	DYNAMITE
RADAR LANDING	TUNNEL ESCAPE	DO YOUR SUMS
ATTACKER	BARREL RAMP	DERBY DASH
GALACTIC DOGFIGHT	CANNONBALL BATTLE	SPACE SEARCH
ZION ATTACK	OVERTAKE	UNIVERSE
INVASIVE ACTION	SITTING TARGET	RATS
OXO	SMASH THE WINDOWS	TANKER
BOGGLES	SPACE SHIP	PARACHUTE
PONTOON	JET FLIGHT	JETMOBILE
SKI JUMP	PHASER	HIGH RISE
HANGMAN	INTRUDER	THE FORCE
OLD BONKS	INFERNO	EXCHANGE
THIN ICE	GHOSTS	

Sinclair
SPECTRUM
ZX81 LYNX
DRAGON
ATARI VIC-30
Apple (ON DISC & CASSETTE)
ACORN-ATOM
BBC A/B
SHARP
ORIC-1
NEW BRAIN

CASCADE SOFTWARE
CASCADES HOUSE
BARGAN'S LANE
LLANDOGO
GWENT
S.WALES
NP54PA

SUPPLY CASSETTE 50 FOR _____ COMPUTER
I enclose cheque/P.O.

Name _____
Address _____

Mail order only.

ORDER NOW!

BUGBEAR

EASIREADER
THE GREATEST PROGRAMMING
AID SINCE FINGERS
CUT DOWN PROGRAM
ENTRY TIME

Over 99% of bugs in programs copied from printout listings are the result of entry errors. The EASIREADER holds copy at a comfortable angle and a specially-designed cursor runs down the program to prevent skipping between complex and similar-looking lines. It effectively keeps a 'finger' on your current line — essential for use with SINCLAIR computers or when using the 'shift' key. Available now only from BUGBEAR (Patent Pending No. 8232718) at an introductory price of £12.99 (plus £1.25 p&p). SAE for further details

Cheque/PO to: BUGBEAR, Dept W, Nicholson Buildings, Templetown, South Shields, Tyne and Wear, NE33 5RZ.

£££s TO BE WON WITH
SUPER DRAGSTER
BBC MODEL B
(32K MODEL A)

For 1 or 2 players. Design your DRAGSTER and race it against a friend or the computer. Too heavy — it won't move! Too clumsy — it crashes! Revving engines, crash noises, hiscore and victory tune — superb sound and graphics.

BEWARE THE SUPER DRAGSTER! What is it? Beat the computer — if you can — and find out. Great game with cash prizes. Competition details with each program. Previous knowledge of dragsters not required. A winner every month — it could be you. Only £5.95 inc p&p.

Watford Technical Books

Available Now

COMPUTE!'S FIRST BOOK OF VIC

Programs, hints, tips, applications, utilities, games, graphics techniques, etc. from the pages of Compute! Magazine, plus articles previously unpublished. Just £11.95 including p&p. Phone orders welcome.

105 St Albans Road, Watford WD1 1RD

(2 minutes from Watford Junction Station)

Tel: Watford (0923) 23324



DRAGON SHARP MZ 80K

NEW! TEXT ON HIGH-RES GRAPHICS FOR DRAGON

A 2.5K sub-routine that produces text of all sizes and colours in any mode or high-res graphics. Easy to use directly from the keyboard and allowing full use of inkey\$, print at and numeric variables. £7.95

WANTED URGENTLY

Dragon, Oric and Lynx programs, we pay excellent royalties or purchase the copyright for cash.

Maths Tutor — A set of programs for teaching maths to children (3-10 yrs) £5.00

Games Packs £5.50 each

(1) Bowling, UFO, Muncher, Micropoly, Mastermind. (2) Race-Chase, Depth Charge, Motor Cross, Glorious 12th, Canyon Bomber. (3) Tank Battle, Reaction Time, Blind Maze, One Man and His Dog, Life.

Adventure programmes:

Devils Triangle — Sail to Bermuda but avoid the Devils Triangle where anything can happen. £5.00. **Earth Rescue** — Search the Universe for a rare mineral needed for Earth survival — space action. £5.00. **Desert Patrol** — Cross the desert if you can! £4.00. **King of the Valley** — Try to rule a kingdom and its people. £3.00. **Business** — Mailing List £15.00, Payroll £25.00, Stock Control £15.00, Home Finance £7.00, Tax Calculator £4.00. Many more programs available SAE for details.

ABACUS SOFTWARE

20, Rhoselagh Ave, Sharncliffe Park, Bolton BL1 6PP

Telephone: 0704 52726

BUSINESS EDUCATION LTD

We BUY and SELL

SECOND-HAND AND NEW MACHINES

RENTAL OPTION available

Phone: 636 9612 Martin Foreman
103 Great Russell Street, London WC1

COMPUTER BOOKS

FOR VIC, DRAGON, SPECTRUM, BBC, APPLE, ETC
OVER 200 TITLES AVAILABLE

Write or ring for complete list and details of our mail order service

Weston Computer Tapes Centre

2 HILLEN, KEW STOKE ROAD, WORLE, WESTON-SUPER-MARE
TELEPHONE (0934) 513430

Through the looking glass

Peter Donn presents a short program to show how light passes through a convex lens.

This program is written for the BBC (any model) and demonstrates how light rays pass through a convex lens. The focal length, object distance from lens, image distance from lens, height of the object and height of the image are constantly displayed.

All these can be altered individually using the function keys (see diagram for details).

A ray diagram is also constantly displayed on the screen. The key to the display is as follows:

Red vertical line = Object
 Green vertical line = Image
 Yellow horizontal line = Principal Axis
 Yellow vertical line = Convex lens

The remaining green lines represent selected light rays.

The program also shows the state of the image visually, whether it is real, vertical, upright or inverted. All measurements are taken in 'units' which can represent whatever you want.

The program can be very useful in education, being part of the Physics 'O' level syllabus.

INCREASE OBJECT DISTANCE
DECREASE OBJECT DISTANCE
INCREASE OBJECT HEIGHT
DECREASE OBJECT HEIGHT
DECREASE FOCAL LENGTH
INCREASE FOCAL LENGTH

```

10 REM LIGHT BY PETER DONN '82
20 *TV 255
30 *KEY 0 a
40 *KEY 1 b
50 *KEY 2 c
60 *KEY 3 d
70 *KEY 4 e
80 *KEY 5 f
90 F=100:O=100:OD=200
100 @%=&00000020A
110 IF OD<1 OD=OD+10:GOTO 330
120 IF O<0 O=0
130 MODE5
140 VDU19,0,4;0;
150 FOR C=1 TO 3:VDU19,C,4;0;:NEXT
160 COLOUR3
170 MOVE0,512:DRAW1280,512
180 MOVE640,312:DRAW640,712
190 GCOL0,1
200 MOVE(640-OD),512:DRAW(640-OD),0+512:
    GCOL0,2:DRAW640,0+512
210 IF OD-F=0 THEN 430
220 ID=(F*OD)/(OD-F)
230 MG=(ID/OD)
240 IYC=512-(MG*O)
250 DRAW ID+640,IYC
260 DRAW 640+ID,512
270 MOVE 640-OD,512+O:DRAWID+640,IYC
280 FOR C=1 TO 3:VDU19,C,C;0;:NEXT
290 PRINT CHR$80,"FOCAL LENGTH :";F/10;
    "OBJECT DIS. :";OD/10
300 IF OD-F=0 PRINT"IMAGE DIS. :INF." ELSE
    PRINT "IMAGE DIS. ";ID/10
310 PRINT "HEIGHT OBJECT:";O/10
320 IF OD-F=0 PRINT"HEIGHT IMAGE :NONE"
    ELSE PRINT"HEIGHT IMAGE :";
    ; -MG*O/10
330 *FX 15,1
340 A$=GET$
350 IF A$="a" OD=OD+10
360 IF A$="b" OD=OD-10
370 IF A$="c" O=O+10
380 IF A$="d" O=O-10
390 IF A$="e" F=F-10:IF F<0 F=F+10
400 IF A$="f" F=F+10
410 GOTO 110
420 END
430 X=640:Y=-(O*X/F)+O
440 DRAW X+640,Y+512
450 MOVE 640-OD,0+512:DRAW X+640,(Y-F)+512
460 GOTO 280
    
```




Richard Shepherd Software

Rid the world of the Transylvanian Terror before he introduces you to the dark world of the living dead in...

Transylvanian Tower

A spectacular 3-D maze adventure
for the 48K Spectrum only £6.50

"Enthralling and addictive"... Popular Computing Weekly
"Addictive"... Sinclair user

Now available from W. H. Smith*



Phone 0628 21107 for instant credit card orders

Richard Shepherd Software, Freepost, Maidenhead, Berks SL6 5BY.

Dealer enquiries welcome

* Selected computer branches only

Sound and vision

Deborah Annette completes her two-part series on m/c with a sound and print controller.

Sound Controller

The Basic call to *Beep* function is located at address 1016. To program the computer to produce sound from the internal speaker you need to make a call to address 949 where variables such as pitch and duration of note can be entered directly in *h* and *de* rather than from the stack. Using the machine code loader from last week try the following:

```
LD HL NN 33 100 1 PITCH
LD DE NN 17 150 3 DURATION
CALL NN 205 181 3 CALL TO ADDRESS 949
RET 201 RETURN TO BASIC
```

The Rom routine at address 949 uses the IX register and also contains *Disable Interrupt (DI)* and *Enable Interrupt (EI)* as the first and last commands. Only the sound function is enabled — all other activities stop.

This routine may be coupled with the keyboard controller (*Popular Computing Weekly*, March 17-23) to indicate that an acceptable entry has been received. For example:

```
RST 56 255
LD A (NN) 58 8 92
CP N 254 119
dp N2 DIS 32 248
LD HL NN 33 100 0
LD DE NN 17 150 0
```

```
CALL NN 205 181 3
RET 201
```

will only respond to depressing the *W* key and will *Beep* an indication that it has done so. This can of course be extended to include a range of keys if necessary and is a very useful 'mug trap'.

Multiple *Beep* calls may be used to produce a range of notes, but require the registers to be saved before the call to *Beep*. For example:

```
LD BC NN 1 30 6 Reduction in Pitch —
                          Number of notes
LD HL NN 33 255 0 Pitch
LD DE NN 17 100 2 Duration
PUSH HL 299
PUSH DE 213 Save Registers
PUSH BC 197
CALL NN 20 181 3 Call BEEP
POP BC 193
POP DE 209 Recover Registers
POP HL 225
LD A L 125
SUB C 145 Decrease Pitch
LD L A 111
DJNZ DIS 16 242 Next Note
RET 201 Return to BASIC
```

Print Controller

As the Spectrum memory map is non-sequential (see how the Psion logo is built up when running the *Horizons* tape), it is

not possible to *Poke* user defined graphics (UDG) or characters to a specific screen location using normal machine code methods. With the Spectrum the *Rst 16* function must be used for this purpose.

First, the accumulator is *Loaded* with the function to be performed (see Table 1) and then the value of the function. Note: *Rst 16* uses the alternative set of registers (you were able to use these registers in ZX81 machine code routines — you cannot with the Spectrum).

Enter program one. It prints a green coloured hash on a red square towards the bottom left-hand side of the screen. You may alter the values of variable '*d*' and '*e*' to correspond to any colour you wish (0-7) and the variables '*b*' (0-31) and '*c*' (0-20) to any position you require on the screen. Character changes are effected by altering the variable '*h*'. See pages 183 to 188 of your Sinclair manual for suitable alternatives.

Program two combines keyboard control, sound and graphics with colour. The program operates by waiting for you to press the '*x*' key, then it sounds a low note, prints six colours and characters in a row and then sounds a high note.

- 16 INK
- 17 PAPER
- 18 FLASH
- 19 BRIGHT
- 20 INVERSE
- 21 OVER
- 22 AT
- 23 TAB

Table 1

				REMARKS
LD HL NN	33	0	35	CHARACTER
LD DE NN	17	2	4	PAPER
LD BC NN	1	16	4	DOWN
LD A N	62	16		SET FOR INK
RST 16	215			
LD A D	122			INK (D) INTO A
RST 16	215			
LD A N	62	17		SET FOR PAPER
RST 16	215			
LD A E	123			PAPER (E) INTO A
RST 16	215			
LD A N	62	22		SET AT
RST 16	215			
LD A C	121			DOWN (C) INTO A
RST 16	215			
LD A B	120			ACROSS (B) INTO A
RST 16	215			
LD A H	124			CHARACTER (H) INTO A
RST 16	215			
RET	201			RETURN TO BASIC

PROGRAM 1

Turn to page 30

ADDRESS	MNEMONIC	MACHINE CODE	REMARKS
23760	RST 56	255	PUT LAST KEY PRESSED INTO ADDRESS 23560 COMPARE WITH 'X' NO TRY AGAIN
	LD A (NN)	58 8 92	
	CP N	254 120	
	JP NZ DIS	32 248	
23768	LD HL NN	33 100 0	PITCH
	LD DE NN	17 150 0	DURATION
	CALL NN	205 181 3	SOUND SPEAKER
23777	LD HL NN	33 6 35	NO OF TIMES LOOP CHARACTER PAPER INK DOWN ACROSS
	LD DE NN	17 0 0	
	LD BC NN	1 16 2	
23786	PUSH BC	197	SAVE REGISTERS
	PUSH DE	213	
	PUSH HL	229	
23789	LD A N	62 16	SET FOR INK
	RST 16	215	
	LD A D	122	
	RST 16	215	
23794	LD A N	62 17	SET FOR PAPER
	RST 16	215	
	LD A E	123	
	RST 16	215	
23799	LD A N	62 22	SET FOR AT
	RST 16	215	
	LD A C	121	
	RST 16	215	
	LD A B	120	
	RST 16	215	
23806	LD A H	124	
	RST 16	215	
23808	POP HL	225	
	POP DE	209	
	POP BC	193	
23811	INC B	4	NEXT POSITION ACROSS CHANGE PAPER COLOUR CHANGE CHARACTER DECREASE LOOP COUNT
	INC E	28	
	INC H	36	
	DEC L	45	
23815	JP NZ DIS	32 225	DONE NO NEXT PITCH DURATION SOUND
	LD HL NN	33 50 0	
	LD DE NN	17 0 3	
	CALL NN	205 181 3	
23826	RET	201	RETURN TO BASIC

Program 2



On the trail . . .

Keith and Steven Brain show you how to add cursor control to your own programmes

At the left and right hand sides of your keyboard are the four cursor control ("arrow") keys which are very useful for controlling left and right, and up and down, movement in games. Only 'up' and 'left' are displayable characters (*Chr\$(126)* and *Chr\$(127)*). While the 'up' arrow can be practically used in a string comparison like:

```
10 IF A$=" " THEN . . .
```

the 'left' arrow can only be obtained by *Shift (Up Arrow)* so really they are best forgotten!

In general, the cursor keys are only used in programs by looking for their ASCII codes.

ASCII codes for cursor keys

	shift not pressed	shift pressed
left arrow	8	21
right arrow	9	93
up arrow	94	95
down arrow	10	91

The codes are different depending on whether you are in upper or lower case, and to avoid chaos in your games by accidentally moving into the wrong case, a 'belts and braces' approach which checks for both is best!

Mapping it out

Movement around the screen must take into account how the screen is organised ("mapped"). The Dragon text screen consists of 16 lines, each of 32 characters. It is mapped sequentially from 0 to 511 (starting from the top left corner and returning to the left of the screen at the start of each new line).

Let's start at point *P* in the middle of the screen (position 238) and think about moving left and right. All we need to do is subtract one from *P* or add one to *P* each time you press that key:

```
110 P=238
120 PRINT @ P,"*";
140 AS=INKEY$:IF A$=" " THEN 140 ELSE
A=ASC(A$)
150 IF A=8 OR A=21 THEN P=P-1
160 IF A=9 OR A=93 THEN P=P+1
290 GOTO 120
```

If you try that, you'll notice that if you go on far enough you move onto the line above or below.

Going the long way round is rather pointless, so let's turn our asterisk into a "turtle" which will move immediately at our command, in any of the four directions, leaving a trail behind him. To move up and down a line directly you simply subtract from, or add 32 (line length) to, *P* in the same way:

```
170 IF A=94 OR A=95 THEN P=P-32
180 IF A=10 OR A=91 THEN P=P+32
```

Doesn't that give you a feeling of power as the poor little asterisk is forced to move wherever you send it! But watch out, if you stray too far, your turtle will fall victim to an *Fc Error* as only values of *P* from 0 to 511

are allowed! You therefore need to add in a check that you have not fallen off the top or bottom of the screen:

```
190 IF P<0 THEN P=0
200 IF P>511 THEN P=511
```

There are several simple games (usually named after snakes or other creepy-crawlies!) which are based on avoiding the trail left behind you. To start with you need to look at what is already in the new print position and compare this with your own character. We can do this by *Peeking* at what is on the text screen. As the start of this (print position 0) is at memory location 1024 we need to add this number to *P*, before we look.

Unfortunately, you will find that if you print a character onto the screen, and then *Peek* to see what it is, you get rather a surprise as *Peek* may not give you the ASCII code of the character. (This is because of the way the Dragon codes characters internally, which is not ASCII.) If you want to find out the corresponding *Peek* values and ASCII codes for the whole character set, you can use this little routine:

```
500 FOR N = 1 TO 255:PRINT CHR$(N);:NEXT
510 FOR N = (1023+1) TO (1023+255):PRINT
PEEK(N);:NEXT
```

The *Peek* value for "*" is 96, so we can use:

```
220 W=PEEK(1024+P)
230 IF W = 96 THEN 300
300 PRINT @ 0,"CRASH!"
```

To keep a record of how far you got before you crashed, add a distance variable which increments with each success:

```
270 D=D+1
310 PRINT "SCORE =";D
```

If you want to move without leaving a trail, you need to erase the last point as you print the next. You can do this most simply by adding a devastating *Cls* to wipe the screen clean in one fell swoop — 210 *Cls* — but if you take a more subtle approach you can be much more selective, and leave the rest of the screen display intact. You need to remember the last print position and print a blank space there just before the new asterisk is printed. To do that we will bring in a new variable *L* (for 'last') which is set equal to *P*, before this is changed:

```
130 L=P
210 PRINT @ L," ";
```

Because of the order of program lines, the "*" is displayed for most of the time, as erasing only occurs when the position changes.

Hungry horror

Let's put these ideas together into a more interesting game where a strange 'Hungry Horror' must search a box for food so that it does not starve. But, it must not make the mistake of eating itself!

First we draw the box, leaving the bottom line clear so that automatic screen scroll does not occur:

```
10 CLS2
20 PRINT @ 0,STRING$(33,128);
30 FOR N = 63 TO 479 STEP 32: PRINT @
N,CHR$(128);CHR$(128);:NEXT
40 PRINT @ 449,STRING$(31,128);
```

and then a random amount of food is placed in random positions:

```
50 Q=RND(20)
60 FOR N=1 TO Q
70 FP=RND(480)-1
80 PRINT @ FP,".";
90 NEXT
```

If you do not like to see food stuck to the wall, just change these two routines around, when any food in unsuitable positions will vanish. Computer logic isn't always as good as common sense!

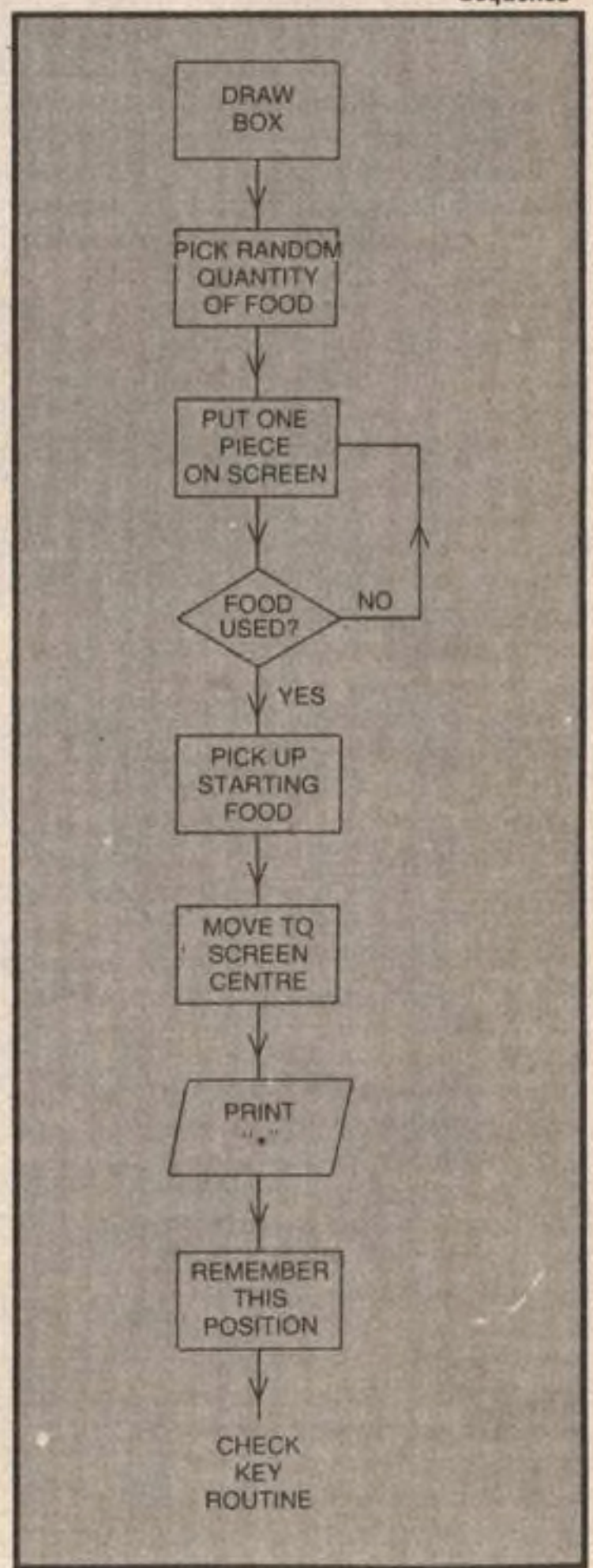
The beast starts off with a full stomach (*F=20*) and adds 10 to its food supply (*F*) every time it finds a "." (*Peek* value 122):

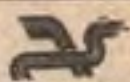
```
240 IF W = 122 THEN F=F+10
```

but it uses one food unit each time it moves, and starves if there is none left:

```
260 F=F-1
280 IF F<1 THEN 330
```

Start Sequence





```

330 CLS0
340 PRINT @ 224, "YOU STARVED AFTER";D;
;"MOVES!"
350 SOUND1,50
360 RUN
    
```

If it hits the wall of the box it loses 5 food:
 250 IF W = 128 THEN F=F-5

This horror leaves a green trail if the erasing routine is left in, as the screen was cleared to yellow and Print "" will give a green block of Peek value 96. (If you take out line 210 you will leave a trail of "" of Peek value 106.)

```

240 IF W = 96 THEN 300
300 CLS4
310 PRINT @224;"YOU JUST ATE YOURSELF
AFTER";D;"MOVES!"
320 GOTO350
    
```

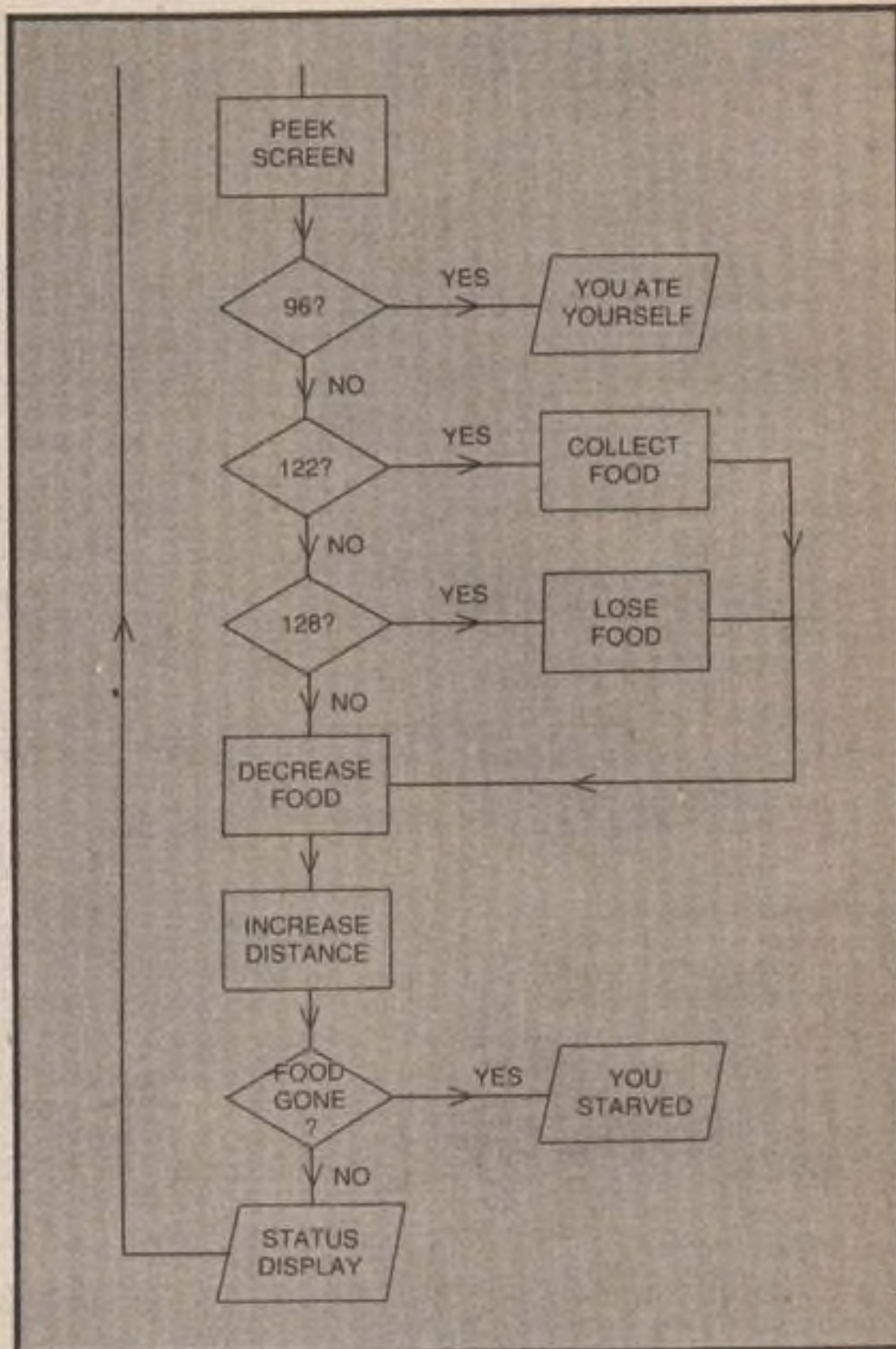
To give you a guide to how well you are doing, we will put a food and distance status display on the bottom line by adding to line 290:

```

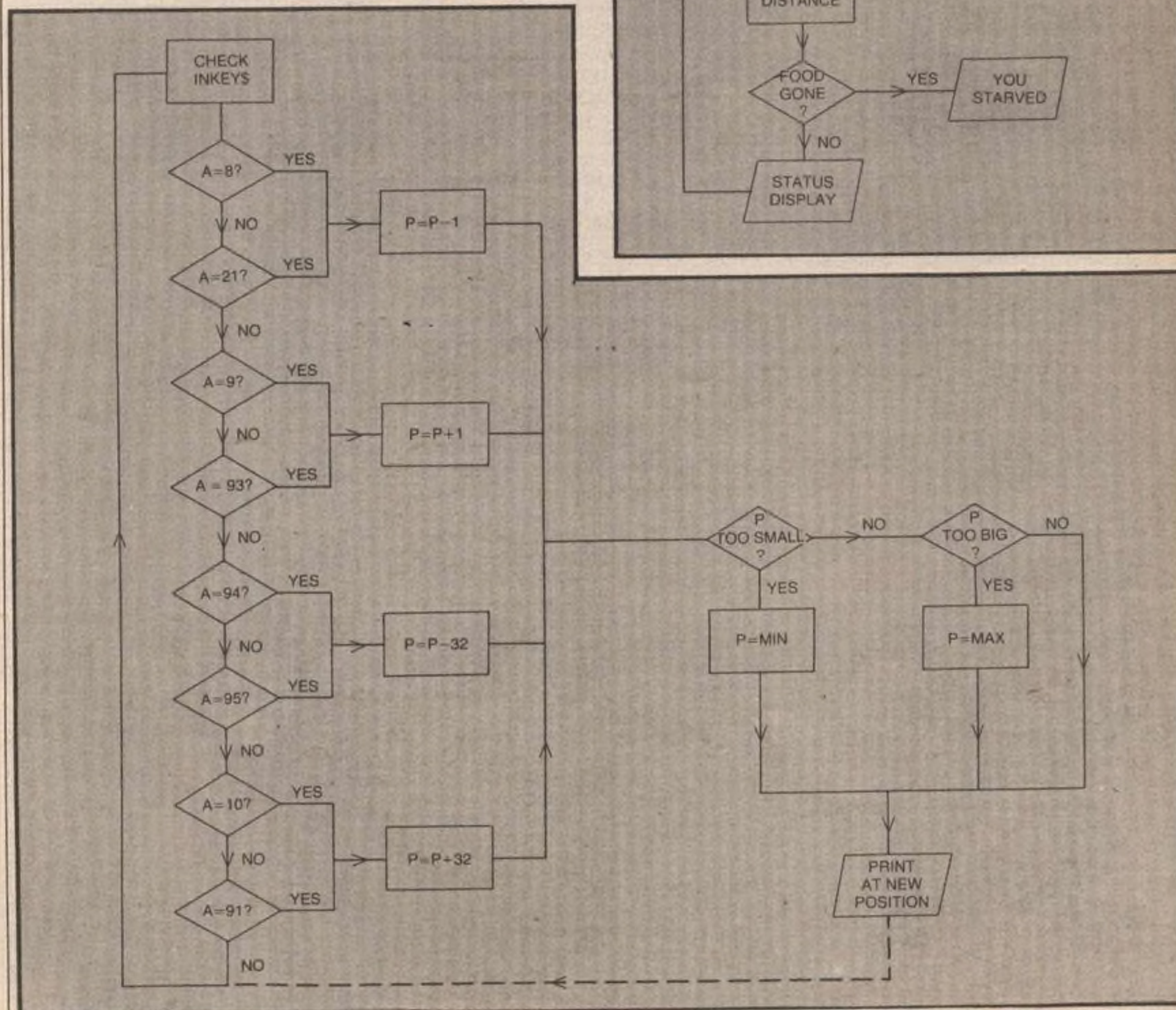
290 PRINT @ 480,"FOOD";F;"DISTANCE";D;;
GOTO120
    
```

You will note that this game is true to life, as no matter what you do you are bound to starve to death in the end when the food runs out!

Screen Peek And Consequence



Cursor Control Routine





```

10 CLS2
20 PRINT @ 0,STRING$(33,128);
30 FOR N = 63 TO 447 STEP 32:
PRINT @ N,CHR$(128);CHR$(128);:NEXT
40 PRINT @ 449,STRING$(31,128);
50 Q=RND(20)
60 FOR N=1 TO Q
70 FP=RND(480)-1
80 PRINT @ FP,":";
90 NEXT
100 F=20
110 P=238
120 PRINT @ P,"*";
130 L=P
140 A$=INKEY$:IF A$="" THEN 140
ELSE A=ASC(A$)
150 IF A=8 OR A=21 THEN P=P-1
160 IF A=9 OR A=93 THEN P=P+1
170 IF A=94 OR A=95 THEN P=P-32
180 IF A=10 OR A=91 THEN P=P+32
190 IF P< 0 THEN P=0
200 IF P>511 THEN P=511
210 PRINT @ L," ";
220 W=(PEEK(1024+P))
230 IF W=96 THEN 300
240 IF W=122 THEN F=F+10
250 IF W=128 THEN F=F-5:SOUND1,5
260 F=F-1
270 D=D+1
280 IF F<1 THEN 330
290 PRINT @ 480,"FOOD";F;"DISTANCE"
;D;:GOTO120
300 CLS4
310 PRINT @224,"YOU JUST ATE
YOURSELF AFTER",;D;"MOVES!"
320 GOTO350
330 CLS0
340 PRINT @ 224,"YOU STARVED
AFTER";D;"MOVES!"
350 SOUND1,50
360 RUN

```

Introducing

DRAGON

USER

The independent magazine for Dragon users - monthly

DRAGON 
USER
60p May 1983 Volume 1 Number 1
The independent Dragon magazine



52 action packed pages showing how to make the best use of your DRAGON

In the MAY ISSUE

* David Lawrence, author of 'Working Dragon' explains how to handle Data Files

* Which software program should I buy?

SUBSCRIPTION ORDER FORM

To: DRAGON USER: Hobhouse Court, 19 Whitcomb St., London WC2 7HF
PLEASE SEND 12 ISSUES OF DRAGON USER

NAME: _____

ADDRESS: _____

SUBSCRIPTION RATE UK £8.00 OVERSEAS £14

CHEQUES/POSTAL ORDERS SHOULD BE MADE PAYABLE TO: DRAGON USER
(Air mail rates can be supplied on application to the subscription department)

CLASSIFIED

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



GAMES PROGRAMMERS

Palace software, part of a leading film and video company, is looking for games for Atari 400/800, BBC Model B, TI99/4A Spectrum, VIC 20 and CBM 64 for distribution in the UK, Europe and USA. High royalties will be paid for top quality and highly original material. Send samples to: Pete Stone, Palace Software, 62-64 Kensington High Street, London W8 (Tel: 01-937 6258).

DRAGON and TRS-80C users need extended Basic CONVERTER Load Dragon progs on Tandy, load Tandy progs on Dragon.

Tape £7 (inc p&p) from F. Philbrow, 43 Grasmere Road, Gatley, Cheshire, SK8 4RS

SINMAX CARTRIDGES ATARI VC SYSTEM (4K)

Sinmax video games cartridges are designed to fit Atari VC system and are available in four different programs.

1. SPACE ROBOT
2. ASTROBATTLE
3. MISSION IMPOSSIBLE

These high quality newly developed video games are priced at only £13.95 (p&p included), or all four at £52 (p&p included). Full instructions included with each cartridge (allow 28 days for delivery).

**Compec Systems (Dept PWK)
70/71 New Bond Street, London W1**

"MURDER ON SPEC" for 16K Spectrum:

A brain-teasing whodunit game for 1-7 players: 60 suspects, solutions with motives, graphics, in 4 parts covering far more than 16K: **£5.50**

"CRICKET ON SPEC"

Summer's coming! Refreshing 16K game with full range of shots, complete scoreboard. **£4.50**

MICROJUICE

46 Aingers Rd., London NW3

2-48K SPECTRUM GAMES

With speech, sound and graphics. **SPACE RESCUE**, try and rescue your three comrades adrift in space, after first lighting off enemy ships. **3D PENALTY KICK**, try your skill as goalkeeper in this great 3D game. For fast dispatch send **£4.50 only to: B. Wright, 8 Thorncroft Road, Littlehampton, Sussex BN17 6DD.**

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

**TELEPHONE PHILIP COPLEY ON 0924 272545
PLEASE RING FOR DETAILS OF OUR MAIL ORDER SERVICE**

DRAGON USER

Can you program for the 6809 micro-processor, as used in the Dragon 32?

If so, call **Dragon User** on 01-839 2449 and find out more about our plans to publish quality games for the Dragon.

Or write to **Dragon User**, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Dragon User —



a Sunshine **SUNSHINE** publication

WANTED URGENTLY

Original Machine Code and Arcade quality games, utility programs, educational and business software for Vic20, ZX81, Spectrum, BBC and Acorn. Best prices paid for copyright purchase. **Rainbow Research, 288 High Street, Ponders End, Enfield, Middx. Tel: 8055455.**

PLANNING, 48K SPECTRUM NEED TO PLAN AHEAD? USE WYPLAN

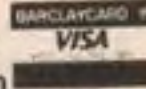
The fast easy, flexible method. Features include Choice of output, Bar-charts, Histograms, Critical/non-critical items, up to 1,000 events. Resources, printer units in weeks/days/hours, m.c. + much more. **£25 with manual. Cheques/POs to:**

WYPLAN SOFTWARE 26 Hillrise Drive Market Weighton, York

SPECTRUM SOUND!

Make your Spectrum louder with the INCA volume booster. No internal connections. Doubles as an attractive radio when not in use. only **£5.99.**

**INCA Electronics,
77 Woodfield St.
Morrison,
SWANSEA,
W. Glam SA6 8BQ
Tel: (0792) 792729**



★★ LYNX SOFTWARE ★★

TAPE 1: The Maze Game/Pac-Man/Break-Out. **TAPE 2:** 3D Challenge; after this you'll never want to enter a maze again. Dodgems: arcade action as you dodge the computer controlled car around the maze. **£5 per tape from CLIVE CARTER, 110 Llancayo Street, Bargoed, Mid-Glam, CF8 8TP.**

BECOME AN ENTREPRENEUR, MARKET YOUR OWN COMPUTER PROGRAMS

Computer Cassette copying service on batch certified HM-1260 tape. Real time recording. C5 — 70p, C10 — 80p, C15 — 90p, C20 — £1. All prices include VAT, post and package.

**HI-TECH SERVICES, 33 Chadacre Road,
Stonleigh, Surrey. 01-393 0991.**

Got a **DRAGON 32** or **TANDY TRS80** colour computer? Then you need your own monthly magazine **RAINBOW** for colour computer users. Send £1.95 and large 26p s.a.e. for sample issue to **ELKAN ELECTRONICS (Dept. PWK), FREEPOST, 28 Bury New Road, Prestwich, Manchester M25 6LZ. Telephone 061-798 7613 (24-hour service).**

SPECTRUM OWNERS

Why wait for weeks? **HIGH SPEED** hire service for all the software you could want. Just £10 life membership, plus £1.25 per tape (inc. P&P). Now you can **TRY** the best programs **BEFORE** you buy. All tapes used with full manufacturers permission. Join today. Send £10 for life membership and first free tape to:

**SPECTRAL SOFTWARE LIBRARY
13 Charlecotte Road, Poynton
Stockport, Cheshire SK12 1DJ
or send SAE for details**

Elephant Software.

PUZZLES FOR THINKERS ON ZX SPECTRUM

Free postage and packing
VANQUISHER 48K

The thinking person's train set. In this brain baffle, rearrange if you can, the jumbled letters of the word **VANQUISHER** via tracks and sidings. Score by time and moves. **£5.20**

PARAGRAM 16K

Can you rotate the 16 letters around into their correct order without getting perplexed. Score by moves. **£4.95**

**ELEPHANT SOFTWARE
41 HAYMILL ROAD
BURNHAM BERKS SL1 6NE**

★ ZX81 KEYBOARD AID ★

SET OF CLEAR STICK-ON BUTTONS GIVES POSITIVE FEEL TO EACH KEY
ONLY 95p + 25p p&p

**I. SAMWAYS, 20 ERICA DRIVE,
CORFE MULLEN, WIMBORNE,
DORSET BH21 3TQ**

MAKE MONEY out of your hobby. We urgently require quality original games and educational software. Top rates paid for new and novel ideas. Write to:

SMT (Trading)

**4 Bengal Lane, Greens Norton,
Towcester, Northants NN12 8BE**

WANTED BIG REWARDS

We urgently need good Spectrum software. Attractive commission rates offered. Premium rates for M/C programs.

Send your programs to us at
**AVALON SOFTWARE
34 Meadway, Ashford
Middx TW15 2TH
NO COPY CATS PLEASE**

★★★ HARD COPY ★★★ DRAGON 32

Basic Programs 1p a line
M/C Disassembled printed as source
45p per K
TRS/80 Mod 1 Level II — Video Genie I
Basic Programs 1p a line
Source code 35p per K

Send SAE for sample of all code
Min charge 80p Cheque/PO
**MJD (PW), 1 NORFOLK ST,
LINCOLN, LN1 1RQ**

SPECTRUM 48K COPY TAPE

Copies any Spectrum file type (program, code data) plus "Headerless" files. Up to 40K quickly and easily. Also displays file details/length, start etc.

N.B. Must not be used to infringe copyrights. **£4.95.**

**N. G. EDWARDS 25 DALES DRIVE
WIMBORNE, Dorset**

SPECTRUM CHESS Dare you face The Turk

The original Turk was an eighteenth century automaton, a life size mechanical figure independent in Turkish costume and seated behind a wooden cabinet on which a chess board and pawns were placed.

CCP now offer you the twentieth century equivalent of that Turk — a chessplaying computer program.

The Turk challenges you to a game of chess

- MANY OPTIONS INCLUDE:**
- 4 LEVELS OF DIFFICULTY
 - BRANCHING TREE GAMES
 - BOARD EDITOR
 - GAMES PREVIOUS FACILITY
 - BLITZ CHESS AGAINST THE CLOCK
 - TANDY PLAYER GAMES
 - UNFINISHED GAMES CAN BE STORED
 - RECOMMENDED MOVE

Chess the Turk ONLY £8.95
Post order to **Oxford Computer
Publishing, P.O. Box 99, Oxford.**



NASCOM I. PCB + 3 amp power supply PCB + parts list, £15 + £1 p&p.

IMP PRINTER. Main drive with printing head and base panel, and printer PCB, **£25 + £2 p&p.**

TOROIDAL TRANSFORMER for 8 amp PSU (8 volts at 8 amps + 15/0/15 volts at 2 amps), **£25 + £2.50 p&p.**

TRANSFORMER. 14/0/14 volts at 3.2 amps (for Imp Printer), **£5 + £2 p&p.**

EX-EQUIPT IMP PCBs (with 280/P/O CPV, VART etc), **£6 + £1 p&p.**

20 WAY RIBBON CABLE, 30in with 1IDC Header, **£1.50 + 50p p&p.**

HEAT SINK, for 3X to 3 Divisive, **£2 + 50p p&p.**

EX-EQUIPT NASCOM I boards, complete (with fault diagnosed on label) + ex-equipt keyboard, **£35 + £1.50 p&p.**

NASCOM I, Factory built, **£65 + £2 p&p.**

EX-EQUIPT IMP PRINTER, complete except for top cover, **£90 + £2 p&p.**

All prices exclusive of VAT (at 15%)

DIONICS

**17 HAWKESWORTH DRIVE
KENILWORTH
WARWICKSHIRE
CV8 29P**

DRAGON 32 SOFTWARE

Quality software on cassette.

Caterpillar + Space Attack	£2.95
Haunted House	£3.95
Golf	£4.95
Pinball	£3.95
Island Adventure	£3.95
Forbidden City	£4.95
Devil's Island	£4.95

Send s.a.e. for full list. Orders under £6—add 50p P&P. Orders over £6 post free.

Send cheque or PO to:

APEX SOFTWARE (PCW)

115 Crescent Drive South,
Brighton BN2 6SB
Tel: Brighton (0273) 36894
Access/Barclaycard welcome.

MAKE YOUR OWN QUALITY JOY-STICKS for the Dragon 32 for only £5 each! For instructions, send SAE plus 50p cheque/PO to 37 Louise Street, Chester.

SPECTRUM RENUMBER/DELETE. At last a machine code program to renumber GOTO, GOSUB, RESTORE, LINE, LIST, RUN. Also features block deletion, selective deletion of Rem statements, and PRINTS memory available. £3.95 from AWA, 50 Dundonald Road, Didsbury, Manchester. Please specify 16K or 48K.

BUG-BYTES Vicmen required. Good condition please. Tel: (0558) 822509 (evenings).

ASR33 teletype, papertape, good, £100. Tel: Caterham 47784 after 7 pm.

JUPITER ACE pre-budget prices! Breakout, Mastermind, Life, Asteroids, Earth Defence, Racer. £3 each, on cassette. SAE for catalogue. Hamsoft, 5 Greenfield Link, Coulsdon, Surrey CR3 2SW.

WANTED. SUPER EXPANDER and Booklet, will collect within 20 miles. Tel: Bedford (0234) 57087 after 6 pm.

ATARI SOFTWARE wanted, buy or exchange other titles, SAE 22 Twinings, Greenmeadow, Cwmbran, Gwent, NP44 4ST or Tel: 06333 64646.

JUPITER SPIDER ATTACK. Fight Skyscraper City with your webs. Watch out for missiles and trains. Great arcade-style game for your 16K Ace. £1 plus sae for listing. A. Sova, 17 Elan Rhyd, Coed Eva, Cwmbran, Gwent NP44 6TY.

CENTRONICS 730 serial printer £220. Tel: Ipswich 219661, ext 225 (daytime).

KOPI KAT

DRAGON 32, TRS80, and Atari owners

Now available for your machine. A Kopi Kat duplicating tape which will copy most of your m/c code tapes — even double loaders. £15. Also available for Atari — Kopi Kat Duplicating tape. £19.95.

Copy m/c tape on to disc. £19.95 inc P&P.
Kopi Kat, 2 Bell Lane, Harborough Leics.

VIC20 (unexpanded) games, 3 fast action space games only £1.50. D. Spencer, 230 Lowgrange Avenue, Billingham, Cleveland.

BBC A(B maze. Easy to use, fun educational program. 45 simple mazes. Times for each maze and set. Keyboard, joystick. State model, £3.50. JD-Soft, Hilcote Hall, Blackwell, Derby.

ATARI 400/800 software club. Join now. Sae for details. Castle games, 44 Augusta Close, Rochdale, Lancs. Tel: (0706) 59602.

SWAP Vic20 Sargon II for any other Vic-20 cartridge. 10 Adam Close, High Wycombe, Bucks.

VIC20, 8K, 3K super expander. Introduction to Basic 1, Vic Revealed, programmer's reference guide, games, £150 ono. Preston 615397 (evenings).

UNEXPANDED VIC20 GAMES. Fruity — 100 percent machine code fruit machine simulation, four fast-spinning reels, eight 'fruits', nudge up/down, respin, hold, cancel, gamble, collect and quit. Ski — fast ski-ing simulation. Avoid trees, bumps and ice patches, manoeuvre through slalom gates. Sub-shot — shoot enemy ships and aeroplanes. Earn extra time for a high score. All games have excellent multi-colour hi-resolution realistic graphics, sound and music, £4 for one, £7 for 2, £10 for 3. Send cheque/PO to: Shaun Southern, 76 Llwyn Road, Oswestry, Shropshire. Fast delivery.

SHARP MZ80K/A software. Ready for immediate hire from 50p. Send sae for membership details and free catalogue. K-Soft software collection, 56 Bolham Lane, Retford, Nottinghamshire.

SPECTRUM, 16K. Upgrade to 48K for Issue 2 machines, no soldering required, kit of ICs, £23.50 inc VAT, p&p, or send me your Issue 2 Spectrum for upgrade, £27 inc VAT, p&p, mail order only, by return. J. C. Brewer (Dept PCW), 7 Roseberry Terrace, Kirkcaldy KY1 1DW.

PERSONAL COMPUTERS bought for cash. Morgan Camera Co, 160 Tottenham Court Road, London, W1. Tel: 01-388 2562.

ATTENTION! Quality games software for ZX81 with/without QS Character board. Send Sae for free catalogue to: Mark Andrews, 44 Eaglesham Road, Newton Mearns, Glasgow.

INTRODUCING TOURNAMENT 1: A great new games tape for the Vic20. Will fit into any memory size (including standard machine) and has four great games: Frogmen, Automania, Astradodge, Cross-Over. Games incorporate excellent sound, colour and high-res graphics. £3.95 inclusive. Send to Tournament Software, 63 Mansion Court Gardens, Thorne, Doncaster, S. Yorks DN8 5BH. Send Sae for details.

ARE YOU a good program writer? Perhaps selling your software from home. Want to make more money? We are looking for top quality Machine Code programs for ZX Spectrum and BBC Micro, for repackaging and the international market. Please write sending details and demo tape/disc to Gerry Smith, Dept 11, Smith Harrowdell Ltd, 39 Darnford Close, Walsgrave, Coventry CV2 2EB.

WANTED VIC SOFTWARE — especially Rabbit, Pixel, Audiogenic, Interceptor software. Wanted Voodoo Castle for Mission Impossible. Also, swap Alien cartridge for Spiders from Mars/Outworld. Phone Leeds 589465.

SPECTRUM LOGO. Learn to 'talk Turtle! Ideal language for introducing children of all ages to programming. Fully tested in school use. Cassette/manual for 48K Spectrum, £5.95. Sae for details of 16K version. Mike Treadaway, 2 New Road, Fritton, Great Yarmouth, Norfolk.

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

JUPITER ACE, as new, all leads + manual etc. Offers over £70. Tel: 0522 751324.

PHILIPS mini digital cassette system £60. Tel: Ipswich 219661, ext 225 (daytime).

VIC20 plus 8K and super expander, Invaders, Chess, Alien and Adventureland cartridges, many cassette games and books, £225. Tel: 01-808 6450.

WANTED: Dragon 32, Kong type program and others bought or royalties paid. Details to Mr Davies, PO Box 26, Port Talbot SA1 31NY.

ATARI 400/800 secondhand software bought/sold. Sae and lists to Jervis, 19 Portree Drive, Nottingham.

FLY THE DRAGON. Flight Simulation program for Dragon 32. Full colour and instrumentation cassette. Only £5.95. Mr Ratcliffe, Church Lodge, Tibenham, Long Stratton, Norfolk.

CASSETTE LABELS PRINTED, self adhesive, any amount, Sae samples. Six-Jays, Swanpool, Falmouth, Cornwall.

ATARI 400/800 OWNERS, play Super Bullion Raiders for only £5.95 inc. Cheques/PO to M. Granata, 36 Dixon Drive, Wallasey, Merseyside.

DUST COVERS AVAILABLE for any computer, printer etc. BBC TI, Epson £3.95. Dragon, Atari, Vic20 £2.95. Sharp MZ-80A-K £4.95. For others please phone or write to Sherborne Designs, Victory House, 8, A The Rank, North Bradley, Trowbridge, Wilts. Tel: 02214 4425. Also made to measure service. Dealer enquiries welcome. Access and Barclaycard.

ORIC-1, VIC20 and ZX81 software, send Sae for catalogue and free program. D. J. Wyatt, 77 Redgrave Gardens, Luton, Beds.

VERIFY FOR DRAGON 32. Machine code software to comprehensively identify and Check Basic/data and M/c cassette files without affecting current program. For listing, Basic "easy enter" and details of how to chain several Basic programs together, send £1.50 plus Sae to Klaus Allen, 10 Ashby Road, Shepshed, Leics LE12 9BS.

WORLD INFO — a database of information about the modern world. Use your 48K Spectrum as a reference book on heads of state, wars, potential wars, types of regime, human rights and much more. It's a datafile for use with Campbell Systems' Masterfile, the standard advanced database system for Spectrum, £5. PHONES keeps track of your phone bill, times calls, costs them, assigns them to person using phone. Good for flat sharers or several people using the same phone, £4.50. Send sae for more details of above programs. Wimsoft (PCW), 20 Brookside Road, Wimborne, Dorset BH21 2BL.

CASIO PB-100 pocket personal computer, unused, in original packing, cost £70, sell £55 (or part swap for Spectrum 48K). Tel: Hemel Hempstead 54059.

WILL SWAP OR SELL Jumbo Jet Pilot, Submarine Commander, Star Raiders, Defender for PacMan or Centipede. Tel: 0602 703604 after 6 pm.

CLASSIFIED ADVERTISING RATES:

Line by line: For private individuals, 20p per word, minimum 10 words.

For companies, traders, and all commercial bodies, 40p per word, minimum 20 words.

Semi-display: £10 per single column centimetre, minimum length 3 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 01-839 2476.

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, Hobhouse Court, 19 Whitcomb Street, London WC2

Computer Swap

01-930 3266

Free readers entries to buy or sell a computer.
Ring 01-930 3266 and give us the details.

Spectrums for sale

SPECTRUM, 48K, tape deck + tapes, £180 ono. Tel: Telford 595734 (after 6 pm).

SPECTRUM, 16K, good condition, few months old, games, quick sale, £89. Tel: Cooden, East Sussex, 5364 (anytime).

16K SPECTRUM, plus ZX printer and 5 rolls of paper, tape recorder, custom case and 5 Spectrum books, £150. Tel: Liss 3864 (Hants).

ZX SPECTRUM, 48K + printer, new, 5 rolls paper and software, value £20, £200 ono. Tel: 0432 74362 (after 8 pm).

ZX SPECTRUM 16K, brand new + cassette recorder + software + 100 listings, £100 ono. Tel: Brighton 688393.

ZX SPECTRUM 16K, boxed, all leads and manuals still under guarantee, lots of s/w involving Scramble, Space Invaders, Horace games etc and Tim Hartwell book, all for £130. Tel: 0656 721441.

5 SPECTRUM software cassettes, £18 for the five. Tel: Milton Keynes 75094.

SPECTRUM ZX 48K + Spectrum carrying case, cassette player + software + books. Hardly used, £175. Tel: York 763875.

NEW 48K SPECTRUM + £100 software, £200 ono. Tel: Bordon 2745 after 6 pm.

ZX SPECTRUM 16K, boxed, all leads and manuals still under guarantee, lots of software including Scramble, Space Invaders, Horace games etc and Tim Hartwell book, all for £130. Tel: 0656 721441.

48K SPECTRUM, with ZX printer and lots of software, console and magazines, worth £325 approximately, sell for £300 ono. Tel: 0803 22058 (Torquay).

ZX SPECTRUM 48K, four months old, £50 software, £170. Tel: 01-850 9066 after 4 pm.

ZX SPECTRUM + software for sale, worth £100 including Hobbit, also the fuller sound box. Sell separately or grouped. Tel: 01-561 6958.

16K SPECTRUM, one month old, games, books, £100. Tel: 0387 68696, Dumfries.

16K SPECTRUM + printer + sound amplifier + books, cassettes, £210. Tel: 01-802 5075.

48K ZX SPECTRUM + printer + cassette deck + games, £200. Tel: Leeds 672122.

16K SPECTRUM + printer + 5 rolls of paper + £30 software, £150 ono. Tel: 0553 62888.

ZX SPECTRUM, 16K + cassette recorder, £30 software, £130. Tel: Shere 2939.

48K SPECTRUM, as new + £70 software + cassette recorder, £190. Tel: Glasgow 041-334 1094.

ZX SPECTRUM, upgraded to 48K, boxed, as new, 9 months guarantee + £50 original software including Flight Simulation, plus sound amplifier, £150. Tel: 0767 314842 (evenings).

SPECTRUM 48K, £110 of software, £200 ono or part-exchange BBC model B. Tel: 01-464 9437 (evenings).

48K ZX SPECTRUM, complete with extensive software, £150 ono. Tel: Slough 73099.

48K SPECTRUM, printer + Abacus controller + £125 books and quality software, £225. Tel: 061-980 6565.

ZX81s for sale

ZX81, 16K Memopack, software, boxed, £45 ono. Tel: Shaftesbury 3410 (anytime).

ZX81, 16K, 10 machine code games, Asteroids etc, + dozens of others, £70 ono. Tel: Steve, Crayford 57560 (after 4.30 pm).

ZX81, 16K, leads, magazines, 11 tapes, ZX Chess II, £55 ono. Tel: 01-549 1164 (after 6 pm).

ZX81, 16K, Fuller keyboard, case, memory board, repeat, o-save, 9S character board, paddle, £100 of software, cost £300, yours for highest offer. Tel: Gregory on Ainess (0349) 882026 (after 6 pm) for details.

1K ZX81 with over £30 books + software, £30 ono. P. Gower, 4 Llyffard Crescent, Newport, Gwent.

ZX81 + 16K + sound unit, £60 software, worth £165, bargain £100. Tel: 01-203 3508.

ZX81, 16K plus software, magazines and books, £55 ono. Tel: 01-897 9369 (after 4 pm).

ZX81, 64K Memo pack, real keyboard, many games and books, cost £160, sell for £80. Tel: 041-638 7332 (evenings).

ZX81, 16K, printer, £25 of software, magazines + books, cost £210, yours for £110 ono. Tel: Kelso 51180 (after 4.30 pm).

ZX81 SOFTWARE, 16K software, Nightgunner £2.50, Fantasy Game £3.50, Dodgems + Connect 4 £3.50, Adventure + Galaxions £3. Tel: Cardiff 759764.

1K ZX81, with books plus software, £35. Tel: 055 71502 (near Glasgow).

16K ZX81 + Inverse Video + Flight Simulation, Chess, Puckman, plus more, cost new £130, accept £65. Tel: 01-581 1300 (after 6.30 pm).

ZX80 + 8K, £15 ono. Tel: Brighton 688393.

ZX81 16K + ZX printer + manual, almost new, £110 ono. Tel: 01-980 5014.

ZX81 16K + ZX printer + manual, almost new, £110 ono. Tel: 01-980 5014.

ZX81, 16K, all leads and manuals, original packing + cassettes + books, guarantee, £60 ono. Tel: 061-747 4149.

ZX81, 1K, no power pack, fuller keyboards, mags, learning lab. Tel: Glasgow 041-632 9325 (5 pm).

ZX81 32K leads, manual and books, £65. Tel: 01-947 8444 (after 6 pm).

16K ZX81 + books + 8 16K arcade games, £60. Tel: 01-455 5337.

ZX81 64K, large, fuller keyboard, three tapes + magazines, £75 ono. Tel: John, Rochdale 524228 after 6 pm.

ZX81, 16K, keyboard with spacebar, software, £70 ono. Tel: Southwater (0403) 730637 (6 pm).

ZX81 16K, includes, DK Tronics keyboard + Graphics Rom, all leads + manual + mags + £75 software, worth £250, £150 ono. Tel: Staines 50522.

32K ZX81 + ZON X81 + keyboard, software and magazines. Offers around £90. Crayford 526502 after 6 pm.

ZX81 16K, £40 software, Invaders, Mazogs, 3D Defender, Flight Simulator, etc, etc, £65 ono. Tel: 01-942 9907, evenings.

ZX81, 32K + keyboard + software, £75. Tel: 0491 69788 (Oxon).

SINCLAIR ZX81, 16K, five games, Learning Lab, books, tape recorder, £70. Tel: 08894 6739.

SINCLAIR ZX81, 16K, guarantee, original 16K memory, £50 software, £50. Tel: 049525 5026.

ZX81, 16K, 6 tapes, £55. Tel: 01-446 5468.

ZX81 + 16K + manuals, books, cassette, £55. Tel: 01-609 1619 (office, ask for John).

ZX81 + 16K RAM with Fuller 42 keyboard + case, leads and manual + 3 books and software, £70 ono. Tel: 0223 842058.

ZX81 + 16K + cassette recorder + over £25 software, £60 ono. Tel: 0703 788746 (after 5.30 pm).

16K ZX81, books, magazines, manual and leads, tapes line 3D Monster Maze, Invaders etc all for £55. Ring 01-445 6194 (after 7 pm).

ZX81, 1K, no power pack, fuller keyboards, mags, learning lab. Tel: Glasgow 041-632 9325 (5 pm).

Commodores for sale

CBM PET 2001, new and old Roms, 24K, small keyboard, integral monitor and cassette, internal soundbox, Arrow fast load and save chip, tool kit, programs, games, books, £250 ono. Tel: Littlehampton 7607 (Sussex).

VIC20, cassette unit, 14in TV, Joystick, £40 software, manuals, dust cover, £170. Tel: 01-800 4994.

VIC20 + tape deck, super expander, joystick, machine package, £70 software, £211 ono. Tel: 0734 784506 evenings.

VIC20, CZN tape deck, joystick, mags, £130 ono. 01-467 5242 (6 pm).

VIC20, tape unit, 16K, 8K, 4 slot Motherboard, joystick, Basic 1 + 2, £50 of software. £400 ono. Tel: 01-200 6120 (6 pm).

VIC20, 11½K, tape deck, Vic Kit 2, joystick, light pen, books, magazines, tapes, games, worth £350, yours for £200 ono. Tel: Glossop (04574) 4203 (4 pm).

VIC20, 8K Ram, with cassette unit, joystick, £50 worth software, 2 months' old, £200 ono. Tel: Malvern 4050.

32K VIC20 + C2N + four cartridges, including 8K Ram + eight books, including P.I.G., Vic Revealed, Stack, Store Board, Vic Kit 2, lots of magazines, over 40 cassette programmes, under three months old. Offers. Tel: 01-574 4122.

VIC20 + 16K + CZN + £140 of software including 2 cartridges. Accept £260 ono or exchange for BBC Model A. Tel: (0423) 500423.

COMMODORE 64, CZN cassette + reference manual, 5 weeks old, £320. Tel: Blackburn 55161, Alan, ext 2268.

VIC20, cassette, fitted 32K Ram, Bickit Rom, M/board, cartridges, books, in custom plinth, £350. Tel: Kendal 28573.

VIC20, C2N tape deck, joystick, mags, £130 ono. 01-467 5242 (6 pm).

VIC20, CZN cassette, joystick, software, 3 months old, free delivery in East London and East Anglia, £135 ono. Tel: Peter, Elmham (036 281) 758.

PET, 64K, new Roms, integral cassette + second cassette player, Rabbit + tool kit, Roms, sound box, load of software, £295. Tel: Brentwood 231490.

VIC20, cassettes, books, magazines, offers. Tel: 01-459 2571, Willesden, NW2.

VIC20 + cassette, leads and manuals, joystick, 3 cartridges including Sargon II, Chess and programmers aid, 6 games cassettes, £180 ono. Tel: 01-340 6854 (evenings).

VIC20 + 16K, cassette deck (£160), super expander (£20), joystick, software, books, Introduction to Basic I and II, £200. Tel: 0424 216414 (anytime).

VIC20, cassette unit, speech synthesizer, mother board, program aid, super expander cartridge, four games cartridges, £50 cassette games, dust cover, £330 ono. Tel: 0920 3529.

VIC20 + cassettes, 3-slot 8K motherboard, 8K Ram, super expander, joystick, basic 1 and 2, Vic Revealed, programmers reference guide, tapes, etc, 3 months old, boxed, cost £400, accept £270. Tel: Durham 780834 Ex.8 (day).

VIC20 with 16K Ram, Super Expander, Programmers aid cartridge, Sargon II, Chess, joystick, cassette, £60 + software, intro to Basic Part I, magazines etc. £220 ono. Tel: Burton upon Trent 815293 (after 6 pm).

COMMODORE PET 2001 series, 8K, around 58 tapes with 150 programs, with sound, £190 ono. Tel: Shanklin (Isle of Wight) 6492, evenings.

VIC20 + super expander + Tellymonsters, Sargon II, Pirate Cove, Rattrace + Superlander, £60 cassette software + joystick, £190 ono. Tel: 01-656 0511.

VIC20 + tape deck, 3K, 3 games + Beginners Reference Guide + magazines + Myriad, £230. Tel: 01-580 4741, ext 82, 9.30 am to 5.30 pm, Mr C. King, Tunbridge Wells 29157 after 7.30 pm.

COMMODORE 64 + cassette player, only a few months old, £350 ono. Tel: 051-651 3394 (after 6 pm).

VIC20. Swap super expander for machine code monitor. Tel: 061-445 6630 (after 4 pm).

VIC20 + cassette unit + super expander, 4 games cartridges, lots of cassettes, joystick + books, £300, or sell separately. Tel: Stourport 6102.

VIC20, tape unit, 16K, 8K, 4 slot M/board, joystick, Basic 1 + 2, £50 of s/w. £400 ono. Tel: 01-200 6120 (6 pm).

VIC20 plus cassette unit, super expander, software worth £50, books, mags, boxed as new, worth £320, sell for £200 ono. Tel: Oxted 7495.

VIC20 + 1 year extended guarantee + £80 of software + joystick + dust cover and programmers reference guide, £200. Tel: 0636 706326 (3-5).

VIC20, 21K, cassette unit, joystick, Jelly Monsters, under guarantee, VIC programmers reference guide + other books and Vic magazines, some cassettes, £225 ono. Tel: Sittingbourne 70811.

COMMODORE 64 + cassette player, only a few months old, £350 ono. Tel: 051-651 3394 (after 6 pm).

VIC20, cassette deck + machine code programs, etc, £180 ono. Tel: 01-751 2303.

PET 2001 8K integral cassette and monitor, just serviced. Programs, manuals, CBM/PET users guide, good buy at £200. Tel: 03542 3693, Camb.

Ataris for sale

ATARI VCS + 2 game cartridges, still under guarantee, original packaging, £85. Tel: 01-960 7735.

ATARI VCS + 5 cartridges, Asteroids, Adventure, Dragster, Kaboom and Combat. £100 or swap for Spectrum or 16K ZX81. Tel: 0978 821 780 (after 5 pm).

ATARI VCS, Space Invaders, Asteroids, Lazer Blob, Indl 500, no joysticks, £90 ono. Tel: Hatfield 63026 (6 pm).

ATARI 400, 48K, cassette deck, Basic, joystick, Star Raiders + many programs, £320 ono. Tel: Dunstable 604737.

ATARI VC, 6 cartridges, joystick + Padaly, £110. Tel: 01-556 6692.

ATARI VCS, 3 cartridges, very good condition, £80. Tel: Ingrebourne 49987.

ATARI VCS + 5 cartridges, Asteroids, Adventure, Dragster, Kaboom and Combat. £100 or swap for Spectrum or 16K ZX81. Tel: 0978 821 780 (after 5 pm).

ATARI VCS + 2 joysticks, 4 pedal controls, Combat + Space Invaders cartridges, will swap for computer or sell for £95. Tel: 0475 7055.

ATARI VCS, joysticks, paddles, touch panel, 8 cartridges including Star Raiders, Pac-Man, Cosmic Arc, Empire Strikes Back and Space Invaders, £140. Tel: 01-748 6681 (anytime).

ATARI VCS, Chess, Pac-Man, Combat, £90 ono. Tel: 01-348 5668 (after 6 pm).

ATARI VCS, nine cartridges, including Defender + Asteroids, including paddles + joystick, hardly used, good condition, £170 ono. Tel: 01-546 9379.

ATARI television game + 6 cartridges including Circus, Breakout, Maze etc, £150. Tel: 01-980 5014.

ATARI video game, £100 + 4 cartridges, or will swap for Vic20. Tel: 061-456 4181.

ATARI VCS, as new, boxed with joysticks + paddles + Combat, Defender, Berserk, Empire Strikes Back. Unwanted gift, £120. Tel: 651 3863 after 4 pm.

ATARI VCS + 16 cartridges including Asteroids, Defender, Superman, Star Raiders and Pac-Man, cost over £450, £200 ono. Tel: Slough 20735 (after 6 pm).

ATARI 800 48K with Basic cartridge, tape deck and disc drive, 2 months old, £550 ono, complete with manuals, boxed. Tel: 0703 582322/581431.

ATARI 400/800, software, cassette + cartridges, many different. Tel: Derby 764595 for details.

ATARI VC, 6 cartridges, joystick + Padaly, £110. Tel: 01-556 6692.

ATARI 400/800: Firebird and Termoil Rom cartridges, cost £25 each, sale price £15 and £10 respectively. For details of these brilliant arcade quality games phone (05827) 69152.

ATARI VCS, 3 cartridges, very good condition, £80. Tel: Ingrebourne 49987.

ATARI television game + 6 cartridges including Circus, Breakout, Maze etc, £150. Tel: 01-980 5014.

ATARI VCS + 10 cartridges, including Chess, £120. Tel: 01-591 4248.

ATARI 800 16K, cassette recorder, joysticks, paddle, books, listings, £380. Tel: 01-393 0116.

ATARI VCS, six cartridges, £80. Tel: 061-437 7569.

ATARI VCS, + Combat cartridge, good condition, £45. Other cartridges available. Tel: 01-669 7590 (after 6 pm).

ATARI 800 48K, disc drive, recorder, 822 printer and 100 + games, value £3,000, will sell for £1,250 or will exchange games. Tel: 063-336 4646.

Tandys for sale

TANDY 4K, with tape recorder, black and white monitor, power supply, 2 tapes, £110. Tel: 01-591 1790 after 6 pm.

TANDY COLOUR COMP 32K, joystick, case, CCR tape, software + hardware + books, etc. Cost £670, accept £570 ono. Tel: 061-370 2162, 6pm to 7.30 pm.

GENIE, 17 months old, fitted with the Rom, sound unit, plug-in joysticks, in original box, with cover, manuals, books, tapes + software., £150. Tel: 01-653 7079 (evenings/weekends).

TANDY TRS80 80, level II, 16K, manual, £220. Tel: Carterton 844170.

TRS80 MODEL III, 2 internal disc drives, tape deck, all manuals, leads, much software on disc + cassette, £1,400. Tel: 01-572 2917.

TRS80 MODEL I, level II, 16K, Tandy tape recorder, Adventure + arcade games + books, £150, no offers. Tel: 01-891 2761.

TANDY TRS80 POCKET COMPUTER + printer, interface, as new, £80. Tel: Ongar 363947.

TANDY TRS80 80, level II, 16K, manual, £220. Tel: Carterton 844170.

VIDEO GENIE, VG 3003, excellent condition, £100 + £15 worth of software, £150 ono. Medway (0634) 573 531.

GENIE I 32K plug-in Roms, Base II printer, 200 programs, books + magazines. Offers over £400. Tel: 0923 44193.

Acorns for sale

ATOM, software, floating point Rom, Toolkit Rom, £200 ono. Tel: Stamford 6409 (6 pm).

BBC MODEL B, complete with all manuals and leads + box, £350 ono. Tel: 01-644 0433.

BBC MODEL A, 32K, 6522 chip, £80 software, £350. Tel: 01-888 1181.

ATOM, s/w, floating point Rom, Toolkit Rom, £200 ono. Tel: Stamford 6409 (6 pm).

BBC MODEL B, 11 weeks old, cassette recorder, leads, software plus NEC 30 hr Basic, plus mags. Will deliver/meet within 150 miles Leicester. Offers around £360. Tel: 0455 611072.

BBC MODEL B. Good condition + software, £330 ono. Tel: 041-881 1342.

ATOM 12K + 12K, floating point Rom, PSU, manuals, leads, tape deck, Acornsoft software II, swap for Spectrum or sell for £130 ono. Tel: 01-789 4260, 6 pm.

BBC MODEL B + disc drive, printer. Tel: Boston 51537.

ACORN ATOM, floating point, 12K, leads, 14 professional games, books, best offer over £100. Tel: 01-366 5777 (after 4 pm).

ACORN ATOM, 12 + 12, power supply and Chess game, £120. Tel: Ripley (Derbyshire) 48870.

BBC MODEL B, 1-2 op. system, £380, inc delivery. Tel: 0473 53161, after 6 pm.

BBC MODEL B. Good condition + £220 ono. Tel: 041-881 1342.

For sale

DRAGON 32, 3 months old, new, boxed, £80 of extras, joysticks, Ghost Attack, tapes, £175 ono. (I have to buy new car). Tel: Eastbourne 846129 (anytime).

SWAP: Spectrum Chess + Planetoids for Flight Simulator + Hungry Horace. Tel: Cobham, Surrey, 3503 (after 5 pm).

SHARP MZ80A, unwanted Christmas present, £100 software, still in box, £495. Tel: Dewsbury 465392 (5 pm to 9 pm).

DRAGON 32 with colour TV, 1 joystick, 2 manuals, £350 ono. Tel: Hertford 52755 (after 5 pm).

SWAP. 16K RAM PACK or sell for £20. Tel: 01-903 0794 (after 5 pm).

DRAGON 32, 4 months old, £150. Tel: 021-378 0174.

SWAP. Pac-Man + Breakout for £20 or Pitfall or Raiders of the Lost Ark or Dragon Fire. Tel: Ashbank 3435.

COMMODORE VIC20, Tomb of Drowan, needs 16K expansion + Asteroids. Sell or swap for Gorf or Choplister. Tel: Odiham 3445.

VIDEO MASTER, Chess Champion, 6 levels, 40 computing magazines, £35 ono. Tel: 01-267 6201 (after 4.30 pm).

VIC20 GAMES, Trax and Border Attack and Moons of Jupiter etc, £10 for all 3. Tel: 01-885 1207 (after 4 pm).

SWAP: Chinon CE4S camera with flash + power and flash, worth £200, want Seikosa printer for BBC B. Tel: Hull 506133 (anytime).

ZX PRINTER, £40. Tel: 01-958 9442.

5 ROLLS ZX PAPER, £8 including P&P. Tel: Bolton 691887 (anytime).

DRAGON 32, 2 months old, manual and cassette leads, £150. Tel: 01-508 6200 after 6 pm.

FOR SALE. Introduction to Basic Parts 1 and 2 for the Vic20, £15 the two; Voodoo Castle and Alien cartridges, £10 each; 3 programming books, £4; 3 cassettes, Trader £4, Panic £3, Gold-rush £4. Tel: Nottingham 233955.

SWAP COMMODORE Mission Impossible adventure cartridge for the Count or Pirate Cove. Tel: 0570 470362 (anytime).

COMPLETE SET of Popular Computing Weekly, Vol. 1 to Vol. 2 No. 6, offers. Tel: Nottingham 703604.

VIC20 Road Race cassette £4. First letter received accepted. Send no cheques. Write to M. Valentine, 101A Underdale Road, Monkmoor, Shrewsbury, Shropshire, SY2 5EF.

VIC20 SOFTWARE. Will swap Adventureland cartridge for the Comet or Voodoo Castle. Tel: 041-942 8146 evenings.

DRAGON 32, boxed, as new + joystick, Star Ship cartridge, Computer Voice, Crazy Kong, lots of software, £190. Tel: 01-843 1092.

PIRATE COVE adventure game for Vic20, two months old, £20. Tel: Mark, 0933 678078.

GORF 8K RAM for Atari, £20. Tel: 01-550 0806 (evenings).

ADVENTURE LAND for Mission Impossible or any other Scott Adams Adventure cartridge. Tel: 01-515 4696.

INTEL SBC 80/10B single-board computer, new, £150. Tel: Garston 78733, Ken.

VU-FILE, Chess (48K) and five rolls of printer paper for the ZX Spectrum, £20. All items new. Tel: 01-574 8583, 7 pm to 8 pm.

COMMODORE 64 games, £7.95 each. Tel: 01-450 4858.

COMMODORE O Level revision programs in Physics and Chemistry, mint condition, £7.50 each. Ring: Johnston (Renfrewshire) 21586 (after 5 pm).

OHIO SUPERBOARD II, Intamon 8K, 15 games, all leads, in case. Originally £270, sell for £110. Ring: Bolton 41691.

LYNX 48K COMPUTER, still in box, £220 ono. Ring: Philip on 061-652 0051.

INTELEVISION CARTRIDGES, £10 and £15 each, Voicebox £35. Ring: 0403 60069.

CROWN CST 980 portable hi-fi, cost £170, 2 months old, swap for 48K Oric or Spectrum. Tel: 061-483 9121 after 2 pm.

JUPITER ACE, complete, unused, with 5 blank tapes, £65 ono. Tel: 0734 665570 evenings.

COMMODORE 64 games, £7.95 each. Tel: 01-450 4858.

Wanted

WANTED, ZX PRINTER. Tel: 061-97-9728.

BBC MODEL A/B. Still under guarantee. Tel: 01-455 6370 after 4 pm.

CASSETTE UNIT for Vic20. Tel: Macclesfield 32637.

WANTED: 48K SPECTRUM, £135 or 16K at £100. Tel: 01-688 5632 (6 pm).

WANTED. Spectrum 14K or 68K, £120 ono or will swap for Dual manual home organ. Tel: Bedworth (0203) 316704.

WANTED: BBC Micro B for £300-£320. Tel: Crowthorne 4161 anytime.

WANTED: ZX80 with all leads, £15. Tel: Maidstone 861664 (any time).

WANTED Introduction to Basic, Part 1. Tel: Stevenage 61765, John.

BBC MODEL B, less than three months old. Tel: Earls Colne 3557.

WANTED: BBC Micro A. Tel: Guildford 38560 (4 pm).

48K SPECTRUM WANTED for ZX81 + 16K and £117.59 worth of software. Possibly settle for 16K Spectrum. A Munro, 70 Meadow Park Street, Dennistoun, Glasgow G31 2ST.

VIC20 Cloudburst or Satellites/meteorites cartridge in exchange for other games. Tel: 0438 811634.

SPECTRUM, IN EXCHANGE FOR MATTEL INTELEVISION 3D computer games machine (as new), with cartridges, superb graphics. Cost £180. Tel: 01-845 2244.

WANTED. Vic20 + 16K Ram + cassette + cartridges required, exchange for OM2N + 200mm telephoto lens and flash. Tel: 0594 23534 evenings.

WANTED. ZX81 internal 32K or 64K Ram. Tel: 01-236 9049 day, 0268 685071 eves. Ask for Morgan.

WANTED. Home computer or Dragon printer plus software. Exchange for sound projector and silent cine camera plus screen. Tel: Telford 581237.

WANTED: Vic20 tape unit, good condition, Tel: 01-890 6510, Feltham.

DRAGON 32 + Centronics printer. Swap for NewBrain + accessories. Tel: 01-856 1198.

WANTED, SPECTRUM 48K, offers ZX81 1K in part exchange. Tel: Boston 723516.

DRAGON 32 for around £170. Offers to: Jim Monahan, Waterford 82253 (Ireland) after 7 pm.

BBC, Model B, 1.2 MOS (preferably). Tel: Hull 849517.

BBC, Model B, offers. Tel: 01-530 2800.

WANTED: VICMEN CASSETTE + joystick. Tel: St Athan 750696.

PRINTER FOR PET. Dual drive floppy discs for Pet. Tel: Brentwood 231490.



MYSTERY TOUR

J M Danes of Northfield, Birmingham, writes:

Q I have a ZX Spectrum, which is my first computer, and I am enjoying learning all the mysteries. One thing that I am interested in is any way of running ZX81 programs on the Spectrum.

A Almost without exception, ZX81 programs can be run on a Spectrum, but some alterations are needed — see *Popular Computing Weekly*, January 13, Letters, for details. Also, the 16K Spectrum only has 9K of usable memory, so some 16K ZX81 programs may take up too much room.

SHY SINCLAIR

Malcolm Singh of Westgate, Dartford, Kent, writes:

Q Please could you tell me if the microdrive for the Sinclair Spectrum will (when released on the market) be usable for the Dragon.

A I have this funny idea for a Sci-Fi story where the hero buys a home computer, called the Binnatone Electron, that has coupled ZX microdrives...

I am still getting a lot of questions about the microdrive, but Sinclair is still very reticent, as he has been for the last nine months. The brackets in your questions are very apt.

However, with the recent announcement that a special interface will be needed to use the microdrives with the Spectrum, I think it would be wise to stop regarding the microdrives as a ZX add-on, and class them much more as a general computer peripheral. I remember saying four or five months ago, that *if* the microdrives turn out to be all they

are cracked up to be, then they would be more important to the computer market than the Spectrum.

I guess that when the microdrives are eventually released, they will be aimed at a range of home micros. Once they have proved themselves reliable, I am sure a range of interfaces will appear.

For all those who have asked when the microdrives will appear, I am afraid I do not know. The microdrive case was shown at the Earls Court show last April, but there has been little sign of it since then. Perhaps it will appear at the next Earls Court Show in June.

BLACK AND WHITE

M J Vale of Coleshill Road, Hodge Hill, Birmingham, writes:

Q I am thinking about buying a Newbrain microcomputer. Will I be able to use its 80 column display and high-res graphics (640 x 250) on a normal 625 line, black and white, television?

A Yes. A normal television should be able to deal with any resolution that can be accessed by a normal microcomputer. The only limit is size — an 80 column display on a small screen will be harder to see, but all the information will be there.

CARD SHARP

Andrew Simpson of Stretford, Manchester, writes:

Q I hope to be getting an Oric soon, as it looks to be as good as the Spectrum and cheaper. I am new to computing, but I would like to know if there is any way I could write a games program (eg, a card game), where each hand was shown on a different television screen. I have looked through several magazines and no one seems to have mentioned it, though I am sure that it would be very useful. I know that more than one joystick can be used, so why not more than one television?

A In short, you cannot use more than one television because you only have one video output and one set of video circuitry in the computer. This is true of all the home micros and many larger

machines as well. To get the effect that you want you would have to connect two computers together, though one would have to be used as the master.

As for joysticks, they control input, not output. In fact, the multiplexer used for two or more joysticks does not put a signal in at the same time from each joystick, rather the input from each is read alternatively. But this is so fast it cannot be detected by the human eye.

BUZZ, BUZZ!

E C De Corte of Barmby Moor, York, writes:

Q When switched on, my Spectrum prevents reception on a transistor radio in an adjoining room, since it causes the latter to emit a loud pitched buzz. Is this a fault of the individual machine, or is it a problem with the Spectrum in general? If it is a general characteristic, then have you any ideas how I can overcome the problem?

A Normally it is the Spectrum that buzzes, so this is a change. This should not happen and the Spectrum is at fault.

Unlike America, where there is a complex web of law governing any form of extraneous broadcasting, there is little on the statute books in this country governing the shielding of appliances. However, in this case it is probably a good thing, as the interference is indicative that there is something wrong with your Spectrum. I would suggest that you send it back as soon as possible.

The fault might well lie with

the power supply — this sort of effect is possible if it is being overloaded. Alternatively, it might be something in the video circuitry. It might be useful to see whether it causes the same problem on other radios. I suggest that you attach a brief note to the machine stating that the problem is interference with a radio.

AUSTRALIAN RELEASES

Richard Herbert of Harris Street, Laurenceton, Tasmania, Australia, writes:

Q I would like to know if some of the latest releases on the British computer market, namely the Spectrum, Lynx, Oric and Dragon, are going to be released in Australia. I would like to know the release date and the cost in Australian dollars.

A I telephoned the various people involved. They were all quite helpful, but not everyone could give me a definite answer and no-one a price.

The Spectrum will certainly be available within the next two to three months, from all the usual outlets. The Lynx and Oric will be available at some time, but there are no definite dates. Computers, manufacturers of the Lynx, are negotiating with potential dealers now and Oric will be starting soon.

Dragon were the most positive and gave me April as the launch month in Australia. The dealership will be through the Hanimex Organisation, Brookvale, New South Wales. However, a price has not yet been finalised.

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, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.*

Top 10

Books	
1 (1) Enter the Dragon, <i>Carter</i>	(Melbourne House)
2 (6) Creative Graphics on the BBC Micro, <i>Cownie</i>	(Acornsoft)
3 (2) Assembly Language Programming for the BBC Micro, <i>Birnbaum</i>	(Macmillan)
4 (4) The Working Dragon 32, <i>Lawrence</i>	(Sunshine)
5 (5) Compute!'s First Book of Vic, <i>various authors</i>	(Compute!)
6 (3) Spectrum Machine Language for the Absolute Beginner, <i>Tang</i>	(Melbourne House)
7 (—) Programming the Z80, <i>Zaks</i>	(Sybex)
8 (9) Vic Programmer's Reference Guide, <i>Finkel</i>	(Commodore)
9 (—) Vic Innovative Computing, <i>Ramshaw</i>	(Melbourne House)
10 (—) Compute!'s Second Book of Atari, <i>various authors</i>	(Compute!)

(Figures compiled by Watford Technical Books, Watford 0923 23324)
(Last week's figures in brackets)

Ziggurat



The square root of -1

Not long ago, I touched on logarithms, and some of the ways in which a knowledge of them could help in understanding certain aspects of computers and mathematical functions.

What I found to be very interesting about the logarithm article was the reaction from the more venerable members of society (ie, those over the age of 20). Many expressed the considered opinion that the whole piece was a waste of time. Apparently it said nothing new, and "everybody knows about logarithms".

My protestations that the application of logarithms to exponentiation and the numerical accuracy of computers was new, were treated with pity. I then asked around amongst my young friends (ie, less than 20 years old) to find out what they knew of logarithms.

Most, I found, had no experience of logarithms before the third year in secondary school — and one third-year pupil still had not encountered such esoteric topics. Asking what they *did* know was more revealing, for few had any true understanding of the potential of logarithms.

Until recently, logarithms were an important part of any secondary school maths syllabus; they had to be used for calculations of any complexity in maths or science.

Because they were used in so many different applications we learnt their limits quite well. Now that calculators are so common, the need for

logarithms in calculation has nearly vanished. But the true power of logarithms goes beyond their mechanical use, and that seems to be disappearing.

The importance of application in the learning of logarithms is only one facet of a wider problem — understanding is helped by use.

Program writers find that for complex graphics effects, for example, they need to be able to use trigonometrical functions. Functions which at school were consigned to the rubbish heap of useless and pointless knowledge. Is this inability to provide people at school with any feeling of relevance a new problem? I think not.

Seymour Papert (he of *Mindstorms*, and the *Monkey Puzzle*) was featured on a television programme recently. Papert argued that mathematics should be taught in a *concrete* way. His way was via the use of the programming language Logo, and Turtle Graphics.

The program was very interesting, but — I think — rather wrong-headed. Children were learning to manipulate turtles on screens, and on the floor; but — I then wondered — how would they learn in the turtle-maths world about the power of logarithms, as the turtle world is geometrical?

Earlier that same evening (on a different channel) there was a programme aimed at helping people to work out the money they should be given in change: I wondered if Turtle Graphics would help here. Just because there is an increasing use of calculators and electronic tills, should we let our minds vegetate?

There seem to be many things wrong with our present (and past) methods of education — but those problems will be worsened by a facile attempt to duck the basic problem, by saying we can do it with pictures. The basic problem seems to be that many people have a total lack of understanding of numbers.

Seymour Papert says of sums "These absurd little repetitive exercises have only one merit: They are easy to grade."

But, if people were more experienced, they would not *try* to find the square root of -1 (even if the calculator allowed them to do so) . . .

Boris Allan

Puzzle

Bull's-eye!

The village of Muddelcombe has its own peculiar game of darts played on the 'Muddelcombe' board consisting of only seven numbered sections. There is no bullseye, but doubles and trebles can be scored as on a standard dartboard. The winner is the first player to score *exactly* an agreed total.

You are playing in the final of the inter-village championship and your opponent needs only a throw of 46 to win. However, it is your throw and you have to score exactly 118 points to win the match.

You have three darts. Which numbers would you aim for?



Solution to Puzzle No 43

The program tests all possible values of the number of paints and brushes bought. The balance of the 100 items is then assessed and the total cost found. If this equals 10,000F then the value is printed.

```
10 FOR P=1 TO 98 20 FOR B=1 TO 98 30 LET C=
100-(P+B) 40 LET COST = P*300 + B*700 + C*50
50 IF COST = 10000 THEN PRINT "Number of
paints=";P;" Number of brushes=";B;" Number of
crayons=";C 60 NEXT B 70 NEXT P
```

This shows that the only possibility is 7 paints, 5 brushes and 88 crayons.

Winner of Puzzle No 43

The winner is: Phil Allen, Flambard Avenue, Christchurch, Dorset, who receives £10.

Top 10

Atari		Vic20	
1 (1) Defender (Atari)*	1 (2) Abductor (Llamasoft)		
2 (3) Miner 2049er (Big Five)*	2 (—) Laser Zone (Llamasoft)		
3 (9) Star Raiders (Atari)*	3 (1) Grid Runner (Llamasoft)		
4 (—) Ghost Encounters (J + V Software)	4 (6) Arcadia (Imagine)		
5 (—) Astro Chase (First Star Software)*	5 (5) Andes Attack (Llamasoft)†		
6 (10) Wizzard of Wor (Rocklan)*	6 (3) Frog (Interceptor Micros)		
7 (2) Fort Apocalypse (Synapse)*	7 (—) Crazy Kong (Interceptor Micros)		
8 (—) Gorf (Rocklan)*	8 (7) Quackers (Rabbit)		
9 (—) Stratos (Adventure International)	9 (10) Traxx (Llamasoft)†		
10 (—) Space Invaders (Atari)*	10 (—) Night Crawler (Rabbit)		

*Cartridge. †32 cassette.
(Figures compiled by Calisto Computers; Birmingham 021-632 6458)

Spectrum		BBC*	
1 (7) Black Crystal (Carnel)*	1 (—) Wordwise (Computer Concepts)†		
2 (2) Time Gate (Quicksilver)*	2 (—) Chess (Computer Concepts)		
3 (1) Penetrator (Melbourne House)*	3 (—) Logo II (Computer Concepts)		
4 (4) Arcadia (Imagine)	4 (—) Hitch-hiker (Computer Concepts)		
5 (6) Frogger (A&F)	5 (—) Algebraic Manipulation (Acomsoft)		
6 (8) Master File (Campbell Systems)	6 (3) Planetoids (Acomsoft)		
7 (9) Vu-3D (Psion)*	7 (—) Monsters (Acomsoft)		
8 (—) Galaxians (Artic)	8 (5) Castle of Riddles (Acomsoft)		
9 (5) Scramble (Mikrogen)	9 (9) Snapper (Acomsoft)		
10 (10) Hobbit (Melbourne House)*	10 (—) Tree of Knowledge (Acomsoft)		

*All Model B. †Cartridge.
(Figures compiled by Buffer Micro Shop, London 01-769 2887)

ZX81*		Dragon	
1 (1) Black Crystal (Carnel)	1 (1) Planet Invasion (Microdeal)		
2 (6) Kong/Dracula (Tony Roberts)	2 (2) Dragon Trek (Salamander)		
3 (—) Galaxians (Arctic)	3 (7) Space Race (Compusense)		
4 (3) Flight Simulation (Psion)	4 (3) Scarfman (Microdeal)		
5 (4) Sea War (Panda)	5 (6) Alcatraz II (Microdeal)		
6 (5) 3D Defender (JK Greye)	6 (4) Invaders Revenge (Microdeal)		
7 (8) Trader (Pixel)	7 (5) Ghost Attack (Dragon Data)		
8 (10) Fantastic Voyage (Folcade)	8 (8) Fun and Games (Shards)		
9 (2) Gulp II (Campbell Systems)	9 (—) Games Pack 2 (Abacus)		
10 (—) Protector (Abacus)	10 (—) Lion Heart (Peaksoft)		

*All 16K.
(Figures compiled by Buffer Micro Shop, London 01-769 2887)

Losers

You predict when the election will be, who will win, how big majority if at all, safe seats, swings etc, and then the V.D.U. flashes up the results to prove you wrong... just like the real pundits on the box...

POLITICAL EXPERT

SOFTWARE BACK

(another unbeatable program this time...)

PIMANIA

have YOU played "Pimania" yet?

"THE BEST EVIDENCE THAT COMPUTER GAMING HAS COME OF AGE ... AN ADVENTURE ENTHUSIAST'S DREAM." (Computer & Video Games.)

"At last a refreshing alternative to death and destruction. You are hooked right from the start." (Which Micro)

"I have been reduced to a gibbering "PIMANIAC" by a crazy cartoon character called the Pi Man" (Interface)

"AWARD GOES TO AUTOMATA." "A NEW SOFTWARE CONCEPT WITH GLITTERING PRIZES." (Popular Computing Weekly)

"All-singing, all-dancing, with clever moving graphics good sound effects and a large number of tunes." (ZX Computing)

"IT COULD TAKE A WEEK, IT WILL PROBABLY TAKE YOU A LIFETIME!" (Electronics & Computing)

"THE COMPLETE ENTERTAINMENTS PACKAGE." THE BEST ADVENTURE GAME REVIEWED, FOR VALUE & PLAYABILITY! (CUC Book of Reviews)

"PIMANIA...THE BEST ADVENTURE GAME THAT WE HAVE EVER REVIEWED" (SINCLAIR USER)



£6,000 PRIZE!

Includes free hit single by Clair Sinclive and the Pi-Men!

NO-ONE HAS WON "PIMANIA".....YET

Attention all doodlerz, dealerz & dezperate dezignerz! TRY THESE HI-RES GRAPHICS PROGRAMS

DRAGON SPECTRUM SPECTACULAR DOODLES & DEMOS

A PACK OF BRILLIANT AUTOMATIC DEMONSTRATION PROGRAMS. PERFECT FOR THE HOME & TRADE ALIKE

plus SELF-TEACHING GRAPHICS DESIGNING AND DRAWING PROGRAM, COMPLETE WITH SIMPLE FULL INSTRUCTIONS

THE SELF-TEACHING USER-DEFINED GRAPHICS PROGRAM, plus A BUILT-IN LIBRARY OF READY-MADE SYMBOLS, including GREEK, RUSSIAN, HEBREW, ARABIC, MATHS, CHESS, FOOTBALL, INVADERS, PACMAN, FROGGER, AND HUNDREDS MORE all at the touch of a key.

CAN YOU WRITE A PROGRAM AS USEFUL AS THIS?

THE PIMAN NEEDS YOU

CAN YOU WRITE AN ADVENTURE AS POPULAR AS "PIMANIA"?

IS THIS A CLUE?

AUTOMATA U.K. IS WAGING WAR AGAINST BOREDOM. WE NEED PROGRAMS THAT ARE AS GOOD AS "PIMANIA" FOR ANY KIND OF MACHINE. HELP US SPREAD FUN AND JOY ACROSS THE PLANET. SEND US YOUR PROGRAMS.....WE DON'T PAY ROYALTIES WE DON'T MINCE WORDS....WE PAY CASH 100% IN ADVANCE.....JOIN US NOW!

SOMETHING FOR THE YOUNG (AND THE SIMPLE-MINDED)

BUNNY ET. PLUS E.T.A.

Gather in the eggies,
Mind the little chickies,
Deliver to the housies,
Eat the yummy lickies;
TWO levels of skill!
THREE levels of action!

ONLY YOU CAN HELP E.T.A. GO HOME! DISCOVER HIS NAME & APPEARANCE..... THEN HELP HIM ESCAPE FROM THE GROWN-UPS.

CAN YOU WRITE GOOD CLEAN FUN?

BOTH GAMES ON 1 CASSETTE, WITH KARTOONS & MUSIC!

CAN YOU WRITE STUFF AS DART AS THIS LOT?

BEST POSSIBLE TASTE

A GREAT COMPILATION OF THIRTY, YES THIRTY GAMES FOR THE 1K ZX81, ALL ON ONE CASSETTE! INCLUDING: HORRORSCOPE, BAD SPELLS, DER FUHRER, ACNE, KICK THE BUCKET, HORSE RACE, ROYAL FLUSH, FUNNY VALENTINE, POX, DOLE, STORK, GROWING UP, LIFE SUPPORT, TUMBLING DICE, FAIRIES, FIND THE NUMBER, REAGAN, CRYSTAL BALL, PS AND QS, GENESIS, GOD, NOAH'S ARK, PLAGUES, GOLIATH, JONAH, MERRY CHRISTMAS, LIES..... and it's all done IN THE BEST POSSIBLE TASTE

ALL PRICES INCLUDE VAT, PACKING & POSTAGE WITHIN THE U.K. DEALER AND OVERSEAS ENQUIRIES VERY WELCOME..... please send me these cassettes, I enclose the right amount:

MY NAME
MY ADDRESS

		£5	No.	£
PIMANIA	ZX81 (16K)	£5		
PIMANIA	SPECTRUM (48K)	£10		
PIMANIA	DRAGON 32	£10		
PIMANIA	BBC (32K)	£10		
DRAGON DOODLES & DEMOS	DRAGON 32	£5		
SPECTRUM SPECTACULAR	all SPECTRUMS	£5		
BUNNY plus E.T.a.	all SPECTRUMS	£5		
THE BEST POSSIBLE TASTE	ZX81 (1K)	£5		
TOTALS		£		

send cash, cheques, POs to: AUTOMATA UK LTD, 65 OSBORNE RD, PORTSMOUTH, PO5 3LR, ENGLAND. TEL. (0705) 735242 (Cut this out, or send us a note if you prefer not to massacre your magazine. And thanks for your custom.)