

40 Rock

# POPULAR Computing WEEKLY

40p

31 May-6 June 1984 Vol 3 No 22

**BRITAIN'S BEST-SELLING MICRO WEEKLY**

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SEE PAGE 45

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**★ STAR**  
**Air/sea Battle on spectrum see page 10**  
**GAME**

## News Desk

### What future for the Lynx now?

by Christina Erskine

THE future of the Lynx computer is in jeopardy.

Manufacturer Camputers has asked its accountants to convene a meeting of creditors on June 8th.

Although the company has not ceased trading, 24 members of staff — over half the employees — were made redundant last week.

Managing director Stanley Charles said, "The company has been seeking additional finance for some time, and while one party has expressed an intent to ensure that the Lynx series will continue, no firm offer has been made."

"It is the desire of the directors on everyone's behalf that owners are found for the project in the period between now and the creditors' meeting."

Geoff Sore, Technical director of Camputers Ltd, added, "In my opinion, the Lynx will continue — the project isn't dead yet, and the company is actively looking for means for it to continue."

Camputers is rumoured to have already received a firm

**continued on page 5**



## Dragon joins MSX bandwagon

DRAGON Data is soon to announce a new home computer which will conform to the Japanese MSX design standard.

The company will be the first UK manufacturer to acquire a licence for the MSX system.

At least seven other European manufacturers are known to be negotiating with systems house Microsoft for MSX licences — including the Dutch electronics giant Philips, which is soon expected to announce it will adopt the system.

Dragon's new machine will have 64K Ram, a Z80 processor and a built-in 3½inch disc

drive unit. And Dragon will work hard to get the machine out into shops like Boots before the first of the Japanese MSX machines makes its debut here in September.

Commented Dragon's Managing director Brian Moore: "MSX could well dominate major sections of the home computer market and comparisons with VHS and video recorders can be readily drawn."

Said Dragon's Kevin Stephens: "Our view at the moment is that MSX is the way we will go. If so, we will almost certainly also be doing software."

**continued on page 5**

## This Week

● **Special Feature** Ray Berry continues his look at the development of microprocessors on page 13.

● **Spectrum** John de Rivaz shows how to add graphics to Quill'd adventures. See page 19. ● **QL** John

Cochrane with part two of his guide to QL keywords on page 23. ● **New Releases** This week's software

includes Antics from Bug-Byte, Bath Time from PSS and Childsplay from Polarsoft, Page 48.



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### 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.

### 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

<b>News</b>	5
Dragon MSX machine	
<b>Letters</b>	7
Spectrum bug	
<b>Star Game</b>	10
Air Sea Battle on 16/48K Spectrum	
<b>Special Feature</b>	13
Microprocessors by Ray Berry	
<b>Reviews</b>	16
In depth software analysis	
<b>Spectrum</b>	18
Quill'd graphics by John de Rivaz	
<b>BBC &amp; Electron</b>	21
Planetary Movement by J Burr and A Pudding	
<b>QL</b>	23
Rom Keywords by John Cochrane	
<b>Dragon</b>	26
Character set for Pmode 4 by Roger Walton	
<b>Commodore 64</b>	30
Machine code programming by Adrian Warman	
<b>Open Forum</b>	33
Four pages of your programs	
<b>Adventure</b>	39
Tony Bridge's corner	
<b>Peek &amp; Poke</b>	41
Your questions answered	
<b>New Releases</b>	48
Latest software programs	
<b>This Week</b>	50
Top 10 plus all this week's software	
<b>Competitions</b>	51
Ziggurat, Puzzle, Hackers	

## Editorial

June will be dominated by shows this year. The Consumer Electronics Show in Chicago will be followed in short order by the Commodore Show in Hammersmith and the Computer Fair in Earls Court.

There are no intimations of any astounding new machines or peripherals, but there should be some new software on display. Commodore, which announced the 264 at Las Vegas in January — but has sat on it ever since, should at least announce its plans for the next six months.

July and August are traditionally rather lean months for the computer industry, but sales usually start in earnest in September as companies gear themselves up for the Christmas boom.

Competition is likely to intensify in the latter third of the year, with Amstrad and the MSX companies all trying to grab a slice of the lucrative micro market. The pressure will also affect software firms, some of whom are already suffering from the current surfeit of software sitting in warehouses around the country.

It is difficult to predict exactly what shape the micro market will be in six months from now, but the indications are that users will have a wider choice than ever before.

## Next Thursday

**Time-a-Climber** for the Spectrum is next week's star game by Alan Jarvis — a mountaineering challenge. Scale the mighty peaks and admire the changing scenery.

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(Trade enquiries welcome)

## Dragon

continued from page 1

ware for MSX." It is not clear at this stage if Dragon will offer a hardware upgrade for the MSX machine to enable it to run the company's present range of OS9 software.

GEC McMichael, Dragon's marketing arm, declined to comment on the possibility of Dragon embracing the MSX standard. So far, eight of Japan's largest electronics companies have opted for MSX.

● Dragon has announced that it will be bundling the Dragon 32 in two special 'starter packs'. Both include a data recorder — one with Logic3's Basic Tutor package, the other with four game cassettes and a Rom cartridge.

## Computers

continued from page 1

offer last week via its solicitors which would reinstate the staff and set out a five year plan for the company. Its solicitors, Turner Kenneth Brown, however, declined to comment on the situation, and directors at Computers said that there had been no such offer.

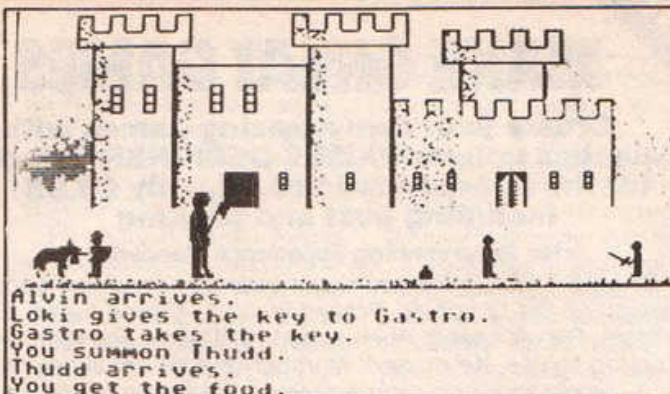
Although the three Lynx micros (48K, 96K and 128K) have sold well overseas, particularly in France and Scandinavia, UK sales have been disappointing. It is thought that this has been a major factor in Computers' financial crisis.

## MSX agree on disc format

THE 10 Japanese MSX computer manufacturers have reached agreement on a common disc format.

It is to be the Sony 3½inch format. Said Toshiba's Chris Greet — instigator of the UK's MSX working party — "The 3½inch format has been chosen as the disc standard for MSX — which will ensure compatibility for MSX disc software."

The 3½inch drives will run Microsoft's MSX disc operating system MSX-DOS. MSX-DOS is data compatible with MS-DOS meaning that IBM files can be exported to an MSX machine. The system-



## Valhalla goes US

VALHALLA, the big selling Spectrum title, is now confidently expected to be available on the Commodore 64 within the next few weeks.

A production version is almost finished, with only minor 'tweaks' left to do. Although the plot objectives and major features of the game are the same as the Spectrum version, Legend regard the 64 edition as slightly superior.

"Obviously we've been able to do more in terms of colour graphics for the characters on the 64 and have improved the backgrounds" said Legend's John Peel. "We've also speeded up the action of the game — more happens sooner — I think we're getting that bit closer to our objective of a computer movie."

In what is believed to be an unprecedented move, Legend has insured itself, reportedly with Commercial Union — for up to £2.5m, to combat the 'Star Wars syndrome' — pirated copies of the game reaching the shops before the official version. The figure reflects anticipated sales in the US when a disc version of the game is issued there at Christmas. One of the companies believed to be involved in the American deal is video and tv giant CBS.

## QL board for sale?

THE processor board from the QL may well be available in the not too distant future for sale to other systems builders.

Sinclair Research and GST Computer Systems, based near Cambridge, are currently negotiating prices, quantity and delivery dates, although the

final agreement is unlikely to take place until Sinclair has sorted out all its own QL delivery problems.

Sinclair has yet to send out all the machines to customers given end of April deadlines for delivery.

Those few customers who have so far received machines are still waiting to receive copies of the Basic manual.



Hitachi's MB-H80 machine calls running under MSX-DOS are also CP/M compatible.

The first MSX micros with disc units are expected to go on

sale in Japan in two week's time.

The decision of the MSX companies to adopt a 3½inch disc standard is a blow to Hitachi, which had hoped that its own 3inch system might be chosen in preference to the Sony one.

Said Hitachi UK's Alan Geekie: "A disc format standard is a fundamental part of the thinking behind MSX and it is inevitable that one of us has to lose out. Certainly it is not a problem though. We will conform to whatever is adopted as the disc standard."

Hitachi's 64K MSX micro — the MB-H801 — will go on sale in the UK in September, priced under £200.

## GOSH set up legal fund

GOSH — the Guild of Software Houses — has established a legal fund to fight software piracy.

Twenty-one member companies attended a meeting held last week and pledged over £50,000 to help establish a legal precedent for software copyright.

Commented GOSH chairman Nick Alexander, "All we have to do now is find a suitable case to fight — and believe me there are plenty of deserving causes."

## Donations welcome

YOU can now donate computer software cassettes to Oxfam, along with the more usual clothes, books and toys.

The overseas aid charity is mounting a special appeal in June and July for any personal computer software from either individuals or manufacturers and retailers. The games can be donated at any one of Oxfam's 650 shops in this country.

## New machine from Atari

ATARI has launched a new video games machine in the US called the 7800 Prosystem.

With advanced colour graphics, the machine will play any game cartridge designed for the Atari 2600 video computer. It can also be expanded, with a full-stroke keyboard, into an introductory computer. In addition, Atari also unveiled 13 new games designed for the 7800 Prosystem.

So far there is no price available for the machine and it is not known if it will be sold in the UK.

## Design change

DK 'TRONICS has now modified the design of its successful add-on keyboard for the Spectrum so that it works with Interface 1 and Microdrives.

The unit costs £45. Details from DK 'Tronics, Unit 6, Shire Hill Industrial Estate, Saffron Walden, Essex.

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# Letters

## Poignant response

I thought I should write and tell readers of what could be a quite serious 'bug' in the Sinclair ZX Spectrum/ZX Interface 1 system. I own an issue two ZX Spectrum fitted with 48K Ram, ZX Interface 1 and one ZX Microdrive. Whilst operating the system recently, I came across a poignant response to the following and similar commands, after Microdrive operation:

PRINT IN 0.

The response, quite often, is not as expected. The system 'locks-up' and thereafter, when several keys are pressed simultaneously, faint vertical bars appear on the screen, similar to the 'venetian blind effect', which plagues all Spectrum owners and is a result of Uncommitted Logic Array (ULA) problems. The only remedy is to reset the computer.

I suspect that this new effect is due to a decoding problem in the ZX Interface 1 ULA, because the error does not occur without the Interface 1 unit attached.

Perhaps other readers have witnessed the effect and some may know the actual reason for it. In either case, I am sure further correspondence on this page would be most welcome and useful.

Alan Turnbull  
Cheshire

## Microdrive options

I would like to comment on two letters published in PCW, May 3.

Ian Ferguson wrote about using the Brother EP22 and *Tasword 2* as part of a word-processing package. These two form part of my package but it may be helpful to add, for those with Interface 1 and possibly Microdrive(s), that the EP22 works with no problems with the RS232 built into the Interface 1 — no additional interface is required.

Uncommonly, both Sinclair and Brother have complied with the standard, and so the Sinclair lead just plugs into the printer and you're off. The only mild irritant (and the

blame here lies at Sinclair's door) is that, apart from alphanumeric characters, Sinclair's character set does not comply with the ASCII standard whilst Brother's does.

Helpfully, Brother publishes in its character set in a table at the back of the manual, the Hex values of each character. Don't worry about Hex conversion; just look for the Hex equivalent in the Sinclair manual and type that character instead. This doesn't work for some characters, eg, the £-sign which happens to be graphics-M. *Tasword* uses graphics characters for printer controls, but for others there is no problem. Such differences are also catered for in copying routines using the "B" stream by adding conditionals in your basic program for commonly used non-standard characters.

On the question of paper, I have found that the best and most economical answer is Brother thermal paper bought on a roll. The ribbons are very costly and, with the roll, you use just the length of paper you require. I have also found that the type is bolder and it doesn't fade as the single sheets tend to.

The question of the word-processing package leads me on the David Lowe's letter. Lucky owners of Microdrives will find that with the package described above, text files are quickly saved and retrieved. A professional package indeed. *Tasman* software are one of the few far-sighted houses that assist their customers in using the hardware they have to its full (Campbell systems is another). This is because they not only encourage and facilitate the making of back-up copies of your valuable software, but also, by providing useful notes, allow you to use your Microdrives as you intend them to be used when you ordered them.

Of course software houses have the right to protect their interests as far as commercial piracy is concerned, but their customers also have rights. Having spent a fortune on software, probably more than on my hardware, I have the right to use that software as I deem best. I do not wish to make money by copying and selling pirated software; the law of the land should cater for that, but I

do want to load my software in seconds not fractions of an hour.

Software houses form themselves into groups to protect their interests. Come on users! We must protect our interests.

I would like to point out to David Lowe that, whilst much software is not immediately compatible, (and I support his plea for magazines to comment on compatibility), there is virtually no software that cannot be transferred — in spite of the efforts of software houses and the thoughtlessness of Sinclair.

Happy Microdriving.

John Ashplant  
30 Gresham Close  
Enfield  
Middx

Anyone who owns a ZX Microdrive will want to put their cassette software on to microdrive cartridge to speed up loading time. We would like to encourage software houses with cassette programs to include a microdrive option.

## Bundles of letters

Obviously, you have been kind enough to publish our ad: the postm... (oops! what a giveaway!) postperson has been frantically shovelling letters into the school letter-box for the past few days, which goes to show you do have readers aged 11-15.

Before I start answering them, I only wanted to thank you.

F J Baynard  
Section 'Patamatique  
College Pierre Dubois  
71 Rue Victor Boissel  
53017 Laval  
France



"The World Wildlife Fund couldn't help."

## More hints

I would like you to print this letter just to prove to me that you read all the letters sent in by readers. This is my third.

I have been buying PCW for over a year now and think it is great, especially the Adventure Corner. But, I would like to see a few more program hints and tips.

C Barnes  
19 Scafell Way  
Clifton Est  
Nottingham

Third time lucky.

## Back to front

Whilst finding the bulk of your magazine very enjoyable, I now find that the first section I turn to is the puzzle on the inside back cover. Could you please tell me if there is a book of similar problems available on the market?

PS If such a book is available, I will still buy your magazine — honest.

Dave Hopkins  
5 Wildbrook  
Port Talbot  
West Glamorgan

The book that seems ideally suited to your needs is *Brainteasers for Basic Computers* by Gordon Lee, who sets the puzzle at the back of PCW each week. The book costs £4.95 and is published by Shiva, 4 Church Lane, Nantwich, Cheshire.

## Desk query

As a part of my 'A' level design course I am designing a computer desk/work unit with the home user in mind. At the moment I am investigating what form one of these units should adopt, whether it be an expandable system or a solid single unit.

With the consumer in mind, I am writing to ask your readers 'what would you want from a computer desk.' As I will be designing, making and possibly selling the design of this desk, I would be very grateful for any ideas.

S Plenderleith  
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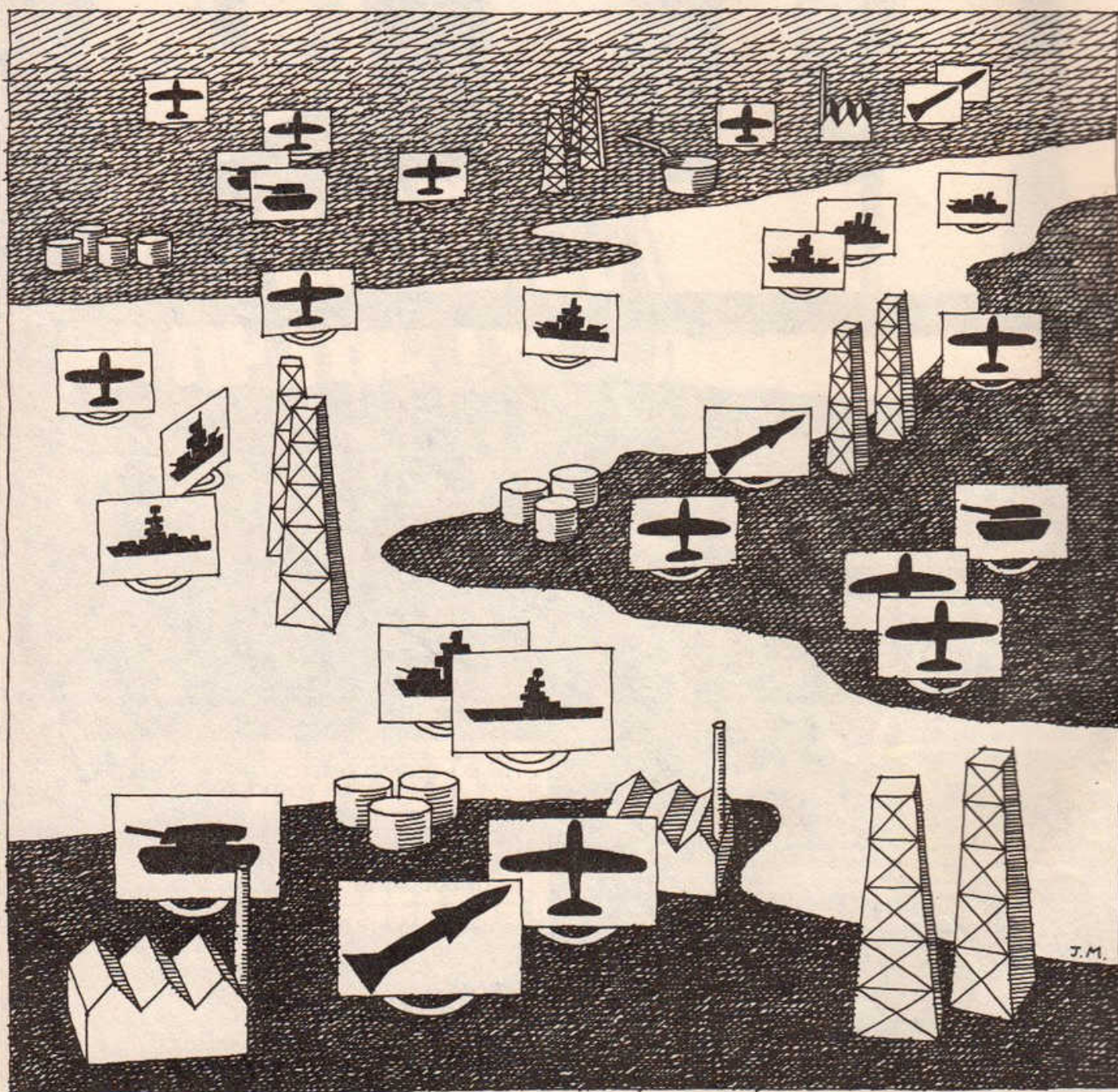
# Air Sea Battle

Stay alive for as long as possible with this strategy game for Spectrum 16/48K by Gary Burrows

**T**his is a strategy game for either model of the Spectrum. The idea is to stay alive for as many months as possible, while under constant attack by enemy forces out to destroy your people. As the leader you

must ensure that you have enough money to buy food and water as well as tanks, warships and jet fighters. You start with a given amount and can increase your money by building mineral sites and oil rigs

and then selling your minerals and oil. If you have no tanks etc, to defend yourself then the enemy will destroy your oil rigs and mineral sites. You can only have 4 tanks, oil rigs, trucks etc, at a time.



# Star Game

```

2 REM * BATTLE_ZONE *
3 REM * @ G.U. Burrows *
4 REM * 9/3/84 *
5 REM * 48k zx spectrum *
50 LET i$="If not then enter n
umber (0)": LET t$="The enemy re
treats."
52 DIM a$(9,14): FOR v=1 TO 9:
READ v$: LET a$(v)=v$: NEXT v
53 DIM b$(2,14): FOR v=1 TO 2:
READ v$: LET b$(v)=v$: NEXT v
54 DIM a(9): FOR v=1 TO 9: LET
a(v)=0: NEXT v: LET i=20
55 DIM b(2): FOR v=1 TO 2: LET
b(v)=0: NEXT v: LET i=20
60 BORDER 6: PAPER 7: CLS
70 INK 1: LET mon=0: LET po=50
: LET mo=500: LET at=0: LET a(1)
=400: LET a(2)=400: GO TO 80
72 CLS: LET mon=mon+1
73 IF a(6)>0 AND a(6)>0 THEN L
ET b(1)=b(1)+INT (RND*(a(6)+a(6)
)+1)
74 IF a(7)>0 AND a(9)>0 THEN L
ET b(2)=b(2)+INT (RND*(a(7)+a(9)
)+1)
75 FOR v=1 TO 2: LET a(v)=a(v)
-(INT (RND*25+1)): NEXT v
76 FOR v=1 TO 2: IF a(v)>100 T
HEN LET po=po+(INT (RND*10+1))
77 IF a(v)<=100 AND a(v)>=50 T
HEN LET po=po-INT (RND*5+1)
78 IF a(v)<50 THEN LET po=po-(
INT (RND*10+1)): NEXT v
79 LET i=i+4: LET i=i+2
80 IF a(1)<1 OR a(2)<1 OR po<1
THEN GO TO 350
81 PRINT AT 1,10:"BATTLE_ZONE"
82 PRINT INK 3;AT 3,6:(")Mont
hs",TAB 23;mon;AT 4,6:(")Attack
s",TAB 23;at;AT 5,6:(")Populati
on",TAB 23;po;AT 6,6:(")Money";
TAB 23;mo
84 FOR v=1 TO 9: PRINT TAB 6;"
(v);":a$(v);a(v): NEXT v
86 PRINT TAB 6; INK 2;"(m);b$
(1);b(1): PRINT TAB 6; INK 2;"(o
);b$(2);b(2)
88 PRINT: PRINT TAB 10;"PRESS
A KEY": FOR v=1 TO 19
90 INK 2: FLASH 1: PRINT AT v,
0:"":AT v,20:"":NEXT v:
FOR v=0 TO 31:
92 INK 3: PRINT AT 0,v:"":AT
20,v:"":AT 21,v:"":NEXT v
93 FLASH 0: INK 1
94 IF RND>.7 THEN GO TO 300
110 INPUT LINE v$: IF v$="m" OR
v$="c" THEN GO TO 250
114 IF v$="1" OR v$="2" OR v$="
3" OR v$="4" OR v$="5" OR v$="6"
OR v$="7" OR v$="8" OR v$="9" T
HEN LET v=VAL (v$): GO TO 117
116 GO TO 110
117 BEEP .25,14: BEEP .5,10
119 CLS: IF v<3 THEN GO TO 150
120 GO TO 200
150 PRINT: PRINT TAB 13;a$(v)
152 PRINT: PRINT TAB 6;"You ha
ve ";a(v);" units.": PRINT: PRI
NT TAB 10;"Money ";mo
154 LET r=INT (RND*2+1)
156 PRINT: PRINT TAB 7;"one un
it costs ";r
160 PRINT: PRINT "If you wish
to purchase more then enter t
he number of units you want."
162 PRINT i$
164 INPUT z: IF z>r OR z<0 T
HEN GO TO 164
166 LET a(v)=a(v)+z: LET mo=mo-
(z*r): PRINT: PRINT "Ok": PAUS
E 100: GO TO 72
200 PRINT: PRINT INK 2;TAB 9;a
$(v)
202 PRINT: PRINT TAB 9;"You ha
ve ";a(v): PRINT: PRINT TAB 9;"
Money ";mo
203 IF v>7 THEN LET r=INT (RND*
20+1): GO TO 206
204 LET r=INT (RND*20+1)
206 PRINT: PRINT TAB 5;"It cos
ts ";r;" to build": PRINT INK 3
;TAB 9;a$(v)
208 PRINT: PRINT "If you wish
to build more then enter the nu
mber you want.": PRINT i$
210 INPUT z: IF z>r OR a(v)+
z>4 OR z<0 THEN GO TO 210
214 LET a(v)=a(v)+z: LET mo=mo-
(z*r): PRINT: PRINT "Ok": PAUS
E 100: GO TO 72
250 BEEP .25,14: BEEP .5,10
251 CLS: IF v$="m" THEN LET v=
1: GO TO 254
252 LET v=2
254 PRINT: PRINT TAB 10;b$(v)

```

```

256 PRINT: PRINT TAB 6;"You ha
ve ";b(v);" units.": PRINT: PRI
NT TAB 9;"Money ";mo
258 LET r=INT (RND*5+1)
260 PRINT: PRINT TAB 6;"value
per unit ";r
262 PRINT: PRINT "You can sell
the ";b$(v): PRINT "that you ha
ve collected at the above rate."
264 PRINT "If you wish to sell
then enter the number of units."
: PRINT i$
266 INPUT z: IF z>b(v) OR z<0 T
HEN GO TO 266
270 LET b(v)=b(v)-z: LET mo=mo+
(z*r): PRINT: PRINT "Ok": PAUS
E 100: GO TO 72
300 FLASH 1: INK 2: PRINT AT 2,
25;"": FOR c=1 TO 400: NEXT c:
INK 1: FLASH 0: CLS
301 LET c=INT (RND*3+1)
302 PRINT: PRINT "You are und
er attack by ";c: LET v=INT (RND
*3+3): PRINT "enemy "; INK 3;a$
(v)
303 PRINT: PRINT AT 4,1;"You h
ave ";a(v); INK 2;" ";a$(v)
306 PRINT AT 6,1;"Enter the num
ber you wish to use to stop t
hem."
308 IF a(v)=0 THEN PRINT: PRIN
T INK 2;" YOU HAVE NO "; INK 3;a
$(v): GO TO 320
310 INPUT x: IF x>4 OR x>a(v) O
R x<1 THEN GO TO 310
311 INK 3: IF x>c AND AND>.2 TH
EN PRINT: PRINT "Ok / ": PAUS
E 100: PRINT i$: GO TO 316
312 IF x=c AND AND>.4 THEN PRIN
T: PRINT "Ok / ": PAUSE 100:
PRINT i$: GO TO 316
314 IF x<c AND AND>.7 THEN PRIN
T: PRINT "Ok / ": PAUSE 100:
PRINT i$: GO TO 316
316 PRINT: PRINT "Ok / ": PA
USE 100: PRINT "The attack conti
nues.": LET a(v)=a(v)-1: PAUSE 1
00: FOR r=1 TO 26
318 PRINT AT 9,r;" ": NEXT r: I
NK 1: GO TO 303
318 LET a(v)=a(v)-1: LET at=at+
1: PAUSE 100: INK 1: GO TO 72
320 INK 1
321 PRINT: PAUSE 200: PRINT "
The enemy has retreated but"
322 LET r=INT (RND*10+1):c: PRI
NT "r;" of the population hav
e": PRINT "been killed!": LET p
o=po-r: LET at=at+1
324 FOR d=3 TO 6 STEP 2: IF v=d
AND a(6)>0 THEN LET a(6)=a(6)-1
325 NEXT d
326 FOR d=3 TO 4: IF v=d AND a(
9)>0 THEN LET a(9)=a(9)-1
330 NEXT d: PAUSE 300: GO TO 72
350 CLS: INK 3
351 IF po<1 THEN PRINT AT 11,6;
"!POPULATION DEAD!!"
352 IF a(1)<1 THEN PRINT AT 11,
6;"!NO FOOD LEFT!!"
353 IF a(2)<1 THEN PRINT AT 11,
6;"!NO WATER LEFT!!"
354 PAUSE 200: CLS: PRINT: IN
K 4
355 PRINT "

```

# TE GAN AR OUE

```

356 PRINT: INK 2
357 PRINT "
FOR v=1 TO 16
358 BEEP .2,v: NEXT v
359 INK 1: PRINT: PRINT " YO
U LASTED FOR ";mon;" MONTHS."
360 PRINT: PRINT INK 3;TAB 6;"
ANOTHER_GAME.(Y/N)"
362 INPUT v$: IF v$<"n" AND v$
<"y" THEN GO TO 362
364 IF v$="n" THEN STOP
366 IF v$="y" THEN GO TO 64
900 DATA "Food","Water","Jet fi
ghters","Warships","Tanks","Truc
ks","Cargo ships","Mineral sites
","Oil rigs","Minerals","Oil"

```



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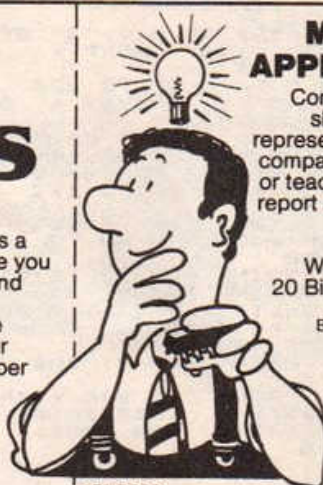
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## Special Feature

# A chip called Sam

*Ray Berry continues his look at the microprocessor*

The question that is most often asked is: 'If this microprocessor is so vital and so fantastic, what does it do?' The only answer that I can give to that question is 'nothing and everything'. On its own, a microprocessor can do nothing at all. It is a kind of extremely fast idiot. It requires instructions in the form of a program. When programmed, it can do almost anything.

First, you must remember that the microprocessor does not understand Basic. The only language that it can comprehend is a series of voltages, made up of a high voltage of about five volts, and a low voltage of about zero. As far as the microprocessor is concerned, these two voltages, High and Low, is all that it needs to be programmed, and thus perform its miracles.

These highs and lows have to go into the thing in a sensible order and this order is called machine code. This consists of instructions and information coded into what is called binary, which is made up of ones and zeros, or highs and lows if you prefer. Since these ones and zeros are not so easy for humans to deal with, we have another system called hexadecimal, which is useful because we can then use one hexadecimal number in place of four binary numbers. Don't forget that the microprocessor cannot understand hexadecimal, it is just a kind of human's shorthand and has to be converted to binary by a program called a monitor before the machine can understand a word.

When the manufacturer makes a microprocessor, they publish the commands or instructions set with the chip. These instructions is all that is needed to program it.

### Permanent memory

In your home computer, there is a machine code program written by the computer manufacturer which tells the microprocessor how to understand the Basic language. Also in this program is all the information that the microprocessor needs to do all the things that your computer can do.

This internal machine code program is so important — the computer wouldn't work without it — that the manufacturer puts it into unchangeable permanent memory called Rom. This means Read Only Memory, and is just that. The microprocessor can read it like a book, but it cannot be changed or erased. If the microprocessor is the heart of the computer, then this Rom is the brain.

When we decide that we want to program the computer, we write out instructions in Basic most of the time. Our instructions go into another kind of memory called Ram. This is Random Access Memory which

simply means that, like an exercise book, we can write in it and the computer can read what we have written. In Ram we can also erase the memory or change it if we wish.

So, how does the microprocessor understand our Basic program? Well, the Rom contains something called an interpreter. This acts in the same way as a translator would act if we wanted to talk to someone who couldn't understand English. It translates our program into the highs and lows that the microprocessor can understand.

### Highs and lows

Sooner or later, you will start wondering what the microprocessor does with all these highs and lows and to figure that out we have to look at what goes on inside the microprocessor's black box. Inside are a few other little boxes. Some of these are like memory locations and are called registers. There is another little box called the ALU or Arithmetic and Logic unit which has a register associated with it called the accumulator. Another of these registers is called the Program Counter. In addition, there is a register called the Stack Pointer and a register called the Flags register or Status register.

A register is rather like a memory location. It can contain either eight or perhaps sixteen binary digits, or high and lows. Without going into the intricacies of binary, suffice to say that if a register contains eight or sixteen ones and zeroes, then the microprocessor knows and understands that this is a command or a piece of information coded into a binary number that it must do something with. If the microprocessor is given a command in the form of a binary number, it will then fetch the piece of information it has been told to deal with either from memory or from another internal register and it will then act on that piece of information.

The things that a microprocessor can do with data are fairly limited. It can add to it or subtract from it. It can turn data around, change it about and transfer it from one part of memory to another.

Just to round off the insides of our microprocessor, I will mention that the manipulations are done inside the Arithmetic Logic Unit and are let out into the Accumulator when finished, the general purpose registers or locations are used mainly for storage, however temporary, and the program counter is a register which contains a number that is incremented or increased by one each time something happens. This tells the microprocessor where to look in memory for the next instruction.

Lastly, the Flag register is a place where the microprocessor looks to see if anything important has happened. Flags will tell the microprocessor if a number is zero or if there is a carry when two numbers have been added — in some processors the Flag register is where the break command is given to the microprocessor.

Coming out of the black box into the daylight again, we see that the microprocessor has lots of connections looking rather like legs. It is through these connections that the microprocessor can communicate with other chips. In fact, the eight bit processor uses 16 of these connections in order to access the memory. These 16 lines are called the address bus. When the processor puts a number on these lines then the memory location that corresponds to that number is activated. Whatever is in that location is then put onto another bus with eight lines called the data bus and sent back to the microprocessor.

The data bus can also carry a number from the processor to memory, so it is two way. The address bus is only one way.

There are control lines that come from the microprocessor that serve to control other parts of the computer and there is something called the clock. This is not something that you can tell the time by, but a circuit containing a quartz crystal that usually runs at 2Megahertz or two million times a second, providing pulses to the microprocessor by which it can synchronise its actions.

### A set of chips

Of course, it takes more than just a microprocessor to make a home computer. We have mentioned the memory, which consists of a set of chips rather smaller than the microprocessor. Other chips also have other important functions.

You may have something called a PIA or peripheral interface adaptor. This chip can deal with several functions such as interfacing or connecting the keyboard to the microprocessor or perhaps form part of a parallel printer output. There is a chip called the VDG or video display generator, which deals with the signals necessary to put your information to a monitor.

Another important chip is called SAM which is short for synchronous address multiplexer. SAM may help in the clock circuit and it may help to provide information for the video display. The most important job that SAM does, though, is to help the microprocessor select the correct Ram chip. The SAM chip is appearing in more and more computers these days and helps to cut out a lot of the circuitry that existed in older machines.

Well there we are. A journey that has taken us into the computer and looked at the microprocessor and, I hope, given you some idea of what goes on inside.

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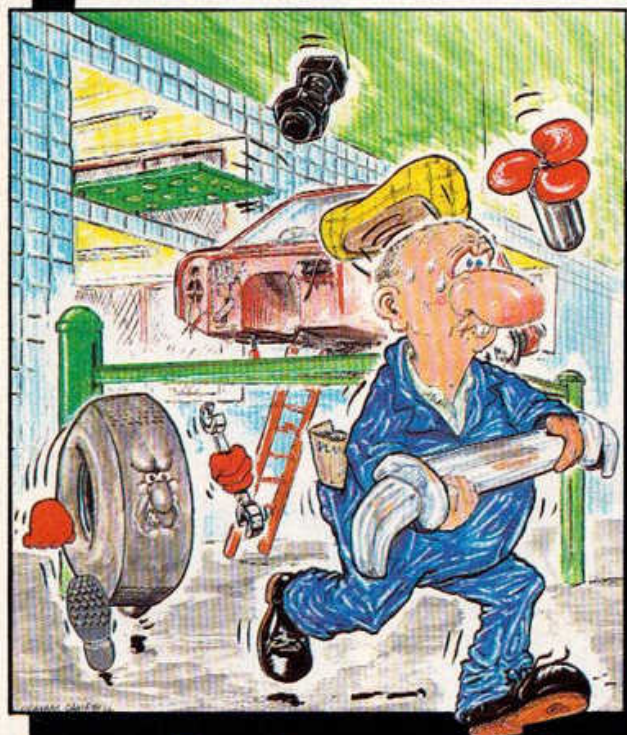
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## Airborne

**M**icro Power's *Bandits at 3 O'clock* is a very amusing game of aircraft dog fighting for one or two players. The program loads in two parts (first part instructions, second part game), and is heralded by an Electron version of "Those Magnificent Men in Their Flying Machines", which just about sums up the whole game!

You are then given several options. Apart from deciding if you are flying alone or against a partner, you can decide to fly at night (3 a.m.) or during the day (3 p.m.); you can have clouds or no clouds; flack (random throughout the game) or no flack; choose whether or not to have two cute airships, and finally whether you want their superb use of sound or not.

Having set up the scene for



the fight, you press the space bar and the warning signal sounds. Press the firing button and you and your opponent are off. First you are seen making a dash from the base building (fantastic use of little men graphics and the sound of pitter patter feet making the mad dash to the aircraft) then, as you make contact, the sound changes again, and last, before

the actual fight begins, the sound of your ascent into the clear skies above.

After that, almost anything can happen. To the continuous drone of the aircraft you manoeuvre your plane ready to fire at your opponent.

If that isn't enough the flack which is to be found in the sky, continually changes its position. Fly into it and good-bye to you.

I was immediately taken with this game but I must admit, taken more by the pure fun of it rather than as a game requiring great skill. I enjoyed the way it's been well thought out, its choice of options; the best use of the Electron's somewhat limited sound capabilities I've seen yet, and the general zaniness of the whole game.

**Fred Short**  
**Program Bandits at 3 O'clock**  
**Price £6.95** Micro Electron  
**Supplier:** Micro Power, 8/8a Regent Street, Chapel Allerton, Leeds.

## On board

**W**heeler Dealer is quite unusual among games for the Commodore 64 – it resembles a sort of board game testing your business skills and strategy, rather than a conventional computer game. Two to 16 players can take part – one person cannot play on their own. At the beginning, each player starts with the same amount of money, which they use to bid first of all for dealerships in car engines, gearboxes or tyres. Having obtained dealerships, players then take it in turns to negotiate and trade with the other players to buy and sell the car parts, the objective being to get sufficient stocks to build complete cars for sale.

The sale of cars happens at the end of each player's turn when he has to take a Town Card (just like a board game). This is randomly selected by the computer and tells the player the size of an order for cars. If he can fulfil the order from his stock he makes the sale, otherwise he loses it.

As you can appreciate from the above description, the game consists entirely of busi-

ness strategy played out between the participants.

A full set of rules which must be read fully before starting, is provided on a separate leaflet with the cassette. Little guidance is given in the program and more would sometimes have been appreciated.

Business games fans may well enjoy *Wheeler Dealer* with its reliance on business skills and negotiations, but they may eventually tire of it because the mechanics of the game are quite repetitive. It is definitely not a game for the arcade enthusiast.

**Richard Corfield**  
**Program Wheeler Dealer** Price £5.50 Micro Commodore 64  
**Supplier** Mr. Chip, 1, Neville Place, Llandudno, Gwynedd, Wales

## Black box

**F**or those who like a little intellectual challenge, relying on 'brain' rather than 'brawn' (ie. logic as opposed to blasting) how about trying to unravel the structure of the *Molecule*?

*Molecule* is a variation of the

'black-box' situation where the objective is to try and find out what is within the 'box' by probing it with some sort of ray or beam. The interior of the box normally contains a number of 'obstacles', which interact with the sensing-beam, by reflecting, deflecting or absorbing it, according to a fixed set of rules. By interpreting the paths of the beams correctly it is possible to infer the positions of the 'obstacles'.

In the case of *Molecule* the 'black-box' is a molecule of the antidote to a deadly virus. You have to find the positions of the atoms within the molecule.

In comparison with other versions of the game *Molecule* provides a very clear set of instructions and examples of how the beam interacts with the atoms. Unfortunately however, the need to constantly reposition the cursor from the foot of the screen is an annoyance, particularly if you decide to delete a marker which you have just positioned.

**Simon Wilson**  
**Program Molecule** Price £6.90 Micro BBC B Supplier Bridge Software, 36 Fernwood, Marple Bridge, Stockport, SK6 5BE.

## Sinking feeling

**A**pril 14th, 1912. On her maiden voyage, in mid Atlantic, the Titanic struck an iceberg. She sank within three hours taking with her a vast fortune in gold. Guess what? You have to recover the lost gold (after first finding the ship, of course).

In the first stage of *Titanic* you have to find a sponsor to finance the mission. A mysterious company called R and R Software tend to offer the best terms, since all that they ask for in return is that you agree to buy every game they release for the next ten years. Using the money that you have raised you must buy various supplies including a NASA aerial photograph of the area.

After smashing into several icebergs, you may be lucky enough to find the Titanic itself. You then have to locate and recover the gold as quickly as possible. This is done in the



form of an adventure game, with rooms, doors, passages and the occasional 'monster' to complete the picture.

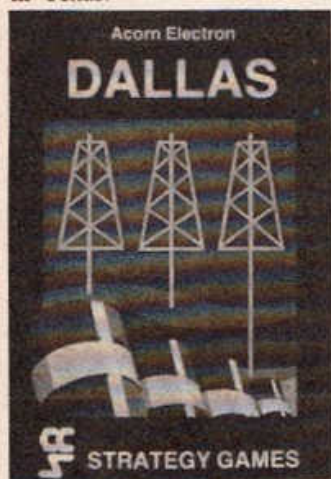
This game does seem to manage to combine elements of resources management and adventure games into one, which does make it quite interesting. However, it does seem to be almost entirely written in Basic, so don't expect any incredible effects.

**Simon Lane**  
**Program Titanic** Price £7.95 Micro Spectrum Supplier R & R Software, 5 Russell Street, Gloucester, GL1 1NE.

## Cut throat

It had to come, a computer version of the tv series everyone loves to hate. The Electron version of *Dallas* has all the wheeling and dealing of the tv programme, but that is where the similarity ends. Of the characters J.R. is still there, but in name only.

Never mind, this is your chance to experience, as nearly as you or I will probably get, the world of high finance, intrigue and cut throat deals that might actually go on out there in Texas.



The program is menu driven and your options are drilling wells, requesting finance, laying pipelines, gaining production facilities or more drilling rigs, and seismic surveying. You start with an outlay of \$100m and during the game will receive "telexes" from the computer which frequently spill out messages regarding the state of the industry, and of course, whether J.R. is making a bid for your company.

After some initial confusion, I got going. Then, with four wells sunk, limestone from two and a blow out from the third, the telex jumped into action with the news that J.R. had bought me out and required my immediate resignation.

In all, an intriguing computer version of a compulsive tv program, although I got a little bit confused by the map and its symbols, due to the small size of the map and the program's use of only blue and white. However, I'm not finished yet J.R. If I can raise some funds, you'd better watch out.

**Fred Short**  
**Program Dallas Price £6.95**  
**Micro Electron Supplier** Cases Computer Simulations Ltd, 14 Langton Way, London, SE3 7TL.

## Escape

*Colditz* is a classic text adventure game using split-screen graphics and scrolling text window technique. You are a prisoner of the Germans in Colditz castle and you are trying to escape through the network of tunnels, rooms and chambers.

As text adventure games go, this one is relatively easy to grasp, the tasks are not too complicated and the vocabulary is straightforward. It is speedy too, in that machine code subroutines are used to give fast responses to commands.

There are objects to be found throughout the game to aid your escape, although the use of these, along with all of your actions, must be cautious as the smallest slip may alert the guards. The computer will also respond with biting sarcasm should you goof — such as trying to walk through a doorway without opening the door first.



**Simon Lane**  
**Program Colditz Price £5.95**  
**Micro Spectrum Supplier** Phipps Associates, 172 Kingston Road, Ewell, Surrey, KT19 0SD.

## Labyrinth

*Psi-Spy* will have you delving into the bowels of the earth, to enter the Labyrinth and then gather gold in great quantities. A snag is that you must also collect the five 'Keys of Zar' in order to get out again.

*Psi-Spy* starts at the approaches where you have to collect rings (50 points per ring) until you are caught by one of the guards and put into the dungeon where you gain attributes proportional to your score.

In the dungeon you come up against many monsters which you can either fight or bargain with in order to get the food, weapons or gold they guard.

The graphics in both the approaches and the dungeon are a little plain and I found the instructions inadequate. However, on playing, the game

proved to be always interesting as there were many challenges to be undertaken and many surprise happenings. *Psi-Spy*



manages to combine elements of both arcade and adventure games producing an interesting hybrid.

**Simon Lane**  
**Program Psi-Spy Price £7.95**  
**Micro Spectrum Supplier** Postern, PO Box 2, Andoversford, Cheltenham, Gloucs.

## Graphic

The *Graphs* package of programs took me back to the hazy days of Maths A Level and hours of making grubby marks on fine green-lined graph paper.

It is a suite of five programs written by D. Williams, a Senior Lecturer in Maths, for use by students studying O and A Level GCE or any similar advanced Maths course.

Programs 1 and 2 are for curve plotting. The first program allows you to plot any curve in terms of  $X$  (including trigonometric functions and curves with asymptotes); the second allows you to plot any parametric curve in terms of  $t$  for  $X$  and  $Y$ .

The next three programs are in the form of multiple choice tests, presenting a graph and a choice of four possible equations — one of which represents the graph shown. The questions are chosen at random, but increase in difficulty as the test progresses. A score is kept — evidence of success or failure for you or some nosy teacher. These tests

cover, in turn, variations on sine, cosine and tangent curves, straight line graphs, and quadratic and cubic curves.

The first two programs have a 'quick plot' facility which automatically scales the graph. It is also possible to choose the range yourself or alter the range once it is plotted.

The instruction booklet is very easy to follow and even suggests some experiments to try — which I found very useful.

Maybe it's the Puritan in me but I'm troubled by this package. To understand the relationship between abstract equations and graphs it is necessary to laboriously work out a whole range of results and plot them by hand onto paper. This sort of tedious chore is ideal for computerisation — by niggling doubt is whether automating the process negates its educational value.

Sometimes the only way to learn is by sheer hard graphing.

**Jan Watterson**  
**Program Graphs Price £9.95**  
**Micro BBC/Electron Supplier:** Salamander, 17 Norfolk Rd, Brighton, Sussex.

## Line drawing

John de Rivaz shows how to add graphics to adventures written with *The Quill*

*The Quill* is a system for writing adventure games in machine code on the Sinclair Spectrum. It has been well described in reviews and advertisements in *Popular Computing Weekly* at the time of writing. However, it provides no means of drawing pictures, and adventure games without pictures are not well

received these days.

By printing lines of graphics, however, pictures can be built up. This program generates some additional graphics from which line drawings can be built on either commercial adventures or your own.

Check that the version of *The Quill* you have stores its special graphics at 26931,

and in the unlikely event it doesn't alter lines 920 and 940 appropriately. (See *The Quill* manual.)

Put an empty tape in the machine and run the program. When you get the "press any key" message, save the code generated by the program. Then load *The Quill* and load the code you have just saved on your tape using the "Load Database" function. You will now have the special graphics in your machine. They will save when you save an adventure or a database.

```
90 REM      14 January 1984
This program creates graphics
for adding pictures to adventure
games written with "The Quill".
```

```
91:
```

```
100 PRINT "Data for special gra
phics for  adventure games"
```

```
110 DATA 0,0,0,0,1,6,8,8
120 DATA 0,0,0,0,192,48,8,8
130 DATA 8,8,8,6,1,0,0,0
140 DATA 8,8,8,48,192,0,0,0
150 DATA 0,0,0,0,15,8,8,8
160 DATA 0,0,0,0,248,8,8,8
170 DATA 8,8,8,8,15,0,0,0
180 DATA 8,8,8,8,248,0,0,0
190 DATA 8,8,8,8,255,0,0,0
200 DATA 8,8,8,8,15,8,8,8
210 DATA 8,8,8,8,248,8,8,8
220 DATA 0,0,0,0,255,8,8,8
230 DATA 129,66,36,24,0,0,0,0
240 DATA 0,0,0,0,24,36,66,129
250 DATA 129,66,36,24,24,36,66,
129
260 DATA 1,2,4,8,16,32,64,128
270 DATA 128,64,32,16,8,4,2,1
```

```
380 DATA 8,8,8,8,255,8,8,8
390 DATA 8,8,8,8,8,8,8,8
400 DATA 0,0,0,0,255,0,0,0
410 DATA 85,170,85,170,85,170,8
5,170
890 DATA 256
900 FOR f=USR "a" TO USR "u"+7
: READ a: IF a=256 THEN GO TO 1
000
910 POKE f,a: NEXT f
919 RESTORE
920 FOR f=26931 TO 27098
930 READ a: POKE f,a: NEXT f
940 FOR f=1 TO 3: SAVE "G"CODE
26931,27098-26931: NEXT f
950 REM
```

The Porthtowan Combo Tape issue 3 contains 4 graphic adventure games using this system. Price £4 from:

RTL, Westowan, Porthtowan, Truro TR4 8AX, Cornwall, UK.

```
960:
1000 FOR f=144 TO 164: PRINT CH
R$ (f-79),CHR$ f: NEXT f
```



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*Joseph Burr and A Pudding show how to determine planetary movement in a perfect universe*

This program demonstrates the effects of planets on each other in a perfect two-dimensional universe. It uses the following equations of motion and gravity:

$$F = (G \cdot M \cdot m) / (D^2)$$

$$A = F / M$$

$$S = (U \cdot T) + (A \cdot T^2) / 2$$

F: Force between two bodies G: Gravitational constant  
M: Mass of body which is under consideration m: Mass of each other body considered in turn D: Distance separating the two bodies A: Acceleration of body under consideration S: Distance gone in one unit of time  
U: Initial velocity of body under consideration T: Initial velocity of body under consideration T: Length of one time unit.

When you Run the program, it asks for the number of objects that you intend to have. Next, you are asked for unit time. If you give this a very small value (say 0.01) the trace will be very accurate, but very slow. Larger values produce a far more immediate effect, but the errors are very much greater. The best method is to set up the program and leave it to run for some time.

It is best to select large values for G (universal constant of gravitation - its real value is about  $6.67E-11$  Newtons/square

metre). We suggest you start at a value of about 50 and work down from there.

The scaler allows you to make the screen any size you want: it normally covers an area of about two hundred and fifty by two hundred distance units (:256\*192 to be exact). The scaler can be used to multiply these distances by any value you want. If you do not want to use a scaler, put in a value of one when prompted.

For each object, the program asks you for five pieces of information: position, mass and velocity. Position and velocity are put in by co-ordinates. The program allows you to put in values that are off the screen (it does not show them unless they are on it).

The program resolves forces separately along X and Y axes. This is why the formulae appear twice.

```

10 REM 2D DETERMINATION OF PLANET
20 REM MOVEMENT IN A PERFECT
30 REM UNIVERSE...
40 REM BY J.BURR & A.PUDDING
50 REM GRAVITRON
60 INPUT "NUMBER OF OBJECTS "; D
70 DIM X(0,3): DIM Y(0,3): DIM M(0): DIM XN(0,3): DIM YN(0,3)
80 INPUT "UNIT TIME "; T: INPUT "G "; G: INPUT "SCALER "; S
90 FOR X=1 TO D: PRINT "OBJECT £"; X
100 INPUT "MASS "; M(X)
110 INPUT "X-POS"; X(X,1): INPUT "Y-POS"; Y(X,1): INPUT "X-VEL"; X(X,2):
INPUT "Y-VEL"; Y(X,2)
120 NEXT
130 PMODE 4,1: PCLS: SCREEN1,1
140 REM ***WORK OUT POSITIONS***
150 FOR A=1 TO D
160 FOR B=1 TO D
170 IF A=B THEN GOTO 280
180 X=X(X,1)-X(B,1): Y=Y(X,1)-Y(B,1): Z=(X*X)+(Y*Y)
190 IF X>0 THEN LET XM=-1: ELSE XM=1
200 IF Y>0 THEN LET YM=-1: ELSE YM=1
210 F=G*M(A)*M(B)/Z
220 FX=ABS(F*X/(X+Y)): FY=ABS(F*Y/(X+Y))
230 FX=FX*XM: FY=FY*YM
240 AX=FX/M(A): AY=FY/M(A)
250 DX=X(X,2)*T+AX*T*T/2: DY=Y(X,2)*T+AY*T*T/2
260 XN(X,1)=X(X,1)+DX: YN(X,1)=Y(X,1)+DY
270 XN(X,2)=X(X,2)+AX*T: YN(X,2)=Y(X,2)+AY*T
280 NEXT
290 NEXT
300 REM ***PLOT POSITIONS***
310 FOR A=1 TO D
320 IF X(X,1)<0 OR X(X,1)>256*S THEN 370
330 IF Y(X,1)<0 OR Y(X,1)>192*S THEN 370
340 IF XN(X,1)<0 OR XN(X,1)>256*S THEN 370
350 IF YN(X,1)<0 OR YN(X,1)>192*S THEN 370
360 LINE(X(X,1)/S,Y(X,1)/S)-(XN(X,1)/S,YN(X,1)/S),PSET
370 NEXT
380 REM ***RESET VALUES***
390 FOR A=1 TO D: FOR B=1 TO D
400 X(X,B)=XN(X,B): Y(X,B)=YN(X,B)
410 NEXT: NEXT
420 GOTO 140

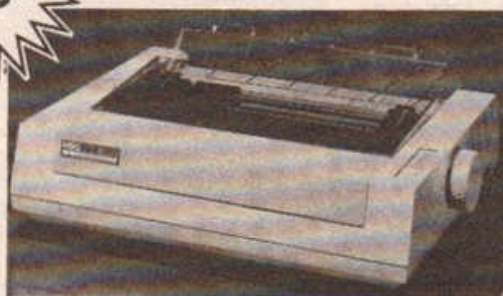
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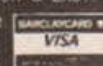
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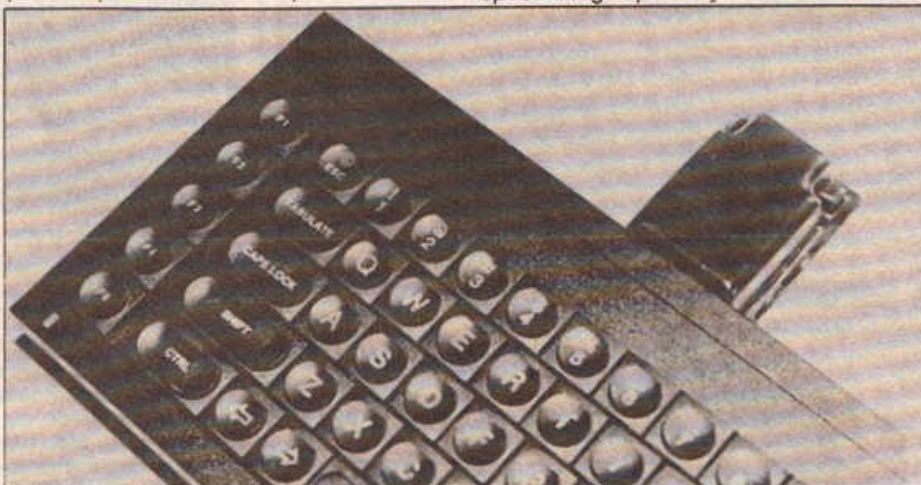
John Cochrane continues his look at the SuperBasic Rom

This week I'll continue the list of keywords available.

**LOAD** — Loads a program from microdrive.  
**LOCAL** — Specifies a set of variables to be used within a Define Procedure or Function which are separate from any globally based variables.  
**LOG10 (n)** — Log to base 10.  
**LRUN** — Load and run a program from Microdrive.  
**MERGE** — Merge a program from Microdrive.  
**MISTake** — Another intrigue with no answer from me.  
**MOD (n)** — Modulus?  
**MODE n** — Modulus?  
**MODE n** — Sets display mode to high or low resolution.  $n=256$  for low resolution,  $n=512$  for high resolution.  
**MOVE n** — Turtle graphics. Move forward  $n$  units.  
**MRUN** — Merge and run?  
**NET n** — Used to define source/destination when using Sinclair Net?  
**NEW** — Clears program from memory.  
**NEXT** — Used as loop end in a For construct, can be followed by additional statements and an End For for a more complex structure than is available with other Basics.  
**OPEN #n** — Attaches a device to Channel  $n$ .  
**OPEN\_IN** — To input data as a pseudo-random file from Microdrive.  
**OPEN\_NEW** — Sets up a pseudo-random (or possibly true-random?) file on a Microdrive cartridge for the first-time storage of data. Subsequent data saves use *Open*.  
**OVER n** — Not the same as Spectrum *over*.  
**PAN n** — Moves screen  $n$  pixels to the right.  
**PAPER n** — Sets background colour.  
**PAUSE n** — Waits  $n$  times twenty milliseconds.  
**PEEK n** — Value of byte at memory location  $n$ .  
**PEEK\_L n** — Ditto for long-word (4 bytes).  
**PEEK\_W n** — Ditto for word (2 bytes).  
**PENDOWN** — Turtle graphics. Commences drawing sequence as turtle moves.  
**PENUP** — Turtle graphics. Halts drawing sequence as turtle moves.  
**PI** — 3.142...  
**POINT x,y** — Plots a pixel at co-ordinates  $x,y$ .  
**POINT\_R** — A relative co-ordinate version of *Point*?  
**POKE n,m** — Sets byte at memory location  $n$  to  $m$ .  
**POKE\_L** — Ditto for long-word (4 bytes).  
**POKE\_W** — Ditto for word (2 bytes).  
**PRINT** — Send character data to screen or other specified channel.  
**RAD** — Degrees to radians conversion?  
**RAND** — Not implemented but exists as word in Rom.  
**RANDOMISE** — Sets seed for random number function.  
**READ** — Should read data from *Data* statements but instead gives "not implemented" message.  
**RECOL** — I don't know what this is but I see Andy Pennell said something about colour palettes.  
**REMAINDER** — Catch all at end of *Select* structure.  
**REMark** — Starts a comment line.  
**RENUM n,m** — Renumbers the program from the first line to start from  $n$  and increment in steps of  $m$ . Default 100,10.  
**REPeat** — Starts a general program loop, terminated by *End Repeat*, jumped out of by *Exit*.  
**RESTORE n** — Sets line for the reading of data from *Data* statements (See *Read*).  
**PETRY** — Don't know.  
**RETurn** — Jumps out of *Procedure* or *Function*.  
**RND (n,m)** — Gives random number (0-1) if no parameters or random integer between  $n$  and  $m$ .  
**RUN n** — Runs program from line  $n$ .  
**SAVE** — Save program to Microdrive.  
**SBYTES** — Save machine-code to Microdrive.  
**SCALE n** — Sets scaling factor for plot commands.  
**SCROLL n** — Moves contents of window up by  $n$  pixels. Can define whole or part of a window for scrolling.  
**SElect** — Structure for multiple-choice programming.  
**SIN(n)** — Trig.

**ASIN(a)** — Trig.  
**SQRT (n)** — Square root of  $n$ .  
**STEP** — Defines step interval in *For* range.  
**STOP** — Terminates program execution.  
**STRIP** — The provisional manual indicates that a stripe effect is available (fine matrix of contrasting colours) but I did not test this out.  
**TAN (a)** — Trig.  
**ATAN(n)** — Trig.  
**THEN** — Used with *If*. The provisional manual implied that this need not always be used but I never found an occasion when it was not required.  
**TURN a** — Turtle graphics. Turn clockwise through angle  $a$ .  
**TURNTO a** — Turtle graphics. Turn to absolute angle  $a$ .  
**UNDER n** — If set to one then display all printed text with underline until reset to 0.  
**VERS** — ?  
**WHEN** — Still to be implemented.  
**WIDTH** — ?  
**WINDOW** — Defines size and position of a screen-display window.  
**XOR** — Logical exclusive Or.

I am very glad to see *Renum* but would like to see it extended to allow blocks of program lines to be copied or moved from place to place as well. It is possible to use



*Diine* with *Renum* and Microdrive *Saves* to move blocks of program around but this is a little long-winded. The *Trace* command mentioned in the provisional manual has not been implemented (along with *Step*) which is a great pity, especially as the programs which I write tend to attract bugs like nobody's business. Turtle graphics are a bit of fun, it will be interesting to see if Sinclair provides the hardware add-ons to drive real turtles.

There are one or two bugs present in the machine, which unfortunately make it very difficult to do much more so far than play around with SuperBasic. For example, using the string-slicing features so beloved of previous Sinclair Basics can lead to program crashes, as can trying to enter a program of more than about 300 lines, as can trying to list a line of more than about 90 characters, as can letting the infuriating automatic-listing-on-line-edit run to the

end of a listing! The *Alt* key is supposed to switch between an insert and a replace mode dueing line editing but does not. There seems to be some obscure interaction between some operations which can cause problems, for example I had problems with *On n=Remainder* and *Print* when used together.

Without a reliable manual it is difficult to be sure that any problems that come up are not the misuse of perfectly good functions. Some things are obvious, others are not. Along with the keywords given above I also listed the error messages ("not implemented" is a bit of a give away) and a list of days of the week and months of the year. Typing *Print DAY\$(3)* gives a print-out of "wed". Typing *Print MONTH\$(4)* gives an immediate crash.

The QL is not a spectacularly fast machine, at least not as fast as I had been hoping. It compares favourably with the Apricot (as an example of a contemporary 16-bit microcomputer) when running calculations but the display is slow — very comparable to the Spectrum. This is no doubt partly due to the windowing and scaling facilities but is a bit of a let down. I am told that Sinclair Research are trying to speed things up but by how much I do not

know. Also, the Microdrives got slower and slower as the program size increased. They work through some form of buffer, which makes some operations very fast — much faster than floppy disc operations — but I suspect that the buffer size is not correctly set which leads to additional delays as either data is read into and out of memory or the buffer is expanded.

This brings me to a rather important observation. I was expecting so much from the QL that I was inevitably disappointed with the machine when I at last got my hands on one. This was not rational and it is only now that I have had time to sit back and think about it that I appreciate the value that is offered by the beast.

To pull my thoughts together. The lack of programming speed and the number of bugs still remaining is disappointing, but the facilities offered by the SuperBasic language are comprehensive.

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## Upper and lower

Roger Walton presents a full character set for use in Pmode 4

The Dragon 32 has no provision for printing text onto the high-resolution graphics screens. In addition, the text screen does not allow true lower-case characters to be printed. This is especially unfortunate in programs to be used by young children who find upper-case difficult to read.

Many programs use the excellent *Draw* command to overcome these difficulties, but this can be slow and tedious. The aim of the present program is to provide a full character set, written in machine code, which may be used in *Pmode 4*.

The idea for the program came from Peter Chase's article "A Question of character" which was published in an earlier edition of *PCW*. A number of changes have been made to the original program.

Listing 1 gives the full program, in Basic, including the machine-code routine, a character set, and an example of the use of the program.

Inspection of the character set data will show that a full range of characters from *Chr\$(32)* to *Chr\$(122)* have been defined. Each character is built up on a grid which is eight pixels wide and 12 pixels deep. This makes the lower-case characters particularly clear. Each number in this data represents one byte of screen memory. Conversion of each number to binary will reveal whether an individual pixel is on or off.

The program is easy to use. The print routine is called using the Basic *Usro* command together with *Varptr* (see line

1500). It is necessary to define the *Usro* address (see line 1330) before the routine is called. The screen is 32 characters across and 16 lines down and the actual printing positions should be *Poked* into addresses *&H7802* and *&H7803* before calling the routine (see line 1470).

The whole program may be saved using *Csave* or using *Csave* "Prognm", *&H7000*, *&H7857*, *&H858*.

With care, it would be possible to select only the data lines of the characters required in a particular program. If you do this, make sure that the data values are *Poked* into the correct addresses. (Remember that *Chr\$(0)* is from *&H7000* to *&H700B* etc). It would also be a simple matter to define other characters and save them as *Chr\$(128)* to *Chr\$(255)*.

Listing 2 gives the assembler code for the actual printing routine. This should make it easy for those readers with assemblers to see how the routine works.

```

10 *****LISTING 1*****
20 *****
30 *
40 * Character set for
50 * DRAGON PMODE 4
60 * Roger Walton Feb. 1984
70 *
80 *****
90 CLEAR 1000,&H6FFF
100 FOR I=&H7800 TO &H7856
110 READ N$:N$="&H"+N$
120 N=VAL(N$)
130 POKE I,N
140 T=T+N
150 NEXT I
160 IF T<>7246 THEN CLS:PRINT
    "DATA ERROR":STOP
170 *MACHINE-CODE DATA
180 DATA 20,02,12,12,1F,21,FC,78
190 DATA 02,C1,10,25,03,5A,20,F9
200 DATA 34,06,A6,80,81,0D,26,03
210 DATA 35,06,39,C6,0C,3D,C3,70
220 DATA 00,1F,02,35,06,BD,78,36
230 DATA 4C,81,20,25,E3,4F,5C,C1
240 DATA 10,25,DD,5A,20,DA,34,36
250 DATA BE,06,00,30,86,C1,00,27
260 DATA 07,30,89,01,80,5A,26,F9
270 DATA C6,0C,A6,A0,A7,84,30,88
280 DATA 20,5A,26,F6,35,36,39
290 *****
300 *POKE IN THE CHARACTER SET
310 *EACH CHARACTER IS REPRESENTED
    BY 12 UNITS OF DATA
320 FOR I=&H7180 TO &H75C3
330 READ N
340 POKE I,N
350 NEXT
360 *****DATA FOR LETTERS*****
370 *CHARS FROM 32 TO 122
380 *
390 DATA 0,0,0,0,0,0,0,0,0,0,0,0
400 DATA 8,8,8,8,8,8,0,0,0,0,0,0
410 DATA 40,40,40,0,0,0,0,0,0,0,0,0
420 DATA 0,20,62,20,62,20,0,0,0,0,0,0
430 DATA 16,56,68,56,68,56,16,16,0,0,0,0
440 DATA 0,34,36,8,16,36,68,0,0,0,0,0

```

```

450 DATA 0,24,36,24,38,36,26,0,0,0,0,0
460 DATA 0,48,16,16,0,0,0,0,0,0,0,0
470 DATA 16,32,64,64,64,32,16,0,0,0,0,0
480 DATA 8,4,2,2,2,4,8,0,0,0,0,0
490 DATA 8,42,28,8,28,42,8,0,0,0,0,0
500 DATA 0,8,8,62,8,8,0,0,0,0,0,0
510 DATA 0,0,0,0,8,8,16,0,0,0,0,0
520 DATA 0,0,0,62,0,0,0,0,0,0,0,0
530 DATA 0,0,0,0,0,24,24,0,0,0,0,0
540 DATA 0,2,4,8,16,32,64,0,0,0,0,0
550 DATA 28,34,38,42,50,34,28,0,0,0,0,0
560 DATA 8,24,8,8,8,8,28,0,0,0,0,0
570 DATA 56,68,4,24,32,64,124,0,0,0,0,0
580 DATA 28,34,2,12,2,34,28,0,0,0,0,0
590 DATA 4,12,20,36,62,4,4,0,0,0,0,0
600 DATA 62,32,60,2,2,34,28,0,0,0,0,0
610 DATA 14,16,32,60,34,34,28,0,0,0,0,0
620 DATA 62,2,4,8,16,32,32,0,0,0,0,0
630 DATA 28,34,34,28,34,34,28,0,0,0,0,0
640 DATA 28,34,34,20,2,4,56,0,0,0,0,0
650 DATA 0,0,8,0,0,8,0,0,0,0,0,0
660 DATA 0,0,8,0,8,8,16,0,0,0,0,0
670 DATA 2,4,8,16,8,4,2,0,0,0,0,0
680 DATA 0,0,62,0,62,0,0,0,0,0,0,0
690 DATA 32,16,8,4,8,16,32,0,0,0,0,0
700 DATA 28,34,4,8,8,0,8,0,0,0,0,0
710 DATA 0,60,66,90,38,38,26,0,0,0,0,0
720 DATA 28,34,34,62,34,34,34,0,0,0,0,0
730 DATA 60,34,34,60,34,34,60,0,0,0,0,0
740 DATA 28,34,32,32,32,34,28,0,0,0,0,0
750 DATA 112,72,68,68,68,72,112,0,0,0,0,0
760 DATA 124,64,64,120,64,64,124,0,0,0,0,0
770 DATA 124,64,64,120,64,64,64,0,0,0,0,0
780 DATA 30,32,32,32,38,34,30,0,0,0,0,0
790 DATA 34,34,34,62,34,34,34,0,0,0,0,0
800 DATA 28,8,8,8,8,8,28,0,0,0,0,0
810 DATA 2,2,2,2,2,34,28,0,0,0,0,0
820 DATA 34,36,40,48,40,36,34,0,0,0,0,0
830 DATA 32,32,32,32,32,32,60,0,0,0,0,0
840 DATA 34,54,42,42,34,34,34,0,0,0,0,0
850 DATA 34,34,50,42,38,34,34,0,0,0,0,0
860 DATA 28,34,34,34,34,34,28,0,0,0,0,0
870 DATA 60,34,34,60,32,32,32,0,0,0,0,0
880 DATA 28,34,34,34,42,36,26,0,0,0,0,0
890 DATA 60,34,34,60,40,36,34,0,0,0,0,0
900 DATA 28,34,32,28,2,34,28,0,0,0,0,0

```

```

910 DATA 62,8,8,8,8,8,8,0,0,0,0,0
920 DATA 34,34,34,34,34,34,28,0,0,0,0,0
930 DATA 34,34,34,20,20,8,8,0,0,0,0,0
940 DATA 34,34,34,42,42,54,34,0,0,0,0,0
950 DATA 34,34,20,8,20,34,34,0,0,0,0,0
960 DATA 34,34,20,8,8,8,8,0,0,0,0,0
970 DATA 62,2,4,8,16,32,62,0,0,0,0,0
980 DATA 126,96,96,96,96,96,126,0,0,0,0,0
990 DATA 0,64,32,16,8,4,2,0,0,0,0,0
1000 DATA 62,6,6,6,6,6,62,0,0,0,0,0
1010 DATA 8,28,42,8,8,8,8,0,0,0,0,0
1020 DATA 0,16,32,126,32,16,0,0,0,0,0,0
1030 DATA 16,16,16,16,68,56,16,0,0,0,0,0
1040 DATA 0,0,24,36,36,36,26,0,0,0,0,0
1050 DATA 32,32,56,36,36,36,56,0,0,0,0,0
1060 DATA 0,0,24,36,32,36,24,0,0,0,0,0
1070 DATA 4,4,28,36,36,36,28,0,0,0,0,0
1080 DATA 0,0,24,36,56,36,24,0,0,0,0,0
1090 DATA 24,36,32,56,32,32,32,0,0,0,0,0
1100 DATA 0,0,24,36,36,36,28,4,4,36,24,0
1110 DATA 32,32,56,36,36,36,56,0,0,0,0,0
1120 DATA 0,16,0,16,16,16,16,0,0,0,0,0
1130 DATA 0,4,0,4,4,4,4,4,4,36,24,0
1140 DATA 32,32,36,40,48,40,36,0,0,0,0,0
1150 DATA 32,32,32,32,32,32,32,0,0,0,0,0
1160 DATA 0,0,54,73,73,73,73,0,0,0,0,0
1170 DATA 0,0,24,36,36,36,36,0,0,0,0,0
1180 DATA 0,0,24,36,36,36,24,0,0,0,0,0
1190 DATA 0,0,24,36,36,36,56,32,32,32,32,0
1200 DATA 0,0,24,36,36,36,28,4,4,6,4,0
1210 DATA 0,0,24,36,32,32,32,0,0,0,0,0
1220 DATA 0,0,24,36,24,36,24,0,0,0,0,0
1230 DATA 32,32,56,32,32,36,24,0,0,0,0,0
1240 DATA 0,0,36,36,36,36,26,0,0,0,0,0
1250 DATA 0,0,36,36,36,36,24,0,0,0,0,0
1260 DATA 0,0,73,73,73,73,54,0,0,0,0,0
1270 DATA 0,0,36,36,24,36,36,0,0,0,0,0
1280 DATA 0,0,36,36,36,36,28,4,4,36,24,0
1290 DATA 0,0,60,4,8,16,60,0,0,0,0,0
1300 *****
1310 * DEMO ROUTINE
1320 PMODE 4:PCLS: SCREEN 1,0
1330 DEFUSRO=&H7800
1340 *X,Y POSITIONS FOR PRINTING
      (X:0T031,Y:0T015)
1350 X=4:Y=0
1360 PR$="The full character set."
1370 GOSUB 1460
1380 X=2:Y=2
1390 FOR I=32 TO 122
1400 PR$=CHR$(I)
1410 X=X+2
1420 IF X>=30 THEN X=2:Y=Y+2
1430 GOSUB 1460
1440 NEXT
1450 GOTO 1450
1460 *DISPLAY CHARACTERS
1470 POKE &H7802,X:POKE &H7803,Y
1480 *CHR$(13) USED TO INDICATE
      END OF STRING.
1490 P$=PR$+CHR$(13)
1500 N=USRO (VARPTR (P$))
1510 RETURN

```

```

7000 30 PRT #0C
7000 40 *****LISTING 2*****
7000 50 * PROGRAM BASED ON ORIGINAL *
7000 60 * BY PETER CHASE PUB. PCW *
7000 70 *****
7800 80 ORG $7800
7800 2002 90 BRA @IN
7000 100 @CHARSET EQU $7000
7802 110 @COORD RMB 2
7804 120 @IN EQU *
7804 1F21 130 TFR Y,X
7806 FC7802 140 LDD @COORD PRINTING
      POSITION
7809 C110 150 @CHECK CMPB #16 SCREEN 16
      LINES DOWN
780B 2503 160 BLD @RDCHAR
780D 5A 170 DECB
780E 20F9 180 BRA @CHECK
7810 3406 190 @RDCHAR PSHS D
7812 A680 200 LDA ,X+
7814 810D 210 CMPA #13 LOOK FOR CR.
      END OF STRING
7816 2603 220 BNE @GOON
7818 3506 230 PULS D
781A 39 240 RTS
781B C60C 250 @GOON LDB #12
781D 3D 260 MUL
781E C37000 270 ADDD #@CHARSET
7821 1F02 280 TFR D,Y
7823 3506 290 PULS D
7825 300 *INDEX FOR CHAR NOW IN Y
7825 BD7836 310 JSR @PRINC
7828 4C 320 INCA NEXT PRINT POSITION
7829 8120 330 CMPA #32 END OF LINE
782B 25E3 340 BLD @RDCHAR
782D 4F 350 CLRA BACK TO START OF LINE
782E 5C 360 INCB NEXT LINE DOWN
782F C110 370 CMPB #16
7831 25DD 380 BLD @RDCHAR
7833 5A 390 DECB
7834 20DA 400 BRA @RDCHAR
7836 3436 410 @PRINC PSHS D,X,Y
7838 8E0600 420 LDX #1536 HIRES SCREEN
      START
783B 3086 430 LEAX A,X
783D 440 *A-REG CONTAINS ACROSS PRINT
      POS.
783D C100 450 CMPB #0
783F 2707 460 BEQ @SHOW
7841 30890180 470 @ADDLINE LEAX 384,X
7845 5A 480 DECB
7846 490 *B-REG CONTAINS DOWN PRINT POS.
7846 26F9 500 BNE @ADDLINE
7848 C60C 510 @SHOW LDB #12
784A A6A0 520 @PRIN LDA ,Y+
784C A784 530 STA ,X
784E 308820 540 LEAX 32,X
7851 5A 550 DECB
7852 26F6 560 BNE @PRIN
7854 570 *EACH CHAR IS 12 LINES DOWN
7854 3536 580 PULS D,X,Y
7856 39 590 RTS
7857 600 END

```

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# Easy machine code

**Adrian Warman's program takes the aches and pains out of machine code programming**

As any machine code programmer can testify, one of the most tedious tasks in the process of creating a machine code program is the calculation of the numbers which are then *Poked* into memory to form the program. These numbers are typically stored in Data statements within a Basic loader program, within the main program itself. Given a machine code program in memory, the task of copying out all the codes and putting them onto the Data statements is slow, boring and error prone.

This simple Basic program, written for the standard Commodore 64, performs the entire task in a simple, painless fashion. An interesting aspect of the program is that it is 'self-modifying' — that is, the program you are left with after the Run is complete is not the program you started with. Such a feature is fairly common on low level machine-code programs, but not so common in medium level languages such as Basic.

In order to make the program as useful as possible, several parameters must be included before running the program. Let us assume: 1) The Data statements are to start with line number 5000. 2) The increment between each of the Data statements is to be 5. 3) The machine code data starts at location 828 (the beginning of the cassette buffer). 4) The machine code data has the last byte at location 90.

In order to operate, the program must have 8 consecutive bytes of memory. We will assume that these start from location 49152.

This information is set up in the program by altering lines 120 to 160, so that they would read as follows (assuming the above

examples hold true):

```
120 Lne = 5000
130 Inc = 5
140 Beg = 828
150 Fin = 900
160 Kee = 49152
```

Then, simply run the program. Various lines will begin to appear on the screen as the data statements are created, but the job is not completed until the screen clears and the message 'Job Done' appears. If you then list the program, you will find that some Data statements have appeared, with the requested data, and with the specified line numbers. These can now be used as desired — perhaps *Merged* into another program using one of the well-publicised routines. Note that the first item of the first Data statement is that of the beginning address, as chosen in line 140, but that the last number of the last Data statement is not necessarily that of the end location as given in line 150. This is because each line always has 16 numbers in it to keep it symmetrical. The last number of the location will appear within these 16 Data numbers.

The Commodore computers have a very useful 10 character key buffer. By putting some fake values into this buffer, we can 'fool' the computer into thinking that some keys were pressed, when in reality the keyboard was not touched!

Owing to the marvellous characteristics of the Commodore editing system, if <Return> is pressed while the cursor is on any screen line, and in direct, the characters of that line are read into an 80 character buffer, and treated as an instruction.

This program works by printing a fake Data line onto a known point on the screen,

followed by a *Goto* instruction. Then certain characters are placed in the keyboard buffer, and the program stopped. Once the program has stopped, the computer deals with these keyboard buffer characters, which enter the Data line as a Basic statement, and then perform the *Goto*, back into the program.

Note that because additions are being made to the program (even though under program control), this is treated as program modification, which causes erasure of variables.

Accordingly, variables must be stored in memory.

## Program notes

With the above points in mind, it should be possible to follow the program listing and understand what is happening.

120-160 The parameters for loading the data, as described above.

180-200 Print the start of the first fake line onto the screen. As each line is started, the screen is cleared, so the first line always starts on the first screen line. The line number is printed, and the Data statement.

210-240 Proceed to list out the next 16 bytes of data using a constant format of 3 spaces for the number, followed by a comma (except the last number of the line).

250 When the program restarts after accepting the fake data line, it must know where to go to. This line prints a suitable *Goto* instruction.

270-360 As pointed out above, all variables are lost when each line is entered. These lines store the variables for access later.

380-410 These lines tailor the keys in the keyboard buffer. Location 198 contains the number of keys in the buffer, in this case, set to three: Home and two Cr or <Return>s.

430 Halts the program. The computer then acts on the contents of the keyboard buffer. This causes entry of the fake Data line, then a restart by the *Goto* 450.

450-490 First thing to do when the program restarts is to reload the variables.

510-530 Update the variables. The next Data line number is calculated (line 510), and the next byte location found (line 520). Finally, a check is made to see if the job has been finished; if not, the whole process starts again.

550-590 Clear out the keyboard buffer, then clear the screen and print 'Job Done'.

```
100 REM DATA CREATOR.
110 :
120 LNE=10000
130 INC=10
140 BEG=49152
150 FIN=49162
160 KEE=700
170 :
180 PRINT CHR$(147);
190 PRINT MID$(STR$(LNE),2);
200 PRINT " DATA ";
210 FOR LOC=BEG TO BEG+14
220 PRINT RIGHT$(" "+STR$(PEEK(LOC)),3);",";
230 NEXT LOC
240 PRINT RIGHT$(" "+STR$(PEEK(BEG+15)),3)
250 PRINT "GOTO 450"
260 :
270 POKE KEEP,LNE-INT(LNE/256)*256
280 POKE KEEP+1,INT(LNE/256)
290 POKE KEEP+2,INC-INT(INC/256)*256
300 POKE KEEP+3,INT(INC/256)
310 POKE KEEP+4,BEG-INT(BEG/256)*256
320 POKE KEEP+5,INT(BEG/256)
330 POKE KEEP+6,FIN-INT(FIN/256)*256
340 POKE KEEP+7,INT(FIN/256)
350 POKE 251,KEE-INT(KEE/256)*256
360 POKE 252,INT(KEE/256)
370 :
380 POKE 198,3
390 POKE 631,19
400 POKE 632,13
410 POKE 633,13
420 :
430 STOP
440 :
450 KEE=PEEK(252)*256+PEEK(251)
460 LNE=PEEK(KEE+1)*256+PEEK(KEE)
470 INC=PEEK(KEE+3)*256+PEEK(KEE+2)
480 BEG=PEEK(KEE+5)*256+PEEK(KEE+4)
490 FIN=PEEK(KEE+7)*256+PEEK(KEE+6)
500 :
510 LNE=LNE+INC
520 BEG=BEG+16
530 IF BEG<=FIN THEN GOTO 1080
540 :
550 POKE 198,0
560 PRINT CHR$(147)
570 PRINT "JOB DONE."
580 :
590 : READY.
```



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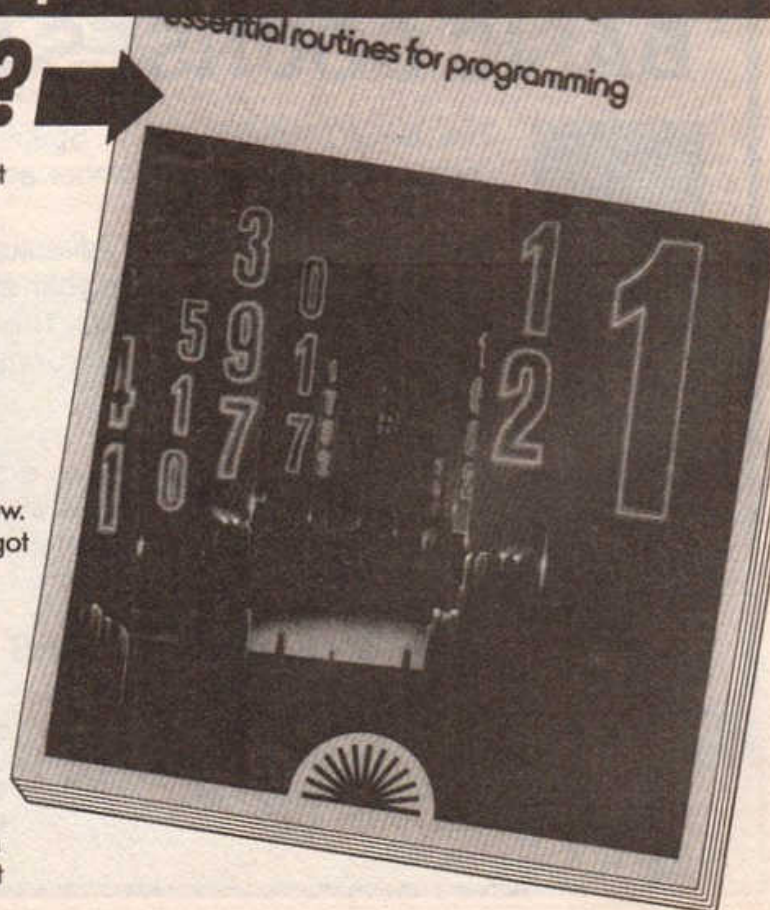
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### Program notes

1-3	Machine code screen mover
60-110	Initialise variables
120-350	Set hook position and draw screen
5000-5200	Set up user defined graphics
6000-6200	Print introduction to game
7000-7110	Play theme tune
8000-8340	Draw fisherman and sea
8360-8800	Move title then clear screen
9000-9100	Main playing loop
9080-9090	Check for hit or miss
9200-9250	Miss routine
9300-9370	Hit routine
9380-9450	If all fish caught go to next level
9500-9600	Hall of fame routine

```

1 REM GONE FISHING © R.WILTS
IRE
2 FOR f=1 TO 25: READ a: POKE
23759+f,a: NEXT f
3 DATA 6,128,17,0,72,213,225,
35,197,1,31,0,26,237,176,43,119,
0,35,35,19,193,16,240,201
10 GO SUB 5000
20 GO SUB 6000
30 GO SUB 8000
60 LET High=100045
70 LET N$="RON"
80 POKE 23658,8
100 LET Level=1: LET Score=1000
00
110 LET Lives=5: BORDER 5
120 LET l=17: LET c=17: LET v=3
: BORDER 5
130 PRINT INK 1;AT 10,0;"
GHIJ BCD
140 PRINT INK 2;AT 12,0;"
BCD GHIJ
150 PRINT INK 3;AT 14,0;" GHIJ
EF
160 PRINT INK 4;AT 16,0;" BCD
GHIHIJ
170 PRINT INK 5;AT 18,0;" GHI
J BCD
180 PRINT INK 6;AT 20,0;"
EF GHIJ
190 IF Level>1 THEN PRINT INK 6
;AT 11,0;" GHIJ GHIHI
IJ
200 IF Level>2 THEN PRINT INK 2
;AT 21,0;" GHIHIHIHI
HIHIJ
210 IF Level>3 THEN PRINT INK 1
;AT 15,0;" GHIHIHIHIHIHIJ
220 IF Level>4 THEN PRINT INK 5
;AT 13,0;"HIJ GHI
HIHIHIHI
230 IF Level>5 THEN PRINT INK 3
;AT 19,0;" GHIHIHIHIHIHIJ
240 IF Level>6 THEN PRINT INK 2
;AT 17,0;"GHIHIHIHIHIHIJ
250 GO SUB 300
260 GO TO 9000
300 PRINT #1; INK 7; PAPER 1;AT
0,0;" Score ";Score;"
Level ";Level
310 PRINT #1; INK 7; PAPER 1;AT
1,0;" High ";High;"
";Lives ";Lives
320 PRINT #1; INK 7; PAPER 1;AT
0,12;"0";AT 1,12;"0"
350 RETURN
5000 RESTORE 5100
5010 FOR c=1 TO 15: READ c$
5020 FOR r=0 TO 7: READ x
5030 POKE USR c$+r,x: NEXT r: NE
XT c
5100 DATA "A",128,129,66,60,129,
66,60,0
5105 DATA "B",3,31,59,127,255,3,
63,7
5110 DATA "C",248,254,255,255,25
5,255,255,254
5115 DATA "D",3,7,159,255,254,20
7,135,3

```

```

5120 DATA "E",0,31,63,95,255,7,6
3,15
5125 DATA "F",0,129,195,247,254,
231,195,129
5130 DATA "G",0,60,78,207,255,12
7,3,127
5135 DATA "H",3,15,63,255,255,25
2,240,192
5140 DATA "I",192,240,252,255,25
5,63,15,3
5145 DATA "J",3,12,60,248,240,24
0,224,192
5150 DATA "K",6,42,20,107,20,42,
8,0
5155 DATA "L",0,0,0,219,0,0,0,0
5160 DATA "M",1,2,0,8,16,0,64,12
8
5165 DATA "N",128,64,0,16,8,0,2,
1
5170 DATA "O",8,8,0,8,8,0,8,8
5200 RETURN
6000 PRINT INK 1; PAPER 6;AT 0,1
0;"GONE FISHING"
6010 PRINT AT 2,0;" In this gam
e you have to catch"fish BCD
EF using the latest "electroni
c fishing rod and hook"
6020 PRINT AT 6,2;"You can contr
ol the position"of the hook IK
J by use of the"following keys
6030 PRINT AT 11,6;"UP-----
"0";AT 13,6;"DOWN-----"A";
;AT 15,6;"LEFT-----"0";A
T 17,6;"RIGHT-----"P";
6040 PRINT #1;AT 0,0;"PRESS ANY
KEY TO CONTINUE": GO SUB 7000
6050 CLS
6060 PRINT INK 1; PAPER 6;AT 0,1
0;"GONE FISHING"
6070 PRINT AT 2,2;"You catch fis
h by a clean"strike on the nos
e of the fish"(a hit on the bo
dy will lose you"a life!)"
6080 PRINT AT 7,2;"If you hit an
electric eel"GHIHIJ GHIHIHI
HIHIHIJ GHIHIHIJ"on any part o
f it's body then"you will caus
e a short circuit"and loose an
other life!"
6090 PRINT AT 13,2;"When you hav
e caught all the"fish on the f
irst level, then"more eels app
ear and the rate of"scoring in
creases"
6100 PRINT AT 18,2;"There are se
ven levels in the"game and the
highest scorer is"shown in th
e hall of fame!"
6110 PRINT #1;AT 0,0;"PRESS ANY
KEY TO CONTINUE": GO SUB 7000
6120 CLS
6130 PRINT INK 1; PAPER 6;AT 0,1
0;"GONE FISHING"
6140 PRINT INK 6; PAPER 2;AT 11,
0;"
";AT 13,0;"
© RONALD WIL
TSHIRE 1984
6150 PRINT #1; FLASH 1; INK 7; P
APER 1;AT 0,0;" PLEASE WAIT WHI
LE I DRAW THE ";AT 1,0;"

```

# Open Forum

```

FISHERMAN FOR YOU!
6200 RETURN
7000 FOR g=1 TO 4e4
7010 RESTORE 7060
7020 FOR f=1 TO 42: READ a: READ
b: BEEP .3*a,b
7030 IF INKEY$="" THEN GO TO 705
0
7040 RETURN
7050 NEXT F
7060 DATA 1.5,8,1,8,2,5,1,1,1,3,
1.1,1,3,1,1,2,3
7070 DATA 1.5,8,1,8,2,5,1,1,1,3,
1.1,1,3,1,1,2,3
7080 DATA 1.5,1,3,1,1,1,1,1,1,1,
1.2,5,5
7090 DATA 1.5,1,3,1,1,1,1,1,1,1,
1.2,5,6
7100 DATA 1.8,1,8,2,5,1,8,2,5,1,
8.1,5,5,1,-4,1,-2,3,1
7110 NEXT g
8000 PLOT 219,163: DRAW 6,2,-0.8
: DRAW 5,-1,-0.3: DRAW 8,-3,-0.3
: DRAW 3,2,0.5
8010 DRAW -12,2,0.3: PLOT 222,16
5: DRAW 4,6,0.3: DRAW 4,0,-3.1:
DRAW 2,0,-3.1
8020 DRAW 4,-2,-3.1: DRAW 0,-4:
PLOT 238,160: DRAW -6,-14,-1.4:
DRAW -5,-1,-1.4
8030 DRAW -3,2,-1.4: DRAW -3,11,
-1.1: DRAW 1,6,-1.1: PLOT 227,16
3: DRAW 1,-3,4.2
8040 DRAW 0,3,3.9: PLOT 232,162:
DRAW 1,-3,4.3: DRAW 0,3,3.9: PL
OT 230,159: DRAW -3,-4
8050 DRAW 4,0: PLOT 233,152: DRA
W -8,0,-1.4: PLOT 239,160: DRAW
0,-4,-3.8: PLOT 221,158
8060 DRAW 0,3,-3.6: PLOT 223,147
: DRAW -5,-9: DRAW -8,-8,0.4: DR
AW 4,-3,0.4: DRAW 4,5
8070 DRAW 7,1,-1.3: DRAW 15,8,1.
9: DRAW -2,8,1.9: PLOT 233,145:
DRAW 0,-4,-1.1
8080 DRAW -10,2,-1.1: DRAW -2,0,
-1.1: PLOT 215,126: DRAW 4,-3: D
RAW 5,5,-0.4
8090 DRAW 5,-3,-0.4: DRAW 19,4,1
.1: DRAW -7,12,1.1: PLOT 219,122
: DRAW -3,-4,-0.8
8100 DRAW -13,2,-0.8: DRAW 3,3,-
1.2: DRAW 5,1,-1.2: DRAW 2,2,3.2
: PLOT 209,129
8110 DRAW -9,0,-0.5: DRAW 0,-3,4
.4: DRAW 4,-2,2.2: PLOT 221,143:
DRAW -7,4,2.2: DRAW 1,-5
8120 DRAW 4,0: PLOT 222,148: DRA
W -9,1: DRAW -6,-1,2.3
8130 PLOT 214,145: DRAW -90,16:
DRAW 89,-18: PLOT 206,143: DRAW
-5,1,-3.2: DRAW -31,6,-0.8
8140 DRAW -27,6,-0.6: DRAW -18,4
,-0.6
8150 PLOT 219,138: DRAW 5,-5: PL
OT 203,143: PLOT 226,161: PLOT 2
31,160
8160 PLOT 124,160: DRAW 0,-32
8300 PRINT AT 6,15;"K"
8310 PRINT AT 5,14;"N";AT 5,16;"
M";AT 6,14;"L";AT 6,16;"L";AT 7,
14;"MON"
8320 FOR w=6 TO 7: PRINT INK 0;A
T w,28;"":NEXT w
8340 FOR f=0 TO 31: PRINT INK 5;
AT 9,f;"A":NEXT f
8360 FOR F=1 TO 32: RANDOMIZE US
R 23760: BEEP .01,-6+F: NEXT F
8380 POKE 23776,32
8390 FOR F=1 TO 32: RANDOMIZE US
R 23760: BEEP .01,26+F: NEXT F
8400 PRINT AT 11,0;"
";AT 13,0;"
"
8500 POKE 23776,119
8600 RETURN
9000 FOR f=1 TO 4e4
9017 LET v=v+.05: IF v>40 THEN L
ET v=40
9025 PRINT AT l,c;" "
9030 RANDOMIZE USR 23760
9035 BEEP .005,v
9040 IF INKEY$="" THEN LET l=l-
1
9045 IF INKEY$="A" THEN LET l=l+
1

```

```

9050 IF INKEY$="O" THEN LET c=c-
1
9055 IF INKEY$="P" THEN LET c=c+
1
9060 IF l<10 THEN LET l=10
9062 IF l>20 THEN LET l=21
9064 IF c<0 THEN LET c=0
9066 IF c>27 THEN LET c=27
9070 PRINT AT l,c;"K"
9080 IF POINT (c*8+8,(21-l)*8+3)
=1 THEN GO TO 9250
9090 IF POINT (c*8-1,(21-l)*8+3)
=1 THEN GO TO 9200
9100 NEXT f
9200 FOR F=1 TO 100: OUT 254,255
: OUT 254,224: NEXT F
9210 FOR r=0 TO 5: PRINT AT r,0;
" ":NEXT r
9215 LET Lives=Lives-1: IF Lives
<1 THEN GO TO 9500
9220 GO TO 120
9250 IF POINT (c*8+8,(21-l)*8+4)
=1 OR POINT (c*8-1,(21-l)*8+4)=1
THEN GO TO 9200
9300 FOR B=0 TO 7: BORDER B: BEE
P .01,2*B: NEXT B
9310 FOR B=0 TO 7: BORDER B: BEE
P .01,16+2*B: NEXT B: BORDER 5
9315 FOR f=1 TO 20: BEEP .01,30:
NEXT f
9320 PRINT AT l,c+1;" "
9330 PRINT INK (l-10)/2+1;AT (l-
10)/2,0;"BCD"
9350 LET Score=Score+Level*(41-I
NT v)
9370 GO SUB 300
9380 IF ATTR (0,0)>56 AND ATTR (
1,0)>56 AND ATTR (2,0)>56 AND AT
TR (3,0)>56 AND ATTR (4,0)>56 AN
D ATTR (5,0)>56 THEN GO TO 9400
9390 GO TO 9000
9400 FOR f=1 TO 10: BEEP .015,20
: NEXT f
9410 FOR f=1 TO 13: BEEP .015,16
: NEXT f
9420 LET Level=Level+1
9430 FOR r=0 TO 5: PRINT AT r,0;
" ":NEXT r
9440 IF Level>7 THEN GO TO 9500
9450 GO TO 120
9500 FOR f=10 TO 21: PRINT AT f,
0;" "
" ":NEXT f
9510 PRINT FLASH 1; INK 2; PAPER
6;AT 10,11;"GAME OVER";AT 13,9;
"HIGHEST SCORE"
9515 PRINT AT 15,7;High;AT 15,7;
"0";AT 15,18;"by ";n$
9520 PRINT FLASH 1; INK 1; PAPER
6;AT 18,5;"YOU HAVE SCORED ";Sc
ore;AT 18,21;"0"
9525 IF Score<=High THEN GO TO 9
560
9530 PRINT FLASH 1; INK 6; PAPER
1;AT 20,7;"WHAT IS YOUR NAME?":
INPUT n$
9535 IF LEN n$>11 THEN LET n$=n$
(1 TO 11)
9540 PRINT AT 15,7;Score;AT 15,7
;"0";AT 15,21;"
";AT 1
5,21;n$;AT 16,5;"
";AT 20,7;"
"
9550 LET High=Score
9560 PRINT FLASH 1; INK 1; PAPER
6;AT 18,5;"YOU HAVE SCORED ";Sc
ore;AT 18,21;"0"
9565 PRINT #1; INK 7; PAPER 1;AT
0,0;"
";ANY TO AG
AIN;"";AT 1,0;"
" PRESS KEY
PLAY
9570 GO SUB 7000
9580 FOR f=10 TO 21: PRINT AT f,
0;" "
" ":NEXT f
9590 PRINT #1; INK 1;AT 0,0;"
"
9600 GO TO 100

```

Gone Fishing  
by R Wiltshire

# Open Forum

## Key Bleep

on Vic 20

This program should work on all Vic 20's,

expanded or not. What the program does, is to produce a beep every time a key is pressed. The program works by wedging a small machine code program at memory address 828 which checks to see if a key is pressed, if so this produces a beep. This

machine code program is automatically called 50 times every second by the computer's own interrupt routine. When the program has finished it then jumps to the computer's own interrupt routine in Rom.

```
Ø REM KEYBOARD BEEP BY S.BATTLE
1 S=828
2 READ A:IF A=999 THEN SYS 828:END
3 POKE S,A:S=S-1:GOTO 2
4 DATA 12Ø,169,73,141
5 DATA 2Ø,3,169,3
6 DATA 141,21,3,88
7 DATA 96,169,15,141
8 DATA 14,144,165,197
9 DATA 2Ø1,64,24Ø,8
1Ø DATA 169,19Ø,141,12
11 DATA 144,76,191,234
12 DATA 169,Ø,141,12
13 DATA 144,76,191,234,999
```

### BASIC LISTING

```
1 REM 32 Spaces
2 LET A$ = "Ø6A83E8ØD7D7D7D71ØFAC9"
3 FOR A = Ø TO 1Ø
4 POKE 16514+A , 16*CODE A$ (A*2+1)
  + CODE A$ (A*2+2) - 476
5 NEXT A
```

### M/C LISTING

16514	Ø6 A8	.START	LD B,A8H
16516	3E 8Ø		LD A,8ØH
16518	D7	.CONT	RST 1ØH
16519	D7		RST 1ØH
1652Ø	D7		RST 1ØH
16521	D7		RST 1ØH
16522	1Ø FA	.LOOP	DJNZ .CONT
16524	C9		RET

Key Bleep  
by S Battle

## Microradio

GW6JJN



### Morse signals

**G**ood news for all you ZX81 owners out there who would like to receive morse code on an unexpanded — yes, 1K — machine. All that is needed is the computer, a radio receiver capable of receiving morse and a new program from Pinehurst Data called *Morse Code Reader*. Since I am no morse code expert I gave the program to a friend who is one of the best morse men I know, Mike Martin G4VRQ. Here is what Mike had to say:

"The program loaded cor-

rectly first time when the copyright notice appeared on the screen. A screened audio lead was connected between the radio receiver and ZX81, ie, from the external speaker socket on the radio to the ear socket of the computer.

"It was found that the best kind of signal for the program was a morse signal of tone and clarity similar to that of the Greenwich time signal. Weak signals were not decoded very well and, as the program notes suggest, two diodes were connected in series with the audio lead. Once a good signal was found, the program worked very well. In fact, over a weekend, several contacts were successfully decoded on the two-metre band.

"The screen display was pleasing and easy to read with a blank line inserted between each line of text making it easy for the operator. The program responded to quite large varia-

tions in the speed of the received morse code, this being controlled by the Fast and Slow keys on the ZX81 keyboard. After trials on the relatively quiet two metre band, the computer was connected to a short wave receiver (a Trio with a dipole aerial) and morse code signals were monitored on various short wave amateur bands. The problem with the short wave amateur bands is that they are very crowded and more than one signal can be heard on any given frequency. Even with extensive filtering, the program did not do too well under these conditions.

"Given a good clear signal, and there are plenty available on the commercial and weather station areas of the short wave bands, the program does very well indeed. As the morse is received it is translated to ordinary alphanumeric characters on the screen. This, of course, applies to any lan-

guage so don't be too surprised if you are confronted with French or German".

Pinehurst must be congratulated on their achievement, fitting a morse decoder into 1K. Brian Bailly, the programmer, tells me he is working on a RTTY version which I suspect might take a little more memory. The tape costs £7.00 and is available from Pinehurst Data Studios, 69 Pinehurst Park, West Moors, Wimbourne, Dorset BH22 0BP. So if you are wondering what to do with your ZX81, plug it into a radio receiver and the world is yours. Thanks to Mike for conducting the test.

Ray Berry GW6JJN

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.

# Open Forum

## Poly Tunnels

on Memotech

This is a small program to demonstrate the Logo type graphics on the MTX ma-

chines by drawing n-sided polygons, producing a tunnel of the shape as it does so.

### Program Notes

10	Calls and clears a graphics screen.	40
20	Asks for the number of sides.	50-60
30	Works out the angle between each side.	70-100
		110
		1000-1010

Sets the A angle preset to 0 degrees. Works out the maximum side length. Sets up the loops and draws one shape. Recalculates side length and shape position. Waits for key press before re-running.

```
10 VS 4: PAPER 15: INK 1: CLS
20 INPUT "NO. OF SIDES ? ";X
30 LET A=((2*X-4)*90)/X: LET A=180-A: LET A=2*PI*(A/360)
40 ANGLE 0
50 LET SL=200
60 IF (X*SL)/PI>191 THEN LET SL=SL-1: GOTO 60
70 PLOT 128-(SL/2),0
99 FOR Y=1 TO 10
100 FOR N=1 TO X: DRAW SL: PHI A: NEXT
110 LET D=(SL*X)/PI: LET SL=SL-(SL/5): PLOT 128-(SL/2),95-((D-(D/5))/2): NEXT Y
1000 IF INKEY$="" THEN GOTO 1000
1010 RUN
```

Poly Tunnels  
by P Clark

## Arcade Avenue

### A blockbuster

It is ironic that with its image as a machine for serious programmers and all its associations with education, some of the very best copies of arcade games are on the BBC B computer. First of all there were the excellent versions of many familiar games that were released fairly quickly by Acornsoft itself, but recently it has turned its hand to more original games and the banner has passed to independent companies such as Aardvark who have produced in *Zalaga* the best 'unoriginal' game I have seen in many a month.

Called *Galaga* in the arcades this game is a fine derivative of the Galaxian theme and Aardvark's version is as good as could ever be expected in the home. The only machine that has game copies equalling the quality of the BBC is, not surprisingly, the Atari micros, although with the determined effort of Atari-

soft to capture the market for home versions of their games we may see some interesting new developments on other machines. Unfortunately, the frighteningly high price of Atari software may mean that such games go unheralded by all but the most dedicated games player.

If you are looking for arcade copies it is interesting to speculate why the Commodore 64 appears to be lacking in good quality versions of some shoot-em-ups, despite the high standard of much of the original software. The answer, I feel, must lie in the fact that the machine, despite having many excellent features, has neither the graphics ability or more importantly the speed of the BBC. The really breathtaking programs for the Commodore 64, and indeed the Spectrum, are those that are written to fully exploit the qualities of the machines and avoid their deficiencies such as *Revenge of the Mutant Camels* or *Manic Miner*. Conversely, these huge

and complex multi-level games may never be seen on the memory limited BBC, or indeed, in view of the time required to play them, in the arcades, although *Dragons Lair* may yet prove me wrong in that respect.

A recent development and one that will be welcomed by the buyer as well as being good for the sales figures is the simultaneous release of the same game for several different micros, often produced from one master programme written on a mini or main-frame computer. We may possibly see the end of the tedious six month wait for a successful program to make the transition from one machine to another, usually becoming outdated in the process. However, I am inclined to wonder how much the restraints of the hardware will limit this trend. It would be a shame to see the various faults of the BBC, Commodore, Spectrum, Oric and the like compounded to produce games that will fit them all with

minimal adjustment.

All machines need their blockbuster games that show off their best features and it is unreasonable to expect these to travel well. No doubt this is why Jeff Minter's zappy Vic 20 games have received such a tepid response once translated to the nearly soundless Spectrum. This may perhaps be a failing of the MSX standard computers — despite all the wonderful extra features by any one manufacturer to make a machine stand out, the shared software will have no room for excellence — it can only be as good as the basic standard will allow.

Tony Kendle

The Arcade Corner is a new section for anyone who enjoys playing arcade games. If you have any comments, from playing tips on difficult games or programs you'd particularly like to praise (or blame!) then write to: Tony Kendle, Arcade Avenue, Popular Computing Weekly, 12-13 Little Newport Street, London WC2R 3LD.

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# Tony Bridge's Adventure Corner



## Victoriana

Whenever a Vic 20 owner writes to me, it is almost always on one of two subjects (sometimes both at once!) — one, why do I not mention the Vic 20 and two, for Help in a Scott Adams adventure. One or two of you, however, have sent in your thoughts on other Vic adventures. Marilyn Boyce of Douglas, Isle of Man, writes:

"Why haven't you reviewed any Vic20 adventures lately? [See what I mean? — TB] There are quite a few about. What do you do all week? Terminal has a series of adventures which must have something for everyone.

"Curse of the Werewolf is the worst of the lot. Objects are randomly distributed throughout the locations for every game. Consequently, it is possible to play for hours before the staff needed to kill the zombie to get into the castle is found. If the werewolf happens to be outside the castle door, it is possible to kill him without even going inside.

"Then you must rescue the girl — I didn't bother! I was already fed up. A few primitive sounds slow down the response time. Death comes without warning, and there is no Save Game facility. I didn't like it at all.

"Magic Mirror on the other hand is very enjoyable. There are lots of locations including a pink palace, a large subterranean cavern and a garden. I always feel I've had value for money if there are plenty of locations to explore. The adventure itself is easy enough for beginners, with enough problems to keep the experienced adventurer interested.

"Rescue from Castle Dread needs 16K expansion and makes very good use of the extra memory. It's an excellent adventure set first in an enchanted forest — you must avoid rats and find your way through flooded tunnels to kill a dragon. Then fly a balloon to Castle Dread where you must rescue the princess from a demon (rescuing a prince would make a nice change, or better still, rescuing a demon from a prince!). I must admit to not finishing this adventure. I think there is a bug in the program (isn't that what everybody says when they're stuck?) [Yes, I have heard that before — TB].

"I received Quest of Merravid (Martech Games) for Christmas and what a disappointment! Advertised as an adventurer's adventure I had expected to be engrossed by it for weeks — instead it didn't even outlast the turkey! There were some nice humorous touches which I liked, but that didn't make up for it being too easy."

Graham Shaw, in his letter last week, mentioned Mr Valentine's list, and while we're on the subject of Vic20 adventures, Mr Valentine has written an up-date to his previous list: "First, though, I have a hint

for all those playing *Crush*, *Crumble* & *Chomp* a good combination which I have found is Mechismo-Combat-Washington which scored 2318 points. Perhaps other readers have found better combinations?

"Anyway, on with what you prefer, TB. *Golden Apples of Zeus* by Romik — this describes itself as "A Text Adventure for the Beginner", and you couldn't be far wrong. For those of you who are interested, there are 5 (yes, five) locations, and the whole adventure can be done in seven (yes, 7) moves. It also takes about 15 minutes to load. The idea is that you have to get some apples off a tree, without dying. Other things you might find are men sowing salt, herbs, a stick, a rock and Cerberus (the three-headed dog). Using a bit of ingenuity and a bit of junior-school Bible knowledge, this should be no test for the average adventurer.

"Rescue from Castle Dread [See also Marilyn Boyce's Letter — TB]. This is more like it! A good adventure for the experienced adventurer. Put it this way, I couldn't get do it. Having reached a nasty-looking warrior, I couldn't get past him (got any ideas TB? [How about some hints, Marilyn?]). Up to there, however, I found the adventure very interesting with plenty of locations and, of course, a ring. Otherwise, you can meet witches, trolls, dwarves and giant rats, which all sounds rather fun (and is!). Well worth buying this one — very challenging.

"Finally, *Four Gates to Freedom* (Phoenix). This is an innovative idea which includes an arcade game as well as the adventure. Unfortunately, you have to finish the game first (which I can't do!). It may be worth a look at, and I might be able to say more about it if TB knows the code. [Unfortunately, I don't know this one, can anyone help? I don't actually like this idea, unusual though it is — it penalises those of us who aren't so quick on the trigger. I have to say, though, that the arcade games in this program and Joker's Wild from the same company are excellent. In case you are stuck in Joker's Wild I can help you crack the code — just think of the suits of the cards!].

"Finally, a plea for help. How do you finish *Voodoo Castle*?"

Following the instructions in the book is essential, but also make sure that you have the doll with you, and that both you and the Count are wearing the lucky charms.

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

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# Peek & Poke



## KEY FAILURE

*Keir Thorpe, 96 Woodlands Avenue, West Byfleet, Weybridge, Surrey, writes:*

**Q** Next month I will have had my Spectrum for two years. Recently ink on many of the keys has been fading and the 9, 0 and L keys have stopped working. Having removed the loose metal top-casing, I discovered that the dots of white wire on the membrane are no longer over each other.

I have heard of a company that supplies new mats and membranes. Please could you supply their address and an idea of their prices?

**A** This 'creeping paralysis' of the keyboard is unfortunately not a new phenomena to the Spectrum. My first machine expired this way — fortunately under guarantee.

TV Services of Cheston Mill, Frenches Road, Cambridge, offer a fixed price service to repair your Spectrum. It will probably cost you about £19 to have your machine fixed.

## THIS YEAR'S MODEL

*Lap Ki Kan, 176 Wandsworth Road, London, writes:*

**Q** I am thinking of getting a CBM 64, but I was told by a friend that there were three models. Could you tell me which one is the best?

**A** The Commodore 64 is likely to have undergone a number of modifications since its initial launch. If you

buy a machine from one of the large retail outlets, such as Boots, you can be virtually certain to get an up to the minute machine. In any case, any differences between the "models" is likely to be very small.

## RADIO INTERFERENCE

*Robin Grimmer, 48 York Road, New Barnet, Herts, writes:*

**Q** My father owns an Osborne I connected to an Epson MX80 printer, which are both earthed. The Osborne interferes strongly with VHF radio — and the printer, though not so strongly. I am sure that it is not mains interference as I can pick it up on a battery radio. Therefore, we require some sort of screening.

Do you know of a firm which could do this? It must be cheap and quick as my father uses the machines every day for work. Alternatively, can you recommend any real metallic paint that we could use ourselves for screening?

**A** I would not suggest that you do the screening job yourself, unless you know what you are doing. I would suggest that you contact North Amber at Canberry House, Tolworth Close, Tolworth, Surrey. They specialise in the maintenance of Osborne and Epson equipment.

## CALL CHARGE

*B. Allen, Perth, Scotland, writes:*

**Q** I was very interested to see the article on the Prism VTX 5000, so I have sent off for details. Could you tell me if the device runs up the phone bill as a normal call would? Is the device good value? Do you need an interface?

Also, how exactly do you translate machine code into Basic and vice versa?

**A** Glad to see that you are taking the sensible step of getting further information before you part with your cash. Now down to business, the answers to your questions

are — Yes. Yes. No. And finally — with difficulty.

To summarise, converting from machine code to Basic is not really very practical and to go from Basic to machine code is best done by a compiler.

## PACMAN CONFUSED

*William Bennetts, Springfield Villa, Upton Cheyney, Bitton, Bristol, writes:*

**Q** I was disappointed when, having switched from a Spectrum to a BBC, I could not find an equivalent to the Spectrum's Screens and Attr. What can I do? Is there any memory location I could read so that my pacman can distinguish between eating walls and dots?

**A** Without delving deep into *Oswrch* and *Osword* calls the answer is no, not really. One possible way out for you would be to use the *Point* statement. This enables you to check the colour of the screen at the specified point. This statement does not work in the same way on the Spectrum, so that may be why you have not tried it yourself.

## POKES FOR THE VIC

*Tom Aiken, 29 Lonsdale Road, Bournemouth, Dorset, writes:*

**Q** In an article on the CBM64 a few weeks ago you published the *Pokes* to stop a program from listing, and to disable the Run Stop button. Although the *Poke* for stopping listing works on the Vic the Run Stop one does not. What is the *Poke* for this in the VIC?

**A** To disable Run Stop you need to *Poke* 37150 with 2. To disable Run Stop/Restore you need to *POKE* 808 with 100.

If you wish to stop your

program being *Saved* then *Poke* 802 with 0 and *Poke* 803 with 0.

## NOT RUNNING

*P. J. Shaw, 305 Basingstoke Road, Reading, writes:*

**Q** I have an Issue 1 Spectrum with Interface 1 and microdrives. I am experiencing problems with a number of published programs, which, when run, lock up the computer. I do not use any program which has the machine code *Poked* into Rem statements.

Is it the combination of the Issue 1 Spectrum and microdrives that is the problem?

**A** You have probably hit the nail on the head. It is quite likely that the m/c programs use the memory locations used by the microdrives. This will cause the programs to lock up the computer. If you want to run these programs then you will have to relocate the code further up the Ram.

## TAPE LOADING ERROR

*Gethin Thomas of Oswestry, Shropshire, writes,*

**Q** I have a loading problem with my 48K Spectrum. When I *Save* programs I have written and try to reload them, a message appears on the screen 'R tape loading error'. The programs were free of mistakes when loaded, so where did the mistakes come from?

**A** It's difficult to be sure of your problem, but I can offer some general advice. Firstly, have you tried Verifying your programs? This should tell you whether they have been saved correctly — always use it on even the shortest saved program.

Either the tape recorder is unreliable, or you are changing the volume setting — use 3/4 volume and full treble.

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

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**SINCLAIR 48K SPECTRUM** with printer, 5 rolls of paper, Kempston joystick interface, Quickshot joystick, cassette player and s/w all 2 months old. All boxed. £250. Tel: Romford 69186, 3-7pm.

**ORIC I 16K** cassette recorder, side tape, £50 of books, 60 games. Oric

Companions. Sell £435. Tel: 01-699 5354.

**48K SPECTRUM**, Speech Synthesizer, 3 channel sound amp, joystick, carry case and s/w £170, or swap Acorn Electron. Phone Lichfield (05432) 55241 after 5pm.

**48K ZX SPECTRUM** interface I and microdrive. Three microdrive cartridges interface II and Quickshot joystick, £1000 of s/w. Sell for £300 the lot. Tel: 01-902 7402 after 5pm.

## Ataris for sale

**ATARI 600XL** and recorder with books, as new, £100. Tel: 01-767 6109. Mr Osbourne.

**ATARI 800**, 48K, 6 months old, under 2 years guarantee, lots of games and magazines, joysticks, recorder, only little used, very good condition, must be seen, £250 ono. Ring: Gravesend 64608. Steven.

**ATARI 800** with basic cartridge, 1050 disc drive, 410 program recorder disc, game cassette, various programs + manuals, brand new, guaranteed, £400 ono. Tel: Wilmslow (0625) 533445.

**ATARI joystick**, £3. Quickshot joystick, £2. Tel: Reading (0734) 23655.

**ATARI 400**, basic, recorder, joysticks, manuals + nearly £500 software, cost well over £700, quick sale, only £360, still under guarantee. Tel: 01-656 3735 after 6pm. ask for Anthony.

## Acorns for sale

**BBC SOLIDISK SIDEWAYS 16K RAM** plus more than 80K software on 40 track disc to work with board. Page can be ??? on disk system, £50. Phone: 01-202 6410 after 6pm.

**BBC 'B'** original software for sale level 9 Adventure Quest with handbook, only £6, also Computer Concepts, Asteroids, bargain at £3.50. Phone Robin on Blewbury 850526 (Oxfordshire). Evenings.

**BBC Prite** lead to centronics printer, £10 ono. Tel: Orpington 35353. John Taylor.

**BBC MODEL B** + DSF 100K drive, joystick, games, case, tape deck, £600 ono. Tel: York (0904) 33329. Eves.

**ACORN ELECTRON** with cassette leads, £165. Tel: Newton-Le-Willows 21444.

## Commodores for sale

**COMMODORE PET 8K** with built in cassette and screen with some software and books £100 ono. 01-748 7050.

**VIC 20** + C2N + 8K cartridge + joystick + lots of s/w inc. 'Alien' cart. Keyboard only 3 months old. £125 ono. Lincoln Tel: (0522) 810696.

**COMMODORE** joysticks £4 each or £7.50 the pair. Tel Gosport 587273.

**VIC 20**, C2N cassette unit, joystick, over 15 games including Gridrunner, Arcadia, Pirate Cove, Intro To Basic Part 1. Worth well over £200, will sell for £160. Tel no: (0502) 514158.

**VIC 20 4 slot** motherboard + 16K Ram pack + super expander + pen — £100 ono. Alan 01-390 5043.

**FOR SALE** Commodore C2N cassette one month old, £38 ono. C64 RESET regains control of crashed computer £5.50. Dr Watsons Assembler Tutor £8. Tel: 0222 865067 after 6pm.

**VIC 20**, cassette recorder, Introduction to Basic Parts One and Two, super expander, joystick, 16K Ram, three games cartridges, games software, books and magazines, £175. Tel: Bolton (0204) 32863.

**VIC 20**, super expander, 16K Ram, motherboard & joystick inc. deck. Ten cartridges, twenty cassettes + books & many magazines. All v.g.c. & guaranteed. Cost £350 + , want only £90 or £125 including b/w TV. Phone 01-444 9132 (ask for Rick).

**COMMODORE 64** software for sale or swap, Falcon Patrol, Forbidden Forest, Aztec Challenge, Super Pipeline, Krystals of Zong, Hustler, Easy Script. Phone 0501-40709.

**VIC 20** plus 16K switchable Ram pack, £100 of software, joystick, books, manual, leads, etc. 3 months old and fully guaranteed. Worth £270. Will accept £160 ono. Telephone Wantage 65944.

**VIC 20**, C2N cassette recorder and quick-shot joystick. One year old, cost £180. Sell for £90. Tel 0684 310377 after 5pm.

**COMMODORE 64**, C2N cassette joystick, two cartridges; s/w inc.; Hobbit, Revenge of the Mutant Camels and Hovver Bovver. Still under 6 months guarantee. Worth over £420, sell for £350 ono. Phone Godstone 843777.

**VIC 20** cassette, joystick, 16K Ram pack, several games, including Jet-pack, Pirate Cove, Amok, Skyhawk and more. £120 ono, quick sale wanted. All in original boxes. Telephone Mirfield (0924) 496604 after 6pm.

**VIC 20** starter pack plus 16K Ram pack & expansion board, joystick, books & tapes, including Dr. Watson Assembler. Eight months old, hardly used £165. Telephone 01-979 5047 work, 01-979 1491 home.

## For sale

**MAGAZINES** PCW approx 40 Volume Two; PCN approx 40; Sinclair User Sept to Dec 83; PCWorld, What Micro odd one or two; £15 or offers to Split 01-659 2924 evenings.

## COMPUTER SWAP

Computer Swap entries are limited to 30 words. Either fill in the accompanying form and send to Computer Swap, *Popular Computing Weekly*, 12-13 Little Newport Steet, London WC2R 3LD or telephone 01-437 4343.

All software offered through Computer Swap must be original and for private sale. Please name titles of software. Requests to "send for list" will not be accepted.

**Warning:** It is illegal to advertise pirated software.

## COMPUTER SWAP

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


Name.....

Address.....

Telephone.....

**STAR BATTLE** for UC20 cartridge £5.00. Maybole (0655) 80237 (4pm). **TEXAS** sell for £85.00, was £150.00 + cartridge, was £15 sell for £8.00. Tel: 0234 63353.

**BACK COPIES** of PCW for sale, 20p each + stamp. Phone to confirm issue wanted. Tel: 04246 2717 after 4pm. Ask for Lesley.

**ORIC-1 48K** Brand new under guarantee £100, also software Harrier Attack, the Ultra etc. Seven tapes altogether, with two books worth £10, sell for £25.

**SHARP MZ80K 48K** Memory, large assortment of languages, Basic Machine Code and s/w £285. Also MZ80 1-0 output + floppy disc card £110. Offers Michael 051 449 2044 (eves).

**16K RAMPACK** for Jupiter Ace plus gamestape including Frogger and Packman, cost me £32, will take £20. Please phone after 6.30pm Aylesbury 26301.

**SIMONS BASIC** for Commodore 64 — £30. Also Load Runner and Pitstop, each £20. Will sell all 3 items for only £65. Tel: 01-954 4548 — Gavin.

**TRS 80 MODEL I & II** + level 2, 32K monitor, line printer, cassette recorder + s/w inc: Editor Assembler, Scripset, Pools Predictor, Manuals, leads and books. £250 ono. Tel: 0744 816879 (eves).

**AQUARIUS CARTRIDGE** Night Stalker. Very good condition, £7.00. Tel: 29628 (0204).

**2X Printer** boxed with guarantee. Brand new £20. Tel: 01-882 5919.

**Mini Minor**, Hunchback, 2 of the best Ultimate games, one of the best defender games. All original. Clearance £20.00 the lot. Tel: 01-952 2870 (Daniel).

**BROTHER EPZZ** printer/typewriter, 2k memory + RS232C interface, 4 months old. Cost £170, sell for £120. Robert Walton, 54 Holyhead Road, Bangor, Bangor, Gwynedd, N. Wales. Tel: 0248-680073.

**COLOUR GENIE** (16K) plus software, dust cover, user magazines, all leads and manuals, quick sale — £80. Tel: 051 430 6504.

**SEIKOSHA GP-250X** dot matrix graphic printer, perfect condition, just three months old, I've now bought a Daisy, only £165. Tel: Ashton-in-Makerfield (0942) 727975.

**LYNX SOFTWARE** for sale, Roborun, Jumping John, Space Trek, Moonfall £3.75 each. Colossal Adventure, Power Blaster and Floyd's bank £5 each. Ring Stafford (0785) 661745 after 5pm.

**SEIKOSHA GP100A** printer. As brand new and with BBC screen dump software. Bargain at £140. Tel: 0734 786568.

**SHARP MZ80K**. Games, user notes, machine language, assembly language, dust cover, green screen, all for £250. Also Mallison Eprom programmer, half price, £100. Tel: 061 737 8980 evenings only.

**48K LYNX** boxed as new c/w PSU, leads, demo tape. Fitted scroller Eprom including Lynx computing book. Nilug membership and newsletters. 12 months guarantee offered, bargain at £110. Tel: (05097) 2807.

### Wanted

**8211 CHIP**. Willing to pay £25.00. Also wanted 1.0 o/s for BBC Supplied in 2 Eproms on carrier board. will pay £5.00. Mr Vekaria. Tel: 01-202 6416.

**BBC B 1.2 O/S** pay around £300. Contact M. Savage. Watford (day) (0923) 47911. (Eves) Beaconsfield (04946) 4985.

**VIC 20 16K** cassette recorder, introduction to Basic Part I, s/w, books. Swap for

48K Spectrum. Sell for £100. Tel: Ian Feeley, 47 South Street Oakham, Rookland, Leicestershire.

**C3M 64 S/W** to sell or swap. Hover Bover £5.00, Grind Runner £3.00, Attack of the Mutant Camels £4.00, Scramble 64 £3.50, Crazy Kong £3.00. Tel: 01-876 4628 after 4.30pm.

**48K SPECTRUM** with or without s/w for around £80.00. Tel: 73235 Rostington (Jason).

**WANTED** information on Commodore 10 program or manuals on Quan Spirit Micro 35/55. Tel: 0772 52989.

**CBM 64 C20** wanted swap for a complete radio control flying system. Only used twice. Tel: Lincoln 686 139.

**ATARI UCS**, 13 cartridges swap for 48K Spectrum with printer, Joystick, Interface and any software. Call R. Haq 01-554 5231 anytime.

**WANTED 16K RAM** pack for VIC 20 (switchable or standard) Brighton (0273) 415778.

**ATARI CARTRIDGES** for swapping. Protector 2 Pac Mars + Subermies Command. If you have games to swap for these. Tel: 01-462 2996 (eves).

**ORIGINAL SPECTRUM** s/w for sale and swap. New titles wanted. Ring David after 4pm on Reading (0734) 661401.

**SWAP NEW** Dragon 32, Joystick, books, mags and over £120 latest goods s/w. For 48K Spectrum with extrasie, Microline/Printer and Joystick. Or sell for £200. Tel: 01-794 6230.

**EXCHANGE** your s/w tapes with our s/w tapes. Send SAE to Steven Bennett, 6 Sinclair Gardens, London W14 with list of what you have for the Spectrum + BBC.

**FULLER SPEECH** Synthesiser. Swap for 16K ZX81 or sell for £30. Tel: 05432 55241 after 6pm.

**48K SPECTRUM** 1 week old, never used + £70 of s/w. Accept £155.00 or swap for Electron + s/w. Tel: 0332 73481 (eves).

**WANTED INTERNATIONAL** Soccer. Northwood 26322.

**ALLAPHONE SHEET** for a Spectrum sweet talker. Tel: (0625) 522375.

**WANTED** 1 extension lead — from Joystick (Commodore 64) any games as well. Will pay £150. Tel: Northwood 26322.

**SWAP ATARI UCS5** 2 Joysticks + 2 paddles + 6 s/w games. Swap for 16K or 48K Spectrum. Or sell for £75.00. Tel: 01-368 2354.

**SPECTRUM SOFTWARE** Super Spy, Ship of Line, Redweed, Wilfred the Hairy. Swap adventure or strategy games. Tel: 0392 73143 or send list with SAE to 45 The Marles, Exmouth, Devon EX8 4NE.

**SNAP (CBM 64)** Matrix, Neocups, Arcadia, Kong, Scramble, Falcon Patrol, Hobbitt & for other CBM and Vectrex please send your lists. SAE for reply to Kevin, 88 Catherine Gardens, Hounslow, Middx. TW3 2PN.

**SWAP TRANSCENDANT 2000** Monosynth V.G.C. for several ZX81 add ons e.g. memory, Hi-res Graphics, Speech Error and/or software. Contact A. Morton 227 Noak Hill Road, Billericay, Essex.

**SPECTRUM S/W** to swap, mad Martha, knights guest, murder at The Manor, Black Crystal, for any text advent. (Not artic). McHugh 44 Namur Road, Penicuik, Midlothian or Tel: 0968 77322.

**SWAP SHARP M2-80k 48k** Ram integral screen cassette including £500 languages and games for a commodore, C2N Cassette Recorder and software or sell £260 ono. Tel: Manchester 061 428 9190.

**CBM64** with or without cassette desk accessories must be guaranteed and in good condition. Tel: 051-722 596.

**WANTED TEXAS T1994A** extended basic module. Tel: 0924 468535 after 4.30pm.

**WANTED 3BL MODEL B**. Offers about £200. Tel: Great Dummow 810 720.

**(UK 20) SWAP GORFOR** Rat Race for the Jelly Monsters or Voodoo Castle. Tel: HutchEnd (428) 1134. Paul Richardson.

**WANTED SPECTRUM 48FC** without accessory cash, waiting. Tel: 0394 282462.

**SPECTRUM S/W** wanted for swap or purchase. Originals only please. Tel: Harpenden 60061.

**WANTED C2N** Recorder for CBM 64 and 64 S/W and mags + books. Tel: 051 733 0090, Richard Wond after 4pm.

**SWAP-OVER** 40 Dragon Games and utilities. Dragon data, micordeal, salamander, etc. For fully working Tandy CGP115 Printer. Write to, W. Matheson, 58 Balfron Crescent, Earnock Estate, Hamilton ML3 9VN, Lanarkshire, Scotland.

## ADVENTURE HELPLINE

**Micro:** 48k Sinclair Spectrum  
**Adventure:** Artics Espionage Island

**Problem:** How do I get into the boat and what does the graffiti mean. P.S. I've completed planet of death!!

**Name:** Mr. S.P. Huxtable  
**Address:** 27 Moorfield Road, Withycombe, Exmouth, Devon Ex8 3QN

**Micro:** ZX Spectrum 48k  
**Adventure:** Espionage Island  
**Problem:** I've got the plans. I am in the volcano. How can I stop getting shot by the guard in the guards room. How can I get off island

**Name:** Stewart Melvites  
**Address:** 13 Elax lands Court, Diags Estate, Wolverhampton UU3 4LX

**Micro:** ZX Spectrum 48k  
**Adventure:** The Hobbit  
**Problem:** How do you escape from the butler in the elvenkings dungeon and get outside?

**Name:** Richard Sheridan  
**Address:** 68 Cissbury Ring South, Finchley N12 7BO

**Micro:** ZX81  
**Adventure:** Black Crystal  
**Problem:** After loading the second map I find it impossible to get off the first screen

**Name:** David Wood  
**Address:** 4 Livingstone Road, Pokesdown, Bournemouth, Dorset  
**Micro:** Tandy colour computer  
**Adventure:** Roaka-tu  
**Problem:** How do I get across the oriental rug without falling into the pit. Is the gem on the other side of the door. I have been trying for 12 months "Please"

## Diary

Event	Venue	Dates	Admission	Organisers
Software 84 (Trade only)	Earls Court London SW5	June 5-7 10.00am- 6.00pm	£2.00 on door (free tickets in advance)	Reed Exhibitions Surrey House Throwley Way, Sutton Surrey 01-643 8040
5th International Commodore Computer Show	Novotel Hammersmith, London	June 7-8 10.00am-6.00pm June 9 9.00am-5.00pm	£2.00 adults £1.00 children £3.00 family ticket	Granard Communications, 4 Babmaes St, London SW1 01-930 6711
The Computer Fair	Hall D Earls Court London	June 14 10.00am-6.00pm (trade and press only) June 15-16 10.00am-6.00pm June 17 10.00am-5.00pm	£3.00 adults £2.00 children & OAPs	Reed Exhibitions, Surrey House, Throwley Way, Sutton, Surrey 01-643 8040
Micro Trade 84 (Trade only)	Barbican London	July 4-6 10.00am-6.00pm	Free	Montbuild Ltd, 11 Manchester Sq, London W1 01-486 1951

## IN FLIGHT

*Flight* is a flight simulation program for the ZX81 which competes quite favourably with Psion's famous offering.

The objective is to fly and land a small aircraft using the information provided by instruments on a cockpit display — the tv screen.

There are two other displays — a 3D view of the runway when you draw near to it and a map which shows the position of plane, hills, beacons and compass directions.

Obviously with a ZX81 the graphic effects are not going to be staggering but in fact the real art of a flight simulation program revolves around how like a real plane it is to 'fly' and here the program scores well.

**Program** *Flight*  
**Price** £4.95  
**Micro** ZX81  
**Supplier** *James Paton*  
2 The Avenue,  
Fallings Park  
Wolverhampton

## TOWERING

*The Inferno* is the latest adventure from Richard Shepherd software and I think the program is its best yet. Technically it's roughly similar to *Urban Upstart* with simple but effective graphics and fairly sophisticated language analysis. The step forward is the introduction à la *Hobbit* of characters to whom you can communicate — in this case Virgil is the Thorin character who follows you around like a stray dog and who wanders off with useful objects from time to time.

Your objective is to escape from the underworld which is divided into nine 'circles' none of them being the sort of place Club Méditerranée would run package tours to although I suppose you could windsurf on the Styx though — and you should get a nice tan with the heat, hey actually...

I don't think those people who usually find Richard Shepherd adventures easy will find the same here — even with a

cheat sheet I was quickly set upon and savaged by a bunch of Harpies.

All the graphics are suitably Gothic and do a pretty fair (if slightly toned down) impersonation of Hieronymus Bosch, art for £6.50 — you can't go wrong. Highly recommended.

**Program** *The Inferno*  
**Price** £6.50  
**Micro** Spectrum  
**Supplier** *Richard Shepherd*  
23-25 Elmshott  
Lane  
Cippenham  
Slough  
Berks

## BIZARRE

*Bath Time* is weird. Weird in the way that only Hungarian software can be weird. It is also the least macho game I have ever seen — the most cataclysmic thing that can happen is a fish dying — important if you happen to be the fish in question I suppose, but not a patch on the destruction of the Earth.

The idea is this. There are a fish and a swan in a bathtub, you control a fairy who can open and close sluice gates. Using the gates you must keep the water level adjusted so that the water does not get too high (the swan will scarper) or too low (the fish cops it.)

This is made difficult by an elephant who drinks water and



an obnoxious little boy who keeps tipping it in so your fairy is kept pretty busy. My fairy control proved fairly ropey and I can't comment on what might occur in later stages of the game. The music is the sort of

Pick of the week

## BEES TO THE RESCUE

*Antics* is the follow up to Bug-Byte's moderately successful *Birds and the Bees* and has Boris Bee trying to rescue Barnabee his cousin from a dreadful fate in the hands (feet) of some ants.

Rescuing Barnabee requires Boris to negotiate dozens of different mazes à la *Jet Set Willy* with 'flutter' replacing the 'jump' command.

Boris must maintain his pollen and stamina levels by visiting flowers from time to time — bashing into ants or thorns saps his strength.

Although the game has good graphics and sound (continuous and possibly even better done than in *Miner*) its real strength is the adventure elements — some parts of the maze look impenetrable but parts of the walls crumble if you fly into them or if you trigger secret openings by visits to certain flowers — it isn't a matter of dodge everything.

If you're into the *Miner/Jet Set* school of sophisticated ar-



cade game you won't regret spending (although it's still too expensive, Bug-Byte) £6.95 for this.

**Program** *Antics*  
**Price** £6.95  
**Micro** Spectrum  
**Supplier** *Bug Byte*  
Mulberry House  
Canning Place  
Liverpool L1 8JB

thing you might expect to hear in the lobby of a large impersonal, international hotel.

The cover blurb suggests that the key feature of the game is its niceness and certainly *Bath Time* is awesomely inoffensive. Bizarre.

**Program** *Bath Time*  
**Price** £7.95  
**Micro** Commodore 64  
**Supplier** *PSS*  
452 Stoney Stanton  
Road  
Coventry  
CV6 5DG

## NO TO NUKES

*Attack on Windscale* is another in Phoenix's twin cassette packages where you must master an arcade style game to gain the access code to an adventure. This one is for the Commodore 64.

The arcade part is pretty much your standard blast the aliens, the excuse here being that they are blitzing the Windscale atomic power station.

The baddies defend themselves with 2 flying saucers which hurl bombs at you.

The adventure concerns your attempts to find a quartz prism which can prevent the reactor from going critical. It has fairly rudimentary graphics for each location and uses what you might call sophisticated single keypress entry — there are a wide variety of options at some locations.

Your adventuring is on a strict time limit — the seconds before the reactor detonates flit away as you stop to think. The final stage occurs if you manage to find the prism within the allotted time (2 hours) — you must find a jet which takes you to the alien's sonic transmitter and destroy it using the prism. Technically unsophisticated, but good fun.

**Program** *Attack on Windscale*  
**Price** £9.95  
**Micro** Commodore 64  
**Supplier** *Phoenix Software*  
Spangles House  
116 Marsh Road  
Pinner  
Middlesex

# New Releases

## SPIDER'S LAIR

Although *Interceptor Micros* have some pretty impressive and elaborate programs coming out for the Commodore 64 these days it was one of their simpler offerings I was most taken with.

*Spider and the Fly* has a beautifully simple idea at its centre — you are a spider and must trap flies by weaving a web around them; to complete each screen you must nab a requisite number of flies.



Your spider existence is threatened by a tracking hand which can knock you off your web or kill you and cans of insecticide which are lethal if they squirt.

Although it's an arcade game a good deal of tactical thinking is required alongside the usual quick reactions on the joystick.

<b>Program</b>	<i>Spider and the Fly</i>
<b>Price</b>	£7
<b>Micro</b>	Commodore 64
<b>Supplier</b>	Interceptor Micro's Lindon House The Green Tadley Hampshire

## ATLANTIS

Praise be for the *Quill*. This machine code adventure writer is enabling a lot of people who have plenty of imagination but not much programming skill to produce entertaining and compulsive adventures.

A case in point is *Atlantis*

*Adventure* by M&J Software. This is an adventure with 150 locations, 90 objects and a vocabulary of 200 words for a mere £4.95.

You are stuck on the fabled island and must search around looking for treasure and a way of escape. I found that even in the first few locations there was plenty to do and one pressing problem to solve, ie, your hunger. As good a text adventure as you'll find anywhere — if it were on the BBC it'd probably come in a big box for £9.95.

<b>Program</b>	<i>Atlantis Adventure</i>
<b>Price</b>	£4.95
<b>Micro</b>	Spectrum
<b>Supplier</b>	M & J Software 7 Charnor Road New Parks Estate Leicester

## UPSTAIRS DOWNSTAIRS

*Staircase Stampede* has Helpful Horace and Horrible Harold battling it out on a 3D staircase in a variety of *Amidar* with overtones of that funny game with the boot and the bomb, whose title I can never remember.

The idea is to paint the staircase and defuse a bomb whilst avoiding Harold and his friends. Any game with allite-



relative names for the goodies and baddies earns my immediate distaste but to be fair, the graphics, sound effects and other features of the game are all pretty good.

<b>Program</b>	<i>Staircase Stampede</i>
<b>Price</b>	£7.50
<b>Micro</b>	BBC

### Supplier

Comsoft Computer  
Software  
7 Roman Drive  
Leeds  
West Yorkshire  
LS8 2DR

## CHECKMATE

*Chess II* is a fairly sophisticated Chess program for the Oric 1 and Atmos with a choice of response times from 5 seconds to 5 hours.



The game is a direct follow up to Tansoft's original chess program improving upon it with faster responses and a wider range of opening moves.

Other features include the option to change sides and set up chess problems, there is even speech synthesis — the computer says something like crccatzzzzzzzghpzzzzzssshhhshshs if you make a wrong move.

<b>Program</b>	<i>Chess II</i>
<b>Price</b>	£9.99
<b>Micro</b>	Oric/Atmos
<b>Supplier</b>	Tansoft Units 1 & 2 Cambridge Techno-Park Newmarket Road Cambridge CB5 8PB

## KIDS STUFF

*Childsplay* is a cassette of ten educational style games for the BBC B. The programs variously teach mathematical and language skills.

In some cases the link between the program and education is nebulous in the ex-

treme. *Hangman* is just *Hangman* whichever way you look at it.

To be fair, others of the games here like *Whichword*, which has the child trying to choose the right word for a sentence from a group of words that look similar, can safely be called educational.

Probably a mixed bag educationally speaking, but could be worth a look.

<b>Program</b>	<i>Childsplay</i>
<b>Price</b>	£9.95
<b>Micro</b>	BBC B
<b>Supplier</b>	Polarsoft 40A Queen Street Hitchin Herts SG4 9TS

## WHO VOTES WINS

Mastertronic, you will doubtless have heard, is selling its software titles for a mere £1.99. Since this is, in many cases, a quarter of the normal selling price of cassettes are they any good? I mean what's wrong with them?

The answer is, that whilst the games I looked at were relatively simple — you're not going to get an *Alice in Wonderland* or a *Jet Set Willy* — they are certainly good value for money and with luck should mean the gradual demise of expensive second rate software.

*The Election game* is for the Commodore 64 and is a strategy based on, as you might suppose, general elections. It's for up to four players with each taking a different party and deciding how much to spend on each constituency.

There are various simple graphics and graphs throughout the game and I enjoyed it. It would be OK at £5 or £6, at £1.99 it's a bargain.

<b>Program</b>	<i>The Election Game</i>
<b>Price</b>	£1.99
<b>Micro</b>	Commodore 64
<b>Supplier</b>	Mastertronic 48 George St London W1

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.

## Atari

- 1 (3) Zaxxon (Data soft)
- 2 (4) Warlock (Calisto)†
- 3 (3) Rally Speedway (Adventure International)\*
- 4 (–) Airstrike 2 (English)
- 5 (7) Pooyan (Data soft)
- 6 (1) Solo Flight (Microprose)†
- 7 (–) Jet Boot Jack (English)
- 8 (–) Sage 5 (Adventure International)†
- 9 (5) O'Reilly's Mine (Data soft)
- 10 (–) Sage 4 (Adventure International)†

\*Cartridge †32K cassette ‡48K cassette  
(Figures compiled by Calisto Computers, Birmingham 021 632 6458)

## BBC\*

- 1 (1) Aviator (Acornsoft)
- 2 (6) Bigger (Alligata)
- 3 (5) Fortress (Pace)
- 4 (–) White Knight (Acornsoft)
- 5 (7) Football Manager (Addictive Games)
- 6 (4) Battle Tank (Superior)
- 7 (2) Spooks and Spiders (Software Invasion)
- 8 (10) French (Acornsoft)
- 9 (9) JCB Digger (Acornsoft)
- 10 (8) Forth (Acornsoft)

\*All model B  
(Figures compiled by Micro Management, Ipswich 0473 59181)

## Vic 20

- 1 (3) Duch Shoot (Mastertronic)
- 2 (–) Chariot Race (Micro Antics)
- 3 (–) Computer War (Thorn EMI)
- 4 (2) Sub Commander (Thorn EMI)
- 5 (–) Flight 015 (Ferranti Davenport)
- 6 (6) Tank Commander (Thorn EMI)
- 7 (7) Crazy Kong (Interceptor)
- 8 (5) Tower of Evil (Thorn EMI)
- 9 (4) Snooker (Visions)
- 10 (–) Games Designer (Galactic)

– Figures computed by Boots/Websters

## Dragon 32

- 1 (10) Cuthbert in Space (Microdeal)
- 2 (1) Chuckie Egg (A & F)
- 3 (–) Dragon Chess (Oasis)
- 4 (7) Kriegspiel (Beyond)
- 5 (3) Eightball (Microdeal)
- 6 (–) Skramble (Microdeal)
- 7 (2) Hungry Horace (Melbourne House)
- 8 (–) Sprite Magic (Knight)
- 9 (9) Space Shuttle Simulator (Microdeal)
- 10 (–) Sprint (Oasis)

## ZX81\*

- 1 (10) Black Crystal (Carnell)
- 2 (–) Crazy Kong (PSS)
- 3 (4) Flight Simulation (Pison)
- 4 (7) 1K Chess (Artic)†
- 5 (–) Asteroids (Quicksilver)
- 6 (8) Space Raiders (Pison)
- 7 (5) Scramble (Quicksilver)
- 8 (9) Defenders (Quicksilver)
- 9 (10) Invaders (Quicksilver)
- 10 (–) Krypton Ordeal (Novus)

\*All 16K except where shown. †1K.  
(Figures compiled by Boots/Websters)

## Spectrum\*

- 1 (2) Jet Set Willy (Software Projects)
- 2 (1) Fighter Pilot (Digital Integration)
- 3 (7) Chequered Flag (Pison)
- 4 (3) Blue Thunder (Foundry Systems)
- 5 (–) Cricket Captain (Allanson)
- 6 (9) Pogo (Ocean)
- 7 (10) Gnasher (Mastertronic)
- 8 (–) Bullseye (Mastertronic)
- 9 (–) Wheelie (Microsphere)
- 10 (4) Atic Atac (Ultimate)

\*All 48K  
(Figures compiled by W H Smith and Son, London)

## Commodore 64

- 1 (7) BMX Racers (Mastertronic)
- 2 (9) Space Walk (Mastertronic)
- 3 (–) Superpipeline (Tasket)\*
- 4 (–) Horace goes Ski-ing (Melbourne House)
- 5 (–) Harrier Attack (Durrell)
- 6 (–) Snooker (Visions)
- 7 (–) Pyramid (Fantasy)
- 8 (–) Ambush (Virgin)
- 9 (–) 3D Speed Duel (DK Tronics)
- 10 (6) Black Hawk (Thorn EMI)

\*Disc.  
(Figures compiled by Boots/Webster)

## Books

- 1 (–) Sinclair QL companion, Allen (Pitman)
- 2 (–) Step by Step Programming Spectrum Book 2, Graham (Darling Kindersley)
- 3 (–) 60 Programs for Commodore 64, Erskine et al. (Pan)
- 4 (–) Commodore 64 Programmers Reference Guide, Commodore (Commodore)
- 5 (–) Very Basic Basic Spectrum, Ellershaw and Schofield (Century)
- 6 (–) Spectrum Sound and Graphics, Money (Granada)
- 7 (–) A Guide to Playing the Hobbit, Elkan (Melbourne House)
- 8 (–) Step by Step Programming BBC Book 1, Graham (Dorling Kindersley)
- 9 (–) Step by Step Programming BBC Book 2, Graham (Darling Kindersley)
- 10 (7) 100 Programs for the spectrum, McLean and Gordon (Prentice-Hall)

Two titles tied for 8th position.

(Figures compiled by Bookwise)

## TAPE

Since many a brand new computer is wrongly accused of not *Loading* and *Saveing* when, in fact, the tape recorder is what's at fault it could be worth spending £2.95 on *The Micro User's Book of Tape Recording*.

This slim book discusses what tape recorders do, how they are used by a computer, how they can be kept in good condition and, most important of all, ways of improving the reliability of *Saveing* and *Loading*. A nice idea and I believe the only book of its kind.

**Book** *The Micro User's Book of Tape Recording*

**Price** £2.95

**Micro Supplier** General Duckworth  
*The Old Piano Factory*  
43 Gloucester Crescent  
London NW1

## PUZZLES

Little to say about *101 Puzzles to Solve on your Microcomputer* except that if you like puzzles and have a computer then this is definitely the book for you.

The puzzles range from codes to maths and take in

computer concepts like number crunching and probability and most important of all the answers are in the back of the book.

**Book** *101 Puzzles to Solve on your Microcomputer*  
**Price** £4.95  
**Micro Supplier** General Harrap  
19-23 Ludgate Hill  
London  
EC4M 7PD

## ADVENTURE

*Beyond the Arcade* is, despite its title, primarily about adventure and strategy games. As such it's not the first but it does have a few elements which single it out.

The book is reasonably thorough and, well, reasonably up to date (most recent game is probably *Valhalla*). All sorts of variants on the basic themes are discussed — strategies, play by mail, and the classic games for various computers are analysed in detail. I was also pleased to see a lengthy section on *Dictator* which I've always thought was underrated.

**Book** *Beyond the Arcade*  
**Price** £6.95  
**Micro Supplier** General Mozaic  
John Wiley & Sons  
Baffins Lane  
Chichester  
PO19 1UD

# This Week

Program	Type	Micro	Price	Supplier
Alphamix	Ut	Aquarius	£1.99	Oasis
Crossword Compiler	Ut	Aquarius	£1.99	Oasis
Electric Organ	Ut	Aquarius	£1.99	Oasis
Flying	Arc	Aquarius	£1.99	Oasis
Gunnery	Arc	Aquarius	£1.99	Oasis
Keyboulder	Ut	Aquarius	£1.99	Oasis
Mastercode	Ut	Aquarius	£1.99	Oasis
Paintbox	Ut	Aquarius	£1.99	Oasis
Rollerball	Arc	Aquarius	£1.99	Oasis
Sketch	Ut	Aquarius	£1.99	Oasis
Solitaire	S	Aquarius	£1.99	Oasis
Symmetry	Ed	Aquarius	£1.99	Oasis
Brainstorm	Arc	BBC	£7.95	Virgin
McVid	Ut	BBC	£14.95	Pro Supply
Sea Adventure	Ad	BBC	£7.95	Virgin
Revelation	Arc	Commodore 64	£7.95	Softek
Bumpers	Arc	Dragon	£7.95	Dragondata
Facemaker	Ed	Dragon	£10.95	Dragondata
Fruity	Arc	Dragon	£7.95	Dragondata
Logo	Ed	Dragon	£39.95	Dragondata
Number Chaser	Ed	Dragon	£10.95	Dragondata
Sea Quest	Ad	Dragon	£7.95	Dragondata
Shape Up	Ed	Dragon	£10.95	Dragondata
Shenanigans	Ad	Dragon	£7.95	Dragondata

Table Adventure	Ed	Dragon	£10.95	Dragondata
Blockbuster	S	Spectrum	£5.95	Compusound
Carpet Capers	Arc	Spectrum	£5.95	Terminal
Front Loop	Arc	Spectrum	£3.00	NTD
Mr Wong's Laundry	Arc	Spectrum	£6.95	Artic
Solar System	Ed	Spectrum	£3.50	Eaglesoft
Space Command	Arc	Spectrum	£5.95	Virgin
Tasprint	Ut	Spectrum	£9.90	Tasman
The Golden Quest	Ad	Spectrum	£7.50	Printout
Treasure Hunt Tool	Ut	Spectrum	£4.95	G W Components
United	S	Spectrum	£5.95	CCS
Bears in the Wood	Arc	ZX81	£3.95	Unicorn
Climber	Arc	ZX81	£3.95	Unicorn

**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.



## Mr Floppy comes to town

I don't know how you spent your last bank holiday, but I spent mine behind a stand at the Midland Computer Fair, rummaging through back issues of *Popular Computing Weekly*, in search of obscure programs. Of course, on the rare occasions I was successful in unearthing the right magazine, the prospective purchaser would decide s/he hadn't got enough pocket money left to buy it.

Mind you, I had a better time of it than Mr Floppy. Mr Floppy was an outrageous black cardboard sandwich, on one side of which was drawn a huge smiling face. His dismal inhabitant, a hard up Birmingham Polytechnic student (names have been withheld to protect the innocent), surveyed the world from a small 6" square, gauze covered grill — which gave him such a narrow angle of view that he had to swing his entire body round to get a look at anything other than objects directly to the front of him.

He wore cream gloves on hands which protruded awkwardly from the side of his bizarre cos-

tume, and cream tights on legs which bowed painfully. This was because he bore (there really is no other word for it) on his feet, enormous foam rubber boots, which forced his knees apart and produced a peculiar lolling gait (he had to lift each foot high into the air, to make any progress — imagine walking in giant heavy snowshoes and you get the idea).

On the first day of the show he got off to a good start, displaying something close to enthusiasm, accosting all and sundry with leaflets extolling the virtues of 'Mr Floppy' floppy discs (don't tell me you didn't make the connection). But, by lunchtime, Mr Floppy resembled Mr Saggy.

He visibly drooped. He trudged between the stalls (not easy when the aisles are about five foot wide and full of people, and you're around three foot from side to side) on his never ending circuit of the exhibition hall. Clearly, the sandwich board was supported on his shoulders in some weird and wonderful fashion, because by that stage his hands grasped either corner in a desperate effort to take off some of the weight.

Watching for Mr Floppy to pass by on his rounds was the only really interesting thing at a (even more than usually) tedious fair. Visitors to the show treated him abominably. They stood on his feet, punched him in the stomach (or what would have been his stomach if he'd had one) and covered up his visor.

All this his alter ego, the Mr-Floppy-underneath-it-all, stood with lugubrious stoicism. He would console himself, in dulcet Brummy tones, with the fact that at least he wasn't recognisable under his layers of cardboard and none of his friends could see the depths to which he had sunk for the grand sum of £15 a day.

You may wonder where all this is leading. 'What,' I can hear you cry, 'is the meaning of all this drivel?'

Well, just this. Mr Floppy was streets ahead of any other marketing device at the show. Why? Because he was funny.

Now, the computer industry is woefully short on humour. Such wit as it commonly displays is usually confined to unsubtle rude word routines concealed in adventure games. Its characters are generally wooden stereotypes, and its ability to humanise its products is nearly non-existent.

Mr Floppy, Automata — and, possibly, the Barbara Woodhouse, Lotus. 1.2.3. advertisements — are rare examples of the industry making itself truly user friendly. There should be more of them.

Gail Counsell

## Prime example

### Puzzle No 109

For many centuries mathematicians have been trying to devise a formula for generating prime and only prime numbers.

All attempts have so far failed — although it

1 2 3 5 7 8 Ho Hum!

must be admitted that some of the efforts are surprisingly good.

Try the formula  $p = n^2 + n + 41$ . This gives a prime result when  $n$  equals all positive integers up to and including 39, but fails when  $n = 40$ :

$$40^2 + 40 + 41 = 1681 = 41^2$$

Another formula is

$$p = n^2 - 79n + 1601$$

Taking the values of  $n$  from 1 to 100, which values do not produce primes?

### Solution to Puzzle No 104

In the program, the four loops A to D are used to simulate all possible throws of four dice. Each total increments that value in the array by one to keep a tally of the scores obtainable.

10 DIM SCORE (252) 20 FOR A = 1 TO 6 30 FOR B = 1 TO 6 40 FOR C = 1 TO 6 50 FOR D = 1 TO 6 60 T = ((A \* B) + C) + D 70 SCORE (T) = SCORE (T) + 1 80 NEXT D 90 NEXT C 100 NEXT B 110 NEXT A

The array is then checked to determine which throws occur most frequently, that is, those which should be chosen in order to increase the chances of winning. Note the use of 'nested' brackets in Line 60 to ensure that the operations are carried out in the order required and not in the computer's order of precedence.

The best pair of numbers to choose are discovered to be 24 and 36, which both occur 41 times each out of the 1296 possible throws.

### Winner of Puzzle No 104

The winner is: Kevin Powis, Old Meeting Street, West Bromwich, who receives £10.

### Rules

If the puzzle can be sensibly solved using a computer then the winner will have included a listing of the program used to find the correct answer. The closing date for entries to Puzzle No 109 is June 15.

## The Hackers



# ... but seriously, AUTOMATA

PIMANIA - the cult adventure that's for real!

16K ZX81 £5 ☐ BBC 32K £10 ☐ Dragon 32 £10 ☐ Spectrum 48K £10 ☐

**DARTZ - animated pub game + spectacular free hit music**

Spectrum 48K £5 ☐

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 ☐

OLYMPIANIA - He's back! He's going for gold! He's sober! Free National Anthem on the flipside.

Spectrum 48K £6 ☐

THE PIMAN'S GREATEST HITS - amazing stereo L.P. cassette

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"I'M A PIMANIAC" - T-Shirts (state size)

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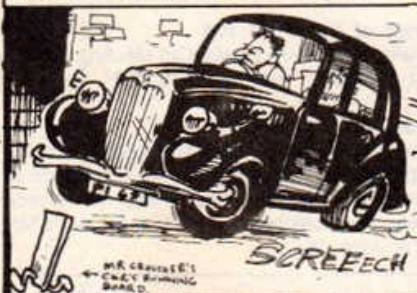
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SHORTAGE OF SPACE PRECLUDING THE POSSIBILITY OF THE OLD 'TUNNELING-INTO-THE-GOVERNERS-OFFICE' CHESTNUT, MEL AND CHRISTIAN ESCAPE, AND ARE SOON HEADING FOR THE PIMAN'S DIGS...



BUT... WHAT'D YOU MEAN, THE FAT GUYS GOT THE GAME?



WELL, LET'S GO ROUND AND PINCH IT RIGHT BACK AGAIN!



MEL CROUCHER, SHAME ON YOU! TO THINK THAT SOMEONE DESCRIBED YOUR CAUSE AS NOBLE THE OTHER WEEK! WE'LL GO AND ASK THESE MEN POLITELY FOR THE GAME'S RETURN - JUST YOU AND I, SO THERE BE NO ROUGH STUFF!



AT THE OFFICE OF TUBBY O'BESSE AND DARYL MCBARYLL, CHEATERS AT PUB GAMES AND PIRATES OF COMPUTER PROGS...



OH, I SEE... IT'S ALL RIGHT FOR YOU TO SMACK PEOPLE IN THE GOB THEN, IS IT?



IT'S NONVIOLENT FOLKS-UNLIKE THIS STRIP, WHICH DOES NOT NECESSARILY REFLECT THE POLICIES OF AUTOMATA UK