

POPULAR Computing WEEKLY

35p 16-22 February 1984

BRITAIN'S BEST-SELLING MICRO WEEKLY

CLASSIFIEDS
START
HERE

I'm An
**URBAN
UPSTART**
Are You?
RICHARD SHEPHERD SOFTWARE

AQUARIUS
SEE PAGE 49

VALHALLA

Computer Swap
01-437 4343

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

DRAGON 32 demo cartridge wanted, or
any defective or faulty cartridges. Ring
Staines 58707, after 6pm.

WANTED, Spectrum 16/48k, or Com-
modore 64. Exchange for Philips or
most video cartridge recorder, many
blank tapes and 2X81 16k. Please
phone Rustington 43511. (West
Sussex).

WANTED, Spectrum 16k or 48k, for
£100. Tel: Brighton 203479 (?????).

DRAGON 32 games program for swap
or sale. Tel: 031 339 5790 (after 6pm).

WANTED, 64 or Sharp M2 711, or Atari
600 XL with c/recorder, Maxim Party,
£155. Tel: 0789 205198.

WANTED, compatible track ball, for
Commodore 64, will give Atari track ball
in exchange. Tel: 01-840 3610.

★ STAR
Z-Fred on Spectrum.
See page 10.
GAME ★

News Desk

MoD bans software protection

A BARNSELY-based cassette duplication company has come up with an answer to the problem of software piracy. Yet the technique may never be used by software houses to protect their programs.

JLC Data has patented a unique system which prevents, not only commercial piracy, but also home tape-to-tape copying. However, the patent has had to be withdrawn and the idea shelved following a secrecy order which was served on JLC by the Ministry of Defence.

"We have had the secrecy order placed on us which spells it out in plain English" — explained JLC's Jim Lamont. "I can't tell anybody about it on pain of imprisonment and heavy fines.

"I must package up all information relating to the research we have carried out in the past eight months and send it to them. It must all go in an envelope marked 'secret' which is in turn put inside another envelope and then be sent by registered post to the MoD. It is all cloak and dagger stuff."

continued on page 5

GEC breathes new fire into Dragon

DRAGON'S intention to diversify its range of products will mean a change of emphasis for the company.

A plan worked out by managing director Brian Moore will shortly expand the company's activities into business micros.

Last week Dragon relinquished marketing and distribution responsibilities to a GEC subsidiary, GEC McMichael, and also reduced the number of staff at its South Wales plant by 29. The redundancies, according to Brian

Moore, are designed to streamline the company.

Dragon has had its fair share of set-backs in recent months. In September, cash-flow problems forced its shareholders to put up £2.5m to bale it out. At the same time Brian Moore was appointed by the shareholders to replace Tony Clarke. Then, in November, one of its shareholders, the troubled Mettoy toy manufacturer, went into liquidation. Its holding has now been shared between the company's remain-

continued on page 5



Dragon managing director Brian Moore

○ ○ ○ ○ ○ ○ ○ ○ This Week ○ ○ ○ ○ ○ ○ ○ ○

- **Reviews** Barbara Conway looks at a selection of BBC adventures on page 16.
- **Spectrum** Trevor Toms continues his series on machine code, see page 21.
- **Dragon** C McGinley looks at the keyboard reading routine on page 24.
- **New Releases** included in this week's selection are Micro Drivin from Softel and Forty Niner from Software Farm, page 52.

DEATHCHASE

3D as you have never seen before on your Spectrum! £6.95 will put you right on the saddle of the Big Bike! Ride deep into the forest through day and night, chasing the enemy riders. Weave through the trees at breakneck speed and watch out for helicopters and tanks - the greatest prizes of all!

Suitable for all Spectrums

new software FOR A NEW dimension

Kempston Joystick compatible

Retail Outlets: - John Menzies, Selfridges, HMV Shops, WH Smiths, and Spectrum shops everywhere and all other good software stockists

Trade Enquiries: PRISM 01-253 2277 Websters Software 0486 84152 Lightning Records and Video 10-969 5255 Micro Dealer UK 51 Albans 34351

MICROMEGA Micromega, Personal Computer Division, Quantec Systems & Software Ltd, 230 - 236 Lavender Hill, London SW11 1LE.

The Team

Editor
Brendon Gore

News Editor
David Kelly

Software Editor
Graham Taylor

Production Editor
Lynne Constable

Editorial Secretary
Cleo Cherry

Advertisement Manager
David Lake

Assistant Advertisement Manager
Alastair Macintosh

Classified Executive
Diane Davis

Advertising Production
Lucinda Lee

Administration
Theresa Lacy

Managing Editor
Duncan Scot

Publishing Director
Jenny Ireland

Popular Computing Weekly,
12-13 Little Newport Street,
London WC2R 3LD
Telephone: 01-437 4343

Published by Sunshine Publications Ltd.



Registered at
the Post Office
as a newspaper

MEMBER OF THE AUDIT
BUREAU OF CIRCULATIONS
ISSN 0265-0509

Typeset by The Artwork Group,
55-63 Goswell Road, London EC1,
in association with Ink on Paper Ltd.
Printed by East Midland Litho Printers
Ltd, Oundle Road, Woodston,
Peterborough PE2 9QR.

Distributed by S M Distribution
London SW9. 01-274 8611. Telex: 261643

© Sunshine Publications Ltd 1984

How to submit articles

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

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

Accuracy

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

This Week

News	5
Satellite tv	
Letters	7
Sinclair microdrive	
Star Game	10
Z-Fred on 16K Spectrum by Nicky King	
Street Life	13
David Kelly talks to Graham Daubney	
Reviews	16
BBC adventures by Barbara Conway	
Programming	18
Basicode by Ian Logan	
Spectrum	21
Machine code by Trevor Toms	
Dragon	24
Keyboard by C McGinley	
BBC and Education	26
New tartan by S Pithers	
Commodore 64	31
Hot dog by T Ellenrieder	
Open Forum	35
Four pages of your programs	
Microradio	39
Ray Berry's column	
Adventure	43
Tony Bridge's column	
Peek & Poke	45
Your questions answered	
New releases	52
Latest software programs	
This week	54
Top 10 plus all this week's software	
Competitions	55
Ziggurat, Puzzle, Losers	

Editorial

Satellites are very much in vogue at the moment. First, the US space shuttle *Challenger* succeeded in losing two satellites within days of each other, then Sir Clive Sinclair announced he could produce a satellite tv adaptor for just £100.

Now, nobody is suggesting that these two items are linked in any way, but they do demonstrate that satellites are 'hot' at the moment.

However, while most people are thinking about satellites in terms of tv or radio communications, they also hold possibilities for computers. Project Universe, which was set up three years ago with funds from the Department of Trade and Industry, is looking at ways of linking together various local area networks via satellites. This would make it much easier for sophisticated computer systems to communicate with each other at high speed.

But, Project Universe is running out of money. It needs somewhere in the region of another £10m to develop a commercial system.

Since the project is an amalgamation of industrial, academic and governmental interests, theoretically there should be no problems in raising additional finance. However, research budgets are extremely tight at the moment, so the money may not be forthcoming.

But then building a universe never was cheap.

Next Thursday

Can you land your commandos on the fort in Hot Drop — next week's star game for the BBC by Ken Swallow.

Subscribe to Popular Computing Weekly

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

Please start my subscription from the issue.

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

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

Please tick relevant box

I enclose my cheque to *Popular Computing Weekly* for

Name

Address

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

THE HOBBIT

WINNER STRATEGY GAME OF THE YEAR

PENETRATOR

RUNNER-UP BEST ARCADE GAME OF THE YEAR

THE HOBBIT

RUNNER-UP GAME OF THE YEAR

MELBOURNE HOUSE

RUNNER-UP SOFTWARE HOUSE OF THE YEAR



1983 GOLDEN JOYSTICK AWARDS

Software ban

continued from page 1

The technique developed by Jim Lamont uses an 'imprint' signal recorded together with the data signal on the tape. The imprint is added at the master stage of recording, so no specialised duplicating equipment is required.

The imprint remains invisible to the computer, unless any copy of the tape is made — either by breaking into the program or by a direct tape-to-tape transfer. Any attempt to copy the tape, corrupts the program.

The crucial aspect of the technique as far as the Ministry of Defence is concerned is that it is equally effective for protecting on-line data. Conceivably, the method could be used to prevent listening-in to either computer network links or other methods of data transfer, even via telephone lines.

Until the MoD action, JLC had been receiving around 70 calls a day from interested software houses. The company will receive some compensation for the loss of its patent. Said Jim: "Whether that compensation will be adequate I doubt very much."

He now plans to go ahead and try to interest software companies in an earlier version of his protection system not covered by the MoD's secrecy order. "The end result of the earlier method is about the same as the one we patented, but it is not so devious" he said. Trials of the less sophisticated system will begin this week when one software house begins a field test of the method.

Dragon fire

continued from page 1
ing investors.

And, most recently, Dragon's link up with Tanno in the US has produced disappointing results. Tanno failed to reach its sales target of only 5,000 machines last year and Dragon's US sales director George Merchant has been sacked.

Future Dragon computer products are now expected to be directed towards the business computer market. Intense competition and price cutting in the home computer market forced Dragon to cut the cost of its Dragon 32 shortly before Christmas by £25 to £145.

QL delays expected as orders grow

FIRST deliveries of Sinclair's new QL computer are now unlikely to be dispatched to customers until at least the beginning of March.

The 28-day period allowed for delivery in the company's mail-order advertisements will be up for the first would-be owners this Friday, February 17. Yet most of the first batch of machines expected at the end of this month will be sent to software authors for program

development and to magazines for review.

The delay is apparently due to continuing development of the ULA chip and work still being carried out on the QL's SuperBasic. The design of the QL Microdrives has however now been finalised — none were in evidence in the machines shown at the January launch — and work to make the four Psion software packages fully compatible with the

Hype is the name of the game

HYPE is the name given to the first boardgame to be launched by a computer software house — Virgin Games.

While other companies are abandoning traditional board-games in favour of their video equivalents, Virgin plans *Hype* as the first of a whole range of packages.

Based on the internal workings of the music business, the object of the game is to assemble your ideal rock band and 'hype' it into the Number 1



slot. The game — conceived by an existing group, *The Technos* — will be launched at the end

of this month and will sell for £17.95.

Other titles to follow throughout 1984 will include *Robin Hood*, *Space Colony* and *Isomer* priced under £10 and a budget range including *Block-it*, *Bluff-it* and *Catch-It*.

Daisy wheel printer

PRICES for daisy wheel printers continue to fall. Star Computer Peripherals are launching a range of Silver-Reed printers with the basic model retailing for £344.

All the printers in the range support subscript, superscript and bold type — print speed on the basic model — the EXP 500 — is 12 characters per second.

More details from Star Computer Peripherals, Unit 6, Imperial Way, Worton Grange Industrial Estate, Reading, Berks.

Brother EP-44 printer



THE distinction between computers and typewriters blurs still further with the launch by Brother of its EP-44 personal printer.

The device is battery driven with full-size keyboard and 28x18 dot-matrix printer.

With 4K of Ram built-in, up to three A4 pages of text can be viewed on a 15-character liquid crystal display and edited before printing.

An RS232 interface allows it to communicate with other devices or to be used as a printer peripheral for a home computer.

The Brother EP-44 costs £253.



drives should be finished at the end of this week.

Orders for the QL are now building up at an alarming rate and some sort of order backlog — traditional for any new Sinclair product — seems inevitable.

Around 6,000 QL orders (worth £2.4m) have so far been placed, and 3,000 of those have been taken in the last week.

Micronet tapes

MRM Software is the first company to move from supplying programs on Micronet 800 — the database network — to producing them on cassette.

MRM's games *Q Man*, *Banana Man*, *Q Man's Brother*, *3D Munchy* and *Secret Sam* are all in Micronet's monthly BBC Top Ten.

Satellite tv receiver

SINCLAIR has given UK television companies a strong incentive to go ahead with their direct broadcast satellite tv plans.

The micro manufacturer has told the BBC and the IBA that it plans to design and produce a satellite tv receiver for under £100.

The cost of such receivers has proved a major stumbling block in the development of satellite tv. Sinclair's price for the device is around a fifth of previous estimates.

The £100 tag would include both the receiving dish and the decoding equipment needed to make the signal intelligible to any ordinary domestic tv set.

Such a low-cost package could well influence the decision of the joint working party, presently deciding the future of satellite broadcasting, in favour of direct broadcast television. Last year the BBC shelved its ambitious satellite broadcasting programme, following the failure of the European broadcasting companies to agree transmission standards.



IT'S HERE.

ANDROID TWO IN 3D.

A NEW DIMENSION IN EXCITEMENT FROM VORTEX SOFTWARE.

Stop the advance of the Millitoids. Survive the maze of death, rationalise the paradox zone and overcome the dangers encountered in the flatlands.

Achieve this and return to the transporter capsule before the deadline. But beware. There are lethal Hoverdroids, Bouncers and land mines everywhere.

3D full colour graphic effects, machine code fast action and multi-screen wraparound zones make Android Two a mindblowing action game.

**SEEK OUT ANDROID TWO AT
ALL THE BEST DEALERS.**



PLEASE RUSH ME:

SPECTRUM 48K

KEYBOARD/JOYSTICK OPTION

ANDROID TWO(S) **£5.95 EACH**

TOTAL VALUE £

Enclose PO/cheque payable to VORTEX SOFTWARE.

NAME _____

ADDRESS _____

Send to mail order address:
VORTEX SOFTWARE 280 BROOKLANDS ROAD MANCHESTER M23 9HD.

DEALER ENQUIRIES WELCOME

Vortex are always seeking exciting new programs. Contact us or send sample.

Waiting for . . .

I would like to ask everyone who is waiting for ZX Microdrives the following question.

There is a company called Sinclair, Who brought out the Microdrive in despair.

A year and a half late,
Was it worth the wait?
Rumours were spread,
I was begining to dread.
So when the Postman knocked on my door,
In his hand a Microdrive I saw.
I quickly signed the paper,
And had it set up five minutes later.
In it the Demo cartridge, I did place,
You should have seen the look on my face.

It started to burr,
The LED started to glow.
Surely it can't be this slow?
I waited a while,
Away went my smile.
I tried to press BREAK,
Was this a mistake?
It appeared to work.
The drive stopped with a jerk.
The screen was just white,
I nearly died of fright.
My Spectrum had crashed,
The cartridge was slashed.
My fists were clenched,
From the power supply, the plug was wrenched.
I sat back and cried,
Oh Sinclair, well they tried,
For my pen I did race,
Does anyone make a disc interface?

Gavin Monk
Commonwealth Hall
Cartwright Gardens
London WC1H 9EB

PS. May I also take this opportunity to recommend Andrew Pennell's excellent book *Master Your ZX Microdrive* to all Microdrive users.

Arcade freaks

I was delighted and relieved to read Steven Mason's letter (*PCW*, Letters, 19-25 January).

This page, in particular, was beginning to create the impression that this magazine was being published solely for the benefit of arcade freaks. Most of the Open Forum programs seem to be of the arcade variety and one becomes ex-

tremely despondent to keep on reading high scores for this, that and the next thing, week in and week out.

At 40 years old I am not particularly into Zap-Pow-Shoot'em Down games and would much prefer to see some advice and programming for more intelligent uses of my Vic 20. I am especially interested in the creation and using of filing systems (I know this is tediously slow with cassette, but I cannot yet afford to uprate to a disc system).

Please don't spoil what is otherwise a very good magazine by allowing it to degenerate into a games-only publication.

Peter Swift
22 Skippingdale Road
Scunthorpe
South Humberside DN 15 8NU

Golden sundial

Dear Pimaniac — until the back page of *Popular Computing Weekly* informs the world that somebody has won my golden sundial it is still in the possession of my wicked bosses at Automata.

Keep reading the back page 'cause nobody's won it yet.
Yours Piously
The Piman

Ideal language

I was horrified to read Iain Stewart's letter (*PCW* 2-8 February) on the subject of "ideal languages". The fact that he mentions a "huge array of structures" on the BBC shows that he has little idea of



"He's fixing the dish on the roof for satellite television."

what structures actually are. To my knowledge, the only structures the BBC has are *Repeat/Until* and *For/Next*, which are not really adequate. Admittedly, the BBC has procedures and functions, but they are rather limited in their power since it is possible to pass parameters by value only, and procedures cannot be local.

To say that the "ideal language" should be capable of indirect jumps (*Goto* variable) is naive; indirect jumps make programs totally unreadable and difficult to debug, especially if they refer to line numbers, which they undoubtedly do in Basic hybrids. In any case, what is *Goto* doing in an ideal language? Structures such as *Repeat/Until*, *While/Do* and *Case* structures remove the need for complicated jumping. Obviously Iain Stewart has never heard of Pascal or Forth, both of which have a large number of structures.

Forth comes very close indeed to my "ideal language" because of powerful words which allow you to create your own structure. But it is worth bearing in mind that there is no "ideal language". For example, Logo, with its advanced list processing capabilities and friendly operating environment, is ideal for teaching the rudiments of programming and maths, but is totally unsuited for writing operating systems. If one language had all the desirable qualities of other languages, it would be too difficult to use. My suggestion to Iain Stewart is to buy a book on Pascal or Forth.

Do any other readers have views on structured programming or languages?

A Hegedus
20 Ebrington Road
Harrow
Middlesex HA3 0LR

Spectrum potential

The heading BBC & Education in the *PCW* index seems to suggest that it is only the BBC micro which has any serious educational uses.

I own a Spectrum and use it principally for learning about the intricacies of computer programming, although I must admit to playing the odd game

of the adventure type now and then. However, education is also an interest of mine, having two small children. More and more software houses, in conjunction with book publishers, are now producing excellent education packages for the Spectrum. Additionally, with a ratio of 1m to 200,000 over the BBC micro, the Spectrum's potential is immense and it is one of the leading computers in schools up and down the country.

While the Spectrum is an efficient 'games' machine, it is also a serious programmer's and educational machine. This, coupled with the networking possibilities with the QL, will make the Spectrum of interest to small business users.

In short, it is not just a games machine and I am sure many of your readers will feel the same. So, how about giving credit where credit is due: Spectrum — business, education and games.

Larry Walker
16 Woodfield Close
Redhill
Surrey RH1 2DL

PS. What has David Hesketh's game on horse racing got to do with education?

Manic Miner pages

I wonder if you can help me, one of your regular readers.

About two months ago, a reader's letter appeared in one of your issues giving a list of entries which could be typed into the Spectrum to gain access to all the pages of the excellent *Manic Miner* program. Sadly, I have now lost this particular copy and miss it greatly.

Could you possibly send me this list or, if necessary, a copy of the relevant issue of *PCW* which would be dated approximately late October or early November.

David Crafts
Popeswood
Limes Lane
Buxted
Uckfield
East Sussex

No sooner said than done. For other readers who may be interested, the issue concerned is *PCW* 3-9 November.

AGF

PROGRAMMABLE JOYSTICK INTERFACE for Spectrum or ZX81

MICRODRIVE
COMPATIBLE



AGF PROGRAMMABLE INTERFACE

Recognised as the only true Hardware Programmed joystick interface this product offers all the features associated with such a design.

You can use any Atari-compatible joystick controller with any software for your Sinclair Spectrum or ZX81, not just those with a joystick option.

Movement of the joystick is recognised by the computer exactly the same as pressing the appropriate control keys, and can therefore give the most immediate response to that movement. The hardware programmed design works with all possible key-reading methods, both BASIC and Machine Code.

Eight directional movement, with or without the fire button being pressed, can be achieved by only programming the left, right, up, down and fire keys required by the game.

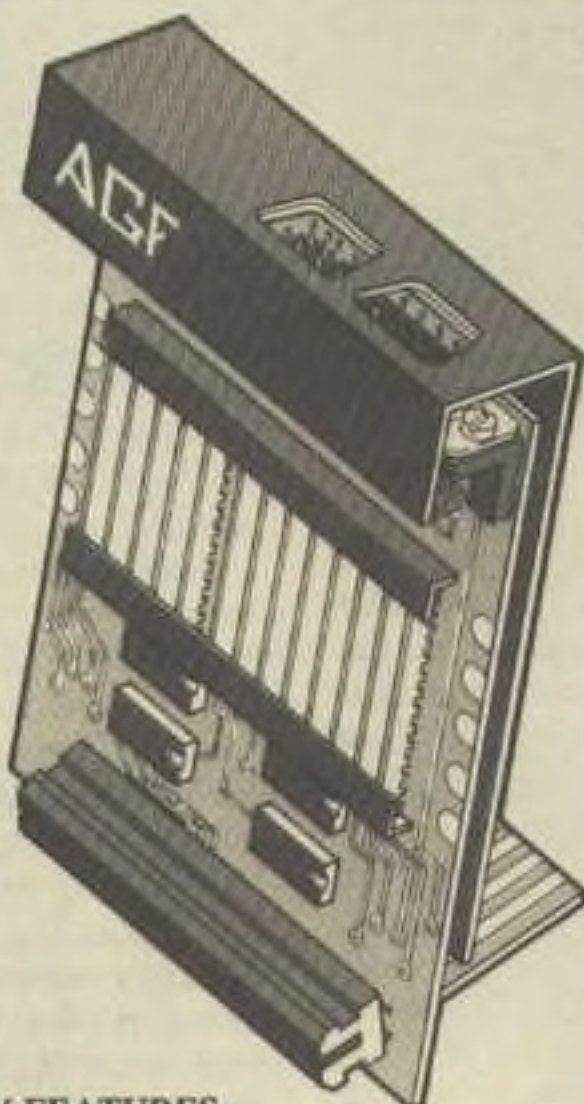
Programming is achieved by a two-digit code, which is looked up on the Programming Chart supplied, for each direction and firing button. These two numbers are then selected on a pair of leads which are clipped onto appropriately numbered strips on the interface.

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

The keyboard remains fully functional and can be used simultaneously with the joystick.

An integral rear expansion connector means there is no need to remove the interface to connect other peripherals.

NB. A recent design improvement now means that the AGF Programmable Interface works with the new Quickshot II rapid "Auto Fire" feature.

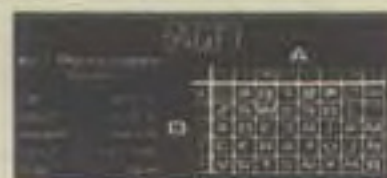


KEY FEATURES

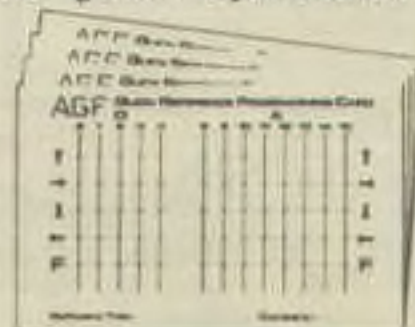
- ★ Programmable design gives TOTAL software support.
- ★ Accepts Atari, Competition Pro, Wico, Starfighter, Quick Shot, Le Stick etc.
- ★ Rear extension connector for all other add-ons.
- ★ Free demo program and instructions.

PACKAGE CONTENTS SUPPLIED

- Programmable Interface Module as illustrated, complete with clip-on programming leads.
- Self adhesive programming chart detailing how to define which key is simulated by UP, DOWN, LEFT, RIGHT, and FIRE.



- One pack of ten Quick Reference Programming Cards for at-a-glance setting to your games requirements.



- 12 months guarantee and full written instructions.

ONLY
16.95
+ £1 P&P



Quickshot II® JOYSTICK

NEW IMPROVED GRIP : BUILT-IN STABILIZING SUCTION CUPS

TRIGGER FIRE BUTTON : RAPID AUTO FIRE SWITCH : TOP FIRE BUTTON

FROM: MR/MRS/MISS

ADDRESS

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

FREEPOST, BOGNOR REGIS, WEST SUSSEX, PO22 9BR.

QTY	ITEM	ITEM PRICE	TOTAL
	PROGRAMMABLE INTERFACE	27.95	
	JOYSTICK(S)	17.95	
	PACK(S) QUICK REFERENCE CARDS	1.00	
ZX81 <input type="checkbox"/> ZX SPECTRUM <input type="checkbox"/> Please tick		FINAL TOTAL	
DEALER ENQUIRIES WELCOME		EXPORT PRICES ON APPLICATION	



WALHALLA

Z-Fred

A new game for 16/48K Spectrum by Nicky King

This is a version of the arcade game Q-Bert for the 16/48K Spectrum. Full instructions are included in the program.

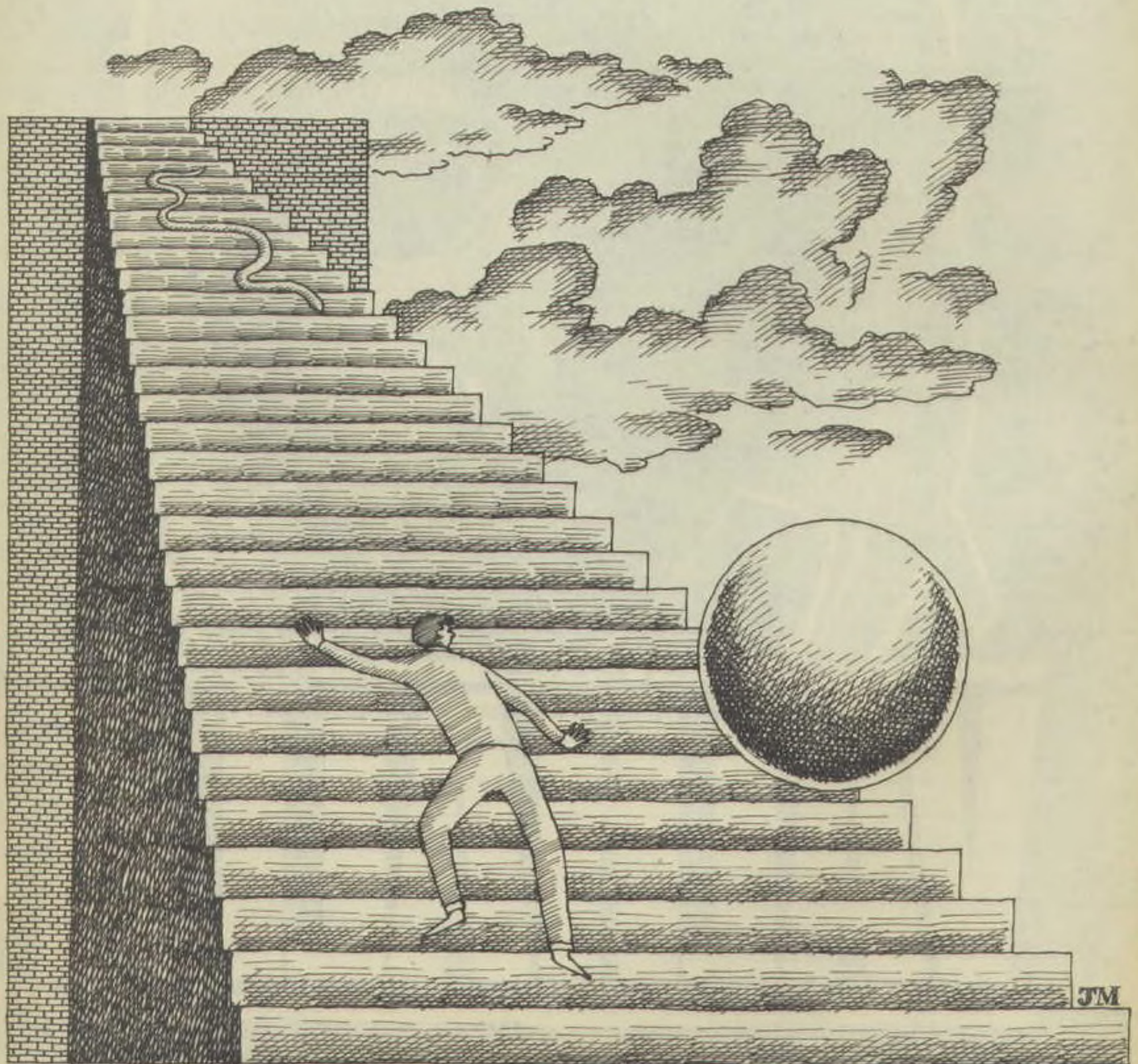
The program was written on a 48K machine — in order to convert the program for a 16K Spectrum, the machine code sound effects have to be removed. This

is done by deleting lines 125-131, 102, 68, and deleting the *Usr* calls in lines 33, 42, 89.

Line 106 contains the data for the empty pyramid graphics, these are *Poked* and subsequently printed on the screen. Line 122 holds the same data as the empty

pyramid, but with the tops filled in, so that *Z-Fred* can fill in a blank top quickly (since *UDG*'s already displayed can be redefined without altering the screen display).

The program consists of 10 main sub-routines, all of which are clearly labelled with *Rem* statements.



```

1 BORDER 0: PAPER 0: INK 7: C
L5
2 DATA 1,1,12,3,0,1,2,4,192,1
92,152,224,128,64,32,16,8,4,2,1,1
52,16,7,3,192,224,112,48,176,1
16,192,16,0,0,0,16,112,79,32,31,
32,0,24,192,0,0,24,4,248
0,0,248,0,0,248,4,248
USR RESTORE 2: FOR f=USR "a" TO
USR "r"+7: READ a: POKE f,a: NE
XT f
4 GO SUB 94
5 LET hi=0
6 REM [REDACTED]
7 LET sc=0: LET li=3
8 LET sheet=1
9 REM [REDACTED]
10 LET x=12: LET y=15
11 LET b=115: LET n=75
12 GO SUB 104
13 LET box=0
14 LET level=1
15 LET a=4: LET b=15
16 LET wait=0: LET count=0
17 LET o=14: LET p=5
18 LET level=1:0
19 PRINT AT 0,0:"HI SCORE:";h;
20 PRINT AT 0,0:"PYRAMID:";she
et
21 PRINT AT 2,0:"LIVES:";li
22 PRINT AT 1,0:"SCORE:";sc
23 REM [REDACTED]
24 IF sheet=13 THEN PRINT AT 3
0:"PYRAMID:1": LET sheet=1: LE
t li=li+1: PRINT AT 2,0:"LIVES:"
li: PRINT AT 2,13: FLASH 1:"BON
US": FOR f=-20 TO 20: BEEP .01,f
: BEEP .01,18-f: NEXT f: FOR f=1
TO 100: NEXT f: LET sc=sc+1000:
PRINT AT 2,13: FLASH 0;
25 LET chance=sheet-5
26 GO SUB 31
27 IF sheet<5 OR sheet>8 THEN
GO SUB 44
28 IF sheet>4 THEN GO SUB 86
29 PRINT AT 1,0:"SCORE:";sc
30 GO TO 23
31 REM [REDACTED]
32 PRINT AT x,y: INK 3; PAPER
5:"AB"
33 IF POINT (b,n)=0 THEN LET s
c=sc+10: LET z=USR 60035: LET bo
x=box+1: GO SUB 57: IF box=21 TH
EN GO TO 42
34 LET x1=x: LET y1=y
35 IF INKEYS="i" AND y=15+(5-l
evel)*2 OR INKEYS="e" AND y=5+15
vel*2 OR INKEYS="f" AND level=0
OR INKEYS="j" AND level=0 THEN G
O TO 67
36 IF INKEYS="i" THEN LET x=x-
2: LET y=y+2: LET level=level+1:
LET n=n+15: LET n=n+15
37 IF INKEYS="e" THEN LET x=x-
2: LET y=y-2: LET level=level+1:
LET n=n-15: LET n=n+15
38 IF INKEYS="j" THEN LET x=x+
2: LET y=y-2: LET level=level-1:
LET n=n-15: LET n=n-15
39 IF INKEYS="f" THEN LET x=x+
2: LET y=y+2: LET level=level-1:
LET n=n+15: LET n=n-15
40 PRINT AT x,y: INK 3; PAPER
5:"AB"
41 IF x1<>x AND y1<>y THEN PRI
NT AT x1,y1: INK 7; PAPER 6:"B"
42 IF box=21 THEN LET z=USR 60
035: LET sc=sc+1000: LET sheet=sh
eet+1: GO TO 9
43 RETURN
44 REM [REDACTED]
45 IF wait=1 THEN GO TO 54
46 LET d=INT (RND*2)
47 PRINT AT a,b: INK 2; PAPER
6:"CD"
48 IF x=a AND y=b THEN GO TO 6
7
49 LET a1=a: LET b1=b
50 LET a=a+2: LET b=b+12 AND d
=0)-(2 AND d=1)
51 PRINT AT a,b: INK 2; PAPER
6:"CD": AT a1,b1: PAPER 6;" "
52 IF a=k AND b=y THEN GO TO 6
7
53 IF a=16 THEN LET wait=1: LE
T count=(20 AND sheet=1)+(10 AND
sheet=2)+(8 AND sheet=3)+(1 AND
sheet=4)+(30 AND sheet=5)+20 A
ND sheet=6)+(10 AND sheet=7)+(1
AND sheet=8)+(30+sheet=9)+(20 AN
D sheet=10)+(10 AND sheet=11)+(1
AND sheet=12)
54 IF wait=1 THEN LET count=co
unt-1
55 IF count=0 AND wait=1 THEN
LET wait=0: PRINT AT a,b: PAPER
6;" " : LET a=4: LET b=15
56 RETURN
57 REM [REDACTED]
58 IF y=5+level*2 AND x<>4 THE
N GO TO 63
59 IF y=15+(5-level)*2 AND x<>
4 THEN GO TO 65
60 IF x=4 THEN PRINT AT x-1,y:
"OP": AT x,y-1:"M": PAPER 7:"
PAPER 6;"N": AT x+1,y:"KL": RETU
RN
61 PRINT AT x-1,y:"HI": AT x,y-
1:"O": PAPER 7:" " : PAPER 6;"J"
: AT x+1,y:"KL"
62 RETURN
63 PRINT AT x-1,y:"OI": AT x,y-
1:"M": PAPER 7:" " : PAPER 6;"J"
: AT x+1,y:"KL"
64 RETURN
65 PRINT AT x-1,y:"HP": AT x,y-
1:"O": PAPER 7:" " : PAPER 6;"N"
: AT x+1,y:"KL"
66 RETURN
67 REM [REDACTED]
68 LET z=USR 60083
69 PAUSE 0: LET li=li-1
70 IF a=x AND b=y THEN PRINT A
T 19,7:"THE BALL GOT YOU": FOR f
=1 TO 200: NEXT f: GO TO 73
71 IF o=x AND p=y AND sheet>4
THEN PRINT AT 19,7:"THE SNAKE GO
T YOU": FOR f=1 TO 200: NEXT f:
GO TO 73

```

```

72 IF y=15+(5-level)*2 OR y=5+
level*2 OR level=0 THEN PRINT AT
19,10:"YOU FELL OFF": FOR f=1 T
O 200: NEXT f
73 IF li=0 THEN GO TO 75
74 GO TO 9
75 CLS
76 IF sc>hi THEN LET hi=sc: PR
INT AT 4,8: FLASH 1:"NEW HIGH SC
ORE"
77 PRINT AT 10,2:"PRESS ANY KE
Y TO PLAY AGAIN"
78 PRINT AT 0,8:"YOU SCORED ";
sc
79 PAUSE 0: GO TO 6
80 REM [REDACTED]
81 IF sheet>8 THEN LET chance=
sheet-9
82 PRINT AT 0,p: INK 9; PAPER
6:"EF"
83 IF (RND*7)>chance+1 THEN RE
TURN
84 LET o1=0: LET p1=p
85 IF o>x AND p<y THEN LET o=0
-2: LET p=p+2
86 IF o>x AND p>y THEN LET o=0
-2: LET p=p-2
87 IF o<x AND p>y THEN LET o=0
+2: LET p=p-2
88 IF o<x AND p<y THEN LET o=0
+2: LET p=p+2
89 IF o<>01 AND p<>p1 THEN LET
z=USR 60000
90 PRINT AT 0,a: INK 9; PAPER
6:"EF"
91 PRINT AT 0,1,p1: PAPER 6;"
"
92 IF o=k AND p=y THEN GO TO 6
7
93 RETURN
94 REM [REDACTED]
95 PRINT TAB 13: PAPER 1:"Z-FR
ED"
96 PRINT " You must guide Z-F
RED " : INK 3:"AB": INK 7:" " :
0
nto all of the cubes without fall
ing off the pyramid and before
the ball " : INK 2:"CD": INK
7:" " gets his " : Also you must watch
out for the deadly snake " : IN
K 6:"EF": INK 7:" " which will
chase you all over the pyramid
"
98 PRINT " You gain points by
filling in all of the tops of t
he squares in the pyramid."
99 PRINT " If you complete pyr
amid 12 then you will be awarded
a big bonus."
100 PRINT " The controls are:
E I
X
J F
"
101 PRINT TAB 4: FLASH 1:"PRES
S A KEY TO PLAY Z-FRED"
102 GO SUB 125
103 PAUSE 0: RETURN
104 REM [REDACTED]
105 CLS
106 DATA 200,140,176,192,192,17
5,320,171,73,147,37,75,147,44,11
5,192,213,170,213,170,213,86,13
9,213,100,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
107 RESTORE 106: FOR f=USR "g"
TO USR "r"+7: READ a: POKE f,a:
NEXT f
108 PRINT " TAB 15,"OP"
109 PRINT TAB 14:"M N"
110 PRINT TAB 13:"OIKLHP"
111 PRINT TAB 12:"M JG N"
112 PRINT TAB 11:"OIKLHIKHP"
113 PRINT TAB 10:"M JG N"
114 PRINT TAB 9:"OIKLHIKHIKHP"
115 PRINT TAB 8:"M JG JG JG"
116 PRINT TAB 7:"OIKLHIKHIKHI
XHP"
117 PRINT TAB 6:"M JG JG JG
JG N"
118 PRINT TAB 5:"OIKLHIKHIKHI
KHIKHP"
119 PRINT TAB 4:"M JG JG JG
JG N"
120 PRINT TAB 4:"IKLHIKHIKHIK
HIKHIKHP"
121 PRINT TAB 5:"OR OR OR OR
OR OR"
122 DATA 200,140,191,255,255,19
1,171,73,147,37,75,147,47,115,
192,213,170,213,170,213,86,139,
213,100,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
123 RESTORE 122: FOR f=USR "g"
TO USR "p"+7: READ a: POKE f,a:
NEXT f
124 RETURN
125 DATA 1,10,7,3,255,0,17,10,
20,20,210,197,205,161,0,193,200,
20,20,145,111,16,242,251,201
126 DATA 00,150,1,1,1,0,200,10
1,3,201
127 DATA 1,00,0,0,255,0,17,100
,20,20,210,107,205,151,0,193,200
,20,125,145,111,16,242,251,201
128 DATA 1,10,100,33,255,0,17,7
0,0,220,210,107,205,161,0,193,20
0,0,125,145,111,16,242,201
129 DATA 1,10,75,33,255,11,17,1
0,0,220,210,107,205,161,0,193,200
,20,125,12,111,16,242,201
130 RESTORE 125: FOR f=60000 TO
60100: READ a: POKE f,a: NEXT f
131 RETURN

```

ULTIMATE



THE NOT · SO · SOFTWARE

CAN YOU HANDLE THE **ULTIMATE**?
 THE MOST AMAZING PROGRAMMES, THE SMOOTHEST
 ACTION, THE HIGHEST RESOLUTION GRAPHICS?
 ALL **ULTIMATE** GAMES ARE ARCADE STANDARD,

FEATURE PACKED, 100% MACHINE CODE.
 AND PURE ADDICTION.
 SO WHICH WILL BLOW FIRST - YOUR COMPUTER OR
 YOUR MIND?



Cookie 16/48K ZX Spectrum



Tranz Am 16/48K ZX Spectrum



Atic Atac 48K ZX Spectrum



Pssst 16/48K Spectrum



Lunar Jetman 48K ZX Spectrum



Jet Pac 16/48K ZX Spectrum
 or BK Expanded VIC 20

ONLY £5.50 EACH Available from: W.H. Smith, Boots, John
 Menzies, Spectrum Centres, large department
 stores and all good software retailers. Or send the coupon direct.
 We'll pack and post your order to you absolutely free in the U.K.

Okay, I dare take my computer to the edge of meltdown. Send me the following:

- Cookie Lunar Jetman Pssst Tranz Am
 Jet Pac Jet Pac - Expanded VIC 20 Atic Atac

I enclose cheque/PO for £ _____ Name _____

Address _____

Code _____

Send to:
 Ultimate Play The Game,
 The Green,
 Ashby de la Zouch,
 Leicestershire.



All the world's a stage

David Kelly talks to Graham Daubney and his accomplice, Topo

Robots are suddenly all the rage. You can't move these days without continually being introduced to some new wheeled wonder.

Although those in the know claim that personal robots will become the greatest thing since home computers, such a notion seems, on the face of it, puzzling. Most of the present generation of robots can do little more than a radio-controlled car costing a tenth of the price. They can both drive forwards and backwards.

But, that is to miss the point. These new home robots have the potential, within the very near future, to do a whole lot more. And prices, which may seem excessive now, should soon begin to fall quite sharply.

One of the front-runners in this new technology is Androbot, a US company set up in 1982 to design and produce a range of personal robots. Androbot was one of a number of companies funded by Atari's founder Nolan Bushnell after he sold Atari to Warner Communications.

Androbot exhibited its first robot — Topo — at the January 1983 CES show. It was controlled by an Apple computer via a 27MHz radio link, using software written in Basic. Several hundred of these Topo 1s were sold before they were superseded by Topo 2 — the version we will see in the UK. Topo 2 uses an infra-red link instead of radio, software is written in Forth — which is better suited for robotics than Basic — and the units feature a built-in speech synthesiser.

In the UK, Prism has been appointed to handle the Androbot machines. The first development versions of Topo 2 were received by the company last November and work began under the direction of Graham Daubney — Prism's development manager — to convert the operating software to run with British computers.

"The first thing I did was to start work on a high-level robotics language for the BBC micro, working as an extension of BBC Basic," says Graham.

"BBC Basic has the rather useful feature that you can add extra command words to it, altering the look-up table and the syntax checker as you go. So far, we have finished the communications software, enabling the BBC computer and Topo to understand each other, but we are still having to call some machine-code routines from Basic. The whole lot should be finished in a few weeks.

"The communications protocol of the infra-red transmission system has been the major development work for us on Topo."

The computer is connected via an RS232 interface to the infra-red tower — the base communicator. The tower contains an 8031 chip which packets up the information to

send to the robot. Topo contains two 8031s to receive and send data, so both the base communicator and the robot are intelligent.

Using one infra-red tower and computer up to 16 Topos can be independently controlled. Four 'public' channels are also included, allowing the same instruction to be broadcast to every Topo within range at the same time.

Line of sight

The 'range' is about 200 feet. In a normal room there would be enough reflection of the infra-red signals from the walls and ceiling that the robot would not have to remain in line-of-site of the base tower.

Information sent to the robot is of two types — either motion data or speech data. Most of the space inside Topo's casing is taken up by a cage for accepting printed circuit-board cards. Two processor boards are supplied as standard, with room for another four or five. One handles the communication with the home base, the other interprets the movement instructions. A speech synthesiser board is built into Topo's head, together with a number of Rom chips containing the robot's firmware — its on-board software.

Androbot developed Topo's software to work with the Apple II computer. Prism is working on the BBC micro version, to be followed by software for the Commodore 64. "We are trying to write transportable code and many of the Forth routines have been translated pretty much as is from the Apple." Commands are self-explanatory: 90 Forward moves Topo forward by 90cm. 90 Left turns Topo through 90°.

At the moment, Topo is capable of little else apart from driving about and talking.



But the age of the robot is only just beginning and there are many problems yet to be solved.

"How do you make a robot climb upstairs? Lateral thinking — for the moment the solution is move into a flat! But we are working on it. We have a joke at the moment. Why did the robot cross the road? Because it didn't know it was there.

"Vision is one of the biggest problems. Without recourse to very sophisticated software it is not possible for a robot to distinguish between different objects. Writing such a program is fine for development work but would be out of the question for an average computer enthusiast.

"So there may have to be some compromises with object identification — we may need to give the robot a helping hand by putting the object on a special plate." This plate might be a passive aid displaying a bar-code which could be read by the robot. Long-range bar-code readers are now available so the robot could pick up the information from some way off. Alternatively, the plate could be an active aid — an infra-red transmitter, for example.

Another idea is to use ultrasonic techniques. An ultrasonic detector works like radar — measuring distance by the time taken for an ultrasonic beam to be reflected back from some obstacle to the robot. In this way the presence of an object may be detected together with its size. "The problems start when you ask it to distinguish between two objects," says Graham. "If one is like a match box and the other the size of a TV then it should be okay but sorting out similar sized objects is much more tricky."

If the robot is preprogrammed with the dimensions of all the possible objects it may encounter, then it can make comparisons. But what happens if one object is square-on to the robot while another is at an angle? The computer attached to the robot ends up having to take the co-ordinates of the object it sees and carry out a three-dimensional rotation of the corner points, trying to match them up with something it knows. Object identification is not as easy as it would first appear.

Having identified the object, the next thing might be for the robot to pick it up. "To begin with an arm of some sort seems a good idea. Unfortunately, they cannot lift much weight and are very complex to manufacture. At the moment we are thinking more in terms of a device which operates like a fork-lift truck."

Both Androbot and Prism are working on a range of add-on units for Topo, giving it perhaps bump detectors, a bar-code reader, a lift, an ultrasonic detector, an arm, a vacuum cleaner, a lawnmower and maybe even a personality. The possibilities are endless and most of the really useful additions are still a long way off.

At £1,500 Topo isn't cheap. Personal robotics is only just beginning and there is an awful lot of work still to be done.

PEDRO

“Vengo”

“Vengo”

“Vengo”

Pedro is one mad mexican gardener, and he's bringing his troubles your way.

Can you stop the animals eating your plants?

Can you block up the maze exits to keep them out of your garden?

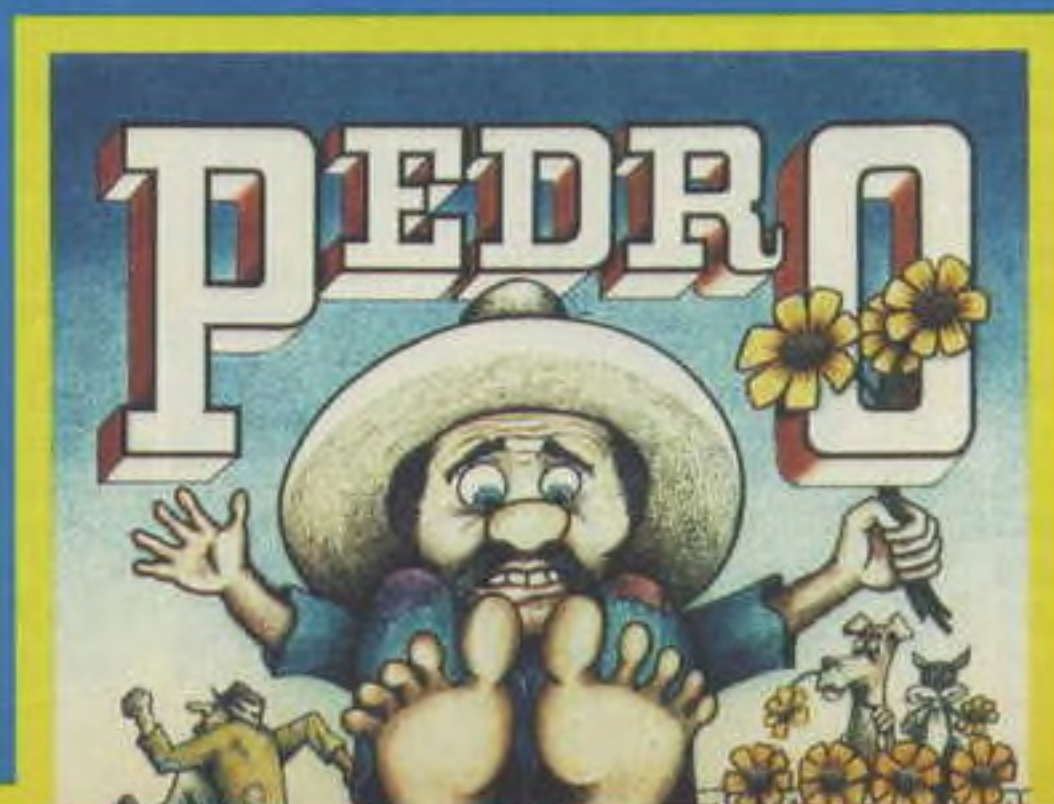
Can you scare away the thieving tramp who's after your precious seeds?

Can you stop yourself pulling out your hair with frustration?

Find out soon, with PEDRO.



For the
48K SPECTRUM
COMMODORE 64
DRAGON 32
BBC Model B
ELECTRON



£5.50

LIFT OFF with



SPACE SHUTTLE



SPECTRUM LAUNCH STAGE



DRAGON 32 ARM STAGE



BBC FINAL STAGE



ATARI FINAL STAGE

MISSION BRIEF

Successfully pilot the Shuttle through Launch, Fetch & Finals. Take off and position Shuttle in orbit. Manoeuvre alongside malfunctioning Satellite. Retrieve - then re-enter to glide without fuel to White Sands Desert.

PREVIOUS SUCCESSFUL MISSIONS

EXCELLENT - "Personal Computer News"
A WELL THOUGHT OUT GAME - "Dragon User"
ALMOST WORTH BUYING A DRAGON FOR -
"Which Micro"



MISSION STATUS Available for
48K ORIC 1, ATARI 16K, DRAGON 32, BBC
MODEL B, SPECTRUM 48K, COMMODORE 64,
ACORN ELECTRON, TANDY COLOUR 32K
CASSETTE £8 DISK £10

Postal Orders to
41 Truro Road, St. Austell, Cornwall PL25 5JE
Telephone/Credit Card Order
Tel: 0726 3456



MICRODEAL



Available from computer dealers nationwide or from larger branches of
John Menzies

A snowball's chance

Barbara Conway finds herself walking some pretty mean streets in this round-up of BBC adventures

After spending the new year industriously falling into pits and chasms, drowning several times, being attacked by all manner of nasties ranging from trolls to giant insects and sinking my pacifist principles more times than I can count in order to wreak havoc of my own, I just hope you appreciate the effort I have been putting in on your behalf.

To be fair, there have been compensations, such as the extraordinary array of treasures I have collected, from rare gems to bunches of vegetables. There have also been a pleasing number of new acquaintances, several of whom have so far refrained from trying to kill me together with at least one who will take any given opportunity (some of them decidedly inconvenient) to sit down and sing. In fact taking everything, including the reincarnations, into account, it has really been quite fun.

And that, of course, has been the object of the exercise. Adventure games, if properly written, should leave the would-be hero(ine) at best triumphant and at worst frustrated but determined to try again and outwit the program. Of the half-dozen I was trying out on the BBC "B", the general standard was excellent, although one or two suffered from that bane of all adventurers, the pointless maze, and their wearisome, annoying, language problems.

Despite offers of help when I got stuck by several of the software houses involved, all these adventures were tackled on the basis that the buyer can't normally get help like that, so neither would I. After a good many years in daily journalism, I backed myself to have as devious a mind as any program writer. In at least one case, I overrated myself dismally.

The case in question was that of *Snowball*, from Level 9 Computing. My assignment was to rescue the giant colony starship *Snowball* from imminent destruction in the heart of a nearby star. There were 200,000 sleeping colonists who had entrusted me with their lives, happily oblivious to the fact that they didn't have a "snowball's" chance with me as the only agent awake and able to deal with the emergency. My most consistent score was 100 out of a possible 1,000.

Shades of a lensman

The cassette is accompanied by a very detailed booklet putting the problem into its own historical perspective. The adventurer is Kim Kimberley (do I detect faint echoes of the E.E. Doc Smith's "Lensman" books?) awaking prematurely in his/her freezer coffin to find that the directional programming has gone awry. Urgent action is needed.

So far, so good. Few seasoned adventurers will have any difficulty escaping from the coffin, but no points are gained from this so don't feel too smug about it. The problems haven't even begun yet. Using the very sophisticated language structure of the program, you now have to work your way up through the ship, from the lowest level, making sure that you pick up, and where necessary construct, items which will aid your mission. There are no easy get-outs in *Snowball*. Yelling "help" gets you nowhere and invective doesn't help much either.

There are said to be 7,000 rooms in all, although there is a great deal of duplication



on the various levels. Nothing that you find is useless, although some items are rather difficult to locate and hang onto, and you can get useful experience in matters such as assembling a spacesuit. As a general rule, press buttons and pull levers whenever the opportunity presents itself. And bird-lovers should take note that on *Snowball* hanging around to hear a nightingale sing will always have fatal consequences!

A complex, original adventure with a hellish puzzle at the start and consistent brain exercise throughout.

Onto one of the most frequently-reviewed, and innovative, micro adventure games going, Melbourne House's *The Hobbit*. This has finally emerged on the BBC and, although the saga itself remains unchanged, there is one major difference from the Spectrum and other versions. Because of the memory limitation of the BBC, this version lacks the excellent graphics on the other machine.

I can live with this lack quite happily, not least because, as a long-time fan of the original J.R.R. Tolkien book (supplied with the game), I prefer to imagine the settings for myself. And nothing has been lost from the adventure itself which follows the plot of the book very closely. You are Bilbo the Hobbit, reluctant adventurer, setting out to beard the dragon Smaug in his lair and steal his treasure. But before you get anywhere near Smaug, you must travel across Middle Earth with (unless and until you lose them) Thorin the dwarf and Gandalf the magician as companions. This is a real-time adventure and, if you don't use the English (sic) vocabulary to act yourself, the other characters will carry on without you. Given half a chance, Thorin will burst into song about gold, while Gandalf will wander in and out and, if requested, may possibly give you a strange map which you can get another to translate for you, and maybe give you lunch as well.

But life isn't all food and song. Apart from a plentiful array of lethal nasties (beware the pale, bulbous eyes), you are pretty well bound to find yourself thrown into jail at least once and, unless you have established friendly relations with one traveller,



you won't get out. You can give complex instructions, speak to the various characters, ask them to chat to each other and, where essential, have a go at killing things. But remember that Hobbits are very definitely not in the warrior class and use your wits, and the book, wherever possible. Don't get bloodthirsty and try to kill your friends either. They will almost certainly turn the tables, and even if you succeed you will live to regret it. Or not.

The "interactive" element of *The Hobbit* does have clear limitations. Although the characters act without you, those actions are mostly confined to popping in and out, singing and maybe grabbing something, like the map. But this is carping. *The Hobbit* is a pleasure to play and, even after successfully completing the treasure-hunt, there are still challenges. It is possible to get scores of well over 100 percent through adroit adventuring. I suppose it's only wistful yearning on my part that makes me wonder if anyone could ever produce a similar effort on Tolkein's mind-blowing *Hobbit* sequel, *The Lord of the Rings*.

Although *The Hobbit* has the most detailed and readable documentation of any game to date, Salamander's case file for *Franklin's Tomb*, part of a wild detective trilogy, proves a very handy crib to keep around while wandering through the eponymous crypt. So useful, in fact, that I can even forgive the use of one of the oldest gags in the business in the intro.

Mean streets

You are Dan Diamond, ex-cop, private eye very much in the Marlowe mould. Lured to a cemetery by a note delivered by a uniformed dame, the ground suddenly opens under your feet and there you are, in a strange chamber with a locked door behind you, no way back to the outside world and a distinct feeling that these streets are the meanest yet.

Franklin's Tomb comes into the "moderately difficult" class of adventure, but it has a pleasant sense of humour which lifts it above the norm. It is possible to get killed (beware of getting into any one-way systems without suitable precautions) and there is a desperately frustrating "maze" problem involving some over-playful giant bats. The spelling also looks a bit eccentric at times but, in at least one case, what I thought was a spelling mistake turned out to be an important clue. A very appealing package.

Castle Frankenstein, from Epic Software, is a more familiar scenario. After an opening cacophony (incidentally *Franklin's Tomb* has a *Pink Panther* musical intro while *Snowball* has a complex musical theme of its own) you find yourself in a village neighbouring the castle of the title. There have been mysterious murders locally and the villagers have nominated

lucky old you to find out if the dreaded Monster has returned.

This is rather more of a conventional adventure than the others in this group, and there were some language problems (if I am told I am on an east/west road I get annoyed if told I can't go west). But after a bit of trial and error it is possible to get



around fairly well, providing that you have managed to gather a few essentials of which the lamp may well be the most important.

Not my favourite, but a substantial adventure with fast reaction times and a good screen lay-out.

Last but not least, two of Acornsoft's own adventures, starting with *Sphinx Adventure*. Like the rest, these are text-only. Starting from the top of a mountain, the adventurer must find the Sphinx and live to tell the tale (and collect the treasure) amassing points, and penalties, en route.

Acornsoft adventures tend to have a sense of the ridiculous, despite accepting limited vocabularies. Those used to indis-

criminatingly killing beings which seem to stand in their way may not get very far. Magic can come in handy, as can a certain limited knowledge of zoology and, as always, when in doubt pick up objects and when you have too many make sure you can find what you drop. The use of most things becomes reasonably apparent quite quickly and there are plenty of objects scattered around.

In *Countdown to Doom* the start is similar to that of *Snowball*, since you are apparently trapped in a spaceship control room. But, when (if) you get out of that one, the scene changes completely. You are on the grim treasure planet of Doom and, if you know what's good for you, you'll get as much loot as you can, fix the ship and blast off before you're stranded there for eternity.

There are plenty of ways to die on Doom, and most of them can, if approached in the right spirit, be forestalled and turned to your advantage. Remember that Doom is hostile, but pretty logical. Staying for too long in the freezing cold can kill you just as effectively as the dreaded pit. But there are ways out of most problems, particularly if you find ways of manipulating the fourth dimension and you can get on with the computer (players only familiar with cassette drives for micros may have a problem in that last respect).

Both these games are absorbing and require intelligent consideration as well as humanitarian instincts (reckless killing can damage your prospects considerably). Being killed yourself may be little more than an inconvenience since reincarnation can be swift and, although it involves unpredictable changes of location, does not deprive you of your hard-won treasures. My own feeling was that *Countdown* was marginally the more devious, and therefore enjoyable, of the two but neither should disappoint.

Firm	Program	Cost
Acornsoft c/o Vector Marketing Denington Estate Wellingborough Northants NN8 2RL	<i>Sphinx Adventure</i>	£9.95
	<i>Countdown to Doom</i>	£9.95
Melbourne House 131 Trafalgar Road Greenwich London SE10	<i>The Hobbit</i>	£14.95
Salamander Software 17 Norfolk Road Brighton East Sussex BN1 3AA	<i>Franklin's Tomb</i>	£9.95
Level 9 Computing 229 Hughenden Road High Wycombe Bucks HP13 5PG	<i>Snowball</i>	£9.90
Epic Software 10 Gladstone Street Kibworth Beauchamp Leicester LE8 0HL	<i>Castle Frankenstein</i>	£7.95

Bilingual bytes

Ian Logan explains some of the mysteries of Basicode

On the 14th of January, 1984, the BBC's Radio 4 acknowledged the existence of the 'microcomputer revolution' by launching its weekly *Chip Shop*. (Radio 4 at 5pm on Saturdays, and 11pm on Tuesdays).

And, as a part of the programme there is a takeaway service of free programs. These programs are broadcast in *Basicode*, and should be loadable into a wide range of common microcomputers. So far, the free programs have been games, but it is intended that in the broadcasts to come, there will be a wide range of programs — hopefully including ones sent in by listeners.

However, in order to take advantage of the 'free' *Basicode* programs, it is necessary to get a 'Basicode-kit' costing £3.95 from the BBC — as yet, there is no such kit available for the Spectrum. A full *Basicode*-kit program will allow for both the *Loading* of a *Basicode* program and for its conversion into the dialect of Basic that is used in the Spectrum. This conversion will not be easy and, until the proper *Basicode*-kit program for the Spectrum appears, it is a matter of guess work as to just how limited the conversion might be.

In this first article, I would like to discuss the 'tape standard' used in the transmission of the *Basicode* programs, and in next week's article give a program for the Spectrum that allows *Basicode* programs to be *Listed*. But, in order to get a *Basicode* to Run, it will be necessary to re-enter the program into the Spectrum — making the required changes as appropriate (probably not very easy)!

The *Basicode* programs are transmitted serially using a 2-tone system. Logic 1's are represented by two full waveforms at 2400 hz, and logic 0's by a single full waveform at 1200 hz. Each byte of data is sent 'least significant bit' (lsb) first, and only the lower seven bits of a byte are sent — as this is all that is necessary to convey the normal Ascii character set.

Normally, before the bytes of the program are sent, there is a seven second 'leader' made up of single full waveforms at 2400 hz. Before each byte of the program, there are three full waveforms at 2400 hz that form a byte-leader, and a byte-start-bit of a single waveform at 1200 hz.

The tape will normally be read by first 'locking onto' the 'leader' of the program and then, for each byte, identifying byte-start-bit before collecting the seven bits that together form a byte of data.

The use of byte-leaders and byte-start-bits allows for a computer to re-synchronise itself to each new byte of data; thereby allowing for differing 'clock rates' between

machines. The first byte of a *Basicode* program is normally a byte of value '2' and the last byte one of value '3'. As there is no header to the program itself, the end of a program can only be identified by the finding of the '3' byte.

The *Tape Examining* program that accompanies this article allows a 48K Spectrum to be used as an oscilloscope. With this program it is possible to produce 127 traces, spanning a half of a second's reading of the Spectrum's cassette port.

The program uses the machine code routine:

```

start  ld a,07h          ;clear port
       out (0feh),a
       ld hl,8020h      ;clear memory
       ld (hl),00h
       inc hl
       ld d,h
    
```

```

ld e,l
ld bc,7fdh
ldir
ld b,40h          ;mask bit 6
ld hl,8020h       ;base of memory
loop   in a,(0feh)
       and b        ;mask cassette bit
       ld (hl),a    ;store result
       inc hl       ;step on
       or l
       jr nz,loop  ;until at 0000h
       ret         ;all done
    
```

The 'loop' examines the cassette port every 1/73000 of a second and therefore gives a fairly good demonstration of the 1200 hz and 2400 hz signals found in a *Basicode* transmission.

The results obtained with this program are shown in Figures 1-3.

In next week's article I will give a *Basicode* listing program, but in the meanwhile why not try to write your own. All the necessary information is contained in the above article and *The Complete Spectrum Rom Disassembly* by myself and Dr Frank O'Hara.

Figure 1
This shows a section of the 7 second leader. There are repeated full waveforms at 2400 hz. — each half wave takes about 700 t states.

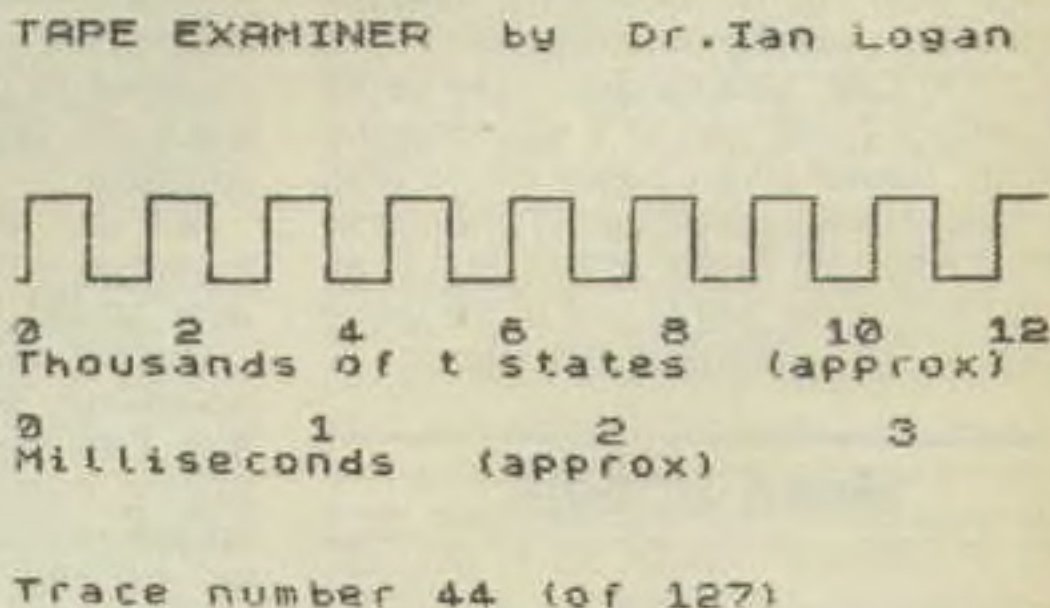


Figure 2
This shows part of a byte of data. The bits of this byte are all logic 0's and each full wave takes a little over 300 t states.

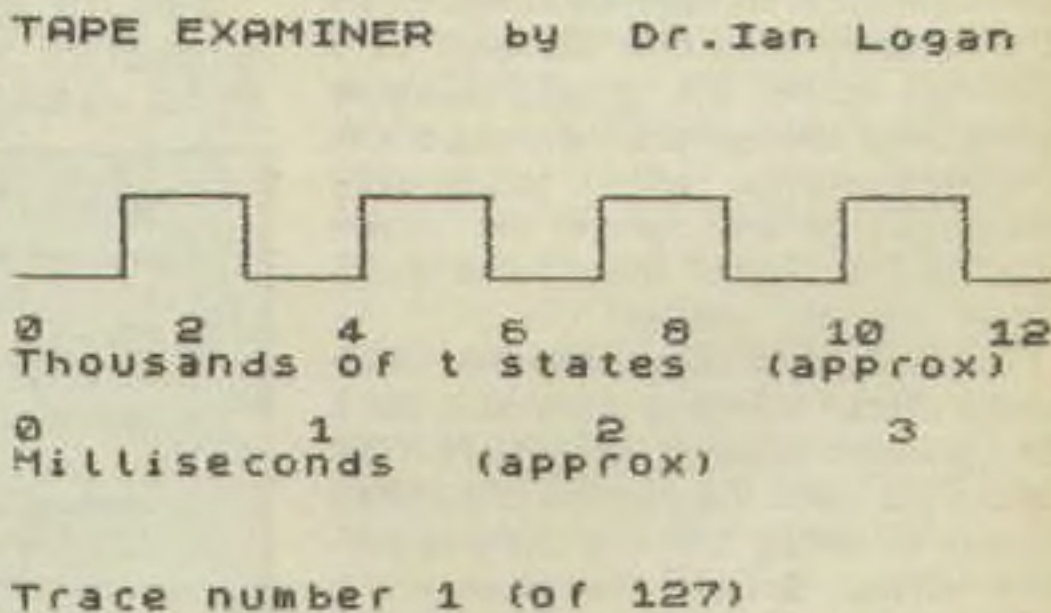
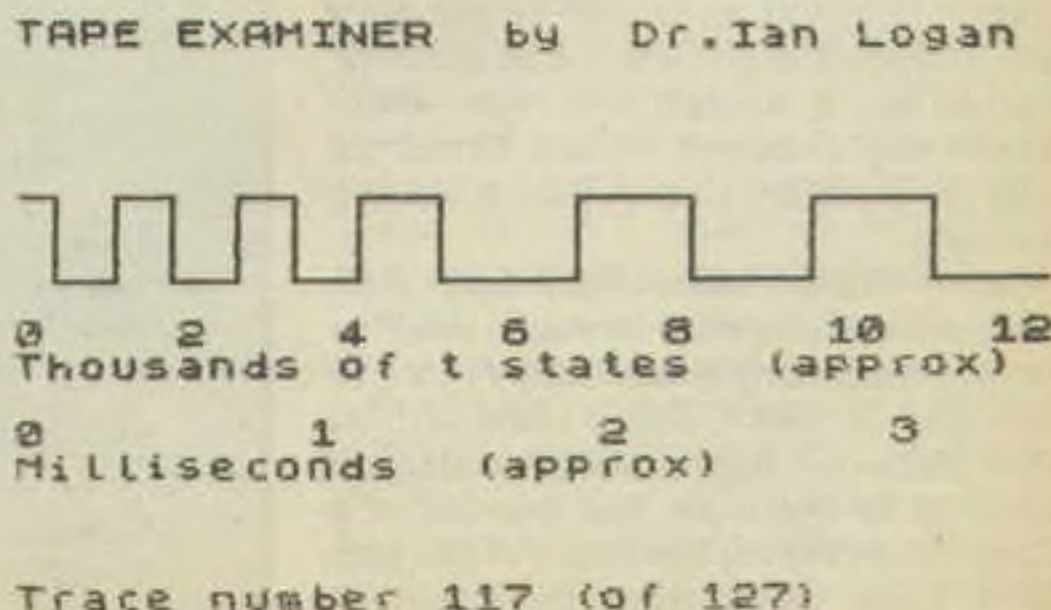


Figure 3
This shows a typical byte-leader followed by a byte-start-bit. The byte-leader goes from the 500 t state point to the 5000 t state point; and the start-bit from 5000 to 8000. The first two bits of the byte of data are both logic 0's in this tracing.



```

1 REM ** TAPE EXAMINER **
2 REM ** by Dr. Ian Logan **
10 CLEAR 32767
20 REM ** get machine code **
30 FOR a=0 TO 31: READ b: POKE 32768+a,b: NEXT a
40 PRINT AT 4,0: PAPER 6:"TAPE EXAMINER by Dr. Ian Logan "
50 REM ** read tape **
60 PRINT AT 13,0: PAPER 6:" Start tape and press any key "
70 PAUSE 0
80 RANDOMIZE USR 32768
90 REM ** display routine **
100 PRINT AT 13,0: PAPER 5:" Stop tape now. Press any key "
110 PAUSE 0
120 PRINT AT 13,0: PAPER 6:"0      2      4      6      8      10     12"
130 PRINT PAPER 6:"Thousands of t states (approx) "
140 PRINT AT 16,0: PAPER 6:"0          1          2          3          "
150 PRINT PAPER 6:"Milliseconds (approx)          "
160 LET t=1
170 PRINT AT 21,0: PAPER 6:"Trace number ";t;" (of 127)";TAB 31;" "
180 LET p=0
190 LET a=32544+t*256
200 LET n=PEEK a: LET n1=PEEK (a+1)
210 IF n THEN PLOT p,100
220 IF NOT n THEN PLOT p,80
230 IF n<>n1 THEN PLOT p,80: DRAW 0,20
240 LET p=p+1
250 IF p<256 THEN LET a=a+1: GO TO 200
260 INPUT "Next trace number (0=RUN)? ";t
270 IF t<1 THEN RUN
280 REM ** clear trace **
290 IF t>127 THEN GO TO 260
300 REM ** clear trace **
310 PRINT AT 9,0: PRINT TAB 31:CHR$ 32:TAB 31:CHR$ 32:TAB 31:CHR$ 32
320 LET p=0
330 GO TO 170
500 REM ** machine code data **
510 DATA 62,7,211,254
520 DATA 33,32,128,54,0,35,84
530 DATA 93,1,223,127,237,176
540 DATA 6,64,33,32,128
550 DATA 219,254,160
560 DATA 119,35,124,181
570 DATA 32,247,201

```

Tread The Path of Adventure with GILSOFT

FOR THE 48K SPECTRUM



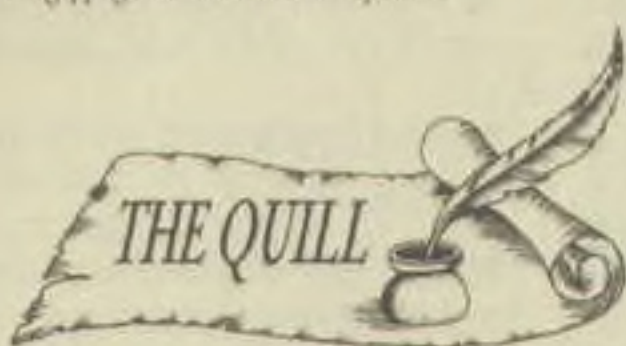
MAGIC CASTLE £5.95

Try to rescue the princess from the castle, but beware of booby traps and vampires! A gripping adventure for the 48K Spectrum.



DIAMOND TRAIL £5.95

Recover the Sinclive diamond after a daring robbery. First you must overcome many problems in a city fraught with danger and intrigue. This is our latest adventure for the 48K Spectrum.



THE QUILL
£14.95

THE QUILL is a major new utility written in machine code which allows even the novice programmer to produce high-speed machine code adventures of superior quality to many available at the moment without any knowledge of machine code whatsoever. Using a menu selection system you may create well over 200 locations, describe them and connect routes between them. You may then fill them with objects and problems of your choice. Having tested your adventure you may alter and experiment with any section with the greatest of ease. A part formed adventure may be saved to tape for later completion. When you have done so THE QUILL will allow you to produce a copy of your adventure which will run independently of the main QUILL editor, so that you may give copies away to your friends. THE QUILL is provided with a detailed tutorial manual which covers every aspect of its use in writing adventures. For the 48K Spectrum



TIMELINE & TASKS £5.95

A superb 16K adventure in which you must locate your time machine to return to the present. Plus a collection of mind stimulating puzzles.

Our Software is now available from many computer shops nationwide, or direct from us by post or telephone.

SAE for full details of our range.

Dealer enquires welcome.

GILSOFT
30 Hawthorn Road
Barry
South Glamorgan
CF6 8LE
☎(0446) 736369

Credit Card Order line
Personally manned for 24 hours
☎0222 41361 Ext430



FREE CASSETTE

T.R.P. SOFTWARE

K-Tel

MAIL ORDER, Hibel House,
2 Hibel Road, Macclesfield
SK10 2AB

Imagine

Double Sider

& Ultimate

TWICE THE FUN WITH £6.95
TWO ON ONE AT £6.95 each
inc p+p

1/2 SUPAVADERS VIC 20
SOS ... SOS: Can you save us ... Or will Supavaders rule.
BOMBER RUN
You are a pathfinder ... Your mission is to flatten the enemy city and land your force.
1/2 PLAGUE VIC 20
Requires 8K expansion.
They're everywhere ... A marching infection ... A creeping horror ... Can you wipe them out before you're infected.
ALIEN DEMON
It knows you're there ... It wants you ... Can you get it before it gets you?
1/2 IT'S ONLY ROCK 'N' ROLL SPECTRUM 48K
Can you become a superstar? A Rock 'n' Roll

idol? ... Or are you just another has been?
TOMB OF DRACULA
Darkness is falling ... The Vampires are hungry ... You can't go back ... Your only chance of survival lies ahead.
1/2 CASTLE COLDITZ SPECTRUM 48K
You are a prisoner of the Third Reich ... Can you escape it's Iron Grip?
BATTLE OF THE TOOTHPASTE TUBES
Can you destroy the Evil Brush Brigade? Or will you succumb to the dreaded Mini Tubes and Chattering Teeth?
1/2 ALIEN SWARM SPECTRUM 16K
The most lethal invasion ever to threaten our World ... From way beyond our Universe.
ARENA
Like the gladiators of old ... Only those with the greatest cunning survive the Aliens' Games.

AT £5.50 inc p+p

SPECTRUM 16K Arcadia, Ah Diddums, Molar Maul, Jumping Jack.

SPECTRUM 48K Zip Zap, Stonkers, The Alchemist, Lunar Jetman, Alic Atac.
VIC 20 Arcadia, Wacky Waters, Catcha Snatcha, Bewitched.
COMM. 64 Arcadia.

SPECIAL INTRODUCTORY OFFER

For every two items ordered, we will give you a FREE C10 TAPE.

** Other games and books available. For a full list send a stamped addressed envelope to the address below. Despatched in 7 days.

POST ORDERS TO: TRP SOFTWARE, Hibel House, 2 Hibel Road, Macclesfield SK10 2AB.

NAME _____

ADDRESS _____

I enclose cheque/P.O. for £ _____ payable to T.R.P. Software.

Please supply me with

1 _____
2 _____
3 _____
4 _____
5 _____

COST

£ P

Price includes VAT and free delivery

TOTAL

P.C.W/1

Boosting the beep

Trevor Toms looks at the beeper in his series on machine code

One of the weakest features of the Spectrum is the beeper, which manages only barely audible squeaks of limited form in Basic (ever tried to listen to the sound effects from that new game at a ZX Microfair?). Machine code certainly widens the type of effects that can be created, although this still falls behind the more recent home computers. Gripes aside, though, this week we'll look at ways of using a couple of Rom entries that allow you access to the beeper.

Firstly, let's look at the way of simulating the *BEEP* command. The Rom routine is *XBEEP*, at address 3B5h, and it requires that the FP stack holds the pitch as the topmost item with the duration as the second. If you're unsure about the FP stack (not the Z80 stack), read last week's article. Since I have not had sufficient space to describe the format of floating point numbers, it is not possible for me to describe the best way of placing numbers on the FP stack, but with only simple arithmetic, it is quite easy to obtain almost any value that you need.

Personally, I find that it is easiest to assume that all beep durations occur in multiples of 1/100th of a second, and that all pitches take integer values only. You are not restricted to this, but it does make life simpler. Listing 1 shows you a small program that simulates:

```
10 FOR b=0 TO 69
20 BEEP 0.05,b
30 NEXT b
```

Remember that the longest duration is 10 seconds, and the highest pitch value is 69. Go outside these ranges and you'll be given a suitable error report from the *XBEEP* routine.

If you want to play a complete tune, then the best method is to hold your tune data in a series of *DEFW* instructions, terminated by a duration of -1. Listing 2 shows such a subroutine — all you need to do is add your tune at the appropriate point. The example plays a short melody.

Moving onto effects, you need a routine called *XSound*, at Rom address 3B5h. In this routine, registers DE hold the effective duration, while registers HL hold the relative pitch. The values in these registers can be worked out to provide genuine tones, but I would suggest that you might as well use the *XBEEP* routine if that's what you want to do. *XSound* is much more useful for creating effect, and Listing 3 shows how you might approach the creation of a sound effect. Don't ask me what it's supposed to sound like — just see how it has been achieved!

With the *XSound* routine, you must be aware of one or two side effects. Firstly, the

Spectrum interrupts are disabled during the routine, so lengthy noises will cost your fast action game dearly. Secondly, the duration of the routine (supplied in registers DE) alters with different frequencies such that doubling the frequency will have the duration for the same given value supplied in DE. By all accounts, the best way is to experiment with different values set within loops such as that shown in Listing 3. Keep the values of DE low so that sounds are produced rapidly, making it possible to create a type of "white noise".

Since this week's article is slightly shorter, I will spend a little time refreshing the concept of assemblers for the newcomers to the series. An assembler is a way of entering your machine code in mnemonic

form, such as that shown in the examples. All jumps, calls and data references can be made using symbol names, letting the assembler assign a value to the symbol while running. In this way, the programmer can free himself/herself from the necessity of calculating the number of bytes needed in relative jump instructions — the assembler does it automatically.

Coding becomes more structured, since it is not necessary to leave those awkward gaps needed for patching up a non-working program. In addition, the likelihood of errors due to decimal/hex translation reduces to nil! There are many assemblers available, nearly all of which are quite capable of dealing with the listings and routines given in these articles with only a few minor alterations.

By Trevor Toms, author of *The Spectrum Pocket Book*, published by Phipps Associates.

LISTING 1 - Simulating BEEP commands

Addr	Hex	Op	Operands
D6D8		XBEEP:	
D6D8		EQU	3F8H
D6D8		XSTKBC:	
D6D8		EQU	2D2BH
D6D8		BEGIN\$HERE:	
D6D8	010000	LD	BC,0 ;STARTING PITCH
D6DB		LOOP:	
D6DB	C5	PUSH	BC ;SAVE PITCH
D6DC	010500	LD	BC,5 ;SET UP 5/100 SEC.
D6DF	CD2B2D	CALL	XSTKBC ;ONTO FP STACK
D6E2	016400	LD	BC,100
D6E5	CD2B2D	CALL	XSTKBC
D6E8	C1	POP	BC ;GET PITCH
D6E9	C5	PUSH	BC ;...BUT SAVE AGAIN
D6EA	CD2B2D	CALL	XSTKBC ;PUT ON FP STACK
D6ED	EF	RST	28H ;FP CALCULATOR
D6EE	C0	DEFB	0C0H ;SAVE PITCH
D6EF	02	DEFB	02H ;DELETE IT
D6F0	05	DEFB	05H ;5/100
D6F1	E0	DEFB	0E0H ;GET PITCH
D6F2	38	DEFB	38H ;EXIT FP
D6F3	CDF803	CALL	XBEEP ;MAKE THE SOUND
D6F6	C1	POP	BC ;PITCH AGAIN
D6F7	03	INC	BC ;INCREMENT PITCH
D6F8	214500	LD	HL,69 ;END LIMIT
D6FB	AF	XOR	A ;CLEAR FLAGS
D6FC	ED42	SBC	HL,BC ;CHECK FOR FINISH
D6FE	30DB	JR	NC,LOOP ;KEEP GOING!
D700	C9	RET	;BACK TO BASIC

Symbols:

```
XBEEP 03F8      XSTKBC 2D2B
BEGIN$ D6D8     LOOP  D6DB
```

No error(s)

continued on page 23

DITTO DATA LTD

ATTENTION ALL TOP PROGRAMMERS !!

YOUR BEST AND ONLY THE BEST MACHINE CODE GAME PROGRAMS FOR COMMODORE 64 — VIC 20 — B.B.C. AND SPECTRUM.

WE WILL ENSURE YOUR PROGRAM HAS MAXIMUM SALES SUPPORT, WITH OUR LARGE DEALER AND MARKETING NETWORK.

OUR OWN LARGE INHOUSE DUPLICATING OF TAPES AND DISCS.

Contact: **NEW PROJECTS DIRECTOR
DITTO DATA LTD.
CORNER HOUSE
6-8 THE WASH
HERTFORD
SG1 41PX**

Telephone: HERTFORD 554474/554484



OH MUMMY!!

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

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

TANK ATTACK**

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

Price (BBC-B OS 1.0+) £7.95

SUB CHASE

A great machine code game in which you must depth charge the submarines. Sounds easy, but you must position your destroyer, set detonation depth, fire and hope you can evade the sub's missiles. The problem is, the higher the skill level, the more intelligent the subs become, and you only have a limited supply of depth charges!!

Price (SPECTRUM) £4.95

UTIL 1

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

Price (BBC-B OS 1.0+) £9.95

**THESE PROGRAMS ARE AVAILABLE FROM LARGER BRANCHES OF *Boots*

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

DEALER ENQUIRIES WELCOME

GEM SOFTWARE

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

LISTING 2 - Playing a tune

Addr	Hex	Op	Operands			
D6D8		XBEEP:				
D6D8		EQU	3F8H			
D6D8		XSTKBC:				
D6D8		EQU	2D2BH			
D6D8		XSTKDATA:				
D6D8		EQU	2D3AH			
D6D8		PLAY\$TUNE:				
D6D8	*210000	LD	HL, TUNE\$DATA			
D6D8		PLAY\$NEXT\$NOTE:				
D6DB	4E	LD	C, (HL)	:GET DURATION		
D6DC	23	INC	HL			
D6DD	46	LD	B, (HL)			
D6DE	23	INC	HL			
D6DF	03	INC	BC	:CHECK FOR -1		
D6E0	78	LD	A, B			
D6E1	B1	OR	C			
D6E2	08	RET	Z	:END DETECTED		
D6E3	0B	DEC	BC	:RESTORE DURATION		
D6E4	E5	PUSH	HL	:SAVE TABLE POINTER		
D6E5	0D2B2D	CALL	XSTKBC	:STACK DURATION		
D6E8	016400	LD	BC, 100	:IN 1/100THS SEC.		
D6EB	0D2B2D	CALL	XSTKBC			
D6EE	E1	POP	HL	:NOW GET PITCH		
D6EF	4E	LD	C, (HL)			
D6F0	23	INC	HL			
D6F1	46	LD	B, (HL)			
D6F2	23	INC	HL			
D6F3	E5	PUSH	HL	:SAVE POINTER		
D6F4	CB00	RLC	B	:STACK SIGNED VALUE		
D6F6	CB08	RRC	B	:...SEE LAST WEEK		
D6F8	9F	SBC	A, A			
D6F9	5F	LD	E, A			
D6FA	51	LD	D, C			
D6FB	48	LD	C, B			
D6FC	AF	XOR	A			
D6FD	47	LD	B, A			
D6FE	0D342D	CALL	XSTKDATA			
D701	EF	RST	28H			
D702	C0	DEFB	0C0H	:STORE 0		
D703	02	DEFB	02H	:DELETE		
D704	05	DEFB	05H	:DURATION/100		
D705	E0	DEFB	0E0H	:GET MEM 0		
D706	38	DEFB	38H	:EXIT		

D707	0DF803	CALL	XBEEP	:PLAY NOTE		
D70A	E1	POP	HL	:RESTORE POINTER		
D70B	18CE	JR	PLAY\$NEXT\$NOTE			
D70D		TUNE\$DATA:				
D70D	3200	DEFW	50	:DURATION		
D70F	0000	DEFW	0	:PITCH		
D711	3200	DEFW	50			
D713	0000	DEFW	0			
D715	1900	DEFW	25			
D717	FFFF	DEFW	-1			
D719	1900	DEFW	25			
D71B	0000	DEFW	0			
D71D	3200	DEFW	50			
D71F	0200	DEFW	2			
D721	6400	DEFW	100			
D723	FDFF	DEFW	-3			
D725	6400	DEFW	100			
D727	FBFF	DEFW	-5			
D729	FFFF	DEFW	-1	:DURATION -1 = END		

Symbols:			
XBEEP	03F8	XSTKBC	2D2B
XSTKDA	2D3A	PLAY\$T	D6D8
PLAY\$N	D6DB	TUNE\$D	D70D

No error(s)

Listing 3

Addr	Hex	Op	Operands			
D6D8		X\$SOUND:				
D6D8		EQU	3B5H			
D6D8		MAKE\$NOISE:				
D6DB	01EA01	LD	BC, 490	:LOOP COUNTER		
D6DB	21F401	LD	HL, 500	:BASE FREQUENCY		
D6DE	110200	LD	DE, 2	:SOUND DURATION		
D6E1		SLOOP:				
D6E1	E5	PUSH	HL	:SAVE BASE FREQ		
D6E2	09	ADD	HL, BC	:UPPER FREQUENCY		
D6E3	*CD9000	CALL	NOISE	:MAKE THE SOUND		
D6E6	E1	POP	HL	:RESTORE BASE		
D6E7	E5	PUSH	HL	:...AND SAVE AGAIN		
D6E8	ED42	SBC	HL, BC	:LOWER FREQUENCY		
D6EA	*CD0000	CALL	NOISE			
D6ED	E1	POP	HL			
D6EE	0B	DEC	BC	:CHECK COUNTER		
D6EF	78	LD	A, B			

D6F0	B1	OR	C	:HAS IT REACHED ZERO?		
D6F1	20EE	JR	NZ, SLOOP	:REPEAT IF NOT		
D6F3	C9	RET		:ELSE BACK TO BASIC		
D6F4		NOISE:				
D6F4	E5	PUSH	HL	:SAVE REGISTERS		
D6F5	D5	PUSH	DE			
D6F6	C5	PUSH	BC			
D6F7	CDB503	CALL	X\$SOUND	:ROM ROUTINE		
D6FA	C1	POP	BC	:RESTORE REGISTERS		
D6FB	D1	POP	DE			
D6FC	E1	POP	HL			
D6FD	C9	RET				

Symbols:			
X\$SOUND	03B5	MAKE\$N	D6DB
SLOOP	D6E1	NOISE	D6F4

No error(s)

Keyboard table

C McGinley shows how to make use of the Dragon's keyboard reading routines

Locations 337-345 are known as the keyboard rollover table. With no keys pressed, they each hold the value 255. Whenever a key is pressed, the appropriate location changes to a certain value. (Fig 1 shows a few examples).

The values produced when a key is pressed stay the same all the time the key remains pressed. Reading the keyboard by *Peeking* the appropriate location, instead of using *Inkey\$* from within a program can produce a repeat key effect. An example from Fig 1 — forgetting location 337 for now — Cap A = location 339 and value 251 when pressed. This method allows more than one key to be read at a time by *Peeking* the appropriate locations. These locations and values can be found by using Program 1 and pressing the key required.

Other than *Peeking*, the only way a key can be read again is after the rollover table has been reset. This is achieved on releasing the key, therefore there is no repeat key. Writing 255 to these locations from within a program will also produce a sort of repeat key usable with *Inkey\$*. A subroutine jump will produce this, eg:

```
50 A$ = INKEY$: IF A$ = "" THEN 50 ELSE GOSUB
1000 FOR A = 337 TO 345 = POKE A, 255: NEXT:
RETURN
```

Machine coding is a better method to do this and also opens up ways of making repeat key a function of the machine. The following method makes use of the systems interrupts.

Every 1/50th of a second the processor stops what it is doing and runs various interrupt routines, ie: to refresh Ram, update clock, service any peripherals that require it, etc. When a regular interrupt (IRQ) happens, the processor jumps to and runs the routine at the location held in the reset vector table (&H BFF0 — &H BFFF). The IRQ location (&HBFF8) holds &H10C which in turn holds a three byte routine:

```
&H10C    7E    JMP
&H10D    9D    9D
&H10E    3D    3D
```

This instruction sends the processor to routines starting at &H9D3D.

If we alter the address held in &H10D and &H10E we can divert the interrupt to a routine of our own design before sending it on its normal path. If this is a rollover reset routine, then every interrupt the rollover table will be reset ready for re-reading. A basic machine code loader at the beginning of a program will achieve this. Assembly Listing 1 and Program 2 are examples.

To develop this further, it would be nice to have a repeat key available all the time.

This can be achieved with the interrupt method, but just resetting the rollover table is not adequate — an element of delay is required but with certain conditions, ie:

- (i) There must not be a delay every interrupt, otherwise operation of the computer will be slowed down to unacceptable levels.
- (ii) Delay is only required on the first character to allow time to release the key if only one character is required.
- (iii) Subsequent characters need no delay.

Assembly Listing 2 is a machine code routine that produces the above conditions.

I have produced a delay by using address 32766 as a counter. Counting up to 50 produces a useful delay.

Working through the routine — the first stage is to clear the address used as a counter and then load IRQ jump address with the location of my routine. The main routine first checks location 337 of the rollover table. This address always changes whichever key is pressed. If it is 255 (no key pressed) it then checks the counter to see if it is 50. If true (delay complete), it resets rollover table and exits to interrupt. If the counter is less than 50, it increments counter and exits to interrupt.

The machine code from Assembly Listing 2 can be loaded with Program 2 by altering the data in line 10 to the data in column 2 of Assembly Listing 2 (do not forget the FINI at the end). Then delete lines 100-130 in Program 2.

Assembly Listing 1

```
7FB0 CC7FC4      20    LDD #@RK,PCR    LOADS INT. VECTOR
7FC0 FD0100      30    STD #100        WITH ADDRESS OF
7FC3 39          40    RTS            MY ROUTINE
7FC4 CCFFFF      50    @RK LDD #FFFF
7FC7 8E0151      60    LDX #337
7FCA ED01        70    @RESET STD ,X++  RESETS ROLLOVER
7FCC 8C0159      80    CMPX #345      TABLE
7FCF 26F9        90    BNE @RESET
7FD1 A784        100   STA ,X
7FD3 7E9D3D      110   JMP #9D3D      EXITS TO INT.
7FD6             120   END
```

Assembly Listing 2

```
7FB0 7F7FFE      20    CLR 32766      RESTS DELAY COUNTER
7FC0 CC7FC7      30    LDD #@RK,PCR    DIVERTS INT.
7FC3 FD0100      40    STD #100        TO MY ROUTINE
7FC6 39          50    RTS
7FC7 8E0151      60    @RK LDA 337     CHECKS FOR KEY
7FCA 81FF        70    CMPA #255      PRESSED
7FCC 2806        80    BNE @START,PCR IF YES CARRY ON
7FCE 7F7FFE      90    CLR 32766      IF NO RESETS COUNTER
7FD1 7E9D3D      100   JMP #9D3D      AND EXITS TO INT.
7FD4 B67FFE      110   @START LDA 32766 CHECK DELAY COUNTER
7FD7 8132        120   CMPA #50
7FD9 2F12        130   BLE @FIRST,PCR UNDER 50 MISS RESET ROLLOVER
7FDB CCFFFF      140   @CLEAR LDD #FFFF
7FDE 8E0151      150   LDX #337
7FE1 ED01        160   @RESET STD ,X++ IF 50 RESET
7FE3 8C0159      170   CMPX #345      ROLLOVER TABLE
7FE6 26F9        180   BNE @RESET,PCR AND EXIT TO INT.
7FE8 A784        190   STA ,X
7FEA 7E9D3D      200   JMP #9D3D
7FED 7C7FFE      210   @FIRST INC 32766 INCREMENT COUNTER
7FF0 7E9D3D      220   JMP #9D3D      AND EXIT TO INT.
7FF3             230   END
```


Programme 1

```

5 '***ROLLOVER TABLE***
10 CLS:PRINT "location","n.p. pressed
":PRINT STRING$(32,"-");
20 FOR A= 337 TO 345:PRINTA,"255"
:NEXT A
:PRINT @396,"[  ]"
30 A$=INKEY$:IF A$="" THEN 30
40 IF ASC(A$)=10 THEN A$="DOWN]"
:GOTO 80
50 IF ASC(A$)=8 OR ASC(A$)=21
THEN A$="L
EFT]": GOTO 80
60 IF ASC(A$)=9 THEN A$="RIGHT]"
:GOTO 80
70 A$=" "+A$+" ]"
80 B=88:PRINT @397,A$ " ";
:FOR A=337 TO
345:PRINT @B,PEEK(A):B=B+32:NEXT A
90 GOTO 30

```

Programme 2

```

10 DATA CC,7F,C4,FD,01,0D,39,CC,FF,
FF,8E
,01,51,ED,81,8C,01,59,26,F9,A7,84,
7E,9D,
3D,FINI
20 CLEAR 200,32700:A=32701
30 READ A$:IF A$="FINI" THEN 40
ELSE POK
E A,VAL("&H"+A$):A=A+1:GOTO 30
40 EXEC 32701
50 DEL-50
100 '
110 '*****MAIN PROG*****
120 CLS:PRINT "PRESS ANY KEY"
130 A$=INKEY$:IF A$="" THEN 130
ELSE PRI
NT A$;:GOTO 130

```

Fig.1

KEY	ROLLOVER TABLE PEEKS									
	337	338	339	340	341	342	343	344	345	
N.P.	255	255	255	255	255	255	255	255	255	
SP. BAR	223	"	"	"	"	"	"	"	223	
A	251	"	251	"	"	"	"	"	"	
B	251	"	"	251	"	"	"	"	"	
C	251	"	"	"	251	"	"	"	"	
D	251	"	"	"	"	251	"	"	"	
E	251	"	"	"	"	"	251	"	"	
F	251	"	"	"	"	"	"	251	"	
G	251	"	"	"	"	"	"	"	251	
H	247	247	"	"	"	"	"	"	"	
I	247	"	247	"	"	"	"	"	"	
J	247	"	"	247	"	"	"	"	"	
K	247	"	"	"	247	"	"	"	"	
L	247	"	"	"	"	247	"	"	"	
M	247	"	"	"	"	"	247	"	"	
N	247	"	"	"	"	"	"	247	"	
O	247	"	"	"	"	"	"	"	247	
P	239	239	"	"	"	"	"	"	"	
Q	239	"	239	"	"	"	"	"	"	
R	239	"	"	239	"	"	"	"	"	
S	239	"	"	"	239	"	"	"	"	
T	239	"	"	"	"	239	"	"	"	
U	239	"	"	"	"	"	239	"	"	
V	239	"	"	"	"	"	"	239	"	
W	239	"	"	"	"	"	"	"	239	
X	223	223	"	"	"	"	"	"	"	
Y	223	"	223	"	"	"	"	"	"	
Z	223	"	"	223	"	"	"	"	"	
←	223	"	"	"	223	"	"	"	"	
↓	223	"	"	"	"	223	"	"	"	
↑	223	"	"	"	"	"	223	"	"	
→	223	"	"	"	"	"	"	223	"	

Character building

S Pithers demonstrates the use of the BBC's multi-coloured characters

This program is an improvement of one found in the BBC user guide. Although it is a fairly entertaining program in itself, its real value is as a demonstration of the use of the BBC's multi-coloured characters.

Ordinarily, you have to *Pling* each one directly. However, in this program I have

instead used the *Gcol 3,x* instruction — the important lines to note are 50-80 and 260 onwards. It should be easy to take out the relevant sections for use in your own programs.

Program Notes

40.....MODE 2

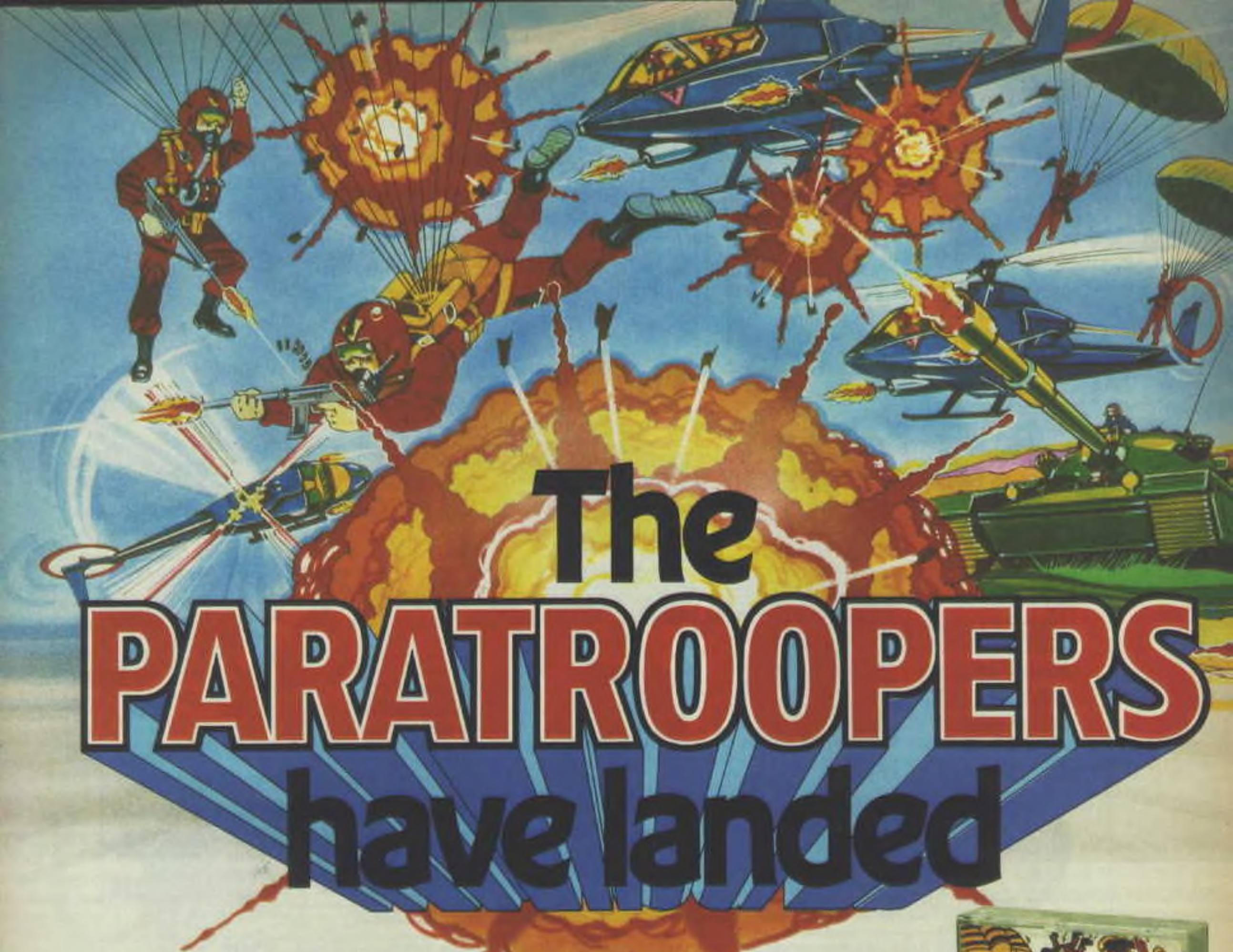
50-80.....DEFINE CHARACTERS
 90-110...DEFINE VARIABLES & JOIN TEXT & GRAPHICS CURSOR
 120.....REPEAT LOOP
 130.....READ A PIECE OF DATA
 140.....VARIABLE B\$=CHR\$ VALUE OF THE DATA
 150.....VARIABLE A\$=A\$+B\$
 160.....UNTIL DATA=227
 170.....REPEAT LOOP
 180-210 IF-THEN'S FOR SCREEN WALLS
 220.....GOTO PROCEDURE P: INCREASE VARIABLES
 230.....UNTIL LOOP
 260-290 PROCEDURE FOR PRINTING MULTI-COLOURED CHARACTER ON SCREEN

```

10 REM New Tartan
20 REM By S. C. Pithers.
30 REM
40 MODE 2
50 VDU 23,224,255,129,129,129,129,129,
129,255
60 VDU 23,225,0,126,66,66,66,66,126,0
70 VDU 23,226,0,0,60,36,36,60,0,0
80 VDU 23,227,0,0,0,24,24,0,0,0
90 T=8
100 X%=640:Y%=512
110 TX%=T:TY%=T:VDU5
120 REPEAT
130 READ B
140 B$=CHR$(B)
150 A$=A$+B$
160 UNTIL B=227
170 REPEAT
180 IF X%<20 THEN TX%=T
190 IF X%>1260 THEN TX%=-T
200 IF Y%<20 THEN TY%=T
210 IF Y%>1000 THEN TY%=-T
220 PROCP:X%=X%+TX%:Y%=Y%+TY%
230 UNTIL FALSE
240 END
250
260 DEF PROCP
270 MOVE X%,Y%
280 PRINT A$
290 ENDPROC
300
310 DATA 18,3,1,224,8
320 DATA 18,3,2,225,8
330 DATA 18,3,3,226,8
340 DATA 18,3,4,227
350
360 REM Changing the 'T' variable
370 REM to 16,32,48 or 64 for example
380 REM will change the tartan like
390 REM pattern, also try different
400 REM Multicoloured characters to
410 REM change the effect.

```

>



The PARATROOPERS have landed

They will make your computer go crazy with fear.

"One of the best examples of user-defined graphics that I have ever seen, along with excellent sound effects."

... Home Computing Weekly

"One of our best games yet."

... Terry Grant, Rabbit software director

"An obscene celebration of slaughter."

... Home Computing Weekly

"My Terry wouldn't do a thing like that."

... Terry's mum

Now appearing at your local computer games shop, Boots, WH Smith and Rumbelows.



RRP
£5.99
inc. VAT

**THESE PEOPLE
AREN'T NICE.
I'M GETTING OUT
OF HERE!**



RABBIT SOFTWARE LTD

Brilliant on Spectrum, VIC-20 & CBM-64.

RABBIT SOFTWARE LTD
Please terrify me with a copy of your catalogue
NAME _____
ADDRESS _____

THE WARREN (UNIT 11), FORWARD DRIVE
WEALDSTONE, MIDDLESEX HA3 8R

THE AMAZING ADVENTURES OF THE

LAUGHING

Games

GSH
GAMES & SOFTWARE HOUSE

PART FOUR

AFTER SPENDING CHRISTMAS WITH HIS FRIEND-THE FRANTIC FERRET-THE LAUGHING SHARK WAS FEELING SOMEWHAT GREEN AROUND THE GILLS.



WHAT HE NEEDED WAS SOME VIRGIN GAMES EXCITEMENT TO WORK OFF THAT CHRISTMAS PUD' PAUNCH

HE'D HEARD THAT HIDEOUS BILL NEEDED HELP IN RESCUING GORGEOUS GRETA FROM THE GI-GANTS



BILL SHOULDN'T BE TOO HARD TO FIND, KEEPING HIS STRENGTH UP, AS HE DID, BY EATING HUGE AMOUNTS OF BAKED BEANS. A CASE OF FOLLOWING ONE'S NOSE!

IF OUR HERO WAS IN NEED OF MORE EXCITEMENT HE COULD TRY FUN-PAC 2....



OUTDRAW GUNFIGHTER IN ABILENE



ESCAPE THE MUGGER IN A DARK CITY ALLEY



OR PILOT STARSHIP SUPERNOVA



HOW ABOUT A NICE QUIET ROUND OR TWO OF GOLF??



JUST ONE OF THE SUPER GAMES IN FUN PAC 3. FOLLOW GOLF WITH AN UNDERSEA CRUISE IN SEAWOLF - THEN ON TO....



A NUCLEAR DISASTER TO SAVE A SCIENTIST OR TWO. (WITH A LITTLE HELP FROM ANDY ANDROID)

SHARK

HAD ENOUGH? DON'T UNDERESTIMATE OUR FISHY SUPER HERO. HE'D HEARD THAT!

DR FRANKY COULD USE A LITTLE HELP IN SUPPLYING HIS MONSTER WITH THE ELIXIR OF LIFE.....

REFRESHES THE MONSTER'S OTHER DOCTOR'S CAN'T REACH

WITH ALL THOSE GHOUL'S, GHOSTS AND CAVE IN'S TO DEFEAT - EVEN THE DYNAMIC DORSAL NEEDS HIS REST. BUT EVEN IN HIS DREAMS

THE ACTION DIDN'T SLOW DOWN. HE WAS TRAPPED, BLOCKBUSTED, SURROUNDED AND CAUGHT ON A CONVEYOR BELT TO DOOM IN THEM - A PARANOID FANTASY

O.K. - IT'S 1984, BIG BROTHER IS WATCHING - BUT OUR SHARK IS STILL LAUGHING.....

NEXT: THE CASE OF THE EXPLODING SAVEDLOY.....

NEW RELEASES



HIDEOUS BILL AND THE GI-GANTS

by Steve Lee for the Commodore 64 (VGA 6003).
By the author of the best seller 'Falcon Patrol' A three-part tale of heroism and romance. Try not to let the amazing graphics and sound distract you as you help Hideous Bill to rescue Greta from the depths of the Gi-Gants' nest and thus get his surprise.
£7.95 R.R.P.
Joystick



THEM - a paranoid fantasy

by Andy 'Grun' Green, for the Oric 48K (VGC 5002).
A five-part paranoid fantasy by one of the best selling Oric authors. Can you avoid 'Them', build the blockbuster, dispel the demons, avoid the uncertainty machine, escape the conveyor belt of doom to finally become a soul-saver!
£5.95 R.R.P.



FUN-PAC 2 - (VGB 7003).



FUN-PAC 3 - (VGB 7004).

by Peter J. Finkle for the T199/4A.
Three fun-packed games for the price of one. Our Fun-Pac cassettes are not just "compilation" tapes but, offer genuine value for money.
FUN-PAC 2 -
1) Escape the Mugger - a game of strategy and skill.
2) Starship Supernova - an exciting adventure set deep in space.
3) Gunfighter - a game of nerve and reactions for 1-6 players.
£6.95 R.R.P.

FUN-PAC 3 -

1) Nuclear Disaster - an unfortunately topical subject. Can you save the scientists from contamination from the leaking radiation.
2) Golf - All the fun of the course without getting wet! For 1-4 players with 1-18 hole option.
3) Sea Wolf - as commander of the submarine Sea Wolf, it is up to you to destroy the enemy ships.
£6.95 R.R.P.



DOCTOR FRANKY AND THE MONSTER -

by Martin Wheeler for the Spectrum 48K (VGC 1011).
A stunningly graphical, nine-screen game. Can you help Dr Franky revive his monster, arcade action, action-packed.
£5.95 R.R.P.

VIRGIN GAMES ARE:

VIC 20	MISSION MERCURY	£7.95
VIC 20	ENYAH 8K	£5.95
VIC 20	CREEPERS 3/8K	£5.95
SPECTRUM	YOMP 16/48K	£7.95
SPECTRUM	STARFIRE 48K	£7.95
SPECTRUM	SHEEPWALK 48K	£7.95
SPECTRUM	GOLF 16/48K	£7.95
SPECTRUM	LOJIX 48K	£5.95
SPECTRUM	RACING MANAGER 48K	£5.95
SPECTRUM	QUETZALCOATL 48K	£5.95
SPECTRUM	ROBBER 48K	£5.95
SPECTRUM	SPECTRUM 48K	£5.95
SPECTRUM	LOST 48K	£5.95
SPECTRUM	THE ISLAND 48K	£5.95
SPECTRUM	GHOST TOWN 48K	£5.95
SPECTRUM	RIDER 16/48K	£5.95
SPECTRUM	DR FRANKY & THE MONSTER 48K	£5.95
ORIC	KILLER CAVERNS 16/48K	£5.95
ORIC	THEM 48K	£5.95
DRAGON	DEATH CRUISE	£6.95
DRAGON	I CHING	£6.95
DRAGON	CASTLE ADVENTURE	£6.95
DRAGON	UXB	£6.95
COMM. 64	FALCON PATROL	£6.95
COMM. 64	BITMANIA	£6.95
COMM. 64	HIDEOUS BILL	£7.95
BBC B	BUG BOMB	£7.95
BBC B	LANDFALL	£7.95
BBC B	SPACE ADVENTURE	£7.95
BBC B	TRENCH	£7.95
BBC B	'OWZAT	£7.95
BBC B	CHEFTAIN	£7.95
BBC B	MICROBE	£7.95
BBC B	PLANKWALK	£7.95
BBC B	CRUNCHER	£7.95
BBC B	NOC-A-BLOC	£7.95
T199/4A	ROBOPODS	£6.95
T199/4A	FUN-PAC	£6.95
T199/4A	FUN-PAC 2	£6.95
T199/4A	FUN-PAC 3	£6.95

VIRGIN GAMES GANG

OUR GANG is growing in numbers all the time and everybody who buys one of our new games will receive from the **LAUGHING SHARK** an invitation to join the Gang for one year, absolutely **FREE**. Gang members will receive a quarterly newspaper packed with irrelevant pictures and information and lots of special offers.

THE "I WANT TO BE RICH AND FAMOUS DEPT"

We are always keen to receive any **ORIGINAL ENTERTAINING PROGRAMS** with good graphics at our now famous "I WANT TO BE RICH AND FAMOUS DEPARTMENT" from any of you programming mega-stars out there. **DON'T DELAY - SEND TODAY!**

PRESS REVIEWS

For a leaflet containing reviews from our current range of games please write to the "IF YOU'VE GOT THEM, FLAUNT THEM DEPARTMENT!"

MAIL ORDER

All our programs are available at normal retail price including postage and packing, direct from our "MY LOCAL DEALER HAS GONE OUT OF BUSINESS BECAUSE HE NEVER STOCKED YOUR GAMES DEPT" at 61-63 Portobello Road, London W11 3DD.

COLOUR CATALOGUE

If you would like a copy of our **FREE 16-PAGE, COLOUR CATALOGUE** (listing details of all our games, complete with screen shots), please write to the "RUSH ME A KOSHER BROCHURE PRONTO TONTO DEPT" enclosing an A4 SAE with 17p stamp.

ANIROOG

COMMODORE
64

NEW

CYBOTRON

Robots are marching relentlessly towards you from all directions. Attacking in wave after wave, they are determined to wipe out the human race. There are twenty levels including three special waves - BRAIN WAVE - GRUNT WAVE and TANK WAVE, with powers to mutate the humans, create pulsars and quasars and fire cannon balls.

J.S./K.B. or TWO JOYSTICKS
£7.95

BONGO

Enjoy the hilarious antics of the Comical Mouse as he overcomes all dangers to win the heart of the lovely princess by collecting her lost diamonds. He must climb ladders, slide down the shutes, use transporters and trampolines to jump across divides to escape and outwit his pursuers. You will be enchanted by the smooth pixel movement of multicolour soft sprites. Six screens with three levels of difficulty.

J.S. £7.95

SPACE PILOT

Realise your dreams of being king of the open skies. Fly your aircraft into unrelenting dog fights with enemy fighters. Prove how well you can handle your craft. Five stages of spectacular scenic graphics. Two player option.

J.S. £7.95

ZODIAC

An arcade adventure of awesome proportions. The evil powers of hell have scattered the signs of ZODIAC in the 400 chambers of THE ABYSS. You have to find and recover these magical creations and fight all the way by annihilating all those who stand in your way.

J.S. £7.95

JUNGLE DRUMS

Join the action packed safari on a twenty screen journey through the lush jungles and swamps to an ancient Aztec temple. The gorillas, the pirahna fish, the crocodiles, the snakes and the spiders not to mention the woodoo man leave very little time for you to collect the clues that will open the temple gates leading to the treasure.

J.S. £7.95

3D TIME TREK II

K.B./J.S. £6.95

GALAXY

K.B./J.S. £7.95

SKRAMBLE

J.S. £7.95

KONG

K.B./J.S. £7.95

MOON BUGGY

J.S. £7.95

HEXPERT

J.S. £7.95

THE DUNGEONS

K.B. £6.95

DARK DUNGEONS

K.B. £6.95

COSMIC COMMANDO

J.S./Stack Light Rifle £5.95

INDIAN ATTACK

J.S./Stack Light Rifle £5.95

STAR BASE DEFENCE

J.S./Stack Light Rifle £5.95

Trade Enquiries:

29 WEST HILL DARTFORD KENT (0322) 92513/8

Mail Order:

8 HIGH STREET HORLEY SURREY
24 HOUR CREDIT CARD SALES HORLEY (02934) 6083
PAYMENT BY CHEQUE P.O. ACCESS/VISA
50p POST & PACKAGING


```

/100:M(N)=M(N)+VS(N)*PR(N)/100
570 PRINT"-----"
-----
580 NEXT N
585 IF M(1)<=0 OR M(2)<=0 THEN 1000
586 PRINT"PRESS ANY KEY!!!!"
587 GET Z$:IF Z#="" THEN 587
590 NEXT M
600 PRINT"Q"
610 PRINT"*****"
620 PRINT"** YOU HAVE REACHED THE FINAL
RESULTS**"
630 PRINT"*****"
640 PRINT"PLAYER 1"
650 PRINT"ORAL:\":M(1)
660 PRINT"-----"
670 PRINT"PLAYER 2"
680 PRINT"ORAL:\":M(2)
690 PRINT"-----"
700 IF M(1)>M(2) THEN PRINT"DECLARE PLAYER
2 AS THE WINNER!!!!!"
710 IF M(2)>M(1) THEN PRINT"DECLARE PLAYER
1 AS THE WINNER!!!!!"
720 IF M(2)=M(1) THEN PRINT"DECLARE A
DRAW!!!!!"
800 INPUT A$
810 IF A#="N" THEN NEW
820 RUN
900 END

```

```

1000 FOR N=1 TO 10
1010 PRINT"*****"
1020 NEXT N
1030 PRINT"**** SOMEONE WENT BANKRUPT
*****"
1040 FOR N=1 TO 10
1050 PRINT"*****"
1060 NEXT N
1200 FOR N=1 TO 10000:GOTO 600
2000 PRINT"Q"
2002 PRINT"INSTRUCTIONS!"
2004 PRINT"YOU ARE THE OWNER OF
A SAUSAGE CHAIN"
2006 PRINT"IN"
2008 PRINT"YOU HAVE TO DECIDE ON HOW TO
RUN YOUR"
2010 PRINT"BUSINESS."
2012 PRINT"DECISION ABOUT THE
AND AMOUNT OF"
2014 PRINT"IT YOU BUY HAVE TO BE TAKEN."
2016 PRINT"YOU HAVE A CHOICE OF 3 SAUSAGES:"
2018 PRINT"1 ST GRADE BEING THE BEST!"
2020 PRINT"TOO HIGH PRICE WILL KEEP THE
CUSTOMERS AWAY!!!"
2022 PRINT"GOOD LUCK!!!!"
2030 GET KK$:IF KK#="" THEN 2030
2040 RETURN
READY.

```

Discover the heavens on your computer

ZX Spectrum Astronomy
by Maurice Gavin

Astronomy, the study of the heavens, and your Spectrum are made for each other. The graphics potential of the Spectrum means that the subject can be brought to life. With over 50 illustrations, this book gives heavy emphasis to the visual content of computing and astronomy. The high quality graphics will also allow you to simulate the movement of the stars for any night at any time.

Maurice Gavin is a Fellow of the Royal Astronomical Society and a council member of the British Astronomical Association. He is also a regular contributor to Popular Computing Weekly.

Look out for the Sunshine range in W.H. Smith's, Boots, John Menzies, other leading retail chains and all good bookshops. Dealer enquiries: 01-437-4343



Please send me ZX Spectrum Astronomy at £6.95 each
I enclose cheque/postal order for £_____ made payable to:
Sunshine Books, 12-13 Little Newport Street, London WC2R 3LD.
Or phone your order through on Access Mastercard 01-437-4343

Name _____

Address _____

Signature _____



SHARDS

software

Vacancy

for a full-time junior programmer to join our staff. Applicant must be 18-25, and living in London/Essex area. Thorough knowledge of Basic essential, as is familiarity with at least two popular home micros. Machine code experience (particularly 6502) preferable.

Write now with full personal details to:

**Personnel Department
SHARDS SOFTWARE
189 Eton Road, Ilford, Essex IG1 2UG**

SPRITES FOR THE DRAGON

Merlin's Sprite Magic offers a whole host of new features for the Dragon

Up to 128 sprites. Size up to 40 x 40 in mode 4, even larger in other modes. Sprite magic uses the 256 x 192 grid for screen addressing. Sprites are programmable for joystick control and/or keyboard control. Sprites may be defined as missiles fired from other sprites in response to fire-button or keyboard. Sprites may be programmed to rebound (like a bouncing ball), or wrap round, or disappear automatically when they get to the edge of the (user defined) screen. A wide range of commands and functions offers comprehensive control of speed, direction, screen edge behaviour and collision detection.

Animation is easily implemented with DRWG function which swaps the drawings being used for sprites and they needn't even be the same size.

Some of the commands are exceptionally powerful . . . MOVEn moves a single sprite, MOVEn,n moves a block of sprites, MOVEM moves all the sprites. All the MOVE commands observe the individual direction, screen-edge, joystick and keyboard instructions for the various sprites. The REPORT function reports how many have crashed. The HIT function reports crashed sprite numbers.

Sprites are non-destructive i.e. they do not leave a "trail". They're fast and they're efficient and they're easy to use.

The Dragon now has its very own BEEP command. This one, however, offers a range of 16 pre-programmed gunshots, explosions, sirens, laser sounds and the like. You can also program your own . . . BEEP (six parameters) lets you generate the kind of noises you have heard on other high quality software.

Keyboard handling has had some attention too . . . optional auto-repeat, INKEY function returns ASCII code, KEY function does the same, but waits for a keypress. CLEAR key clears hi-res screen and homes the print cursor.

We have also included a couple of routines to provide text on the hi-res screen . . . in all 5 PMODES with enhanced cursor controls providing relative as well as absolute positioning, PAGE command, HOLD command (to fix headers or graphics), COLOUR command changes text foreground and background colours etc. The hi-res screen is used just like the Basic text screen, including editing. You can also re-define the character set using the friendly new command CHR(n)=eight row values.

Sprite Magic requires absolutely no knowledge of machine code. The comprehensive manual describes the new Basic commands in full, with lots of examples. As well as the documented demonstration program, the cassette includes Character and Sound Generators, Mate in two (yes you can!), Shooting Gallery and Breakout. Price £17.25 all inclusive.



MERLIN (MICRO SYSTEMS) LTD,
93 HIGH STREET, ESTON, CLEVELAND
Tel: (0642) 454883



EXTRA ++ EXTRA ++ EXTRA

Ten JET SET WILLIE TAPES personally

signed by Mathew Manic-Miner-

Smith to be won in a special

CRASH No 2 "Debug

puzzle". Somewhere

"around some" isn't.

Where is it?

Answers on a

postcard only

to "CRASH".

Get it now!

Got it?

Great!

**The only monthly mag
to guide you through
the jungle of Spectrum software
with more reviews and info on games
than even mighty Kong
could swallow!**

NEWS REVIEWS

ARTICLES COMIC STRIP

COMPETITIONS CHARTS

ORDER YOUR COPY FROM YOUR NEWSAGENT NOW!

75p.
at all good
newsagents

DETAILS

Level 9 Computing specialise in high, pure-text puzzle adventures with detailed scenery and a wealth of puzzles. All games have over 200 locations and a save game feature, and cost £9.90 inclusive.

MIDDLE EARTH ADVENTURES

1: COLOSSAL ADVENTURE. A complete, full size version of the classic mainframe game "Adventure" with 70 bonus locations added.

2: ADVENTURE QUEST. Centuries have passed since the time of Colossal Adventure and evil armies roam The Land. With cunning, you must overcome the many obstacles on the road to the Black Tower, source of their demonic power, and destroy it.

3: DUNGEON ADVENTURE. The trilogy is completed by this massive adventure, set in the rich caves below the shattered Black Tower. A sense of humour is essential!

THE FIRST SILICON DREAM ADVENTURE

4: SNOWBALL. The first of Pete Austin's second trilogy. The giant colony starship, Snowball 9, has been sabotaged and is heading for the sun in this giant game with 7000 locations.

THE LORDS OF TIME SAGA

7: LORDS OF TIME. Our congratulations to Sue Gazzard for her super design of this new time travel adventure through the ages of world history. Chill to the ice-age, go roamin' with Caesars legions, shed light on the Dark Ages, etc. etc.

LEVEL 9 ADVENTURES

**BBC 32K COMMODORE 64 SPECTRUM 48K
LYNX 48K NASCOM 32K ORIC 48K ATARI 32K**



Level 9 adventures are available at £9.90 from good computer shops, or mail order from us at no extra charge. Send order, or SAE for catalogue, to the address below - and please describe your micro.

LEVEL 9 COMPUTING

Dept 229 Hughenden Road, High Wycombe, Bucks HP13 5PG

REVIEWS

"Adventures which have a fast response time, are spectacular in the amount of detail and number of locations, and are available to cassette owners. Simply smashing!" - *Soft, Sept 83*

"Colossal Adventure is included in Practical Computing's top ten games choice for 1983: "Poetic and tough as hell." - *PC, Dec 83*

"To sum up, Adventure Quest is a wonderful program, fast, exciting and challenging. If you like adventures then this one is for you" - *NILUG issue 1.3*

"Dungeon Adventure is recommended. With more than 200 locations, 700 messages and 100 objects it will tease and delight!"

- *Educational Computing, Nov 83*

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

- *Which Micro?, Feb 84*

"Lords of Time. This program, written by newcomer Sue Gazzard, joins my favourite series and is an extremely good addition to Level 9's consistently good catalogue..."

As we have come to expect from Level 9, the program is executed with wonderful style - none of those boring "You can't do that" messages! Highly recommended." - *PCW, 1st Feb 84*

THE FABULOUS CASSETTE



FROM

Cascade

VALUE that's out of this world

50 GAMES ON ONE CASSETTE

DRAGON BBC A/B Spectrum apple ATARI ORIC-1 ZX81 VIC-20

ONLY
£9.95
(INC. P&P and VAT)

It is impossible to tell you everything about the 50 games on CASSETTE 50 but they include many types such as maze, arcade, missile, tactical and logic games, to suit most tastes in computer game playing. CASSETTE 50 will appeal to people of all ages and the games will provide many hours of entertainment for all the family at a fraction of the cost of other computer games.

EXPRESS DELIVERY - ORDER NOW

Name _____

Address _____

Post Code _____

Country _____

Dealers & Stockists enquiries welcome.

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

£ _____ made payable to Cascade Games Ltd.

Please debit my No. _____

SPECTRUM ORIC-1 ZX 81 VIC 20
BBC A/B DRAGON ATARI APPLE



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

PCW 18/2/84


```
2000 FORX=1TON
2010 IFB(X)=H(X)THENH(X)=0:B(X)=0:B=B+1
2020 NEXT RETURN
```

Listing 2

```
0 POKE36879,8:POKE56,28:POKE52,28:PRINT"J":CLR:PRINTCHR$(8)
1 PRINT"
2 PRINT" | PLEASE WAIT |"
3 PRINT" "
10 FORX=1TO34*8:READS:POKE7167+X,S:NEXT
15 FORX=0TO207:READS:POKE7448+X,S:NEXT:CLR:POKE36869,255
20 PRINT"J"
30 IF PEEK(37151)=126THENPRINT"#####PRESS PLAY":GOTO30
40 PRINT"#####* &MASTER MIND& "
50 PRINT" & IS LOADING& (.....)"
60 POKE56,28:POKE52,28:LOAD"*MASTER*"
99 DATA24,60,118,231,247,118,60,24,120,68,66,66,126,66,66,66
110 DATA120,68,66,65,126,65,65,126,14,16,32,64,64,64,64,126
120 DATA120,66,65,65,65,65,66,120,6,8,16,62,64,64,64,126
130 DATA6,8,16,62,64,64,64,64,14,16,32,64,64,70,66,126,66,66,66,66,126,66,66,66
140 DATA126,8,8,8,8,8,8,126,126,8,8,8,8,72,40,24
150 DATA64,64,66,68,72,80,120,70,64,64,64,64,64,64,126
160 DATA 120,76,74,73,73,73,73,120,76,66,65,65,65,65,65
170 DATA248,132,130,129,129,65,33,31,120,68,66,126,64,64,64,64
180 DATA248,132,130,129,137,69,35,31,120,68,66,126,96,80,72,68
190 DATA14,16,32,64,124,4,8,112,126,8,8,8,8,8,8,8,8
200 DATA66,66,66,66,34,18,10,6,66,66,66,66,66,66,38,24,24
210 DATA146,146,146,146,146,82,50,14,129,66,36,24,24,36,66,129,66,66,34,30,4,8,1
  6,96
220 DATA126,2,4,8,16,32,64,126,24,36,118,231,247,102,60,24
241 DATA24,36,118,199,223,70,60,24,24,60,94,215,195,118,60,24
242 DATA24,36,110,227,251,98,60,24,24,52,110,227,235,98,60,24,0,0,0,0,0,0,0
243 DATA0,102,102,0,0,102,102,0
244 DATA0,102,102,0,0,96,96,0,0,102,102,0,0,0,0,0,96,96,0,0,0,0
245 DATA 8,8,8,8,8,8,8,8,8,8,15,8,8,8,8,8,8,15,0,0,0,0,8,8,8,248,0,0,0
246 DATA 0,0,0,248,8,8,8,8,0,0,0,15,8,8,8,8,0,0,0,255,0,0,0,0,8,8,8,248,8,8,8,8
247 DATA 8,8,8,255,0,0,0,0,0,0,255,8,8,8,8
260 DATA15,19,37,73,146,164,200,240,24,56,88,24,24,24,24,126
280 DATA240,8,4,2,127,64,64,127,120,4,2,1,63,1,1,127
300 DATA2,4,8,18,34,127,2,2,127,64,64,126,2,4,8,240
320 DATA15,16,32,64,124,66,65,127,127,1,2,4,8,16,32,64
340 DATA24,36,66,129,126,129,66,60,127,65,33,31,1,2,4,120
370 DATA255,255,255,255,255,255,255,255,0,0,0,0,0,24,24,0,8,8,8,255,8,8,8,8
```

Mastermind
by M Tooley

Screen Copy

on Spectrum

This program was designed for the 48K machine but it is relocatable for owners of 16K by moving it down memory. The routine allows the whole screen (192 lines)

or parts of the screen to be copied onto the ZX printer. Play around with the input values to get an idea of the kinds of effects you can achieve.

```
1 REM #####
2 REM #LINE COPY#
3 REM #####
4 REM
10 CLEAR 65199
20 DATA 243,6,176,33,0,64,205,178,14,201
30 FOR n=65200 TO 65209: READ
a: POKE n,a: NEXT n
40 CLS : INPUT "Start line 0-192 ";s
50 INPUT "Amount of lines to be printed ";c
55 LET a=(16384+s*32)/256
60 POKE 65202,c: POKE 65205,IN
T a: POKE 65204,a-INT a
70 PRINT "To activate the routine use
```

```
RANDOMIZE USR 65200"
80 INPUT "save y/n ";n$
90 IF n$="y" THEN PRINT "The code to be saved on tape when activated will copy from line";s;" for ";c;" lines.":SAVE "tcopy"CODE 65200,10:
```

The routine will run at any address

Screen Copy
by Daniel Bland

Open Forum

Shadow

on BBC

This is a routine which can be called when shadows are needed as a decorative feature on titles of programs, names of authors of programs or even copyright notices.

Use of the *Procedure* is explained in Rem

statements in the listing and will run on a BBC model B.

The foreground printing colour can be changed for personal preference by changing the *gcol* value in line 300

Program rules

240 Change true colour 0 (black) to logical colour 7 (white) and change true colour 7 (white) to logical colour 0 (black).

250 Change text cursor to graphics cursor.
260 Work out to place 'p\$' in central 'X' position and put value in 'I'.
270-320 Print 'p\$' and shadow.
330-340 Wait three seconds.
350 End of procedure.

The printing is achieved by firstly printing the black shadow, and then printing the different colour slightly off position in the 'X' and 'Y' direction.

```
10 REM *****
20 REM *
30 REM * SHADOW *
40 REM * BV *
50 REM *ABDUL.K NATHEKAR*
60 REM *
70 REM *****
80
90 REM P$ CONTAINS THE WORD TO BE
100 REM PRINTED WITH ITS SHADOW
110 REM AND
120 REM B% IS THE GRAPHIC SCREEN
130 REM 'V' CO-ORDINATE WHERE THE
140 REM WORD IS TO BE PRINTED.
150 REM 600 IS IDEAL FOR TITLES.
160 REM MAXIMUM LENGTH OF CHARACTERS
170 REM IN P$ IS 15.
180 REM MODE HAS TO BE CHANGED TO
190 REM MODE 2 BEFORE CALLING

200 REM PROC SHADOW.
210
220 DEFPROC SHADOW(P$,B%)
230 CLS
240 VDU19,0,7,0,0,0;19,7,0,0,0,0
250 VDU5
260 I=(640-(32*LEN(P$)))-10
270 MOVEI,B%
280 GCOL0,7
290 PRINTP$
300 GCOL0,5
310 MOVEI+9,B%-5
320 PRINTP$
330 T=TIME+300
340 REPEAT UNTIL TIME>T
350 ENDPROC
```

Shadow
by Abdul Nathekar

Sorting

on BBC

This sort program can be helpful in produc-

ing in alphabetical order lists of record discs video tapes, etc.

This puts to use the BBC micro B and a printer. Names are entered as *Data* state-

ments and the end of the listing. Termination of the *Data* is executed by zzz. It is worth noting that lower case letters will be considered after capitals.

```
10 REM VIDEO LIST
20 DIM name$(200)
30 count_in = 0
40 REPEAT
50 count_in = count_in + 1
60 READ name$(count_in)
70 UNTIL name$(count_in)="zzz"
80 REM to sort the VIDEOS ETC
90 scan = 2
100 FOR count_out = 1 TO count_in - 1
110 FOR sort = scan TO count_in - 1
120 IF name$(count_out) < name$(sort) THEN 160
130 temp_store$ = name$(sort)
140 name$(sort) = name$(count_out)
150 name$(count_out) = temp_store$
160 NEXT sort
170 scan = scan + 1
180 NEXT count_out

190 REM to Print the list
200 VDU2
210 PRINTSPC(25)" VIDEO LIST"
220 PRINTSPC(25)"*****"
230 PRINT'
240 FOR P_out = 1 TO count_in - 1
250 PRINT TAB(20),P_out TAB(25)name$(P_out)
260 NEXT P_out
270 VDU3
300 DATA THE LADY KILLERS
301 DATA A CASE FOR P.C. NINE
302 DATA WENT THE DAY WELL
303 DATA VAMPIRA
304 DATA DRY ROT
400 DATA zzz
```

Sorting
by A Moulden

JLC DATA DUPLICATION

CASSETTES — DISCS — EPROMS

- ★ 7 YEARS DATA EXPERIENCE ★
- ★ HIGH LEVEL OF SECURITY ★
- ★ NORMALLY NO MASTERING FEE ★
- ★ NORMALLY 7-10 DAY TURNAROUND ★
- ★ 24 HOUR TURNAROUND SUPERFAST SERVICE IF REQUIRED ★

Cassette Duplication — for most micros.

Disc Duplication — 35, 40, 80 track S/S, D/S, S/D, D/D.

Eprom Duplication — most types.
All data verified.

Blank Cassettes, Discs, Eproms — bulk sales only.

Blank Labels — most colours — bulk sales only.

Labels in sheets or rolls.

★ NEW SERVICE ★

Letter-heads and forms in rolls or fanfold for computer printing.

Telephone: (0226) 87707 24 hours
7 days a week

Enquiries and accounts to:
JLC DATA, 49 CASTLE STREET, BARNSELY,
SOUTH YORKSHIRE S70 1NT

In the interests of security, callers without appointments or proof of company status will not be seen.

Wizard Software

FOR DRAGON 32 ZX SPECTRUM 48K ORIC-1 48K



DRAGON STAR TREK DRAGON 32 £8.45

A real time version featuring a 10 x 10 galaxy, shield control, photon torpedoes, status reports, signals received, galactic search, scanner control, warp drive, star bases with docking, black holes, planets and planet landfall, pulsars, novas, stars, asteroids, meteors, shuttles and shuttle docking, automatically converging and attacking Klingons. Four levels of difficulty, comes with instruction manual.

TIME PORT 1 DRAGON 32 £8.45
ZX SPECTRUM 48K £6.95

The first in a series of five adult strategy adventure games. Direct your robot and acquire the object that the Keeper will ask for and bring it safely back to the Time Port.

EVICTOR DRAGON 32 and ORIC-1 48K £7.95
ZX SPECTRUM 48K £5.95

An original arcade game presented in high resolution graphics with machine code for extra zip. Evict the aliens from their self-regenerating and defended base. Features lasers, phasers and bombs. Five skill levels. Dragon 32 and Oric-1 versions feature a demonstration mode.

RECOMMENDED BY THE MICROCOMPUTER SOFTWARE CLUB

All prices inclusive. Mail order. Cheques or postal orders to:

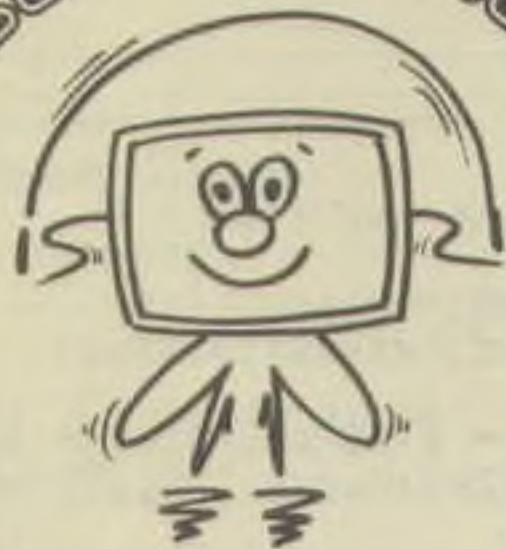
**WIZARD SOFTWARE, DEPT. PCW, PO BOX 23
DUNFERMLINE, FIFE KY11 5RW**

Also available from software retailers in UK, Europe and Africa.
Send large SAE (7in. x 5in.) for full program catalogue.
Royalties paid for superior quality DRAGON 32 and ORIC-1 software.

FREE C15 tape with every purchase when you bring this ad

Got a computer?
Give it a boost at

FLEXIWORDS



The Super Computer Shop

Software books and accessories for
ACORN COMMODORE SINCLAIR MICROWRITER

18 Otley Road, Headingley, Leeds
(0532) 758474

You're better off at a proper computershop



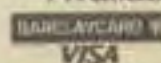
POOLSWINNER

THE ULTIMATE POOLS PREDICTION PROGRAM

- PREDICTS** Not just SCOREDRAWS, but NOSCORES, ALWAYS and HOMES
 - IT WORKS** We **guarantee** the program performs significantly better than chance
 - ADAPTABLE** "Poolswinner" allows the precise prediction formula to be set by the user — you can develop and test your own unique method. Probabilities are given on **every** fixture — choose as many or as few selections as you wish
 - EASY TO USE** Fully menu driven, with detailed instruction booklet
 - DATABASE** The program comes complete with the largest database available — over 20,000 matches. The database automatically updates as results come in
- APPLE, BBC (B), COMMODORE 64, DRAGON, SPECTRUM (48K), ZX81 (16K)
£15 (all inclusive)

We produce databases for those developing their own prediction program. Two years results £7.50. Five years results £12.50

Available from dealers, or direct (return of post) from . . .



Selec Software



37 COUNCILLOR LANE, CHEADLE, CHESHIRE 061-428 7425
DEALER ENQUIRIES WELCOME

Function Keys

on BBC

This program effectively gives the user 20 function keys using the 0.1 operating system, instead of the usual 11. It does this by assigning Key 0 to call a short machine code routine located at &ODOO to switch between two sets of functions.

Key in all the bytes from the hex dump as *Data* in the program. Then go through the same routine for your second set of definitions. To find how many bytes you are using

when programming the keys use *Print* ?&OB11. Quite probably, one set of functions will use more memory than the other, so, in line 260, the number after the CPX statement must be the larger of the two numbers obtained plus one.

Note that in both sets of definitions, Key 0 must be defined as *Call* &ODOO:M. Below are the function key definitions.

```
KEY 0 CALL&ODOO:M
KEY 1 RUN:M
KEY 2 :NLIST:M:O
KEY 3 CLS:M
KEY 4 NEW:M
```

```
KEY 5 LOAD"":M
KEY 6 SAVE"
KEY 7 CALL&6000:M
KEY 8 MODES6:M:NLIST:M:O
KEY 9 MODE7:M
KEY 10 OLD:M
KEY 0 CALL&ODOO:M
KEY 1 +LOAD""8000:M
KEY 2 LIST07:M
KEY 3 LIST00:M
KEY 4 AUTO
KEY 5 RENUMBER
KEY 6 +LOAD:M
KEY 7 LOAD"
KEY 8 +CAT:M
KEY 9 +MOTOR
KEY 10 OLD:M
```

```
10 REM ***** FUNCTION KEYS *****
20 REM ***** ROBERT TURNER *****
30 REM ***** SEPTEMBER 1983 *****
40 DIM A$(91)
50 FOR A%=0 TO 91
60 READ A$(A%)
70 A%?&0B00= EVAL("&" + A$(A%))
80 NEXT A%
90 FOR A%=0 TO 91
100 READ A$(A%)
110 A%?&0D20= EVAL("&" + A$(A%))
120 NEXT A%
130 FOR PASS=0 TO 2 STEP 2
140 P%=&0D00
150 COPT PASS
160 LDA #0
170 TAX
180 TAY
190 .loop LDA &0B00,X
200 TAY
210 LDA &0D20,X
220 STA &0B00,X
230 TYA
240 STA &0D20,X
250 INX
260 CPX #92
270 BNE loop
```

```
280 RTS
290 J
300 NEXT
310 DATA 11,1B,1F,26,2A,2E,35,3A,44,51,57,5B,
5B,5B,5B,5B,5B,5B,43,41,4C,4C,26,30,44,30,
30,0D,52,55,4E,0D
320 DATA 0E,4C,49,53,54,0D,0F,43,4C,53,0D,4E,
45,57,0D,4C,4F,41,44,22,22,0D,53,41,56,45,
22,43,41,4C,4C,26,36,30,30,0D,4D,4F,44
330 DATA 45,36,0D,0E,4C,49,53,54,0D,0F,4D,4F,
44,45,37,0D,4F,4C,44,0D
340 DATA 11,1B,27,2E,35,39,41,47,4C,51,57,5B,
5B,5B,5B,5B,5B,5B,43,41,4C,4C,26,30,44,
30,30,0D,2A,4C,4F,41,44,22,22,38,30,30,
30,0D,4C,49,53,54,4F,37,0D,4C
350 DATA 49,53,54,4F,30,0D,41,55,54,4F,52,45,
4E,55,4D,42,45,52,2A,4C,4F,41,44,0D,4C,
4F,41,44,22,2A,43,41,54,0D,2A,4D,4F,54,
4F,52,4F,4C,44,0D
```

Function Keys

by Robert Turner

Microradio

GW6JJN



Software library

It appears that Microradio is having some influence on the world at last. Gillian Orpin, proprietor of the National Software Library, 200 Mulgrave Road, Cheam, Surrey SM2 6JT, has written to me with some very good news for radio-computing enthusiasts.

Gill, who reads this column regularly, has decided to add some amateur radio programs to the Library's catalogue. The programs are for the Sinclair Spectrum and are published by G41NP Software. The first

program is *Awards Manager* (reviewed in *PCW*, Microradio, 26 January-1 February).

The second program is *Contest Duping*. What is *Contest Duping* you might ask? Well, when taking part in a contest on air, it is important to know whether a station has already been worked, because if it is entered twice, or duplicated in the log, then points will be lost. This program allows you to enter the callsign of a station and the computer will tell you whether to go ahead or not.

A month or two ago, a gentleman in Scotland wrote to Microradio asking if it were possible to find a program for the Spectrum which would plot the positions of the planets in the solar system, including the sun and moon. He was interested, as a radio amateur and astronomer, in the data and time, both real and sidereal,

of the various planets. I remember writing back to him explaining that I knew of no such program.

Good news — I have found one. It is called *Ephemeris* by Bridge Software and is available from the National Software Library. Also available from the library is *The Night Sky*, again from Bridge Software. This remarkable program will draw a star map for any time and date for any given direction.

I would like to congratulate Gillian Orpin on being the only software library in Britain to carry radio software.

I realise, of course, that in the past there has been much discussion about software libraries and whether or not they affect sales of software. I, like many other computer users, have bought software only to be disappointed.

As far as radio-computing is concerned, we are dealing with utility programs which can often cost a lot more than games. The advent of a software library, which includes such utility programs in its repertoire, means that a particular program can be hired and, if it is what you want, bought from the library at a substantial discount. For once, there are real advantages to the consumer — surely not a bad thing since without the consumer, there would be no computer industry.

Ray Berry GW6 JJN

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

A NEW SPECTRUM PROGRAMMABLE JOYSTICK INTERFACE

— PLUS SOUND

(Normally a £10 Add on)

from **Rainbow Electronics**

- PROGRAMMABLE** — Allows any joystick position to represent any key — without wires, or leads, or tapes!
- UNIVERSAL** — Enables use of ALL Software
- AMPLIFIED SOUND** — Internal micro-chip amplifier boosts Spectrum's beep with simple connection to ear or mic socket.
- EASY TO USE** — All joystick positions are programmed simply by selecting joystick position, pushing desired key on spectrum, releasing joystick, and then the key.
- ADAPTABLE** — Accepts diagonal positions.

ONLY £24

plus £1 p&p.



This is a top quality product and we aim to give you an excellent service.

Send Cheque or P.O. to: **Rainbow Electronics**
Glebe House South Leigh Witney Oxfordshire OX8 6XJ
Tel. Witney 5844

ISCOM

9 Winchester St, Dept 1
ACTON, LONDON W3

Affordable Mail Offers
Hardware Orders Valid
& only until
Software 30/4/84

- ZX Spectrum 16K £90, 48K £115**
Printer £35, Light pen £15, Kempston interface £9.
- Commodore 64 £180, VIC 20 £125**
Printer MPS 801 £220.
- BBC B £375 ORIC 48K £125**
MCP-40 £100, Col Monitor £200
Quick shot Joystick £9.

New and Top 50 Software

CMB 64 Software: Hobbit 64 RRP 14.95 OUR P. 13 Manic Miner, Crazy Ballon, Galaxy 64, UGH, Kong, Scramble, Squash Frog, Quantic Warrior, Dancing Feet, Krystals of Zong RRP 7.95 OUR P. 6.70 Hoever Bover, Altair 4, RRP 7.50 OUR P. 6.40 Colossal Adventure, Snow Ball RRP 9.90 OUR P. 8 Kick Off, Widows Revenge RRP 6.99 OUR P. 5.90 Hunch Back, Mr Wimpey, Super Pipeline, Lazer Zone, Jammin RRP 6.90 OUR P. 5.80 Transylan Tower RRP 6.50 OUR P. 4.90 Quasar 64 RRP 5.99 OUR P. 4.80

Spectrum Software: Vallhalla, Hobbit RRP 14.95 OUR P. 11.50 Fighter Pilot, Hunter Killer RRP 7.95 OUR P. 6.50 Ant Attack, Death Chase, Kick Off, Skull, Classic Adventure, TRAXX, Penetrator, Hunch Back, Strike Attack RRP 6.95 OUR P. 5.50 Doomsday Castle, Romells Revenge, Urban Upstart RRP 6.50 OUR P. 5 Bird and the Bees, Jetset Wille, Manic Miner, The Omega Run, Ometron, 30 SEIDDAB Attack, Kong, Micro Bot, Pinball Wizard, Pool, Mr Wimpey, Harrier Attack, Wheelie, Revenge of the Mutant Camel RRP 5.95 OUR P. 4.70 Attic Atac, Schuba Dive, Jet Pac, Lunar-jet Man, Pssst, Cookie, Alchemist, Zzoom, Stonkers, ZipZap, Arcadia RRP 5.50 OUR P. 4.45

SEND LARGE SAE FOR OUR FULL CATALOGUE.
Prompt dispatch upon Return of Cheque.
Cheque/P.O. to above address.

WANTED

The very best machine code arcade games
for Dragon, Commodore 64, BBC and Electron

Company Reg. No. 1701670

Director: I. Manley
Software: J. Morrison
Secretary: I. Blund



V.A.T. No. 392 1083 60

Software & Hardware
Systems Design Specialists

J. Morrison (Micros) Ltd.

1 Glensdale Street, Leeds, LS4 9JJ

Telephone (0532) 480987

Dear Software Writer,

Because our software is so popular, and up until now we have written everything ourselves, we are finding it difficult to keep up with the demand for new games from us.

For the very first time we have decided to look at software written by other people. As you will appreciate, we have a hard-won, first class reputation to maintain and therefore we will only consider the very best games. We are looking for arcade games for the Dragon, Commodore 64, BBC and Electron.

If you feel that your software can match the quality of our existing games then call us on Leeds (0532) 480987.

In return you can expect immediate action, honest and fair dealings at all times, substantial sales and a fair reward for your efforts.

Yours sincerely,

Ignace Manley

Ignace Manley
Director

ULTRASOFT

MAIL
ORDER
ONLY

BETTER SOFTWARE AT BETTER PRICES

PO BOX 107, UXBRIDGE, MIDDX, UB10 0RG

SPECTRUM

- CRYSTAL** Rommels Revenge Invasion of the Body Snatchers RRP £7.50
..... Our Price £6.50
- R SHEPHERD** Urban Upstart RRP £7.50
..... Our Price £6.50
- OCEAN** Hunchback Mr Wimpey Transversion, Digger Dan RRP £5.90
..... Our Price £5.50
- BUG BYTE** Cavern Fighter Birds & Bees, Pool, Aquarius RRP £5.95
..... Our Price £5.50
- ULTIMATE** Lunar Jetman Atac, Pssst, Cookie RRP £5.50
..... Our Price £4.95

VIC 20

- ULTIMATE** Jetpac RRP £5.50
..... Our Price £4.95
- LLAMASOFT** Meta Llamas RRP £6.00
..... Our Price £5.00
- OCEAN** Caterpillar RRP £6.90
..... Our Price £6.25
- DURRELL** Quest of Merrarid RRP £7.95
..... Our Price £7.25
- QUICKSILVA** Skyhawk RRP £7.95
..... Our Price £6.95
- CHANNEL 8** Black Squid RRP £9.95
..... Our Price £8.95

DRAGON

- MICRODEAL** All their titles RRP £8.00
..... Our Price £7.95
- JMM** Maurice Minor Crusader, Vultures, Droid RRP £6.95
..... Our Price £6.25
- PEAKSOFT SAS**, Champions RRP £6.95
..... Our Price £6.25
- S/V** Quickshot Joystick RRP £12.95
..... Our Price £11.95

COMMODORE 64

- MICRODEAL** Space Shuttle RRP £8.00
..... Our Price £7.75
- OCEAN** Mr Wimpey, Hunchback RRP £6.90
..... Our Price £6.25
- S'WARE PROJECTS** Manic Miner RRP £7.95
..... Our Price £7.25
- QUICKSILVA** Ring of Power RRP £9.95
..... Our Price £8.25
- Purple Turtles, Aquaplane RRP £7.95
..... Our Price £6.50
- TERMINAL** Super Gridder, Scramble, Dogfight RRP £9.95
..... Our Price £8.25
- INTERCEPTOR** Siren City, Tokens of Gaul, Vortex Raider RRP £7.00
..... Our Price £5.95

SEND SAE FOR OUR CATALOGUE
(PLEASE STATE MACHINE)

Home
Computer
Centre



29 Millcroft, Crosby, Liverpool L23 9XJ
Tel. 051-727 8050

ASTERFRET TRADING LTD. INCORPORATES
HOME COMPUTER CENTRE

MOTHERBOARDS

VIC 20 4 SLOT SWITCHABLE — £28.95
CBM 64 4 SLOT SWITCHABLE — £29.95

LIGHT PENS

CBM 64 + FREE GAME — £28.75
VIC 20 + FREE GAME — £28.75



VIC 20 and CBM 64 are reg'd trade marks
Commodore Business Machines



16K STANDARD
£27.95

RAM PACKS

VIC 20 16K STANDARD — £27.95
VIC 20 16K SWITCHABLE — £35.95
VIC 20 32K SWITCHABLE — £49.95

ALL RAM PACKS CARRY 2 YEARS GUARANTEE

Please allow up to 21 days for delivery. All prices include V.A.T., postage and packing.

If you wish to be added to our mailing list,
please tick the appropriate box

PLEASE SEND ME



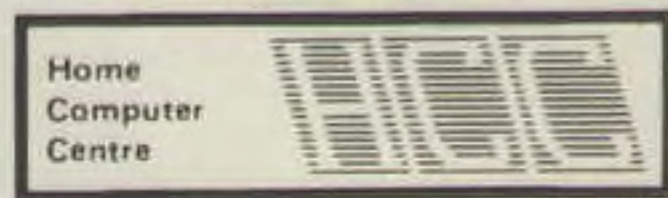
Name _____
Address _____

Qty

- VIC 20
- CBM 64
- 16K Std. Ram Pack
- 16K Switchable Ram Pack
- 32K Switchable Ram Pack

- VIC 20 4 Slot Motherboard
- CBM 64 4 Slot Motherboard
- VIC 20 Light Pen
- CBM 64 Light Pen
- BBC Light Pen

I enclose Cheque/PO for £ _____



PCW

pro clone.

PRO CLONE LTD, WHITEHALL HOUSE, UNION STREET, LUTON, BEDS LU1 3AN. TEL (0582) 418727

NO FUSS, HIGH QUALITY, PROMPT AND EFFICIENT

data duplication

SERVICE

CASSETTES — DISKETTES — PRINTING — PACKAGING

DATA DUPLICATION. WE USE QUALITY PRODUCT AND PROFESSIONAL DATA PLANT ONLY.

fast.

distribution distribution distribution distribution distribution distribution distribution distribution distribution

Your Best Source of Best Sellers

SS IJK
ISL
ddictive
Prottek
fantasy
ULTIMATE
SOLAR SOFTWARE
MICROMEGA
CRL
DOCTOR SOFT
DIAMOND SOFT
DJL SOFTWARE
BUG-BYTE SOFTWARE
Stell
A & F SOFTWARE
SQUIRREL
Opus
SUNSHINE
SUPERIOR
BANANANA SOFT
SOFTWARE PROJECTS

ocean
VISIONS
ANIROG
DIGITAL FANTASIA
MIKRO-DEN
GILSOFT
Doric
ocean
LONGMAN
ROTTNIK
LOTHLORIEN
GEMINI
SUMLOCK
LYVERS
SOFTTEK
MICROSPHERE
Lombard
Kosmos
GAMES MACHINE
Durell
Software
ARCADE
Games

We know what's selling

As a leading distributor of home computer software, we know what's selling in retail outlets. We've also got the knowledge and capability to best service and supply the requirements of quality computer shops nationwide.

The 12 top games featured above are available now in

John Menzies spectrum

shops and other good computer shops supplied by Tiger Distribution. Make sure of your stocks - and our support - by contacting your Tiger Distribution van-salesman - or by phoning our tele-salesgirls on 051-420 8888.

Tiger Distribution, Commercial House, 4 Victoria Road, Widnes, Cheshire, WA8 9QY.

Your Best Source of Best Sellers

Tony Bridge's Adventure Corner



Hall of the mountain kings

This week I'll look at some more of your letters; the first one is from Philip Maxey of Forest Hill in London.

"I have just bought a ZX81 with 16K memory. I cannot find any good adventures for it, and would be glad if you would suggest some. Also, I would be very pleased if you could give me some hints on writing some adventure programs."

The good old ZX81 has been rather neglected of late, but of course, it is still the little machine that introduced many thousands of us to the joys of computing. There are, however, still many good adventures for the machine. Artic's programs, available for the Spectrum, were originally written for the ZX81. There are four (the latest one, unfortunately, was written for the

Spectrum only), and all are text only, extremely addictive and a good introduction to adventuring.

The original adventure program was written on a huge mainframe computer, but there are several versions around for the rather smaller ZX81 — one of which comes from Abersoft, and is called *Adventure 1* (we are still waiting for *Adventure 2*). Carnell Software will supply you with a couple of extremely good programs: *Volcanic Dungeon*, which remains one of my favourites (it is a sort of text punch up), and *Black Crystal*.

Phipps Associates have several good adventures for the ZX81, including the great *Knight's Quest* (anyone who has ploughed through more than a couple of the corners will know that this is one of my very favourites!). There should be enough there to keep anyone happy for several weeks!

"Dear Tony, I have recently bought Level 9's *Colossal Cave* for our Lynx 48K. After some hours of logic, brainstorming and lateral thinking, we keep finding ourselves stuck in the hall of the mountain kings. Help! It's driving us crazy — every time we offer the snake something or mention the word *Give*, the program prompts: "To whom?" (What, good grammar in an adventure? Well, this is Level 9, of course!)

"No matter how we word or arrange the question, the response is always the same. With the prospect of a further 270 locations to go, I am reluctant to send away for my free clue so soon," writes Alan Eastaigh of Birmingham.

Keep that free clue 'til later, Alan, believe me, you'll need it! For now, try this:
HJIUCSKTE*RO*PCEANG*EW

Once past that snake, you'll find one of the most fascinating adventures around.

Andrew Dilley writes to me from Godalming in Surrey: "A few issues ago, you had a letter asking you what *PSBL* and *DID* meant when they appeared during *Pirate's Cove* for the Vic.

"When they appear they are followed by numbers. These numbers correspond to the responses that the computer can give. *PSBL* tells you the possible responses that can be given to a particular command, while *DID* tells you the number of the response you got. This can be very useful!

"For example, if you, "break mirror", and you get three different *PSBL* numbers, you know that it is worth pursuing this line of thought! After all, with three different responses available, one of them must be good! Typing "P" >return< gets you the numbers, while "X" >return< gets you back to normal.

"I have only tried this with *Pirate's Cove* and *Voodoo Castle*, but it may well work with all of the Scott Adams adventures."

And Simon Mills of London SW12 writes in a similar vein: "Re: the hieroglyphics found in *Pirate's Cove*. They are not a bug as you might have thought. They are probably a way for Scott Adams to check that the adventure is doing what he intends. The feature can be obtained by pressing *XP* or *T* — they are available on all adventures by him. There is another single-letter command that can be used, and that is *V*. This speeds up the rate at which the text is scrolled.

"Another command that I have found is *AUT* — I haven't yet found what it does, but assume it stands for Auto. I have solved four of the Scott Adams adventures for the Vic20 and I am at present stuck on *Mission Impossible*. Could you please tell me how to open the blue door? I have opened all the others!"

Finally, a couple of letters that I can't answer — if you know, let us all know!

"I cannot get any further than the grill in the stone slab, in *Arrow of Death, pt II* (from Channel 8 Software). Please can you tell me how to open it? Also, is there another exit from the beginning (for example, over the narrow gorge?) If so, how do I do it?" asks I Senator of West Moors, Dorset.

"I have recently purchased a Commodore 64 with disc drive, and among the games that came with the package is *The Quest*. Having spent the best part of 60 hours with the problem of getting out of the first set of rooms, I have finally decided to put pen to paper!

"I have got the sword out of the ground, but cannot get any further. I've investigated as thoroughly as possible. While I still have some hair left, I'd really like a pointer on how to escape from this dilemma," pleads Keith Irving of Morayshire, Scotland.

I hope someone can help with these problems. Next week, HHOF!

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

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

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

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

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

Adventure Helpline

Micro.....

Adventure.....

Problem.....

Name.....

Address.....

MOGUL

THE HOTWARE PEOPLE



METAMORPHOSIS

You stumbled into the nest of the **Cyglorx** and find yourself fighting off robot tanks guarding the **Cyglorx** eggs. You think you have everything under control and then the eggs start **hatching**. Commodore 64 version features 4 different screens.
VIC 20 - COMMODORE 64
£7.95

CREATOR'S REVENGE

The **creator** assembled a massive army of **robots** and **insects** to take revenge on the earth. Destroy insects, get treasures, and get the **neutron bomb deactivator**. Battle robots and **destroy** the neutron bomb before it annihilates your city. Miss and you must face the **mutants**. Features 4 different screens.
COMMODORE 64
£7.95

OTHER GAMES AVAILABLE



MOGUL COMMUNICATIONS LIMITED
90 Regent Street, London W1R 5PT Telephone 01-437 3156/7

BOOTSTRAP ROM

Alison Davis of Wall Walk, Carlisle, Cumbria, writes:

Q Please can you tell me what a bootstrap Rom is? I have a Spectrum, and I do not think it has one, does this matter?

A Some computers, usually the larger business models, have only a very small Rom, called a Bootstrap Rom. This type of Rom has within it only a very few routines. Such computers have a Dos or Disc Operating System. In effect this means that Rom is stored on Disc, not on board the computer. The Bootstrap Rom's only job is to get the Disc with the Operating system, loaded into a reserved area of Ram.

Although this may seem a clumsy system, in fact it is far more flexible. Loading or 'Booting Up' the Disc only takes a few seconds, and it means that a whole variety of languages can be used depending on the individual user's specific requirements.

ISSUE NUMBER

A Donnahue of Leighton Buzzard, writes:

Q I have a 16K Spectrum which I bought a few months ago, and I thought it was an issue 3 model. I have looked at a friend's and mine together, and have checked the expansion hole at the back, and they seem the same. Can you please tell me how to tell the two Issues apart, just so I can be sure of what I have got, because I will want to up-grade at some time.

A Any Issue 2 Spectrum will have its issue number somewhere on the PCB. However, if you do not want to take the top off, then there are ways of telling the issues apart from looking at the expansion port. Issue 1 models can also be identified by a small hole in about the middle left of the base of the computer. At the bottom of this hole is a small brass screw which, in fact, is a

trimming capacitor, which means that it is easier to tune in an issue 1 Spectrum if this is necessary. If you look through the expansion port you will also see several brown discs, these are ceramic capacitors, and are not visible on issues 2 & 3.

The most obvious give away otherwise is the heatsink. On the issue 2 this is hardly visible as it runs down the left hand side of the computer. Turn the computer upside down, and look through the expansion port at the underside of the top moulding, and that is exactly what you will see — a shiny black surface. On the issue 3 however, if you do this you will see a not quite so shiny aluminium surface. The heat sink of the issue 3 runs along the back of the computer, and above the expansion port. There are other ways of telling, especially if you undo the computer, but these are the easiest.

USR FUNCTION

Henry Thompson of Ashtree Close, Middlesbrough, writes:

Q I have a Dragon 32 with which I am learning BASIC quite well. At school friends with other computers have used the *Usr* function, and I know that it is meant to be available on my Dragon, but I cannot get it to work. I always get the same thing happening whether I use *Usr 0* or *Usr 8* or whatever.

A There is a bug in the Rom routine that takes you to the address specified in the *Usr* statement. There is in fact a simple solution, add a nought in front of the number, thus *Usr 8* would become *Usr 08* and so on.

COMPUTER MARKET

John Davies of Muswell Avenue, Muswell Hill, London N10, writes:

Q Please could you advise me if there are any major developments taking place in the computer market at the moment? I have got a ZX Spectrum, which I have had for

a year now, but I am wondering whether to expand my system or get a new computer — possibly a Sinclair QL.

I've heard rumours that all the present systems, costing under £1000 will soon be out of date. If so could you advise on a system that will not be obsolete a few months after I buy it?

A There are always major developments taking place. Manufacturers and the press play a game, where the manufacturer must let enough information about a potential new product to leak out, so that the public's interest and attention are maintained without giving too much away to their competitors. It is a situation made more complex by the fact that some manufacturers encourage independent software houses, where others do not.

The QL did take most people by surprise, because it was announced so quickly. It remains to be seen whether or not deliveries and reliability can keep pace. The track record does not offer a lot of hope, but you never know. The most important point to keep in mind is, does the computer I have now do what I want it to do? Remember when a computer has sold as many units as the Spectrum has, it just does not die. I still get letters every week from ZX81 and Vic20 owners. Both are computers that are meant to be dead.

It is a fact that already computer technology far outstrips the average user, so why buy the latest all singing, all dancing, model if you are not going to get anything extra out of it? The best analogy is with calculators, there are some exceptionally sophisticated models now available. Personally I have an old simple one. I do not use it for anything complex, so I have no intention of getting rid of it for a better model. This highlights the approximate differences between this country and America, where people are more likely to dispose of their existing machine for something new. Look at the problem the TS1000 had, once the 2000 was announced.

As regards price, I think it is just the case that a computer which would have cost £1500 a year or two ago, will be below

the thousand pound mark in a year or so's time. In this respect the new Sinclair QL is the marker against which all other cheaper computers will have to compare themselves — taking this role from the BBC. But whatever you buy it will always be superseded at some time — why wait?

THE SAME ANSWER

David Freeman of Great Eastern Street, Cambridge, writes:

Q I have a question that I have seen answered for other computers but not my own. I hope the answer is not going to be the same. My question is this. How do I make my programs break proof; the computer I have is the Oric.

A I am afraid that the answer is going to be similar, in that there are no completely fool proof ways of stopping someone breaking into your programs. There is a book by Bob Maunder called *The Oric Handbook* which contains several useful tips and hints, but in the end it is the same story; any program that can be written can be broken.

BBC PROBLEM

J. Misket of All Hallows Road, Caversham Road, Reading, writes:

Q I have a BBC micro model B. On listing a program with a first line of 300 or more, then later at the end typing *Old (R)* then *List (E)* the first line number changes. Line 300 changes to 44, and all the numbers above three hundred change. For example 650 become 138, line 1000 is 232, 2000 as 16, and 3000 as 48 A dummy line such as *100 Rem Cold isn't it*, gets over this problem. But why should this be? What do you advise?

A To be honest I do not have an answer to your question. You do not say what operating system you have. I can only assume that in fact it is one of the bugs in the 0.1 OS, as there were a couple relating to the use of the *Old* command. Anyone else with a 0.1 have the same problem?

"Are you ready for a new Adventure? At a low price . . .!"

	RRP	Our Price		RRP	Our Price				
	£	£		£	£				
SPECTRUM 48K									
Inca Curse	ART	8.95	5.95	Twin Kingdom Valley	BUG	9.50	8.50		
Ship of Doom	ART	6.95	5.95	The Fabulous Wanda	GAM	7.95	6.95		
Espionage Island	ART	6.95	5.95	Token of Ghall	INT	7.00	5.95		
Pimania	AUT	10.00	8.95	Horn of Karn	INT	7.00	5.95		
Groucho	AUT	10.00	8.95	Colossal Adventure	L9	9.90	8.90		
The Castle	BUG	6.95	5.95	Adventure Quest	L9	9.90	8.90		
Black Crystal	CAR	7.50	6.50	Dungeon Adventure	L9	9.90	8.90		
Woods of Winter	CRI	6.95	5.95	Lords of Time	L9	9.90	8.90		
Dungeon Master	CRY	7.50	6.50	Snowball	L9	9.90	8.90		
Hall of Things	CRY	7.50	6.50	Quest of Merravid	MAR	7.95	6.95		
Oracle's Cave	DOH	7.95	6.95	The Hobbit	MEL	14.95	11.75		
Jerico 2/Farmer	ELE	5.95	4.95	Ring of Power	QUT	9.95	8.95		
Colossal Adventure	L9	9.90	8.90	Transylvanian Tower	SHE	6.50	5.50		
Adventure Quest	L9	9.90	8.90	VIC 20 16K					
Dungeon Adventure	L9	9.90	8.90	Dark Dungeons	ANI	5.95	4.95		
Snowball	L9	9.90	8.90	The Orb	IMP	5.00	4.50		
Lords of Time	L9	9.90	8.90	Trader	QUT	14.95	13.45		
The Hobbit	MEL	14.95	11.75	Starship Escape	SUM	9.95	8.95		
Mad Martha	MIX	6.95	5.95	Curse of the Werewolf	TER	9.95	8.95		
Mad Martha II	MIX	6.95	5.95	Rescue from Castle Dread	TER	9.95	8.95		
Xadgam	QUI	6.95	5.95	Castle Bloodstone	SUM	10.95	8.95		
Villnor's Lair	QUI	6.95	5.95	DRAGON 32					
Smuggler's Cove	QUI	6.95	5.95	Pimania	AUT	10.00	7.95		
Trader	QUI	6.95	5.95	Keys of Roth	CRI	6.95	5.95		
Transylvanian Tower	SHE	6.50	5.50	Crystal Chalice	DUN	7.95	6.95		
Ship of the Line	SHE	6.50	5.50	Temple of Zoren	DUN	7.95	6.95		
Super Spy	SHE	6.50	5.50	Treasure Tomb	DUN	7.95	6.95		
Devils of the Deep	SHE	6.50	5.50	Giant's Castle	DUN	5.95	4.95		
Invincible Island	SHE	6.50	5.50	The Quest	IMP	5.00	4.50		
Urban Upstart	SHE	6.50	5.50	The Orb	IMP	5.00	4.50		
Valhalla	LEG	14.95	11.75	Death's Head Hole	PEA	5.45	4.95		
SPECTRUM 16K									
Planet of Death	ART	6.95	5.95	Transylvanian Tower	SHE	6.50	5.50		
BBC									
Pimania	AUT	10.00	8.95	ORC-1					
Old Father Time	BUG	9.50	8.50	Fantasy Quest	LJK	6.50	5.50		
Twin Kingdom Valley	BUG	9.50	8.50	Colossal Adventure	L9	9.90	8.90		
Colossal Adventure	L9	9.90	8.90	Adventure Quest	L9	9.90	8.90		
Adventure Quest	L9	9.90	8.90	Dungeon Adventure	L9	9.90	8.90		
Dungeon Adventure	L9	9.90	8.90	Lords of Time	L9	9.90	8.90		
Snowball	L9	9.90	8.90	Snowball	L9	9.90	8.90		
Lords of Time	L9	9.90	8.90	The Hobbit	MEL	14.95	11.75		
The Hobbit	MEL	14.95	11.75	Island of Death	OCE	6.90	5.90		
Death's Head Hole	PEA	5.45	4.95	Island of Death	OCE	6.90	5.90		
Send Cheque/PO to:									

FREE POST & PACKING!

ATLANTIS SOFTWARE

Dept. A1, 28 Tile Kiln Lane, Hastings, East Sussex.

SEND SAE FOR UP-TO-DATE LIST OF OUR AMAZING BARGAINS. STATE MICRO 9 RAM!

PCW3

TT-S: SPECTRUM TOOLKIT

5 programmers' programs for the 16K or 48K Spectrum:

★ **GAMMA** : A compact (4K) Microdrive compatible BASIC extension which aids programming and debugging by adding 10 new keywords, with syntax checking:

- RENUMBER** : All or part of the program, intelligently, including all GOTO's, GOSUB's RESTORE's etc.
- DELETE** : Any block of lines.
- MOVE** : A block of lines, with re numbering of GOTO's etc.
- FIND** : Any string, variable, keyboard etc., starting from any line.
- TRACE ON** : Displays line and statement numbers and the current value of any variable or expression as the program is executed. Variable speed execution or single-step.
- TRACE OFF** : Turns off TRACE function.
- VARIABLES** : Displays an ordered list of all variables used, with their current values.
- FREE** : Shows amount of free memory, values of key system variables, and displays UDG's.
- AUTO** : Gives automatic line numbering when entering programs, from any line number and with any step size.
- HELP** : Provides information on new keywords.

GAMMA also protects against accidental over-writing of existing program lines or NEW, and gives a flashing line cursor which is easily visible in listings. It can be loaded into any area of RAM on a 16 or 48K machine.

- ★ **SCREEN** : A high-resolution drawing program with proper 'fill' and text print facilities. Can be used with a joystick via Kempston or Sinclair interfaces.
- ★ **UDG** : A powerful aid when creating user defined graphics characters.
- ★ **TAPE** : Reads and displays the contents of tape file headers.
- ★ **RAM** : A fast and comprehensive memory test program.

£7.95 inc. carriage Access/Visa accepted

TIMEDATA Ltd. Dept F

16 Hemmells, Laindon, Basildon, Essex SS15 6ED Tel: (0288) 418121

THANK YOU!

for your response to our call for games programs. We enjoyed evaluating them, but you didn't send enough

PLEASE SEND MORE!

Immediate evaluation as usual, to: Ron Heyes,

KACE INTERNATIONAL
32 AVON TRADING ESTATE,
AVONMORE ROAD, LONDON W14
or TEL: 01-602 7355 (Ext 35)

ALSO WANTED —
Freelance machine code programmers

DENIS THROUGH THE DRINKING GLASS

FOR 48K SPECTRUM



1. Are they long enough?
2. What is number 36?
3. Who spoiled the photos?
4. Is there really such a pub in Plymouth?
5. What made Woy dizzy?
6. Is he a quarter pounder?
7. A hole in one or one in a hole?
8. Where did he learn to talk like that?
9. Has he gone off his Malvinas?
10. Who is it dummy?

Score 10 — You wrote it. 1 — 5 You've played it
0 — To get your copy of Denise Through the Drinking Glass send £5.50 to:

APPLICATIONS SOFTWARE SPECIALISTS
8 St Paul's Road
Peterborough
PE1 3DW



CLASSIFIED

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

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

GAMES SOFTWARE

CASH PAID for your unwanted games (Spectrum or BBC). No copies please. Tel: Bob 0992 552637, evenings or weekends.

SPECTRUM SOFTWARE SALE

Title	Publisher	RRP	Cost
Krazy Kong	P.S.S.	£5.95	£3.80
Manic Miner	Bug Byte	£5.95	£4.40
Tranz Am	Ultimate	£5.50	£4.00
Zoom	Imagine	£5.50	£3.85
Spawn of Evil DK Tronics		£4.95	£3.70

Post & Packing: 40p per order
S.A.E. for list of other titles. Lists for Dric, BBC, Commodore 64, Vic-20 also available

CAROLINE SOFTWARE

155 Sanctuary Way,
Grimsby, South Humberside

SPECTRUM 16/48K, "Raquel" presents her games pack for ages 16 and over only (state age when ordering). Still only £3.50. I. Brooks, 17 Malvern, Coleman Street, Southend, Essex.

WANTED

ENIGMA (SOFTWARE) LTD require part-time and freelance games and utility programmers (all machines). Lump sum and/or royalties negotiable.

Contact us at

208 Aigburth Road,
Liverpool L17 9PE
Tel: 051-727 8050

SPECTRUM, two new super games from Wizard — 'Gone Fishin', Pigeon Shoot, only £2.50 for both. Cheques-POs, state 16K/48K. Wizard, 6 Crown Close, Sherwood Park, Rainworth, Notts.

FANTABULOUS FEBRUARY

THE HOBBIT (Melbourne)
CBM 64 & Spectrum £11.65

VAL HALLA (Legend)
Spectrum £12

Jetpac, Lunar Jetman, Atic Atak (all ULTIMATE) for the Spectrum £4.50 each.

PERIPHERALS

VIC-20 16K RAM pack (switchable) £30

CBM 64 Simon's BASIC £45 (save £5)

S.A.E. for list. State machine. Cheques & postal orders to:

LA MER SOFTWARE
22 West Street, Weston-Super-Mare, Avon BS23 1JU

Tel: 0934 26339 for quotation between 10am and 6pm

IT'S A MYTHTERY: Amazing Spectrum 48K Adventure. 200+ locations. Psycho Mythic Mind, drama, only £3. Mythsoft, 84 Elland Road, Brighouse, W. Yorks HD6 2QR

50 SPECTRUM programs for only £5. High quality cassette for all Spectrum owners with something for everyone. Defender, Mazes, Invaders, Hopper, Anagram, Zombies, Rainbow, Calendar, Centipede, Blitz, Meteors, Space Panic, Star Trek, Tron, Star, Dodgers and many more. Cheques to J. Loach, 8 Cottesford Close, Hadleigh, Suffolk or SAE for details.

NOVA SOFTWARE

£4.95

PRESENTS THE LAST SHIP OF ZENDOK

(48 ZX Spectrum)

The first part of a 3 part adventure: THE EMPIRE OF THAILAX

Are you brave enough to challenge the evil Thailaxians? In this first text adventure, you must re-activate the last ship of the once great fleet of Zendok by finding 6 controlling crystals.

Please make cheques/PO's payable to:

A. B. Saxton; and send to:
NOVA SOFTWARE (Dept. PCW)
2 Gertrude Road, Dracott
Derby's DE7 2NW
(PART 2 OUT SOON)

SOFTWARE ONLY £1.00

CONTACT VIC ON (0482) 706767
MAIL ORDERS WELCOME
* WANTED — CLEAN COMPUTERS

M. MICRO'S

14 DORNOCH DRIVE
JAMES RECKITT AVENUE, HULL

NCHSOFTWARE presents Fruit Machine (Spectrum 48K) M/code action with all the "Pub" machine features. Nudge up and down, holds, gambles, etc. Only £5.50 inc p&p to: NCHSoftware, 19 Medhurst, Two Mile Ash, Milton Keynes, Buckinghamshire. DRAGON GOLF. Up to 4 players 18 holes, bunkers, trees, water plus slice or hook shots, arcade style control, super graphics keyboard or joystick option. £3 only. Phil Brooks, 104 Bargates, Leominster, Herefordshire.

COMMODORE 64 & Vic 20 + 8K/16K Soccer Club Boss. Features match commentary, league tables, formations, injuries, etc., and only £2.99. D. Spencer, 230 Lowgrange Avenue, Bilingham, Cleveland.

ZX81 High resolution programs! Invades (reviewed ecstatically in ZX Computing) £4.95. Swarm £2.95. Graphics £5.95. Odyssey Computing, 28 Bingham Road, Sherwood, Nottingham.

MATCHDAY 48K SPECTRUM: follow your team in any English/Scottish football division, £4.75. From C. D. S., 27 Plantation Road, Leighton Buzzard, Beds.

SPECTRUM TOP 15

DEATH CHASE — Micromega (16k)	£5.40
HORACE AND THE SPIDERS — Psion (16k)	£5.50
JETPAC — Ultimate (16k)	£4.40
PYRAMID — Fantasy (48k)	£4.50
ALCHEMIST — Imagine (48k)	£4.50
SPLAT — Incentive (48k)	£4.50
HOBBIT — Melbourne House (48k)	£10.20
KONG — Ocean (48k)	£4.75
HUNCHBACK — Ocean (48k)	£5.40
MR WIMPY — Ocean (48k)	£5.40
CHEQUERED FLAG — Psion (48k)	£5.75
FLIGHT SIMULATOR — Psion (48k)	£7.55
3D ANT ATTACK — Quicksilver (48k)	£5.99
ATIC ATAK — Ultimate (48k)	£4.40
LUNA JETMAN — Ultimate (48k)	£4.40

FREE P+P (1st class), Fast Service.

Cheques, P.O.'s to:

G.R.P. SOFTWARE,
81 OPENSHAW DRIVE,
BLACKBURN, LANCs BB1 8RB

BBC MODEL B DRAW POKER

Play against your computer in this classic gambling game of skill and bluff.

— FULL COLOUR —

— HIGH RESOLUTION GRAPHICS —

£5.95 tape or disc version (Disc version supplied on tape)

Send cheque of P.O. to G. C. Carpenter,

154 Whytecliffe Road, Purley,
Surrey CR2 2AS

WEATHERMAN forecast the local weather, includes graphics. Graphics animator. Space Disaster adventure. £3.95 each, £7 for two, £10 for three. Cheques to Eastwood and Simpson, 24 Mossborough Road, Rainford, Merseyside, WA11 8QN. All for 48K Spectrum.

DRAGON/32 BBC MODEL B ATARI 400/800 TRS80 C/C 32K ELECTRON

747 FLIGHT SIMULATOR

Superbly realistic instrumentation and pilot's view in lifelike simulation which includes emergencies such as engine fires and systems failures. This program uses high resolution graphics to the full to produce the most realistic flight-deck display yet seen on a home computer. There are 21 real dials and 25 other indicators (see diagram). Your controls operate throttle, ailerons, elevators, flaps, slats, spoilers, landing gear, reverse thrust, brakes, etc. You see the runway in true perspective. Uses joysticks and includes options to start with take-off or random landing approach. "A real simulation, not just another game" (Your Computer, April 19, 1983).

"The cockpit display is impressive" (Which Micro).

Cassette £9.95 (p&p and VAT included):

DACC Ltd (Dept. PCW)

23 Waverley Road, Hindley, Greater Manchester WN2 3BN
(Despatch within 48 hours)



CLASSIFIED ADVERTISING RATES:

Line by line: 20p per word, minimum 20 words.

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

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

If you wish to discuss your ad, PLEASE RING Diane Davis 01-437 4343.

Here's my classified ad.

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

Please continue on a separate sheet of paper

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

Name

Address

.....

.....

Telephone

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

HORSE RACING ANALYSIS BY COMPUTER RATING METHODS

Be like the Professionals, do your own RATINGS with real confidence when you use this unique "METHOD". There's nothing to beat it, so, IT'S GOT TO BE YOUR BEST BET. Also included in this unique package is a very successful and easy Method for finding the most consistent "HORSE TO FOLLOW" plus a superb Staking Plan. Remember, you've nothing to lose but a lot to gain when you know "HOW".

Suitable for both FLAT & N/H and supplied on one cassette. Don't delay, write today for further information leaflet enclosing SAE to: CRM 14, Langdale Place, Newton Aycliffe, Darlington, Co. Durham, DL5 7DX.

ZX81 16K Golf, includes all normal features, plus choice of handicap, cassette £3.95, or listing £1.95, from T. D. Frost, The Links, Montrose, Angus, Scotland.

DRAGON 32 SUPADRAW — "The Respectable Game". Brings graphics to life. Draw shapes — preprogrammed or freehand — using joysticks or keyboard — then colour them in, menu driven, £7.95, including user manual. Steeplesoft, 58 Deepfield Way, Coulsdon, Surrey CR3 2SR.

PYRAMID ADVENTURE Travel in search of the Pharaoh's death mask. But can you beat the curse? For Dragon 32 or Oric 48K. On cassette £4.95. EXODUS, 36 Penrice Drive, Tividale, Warley, West Midlands B69 1UQ.

GLYNTAPES ZX81, Gunslinger £2.50, Bird Attack £2.50, Toad Jump £2.50, Cannon Shot £2.50, PP 25p, 10 Harold Avenue, Gorton, M/C 18.

TOP 100 Spectrum games, two for the price of one, Beedus Software. Tel: 01-954 7177, or 01-906 0446.

ORION SOFTWARE

TOPPLER

A Dragon 32 version of the Arcade Game "Carnival".

CRAZY CHASER

A super speed version of the Arcade Game "Dodgems" for your Dragon 32. Both programs are written in 100 per cent machine code and have super high resolution graphics and sound.

ONLY £6.95 EACH

Send cheques or POs to:
38 Trentham Road
Coventry CV1 5BD

CLUBS

VIC 20 SOFTWARE HIRE

Dozens of titles from 50p per week. Send £3 cheque/PO for membership kit to:

VIC 20 SOFTWARE HIRE

242 Ransom Road, Mapperley,
Nottingham
or phone Nottingham 626 953
for more details.

SOFTSWAP: The new software exchange club for BBC, CBM 64, Spec-

trum and Vic owners. Free membership. SAE to J. White, Hillside, Totterdown Lane, Weston-Super-Mare, Avon.

SPECTRUM SOFTWARE Library, two weeks hire £1. Lifetime membership £5. Stamp for list to: Hire Soft, 113 Broomfield Road, Marsh, Huddersfield.

BORED with your Spectrum software? Fancy a change? Then join

SOFT EXCHANGE

The Spectrum Software Exchange Club Swap your used programs for new ones, £1 per swap, free life membership. SAE for details to: Soft Exchange (Dept. PCW), 11 Canturton Drive, Moolis, Wirral L47 7AL.

NEW MULTI INTEREST Club, holiday camps, software exchange, exhibition groups, pen pals, selling or buying. For more details Tel: 01-807 7587.

SOFTOPTION. The Spectrum Software Swapshop, swap your cassettes for £1 only, SAE for details. Softoption, 8 Wyre Street, Ashton, Preton, Lancs PR2 2RQ.

FREE SOFTWARE EXCHANGE. Two free swaps on joining our club. SAE please. Allchange, 35 Foredyke Ave., Hull HU8 0DS.

SOFTWARE EXCHANGE. Swap your used software, £1 per exchange, Spectrum and Dragon, SAE please. Unsec, 15 Tunwell Greave, Sheffield S5 9GB.

UTILITIES

SPECTRUM SPEEDYLOAD. Halve your waiting time! This short program lets you save/load at 3,000 baud. Easy to use with any tape command, cassette (48k) £3.95. Ness Micro Systems, 100 Drakies Avenue, Inverness.

"MICRO-PRINT 85"

An outstanding SPECTRUM utility — lets you select from SIX type-sizes in your Basic or m/c code software. You choose —

- either 85 characters-per-line,
- or 84 characters-per-line,
- or 51 characters-per-line,
- or 42 characters-per-line,
- or 36 characters-per-line,
- or 32 characters-per-line.

The six pitches are constantly mixable onto all 24 screen lines. Lprint and a 1-24 line COPY included, all from just 1100 bytes of magic Z80 machine-code! Get your 16/48K cassette plus Demo for only £5.00 from

MYRMIDON SOFTWARE
PO Box 2, TADWORTH, Surrey
KT20 7LU

ORIC Forth Floating Point extension words. Full facilities, Trig functions, complex numbers, and turtle graphics. £4.50 (including full documentation) David McKelvie, 86 Northcott, Bracknell, Berks.

RECRUITMENT

PROJECT MANAGER - SOFTWARE ENGINEERS HARDWARE ENGINEERS - SERVICE ENGINEERS

Prism Developments is looking for enthusiastic and determined people to work on innovative projects in the high-tech industry.

Prism Developments is a division of Prism Technology Holdings Limited, the fast expanding group that gathers together a number of highly successful companies covering microcomputer distribution, business products, software merchandising, publishing and international trading.

Project Manager

Reporting directly to the Director of Developments, you will probably be in the age range 25-35 and a computer or electronics engineer/hobbyist whose creativity is currently being frustrated.

Your duties will include competitive analysis, concept evaluation, development of product specification and, in some instances, liaison with outside developers.

It is envisaged that, following concept acceptance, you would be involved in prototype and development work with a small team of technicians reporting to you.

A formal electronics or computer education may not be necessary, but you should have experience in microprocessor based systems, communications and electronics hardware at component level.

Software Engineers

Software engineers with a thorough practical knowledge of Z80 and 6502 assembly level development environments and artificial intelligence projects. You will also be expected to have a working knowledge in one of PASCAL, LOGO or FORTH and some familiarity with 16 bit processors would also be an advantage.

As well as implementation, you would be expected to make

constructive input at concept and design stages and undertake evaluation and implementation feasibility studies, possibly to the level of dictating your hardware requirements and development system.

Hardware Engineers

Familiarity with a broad range of digital and analog devices will be essential as most of your time will be devoted to solution seeking and prototyping across a broad spectrum of subjects ranging from robotic sensory systems to R.F. communications.

You will be expected to have good construction abilities as well as a comprehensive understanding of microprocessor based systems.

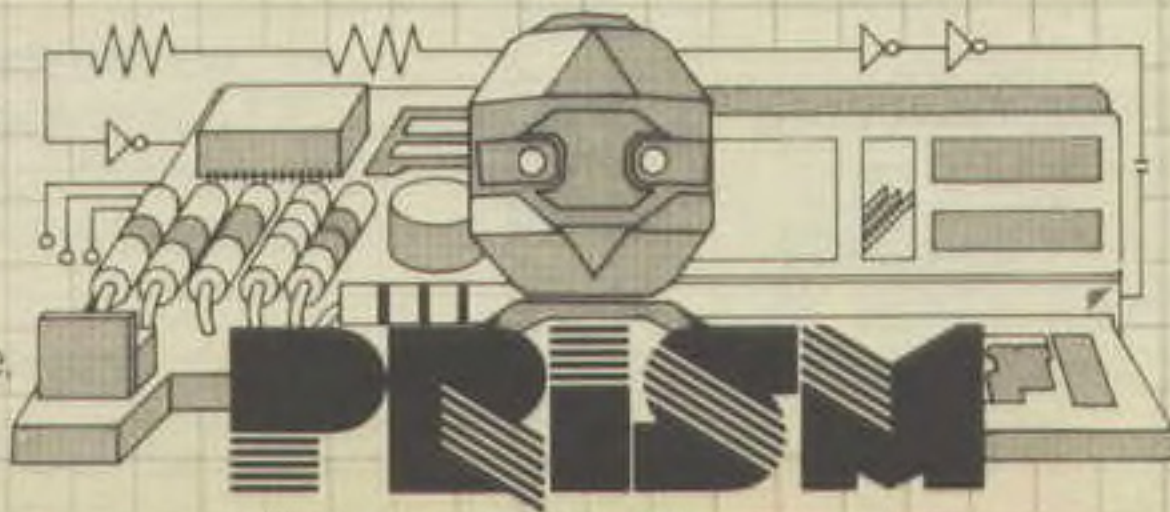
Service Engineers

Working primarily on a portable micro-system and covering all aspects of service and technical assistance to customers.

A thorough knowledge of monitors, disk drives and electronics hardware will be essential as you will be expected to fault-find to component level as well as providing a customer technical help line, working initially with the system designers. You will then become involved in the setting up of a new service facility which will entail assisting the service manager in the areas of spare parts and test equipment.

All of the above positions offer a high degree of flexibility, combined with attractive remuneration and incentive packages. You will be based in London with 4 weeks holiday entitlement per annum.

If you believe you possess the creative flair necessary to fulfill one of the above positions, then please write, enclosing your c.v., to: Sue Lowndes, Prism Developments, Prism House, 18/29 Mora Street, London EC1V 8BT.



PERSPECTIVES ON THE FUTURE

★ ★ TAPE COPIER ★ ★

You need a BACK-UP copier to protect your Spectrum tapes. Our package copies all types of programs easily with many unique features. We offer a full money back guarantee if you are not satisfied.

- ★ M/drive copies basic/code/ data onto the microdrive stops programs to help make them run!
- ★ LOADS in all program parts (no limit) CONTINUOUSLY — even without pressing a key. Most copiers require many loadings — MASSIVELY saving you time and trouble!
- ★ Copies ALL programs that we are aware of (headerless/mc/etc).
- ★ Break at any time — just copy a "header" if you like!
- ★ First class post + updates at £1.50
- ★ Verifies Repeat copies
- ★ Maxcopy makes a working copy of the full 16K or 48K! Gives program name.
- ★ FULL user instructions but the package is VERY SIMPLE to use.

Cost £4.50

(£5.50 with m/drive)

(overseas + £1 Europe, £2 others) old customers old tape, SAE £1.50 (or £2 with m/drive).

MASSIVELY IMPROVE ALL YOUR SPECTRUM PROGRAMS using our GRAPHICS AND SOUND TOOL KIT

Write impressive GAMES, or smarten up your other programs with PROFESSIONAL machine code effects. Yes m/code at your fingertips called from BASIC. No knowledge of m/c required!

- ★ Over 80 routines including PIXEL scrolls — all directions — wrap around.
- ★ Character rotates and reflects, border effects, screen inverts, BOX fill.
- ★ Sound, memory left, etc. DEMO tape and FULL MANUAL.
- ★ Easy to use, and relocatable in memory. ONLY £5.50 (not the usual £10+)

TERM. DEPT PW
16 STONEPIT DRIVE,
COTTINGHAM
MARKET HARBOROUGH, LEICS

COMMODORE REPAIRS

by CBM approved service engineers: for all out of guarantee units. Eg. Vic 20, CBM 64, C2N Datasette, printers, Vic 20 modulators, disc units, etc.

For more details tel, or SAE to:
G. C. Bunce & Son, 38 Burlington Road,
Burnham, Bucks SL1 7BD. Tel: (06286) 61886

SINCLAIR OWNERS

If you want to use your computer to help you in your business, or write games in machine-code, and you don't know how.

Phone Mr Farhang-Mehr
Tel: 01-354 1584
for advice and assistance.

REPAIRS — 2X81 — Spectrum out-of-guarantee repairs by our computer dept. Engineers have had three years experience servicing Sinclair computer products. Price including p+p ZX81 — £11.50; 16K RAM — £9.95; Spectrum — £18.75. Send with cheque or P.O. to: TV service of Cambridge Ltd., French's Road, Cambridge CB4 3NP. Tel: (0223) 311371

COMPUTER SERVICE AND REPAIRS

SPECTRUM, COMMODORE, BBC
ENFIELD COMMUNICATIONS
135 High Street, Ponders End,
Enfield, Middx.
Tel: 01-805 7434

IBM records

COMPUTER PROGRAMS

REAL-TIME or (Slow) HIGH-SPEED Professional Cassette Duplication and Blanks from 1 to 1,000+. Computer printed Cassette Labels, etc. Fast Security Delivery service.

IBM records — a division of FILTERBOND LTD, 19 Sadlers Way, Hertford SG14 2DZ. 0992-551188.

SOFTWARE

COMMODORE 64 SOFTWARE. Continental's "Home Accountant," Com-

from Microdrive. Only £3.95. Alan Turnbull, 65 Vicarage Road, Cale Green, Stockport SK3 8HL.

FREE SOFTWARE

If the idea of free software and a good second income appeal to you send SAE to:

DATAGRAPH (C)
11 CONNAUGHT PLACE
LONDON W2 2ET

DIY FOR MICROCOMPUTERS — VOL. 1

Let your MICRO assist you to work out the quantities of Building Materials for your home improvements and repairs, using a:

DRAGON 32 & 64
SPECTRUM 48K
BBC 32K

SIDE 1 of the cassette gives guidance and calculates the average materials for BRICK-LAYING, CONCRETING, TILING and PAVING, PAINTING and WALLPAPERING, and also converts 20 units of measurement from Metric/Imperial and Imperial/Metric.

You may 'enter' in Metric or Imperial Units, the results being given in the Metric Units of sale.

SIDE 2 gives ADVICE and HINTS on the above subjects, plus HEALTH AND SAFETY AND METRICATION.

£5.00 (or SAE for details) to:

D. A. Hanson, 4 South Cottages
Shenley Lane, London Colney
Herts AL2 1AD

COMMODORE AND Spectrum software, 10% off RRP — over 600 titles! Bargain vic 20 cartridges, £6 each, or 4 for £18. Telephone: 01-594 9979 for price list.

SOFTWARE DISCOUNTS

eg. SPECTRUM

ATIC ATAK, JETPAC, etc.£4.95
THRUSTA (Software Projects).....£5.25
HUNCHBACK (Ocean).....£5.90
FIGHTER PILOT (Dig Int).....£6.50
ALCHEMIST, ZOOM, etc.....£4.75

COMMODORE 64

MANIC MINER (S. Projects).....£5.50
PILOT 64 (Abbex).....£5.99
SUPER PIPELINE (Task Set).....£5.90
Fast service. List sent with order. Prices incl. First class P&P.

Ch/PO to: O.J. SOFTWARE
273 Mossy Lea Road, Wroughton
Wigan, Lancs. WN6 9RN

"STOCK CONTROL Spectrum 48K 1000 lines with part number and 10 character description. Stock transactions, list items below recorder level, valuation of single part and total stock. Search by description. £3.95 to I. Hearn, 58 Smallfield Road, Horley, Surrey."

FOR HIRE

HIRE A COMPUTER from ZX81 upwards for a week or a year. We also buy and sell second-hand computers, magazines and books. Business and Computer Services, 29 Caledonian Road, London N1 1BA. Tel: 01-607 0157.

DEALERS

CONTACT ANGLIA COMPUTER CENTRE for the Spectrum 16K plus 48K, VIC20, Dragon, Lynx, VIC and Epson HX-20. Tel: (0603) 667 036. (Unbeatable prices).

24 The Parade
COMPUTER Silverdale, Newcastle
CABIN Tel. 0782 636911

Commodore, Sinclair
Official dealers for
Acorn, BBC service and
information centre

Huge range of hardware and software backed up by sophisticated service department

The New Memotech Computers now in stock

BIG DISCOUNTS

We can supply almost any make of computer game, software utility, hardware or book for Spectrum, VIC20, Commodore 64 or BBC. Hundreds of titles at up to 25 per cent off R.R.P send large S.A.E NOW!
Rainbow Systems Ltd., P.O. Box 42,
Harrogate, N. Yorks HG2 9JW.

PENNINE COMPUTER CENTRE WE HAVE NOW MOVED TO:

30 BURNLEY ROAD
ACCRINGTON
LANCS.

Tel: 0254 390424.

SOFT MACHINE

OPEN MON-SAT, 10.30-6

We offer a selection of the Finest Books and Software currently available for: Oric, ZX81, Spectrum, BBC, Dragon, Vic20 and Commodore 64 Microcomputers.

3 STATION CRESCENT
WESTCOMBE PARK
LONDON SE3

Tel: 01-305 0521

or send SAE for free Catalogue (State which Computer)

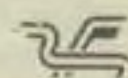
A RETAILER for Sinclair accessories in the North of England. We are situated near the M1 and M62 motorways. As well as a complete range of hard and software, our service department can repair, modify or fit a wide range of accessories. Hours of business 10am-8pm Tuesday to Saturday inclusive.

TELEPHONE PHILIP COPLEY ON
0924 272545

6 WESTLEY ST, OSSETT, W. YORKS

PLEASE RING FOR DETAILS OF OUR MAIL ORDER SERVICE

MAGAZINES



DRAGON USER

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

EDUCATIONAL SOFTWARE

TABLES. 48K Spectrum. Help under-10s to learn their tables with this fun program. Send £3 to Josoft, 15 Swansea Road, Pontllw, Swansea.

YOU NEED user instructions for the German speaking market? Contact: Juergen Schalla, Friesenstrasse 24, D-3000 Hannover 1, West Germany. Phone 010 49 511 342848.

PASS FRENCH "O" LEVEL! Fifty verbs; five tenses. Random/selective testing and listing. 48K Spectrum; £3.95. Thies Language Software, 25 Primula Drive, Norwich.

AQUARIUS

GAMES PACKS FOR UNEXPANDED COMPUTER

BUNCH OF 5 / GAMES PACK 1

Snake, Masterguess, Symon, Bomber, Hi-Lo £4.95

GAMES PACK 2

Collector, Blocked!, Rocket Run, Minefield, Air Defence £4.95

SPECIAL OFFER

ORDER BOTH TAPES FOR ONLY £8.95 CASSETTE RECORDER LEAD £1.95

WE ALSO SUPPLY ALL AQUARIUS PRODUCTS

PROCESSOR LTD
A.O.S. House
1 Willow Parade
CRANHAM
Essex RM14 1DZ

BOOK NOW IN STOCK £5.95

AQUARIUS AND HOW TO GET THE MOST . . .

MAIL ORDER ONLY

SAE FOR FURTHER DETAILS

SPECTRUM TIMESAVER. Eliminates plug pulling on load/save. Neat switch box fits cassette ear socket. £4.87. K. Gibson, 44 Highlands Road, Horsham, Sussex.

Fifty useful m/c routines. Only £6 inc. processor independent sound. On Error Goto, Break Proof saving for Basic programs, many screen routines, renamer (Goto's etc.), Tape Copier, m/c stopper and more! All routines well documented.

Cheques to: Hugh Swann
Tutnall Farmhouse, Tutnall, Boms, Worcs.

SERVICES

COMPUTER PROGRAMS COPIED: 1-7 minutes from 33p; 7, 1-13 minutes from 41p per cassette, including VAT and library case. Tel: M.G. Copies, Burntwood 75375 (24 hours).

modore's "General Ledger." Fantastic programs for 64. £35 each includes very comprehensive manuals in each case. Virtually unused. Peacohaven 81184 or 3161.

WORDSMITH. Simple, efficient word processing for the BBC Model B. Send £9.95 for cassette and instructions to G. W. Smith, 11 Reservoir Road, Ruislip, Middlesex.

HOME ACCOUNTS. Put your house in order! Probably home computings best use! Comprehensive coverage of bank accounts, credit cards, HP. Inbuilt accuracy check. Records all transactions. Protects cashflow for any period ahead. Available for CBM64 or Vic 20. £12 or free details from R. B. Computer Services (Dept CA), 2 Hazelwood, Windmill Hill, Brixham, Devon. Tel: 080 45-55532.

AUTO-MERGE — An amazing utility that merges your auto-start programs

G.C.E. 'O' LEVEL 48k Spectrum

MATHEMATICS

LONDON SYLLABUS B (361) 1984/5 £30 THE SET
CAMBRIDGE SYLLABUS D (4004) 1984/5 £30 THE SET

PHYSICS

A.E.B. SYLLABUS 052 1984/5 £26 THE SET

CHEMISTRY

LONDON SYLLABUS 081 1984/5 AVAILABLE
CAMBRIDGE SYLLABUS 5070 1984/5 APRIL/MAY

SUCCESS IS YOURS OR WE WILL REFUND THE FULL PURCHASE PRICE

HOMESTUDY LTD. TRELEIGH WOODS FARM, TRELEIGH, REDRUTH, CORNWALL

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

DON'T WAIT until examination panic sets in. Consult London's foremost tutorial agency now. Almost all subjects at all levels. Tel: 01-722 1379.

ACCESSORIES

COMPUTER USERS, expand with our range of books, manuals, games/educational software. SAE for free lists/introductory offer. Adepak, 109 Bellamy Drive, Stanmore HA7 2DG.

adapt electronics

WIRE KIT The answer to "Whoddy Rampacks" £1.50
Suits for ZX80 and 81
① SPACER KIT To use RAMACK with ZX Printer £1.50
② 23W + 23W Female connectors for ZX80-81 £2.00
③ CASSETTE LEADS Standard Sinclair type (pair) £1.50
④ 9K BASIC ROM for ZX81 or update your old ZX80 £2.00
⑤ SINCLAIR ZX81 Programming Instruction Manual £2.00
⑥ 16K RAMPACK for ZX81 made by Smoler £70.00
⑦ VIDEO OUTPUT ADAPTOR for any ZX or SPECTRUM provides composite video feed & phono socket. Full instructions NO SOLDERING NECESSARY. £2.25
⑧ SPECTRUM RS232 Leads for Interface 1 £10.00
Please add 50p P and P per order or send SAE for further details
30 STARLING CLOSE, BUCKHURST HILL, EBBW, G19 8TN

FOR SALE

MICRODRIVE Order Form for sale. Best offer secures. Tel: 0442 67080 after 6pm.

MICRODRIVE Order Form. Best offer secures. Tel: (0642) 465221.

ZX PRINTER plus paper, hardly used. £20. Also Microdrive and interface 1 order form. Offers? Telephone 01-360 6850.

COMMODORE 64 + cassette interface, works with virtually all recorders + "Using the 64". 2 months old as new condition. 10 months guarantee. £170 + postage. Peacehaven 81184 or 3161.

VIC 20 UNEXPANDED. Character design program. Create user defined graphics. Cheque/PO £3.50 to P. King, 57A Torquay Road, Paignton, Devon. **48K SPECTRUM**, Interface 1, Interface 2, Microdrive printer with paper and software. All for £245. Telephone 01-524 4368.

VIC BARGAIN RAM PACKS 3K + 8K (both unused) + 16K. Also Star Battle cartridge game. All boxed with instructions. £50 the lot. 01-444 4010.

48K SPECTRUM, complete as new, boxed lead, manuals, demo tape. Lots of software. £100 ono. St Albans 58766.

COMMODORE 64 Printer Interface. Intelligent system from RAM Electronics. Cost £57 for cartridge + cable for Centronics. £40 + postage. One month old. Peacehaven 81184 or 3161.

BBC B BRAND NEW. 12 month guarantee, cassette cable, "The BBC Micro" (book), over £72 of games for £390. Tel: Leicester 897268.

SPECTRUM PRINTER interface, Rd digital tracer, Kempston joysticks, util-

ties, games, etc. All at half price or less! Details from: S. Renton, "Greenlees", Braehead, Lasswade, Midlothian.

BBC MODEL B for sale, including soft cover, some software and mags. £299. Tel: Manchester (061) 445 0557.

VIDEO GENIE 48K system for sale plus monitor, dual disc drives, software and printer for £750 ono. Ilkeston (0602) 302497.

MICRODRIVE AND interface order forms for £16. First ring Alec 01-553 5920 evenings.

MICRODRIVE Order Forms (ZX) offers. 0226 385050.

ZX PRINTER £30 O.N.O., Manic Miner £4.00, chequered flag £4.00 + lots more spectrum games + Sinclair users/programs, any offers 0452 830675 after 6pm.

VIC 20 + 3K RAM EXPANSION, C2N cassette games, cartridges inc Pirate Cove, VIC revealed, excellent condition, £130. Harpenden 60257.

SAVE £100! Okidata Printer 82A, 120cps, true descenders graphics, foreign languages, parallel serial ports, friction pin feeds. £290 + VAT with cable ribbons 01-778 2877.

EPSON MX100F/T with RS232 or centronics interfaces. Unused for quick sale. £199 o.n.o. 0827-872 861 evenings, 021-359 5894 day.

EPROMS new, immediate despatch 2764 8K byte £6.50. 27128 16K byte £18.00. BBC compatible. Prices all inc UFF 1 & 2. The Corner, Horsey, Gt. Yarmouth, Norfolk.

B.B.C. MODEL B 1.2 o.s. plus teac disc drive plus some software and books £420. Tel: Studley 2934

48K SPECTRUM and light pen, 9 games including Scrabble. £170 ono. Tel: Donald (07983) 3777 after 9pm (West Chilington, West Sussex).

MICROLINE M80 Matrix Printer. Dependable for Beeb listings, letters, spreadsheets. £150. One year old. Will deliver London to Oxford area. Tel: 01-581 5490.

MICRODRIVE Order Form. Highest offer secures. ZX Printer paper, five rolls. £8. Tel: 0532 644594 after 6pm.

HARDWARE

DISK DRIVE FOR BBC MICRO £95

Limited number of ex-equipment bare drives with warranty, formatter and two Fuji disks at £95 including VAT. Cable kit £17. Carriage, insurance £8. Brand-new drives complete in cabinets also available.

Phone Lynda, Aylesbury (0296) 630364, 631446, 631424, or write to: Helistar Ltd, 150 Weston Road, Aston Clinton, Aylesbury, Bucks HP22 5EP.



VIC 20 plus C2N and introduction to basic part 1, plus 16K and programmer also cartridge and joystick, books and mags, £130 of S/W, 2 months old, excellent condition. Also 22" black and white TV. Tel: 01-205 7948 (Colindale) eyes.

WANTED

G. W. & A. HESKETH (Publishers) are looking for education programs and programmers for BBC B, CBM 64 and Pet, Spectrum for home and school use; interactive, multiuser expert systems and simulations especially but not exclusively wanted. Contact G. W. & A. Hesketh (Publishers), Cronos Software, PO Box 8, Ormskirk, L39 5HH. **UNBEATABLE ROYALTIES** paid for your arcade/adventure/educational/utility program for Spectrum/ZX81 (Basic or M/C). Send tape for an immediate decision to Odyssey Computing, 28 Bingham Road, Sherwood, Nottingham.

WANTED

Quality Games and utility programs for any Micro. All programs considered. *Instant cash plus royalties. on all programs accepted with a view to distribution in UK, USA and Europe.* Dream Software PO Box 64 Basingstoke, Hants RG21 2LB Tel: Basingstoke (0256) 25107

SUNSHINE

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

Sunshine: Publishers of Popular Computing and Dragon User

Computer Swap 01-437 4343

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

Dragons for sale

DRAGON 32 for sale £70 of s/w joystick to sell. £130. Tel: 01-809 4010 after 6pm.

DRAGON S/W, Vultures £5. Donkey Hug 15. Metroids Cartridge £12. Joystick £5. Dustcover £1.00. Tel Andy 01-942 5026 (No swaps).

DRAGON 32 + manuals + 2 joystick and all dragon users mags since June. 1 book of Dragon programs, 30 of the best games inc; The King, Franklins

LWS

VIC20 CBM64 OWNERS!!!

BUY DIRECT FROM THE MANUFACTURERS AND SAVE POUNDS!!!

3-SLOT SWITCHABLE MOTHERBOARDS, VIC20 £18.95; CBM 64 £19.50
4-SLOT SWITCHABLE MOTHERBOARDS, VIC20 £21.50; CBM 64 £22.50

NEW NEW NEW

ROBOT DRIVE INTERFACE

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

COMING SOON

WANT TO BUILD A DROID?

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

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

Tomb, Cuthbert in the Jungle. Cartridge + cassette. Excellent condition. £299. 01-681 2970.

DRAGON 32: Software for sale, many different programmes, all originals, hardly used, includes chess, backgammon. 50 game tape. Swap or sell. Phone John "Boy" — 250 4093.

DRAGON 32 inc. s/w joystick, mags and manuals £150. Tel: 01-883 5803.

Commodores for sale

VIC 20 plus 16K memory bank, C2N cassette disc drive and S/W, machine code monitor, Super Expander, Rat Race, Supermender, Pirate Cove. £300. Tel: 01-732 5438.

VIC 20 with joystick and Gorf, Rat Race, Mole Attack, £70, or complete with CTN 16K Ram pack, £90 worth tapes, offers. Phone Ingrebourne 76431.

16K VIC 20 C2N unit books, games, super expander cart all for £180. 9 months old. Call/write, 47 Oldfield Park, Westbury Wilts. Ask for Bruce Whitfield. **CBM64** with £160 of S/W, worth £390 sell for £320 ono. Tel: Saffron Walden 22207, after 6pm.

VIC 20, £60, including £100 of S/W and £30 of books, CBM expansion, £20, super expander cartridge, £20, programmes aid K20 Arfon expansion unit, £50. Tel: St Annes-on-Sea 711658, after 4pm.

VIC 20 with cartridges and £300 of S/W, sell for £150. Spectrum Microdrive orderform, offers. Tel: 041 639 2789.

Ataris for sale

ATARI VCS plus joystick, Video Chequers and Combat cartridges for £25. Phone Basildon (0268) 555 468.

ATARI CONSOLE games, Gorf, Popeye, Super Cobra, River Raid, Pitfall, £20 each, Missile Command, Kangaroo, Casino, Keystone Kapers, £15 each, all boxed. Phone Stanley 31737, or write to P.O. Hanlow, 2 Palmer Road, Dipton, Staley, Co Durham.

ATARI software, Zork I, Star Raiders, £15, Rescue at Rigel, £10 each. Tel: Southend-on-Sea 353336.

Acorns for sale

BOOKS — The BBC micro revealed, basic programming on the BBC micro-computer and inside basic games, all in mint condition, £5 secures the lot. Tel: 0245 50432.

BBC B 1.2 O/S, 8 months old, £100 worth of S/W inc basic comp books, leads, boxed, £365. Tel: 01 807 8240.

BBC MODEL B, 1.2 rom, excellent condition, £300, includes leads and user guide. Tel: York (0904) 27411 after 6.30pm or weekends.



LYNX SOFTWARE

FROM BUSTECH. NEW RELEASES!!

YNXVADERS

100% M/C arcade game for the Lynx. Good implementation of space invaders with smooth fast graphics. £7

ROBORUN

This game has seven levels to progress through with the hazards of radio-active barrels, guards, etc. Each level is harder till eventually you have to face XP2 and defeat him. Great entertainment with a hall of fame. £8

Dealer enquiries welcome. Send SAE for full software list of 15 titles.

NAME

ADDRESS

Please tick boxes and send cheques/PO to:
Bustech, 19 Landport Terrace, Portsmouth, Hants
ALL ORDER DESPATCHED WITHIN 14 DAYS
Dealer enquiries welcome

DISCOUNT SOFTWARE

HUGE DISCOUNTS OFF MOST COMPUTERS
12-PAGE CATALOGUE, INCLUDING:

	RSP	Our Price
SPECTRUM		
Manic Miner (Bug-Byte)	£5.95	£4.95
Art Attack (Quicksilver)	£6.95	£5.95
Hobbit (Melbourne)	£14.95	£11.99
COMMODORE 64		
Everest Ascent (Shepherd)	£6.50	£5.00
Hunchback (Ocean)	£6.90	£5.90
BBC		
Slicker Puzzler (DK Tronics)	£6.95	£5.95
Dictator (DK Tronics)	£6.95	£5.95
ORIC		
Asteroids (Artic)	£5.95	£4.95
Bozy Boa (CDS)	£5.95	£4.95
DRAGON		
Maurice Minor (J. Morrison)	£6.95	£5.95
Leggit (Imagine)	£5.50	£4.50

CWO P&P 55p 1 Tape, 2 or more Post Free. SAE for 12-page catalogue of software for most computers, to:
DISCOUNT SOFTWARE, 45 Brunswick, Bracknell, Berks



MONSTER SOFTWARE CLUB

SOFTWARE LIBRARY FOR THE DRAGON 32

- ★ Software for hire from 11 manufacturers
- ★ Over 90 titles to choose from, and growing
- ★ TWO YEARS membership for only £8.00
- ★ Same-day service

Send for details of FREE three months trial membership enclosing SAE to:

MONSTER SOFTWARE CLUB

32 Lennox Drive
Lupset Park, Wakefield WF2 8LU

25,000 *HUSTLER PLAYERS CAN'T BE WRONG!!

Don't miss the full range of magical programs for your Commodore

Available from:
W. H. SMITH, LASKYS, LIGHTNING DEALERS, SPECTRUM SHOPS, GREENS, HMV SHOPS, GAMES WORKSHOPS, CENTRESOFT and PCS STOCKISTS and all Good Dealers.

*HUSTLER is a realistic Pool simulation.

or direct from:



bubble bus software

87 High Street, Tonbridge, Kent TN9 1RX
Telephone: 0732 355962

MICROMAGIC FOR VIC20 MIKMAG GAMES

PRESENT FUN, ENTERTAINMENT AND PURE FRUSTRATION!

8K + GAMES

★ CURSE OF ZOLTIN ★

Beat mad Zoltin's traps and his army of Zenophons to steal his ill-begotten hoard of gold — if you can! Very difficult. £3

★ SAFECRACKER ★

The evil Count von Tu has plans to destroy the world with his Megadoom bomb. Your job — among many death-defying tasks — is to find the combination to his safe and save civilisation. Extremely hard. £4

★ GREYHOUND DERBY ★

Name your own dog. Qualifying heats, betting, race commentaries. But can you win the Derby? Very addictive. £4

★ HEAVYWEIGHT CHAMPION ★

Can you fight your way out of seedy local halls and climb the ladder to become world champion? A knockout game! £4

★ POP STAR ★

Beat greedy managers and so-called experts to get your record to No 1. Great fun! £3

— UNEXPANDED —

● KINGDOM OF VARGO ●

Virtually impossible adventure — but it can be done! Probably hardest game on market. £4.99

● GRAND NATIONAL ●

Name your own horse. Race commentary, tipsters, betting, trainer's advice etc. Frustrating fun! £3

● JUMPWINNER! ●

Amazing National Hunt winner-finding system now more than 200 points up since first advertised. No racing knowledge required. £5 buys secret

MIKMAG GAMES

21 HOLLYMEAD, CARSHALTON, SURREY
DEALER ENQUIRIES WELCOME

THE



RUN

IS HERE

MERCURY HOUSE

GAMES FOR

AQUARIUS

MERCURY HOUSE

Gamespack 1 contains — Bombardier, Fruit Machine, Hangman, Alien Descent, Escape — £4.99

Gamespack 2 contains — Dungeon Adventure, U-Boat, Golf, Starcatcher, Moonraker — £4.99

SPECIAL OFFER

BOTH TAPES ONLY £7.99

Din to Din or Din to Jack — £1.75

CHEQUES, POs TO

MERCURY HOUSE

PO BOX 157, MANCHESTER M60 1PP

Mail order only

Trade enquiries welcome

Please allow 14 days for delivery

New Releases

THE STING



Scorpion is a high speed arcade game for the unexpanded Vic20, which, it is interesting to note, is still outselling the Commodore 64.

The player must defend himself from a trail of scorpions. As you might expect the setting is the desert, which, aside from the blazing heat, is littered with poisonous cacti.

An additional problem is a deadly spider that turns up from time to time, and falling cacti spores that form more cacti and get in your way. As you may have gathered, this is basically a version of that old classic *Centipede* but is none the less addictive for all that.

Program *Scorpion*
Price £7.95
Micro Vic20
Supplier Sumlock
198 Deangate
Manchester M3 3NE

CORRECT

Besieged is part of a series of programs from Sulis Software designed to cover, in an entertaining way, just about every quirk of English spelling.

In *Besieged* you must help a knight enter a castle, across a ravine, by building him a bridge. To build the bridge you will have to get the correct spelling of various words.

The package contains two cassettes and a short manual. The graphics are neatly done and the words in the game are

all fairly difficult to spell correctly, or rather are easy to spell incorrectly and it is recommended for ages 15 and above.

Program *Besieged*
Price £8.65
Micro Commodore 64
Supplier Sulis Software
C/O John Wiley & Sons
Baffins Lane
Chichester PO19 1UD

HIDEAWAY



Richard Shepherd Software is one of the leading Spectrum adventure game houses. Now it is converting many of its best sellers for other machines — the latest is *Super Spy* now on the Dragon 32.

The game is divided into four sections as you try to discover the location of Dr Death's secret hideaway, destroy his missile and save the world.

The game is a mixture of text and graphics. The first section involves accumulating your necessary weapons and unraveling coded messages to discover the location of the evil Doctor's island.

In the next section, you have to explore the island and discover Dr Death's secret hideaway. This is followed by a 3D graphic maze, which contains the control room. Finally, you must discover the code to disarm the missile and save the world. Simple, eh — still it's something to put on your CV.

Program *Super Spy*
Price £6.50
Micro Dragon 32

Supplier Richard Shepherd
Software
Elm House
23-25 Elmshott Lane
Cippenham
Slough
Berkshire

DECIMAL

Cut'n'Val is an educational program for the BBC that will test just about any mathematical expression you wish including decimal arithmetic up to six decimal places, exponential expressions, logical expressions, etc.

The questions can be run in a test format where both the result and an analysis of the difficult questions are given at the end.

It can be adapted for any level of ability from 7 to 16+. It can be run from disc, tape or network on all operating systems.

Program *Cut 'n'Val*
Price £14.50
Micro BBC B
Supplier MP Software Services
165 Spital Road
Bromborough
Merseyside L62 2AE

GIANT RATS



The ZX81 is still being manufactured — a surprising and oft forgotten fact in this time of QIs and Adams. Moreover, people are still buying it — usually as a 'toe dipped in the water' measure to see how they feel about computing without risking much money.

With these facts in mind, some software houses are still producing new software for the machine and some of it is pretty impressive.

Forty Niner is a digging game where you must burrow through the earth searching for gold nuggets. You must watch out for giant rats and snakes as well as a gremlin who is digging his way through your pile of earth to get at you.

The really remarkable thing about the game is that it features hi-resolution graphics just like the Spectrum (although black and white of course), so the rats really do look like rats instead of square tables. Highly recommended.

Program *Forty Niner*
Price £5.95
Micro ZX81 (16K)
Supplier Software Farm
155 Whiteladies Road
Clifton
Bristol BS8 2RG

A FORTUNE



Cases Computer Simulations are more or less the only company I can think of who have specialised in Simulations — those programs where you try to run a business in the midst of various, computer derived, managerial problems.

In *Stock Market* you try to make your fortune out of stocks and shares. You can buy up to six different shares and must respond to high and low prices, newsflashes and company reports in deciding when and what to sell or buy.

The program can provide graphs of your performance

and will even analyse your mistakes. There are three difficulty levels and at the hardest you will really need to think carefully about each decision.

Program *Stock Market*
Price £6.00
Micro *Spectrum 48K*
Supplier *Cases Computer Simulations*
 14 Langton Way
 London SE3 7TL

WAR GAMES

Kriegspiel is an elaborate wargame simulation for the Dragon 32. It is set in a mountain and forest landscape and involves two commanders in charge of tank divisions and infantry — the winner is the first one to enter his opponent's capital.

The different types of terrain illustrated by differing coloured hexagons on the screen display have differing properties in respect of attack, defence and movement properties.

The game involves all kinds of factors including the weather and your ability to recruit new forces. You can play either against the computer or against another player.

Program *Kriegspiel*
Price £6.95
Micro *Dragon 32*
Supplier *Beyond Software*
 Competition House
 Farndon Road
 Market Harborough
 Leicestershire

BLACK BOX

An educational program for the ZX81 might seem a fairly doubtful idea, but then again maybe not. There must be a lot of homes where the funny black box introduced parents into the world of computing and after they had gone on to higher and more expensive things, the children got the 'toy' ZX81.

Hidden Letters is the program and it is a mixture of a word game and an educational program teaching reading and comprehension. The tests involved can be adapted for use

by any age group from five upwards.

Program *Hidden Letters*
Price £4.95
Micro *ZX81 (16K)*
Supplier *Poppy Programs*
 Richmond House
 Ingleton
 Carnforth
 Lancs LA6 3AN

COMPOUNDS



Which Salt? is an educational program for the BBC that might just manage to educate. It contains information on 24 chemical compounds and tests you on them.

When the program is run, the results of a series of simple chemical tests are given — you have to deduce the compound from the information. You can either make a guess or 'run' other tests in order to get more results. The more tests you need, the lower your score.

The program comes with a sample worksheet which, it is suggested, could be used to work through the results of the tests in the classroom. An obvious subject no one else seems to have used.

Program *Which Salt?*
Price £6.95
Micro *BBC B*
Supplier *Program Power*
 Northwood House
 North Street
 Leeds LS7 2AA

ALIENS

Although you'd have thought that the memory expansion was an inevitable purchase for the Vic20 — in fact there are

very few games using the extra 16K.

Starship Escape is one of the few, and is called a machine code graphics adventure. Looked at more closely, it proves to be simply a very complex arcade game in which you must search an alien vessel for the various parts of your own ship which have been scattered around by some nasty aliens.

Various baddies (of course) are trying to prevent you from recovering the parts of your ship and will send you back to where you started if they catch you. You are helped by K9, the well known copyright infringement, who can attract the baddies towards him, giving you time to make your getaway.

Other features in the game include a map of the alien ship and a surrender button if the going gets too tough.

Program *Starship Escape*
Price £9.95
Micro *Vic20 (16K)*
Supplier *Sumlock*
 198 Deangate
 Manchester
 M3 3NE

LIME CAKE



Who remembers *Dig Dug*? It was the arcade game of 1982 (well, at one point) and involved moving a little man through the earth digging his way to various treats like cherries and other fruit.

Now it is available for the Spectrum and is entitled *Dinky Digger*. This version has all the features of the original, except the continuous music — which is the Spectrum's fault rather than Postern's.

To complete each screen, Dinky has to eat all the goodies and kill all the monsters; the crowning glory being a lime cake at the centre of each screen which marks the entrance to the monsters' lair.

With the likes of *Ultimate* around, no serious software house should be able to get away with anything other than excellent graphics — these though are not too good, looking like compiled Basic.

Program *Dinky Digger*
Price £6.95
Micro *Spectrum 48K*
Supplier *Postern*
 PO Box 2
 Andoversford
 Cheltenham GL54 5SW

LOGICAL

Micro Drivin is a graphics adventure for the 48K Spectrum. It is one of the best I've seen and is as challenging as you could possibly require.

The basic plot involves hunting for clues on a mysterious island — it works a little like the tv program *Treasure Hunt*, where each clue leads you on to the location of the next.

The graphics are superb. A major feature of the game is a sports car you use to drive from place to place — the interior of the car is as good as any of the graphics on *Chequered Flag*.

Each location is illustrated with the graphics appearing instantaneously on the screen.

In terms of the adventure, it's as difficult as any I've tried although (with the help of a crib sheet) I can see that all the clues are logical and fair. Buy it and see how long it takes you to find the car keys!

Program *Micro Drivin*
Price £6.95
Micro *Spectrum 48K*
Supplier *Softel*
 5 Durward Drive
 Fife

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

Top 10

Top 10

Spectrum*

- 1 (1) Alic Atac (Ultimate)
 - 2 (4) Lunar Jelfman (Ultimate)
 - 3 (-) Stonkers (Imagine)
 - 4 (3) Manic Miner (Bug-Byte)
 - 5 (2) Chequered Flag (Psion)
 - 6 (9) Hunchback (Ocean)
 - 7 (-) Pyramid (Fantasy)
 - 8 (-) Mr Wimpy (Ocean)
 - 9 (8) 3D Art Attack (Qicksilva)
 - 10 (6) Flight Simulation (Psion)
- * Requires 48K.
(Figures compiled by W H Smith and Son, London)

Atari

- 1 (2) Zaxxon (Datasoft)
 - 2 (4) Slinky (Cosmi)
 - 3 (7) Sea Dragon (Adventure International)
 - 4 (3) Astro Chase (Parker Brothers)*
 - 5 (1) Warlock (Calisto)†
 - 6 (-) Paris in Danger (Aviation Hill)‡
 - 7 (-) Zork III (Infocom)†
 - 8 (-) Enchanter (Infocom)†
 - 9 (6) Caverns of Kalka (Cosmi)
 - 10 (5) O'Reilly's Mine (Starcade)
- * Cartridge † 32K Cassette or disc ‡ 48 K Disc
(Figures compiled by Calisto Computers, Birmingham 021 632 6458)

BBC*

- 1 (-) Rocket Raid (Acornsoft)
 - 2 (3) Planetoids (Acornsoft)
 - 3 (2) White Knight Mk2 (BBC)
 - 4 (-) Monsters (Acornsoft)
 - 5 (10) Disc Doctor (Computer Concepts)
 - 6 (-) Meteors (Acornsoft)
 - 7 (-) Missile Control (Gemini)
 - 8 (4) Chess (Acornsoft)
 - 9 (5) Snapper (Acornsoft)
 - 10 (-) View (Acornsoft)†
- † Rom * All Model B.
(Figures compiled by Micromanagement, Ipswich 0473 59181)

Books

- 1 (-) Advanced Graphics for the Spectrum, *Angell and Jones* (Macmillan)
 - 2 (-) Mastering Machine-code on Your ZX Spectrum, *Baker* (Interface)
 - 3 (7) Spectrum Microdrive Book, *Logan* (Melbourne House)
 - 4 (4) BBC Micro Disk Companion, *Latham* (Prentice Hall)
 - 5 (3) Advanced User Guide for the BBC Micro, *Bray* (Cambridge Micro Centre)
 - 6 (-) 100 Programs for the ZX Spectrum, *McLean* (Prentice Hall)
 - 7 (9) Programming the M68000, *King* (Addison-Wesley)
 - 8 (8) Commodore 64 Programmer's Reference Guide, *Commodore* (Commodore)
 - 9 (8) Complete Forth, *Winfield* (Sigma)
 - 10 (5) 68000 Assembly Language Programming, *Kane and Leventhal* (Osborne)
- (Figures compiled by Watford Technical Books, Watford 0923 23324 Prestel 28844)
(Last week's position in brackets).

Vic 20

- 1 (8) Wacky Waiters (Imagine)
- 2 (2) Wizard and the Princess (Melbourne House)
- 3 (5) Snooker (Visions)
- 4 (-) Grid Runner (Liamasoft)
- 5 (5) Flight Simulation (Ferranti)
- 6 (1) Bewitched (Imagine)
- 7 (3) Catcha-Snatcha (Imagine)
- 8 (-) Abductor (Liamasoft)
- 9 (10) Arcadia (Imagine)
- 10 (-) Tomb of Drowan (Audiogenic)

Dragon 32

- 1 (-) The King (Microdeal)
- 2 (2) Eightball (Microdeal)
- 3 (4) Skramble (Microdeal)
- 4 (3) Leggit (Imagine)
- 5 (-) Grand Prix (Salamander)
- 6 (1) Space Shuttle (Microdeal)
- 7 (5) Dragon Chess (Oasis)
- 8 (7) Transylvanian Tower (Richard Shepherd)
- 9 (9) Intergalactic Forth (Microdeal)
- 10 (-) Danger Ranger (Microdeal)

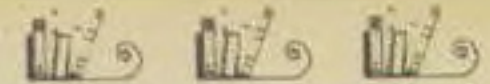
Commodore 64

- 1 (2) Space Shuttle (Microdeal)
- 2 (7) Falcon Patrol (Virgin)
- 3 (1) Crazy Kong (Interceptor Micros)
- 4 (-) Spirates and The Snowman (CBM)
- 5 (4) Cosmic Convoy (Tashsoft)
- 6 (-) Styx (Supersoft)
- 7 (9) Motorman (Audiogenic)
- 8 (-) Transylvanian Tower (Richard Shepherd)
- 9 (-) Ship of the Line (Richard Shepherd)
- 10 (5) Hover Bovver (Liamasoft)

ZX81

- 1 (3) Football Manager (Addictive Games)
 - 2 (1) Asteroids (Quicksilva)
 - 3 (-) Flight Simulation (Sinclair)
 - 4 (-) Mothership (Sinclair)
 - 5 (-) Space Raiders (Sinclair)
 - 6 (-) Chess in 1K (Sinclair)
 - 7 (5) Invaders (Quicksilva)
 - 8 (4) Defender (Quicksilva)
 - 9 (7) Krazy Kong (PSS)
 - 10 (6) ZXAF (Bug-Byte)
- (Figures compiled by Boots/Websters)

Book Ends



Supplier *Granada Publishing*
8 Grafton Street
London W1X 3LA

BBC DISKS

In the preface to *Disk Systems for the BBC Micro* it explains that since "the BBC machine is bought mainly by serious programmers... a very large proportion of BBC B users are likely to have or consider buying, disk systems."

Without wishing to go overboard on this, I should like to assert that the premise of the above argument is not really true and moreover could possibly upset those who feel it implies that other machines cannot be used for serious purposes — 32K is a bit pathetic these days and lots of BBC B's are in schools — both factors requiring fast access times; perhaps that's why so many BBC Disks are sold.

Anyway, the book is a fairly comprehensive guide to what disk drives are and what you can do with them in conjunction with your BBC Micro. It contains useful sections on files and machine code and a complete list of the DFS commands.

Book *Disk Systems for the BBC Micro*
Price £6.95
Micro BBC B

MACHINE CODE

Although there are many books for Spectrum owners who are beginning to look at machine code having mastered Basic, there are few for people who have successfully grappled with registers and hexadecimal and are wondering what to do next.

David Laine's *Machine Code Applications* could be the book. It starts with the premise that you already know some machine code and discusses floating point numbers, animated graphics and passing parameters — there are various programs that illustrate the points made which are useful routines in their own right.

The book is written in a discursive arcane style — chapters begin with quotes from various unlikely sources — that you will either love or hate.

Book *Applications*
Price £6.95
Micro Spectrum
Supplier *Sunshine 12-13*
Little Newport Street
London WC2R 3LD

This Week

Program	Type	Micro	Price	Supplier
3D Battlstar	Arc	Oric 1	£6.50	Topaz
Address File	Ut	Oric 1	£7.50	Severn
Alphabet	Ed	BBC B	£9.95	Opal Soft
Assignment East Berlin	Ad	Spectrum	£5.95	Link
BC Basic	Ut	Commodore 64	£57.50	Kuma
Basil Goes Ballooning	Ad	Dragon 32	£7.95	Computerhouse
Bombs Away Basil	Ad	Dragon 32	£7.95	Computerhouse
Chess	S	MZ 700	£9.95	Solo
Classic Adventure	Ad	Spectrum	£6.95	Melbourne House
Cobra	Arc	Memotech	£6.50	Xaviersire
Computer Cookbook	Ut	Spectrum	£5.95	PMCS
Cricklewood Incident	Ad	Dragon	£7.95	Salamander
Dr Franky	Ad	Spectrum	£5.95	Virgin
Dynamic Graphics	Ut	Spectrum	£14.95	Procom
Encounter	Ad	Oric 1	£7.50	Severn
Extended Basic	Ut	Oric 1	£7.50	Severn
Fun Pac2	Arc	Texas	£6.95	Virgin
Fun Pac3	Arc	Texas	£6.95	Virgin
Galaxy Adventure	Ad	Spectrum	£2.75	Alpha
Game of Truth	Ad	MZ700	£6.95	Solo
Glaxxons	Arc	Dragon	£8.00	Microdeal
Happy Letters	Ed	Electron	£8.97	Bourne
Happy Numbers	Ed	Electron	£8.97	Bourne
Happy Writing	Ed	BBC	£8.97	Bourne
Hell Gate	Arc	Vic20	£6.00	Liamasoft
Hideous Bill	Arc	Spectrum	£7.95	Virgin
Invader Cube	Arc	Dragon	£5.95	Oasis
Killer West	Arc	Commodore 64	£6.95	Alligata
Lone Raider	Arc	Oric 1	£7.50	Severn
Map Rally	Ed	Electron	£8.97	Bourne
Marooned	Ad	Vic20	£4.50	Buntasoft
Matchday	S	Spectrum	£4.75	C&D Software

Microbot	Arc	Spectrum	£5.95	Softek
My Secret File	Ut	Commodore 64	£9.95	Mosaic
My Secret File	Ut	Spectrum	£9.95	Mosaic
Mystery of the Java Sea	Ad	Dragon 32	£7.95	Shards
North Sea Oil	S	Dragon	£5.75	Shards
Pacific War	S	Spectrum	£6.00	CCS
Pascal	Ut	Dragon 32	£14.95	Oasis
Physics 1	Ed	Dragon 32	£6.90	N.W.B.C.
Sprint	Ut	Dragon 32	£14.95	Oasis
Sprite Magic	Ut	Dragon 32	£17.25	Slik
Super Mouse	Arc	MZ 700	£3.95	Solo
Them	Arc	Oric 1	£5.95	Virgin
Timeman One	Ed	Electron	£8.97	Bourne
Timeman Two	Ed	Electron	£8.97	Bourne
Tornado	Ut	Commodore 64	£9.97	B&F CSL
Ugh!	Arc	Commodore 64	£7.95	Softek
Ultimon	Ut	Spectrum	£13.50	Microholics Anonym
War 70	S	Spectrum	£6.00	<i>Machine Code</i>
Wings of War	Ad	Dragon 32	£7.95	Salamander
Word Processor	Ut	MZ 700	£19.95	Solo
Wordgame	S	BBC B	£5.45	Scientific
Wordhang	Ed	Electron	£8.87	Bourne
Zoids	Arc	Commodore 64	£7.95	Softek

Key: Ad — adventure/Arc — arcade/Ed — education/
S — strategy-simulation/Ut — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to: This Week, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.



Whiz kids

Whiz Kid Genius is Millionaire at eight. "We always wanted him to get a paper round like the other lads round here, but now we're glad he didn't," said whiz kid Ronny's pretty mother, Gladys (28).

Have you ever wondered where all the whiz kids went? Fleet Street used to be full of them. Features editors would spend ages dreaming up more puns on the word chip.

Hopefully, most of the kids made a couple of thousand pounds and are now doing physics or maths at University. Hopefully too they are spending some of their free time in less isolated activities than programming computers.

Even at the height of the fuss one thing was clear to me from the dozens of programs I am sent every week — with a few exceptions, the best were never from lone fifteen year old programmers. Even when a marvellous game was written by such a person, it was usually from one of the large software houses like Quicksilver where the company could provide advice and equipment to ensure a professional end result.

But even these enthusiastic amateurs are being replaced by highly paid professionals. This inevitable change is clearest seen in the Spectrum software market.

For complex reasons, mainly to do with money and market forces, Spectrum software is, by and large, cheaper and better than the software for any other machine. Before writing in to complain, take a look at some of games generally available under £6 from Ultimate or Imagine — you'll find it difficult to disagree.

What happened, and is still happening, in the Spectrum market is that as sales of the machine grew the professionals moved in — there was real money to be made. Advertising budgets expanded and many small operations that had

been previously ticking over with a small profit, started to lose money — they couldn't compete with the high profile, high quality, operations.

Atari made a lot of mistakes, but putting out poor quality software was not one of them. On the contrary, they knew a basic fact at a very early stage — really good games could not be written by one person. Too many different and, in many ways opposing, skills were required. Consequently, the Atari programmers invariably worked with graphic designers and games designers, who concentrated on the look and 'play' of the game respectively.

The same set up is true of the top Spectrum software houses — programs are written by teams rather than individuals.

This situation will undoubtedly start to be repeated on other machines which sell well — it is already largely true of the Commodore machines with their large transatlantic user base.

It is not so easy to predict the overall effects on the market in say, five years time. Should we view it with enthusiasm or foreboding?

The quality of the games in terms of use of graphics and sound will undoubtedly go up and prices will probably be standardised at a reasonable level (it could be argued that one of the things Atari did wrong was to sell its games too expensively). Getting hold of the games will be as easy as buying records — with large budgets for advertising and promotion new programs will be 'visible' — no more waiting ages for a response from a mail order company.

I see some problems through too. What will really be encouraged is standardisation — maximum appeal to maximum numbers of people for maximum profit.

The obvious analogy is with the record business — if you have top 40 tastes, you'll be well catered for.

What we must hope is that the analogy is actually very precise — in that case, just as there is an 'underground' record industry which survives (low budget labels, small scale advertising, little radio play), perhaps it is not unreasonable to imagine an 'underground' software industry where small companies grow up to fill a demand for programs outside the norm. Maybe they won't have the professional veneer of their popular rivals, but if the record industry is anything to go by, they may be far more interesting and imaginative.

Graham Taylor

On the tiles

Puzzle No 94

I called round to see Albert at his workshop last Saturday, to see if he could repair an antique chair that I had acquired. When I arrived he was busy working on two matching rather broken down old tables.

"I'm only interested in the tops," explained Albert. "You see they're covered with square tiles which I am hoping to remove and use to cover a larger table that I have made." Each table top was inlaid with very attractive inch square tiles, arranged with as many tiles to the row as there were rows.

Several weeks later he rang to say my chair was ready, so I went straight over. "What do you think of my new table?" he asked when I arrived. The new table top was covered with the tiles that he had salvaged — again in a perfectly square arrangement.

"Unfortunately, I broke one of the tiles," said Albert, "but luckily I still had precisely the correct number of tiles left for me to complete the job."

How many tiles did he use on the new table?

Solution to Puzzle No 89

From the alphabetic $DAYS * 7 = WEEK$ it is clear that D must be equal to 1, otherwise there would be more than four digits in the product.

The program generates successive values for the word $DAYS$ and multiplies this by seven to obtain the product. This result is first checked to determine if the second and third digits are the same, and then to see if the digits of the product are different from those in the word $DAYS$.

```
10 LET D = 1 20 FOR A = 0 TO 9 30 IF A = D THEN
GOTO 210 40 FOR Y = 0 TO 9 50 IF Y = D OR Y = A
THEN GOTO 200 60 FOR S = 0 TO 9 70 IF S = D OR S
= A OR S = Y THEN GOTO 190 80 LET DAYS = D *
1000 + A * 100 + Y * 10 + S 90 LET WEEK = DAYS * 7
100 LET WS = STRS WEEK 110 IF WS(2) <> WS(3)
THEN GOTO 190 120 IF WS(4) = WS(3) OR WS(4) =
WS(1) OR WS(2) = WS(1) THEN GOTO 190 130 FOR
N = 1 TO 3 140 IF N = 3 THEN LET N = 4 150 LET K =
VAL WS(N) 160 IF K = D OR K = A OR K = Y OR K = S
THEN GOTO 190 170 NEXT N 180 PRINT D;A;Y;S;"" 7
=""; WS 190 NEXT S 200 NEXT Y 210 NEXT A
```

This results in two possibilities: $1048 * 7 = 7336$ and $1207 * 7 = 8449$.

Winner of Puzzle No 89

The winner is: R A Mitchell, Lingdale Avenue, South Bents, Southerland, who receives £10.



AUTOMATA

... but seriously,

- PIMANIA** - the cult adventure that's for real.
16K ZX81 £5 BBC 32K £10 Dragon 32 £10 Spectrum 48K £10
- GROUCHO** - the Pimania sequel, Concord-QE2-USA prize
Free rock music on the flipside. Spectrum 48K £10
- PI-EYED** - the comedy cartoon arcade game, starring
the PiMan. Free protest-disco record. Spectrum 48K £6
- PI-BALLED** - A triumph of the arcade programmer's art.
Starring the PiMan. Free offensive-Reggae music. Spectrum 48K £6
- MORRIS MEETS THE BIKERS** - exciting arcade fun,
as seen on TV. Outrageous free doo-wop record. Any Spectrum £6
- YAKZEE** - Bruddy wonderfurr game of ruck and skirr.
An oriental masterpiece for Dragon 32 plus. Spectrum 48K £5
- GO TO JAIL** - Play the game
find out what all the fuss is about, cookie. Spectrum 48K £6
- THE PIMAN'S GREATEST HITS** - amazing stereo L.P. cassette £3

24 HOUR CREDIT CARD HOTLINE (0705) 735242

I ENCLOSE THE RIGHT MONEY, OR DEBIT MY ACCESS/VISA CARD

CARD NUMBER

MY SIGNATURE

MY NAME

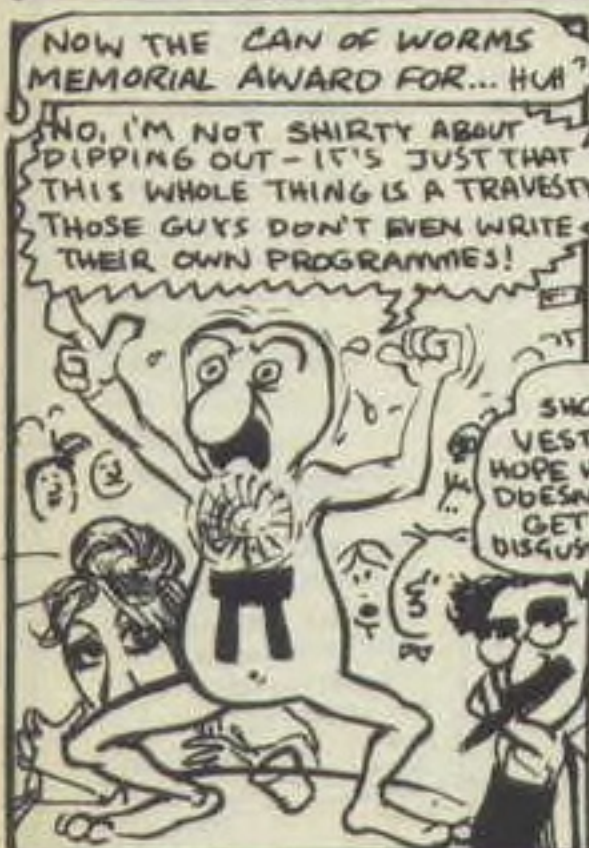
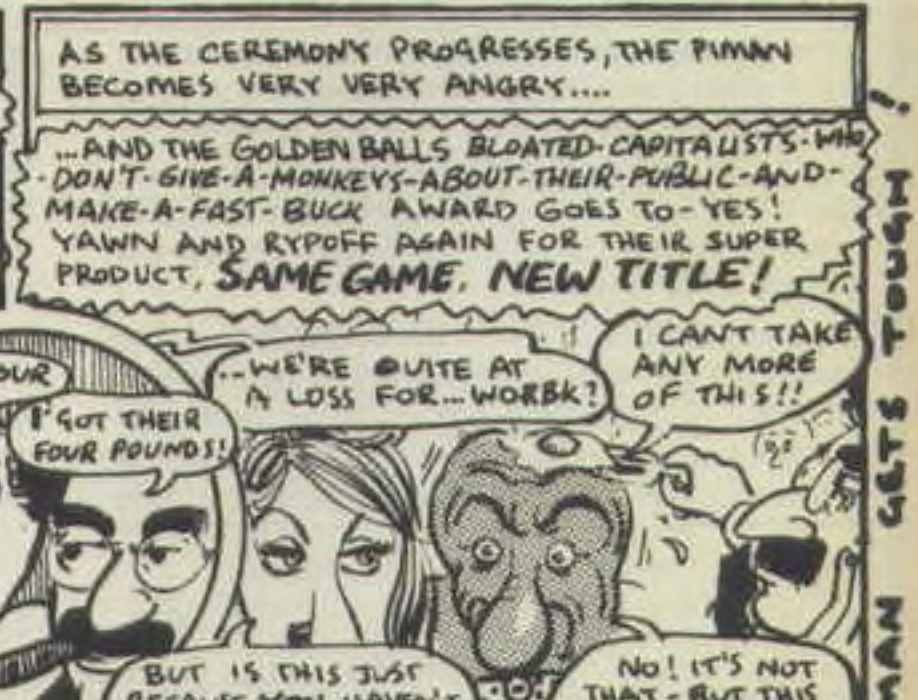
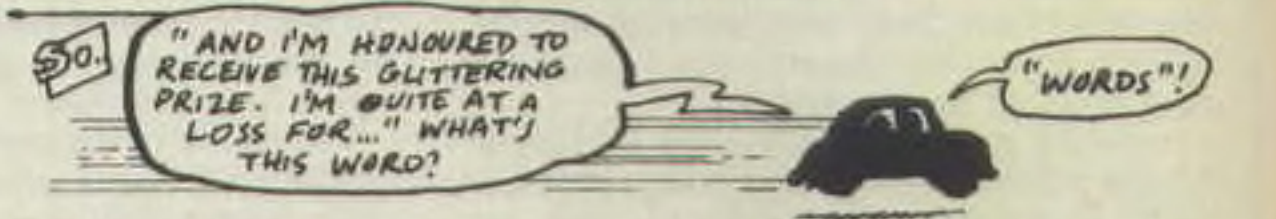
MY ADDRESS

POST CODE

NO EXTRAS! ALL OUR PRICES INCLUDE DELIVERY AND V.A.T.
Send to: AUTOMATA U.K. LTD.
27 Highland Road, Portsmouth, Hants. PO4 9DA

THE PIMAN, WHOSE ALCOHOLIC BENDER AND SUBSEQUENT MYSTICAL ENCOUNTER WITH THE PYRAMID OF PI INSPIRED 2 GREAT NEW ARCADE STYLE GAMES: PI-EYED AND PI-BALLED (AVAILABLE NOW WITH LADY CLAIR'S FREE HIT SONGS ON THEIR BACKSIDES), IS BACK WITH HIS MATES. YAKZEE YAK HAS TOLD HIM HE MUST TRAIN FOR THE OLYMPICS. PIMAN IS NOT SO SURE...

EVENTS (the Devil made me do it!)



PHONE LADY CLAIR TO BUY SPECTRUM DISC DRIVES! £260 INCLUDING SECURITYOR DELIVE

BY... NEXT WEEK, THE PIMAN GETS TOUGH!