40 Rock

POPULAR Computing WEEKLY

35p 19-25 May 1983 Vol 2 No 20

This Week

Vic20 software

Mike Grace casts his eye over another collection of arcade games for the Commodore Vic20. See page 14.

Llamasoft

David Kelly talks to Jeff Minter — the man behind Llamasoft and one of the top Commodore programmers in both the US and UK. See page 13.

The Pit

Paul Sellin presents the first part of his three-part text adventure for the 16K Spectrum on page 20.

New releases

All the latest software from a host of companies including DK'Tronics' *Spawn of Evil*. See page 49.

★STAR
Star Swarm on Spectrum. See page 10.
GAME★

News Desk

Psion and Sinclair head into Rom

THE Psion/Sinclair partnership is heading into Rom.

Cartridge software for the Sinclair Spectrum should be available for the machine some time in late Summer.

The Psion/Sinclair cartridges will be priced at about half the current price for Rom software. Commented a Sinclair spokeswoman, "Some of the programs will cost less than £10."

In order to run the programs with the Spectrum a special Sinclair adaptor is required, but this will cost under £20. When the adaptor is launched, a range of Rom Programs from Psion will also be available.

Psion's managing director, David Potter, confirmed that his company had been developing cartridge programs

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Psion managing director, David Potter

Rabbit takes a leap forward

NINE new games for the Vic20 and five new titles for the Commodore 64 have been announced by Rabbit Software.

The company, traditionally a specialist in Commodore software, is also diversifying to produce a range of programs for the Spectrum, available in June, and BBC machines.

To support this increased production Rabbit is in the process of setting up its own tape duplication plant using £80,000 worth of equipment supplied by Tape Automation in the US.

The Vic titles are: *Paratrooper*, with high-resolution graphics on the basic machine, *The Catch*, trapping marbles, *Pakacuda*, a sort of underwater Pac-Man, *Critter*, farming cherries, *Race Fun*, driving cars, *Anti-matter Splatter*, protecting the universe, *English Invaders*, shooting down nouns, adjectives and verbs for the 7- to 10-year-old, *Cyc-*

Continued on page 5

Classified

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Continued on page 44

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19-25 May 1983 Vol 2 No 20

SUNSHINE

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

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

Programs should, whenever possible, be computer printed.

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

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

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Editorial

British Telecom is to computerise its directory enquiries service. The contract, worth £25m, has been awarded to Standard Telephones and Cables, despite strong competition from ICL, IBM and DEC.

This development may not seem immediately relevant to micro users, but it is indicative of the way that computers are forcing themselves into every aspect of public and private life. A year ago, computers were scarcely mentioned outside the specialist press — now there are radio and TV micro shows and regular computer columns in *The Times* and *The Standard*.

Cars are now advertised on the strength of their microprocessor controls. Football and election results are forecast with the aid of computers. Even books are now being written on computers, with the help of word-processing packages and disc systems.

In short, there is a far greater public awareness of computers than ever before. Micros are 'hot' in every sense of the word.

But, despite this computer awareness, industry is taking a long time to adapt to changed circumstances. British Telecom's directory enquiries service will not be completely computerised until 1986.

Computer awareness is one thing, computer acceptance is another.

Next Thursday

Find out if you can bomb the enemy submarines as your warship patrols the ocean. You have 20 depth charges and the deeper the enemy submarine, the more points you score if you hit it! Depth Charge — next week's Star Game for the Vic20 by Robert Irvine.

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PCWk

Heading Into Rom

Continued from page 1

for some time. "We have so far organised six items, but by the time the interface is launched we will have others ready," he said.

Sinclair's managing director Nigel Searle commented, "Obviously everyone is working on solid-state software — we wouldn't want to stick only with cassette material indefinitely."

It is possible that the Sinclair move has been prompted by an increase in software piracy and home-taping. David Potter estimates that piracy could be costing his company as much as £2.9m — 30 percent of its turnover — each year.

Rabbit leaps forward

Continued from page 1

lons, avoiding alien fighters, and *Escape MCP*, fleeing the 6502's CPU.

The games for the 64 are: *Pakacuda, Cyclons, Centropods* — a sort of Centipede game — *Escape MCP* and *Annihilator*. Rabbit has also produced the first of a range of business programs for the 64 — *Infomast*, a programmable database.

All the programs with the exception of *Infomast* are priced at £5.99. *Infomast* costs £91.

The games are available through Lasky's, Curry's Micro C, and Commodore dealers. Also, in the next few weeks, the games for the Commodore 64 will be sold through W H Smiths.

Rabbit director, Heather Lemont commented: "We feel we now have a good grasp of the Vic and 64 so we want to cover a wider range of machines.

"The Spectrum has now come down to a price where it is available to almost everybody and so it seemed a natural first choice."

Rabbit Software was formed in 1981 and began by selling games for the Apple and Pet machines. The company now has 12 full-time employees and its games for the Commodore machines are distributed throughout the world.

Kempston goes soft with new company

KEMPSTON Microelectronics is moving into software.

The company, which sells a range of add-ons for the Sinclair machines, follows other companies such as DK 'Tronics and Quicksilva who have also diversified in a similar way.

The software operation will be run as a separate company — Kempsoft — and will both distribute existing programs from smaller houses and generate its own software. To begin with all material will be for the Spectrum.

Kempsoft's first task will be to distribute the new game from Ultimate Play the Game called *Jet Pac*. The first offerings under its own banner will be *Android 1* and *Conversion Tapes 1 and 2*. These latter two titles will convert big-selling games from other suppliers so that they can be operated using the Kempston Competition Pro Joystick.

The first conversion tape will allow joystick operation of Imagine's *Arcadia*, Psion's *Flight Simulation* and (with Melbourne House) *Horace Goes Skiing*, Melbourne's *Penetrator*, Bug-Byte's *Spectres* and Mikrogen's *Space Zombies*. *Conversion Tape 2* will work with a further seven titles including DK 'Tronics' *Centipede*.

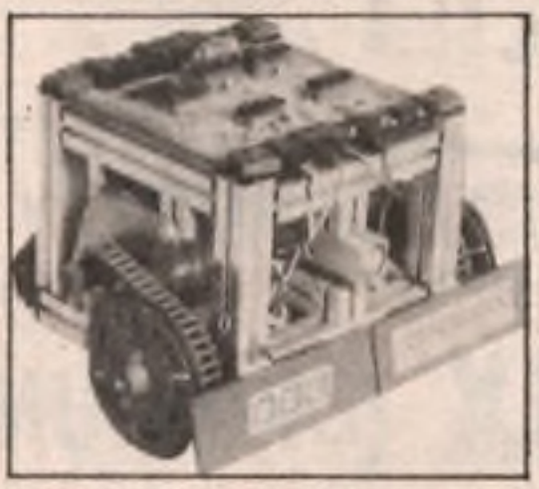
To complement Kempston's Centronics interface for the Spectrum, Kempsoft will produce a word-processing package and a number of business programs.

"Software will become an increasingly important part of what we do," said Kempston's managing director, Ab Pandaal. "We will be shortly appointing a manager for Kempston Microelectronics, leaving me free to concentrate on Kempsoft.

"A full-time programmer will be taken on and I am currently on the look-out for games that we can sell through our existing dealer network."

As part of Kempston's expansion, both companies will be moving to new premises in the next four weeks.

More cash for school micros



COMPUTERS in education get another boost as the Department of Industry's Micros in Schools programme gets a further £8m.

Some £3m of this is to go to secondary schools to provide additional colour monitors and simple control devices, such as the Economatics BBC Buggy three-wheeled robot.

The remaining £5m will go to colleges of further education to supply computer-controlled machine tools.

Timex sit-in continues

WORKERS involved in the sit-in at the Timex plant in Dundee have rejected a 10-point plan proposed by the company to solve the dispute.

The sit-in by 350 workers, now in its seventh week, was prompted by proposed compulsory redundancies at the plant (see *PCW*, April 14). The industrial action has halted work on the pilot production line for the Sinclair flat-screen tv.

Under the rejected company plan Timex had agreed to make no compulsory redundancies for a period of 90 days; however, union representatives are seeking agreement on a procedure for reallocation of employees after the 90-day period.

In an official statement, Sinclair Research commented that the rejection of the company's plan was "very serious". Timex is now expected to continue with its legal move to evict the workers from the Milton plant.

● Sinclair Research is concerned that the production of its £50 flat-screen tv shouldn't be delayed because of international competition from similar products manufactured in Japan and the Far East. Sony, Casio, Seiko and Hitachi all have miniature tv products at an advanced state of development.

Texas follows suit with TI 99/4A package deal

TEXAS Instruments has now joined the growing band of price cutters reacting to the Sinclair Spectrum price drop three weeks ago.

Every purchaser of the TI 99/4A microcomputer between now and the beginning of July will receive a pair of joysticks, the *Beginner's Basic Tutor* cassette, the *Connect Four* Rom cartridge and either the TI *Speech Synthesiser* or the TI cassette recorder, entirely free.

This package deal is similar to the combination announced by Commodore two weeks ago for the Vic20.

The offer adds equipment with a recommended retail price of £105 to the TI 99/4A machine which sells for around £150.

● Timex has cut the US cost of the ZX81 American equivalent, the TS1000 — it is now down to £33.50.

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LETTERS

The Sky at Night . . .

I am writing to you to make a few comments about an article which you published in your 21-27 April issue, regarding the tracking of our amateur radio satellite, UOSAT.

First, concerning factual problems in the text, please note the following:

1) The title "The Sky at Night" and references to astronomers are irrelevant — UOSAT carries no astronomical experiments and passes overhead (anywhere on earth) during the afternoon as well as overnight.
2) The frequency given of 145.8 MHz is incorrect — the actual VHF beacon frequency is 145.825 MHz.
3) It is unlikely that a general-purpose portable aircraft/marine band receiver will be suitable for UOSAT reception — the satellite will require a narrow-bandwidth frequency-modulation (nbfm) communications receiver for adequate reception. Indeed, unless one of these is used in conjunction with a directional antenna, this program is unnecessary!
4) Synthesised voice downlink data is only one of many data formats transmitted — others of interest to your readers may be 1200 bd, 600 bd, 300 bd and 110 bd ASCII, 45.5 bd RTTY and 10 and 20 wpm morse code.
5) Elevation is the *angle* above the horizon.
6) Guildford 571281 is the main University of Surrey telephone number. The UOSAT office/command station houses an extremely busy team of engineers who have been inundated, since the publication of your article, with requests for orbital data which can more conveniently be supplied by the recorded message which we have provided on Guildford 61202.

Secondly, the program and text data themselves have a number of flaws:

1) "Azimuth" and "Elevation" in the first line are both spelt incorrectly.
2) The orbital parameters used in the program appear to be based on expected data supplied *before* the satellite was launched in October 1981! Since atmospheric drag causes these parameters to change, we supply weekly updates on Guildford 61202, so the program data supplied is most unsatisfactory. This is the main reason for the "Accumulative error now significant" exit at line 1420.

   Since Guildford 61202 only gives one set of equator crossing longitudes and times for each day, the program as published appears only to be capable of producing beam headings for two of the 15 orbits daily, before this line causes it to fail! Allowance for drag would allow the program to run (accurately) for a whole week's worth of predictions.
3) The equator crossing time and bearing supplied in the test data are totally fictitious and can not occur in practice. Due to the sun-synchronous properties of the UOSAT orbit, a bearing of 320° will be seen at approximately 12:30 GMT.
4) I have not been able to run the program to test for numerical inaccuracies or incorrect formulae — both common in programs of this type — due to the recent demise of our ground-station Spectrum.

Your readers may be interested to know that AMSAT-UK can supply sets of programs, orbital data and technical information to help track and observe the whole AMSAT-OSCAR series of satellites, as well as a number of weather satellites. They can obtain a list of publications by sending a stamped addressed envelope (AMSAT-UK is a volunteer-run organisation subject to the same large surges of requests as ourselves) to:

AMSAT-UK,
94 Herongate Road,
Wanstead Park,
London E12 5EQ

I hope that this information is of use.

R M A Peel, G8NEF
Spacecraft Engineer
(Software)
Dept of Electronic and
Electrical Engineering
University of Surrey

Our thanks to Mr Peel for his corrections and additions to "The Sky at Night" article and our apologies to the UOSAT team for any inconvenience caused by printing the main University of Surrey telephone number.

We would be extremely interested to hear from any of our readers who have succeeded in receiving data from UOSAT OSCAR-9.

Computing classes

With reference to the enquiry in *Popular Computing Weekly*, volume 2, Number 11, concerning computing classes, I have been running classes since last November in North Berwick using the BBC Model B micro.

These classes have covered the range of activities from computer appreciation to programming in BBC Basic. The age range has been from 8 to over 70 years old and one course included a grandmother who was determined to be a step ahead of her grandchildren. The normal course length is 10 to 20 hours.

Ian Goodall
14 Ware Road
North Berwick
East Lothian EH39 4BN

Software protection

With regard to your editorial in the edition of 28 April, may I make the following points on behalf of the Computer Trade Association:

We realised from the start that the specific needs of the software companies in relation to the question of software protection could not effectively be met by the association whose general aims are the "advancement and promotion of the Computer Trade". It has also been recognised that there is a danger in having too many bodies trying to do the same thing.

It was clear at our last meeting that what was needed was a single body to act for and on behalf of the software houses to deal with the specific subject of software protection. With this in mind the association is actively supporting steps for the setting up of such a body which will be an affiliated group to the association. Such a group will concentrate on the specific tasks which need to be carried out in relation to the question of software protection. Plans for such a group are now well developed and it will certainly be in existence within the next couple of weeks. It will have its own staff and be working in close liaison with other bodies dealing with similar problems, particularly in the video industry.

The formation of such a group reflects a positive move by the association and its members to tackle the difficult problem of software protection. It also means that the association as a whole can spend a greater part of its effort carrying out its main aims; that is, the general improvement of the computer trade and the service it provides to the public.

May I also ask you to make it known to your readers that the association does run a complaints service and should they have any complaints about service, supply, etc, they should write to me and the matter will be looked into. The association is quite prepared to take up complaints from the public against both members and non-members.

Incidentally, it may interest you to know that there are plans for the future to set up affiliated groups for both dealers and manufacturers.

Nigel Backhurst
General Secretary CTA
108 Margaret Street
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Leicestershire LE6 2LX

Programs needed!

Help. Programmers everywhere, I need educational programs!

I have just purchased a 48K Spectrum for use in a hostel for mentally handicapped adults, but I am unable to find any suitable teaching programs to use with them. If you feel that you can help, I require programs in the fields of maths, spelling, recognising colours, improving co-ordination, etc.

Because of the group that the programs are intended for, they need to be fun to use and should make full use of colour, sound and graphics.

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J. MORRISON (MICROS)

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Star Swarm

A new game for the 16K Spectrum by Richard Sharod

The object of this game, for the 16K Spectrum, is to shoot down the aliens which appear in formation at the top of the screen. Each alien will fall out of formation and try to pass you. Points are awarded for the destruction of each alien, but points are also deducted from your score for each alien that passes you.

If you crash into an alien, you will lose one of your three lives.

When you clear a formation, another will appear at the top of the screen. When you have cleared six formations, you will be moved to a star-base where you will have to shoot a mother ship. Sharp shooting is needed here to gain a high bonus.

Controls are: 6 — left, 7 — right, 0 — fire.

Program notes

The program includes two machine code routines which are used to create sound effects. The codes for these routines are held in the first two data statements.

The program uses all 21 user defined graphics. It is advisable to enter and run lines 10-31 before the rest of the program, so that you can see them.

NB. Great care should be taken to ensure that the data is entered correctly.

```
    1 REM
          "STAR-SWARM"
written by Richard Sharod

    2 RESTORE : CLEAR 32399
    3 LET n$="SPECTRUM": LET v=17
50: FOR a=32400 TO 32459
    4 READ n: POKE a,n
    5 NEXT a
    6 DATA 6,1,197,33,15,0,17,40,
0,229,205,181,3,225,17,16,0,167,
237,90,125,254,255,32,237,193,16
,230,201,0
    7 DATA 6,1,197,33,0,3,17,1,0,
229,205,181,3,225,17,16,0,167,23
7,82,32,240,193,16,253,201,0,0,0
,0
   10 FOR z=144 TO 164: FOR f=0 T
O 7: READ a: POKE USR CHR$ (z)+f
,a: NEXT f: NEXT z
   11 DATA 65,67,78,248,76,70,3,0
   12 DATA 2,130,226,62,98,194,12
8,0
   13 DATA 64,224,224,64,64,64,22
4,0
   14 DATA 2,7,7,2,2,2,7,0
   15 DATA 146,84,0,214,0,84,146,
0
   16 DATA 170,170,255,248,14,3,1
,1
   17 DATA 85,85,255,31,112,192,1
28,128
   18 DATA 48,125,215,199,109,56,
16,16
   19 DATA 12,190,235,227,182,28,
8,8
   20 DATA 3,30,241,121,14,19,33,
64
   21 DATA 192,120,143,156,112,20
0,132,2
   22 DATA 128,71,60,225,60,71,13
1,1
   23 DATA 1,226,60,135,60,226,19
3,128
   24 DATA 8,4,127,227,127,72,36,
18
   25 DATA 16,32,254,199,254,18,9
6,72
   26 DATA 248,137,15,60,35,17,8,
4
   27 DATA 31,145,240,60,196,136,
16,32
   28 DATA 129,67,36,28,48,96,66,
68
   29 DATA 129,66,100,56,12,6,66,
34
   30 DATA 201,147,156,140,152,18
0,226,193
   31 DATA 147,201,101,49,25,45,7
1,131
   60 GO SUB 3000
   70 LET sc=0: DIM a$(12): LET a
$="[redacted]"
   71 LET hit=0
   72 LET li=3
   75 BRIGHT 1: INK 5: PAPER 0: B
ORDER 0: CLS : LET f=1
   80 IF f>12 THEN GO TO 1000
   81 PRINT INK 5;AT 0,20;"SCORE=
";sc
   82 PRINT AT 0,0;: FOR q=1 TO l
i-1: PRINT "IOI ";: NEXT q
   85 LET a=15
   86 LET b$=a$(f)+a$(f+1)
   87 PLOT 0,16: DRAW 10,-10: DRA
W 228,0
   88 DRAW 10,10: DRAW 0,-16: DRA
W -248,0: DRAW 0,16
   89 PRINT AT 2,10;: FOR l=0 TO
hit: PRINT "
   90 FOR z=0 TO 20 STEP 1: PRINT
 AT z,15;"IOI": RANDOMIZE USR 324
30: PRINT AT z,15;"   ": NEXT z
   91 PRINT INK f/2; BRIGHT 1;AT
2,10;b$;" ";b$;" ";b$;" ";b$;" "
;b$;
   95 PRINT AT 2,10;: FOR l=0 TO
hit: PRINT "   ";: NEXT l
   96 LET x1=10: LET y1=10
  100 LET x=2: RANDOMIZE : LET d=
INT (RND*15): LET l=INT (RND*15)
: LET y=l+d
  110 PRINT AT 20,a-1;" IOI "
  120 PRINT AT x1,y1;"   "
  140 LET a=a+(INKEY$="7" AND a<2
7)-(INKEY$="6" AND a>2)
  160 IF INKEY$="0" THEN GO SUB 2
50
  170 LET x=x+1: LET y=y+(RND<.4
AND y<28)-(RND>.6 AND y>1)
  175 IF x=20 THEN LET sc=sc-10*f
: PRINT AT 0,25;"   ";AT 0,25;s
c: PRINT AT x,y;"   ": GO TO 300
  180 PRINT INK f/2;AT x,y;b$
  185 IF x=19 AND y=a THEN GO TO
600
  186 IF x=19 AND y=a-1 THEN GO T
O 600
  187 IF x=19 AND y=a+1 THEN GO T
O 600
  190 LET x1=x: LET y1=y
  195 BEEP .01,(x/2*f/2)-20
  200 GO TO 110
  250 LET t=a: FOR g=19 TO x1 STE
P -2: PRINT AT g,t;"I I";AT g,t;"
  ": NEXT g: PRINT AT g,t;"###":
RANDOMIZE USR 32400: PRINT AT g,
t;"  "
  260 IF t=y OR t=y+1 OR t+1=y+1
OR t+1=y THEN GO TO 500
  270 RETURN
  300 LET hit=hit+1
  310 IF hit>=5 THEN LET hit=0: L
ET f=f+2: PRINT AT 20,a-1;"   "
;AT x,y;"   ": GO TO 60
  320 GO TO 95
  500 FOR h=1 TO 3: PRINT AT x,y;
"###": RANDOMIZE USR 32430: PRINT
 AT x,y;"   ": NEXT h
  510 LET sc=sc+10*f
  512 PRINT AT 0,25;"     ";AT 0,
25;sc
  515 LET hit=hit+1
  520 GO TO 310
  600 PRINT AT 20,a-1; FLASH 1; I
NK 6; PAPER 0;"[redacted]";AT 19,a-1;"
[redacted]": FOR f=1 TO 10: RANDOMIZE
USR 32430: NEXT f
  610 LET li=li-1
  620 IF li<>0 THEN GO TO 75
  630 IF sc<v THEN GO TO 650
  640 LET v=sc: PRINT AT 10,1;"YO
U HAVE REACHED THE HI-SCORE"
  645 PRINT AT 15,6;"PLEASE ENTER
 YOUR NAME": INPUT "NAME>";n$
  650 CLS : PRINT AT 10,10;"HI-SC
ORE=";v;AT 12,12;"BY ";n$
  660 FOR f=-50 TO 50 STEP 1: BEE
P .1,f: NEXT f
  670 GO TO 60
 1000 CLS
 1001 LET k=1000
 1010 PLOT 24,24: DRAW 0,100
 1011 PLOT 232,24: DRAW 0,100
 1012 PLOT 40,32: DRAW 0,84
 1013 PLOT 216,32: DRAW 0,84
 1014 PLOT 56,40: DRAW 0,68
 1015 PLOT 200,40: DRAW 0,68
 1016 PLOT 72,48: DRAW 0,52
 1017 PLOT 184,48: DRAW 0,52
 1020 PLOT 0,8: DRAW 80,0: DRAW 0
,-8: DRAW 80,0: DRAW 0,8: DRAW 8
0,0
 1030 PLOT 24,24: DRAW 48,24
 1040 PLOT 232,24: DRAW -48,24
 1050 PLOT 24,124: DRAW 48,-24
 1060 PLOT 232,124: DRAW -48,-24
 1070 PRINT AT 0,5;"[redacted]";sc;AT
 0,17;"[redacted]";k
 1080 FOR f=2 TO 20: PRINT AT f,1
5;"IOI": RANDOMIZE USR 32400: PRI
NT AT f,15;"   ": NEXT f
 1090 LET a=15: LET c=+1: LET x=3
: LET y=0
 1200 PRINT AT x,y-1;"  [redacted]  ";AT x+
1,y-1;"  [redacted]  "
 1205 LET k=k-5: PRINT AT 0,23;k;
"  "
 1210 PRINT AT 20,a-1;" IOI "
 1220 LET a=a+(INKEY$="7" AND a<1
8)-(INKEY$="6" AND a>12)
 1230 BEEP .01,y*2
 1240 IF INKEY$="0" THEN GO SUB 2
000
 1250 LET y=y+c
 1260 IF y>28 THEN LET c=-1
 1270 IF y<2 THEN LET c=+1
 1280 GO TO 1200
 2000 RANDOMIZE USR 32430: IF a<>
y THEN RETURN
 2010 FOR f=19 TO 3 STEP -1: PRIN
T AT f,a;"I I": BEEP .1,f*2: PRIN
T AT f,a;"   ": NEXT f
 2020 FOR f=1 TO 10: PRINT AT x,y
;"   ";AT x+1,y;"   ": RANDOMIZE U
SR 32400: PRINT AT x,y;"[redacted]";AT x
+1,y;"[redacted]": NEXT f
 2030 LET sc=sc+k: PRINT AT 0,11;
sc
 2031 IF v<sc THEN LET v=sc
 2035 PRINT AT x,y;"   ";AT x+1,y;
"   "
 2040 FOR f=20 TO 2 STEP -1
 2050 PRINT AT f,a;"IOI": BEEP .1,
f: PRINT AT f,a;"   ": NEXT f
 2060 CLS : PRINT AT 10,5;"[redacted]
[redacted]";AT 15,6;"[redacted]
[redacted]"
 2070 LET li=li+1
 2080 BEEP .2,RND*40
 2090 IF INKEY$="" THEN GO TO 208
0
 2100 GO TO 75
 3000 INK 5: PAPER 0: BORDER 0: C
LS : PRINT INK 5; PAPER 1;AT 0,0
;"[redacted]
[redacted]"
 3010 PRINT '" SCORE  10  30  50
  70  90  110"
 3020 PRINT '" SHIP [redacted]
[redacted]"
 3030 PRINT '"  Hitting the abov
e ships will    gain you the abo
ve points."
 3040 PRINT '"  However letting
 them past      will lose you po
ints."
 3050 PRINT '"  You have to kill
  off as many   aliens as you ca
n before you    reach the star-b
ase."
 3085 PRINT INK 5; PAPER 1; FLASH
 1;AT 21,0;"[redacted]
[redacted]"
 3090 BEEP .02,RND*40
 3100 IF INKEY$="" THEN GO TO 309
0
 3110 CLS
 3120 PRINT '"   When you reach t
he star-base    you will have to
 shoot a        mother ship."
 3130 PRINT '"                  [redacted]
rship": PRINT "
 3140 PRINT '"   Bonus point are
 avalible,      so sharp shooti
ng is needed    to gain high po
ints."
 3150 PRINT '"   You get an extr
a ship after    hitting the mot
hership."
 3160 PRINT '"    6 Left  7 Righ
t  0 Fire"
 3170 PRINT INK 5; PAPER 1; FLASH
 1;AT 21,0;"[redacted]
[redacted]"
 3180 BEEP .1,RND*40
 3190 IF INKEY$="" THEN GO TO 318
0
 3200 RETURN
```

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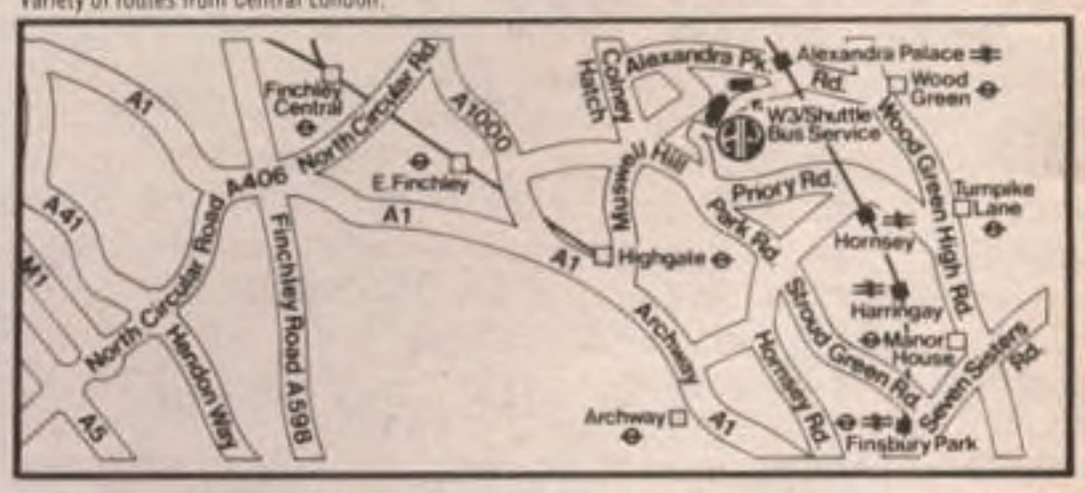

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Galloping llamas!

***David Kelly** talks to a man who is hooked on llamas – Jeff Minter*

Llamasoft is an unusual animal. It is now one of the top independent Commodore Vic20 and 64 software houses, but it is still basically a one-man company.

Jeff Minter began programming the Vic20 when he was forced to spend an unhappy few months lying on his back recovering from a nasty virus infection. After this enforced break in his college course in maths and computing — which he didn't care for very much anyway — he decided not to return, but to push on with his galloping Llamasoft venture.

As to the reasoning behind his company's choice of name he says, "I like Llamas", to which there are few answers. And to prove the point he sports a knitted pullover with repeated motif looking uncommonly like the mountain-loving ruminant.

Jeff, who recently celebrated his 21st birthday, formed the company just over a year ago to sell his games. However, his interest in micro-computers goes back further. At sixth form college he started by studying double-maths A-levels which he hated. "So they put me on an English course — and I used to write code during the lessons," says Jeff. "I was only allowed to borrow the 6502 book from the library for a week so I had to learn it quick!

"I did some programming on the 8K Pet. That was in the days when an Apple with high-resolution screen was heaven and having more than 8K was a dream."

While at college Jeff programmed a graphics Rom for DK'Tronics and then started thinking about Vic20 programming. "It was cheap, and it had colour. It's very strange — one of the last things I remember on the day I fell ill was stumbling into a shop in Oxford asking if they had a Vic."

Brain-damaged

In April last year, Llamasoft was getting orders worth £15 to £20 a week. "Now we are banking about £5,000 a week which, for a one-man operation, is really nuts." Jeff shakes his head, slightly bemused.

Jeff is, first and foremost, a programmer. And like so many programmers, he is a science fiction fanatic — his book shelves are crammed with garish covers from Asimov to Herbert.

The arcades also attract him. He spends a good deal of time there and actually has his own arcade machine of *Space Firebird* – a version of *Phoenix* — in his work room. Jeff reckons you have to be an arcade junkie to write good computer games: "Eugene Jarvis who wrote *Defender* for Williams said once that to come up with good games ideas you have to be a bit brain-damaged — and he has a point."

"The first game I produced was a version of *Defender* and I solemnly swear not to copy an arcade game again. I am now totally against the idea of arcade copies — you can do just as well without imitating other people's ideas. I can't really see what is the fun in sitting down and coding something that has already been done.

"Most of the software houses today only seem to be interested in putting everything in a special box. I went up to one recently who spend £40,000 a month on advertising. They said, 'This game will be the top seller in two months time.' To say that before the game has even been written is incredible."

At the Pet show last June — Llamasoft's first public appearance — Jeff's version of *Defender* was seen by Jay Balakrishnan, founder of HES, one of the big US software houses, and he took up the American rights to the program calling it *Aggressor*. Since then HES has taken *Grid Runner* from Jeff which has become a number-one best seller. Sixty per cent of Jeff's income now comes from the US, just from these two games.

At the beginning of April Jeff concluded a deal with HES to write games for them: "Originally they wanted me to write 10 games a year — we settled on four. That is much more realistic — I can then afford to sit down and tweak at each program until it is just right before I hand it over.

"The 64 is going to be massive in the US. It is rumoured that the price may drop to under $200 and all the big Atari companies like Broderbund are converting their material for it.

"I first saw the machine at last year's Pet show in June. Then HES brought an American machine over for me in September. It is a great machine — just about anything you can do on the Atari you can do on the 64. Although it has fewer colours it has more sprites — more moveable graphic characters. And sprites are *the* way to go.

"Most arcade machines — *Phoenix* for example — are just machines that can handle 64 multi-coloured sprites. The 64 has 8 sprites but you can improve on that. By interrupting the screen scan you can, theoretically, have 256 but I find that 64 is more convenient. Otherwise all the interrupts slow down the processor."

When coding a program Jeff uses a modular approach: "I may get the ships moving one day, something else the next, but it is vitally important to de-bug each module every time I come to the machine. Then at the end I tie all the sections together with a start loop. I keep notes as I go along, sticking little *Remark* fields as I go. Nothing is so incomprehensible as your own code a month later.

"My next big game will be called *Matrix*. When I have got it right for the Vic, it will only take a few days to convert it to the 64 because only the screen access and

sound routines will need to be changed.

"Nobody writes in pure hex anymore. I still do a fair amount of work using the standard mini-assembler cartridge on the Vic. Although you cannot define labels on it, it is useful for de-bugging or for writing little routines that are machine-specific.

"Most of the time though I use the Commodore 64 assembler — a standard Pet assembler converted for the 64."

Doodling along

Jeff has a great deal of admiration for other programmers and believes that in the future it is the writers not the publishers who will attract attention. "In America it is already going that way — companies are starting to push names. HES is now pushing me and Tom Griner who did *Choplifter* for the Vic. He is only 17 and is very strong on coding and does a lot of very good conversions.

"*Star Raiders* on the Atari is the best game I've ever seen. To get that inside an 8K Cartridge is a great programming achievement. I think it is a capital crime that nobody knows who wrote it because Atari keep their programmers quiet. Whoever wrote it deserves to be very rich and have his feet kissed every morning. That game is evil!"

Jeff is really a software house manager by default. His interest is programming, but the idea of working for someone else does not appeal. Also, the idea of expanding and becoming an employer of other games writers doesn't seem right to Jeff: "I just want to carry on doing my own thing. When graphics get really complicated I might need a specialist — a cartoonist. Or I can see myself joining a programming team — but really I'm just doodling along getting the next game out."

Matrix will be ready in time for the Chicago show in June. "It's nearly working now — there is only one small bug to sort out. Occasionally, when you shoot a camel its bum gets left behind!"

Jeff plans to convert *Laser Zone* to the 64 and produce a sequel to *The Attack on the Mutant Camels* called *The Camel's Revenge*.

Meanwhile Jeff is hooked on *Matrix*. "By the time I demonstrate it in the States I want to be very good — I don't want anyone beating me out there!" ■

Staying cool . . .

***Mike Grace** picks his way through another selection of Vic20 arcade games*

I bought my Vic20 just after the very first machines had become available. Initially I was frustrated by a lack of software and, apart from those appalling 'games' in the back of the User Guide and a couple that appeared in early magazines, I was left stranded for several weeks before the first of Commodore's range of cartridges became available. I can well remember the day I saw the first software — after parting with what seemed like a fortune (£19.95 to be exact) I hurried eagerly home with my own version of *Space Invaders.'*

Regular readers will know I have a distinct dislike for the wham bam shoot 'em up style of game, preferring the more gentlemanly and skilful art of the adventure game or the game of chance. But, in those halcyon days of 1982 *Space Invaders* was all I had and I sat entranced, finger on the firing button, as wave after wave of . . . well, you know the game and if you're reading this you probably know the fascination.

So, in tribute to those early days, I thought I'd devote this review to the shoot 'em up type of game (or shoot 'em down in some cases). If you are already about to flick to the next page with a grimace of disgust or a tired yawn — stick with it, you may be in for a few surprises!

Let's start with *Abductor* by Llamasoft (who have one Jeff Minter — a programmer extraordinaire who is obviously going places). This cassette is priced at £6 and is for the unexpanded Vic, a fact hidden away on the instruction sheet. It would have been better to have the memory required displayed more prominently on the cassette itself or on the packaging.

On *Loading,* I was faced with a very low-resolution graphics drawing of an animal (presumably a llama) and the slightly twee remark that it was *lloading* (not a spelling error but a link to the double l in llama). But enough of the frivolity — on with the game.

Basically, you are in control of a plasma cannon which patrols along the bottom of the screen, guarding a few matchstick men you must protect. The baddies are a fleet of objects that fly about and try to pick up your men and take them off, whereupon you lose. Your aim is to blast the baddies out of the sky, either before they reach your crew, or at least before they get your man to the top of the screen. If you manage to get them before they actually get the man away he will fall safely to the ground and remain as bait for another fleet of baddies. Needless to say, each succeeding wave of the enemy gets harder to stop.

The game is fairly straightforward to play, and I liked the fact that with relatively little trouble you can exchange your insignificant cannon for a much more impressive (and double firing) one. I found the flight patterns of the aliens very stereotyped (but they still beat me as often as not) and their ability to appear as if from underground a little sneaky. But, one aspect of the game I felt was cheating, was the fact that it was impossible to rescue the poor little man at the extreme edge of the screen, either left or right.

"Blast as fast as you can!"

The instructions were good, the cover reasonable and I liked the tips given which include the classic remark *Stay cool,* as well as more mundane advice such as *Blast as fast as you can* and *Be accurate.* What did depress me was the comment that awesome players will be looking for a score of 15,000 or more — my own score was pitiful!

The next game I *Loaded* was *Power Blaster* from Romik, also for the unexpanded Vic, at £9.99. It seems only a couple of months ago I was bemoaning the fact there was so little software for the 16K expanded Vic — now it seems almost the reverse. Anyway, *Power Blaster* is an excellent example of lack of kilobytes not reducing originality, and is one of the best games I've played yet from Romik. *Loading* reveals the now traditional blue background and letters in Romik style, and after about six pages of totally unnecessary background spiel we get down to the game.

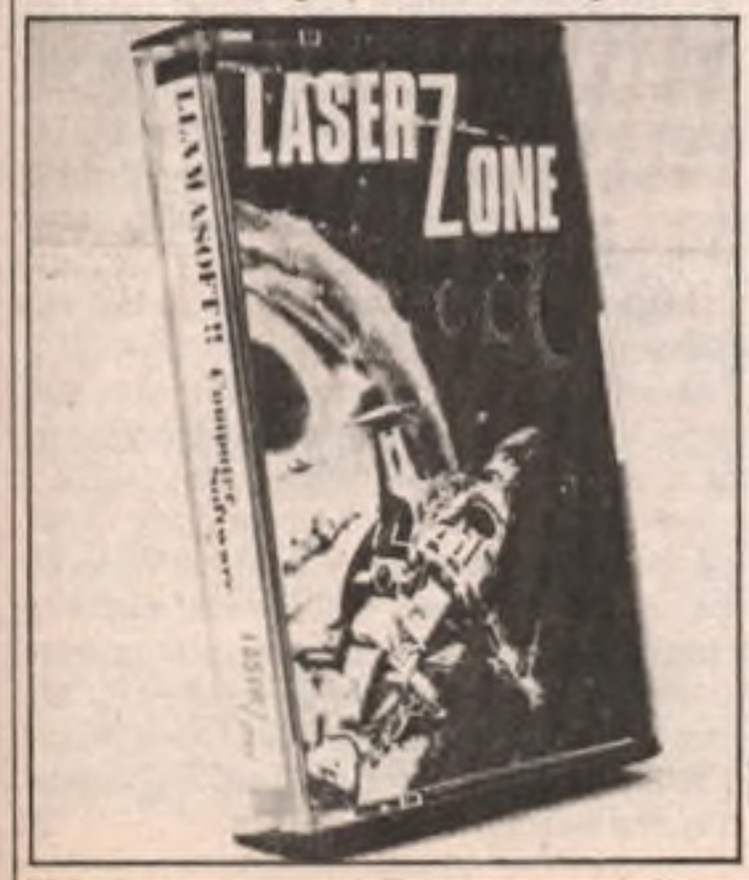
A maze-like structure is filled with dots (bombs planted by the baddies) and gal-

loping Martians. You are in control of a spaceship which is free to move around the maze, wiping out the bombs by firing blasts at them, and killing Martians before they get close enough to touch you.

Like all these games, it's much easier to play than to explain. Unlike quite a few it's also more interesting to play, partly because the score for bombs actually decreases if you aren't firing and destroying more (so you can end up with a minus score if you aren't careful) — and you only have one life. Let a Martian get you and zappo! You're dead.

I liked the originality of this one, and the noise made by firing the gun seemed more satisfying than usual. One unique feature was the ability to enter hyperspace to escape the Martians. Pressing the fire button at the same time as moving the joystick forward makes your ship disappear and reappear somewhere else at random. Unfortunately, in the excitement of the game, I found myself doing this by mistake, but practice gradually made this happen less often. The graphics weren't exceptional, but more than adequate and the Martians seemed slightly lovable little guys (even if they *were* baddies).

Let's stick with Romik for the next tape, *Time Destroyers* by Clifford Ramshawe,



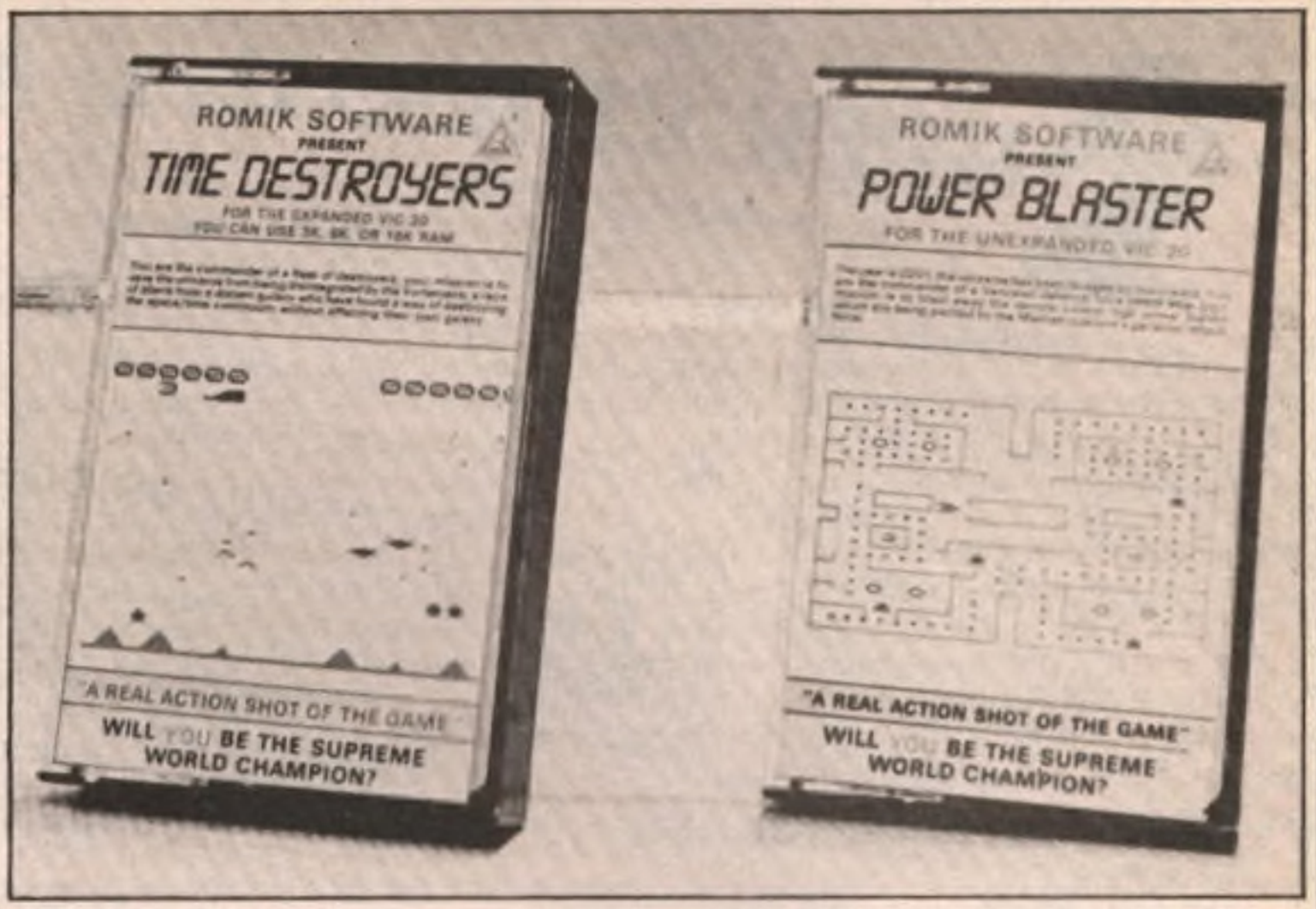
the same price but needing expansion of 3,8 or 16K. Romik has tended to standardise the keys if you're not using a joystick — full marks for that, and they've selected sensible keys as well, using A,S,D,F1 and F7 for the various directions and for Firing — but how anyone plays with keys once they've used the joystick is beyond me. And as with almost all these games there are various levels of skill, although *Time Destroyers* just adds more baddies whereas other games such as *Power Blaster* tend to increase speed as well.

Once the instructions are passed, the game goes on *Loading* for a long while — the screen fills with disturbing garbage which might put a few people off — then finally clears and asks which level you'd like to play. I picked 1 as usual, and found I was in another of those games where my spaceship is skimming over the surface of a planet with aliens swooping in to bomb, while all I can do is fly along trying to shoot them first. As I've said before I'm hopeless at this sort of game, but if I try to remain dispassionate how does this version differ from others?

Well, for a start this time the aliens are trying to airlift atomic powerplants from the surface of Mars, so you have to zap them out of the sky before they can get the powerplants away and turn from green meanies into purple super-meanies. As the skill levels increase you meet spidercraft, buzzers, magnetrons and the mothercraft! But the basic essence of the game is the same, you just fly along trying to kill them before they kill you. You have three lives, rather unimaginative bolts of power, but your ship will turn round and go the other way if you miss out on a baddie. Sadly, I wasn't inspired by this Romik version.

"Blast 'em when you see 'em!"

With my trigger-finger feeling a bit sore, I moved on to another Jeff Minter goody from Llamasoft called *Laser Zone*. This is quite the most skilful zap game I've seen, requiring a high degree of concentration. This time you have two spaceships to control, one on the horizontal and one on the vertical axis of a board shaped like a



graph. The ships can only move along their lines, and to make it even harder each ship must be positioned over a small mark to enable it to fire. Thus, if the horizontal ship is over a firing mark while the vertical isn't then only the horizontal ship will fire, whilst if both are over marks then both will fire.

By a neat trick of joystick control, it is possible to make one ship or the other tilt through 45 degrees to fire — a deadly cunning manouevre if you can get it right. The purpose of this is to blast the aliens (looking like a bunch of fugitives from a horror movie) before they can get either of your ships.

The game is so hard to play that you actually get a training program in ship movement (essential prior to serious playing) and then you're off. This game must be the best I've seen of this type yet, and almost converted me away from the adventure game.

The packaging is far superior to most software at this price (£6) and the instructions are clear, concise and extremely helpful. Once again we get some good Minter tips to help us, like *Blast 'em when you see 'em*, and there are 31 skill levels! There are other goodies in this game, but I've said enough. I recommend this game highly, and for those of you who do buy it I'll let you find out the extra thrills for yourself. Not an easy game to master — but terrific fun getting there.

Firm	Program	Cost	Value (1-10)
Llamasoft Software 49 Mount Pleasant Tadley Hants	*Abductor* *Laser Zone*	£6.00 £6.00	5 9
Audiogenic Ltd PO Box 88 Reading Berks	*Kaktus*	£7.95	8
Romik Software 24 Church Street Slough SL1 1PT	*Power Blaster* *Time Destroyers*	£9.99 £9.99	7 4

And what game have I left to last? Another firepower game, to be sure, but one with a neat twist. This is *Kaktus* from Audiogenic at £7.95 (needs 8K expansion) and is perhaps the neatest twist on the Invaders type whilst retaining the basic concept. This time you are a gopher (and to their credit the people who write the instructions actually say 'believe it or not' before telling you that). You are mainly underground, firing a cannon through holes in the ground at wasps and hornets who are trying to get at a cactus that you must save from destruction. Occasional moles zoom along and try and block up your holes to stop you firing and buzzards drop nasty eggs on you, but through it all you just keep firing.

Of course, the rationale is plain ridiculous (after all, have you ever heard of a gopher firing a cannon?) but as usual that doesn't matter one little bit. All that matters is that you keep your finger on the firing button. It's a good game, fast and furious, with reasonable graphics and a level of skill that doesn't keep the idiots like me from giving up at the start. I found it not as skilful as *Laser Zone* but in some ways more enjoyable — and it was a welcome change not to be zapping aliens out of a black Martian sky.

And so we pause, exhausted and tired, right index finger still twitching, eyes strained and heart pumping. I'm definite in my own mind that the standard of Vic software is increasing in quality, not in leaps and bounds, but in small and sure stages, with one or two gems still standing out of the crowd. I feel even the zap and pow games are getting better as well, and I'm not so superior about them as I used to be. But most of all — I'm flaked. ■

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All along the line . . .

***Keith Wardle** presents a line control game for the BBC A and B*

This program *Voida* is a game for the BBC micro which Runs on both Model A and B.

The objective of the game is to control a diagonally moving line, while avoiding oncoming vertical lines. To change the direction of your line simply press any key.

You start the game with three lives — one is lost each time you hit an oncoming line. Speed increases as the game progresses. If required, difficulty can be increased by adding the following lines:

115 FOR R% = 1 TO (either 2 or 3)

145 NEXT

At the end of the game your score is displayed. To restart the game, press the red fl key.

Line description

10	Select MODE 7 for introductory text.
20	Delete cursor.
30	Print text (lines 340-540)
40	Set up function key 1 to restart game.
50	Select MODE 4 for game display.
60	Delete cursor.
70	Set Z% (position of diagonal line).
80	Set Y% (how much to move Z%).
90	Set K% (score) to zero.
100	Set L% (number of times vertical lines have been hit) to zero.
110	Start game loop.
120	Pick random number.
130	Move graphics cursor.
140	Draw vertical line.
150	Scroll screen downwards.
160	Check to see if diagonal line has hit vertical line.
170	Calculate delay period (low if score is high and vice versa).
180 190 200	Execute delay.
210	Has a key been pressed?
220	If so change direction.
230	Clear buffers.
240	Move graphics cursor to present position of diagonal line.
250	Calculate new position of diagonal line.
260	Is diagonal line off right hand side of screen?
270	Is diagonal line off left hand side of screen?
280	Draw new section of diagonal line.
290	Make a sound.
300	Add 1 to score.
310	Continue if not hit three times.
320	Otherwise print score.
330	End program.
340-540	Introductory text. ■

```
L.
  10 MODE7
  20 VDU23;8202;0;0;0;
  30 PROCTEXT
  40 *KEY1|MG.50|M
  50 MODE4
  60 VDU23;8202;0;0;0;
  70 Z%=640
  80 Y%=32
  90 K%=0
 100 L%=0
 110 REPEAT
 120 A%=RND(39)*32
 130 MOVEA%,982
 140 DRAWA%,1006
 150 VDU30,11
 160 IF POINT(Z%,520)=1 THEN L%=L%+1:SOUND2,-15,123,1
 170 J%=(800-K%) DIV 100
 180 B%=TIME
 190 REPEAT
 200 UNTIL TIME>=B%+J%
 210 P%=INKEY(0)
 220 IF P%<>-1 THEN Y%=-Y%
 230 *FX15,0
 240 MOVEZ%,512
 250 Z%=Z%+Y%
 260 IF Z%>1248 THEN Y%=-Y%:Z%=1248
 270 IF Z%<32 THEN Y%=-Y%:Z%=32
 280 DRAWZ%,544
 290 SOUND0,-12,1,1
 300 K%=K%+1
 310 UNTIL L%=3
 320 PRINTTAB(5,9)"Score = ";K%
 330 END
 340 DEFPROCTEXT
 350 PRINTTAB(12,7)CHR$131CHR$141"V O I D A"
 360 PRINTTAB(12,8)CHR$131CHR$141"V O I D A"
 370 P%=INKEY(750)
 380 CLS
 390 PRINT''''CHR$133"In this 9ame you are the dia9onally"
 400 PRINTCHR$133"movin9 line and must avoid the oncomin9";
 410 PRINTCHR$133"lines. To chan9e direction all you need";
 420 PRINTCHR$133"do is Press any key."
 430 PRINT'CHR$130"You are 9iven three lives to"
 440 PRINTCHR$130"start with and each time you"
 450 PRINTCHR$130"collide with the oncomin9"
 460 PRINTCHR$130"lines a life is lost and a"
 470 PRINTCHR$130"sound will occur."
 480 PRINT'CHR$134"At the end of the 9ame your"
 490 PRINTCHR$134"score will be disPlayed"
 500 PRINT'CHR$131"To restart the 9ame Press the red key"
 510 PRINTCHR$131"marked"CHR$129"f1"
 520 PRINT''''CHR$136"Press any key to start the 9ame"
 530 R=GET
 540 ENDPROC
```

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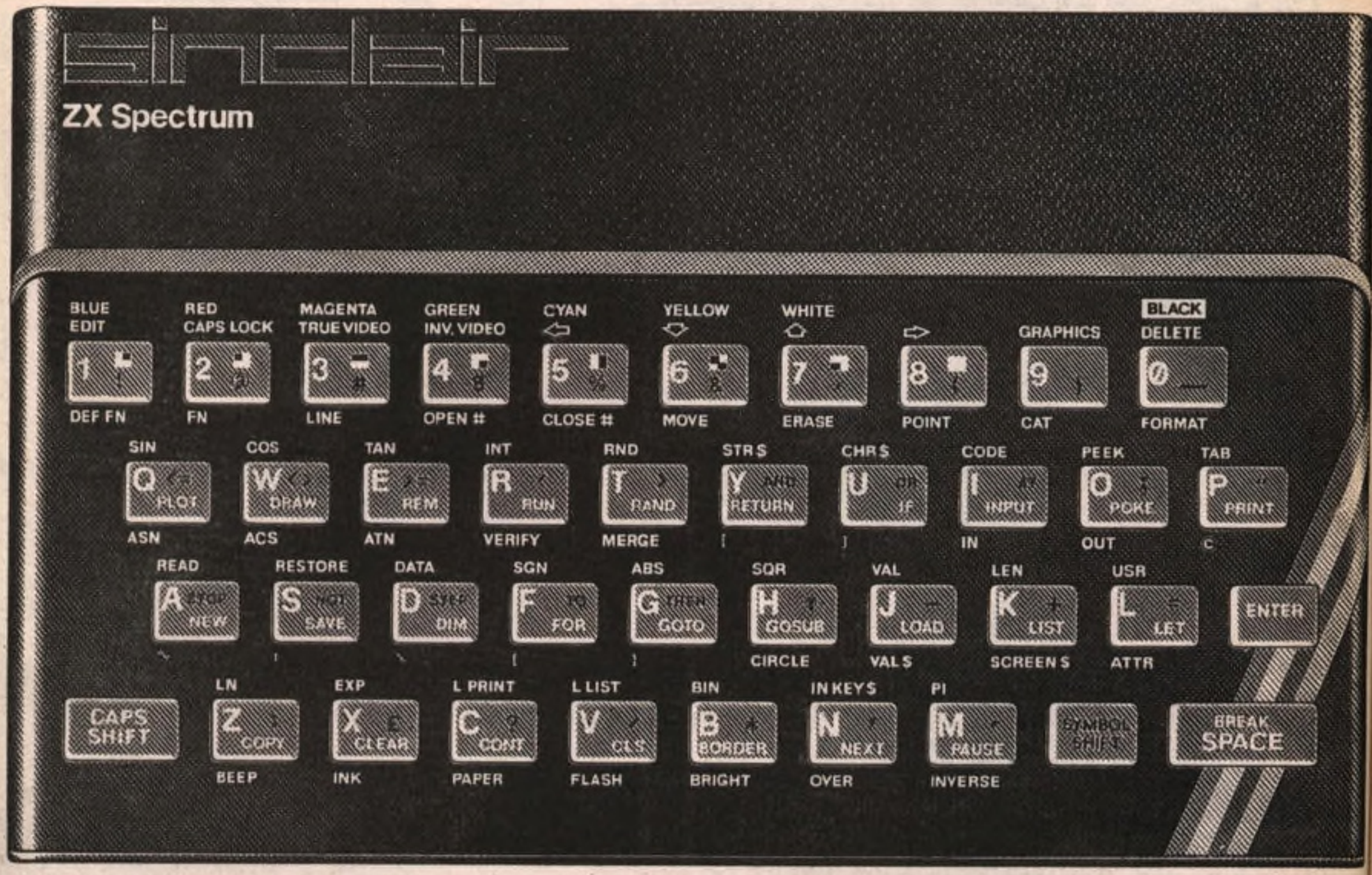

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The Pit — part one

***Paul Sellin** presents* The Pit – *a three-part text adventure for the 16K Spectrum*

Writing an adventure game is not nearly as difficult as it may appear, as long as you always remember to keep the different parts of the program in their own separate blocks. It is always a good idea to keep a list of where each section starts, together with a note of all the variables, strings and their uses.

The program printed here is called *The Pit* and is a text adventure game, written to fit into a 16K ZX Spectrum. There is no reason why the program cannot be typed into any other machine, as long as any differences in the Basic, such as *Print At, Drawing* and String Slicing are taken into account.

In order to write an interesting program within the memory available, various space-saving ideas are used. The most obvious of these is the use of multi-statement lines, which on the Spectrum can be of any length, although in practice they are nearly always brought to an end by an *If . . . Then* statement. Other machines whose Basic includes *If . . . Then . . . Else* can of course get round this problem if even longer lines are required.

Throughout the length of the game, the computer stores a 'map' of the playing area in a character array. In this program the game can be played on four levels, each of 20 rooms by 10 rooms. This means that the array is dimensioned by the command *Dim(4,10,20)*, which can be thought of as four pages of a book, each one containing 10 rows of letters and each row containing a line of 20 letters.

The player enters on 'page one' and moves around the rows or columns on that page. Line 100, after *Clearing* out the User Definable Graphics to make more memory available, calls sub-routine 9000, which initialises the main array. After printing up the title and credits, the computer dimensions the array and then proceeds to fill it with the monsters and nasties which you will come up against later.

The *For . . . Next* statement, using *z* as the control variable, makes the program fill

```
 100 CLEAR PEEK 23732+256*PEEK 2
3733: GO SUB 9000: CLS : PRINT "
You are now in The Pit.""": LET
 s=20: LET p=20: LET d=20: LET i
=20: LET fl=10: LET l=0: LET si=
1: LET ar=INT (1+RND*4): LET p$=
" ": LET y$=" "
1000 POKE 23692,255: IF INKEY$<>
"" THEN GO TO 1000
1002 LET p$=INKEY$: IF p$="" THE
N GO TO 1002
1003 IF INKEY$="m" THEN GO SUB 9
200
1004 IF INKEY$="f" THEN GO TO 27
00
1005 IF INKEY$="t" AND y$="the R
une Staff" THEN PRINT "Ready to
 Teleport."'': GO TO 2200
1010 LET oy=y: LET ox=x: LET y=y
+(p$="6" AND y<10)-(p$="7" AND y
>1): LET x=x+(p$="8" AND x<20)-(
p$="5" AND x>1): IF s<1 THEN GO
TO 9800
1011 IF CODE p$<53 OR CODE p$>56
 OR (oy=y AND ox=x) THEN GO TO 1
000
1015 PAPER 5: PRINT "You move ";
: IF p$="7" THEN PRINT "north."
1017 IF p$="6" THEN PRINT "south
."
1018 IF p$="5" THEN PRINT "west.
"
1019 IF p$="8" THEN PRINT "east.
"
1020 PAPER 7: PRINT '"You are at
 ";x;" ,";y: LET z$=a$(z,y,x): RE
STORE 1500+CODE z$: READ o$,e: I
F o$="x" THEN GO TO e
1532 PRINT '"You have found ";o$
: GO TO e: DATA "an empty room",
1000
1542 DATA "x",2000
1563 DATA "x",2800
1596 DATA "some loot",2400
1599 DATA "an ancient chest",250
0
1602 DATA "some flares",2900
1609 DATA "x",3000
1616 DATA "an unscrupulous Trad
er",3500
2010 LET a$(z,y,x)="m": RESTORE
2030: FOR h=1 TO 1+RND*6: READ p
$: NEXT h: PRINT "You have found
... "'TAB 3;;p$('TO LEN p$-1): I
```

'pages' one to four in turn (throughout the program the variable *z* is used as the level or 'page' number which the player is on). *o$* contains the five characters which will be put on to the array first. The *For . . . Next* loop containing *h* slices *0$* to produce one of its five characters each time round, so when *h=1* then *p$=o$(1)* or £ and when *h=2* then *p$=o$(2)* or *f*, etc up to *h=5* inclusive.

There is a second loop inside the *h* loop made by the *For . . . Next* statement containing *e* as its control variable. For each count of *h* this loop is set up to count *e* from 1 to a number between 8 and 13. For every loop of *e* one space in the specified page of the main array *a$* is filled with the character present in *p$*. This puts the characters *£,f,t,c,?* into a random position on that page any number of times between 8 and 13.

Next, the monsters must be added. The *e For . . . Next* loop is set up again, this time to increment *e* from 1 to between 20 and 25 (ie, there will be more monsters on each page than any of the other five characters). After that has finished looping, the *e* loop is set up a final time to add between 3 and 6 *, or gems per page.

When the *e* loop has finished, it means that one of the four pages has been filled with varying numbers of the seven characters. When the computer meets the *Next z* command, it increases *z* to two and repeats the whole process, filling up page 2, and so on until *z* is greater than 4.

Notice that when calculating the random positions in the array, *1* is added to *Rnd+9*, etc, to prevent a low value of *Rnd* from producing a result of zero — this would cause the program to crash when the computer tried to find the part of the array with a subscript of zero.

Just before the subroutine *Returns* to line 100, it sets up the variables *z, y* and *x*, which record the player's position. These variables will always be used for the 'page' number *(z)*, row number *(y)* and column number *(x)* respectively.

At the start of the game the player is placed at position 10 of the first row of page 1. Also notice that that position in the main array is made empty, or equal to a space, so that the room with the entrance will not contain any monsters.

On returning from the subroutine, the variables which will be used to keep note of the player's condition throughout the game are set up. These are *s* for strength, *p* for psi power (for spells, etc), *d* for dexterity and *i* for intelligence, all initially set at 20. The game ends if your strength *s* ever drops to zero or below.

The other variables are: *fl*, the number of flares you carry, *l* the amount of loot you have, *si* whether you have sight or not (*si* =1 or 0) and *ar*, your armour, ranging from 1 (weak armour) to 5 (strong armour). *p$* and *y$* are string variables used later in the game.

So now we have set up the game ready to play, with a complete map of the area in the computer's memory and the players poised to enter. Next week we shall create the most dangerous part of an adventure game, the monsters . . . ■

● *The Pit* has been split into three parts. Enter part 1 of the program now and *Save* it on tape. Part 2 will be published next week. You will need to enter all three parts of the program before Running it.

```
F p$="nothing0" THEN GO TO 8000
2013 IF y$=" " THEN PRINT '"It's
 yours!": LET y$=p$: GO TO 8000
2015 PRINT '"you already have ";
 INVERSE 1'y$( TO LEN y$-1); INV
ERSE 0'"Do you want to swap it f
or the"; INVERSE 1'p$( TO LEN p$
-1): BEEP .3,24: PAUSE 1: PAUSE
0: IF INKEY$<>"n" THEN PRINT "It
's yours!": LET y$=p$: GO TO 800
0
2030 PRINT "OK."': GO TO 1000: D
ATA "the Avril stone5","nothing0
","the Gem of Grune1","the orb o
f Zot4","the Rune Staff4","the f
lame of Plathe2"
2200 INPUT "Co-ords to teleport?
 (x,y)";x,,y: INPUT "Level?";z:
IF (>1500 AND y=1 AND x=10 AND z
=1 THEN GO TO 9900
2210 IF x<1 OR y<1 OR x>20 OR y>
10 OR z<1 OR z>4 THEN BEEP .5,-1
6: GO TO 2200
2215 BEEP 2,24: GO TO 1020
2400 BEEP .05,12: BEEP .05,12: B
EEP .1,24: LET e=1+INT (RND*30):
 LET (=(+e: PRINT "You have foun
d ";e'': LET a$(z,y,x)=" ": GO T
O 8000
2505 LET a$(z,y,x)="m": PRINT FL
ASH 1;"Anything to do?": PAUSE 1
: PAUSE 0: IF INKEY$<>"o" THEN P
RINT "OK."': GO TO 1000
2510 RESTORE 2530: FOR h=1 TO 1+
RND*8: READ x$: NEXT h: PRINT "Y
ou have found... "'TAB 3;;x$: IF
 x$<>"nothing" THEN IF x$( TO 5)
<>"a set" THEN GO TO 2540
2514 IF x$="nothing" THEN GO TO
1000
2515 LET e=12-INT (RND*16): PRIN
T "To what do you want to add yo
ur bonus?": PAUSE 0: IF INKEY$="
i" THEN LET i=i+e: GO TO 2520
2516 IF INKEY$="d" THEN LET d=d+
e: GO TO 2520
2517 IF INKEY$="s" THEN LET s=s+
e: GO TO 2520
2518 IF INKEY$="p" THEN LET p=p+
e: GO TO 2520
2519 PRINT "OK."': GO TO 1000
2520 PRINT "You got ";e;" bonus
points!": LET p$=" ": LET a$(z,y
,x)="m": GO TO 8000
```

Direct access . . .

***Peter Forward** explains how to access block graphics from the keyboard*

All 16 graphic blocks can be printed on demand, in any of eight colours, together with cursor movements, directly from the keyboard.

The Dragon 32 block graphics can normally only be accessed using the rather cumbersome *Print Chr$( )* function, which makes the construction of games, figures and screen layouts time-consuming, and is particularly difficult for novice programmers. This machine code utility allows the direct entry of block graphics into print statements and strings.

The Basic program in Figure 1 should be typed in, paying particular attention to the contents of lines 60000 to 60050. It is a good idea to *Save* a copy of the program at this stage, just in case you have made an error which will cause the computer to 'hang up' when the program is Run.

After Running the program, the graphics mode can be entered at any time by pressing *Shift* ↑. The keys *1* to *8* will select the print colour, the keys *A* to *P* will input the 16 graphics blocks and keys *Z,X,V* and *Q* the cursor movements.

To enter graphics in your print statements, type in the normal way, then when graphics are required operate the *Shift* ↑. Next, type in the graphics and before closing the quotes operate the *Shift* ↑ again to return the keyboard to its normal mode to finish your program line. The *Shift* ↑ can be used at any time to toggle into, and out of, the graphics mode. However, operating *Return* will always reset the keyboard for normal operation.

When in the graphics mode, the space bar and the ← (delete) key still retain their normal functions, but other keys will be ignored.

The inclusion of cursor movements (keys *X,Z,V,Q*, being *Down, Up, Left, Right*) allows you to design complete figures such as chess pieces, invaders, etc, directly into the program line. Once the complete figure is given a string label, simply print it on demand using the *Print* or *Prints@* functions. If you overwrite your drawing, then due to the Basic interpreter, the cursor will print a space on your masterpiece. Don't worry — when your program is Run or *Listed*, you will see that all is well!

The Basic program is used to *Load* a machine code routine into the protected high memory of your computer — it assumes that your own program will start at line 40 onwards. This utility uses the fact that on entering the printout routine in Rom at *B54AH* there is a jump to Ram at *0167H* which normally contains an *Rts* (return from subroutine) instruction. Line 30 of the Basic program modifies this to jump to the new routine that you have entered starting at *7D01H*, which modifies the key value. A full listing is given in Figure 2.

Note that in line 10 the '200' should be modified to allow the string space required by your program. Also, the reserved memory space from *7E00H* to *7FFFH* is available for your own machine code routines, or to extend the above program to include other key controlled functions. ■

FIGURE 1

BASIC PROGRAM LISTING :keyboard graphics routine for DRAGON 32

```
1 REM *** KEYBOARD GRAPHICS-PETER FORWARD-COPYRIGHT 1983 ***
10 CLEAR 200, 32000
20 FOR T = 32001 TO 32226:READ A$:B$="&H"+A$:C=VAL(B$):POKE T,C:NEXT
30 POKE &H167,&H7E:POKE &H168,&H7Q:POKE &H169,&H01:POKE &H7DF3,&H3F
59999 END
60000 DATA 81,0D,26,04,7F,7D,F2,39,81,20,26,01,39,81,08,
          26,01,39,81,5F,26,06,73,7D,F2,86,00,39,7D,7D,
          F2,26,01,39,81,41,25,0A,81,50
60010 DATA 22,46,BB,7D,F3,39,12,12,81,32,26,04,86,4F,20,
          32,81,33,26,04,86,5F,20,2A,81,34,26,04,86,6F,
          20,22,81,35,26,04,86,7F,20,1A
60020 DATA 81,36,26,04,86,8F,20,12,81,37,26,04,86,9F,20,
          0A,81,38,26,04,86,AF,20,02,86,3F,B7,7D,F3,86,
          00,39,F7,7D,F4,81,58,26,11
60030 DATA FC,00,88,C3,00,20,10,83,05,FF,22,48,FD,00,88,
          20,3D,81,5A,26,11,FC,00,88,83,00,20,10,83,04,
          00,25,E2,FD,00,88,20,28,81,51
60040 DATA 26,11,FC,00,88,C3,00,01,10,83,05,FF,22,1E,FD,
          00,88,20,13,81,56,26,12,FC,00,88,83,00,01,10,
          83,04,00,25,E2,FD,00,88
60050 DATA F6,7D,F4,86,00,39,B6,00,89,B7,7D,F5,86,0D,BD,
          B5,4D,B6,7D,F5,B7,00,89,86,00,F6,7D,F4,39
```

continued on page 25

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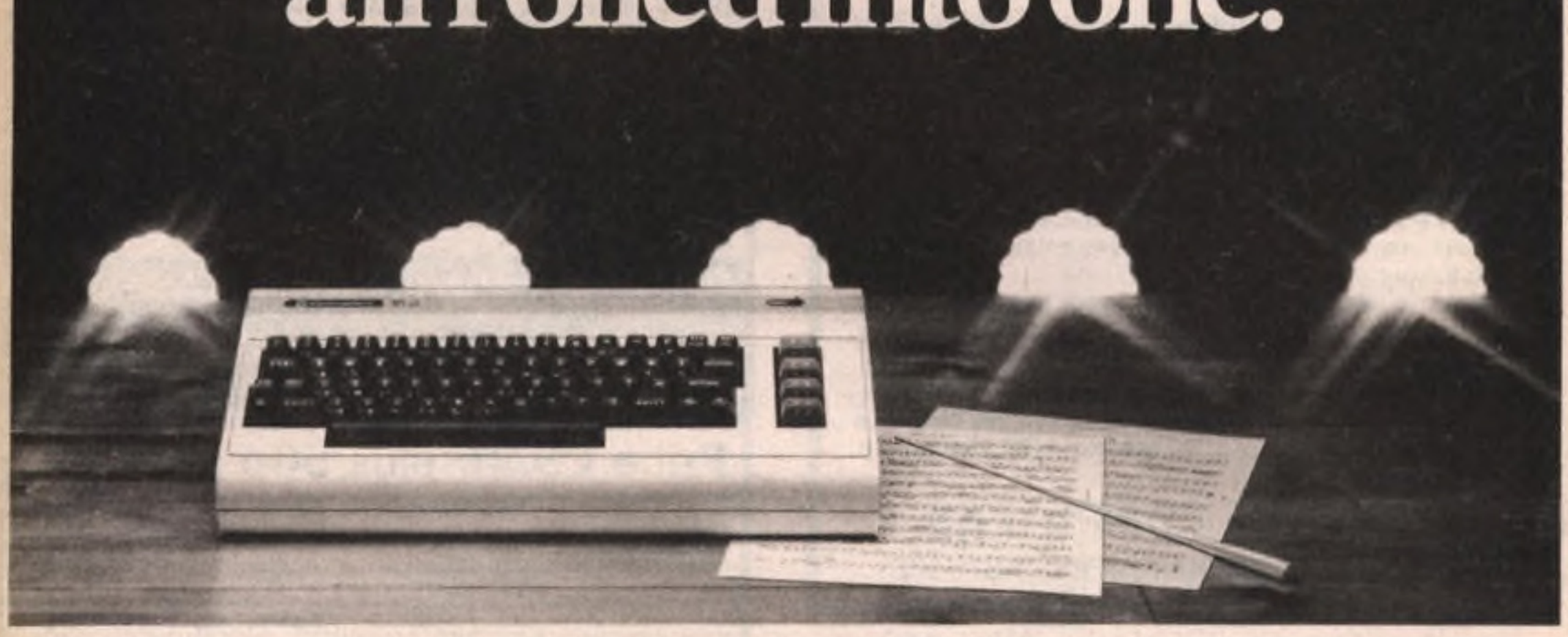

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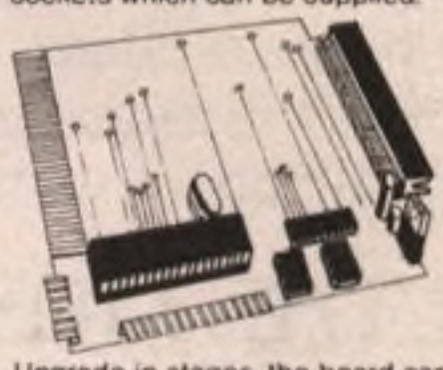

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FIGURE 2 - MACHINE CODE LISTING : Keyboard graphics routine

```
7D01   START     81 0D          CMPA #0D
                 26 04          BNE SPACE
                 7F 7D F2       CLR 7DF2
                 39             RTS
       SPACE     81 20          CMPA #20
                 26 01          BNE DELETE
                 39             RTS
       DELETE    81 08          CMPA #08
                 26 01          BNE TOGGLE
                 39             RTS
       TOGGLE    81 5F          CMPA #5F
                 26 06          BNE TEST
                 73 7D F2       COM 7DF2
                 86 00          LDA #00
                 39             RTS
       TEST      7D 7D F2       TST 7DF2
                 26 01          BNE KEY
                 39             RTS
       KEY       81 41          CMPA #41
                 25 0A          BLO COLOR2
                 81 50          CMPA #50
                 22 46          BHI CURSOR
                 BB 7D F3       ADDA 7DF3
                 39             RTS
                 12             NOP
                 12             NOP
       COLOR2    81 32          CMPA #32
                 26 04          BNE COLOR3
                 86 4F          LDA #4F
                 20 32          BRA COLOR
       COLOR3    81 33          CMPA #33
                 10 83 05 FF    CMPD #05FF
                 22 48          BHI NEWLINE
                 FD 00 88       STD 0088
                 20 3D          BRA EXIT1
       UP        81 5A          CMPA #5A
                 26 11          BNE RIGHT
                 FC 00 88       LDD 0088
                 83 00 20       SUBD #20
                 10 83 04 00    CMPD #0400
                 25 E2          BLO ADDLINE
                 FD 00 88       STD 0088
                 20 28          BRA EXIT1
       RIGHT     81 51          CMPA #51
                 26 11          BNE LEFT
                 FC 00 88       LDD 0088
       ADDONE    C3 00 01       ADDD #01
                 10 83 05 FF    CMPD #05FF
                 22 1E          BHI NEWLINE
                 FD 00 88       STD 0088
                 20 13          BRA EXIT1
       LEFT      81 56          CMPA #56
                 26 12          BNE EXIT2
                 FC 00 88       LDD 0088
                 83 00 01       SUBD #01
                 10 83 04 00    CMPD #0400
                 25 E2          BLO ADDONE
                 FD 00 88       STD 0088
       EXIT1     F6 7D F4       LDB 7DF4
       EXIT2     86 00          LDA #00
                 39             RTS
       NEWLINE   B6 00 89       LDA 0089
                 B7 7D F5       STA 7DF5
                 26 04          BNE COLOR4
                 86 5F          LDA #5F
                 20 2A          BRA COLOR
       COLOR4    81 34          CMPA #34
                 26 04          BNE COLOR5
                 86 6F          LDA #6F
                 20 22          BRA COLOR
       COLOR5    81 35          CMPA #35
                 26 04          BNE COLOR6
                 86 7F          LDA #7F
                 20 1A          BRA COLOR
       COLOR6    81 36          CMPA #36
                 26 04          BNE COLOR7
                 86 8F          LDA #8F
                 20 12          BRA COLOR
       COLOR7    81 37          CMPA #37
                 26 04          BNE COLOR8
                 86 9F          LDA #9F
                 20 0A          BRA COLOR
       COLOR8    81 38          CMPA #38
                 26 04          BNE COLOR1
                 86 AF          LDA #AF
                 20 02          BRA COLOR
       COLOR1    86 3F          LDA #3F
       COLOR     B7 7D F3       STA 7DF3
                 86 00          LDA #00
                 39             RTS
       CURSOR    F7 7D F4       STB 7DF4
       DOWN      81 58          CMPA #58
                 26 11          BNE UP
                 FC 00 88       LDD 0088
       ADDLINE   C3 00 20       ADDD #20
                 86 0D          LDA #0D
                 BD B5 4D       JSR B54D
                 B6 7D F5       LDA 7DF5
                 B7 00 89       STA 0089
                 86 00          LDA #00
                 F6 7D F4       LDB 7DF4
                 39             RTS
```

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7DF5 = A STORE

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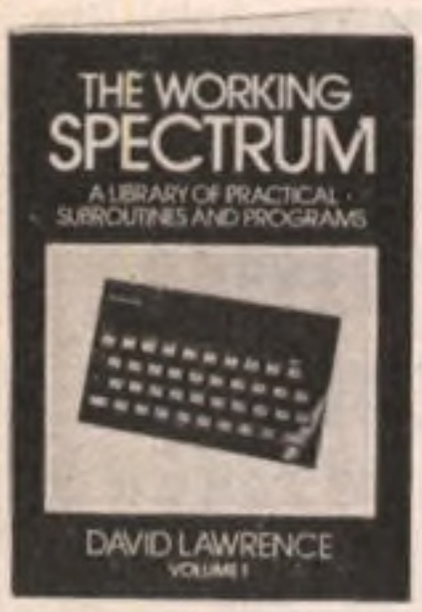

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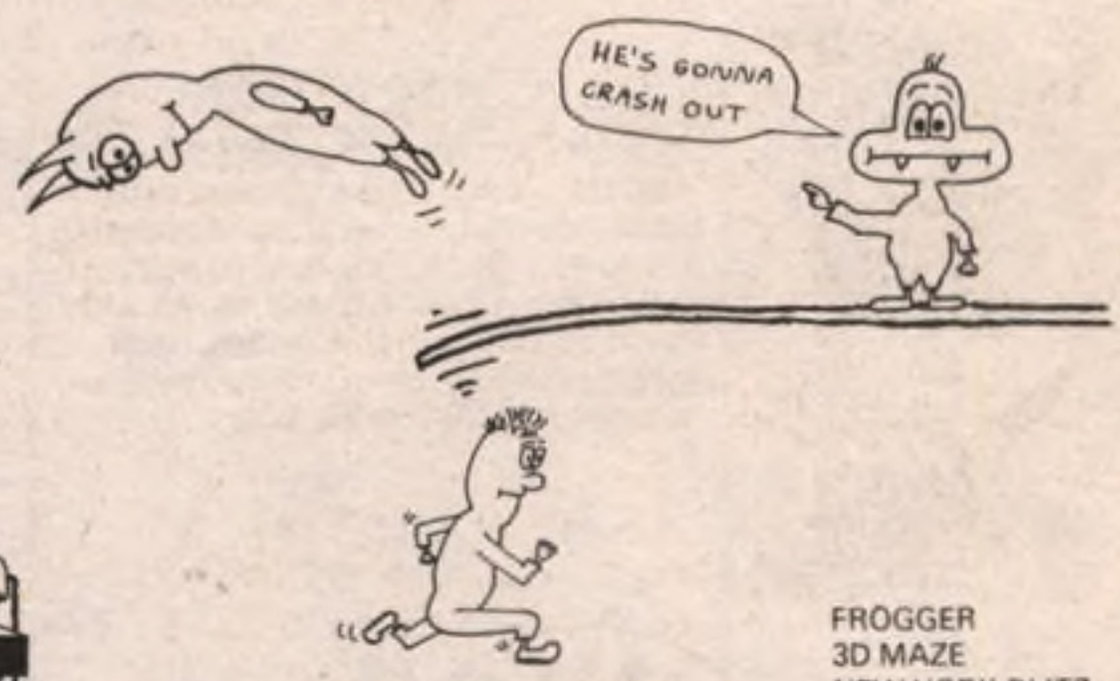

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The sizes of the planets relative to each other are approximately correct, although the sun is out of proportion.

The time taken for the orbit of each planet is: Mercury — 88 days; Venus — 255 days; Earth — 365 days (the moon orbits the Earth once every 30 days).

The main section of the program is contained in lines 200-330. Line 210 calculates the Earth's position, which is printed by line 230. The procedures to print the moon, Venus and Mercury are called in lines 240-260. A 1/10 second delay is called in line 270 while lines 280-300 over-print the moon, Venus and Mercury in their logical inverse colours; ie, black. Finally, line 310 over-prints the Earth.

Program notes

150 Calls procedure which sets all variables and defines characters.
160 Calls procedure which asks whether you want to plot the courses.
170 Causes characters to be printed at the graphics cursor.
180 Calls procedure to draw the Sun.
200- 330 Draws Earth. Calls procedures to draw and erase the Moon, Venus and Mercury. Erases Earth.
270 Causes a pause (10/100 sec) before continuing — to increase or decrease the speed of action, change the number.
350- 410 Procedure to draw the moon (relative to the Earth).
460- 540 Procedure to draw the Sun (uses Plot 85 for speed).
560- 650 Procedure to initialise all variables used.
670- 770 Procedures to draw and delete Venus.
790- 840 Procedure to delete the moon.
860- 960 Procedures to draw and delete Mercury.
980-1040 Procedure to ask whether the courses of the planets should be plotted or not.

Variables used

EDX — Degrees from Earth's starting point (this is automatically set back to 0 when it has completed each orbit).
PX — 'X' position of Earth.
PY — 'Y' position of Earth.
P — Variable for course plotting option.
MOX — 'X' position of the moon.
MOY — 'Y' position of the moon.
MX — Degrees from moon's starting point.
POX — 'X' position of Venus.
POY — 'Y' position of Venus.
MEX — 'X' position of Mercury.
MEY — 'Y' position of Mercury. ■

```
>cC
   10 REM ************************************
   20 REM *                                  *
   30 REM *          O R B I T S             *
   40 REM *                                  *
   50 REM *  (Earth,Moon,Venus,Mercury)      *
   60 REM *                                  *
   70 REM *             ***                  *
   80 REM *                                  *
   90 REM *          by N.Butler             *
  100 REM *                                  *
  110 REM ************************************
  120 REM
  130 REM
  140 MODE1
  150 PROCinit
  160 PROCask
  170 VDU 5
  180 PROCsun
  190 REM   ** MAIN LOOP **
  200 FOR EDX=0 TO 360 STEP 2
  210 PX=640+550*SIN(RAD(EDX)):PY=512+190*COS(RAD(EDX))
  220 IF P=1 PLOT 69,PX,PY
  230 MOVE PX,PY:PRINTCHR$(225)
  240 PROCmoon
  250 PROCvenus
  260 PROCmercury
  270 PROCwait(10)
  280 PROCdelmoon
  290 PROCdelvenus
  300 PROCdelmercury
  310 MOVE PX,PY:PRINTCHR$(225)
  320 NEXT EDX
  330 GOTO 200
  340
  350 DEFPROCmoon
  360 GCOL3,1
  370 MOX=PX+60*SIN(RAD(MX)):MOY=PY+30*COS(RAD(MX))
  380 MOVE MOX,MOY:PRINTCHR$(226)
  390 MX=MX+24
  400 GCOL3,3
  410 ENDPROC
```

```
420
430 DEFPROCwait(T)
440 TIME=0:REPEAT UNTIL TIME>T:ENDPROC
450
460 DEFPROCsun
470 GCOL0,2
480 FOR S=1 TO 20:PLOT 69,RND(1280),RND(1024):NEXT S
490 MOVE 640,510
500 FOR S=0 TO 360 STEP 20
510 MOVE 640,512:PLOT 85,640+50*SIN(RAD(S)),512+50*COS(RAD(S)):NEXT S
520 GCOL3,3
530 ENDPROC
540 MX=0
550
560 DEFPROCinit
570 VDU 23,225,&3C,&7E,&FF,&FF,&FF,&FF,&7E,&3C
580 VDU 23,226,&00,&00,&18,&3C,&3C,&18,&00,&00
590 VDU 23,228,&38,&7C,&7C,&7C,&38,&00,&00,&00
600 VDU 23,227,&00,&3C,&7E,&7E,&7E,&7E,&3C,&00
610 MX=1
620 PLX=0
630 MERC=0
640 VDU 19,3,6,0,0,0:GCOL3,3
650 ENDPROC
660
670 DEFPROCvenus
680 POX=640+362*SIN(RAD(PLX)):POY=512+134*COS(RAD(PLX))
690 MOVE POX,POY:PRINTCHR$(227)
700 IF P=1 PLOT 69,POX,POY
710 PLX=PLX+3.2
720 ENDPROC
730
740 DEFPROCdelvenus
750 POX=640+362*SIN(RAD(PLX-3.2)):POY=512+134*COS(RAD(PLX-3.2))
760 MOVE POX,POY:PRINTCHR$(227)
770 ENDPROC
780
790 DEFPROCdelmoon
800 GCOL3,1
810 MOX=PX+60*SIN(RAD(MX-24)):MOY=PY+30*COS(RAD(MX-24))
820 MOVE MOX,MOY:PRINTCHR$(226)
830 GCOL3,3
840 ENDPROC
850
860 DEFPROCmercury
870 MEX=640+212*SIN(RAD(MERC)):MEY=512+79*COS(RAD(MERC))
880 MOVE MEX,MEY:PRINTCHR$(228)
890 IF P=1 PLOT 69,MEX,MEY
900 MERC=MERC+8
910 ENDPROC
920
930 DEFPROCdelmercury
940 MEX=640+212*SIN(RAD(MERC-8)):MEY=512+79*COS(RAD(MERC-8))
950 MOVE MEX,MEY:PRINTCHR$(228)
960 ENDPROC
970
980 DEFPROCask
990  PRINTTAB(10,3)"O R B I T"
1000 PRINT''''"  Do you want the orbits of the planets traced out (Y/N)"
1010 PATH$=GET$
1020 IF PATH$="Y" P=1:CLS:ENDPROC
1030 IF PATH$="N" P=0:CLS:ELSE GOTO 990
1040 ENDPROC
```

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

Paint

on Spectrum

This machine code routine can be used to fill in a shape on the screen with pixels of a specified colour.

To enter the hex code into the memory, the following *Basic* program should be used:

```
10 FOR f=32300 TO 32456
20 INPUT x
30 POKE f,x
40 NEXT f
```

Next run the program and type in the hex numbers, pressing *Enter* after each. When all the code has been entered, it is best to

Save "Paint" *Code* 32300,120

before attempting to use the routine.

To use the routine, x and y co-ordinates must be given for the position from which colouring is to begin; that is, a point inside your shape. Therefore it is necessary to:

Poke 32500,x co-ordinate

Poke 32501,y co-ordinate

The colour of the pixels is set by:

Poke 32502,attribute (see page 116 of manual)

Having done all this, and drawn your shape, type

Randomize usr 32300

and watch as your artwork is coloured in.

The routine will stop colouring when it can move no further up or down from the original pixel, and will work on the 16K or 48K Spectrum.

The following program incorporating the routine might appeal to modern-art lovers.

```
10 BORDER 0:PAPER 7:INK 0:CLS
20 FOR f=1 TO 50
30 LET x=RND*253+1:LET y=RND*172+1
40 PLOT x,y:DRAW RND*253+1-x,
   RND*172+1-y
50 NEXT F
60 FOR f=1 TO 30
70 LET x=RND*253+1:LET y=RND*172+1
80 IF POINT (x,y)=1 THEN GOTO 70
90 POKE 32500,x:POKE 32501,y
100 POKE 32502,57+INT(RND*7)
110 RANDOMIZE USR 32300
130 NEXT f
```

```
32300  56 244 126
32303  95
32304  56 245 126
32307  87
32308  58 246 126
32311  50 143  92
32314  75
32315  66
32316  66
32317 205 128 126
32320  75
32321   4
32322 120
32323 254 174
32325 210  93 126
32326 197
32329 213
32330 205 206  34
32333 209
32334 193
32335 197
32336 213
32337 205 213  45
32340 209
32341 193
32342  60
32343  61
32344 254   1
32346 194  61 126
32349  66
32350  75
32351 205 128 126
32354  75
32355   5
32356 120
32357 254   1
32359 218 127 126
32362 197
32363 213
32364 205 206  34
32367 209
32368 193
32369 197
32370 213
32371 205 213  45
32374 209
32375 193
32376  60
32377  61
32378 254   1
32380 194  94 126
32383 201
32384  75
32385 197
32386 213
32387 205 229  34
32390 209
32391 193
32392  12
32393 121
32394 254 255
32396 210 164 125
32399 197
32400 213
32401 205 206  34
32404 209
32405 193
32406 197
32407 213
32408 205 213  45
32411 209
32412 193
32413  60
32414  61
32415 254   1
32417 194 129 126
32420  75
32421 197
32422 213
32423 205 229  34
32426 209
32427 193
32428  13
32429 121
32430 254   1
32432 218 200 126
32435 197
32436 213
32437 205 206  34
32440 209
32441 193
32442 197
32443 213
32444 205 213  45
32447 209
32448 193
32449  60
32450  61
32451 254   1
32453 194 165 125
32456 201
```

Paint
by G R Barnes

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ACCESS

HI-RES upgrade to a 51 by 24 display — cartridge £25.30

Just plug this cartridge into your DRAGON, switch on and you have a 51 column by 24 line display with true lower case characters. This amazing software uses the high resolution mode to draw the characters on the screen and allows you to use BASIC almost as normal. In fact there are a number of extensions to BASIC to allow you to use the many additional features • mix graphics and text on the same screen • select any of nine standard ASCII character sets for FRENCH, SPANISH, GERMAN, ITALIAN, BRITISH, USA, SWEDISH, DANISH or JAPANESE • redefine any of the 244 characters • SPRITE GRAPHICS MODE enables any character to be an 8 by 8 dot sprite • a more responsive keyboard with AUTO-REPEAT • extra shift gives the missing characters to the DRAGON keyboard • leaves about 19,500 bytes for BASIC • switch between HI-RES and normal modes at any time • BLACK on GREEN, BLACK on WHITE, GREEN on BLACK or WHITE on BLACK • 32 by 16 compatibility mode for existing programs • Hi-res is a must for serious programming.

DASM an easy to use 6809 machine code assembler cartridge — £18.95

• Specially designed for convenient use on the DRAGON • Does not use a separate editor • Ideal for producing machine code routines to be called from BASIC • Includes a 6809 Reference Card.

Type your assembler program just as you would a BASIC program and use BASIC to call DASM. When DASM has assembled your program it returns to BASIC where you can check for errors and execute the program immediately if required. The source program is saved and loaded using the normal CSAVE/CLOAD. The assembled program may be saved to tape using CSAVEM (this can easily be done automatically in BASIC when the assembly has finished).

DASM is a two pass symbol assembler which allows labels of any length (the first five characters and the last character are used). All the 6809 mnemonics and addressing modes are supported plus comprehensive assembler directives for defining constants reserving memory, directing output to screen or printer. Errors detected by DASM are reported with easy to understand messages.

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DEMON gives you access to the inside of your computer. It features a real time display of memory location in both hexadecimal and alphanumeric codes, a full screen editor for memory and register contents and multiple breakpoints. There are 12 commands designed to assist in debugging and running machine code programs (or BASIC programs with PEEK and POKE).

DEMON, unlike inferior products, has its own documented input and output routines which means that it does not interfere with BASIC. DEMON can be called from a BASIC program and will return control to the BASIC program. A user manual and a 6809 Reference Card are included.

DASM/DEMON — cartridge £30.45

Combines DEMON and DASM in one cartridge. The ideal combination for developing machine code programs on the DRAGON.

DECODE BASIC Converter — cartridge £18.95

DECODE converts BASIC programs between TANDY COLOUR format and DRAGON 32 format. Simply CLOAD the "foreign" program from tape, EXEX the cartridge and the program is converted. The same cartridge will work on a DRAGON 32 and a TANDY COLOUR (Extended BASIC).

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Cards

on Commodore 64

This short program for the 64 deals four hands from a standard pack of 52 cards randomly.

Program notes

21-24	Allocate suits
25-26	Reduce X to between 1 and 13
30-70	I and II to 13 to AKQJ
100-400	Prints the card

Variables
Z Number of cards dealt
K(I) Flag for card selected
IfK(X) = I then new X is found
IfK(X) = 0 then this X is selected and K(X) = I

```
 1 PRINT"■"
 2 POKE53280,0:POKE53281,3
 3 GOSUB2000:PRINT"■"
 5 PRINT"■NORTH","■EAST","■SOUTH","
   !WEST"
 6 PRINT" ―――― "," ―――― "," ―――― ","
   ――――"
 7 Z=0:DIMK(52):FORI=1TO52:K(I)=0:NEXT
10 X=INT(RND(1)*52+1)
14 IFZ=52THEN1000
15 IFK(X)=1THEN10
16 K(X)=1
21 IFX/4=INT(X/4)THENS$="H"
22 IF(X+1)/4=INT((X+1)/4)THENS$="D"
23 IF(X+2)/4=INT((X+2)/4)THENS$="C"
24 IF(X+3)/4=INT((X+3)/4)THENS$="S"
25 FORI=1TO3:IFX<14THEN30
26 X=X-13:NEXT
30 X$=STR$(X)
40 IFX=11THENX$=" J"
50 IFX=12THENX$=" Q"
60 IFX=13THENX$=" K"
70 IFX=1THENX$=" A"
100 IFS$="C"ORS$="S"THEN400
200 PRINT"■ "X$S$,:Z=Z+1:GOTO10
400 PRINT"■ "X$S$,:Z=Z+1:GOTO10
1000 PRINT:PRINT:PRINT:PRINT"
     ■■ HAND DEALT"
1010 PRINT:PRINT:PRINT:PRINT"
     ■■ANOTHER? (Y/N)"
1020 GETA$:IFA$=""THEN1020
1030 IFA$="Y"THENCLR:PRINT"■":GOTO5
1040 IFA$<>"N"THEN1020
1050 PRINT"■":END
2000 PRINT"                    ■■ E A L"
2010 PRINT"                    ■■■■■■■■■■"
2020 PRINT"   THIS PROGRAM WILL DEAL
     FOUR RANDOM          HANDS OF CARS
2030 PRINT:PRINT:PRINT:PRINT"■■■■
     PRESS ANY KEY"
2060 GETA$:IFA$=""THEN2060
2070 RETURN
```

Cards
by N F Leigh

Space Blitz

on BBC

This program is for model B. The idea is similar to Blitz but with the complication of anti-aircraft missiles.

The missiles become ever more difficult to avoid as you reach more and more screens. Ten points are scored for each block hit, anti-aircraft missiles score a random number between 20 and 40.

On each screen the city gets larger, and a free ship is awarded for every thousand points.

Program notes

50-100	Speed of flash and store high score.
120-200	Screen array and set up variables.
210-260	Set up city, Z = number of blocks.
380-490	Free ship and and move ship.
480-640	Ship crashed? and move shot.
590-620	Block hit? Bomb hit missile? Ship hit?
700-860	Increase score, decrease ships. Messages.
870-1080	Move missile.
1120-1160	Instruction, missile points.
1200-1240	Print block of city; reset variables if ship hit.

VDU 23;8202;0;0;0; turns off the cursor.
My highest score is 2885.

PROGRAM OF THE WEEK

```
 10 ENVELOPE1,1,5,5,5,100,0,0,0,5,-5,100,5,127
 20 SOUND0,1,1,30
 40 MODE7
 50 *FX9,3
 60 *FX10,3
 70 ONERRORH%=0:ONERROROFF
 80 IFH%>0THEN100
 90 INPUT"PREVIOUS HIGH SCORE",H%
100 ONERROROFF
110 CLS:GOSUB1120
120 DIMA(19,30)
130 MODE2
140 VDU23,228,66,153,0,165,165,0,153,66
150 Q=0:T=0
160 VDU23,229,16,56,56,56,56,124,130,130
170 J=0
180 XC=0:B=0:C=0:D=0:G=0:F=1:S=0:Z=0:SHIPS=3:WAVE=1
190 K=3
200 *FX11,1
210 FORR=0TO19:FORO=0TO30:A(R,F)=0:NEXT:NEXT
220 VDU23;8202;0;0;0;
230 VDU23,230,255,255,153,153,255,153,153,255,23,255,
    0,240,126,127,126,240,0,0
250 VDU23,231,96,112,120,127,127,255,0,0
260 VDU23,232,0,0,120,248,255,255,0,0
270 COLOUR3:Z=19:FORX=0TO18:PRINTTAB(X,30)CHR$(230);
    :A(X,30)=1:NEXT
280 Y=30
290 Y=Y-1
300 IF Y=12 GOTO370
310 FORX=0TO18:IF A(X,Y+1)=0 GOTO330
320 P=RND(K):IF P<K GOTO340
330 A(X,Y)=0:GOTO350
340 PRINTTAB(X,Y)CHR$(230):A(X,Y)=1:Z=Z+1:SOUND&0010,
    -15,7,1
350 NEXT
360 GOTO290
370 COLOUR1
380 IF XC>1000 SHIPS=SHIPS+1:VDU19,3,10,0,0,0:XC=XC-
    1000
400 VDU30:PRINT" SCORE=";S;TAB(12)"SHIPS=";SHIPS
410 COLOUR0
420 PRINTTAB(G,F)"  ":COLOUR2:SOUND&0010,-10,7,2
430 G=G+1
440 IFG>=19 F=F+1:G=0
450 A$=INKEY$(0):IFA$=" " G=G+1:IFG >=19 F=F+1:G=0
460 *FX15,1
470 PRINTTAB(G,F)CHR$(231)CHR$(232)
480 IF A(G,F)=1 GOTO750
490 GOTO870
500 IF B=1 GOTO540
510 IFA$="Z" GOTO530
520 GOTO370
530 B=1:C=G:D=F:SOUND&0011,-15,253,2
540 N=0
550 COLOUR0:PRINTTAB(C,D)" "
560 D=D+1
570 IF D=31 B=0:GOTO370
580 COLOUR12:PRINTTAB(C,D);CHR$(255)
590 IF A(C,D)=1 GOTO650
600 IF C=Q AND D=T GOTO1170
610 IF G=Q AND F=T GOTO750
630 N=N+1:IF N<3 GOTO550 ELSE GOTO370
650 SOUND&0010,-15,7,4
660 PRINTTAB(C,D)CHR$(228):NOW=TIME:REPEAT UNTIL
    TIME=NOW+20
670 PRINTTAB(C,D)" "
680 A(C,D)=0
690 B=0
700 S=S+10:XC=XC+10:Z=Z-1:IF Z=1 K=K+1:GOTO720
710 GOTO870
720 MODE7
730 PRINT'''CHR$(129)"Well done you have destroyed
    that planet,you must now try to destroy a bigger
    planet."':WAVE=WAVE+1
740 NOW=TIME:REPEAT UNTIL TIME=NOW+300:MODE2:VDU23;
    8202;0;0;0;:G=0:F=1:GOTO270
750 NOW=TIME
760 PRINTTAB(G,F)CHR$(228)CHR$(228)
770 A(G,F)=0
```

continued over the page

```
780 SOUND0,1,1,30
790 REPEAT UNTIL TIME=NOW +150
800 SHIPS=SHIPS-1:IF SHIPS=0 THEN MODE7:PRINTCHR$(131)
    "YOU HAVE CRASHED" ELSE PROCBANG:GOTO410
810 PRINTCHR$(129)CHR$(141)"YOUR SCORE IS ";S'CHR$
    (129)CHR$(141)"YOUR SCORE IS ";S:IF H%<S PRINT'
    CHR$(134)"YOU HAVE SET A NEW RECORD":H%=S
820 PRINT"THE RECORD IS ";H%
830 *FX11,66
835 *FX15,1
840 PRINTCHR$(135)"ANOTHER GAME(Y/N)":INPUTQ$:IF Q$=
    "N"THEN END
850 MODE2
860 GOTO180
870 IF J=1 GOTO930
880 J=0:T=11:Q=RND(19)
890 T=T+1:IF A(Q,T)=1 GOTO920
900 IF T<30 GOTO890
910 GOTO500
920 J=1:T=T-1
930 N=0
940 COLOUR0
950 IF A(Q,T)=1 GOSUB1200 ELSE PRINTTAB(Q,T)" "
960 IF WAVE>2 THENQ=Q+SGN(G-Q)
970 IF WAVE=2 THEN Q=Q+(RND(3)-2)
980 IF Q<0 Q=0
990 IF Q>18 Q=18
1000 T=T-1:IF T=0 GOTO1100
1010 SOUND&0011,-14,121,1
1020 COLOUR6
1030 J=1
1040 IF Q=G AND T=F GOTO1090
1050 IF Q=G+1 AND T=F GOTO1090
1060 PRINT TAB(Q,T)CHR$(229)
1070 N=N+1:IF N=2 GOTO500
1080 GOTO500
1090 J=0:GOTO750
1100 J=0:T=0
1110 GOTO500
1120 PRINTCHR$(129)CHR$(141)TAB(12)"SPACEBLITZ"'CHR$
    (129)CHR$(141)TAB(12)"SPACEBLITZ"'
1130 PRINT"You have been called upon to serve "'"the
    empire in the Inter galactic bombingforce."'"You
    have been called out on a dangerous attack
    mission on alien planets"'
1140 PRINT"You must destroy the planet before you
    crash or destroyed by alien anti_attack missiles
    as you dive and circle the     planet's inhabited
    areas"'
1150 PRINT"THE CONTROLS ARE:_"'"Z_________DROP ATTACK
    UNITS"'"SPACE BAR-SPEED UP"'CHR$(129)"GOOD LUCK"
1160 X=GET:RETURN
1170 PRINTTAB(C,D)CHR$(228):B=0:J=0:DS=RND(40)+20:S=S
    +DS:XC=XC+DS
1180 SOUND&0010,-15,121,7
1190 PRINTTAB(C,D)" ":GOTO370
1200 COLOUR3
1210 PRINTTAB(Q,T)CHR$(230):RETURN
1220 DEFPROCBANG
1230 PRINTTAB(G,F)"  "
1240 G=0:F=1
1250 ENDPROC
```

Space Blitz
by Stuart Arnell

Morse

on Vic20

This program translates English (or any other language) into Morse Code. It prints the message in English and in Morse Code and also produces the real sound of Morse transmitting.

You can control the speed of the sound, by inputting a value between 1 and 500. We think 1-30 is for the expert, 30-100 medium, and 100-500 for the absolute beginner.

If you want to change speed then input "£" instead of the text. We have put in a little demo in lines 5-19 and hope that it's all right.

Maybe someone will try to connect the Vic to a radio transmitter and try it out "on the air". If so, we would very much like to hear about it.

Program notes:

5-19	Demo part
55-85	Reads and prints the alphabet
85-88	Asks for speed
105-155	Translates English to Morse Code
175-205	Data
225-255	Sound routine

```
0 REM*****************
1 REM*MORSE  MONITOR*
2 REM*   (C) 1983   *
3 REM*  J.J. & B.B. *
4 REM*****************
5 PRINT"■"
6 FORT=1TO5:PRINT"■■■
```

Bar graph

on ZX81

This program is written for the 16K ZX81. It will draw a line graph or a bar chart with 10 points or 10 bars in the limit 1-40 inclusive. Instructions on how to run the program are included in the program.

The program is well-structured so looking at the listing should enable you to see how it works.

```
  1 REM **************************
  2 REM *******GRAPHS************
  3 REM **************************
  4 REM **THIS PROGRAM PRINTS**
  5 REM ****OUT LINE GRAPHS*****
  6 REM ****AND BAR GRAPHS******
  7 REM **************************
  8 CLS
  9 LET A=0
 10 PRINT TAB 12;"GRAPHS"
 11 PRINT TAB 12;"------"
 12 PRINT TAB 13;"----"
 13 PRINT TAB 14;"--"
 14 DIM B$(21)
 20 PRINT AT 5,0;" THIS PROGRAM
 WILL DRAW A LINE-";AT 7,0;"GRAP
H OR A BAR CHART AFTER YOU";AT 9
,0;"HAVE TYPED IN THE 10 HIGHTS
OF";AT 11,0;"THE POINTS TO BE  P
LOTTED OR";AT 13,0;"THE 10 HEIGH
TS OF THE BARS."
 25 PRINT AT 15,0;"ALL OF THE I
NSTRUCTIONS ARE";AT 17,0;"CONTAI
NED IN THE PROGRAM."
 30 PRINT AT 21,2;"PRESS ANY KE
Y TO CONTINUE."
 40 IF INKEY$="" THEN GOTO 40
 99 CLS
 100 PRINT "TYPE IN LABEL FOR HO
RIZONTAL
              AXIS AND NEW/LINE."
 110 INPUT A$
 115 PRINT
 116 PRINT
 120 PRINT "TYPE IN LABEL FOR VE
RTICAL
              AXIS AND NEW/LINE."
 140 INPUT B$
 990 REM **************************
 991 REM ****PRINT OUT AXIS*****
 992 REM **************************
 999 CLS
1000 PRINT "  40"
1010 PRINT "    "
1020 PRINT "    "
1030 PRINT "    "
1040 PRINT "    "
1050 PRINT "  30"
1060 PRINT "    "
1070 PRINT "    "
1080 PRINT "    "
1090 PRINT "    "
1100 PRINT "  20"
1110 PRINT "    "
1120 PRINT "    "
1130 PRINT "    "
1140 PRINT "    "
1150 PRINT "  10"
1160 PRINT "    "
1170 PRINT "    "
1180 PRINT "    "
1190 PRINT "    "
1200 PRINT "  0 1 2 3 4 5 6 7 8 9 0"
1205 REM **************************
1206 REM ******LABEL AXIS*******
1207 REM **************************
1210 PRINT TAB 15;A$
1220 FOR Z=0 TO 20
1230 PRINT AT Z,0;B$(Z+1)
1240 NEXT Z
1250 LET A=A+1
1260 IF A=1 THEN PRINT AT 10,4;"
PRESS ANY KEY TO CONTINUE."
1270 IF A=1 AND INKEY$="" THEN G
OTO 1270
1280 IF A=2 THEN GOTO 2500
1290 IF A=3 THEN GOTO 3500
1350 CLS
1360 PRINT AT 0,0;"DO YOU WANT A
 LINE GRAPH (1) OR";AT 2,0;"BARC
HART (2) TYPE IN";AT 4,0;"NUMBER
 OF  CHOICE."
1370 IF INKEY$="1" THEN GOTO 200
0
1380 IF INKEY$="2" THEN GOTO 300
0
1390 GOTO 1370
1990 REM **************************
1991 REM ***ENTER LINE GRAPH****
1992 REM *****CO-ORDINATES******
1993 REM **************************
2000 CLS
2010 PRINT "TYPE IN 2ND PART OF
CO-ORDINATE
              AND RETURN (LIMITS 1
 TO 40)"
2015 PRINT
2020 PRINT TAB 6;"1,?";
2030 INPUT Z
2034 PRINT Z
2035 PRINT
2040 PRINT TAB 6;"2,?";
2050 INPUT Y
2054 PRINT Y
2055 PRINT
2060 PRINT TAB 6;"3,?";
2070 INPUT X
2074 PRINT X
2075 PRINT
2080 PRINT TAB 6;"4,?";
2090 INPUT W
2094 PRINT W
2095 PRINT
2100 PRINT TAB 6;"5,?";
2110 INPUT V
2114 PRINT V
2115 PRINT
2120 PRINT TAB 6;"6,?";
2130 INPUT U
2134 PRINT U
2135 PRINT
2140 PRINT TAB 6;"7,?";
2150 INPUT T
2154 PRINT T
2155 PRINT
2160 PRINT TAB 6;"8,?";
2170 INPUT S
2174 PRINT S
2175 PRINT
2180 PRINT TAB 6;"9,?";
2190 INPUT R
2194 PRINT R
2195 PRINT
2196 SCROLL
2200 PRINT TAB 6;"10,?";
2205 INPUT Q
2210 PRINT Q
2211 IF Z>40 OR Z<1 THEN GOTO 22
50
2212 IF Y>40 OR Y<1 THEN GOTO 22
50
2213 IF X>40 OR X<1 THEN GOTO 22
50
2214 IF W>40 OR W<1 THEN GOTO 22
50
2215 IF V>40 OR V<1 THEN GOTO 22
50
2216 IF U>40 OR U<1 THEN GOTO 22
50
2217 IF T>40 OR T<1 THEN GOTO 22
50
2218 IF S>40 OR S<1 THEN GOTO 22
50
2219 IF R>40 OR R<1 THEN GOTO 22
50
2220 IF Q>40 OR Q<1 THEN GOTO 22
50
2240 GOTO 999
2250 CLS
2260 PRINT AT 10,0;"YOU PUT IN A
 NUMBER OUT OF THE";AT 12,0;"LIM
ITS SO YOU HAVE TO";AT 14,0;"RE-
ENTER  ALL OF THEM."
2270 PAUSE 500
2280 GOTO 2000
2490 REM **************************
2491 REM *****PLOT POINTS ON****
2492 REM *******LINE GRAPH*******
2493 REM **************************
2500 PLOT 9,Z+3
2510 PLOT 15,Y+3
2520 PLOT 21,X+3
2530 PLOT 27,W+3
2540 PLOT 33,V+3
2550 PLOT 39,U+3
2560 PLOT 44,T+3
2570 PLOT 51,S+3
2580 PLOT 57,R+3
2590 PLOT 63,Q+3
2600 REM **************************
2601 REM *****JOIN UP POINTS****
2602 REM **************************
2610 LET X1=9
```

continued on page 37

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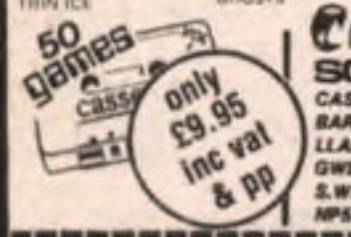

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7th ZX MICROFAIR

```
2611 LET Y1=Z+3
2612 LET X2=15
2613 LET Y2=Y+3
2614 GOSUB 2800
2617 LET X2=21
2618 LET Y2=X+3
2619 GOSUB 2800
2622 LET X2=27
2623 LET Y2=W+3
2624 GOSUB 2800
2630 LET X2=33
2635 LET Y2=V+3
2640 GOSUB 2800
2645 LET X2=39
2650 LET Y2=U+3
2655 GOSUB 2800
2660 LET X2=44
2665 LET Y2=T+3
2670 GOSUB 2800
2675 LET X2=51
2680 LET Y2=S+3
2685 GOSUB 2800
2690 LET X2=57
2695 LET Y2=R+3
2700 GOSUB 2800
2705 LET X2=63
2710 LET Y2=Q+3
2725 GOSUB 2800
2799 GOTO 4000
2800 LET M=(Y2-Y1)/(X2-X1)
2810 LET C=Y1-M*X1
2820 FOR F=X1 TO X2
2830 PLOT F,M*F+C
2840 NEXT F
2850 LET X1=X2
2860 LET Y1=Y2
2870 RETURN
2990 REM ***************************
2991 REM ****ENTER HIGHT OF*****
2992 REM ***COLUMN-BAR GRAPH****
2993 REM ***************************
3000 CLS
3005 LET A=A+1
3012 PRINT "ENTER HEIGHT FOR EAC
H COLUMN"
3013 PRINT
3015 PRINT "HEIGHT OF COLUMN IS
FROM 1 TO 40"
3020 PRINT
3030 PRINT "TYPE IN HEIGHT OF 1S
T COLUMN"
3040 INPUT Z
3045 PRINT Z
3050 PRINT "TYPE IN HEIGHT OF 2N
D COLUMN"
3060 INPUT Y
3065 PRINT Y
3070 PRINT "TYPE IN HEIGHT OF 3R
D COLUMN"
3080 INPUT X
3085 PRINT X
3090 PRINT "TYPE IN HEIGHT OF 4T
H COLUMN"
3100 INPUT W
3105 PRINT W
3110 PRINT "TYPE IN HEIGHT OF 5T
H COLUMN"
3115 INPUT V
3117 PRINT V
3120 PRINT "TYPE IN HEIGHT OF 6T
H COLUMN"
3130 INPUT U
3135 PRINT U
3140 PRINT "TYPE IN HEIGHT OF 7T
H COLUMN"
3150 INPUT T
3155 PRINT T
3160 PRINT "TYPE IN HEIGHT OF 8T
H COLUMN"
3170 INPUT S
3175 PRINT S
3180 PRINT "TYPE IN HEIGHT OF 9T
H COLUMN"
3190 INPUT R
3195 PRINT R
3196 SCROLL
3200 PRINT "TYPE IN HEIGHT OF 10
TH COLUMN"
3210 INPUT Q
3213 SCROLL
3215 PRINT Q
3220 IF Z>40 OR Z<1 THEN GOTO 32
40
3221 IF Y>40 OR Y<1 THEN GOTO 32
40
3222 IF X>40 OR X<1 THEN GOTO 32
40
3223 IF W>40 OR W<1 THEN GOTO 32
40
3224 IF V>40 OR V<1 THEN GOTO 32
40
3225 IF U>40 OR U<1 THEN GOTO 32
40
3226 IF S>40 OR S<1 THEN GOTO 32
40
3227 IF T>40 OR T<1 THEN GOTO 32
40
3228 IF R>40 OR R<1 THEN GOTO 32
40
3235 IF Q>40 OR Q<1 THEN GOTO 32
40
3238 GOTO 999
3240 CLS
3241 PRINT AT 10,0;"YOU ENTERED
A NUMBER THAT IS OFF"
3244 PRINT AT 12,0;"THE SCALE SO
 YOU WILL HAVE TO"
3246 PRINT AT 14,0;"RE-ENTER ALL
 OF THEM."
3247 PAUSE 400
3248 CLS
3249 GOTO 3010
3490 REM ***************************
3491 REM ****DRAW BAR-CHART*****
3492 REM ***************************
3500 FOR C=4 TO 3+Z
3510 PLOT 9,C
3515 PLOT 8,C
3520 NEXT C
3530 FOR C=4 TO 3+Y
3540 PLOT 15,C
3545 PLOT 14,C
3550 NEXT C
3560 FOR C=4 TO 3+X
3570 PLOT 21,C
3575 PLOT 20,C
3580 NEXT C
3590 FOR C=4 TO 3+W
3600 PLOT 26,C
3605 PLOT 27,C
3610 NEXT C
3620 FOR C=4 TO 3+V
3630 PLOT 32,C
3635 PLOT 33,C
3640 NEXT C
3650 FOR C=4 TO 3+U
3660 PLOT 38,C
3665 PLOT 39,C
3670 NEXT C
3680 FOR C=4 TO 3+T
3690 PLOT 45,C
3695 PLOT 44,C
3700 NEXT C
3710 FOR C=4 TO 3+S
3720 PLOT 50,C
3725 PLOT 51,C
3730 NEXT C
3740 FOR C=4 TO 3+R
3750 PLOT 56,C
3755 PLOT 57,C
3760 NEXT C
3770 FOR C=4 TO 3+Q
3773 PLOT 63,C
3774 PLOT 62,C
3780 NEXT C
3790 LET S=S+1
4000 PAUSE 500
4005 CLS
4010 PRINT AT 5,1;"(1) TO START
AGAIN "
4020 PRINT AT 10,1;"(2) TO FINIS
H"
4030 PRINT AT 15,1;"ENTER NUMBER
 OF CHOICE"
4040 IF INKEY$="1" THEN GOTO 1
4050 IF INKEY$="2" THEN GOTO 500
0
4060 GOTO 4040
5000 REM ***************************
5001 REM ****GOODBYE MESSAGE*****
5002 REM ***************************
5010 CLS
5020 FOR A=1 TO 21
5030 SCROLL
5040 PRINT TAB A;"GOODBYE"
5050 NEXT A
5060 STOP
9000 SAVE "GRAPH■"
9090 GOTO 1
```

Bar graph
by Neil Simons

Wizard Software

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OPEN FORUM

Allen Alert

on Vic20

This runs on an unexpanded Vic. You are a space pilot and your planet is being attacked. With lightning speed you manoeuvre your gun sight and fire at the rapidly moving alien. Can you survive?

The program makes use of the Vic's hi-res graphic capability with realistic aliens and gun sights.

Controls are:
L = Up M = Down
J = Left K = Right
H = Laser.

Program notes
100-170 Set up hi-res
180-190 Define main variables
200-350 Main control routine
750-770 Explosions and invader sounds.

```
100 REM ***DEFINE CHARACTERS***
110 POKE52,28:POKE56,28:CLR:FORA=7168TO7679:
    POKEA,PEEK(A+25600):NEXT:POKE36869,255
120 REM **DEFINE GUN SIGHT**
130 FORA=7432TO7439:READB:POKEA,B:NEXT
140 DATA24,24,60,231,231,60,24,24
150 REM **DEFINE INVADER**
160 FORA=7439TO7446:READB:POKEA,B:NEXT
170 DATA24,60,126,219,255,126,60,102
180 BU=15:REM ***SET VARIABLES, SCREEN AND
    POKES***
185 PRINT"■"
190 T=T+1:PRINT"■SCORE="SC:A=7680:B=38400:X=
    142:DX=32:POKE650,128
200 REM ***CONTROL ROUTINE***
210 REM **GET CHARACTER FROM KEYBOARD**
220 C=0:REM **I=UP;M=DOWN;J=LEFT;K=RIGHT**
230 C=C+1:GETA$:IFA$="I"THENX=X-22:Y=22
240 IFA$="M"THENX=X+22:Y=-22
243 POKE36875,0:POKE36874,0
245 IFT>100RBU<1THENPRINT"■THE ALIEN'S HAVE
    LANDED":PRINT"YOUR SCORE WAS"SC"WITH
    "XY"TRY'S":END
250 IFA$="J"THENX=X-1:Y=1
253 IFBU<1THEN257
255 IFA$="H"THENGOSUB700:XY=XY+1:BU=BU-1
257 PRINT"■■■■■■■■■■■■ENERGY=    ■■■"BU
260 IFA$="K"THENX=X+1:Y=-1
265 IFX<00RX>506THENX=0:GOSUB600
270 REM **POSITION GUN SIGHT**
275 PRINT"■■■■■■■"SC
280 POKEA+X,33:POKEB+X,2:POKEA+X+Y,32
285 IFC<5THENGOTO230ELSEGOTO290
290 REM **POSITION AND MOVE ALIEN**
295 POKE36878,15:POKE36875,128
300 DX=DX+22:D=INT(RND(1)*3)+1
310 IFD=1THENDX=DX-1
320 IFD=3THENDX=DX+1
330 POKEA+DX,34:POKEB+DX,6:POKEA+DX-21,32:POKE
    A+DX-22,32:POKEA+DX-23,32:POKE36875,0
340 IFA+DX>8164THENGOSUB600:POKE36878,15:FORT
    =1TO3:FORG=128TO255:POKE36874,G:NEXT:NEXT:
    GOTO185
350 GOTO220
600 FORE=0TO21:POKEA+E,32:POKE8164+E,32:NEXT:
    RETURN
700 IFPEEK(A+X)=34ORPEEK(A+DX)=33THENSC=SC+10:
    GOSUB750:BU=BU+1:GOTO190
710 RETURN
750 POKE36878,15:FORL=1TO30:FORM=250TO240STEP-1
    :POKE36874,M:NEXTM:FORM=240TO250
760 POKE36874,M:NEXTM:POKE36874,0:NEXTL:POKE
    36878,0
770 RETURN
```

Alien Alert
by C Anderson

Adventure Competition

Write an adventure game and win a Commodore 64!

***Popular Computing Weekly* is offering a star prize of a Commodore 64 for the best adventure game written for *any* home micro — PLUS — a special prize of a Vic20 for the best essay on an adventure theme — PLUS — for the next 10 runners-up, two Commodore adventure games.**

Each week during May, *Popular Computing Weekly* will publish a coupon — simply cut out any three and send them in with your entry.

The best adventure games are ideally a combination of action and logical riddles. For instance, to open a door, the player should not merely have to find the magic word, but have to solve a puzzle in order to progress to the next location. Good graphics obviously enhance a program — and we'll be looking for a game that makes imaginative use of graphics, although that does not mean that a text-only program will be eliminated.

Other things we will be looking for are the surprise twists that make a program worth coming back to again and again.

And remember, don't make your game too difficult in the early stages — adventuring novices should have a chance to get some way into the game before getting stuck!

For those of you submitting scenarios with your program, think of it as a guide line for a programmer. Draw a map showing location objects and other important details of your adventure, and compile a dictionary of key words that your program will accept.

If you do not want to write a full-blown adventure game, you can still enter the competition by writing an essay (up to 2,000 words) on an original adventure theme. A Vic20 will be awarded to the essay which describes the most original and interesting adventure game.

The competition will be judged by Tony Bridge and *Popular Computing Weekly* editor Brendon Gore.

PRIZES
1. Commodore 64
2. Vic20
3. Two Commodore adventure games of your choice for 10 runners-up

HOW TO ENTER
All you have to do to enter this competition is collect the coupons from three issues of the magazine and send them, together with your entry (stating which machine your game is for) to:
Popular Computing Weekly
Adventure Competition
Hobhouse Court
19 Whitcomb Street
London WC2 7HF

RULES
1. Each entry must consist of your adventure, or essay, together with three coupons, and your name and address
2. Closing date for the Adventure Competition is 30 June 1983
3. The judges' decision is final.
4. No employees of Sunshine Publications Ltd, or their families, will be eligible to enter.

Adventure Competition (3)

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Source of light!

This week, I want to look at two programs from the same source, Mikro-Gen.

The traditionalist will appreciate *Sorcerer's Castle*. The player may make the choice of becoming, for the duration, a warrior, wizard, elf, Hobbit and so on. Several points are then dished out for strength, wisdom, intellect, etc — the good old traditional Dungeons and Dragons Parameters.

A few more points are given to the player, to be distributed as he wishes. Then 60 gold pieces are used to purchase weapons, armour and flares or torches (and you will certainly need some source of light when play starts).

A lengthy wait follows, while the floor plan of the castle is set up — a nice feature of this being the clock that counts down the seconds. It's good to know that the computer hasn't packed up on you!

When the set-up is finished, the player is given information of his whereabouts in the castle. The castle has several levels, each containing 64 rooms (a square of 8x8). A list of weapons and treasure is also available. Now things really start to get interesting! It is possible, of course, to simply thrash about in the dark going from room to room.

But the cautious, or prudent, adventurer will have provided him (or her) self with a torch, or more extravagantly, as they can only be used once, a flare. By shining the light into the next room, the player can safely examine what awaits. In this way, the whole matrix can be mapped out. A floor plan can be called up, but will only show the contents of rooms visited.

Whilst travelling about, various treasures and objects are discovered. These are sometimes booby-trapped for the unwary. A book may be a vital clue, or it may blow up in the adventurer's face — or stick to the weapon hand! However, there are many gems lying about for the taking.

The purpose of all this weird wandering is to find the Sorcerer and beard him in his lair! He is resident in one room of the castle, and many clues are presented to the searcher during the course of his wandering. Whilst the books may be booby-trapped, it is often worth taking the risk to open them, as they may also give the location of the Sorcerer's room.

Now, there are several features of the game, such as the method of travel between levels, and a special extra-fast way of travelling, that I won't detail here — I don't want to give everything away! The program is really a blood relative of that old favourite, *Wumpus*, but doesn't suffer because of that. If you are a renegade from *D&D'ing*, looking for some of the flavour of that game, *Sorcerer's Castle* is well worth a look.

The second program from Mikro-Gen, again for the expanded Spectrum, is *Mad Martha* — a marvellous title for a marvellous adventure. The whole program is really dotty, and a refreshing change from some of the doom-laden programs encountered nowadays.

The player is cast in the role of the poor, hen-pecked, husband of the Martha of the title. Like many of us, he has the purely unselfish and totally reasonable yearning to go and have a good night out — he reckons without his dear wife, however! From the very start, he has troubles, as circumstances do their best to thwart him. First, he wakes up the baby, who starts yelling. Too much noise, of course, will bring "her indoors" running to see what hubby is up to.

Each location is depicted in high-resolution graphics and has an object to be used (at that location or some other), and a puzzle to be solved — in this game, you will not get to the next stage without solving the present conundrum.

So far, *Mad Martha* is a very funny, but otherwise straightforward adventure, but at certain points it makes a u-turn and becomes an arcade game. There are several of these sections, each one different — none of them will take over from *Scramble* or *Defender*, but they are amusing diversions.

I should say now that I haven't had the game long enough to make any significant headway (Martha keeps getting me with her chopper!), but I'm looking forward to getting my own back! If anyone has worked through the adventure, would you send me (in a sealed envelope!) the solution?

Thank you for all the hints and advice you have sent in, regarding *The Hobbit* — they have all been very interesting. Some of you have sent fairly detailed breakdowns of the program, but I have yet to see a complete plan of the adventure. If anyone would like to send me a blow-by-blow description of their wanderings, I would be very grateful.

R W Humpleby, of Hartlepool, is stuck in the Goblin's Dungeon, and so is Dorene Cox of Dagenham — she has had problems in many locations of *The Hobbit*. But don't worry, Dorene, I don't think you've got a dodgy tape!

For these, and any others still stuck at the Dungeon, here is an encoded clue — first type in the little coding program (*Popular Computing Weekly*, 5-11 May, page 33) and then type in this coded message:

Sorcerer's Castle

for 48K Spectrum

sthnrmaoo•rey•rcy•tia•

and then

d•hhigrtool•uotg

Let me know if you need any more help! One or two of you have mentioned little bugs in the program — one of the most serious will cause the program to hang up and refuse to respond any further. If you key *Caps Shift* and then the number 1, you will have to reload the program — just beware of clumsy fingers!

Jonathan Brennan (13), of Maidenhead, has sent me a few cryptic clues to inform me of his current position in what he says is undoubtedly the best adventure game ever made. "Once captured, I fell for the trap and the Butler had me over a barrel . . . From then on it was lonely on my holiday in the Lake District . . . But I am still having trouble with William Shakespeare . . ." Can you work out where he is now?

Next, some help required! Neil Stubbs, of Mundesly, Norfolk, and Richard Cooke, of Norwich, are both struggling with *Castle of Riddles*, for the BBC-B. They are having trouble in the corridors of doom, the safe and the gallery. If you have finished the game, or can throw some light on the situation, please let me know.

Finally, I'll let Peter Cusimano, of Idle (an apt name, maybe?), have the last word. He says: "I enjoy reading your articles and always turn to your pages last." I don't quite know how to take that, Peter! Anyway, he says, as a final word: "There's no beer on Jupiter!" — Well, Peter, I remember a few good nights down at the Old Red Spot! ■

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to: Tony Bridge, Adventure Corner, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

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PEEK & POKE

TWO QUESTIONS

Scott McCall of Dudley Drive, Glasgow, writes:

Q I am a Spectrum owner, and have so far had many happy hours on this fine computer. But I have two questions about it.

(a) Is it possible to get a proper keyboard for it with moving keys at the correct pitch, and with a space bar. I have seen several illustrations in magazines of keyboards for the ZX81, but they all seem to copy the original keyboard. Is it possible to get one which has its own key just for comma and full stop, for example.

(b) Is there any way of interrupting the *Integer out of range* error code for the *Print* and *Plot* commands? Or is there a way of using a routine that would allow for plotting to be done off the screen?

A There are several keyboards on the market, but the only one that matches your needs is made by Dean. This board comes with several extra keys, the functions of which depend entirely on you.

No command presents any special problems to put on a separate key. Like the ZX81, the Spectrum uses eight addresses and five data lines, and these need wiring up normally. The only problem comes with shifted characters where some 'juggling' of the lines is involved to simulate the double statement. Details of how to do this, plus a set of the necessary diodes, are available from Stephen Adams, 1 Leswin Road, Stoke Newington, London N16.

The only way to stop the *Integer out of range* error code is to stop the *Plot* command going off the end of the screen. To do this a routine is needed that searches for the end of the screen, intercepts the *Plot* command before it gets there, and stops it at the last screen location.

SWITCH ON OR OFF

Simon Jones of Edmunds Road, Hertford, Herts, writes:

Q I have a 16K Spectrum and I would like to know if I can switch on or off a relay using the edge connector and the *Out* command (or any other command). If not, would I have to buy an I/O port, or would the ZX expansion module have this facility? I know a little about electronics, so I might be able to make some adjustments to the connector.

A You will need an I/O port for your Spectrum if you want to use a relay. I am not sure what you mean when you say the 'ZX expansion module', but I presume you mean the one that Sinclair intend to supply themselves. If so, this won't be suitable as it is designed for networking and driving a printer.

There are several commercially available ports that will do what you want; R D Labs make a motherboard that has three ports on it. Furnell Engineering, and Kempston also manufacture one. If you really do have confidence in your ability to wield a soldering iron, then Stephen Adams' book *20 Electronic Projects* has plans of how to make your own.

A-LEVEL MATHS

R A Batternill of Ladram Road, Gosport, Hants, writes:

Q First of all thank you for the magazine, it is greatly appreciated. As a relative newcomer to the 'micro scene', (I own a Dragon), I am not yet able to write the programs, I need, as fast as I need them. Could you please tell me where I might find a program in mathematics up to A-Level standard for the solutions on linear and simultaneous equations.

My thanks to G Norton for his x,y plotter, *Popular Computing Weekly*, Vol 2 No1, as it was very useful.

A I am afraid that so far I have been unable to track down any Dragon software to A-Level standard at all. I think that more advanced software will slowly become available, as more people come to realise the potential of this computer.

Unfortunately, it suffers from not being one of the approved micros for use in schools; I do not think that this is any inherant fault of the machine itself, rather a case that it was not in existence when the scheme started. Whether or not it will be included will depend on the government, but if it is not included then I think that will slow the development of such software. I do not know if any reader has a program for what you want but if anyone does, please send it in.

WHAT'S THE ADDRESS?

Gary Hardwicke of Bracken Brough, Brixworth, Northampton, writes:

Q I have had a Vic20 now for about six months and I would very much like to know how to use the user port.

I was told by a friend that numbers could be *Poked* into it to change it to binary. If there was one in the bit a current was sent, and if there was a nought then no current was sent.

If this is true, how do I go about setting up my Vic to control lights and so forth? Will I need a control box, or will ordinary switches do?

Also, what is the address of the user port? Is there any hardware that will help me, or any good books that will give me more information?

A The plans of the user ports, and the various allocations of the individual pins, is a much more involved problem than I am able to cover here. The *Input* and *Output* from a port is always in binary. A current is either present or not. In the same way, the numbers you *Poke* into the port, or anywhere else, are translated into binary for the computer to understand.

There are two books that you should look at. One is Nick Hampshire's book *Vic Revealed*. This contains the mapping and allocation for all the Vic ports. The other is Stephen Adams' book *20 Electronic Projects for the ZX81 and Other Computers*. It is currently being revised to include more information about the mapping for a variety of projects. When you have worked out enough to make use of the ports possible, Stephen Adams' book will supply some interesting projects to try.

UNUSUAL FEATURE!

B Steen of Spicer Lane, Bear Cross, Bournemouth, Dorset, writes:

Q I recently bought Psion's *Flight Simulation* program for my ZX81, which I would recommend to anyone. It has the unusual feature of being able to check to see if it has loaded itself with *Load check* followed by either *Passed* or *Failed*.

I was most surprised to find that this program was recorded onto only one side of the tape, so I decided to make a safety copy. Although the program was copied satisfactoraily it stopped at the line:

```
IF USR (102 * PEEK 16400 + 256 *
PEEK 16401) = 0 THEN RUN.
```

If I give the command Run it does — but I have lost the *Load check* facility. Can you tell me how to get it back?

A This I can only assume is software protection in action, as I do not know how the line works and neither can I remember seeing a similar line in other programs. It would seem as though some sort of specific variable has to be defined, and it cannot be defined if the *Save* command is used.

From Psion's point of view, I am sure that you can appreciate their desire to protect their product. I can offer no suggestions — I did not contact Psion as I think they would be justified in not giving me an answer.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

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VIC20 + cassette unit + 16K + 3K expansion unit, well over £1,000 software, including 2 game cartridges, joystick, loads of games + books + magazines, value £1,350. Must sell quickly for only £450!!! ono. Tel: Ruislip (08956) 38564.

VIC20 16K memory expander, cassette recorder, joystick, introduction to basic, 2 Rom cartridges + selection of software, £280 ono. Tel: 01-317 0999.

VIC20 games cassette including Night Crawler, Amok, Alien Blitz, Blitz, Space Freaks, Cosmiads, Vicmen, Scramble, £22 the lot. Tel: Stafford 663166.

COMMODORE Vic20 + cassette drive, software + introduction to basic, part 1, £130. Tel: 01-393 8550.

VIC20 + cassette unit, super expander, joystick + £60 software, £180. Tel: Hook Norton 737224.

VIC20 Robert Carrier menu planner, £5; Sub-space Striker, £3.50; Vic Revealed £5. Tel: Newport (Isle of Wight) 525737.

VIC20 + CASSETTE UNIT + 16K and 3K expansion unit + joystick + well over £1,000 of software, consisting of 95 per cent cassette based software (mainly games) + 5 per cent books and magazines etc. Also 2 games cartridges, all in good condition, value a hell of a lot, price far, far less, £450. Tel: Ruislip (08956) 38564.

VIC20 CARTRIDGES for sale, including Gorf, Sargon 2, Chess, £15 each. Also Rat Race, Starbattle, Jellymonsters, Alien and many many more, £11 each. Tel: 574 4122 after 6 pm.

64K RAM EXPANSION for Vic20, £80. Tel: Penketh 2601.

VIC20 + CASSETTE PLAYER, 16K, 3K super expander, programs, reference guide and Vic revealed, software and joystick, £250. Tel: Ripley 810217.

VIC20 C2N CASSETTE, 8K Ram, £100 of cassette software, £120 cartridge software, programmers reference guide, Commodore Computing magazines, £235 ono. Tel: Buxton (Derbyshire) 78029.

VIC20 COLOUR COMPUTER + cassette, good condition including Demo cassette etc, £125. Tel: Bishops Stortford 57011.

VIC20 PLUS SUPER EXPANDER, still under guarantee, programs and software etc, £130 or nearest offer. Tel: 01-800 9517 after 5 pm.

COMMODORE VIC20, with C2N tape unit, complete, dust cover set, excellent £20 joystick, all manuals, Road Race plug-in cartridge as well as much tape, software included, original Bug-Byte, Vic Men, Blitz, excellent condition, £200 ono. Tel: Padgate 810490 after 5 pm.

VIC20 + CASSETTE DECK, Blitz, Frogger and Domino, all boxed, swap for Dragon 32. Tel: 061-941 2553.

VIC20 GAMES to swap or sell games from Audiogenic, Llamasoft, Rabbit and many more. Tel: 0442 58200.

VIC20, AS NEW, 8K, C2N cassette recorder, joystick, £16 books + £60 well-known games, £200. Tel: Aberystwyth 611341 after 5 pm.

VIC20 + C2N, 16K Ram, £100 ono. Tel: Taunton 88726 anytime.

VIC20 + CZN + 16K, over £1,000 of software, 95 tapes, joystick, books, magazines, excellent condition, value £1,400, yours for £450 ono. Tel: Ruislip (08956) 38564 (4.30 pm).

PIRATE COVE CARTRIDGE, £17. Tel: N. Rodgers, 0742 344427 daytime.

BRAND NEW COMMODORE 64s, price £345, sale price £295 (a saving of £50). 10 for sale. For details write to "64s Offer", 3 Wensley Close, Harpenden, Herts AI5 1RZ.

VIC20, cassette, 35607 motherboard, 8K Ram, expansion, machine code monitor, manuals, books on machine code + Basic joystick + over £300-worth of software, including Jelly Monsters, Sargon II, Chess, Star Battle, Avenger + Alien, £350 ono or swap for BBC model B. T. Wilson, 21 Chentonfield, Fulwood, Preston, Lancs PR2 3WH.

VIC20 + cassette with 3K Super-expander + 8K Mission Impossible + Radar Ratrace, Vic Revealed, Intro to Basic part 1, Mastermind, Backgammon + other software, best offer secures. Tel: 01-952 4397.

FREE VIC20 + C2N + 16K + 3K expansion units + well over £1,000 software, consisting of 95 per cent cassette based software (mainly games), two game cartridges, joystick, books and mags. Value approx £1,400 all this for nothing provided that the introduction manual is purchased for £450. Tel: Ruislip 08956 38564.

SWAP VIC20 C2N cassette recorder, software and programing kit, all under guarantee, in very good condition, for your Atari 400 + cassette. Rec, basic cartridge and software. Tel: Peterborough 242811.

8K COMMODORE VIC20 + Starbattle + Mission Impossible, intro to basic part 1, Vic revealed, loads of tapes, £140. Tel: 0492 623275.

VIC20, boxed, three months old, £85 ono. Tel: 07072 68496.

COMMODORE PET 3016 16K 12-inch, screen took kit chip model, cassette deck manuals + dust cover, software progs, £225. Tel: 0203 465472.

VIC 8K Ram, cartridge + 8K software, £25. Tel: Harpenden (05827) 5232 eves.

Ataris for sale

ATARI VCS, 4 cartridges including PacMan, good condition, £65. Tel: (Formby) 07048 70531.

ATARI OWNER wishes to sell, buy or swap programs. Tel: Winterbourn 776072.

ATARI VCS + 11 cartridges, £150. Tel: 0434 604272 anytime.

ATARI 800, 32K, cassette, manuals, £300 of software, £350. Jim Franklin, tel: 01-995 4998.

SWAP ATARI 6 games for 16K Spectrum. Tel: 01-672 4624.

ATARI VCS + PacMan + Video Chess, mint condition, boxed as new, £80. Tel: 348 5668 after 6 pm.

ATARI 400 16K including program recorder, 2 joysticks, Asteroids, Basketball, Star Raiders, Centipede + Basic cartridges, 2 books, all leads, offers. Tel: Dave, 051-427 4927.

ATARI VCS + PacMan + Asteroids + Berserk + extra paddles, £110. Tel: 01-582 1869 (after 6 pm).

ATARI 400 48K, cassette recorder, joysticks, basic + manuals, service guarantee on hardware, over £400 of cassette games, software including well known arcade games, superb, £350 for quick sale. Tel: 0702 201637.

ATARI VCS with paddles, joysticks, Invaders, Asteroids, Combat cartridges, almost new, offers around £60. Tel: Leicester 0533 884852 after 6 pm.

ATARI 800 48K, cassette recorder, with joysticks, £70 of software, 4 months old, almost new, £399. Tel: 021-357 2487.

ATARI VCS + all accessories + Space Invaders + Combat cartridges, £55 + many other cartridges from £8 up. Tel: Slough 20735 after 6 pm.

ATARI 400 with 48K + Inhome keyboard + basic, £200. Tel: home 274 7897; work 353 6566.

Acorns for sale

BBC MODEL B, OS 1.2 + disc interface + disc drive, cassette player + manual + leads, etc, also tons of software including machine code monitor with Rom, only £699 — will sell disc separately. Tel: Uxbridge 0895 35129.

BBC MODEL B + monitor + cassette recorder, software, books, 7 months old, open to offers. Tel: Mansfield 550372 after 6 pm.

BBC B, 32K, 3 months old, recorder, joystick, books, magazines, software, £390 ono. Free delivery up to 30 miles. Tel: Godalming 23436 (6 pm).

ACORN ATOM, 2K Ram, 12K Rom, floating point, all leads + power supply, manual, software, recent manufacturer service, £150. Tel: Southampton 736258 after 6 pm.

ACORN ATOM, 12K and 12K Ram, Ross utility Rom, external power supply, games, books, cassette deck, complete, £150. Tel: (0793) 823183.

For sale

CASIO FX502P Personal Computer, complete with manuals, cassette, interface, etc, £50 ono. Tel: 531 2892.

VIC20 software, to swap or sell, one Vicmen, Tomb of Dwin, Vic Rescue, Lazerzone, Martian Invader, Myriads. Tel: 031 6617477.

MANSION ADVENTURES, and Startraders, swap for any other adventure game. Tel: 707 0083.

FOUR VIC20 CARTRIDGES, worth £85 new, sell for £50. Tel Newark 0636 706326.

JUPITER ACE, brand new, £60. Tel: 051 4286281.

ITT 20/20 (Apple) 48K — 1 disc drive, £500 ono. Tel: 204 7032 weekday evenings.

COMMODORE 64 GAMES — Startrek, Othello, Backgammon, Drafts, Pontoon and Synth, machine code side scroll, prices range from £2.95 to £5.95. Tel: 748 8178 after 5 pm or weekends any time.

TRS 80 MODEL 1, level 2, 4 months old, nearly £300 worth of software and cassette recorder plus soundbox, books, manuals, price £250. Tel: 021 705 3469 after 5 pm.

DO YOU WRITE MACHINE CODE? On the backs of envelopes? If so why not use our coding sheets at only 3p each or £2.50 for 100. Send cheques/POs to: M. A. Valentine, 101A Underdale Road, Montmoor, Shrewsbury, Shropshire SY2 5EF.

SEIKOSHA GP100A PRINTER, six months old, excellent condition (owner has upgraded!), Centronics parallel, used with a Dragon 32, previously £180 (present price £240). Tel: Rustington (W. Sussex) 09062 72845.

BORIS MULTI-LEVEL CHESS COMPUTER, mint condition, with free chess set and power supply, £125 ono. Tel: Aylesbury 27357.

ORIC SOFTWARE for sale. Tel: 445 5989.

ORIC 1 — 48K Ram, plus Forth and manuals, plus mags and adventure games. New price £210 — asking price £170. Tel: Nottingham 295074.

ATARI TV GAME, with five cartridges, four months old. Worth over £200. Sell for £100. Tel: 051 9288011.

VIC20 GAMES, Scramble, Myeroid, Tank War, Arcadia, Alien Wars, Star Quest, Sub Space Striker, Incounter, Space Storm, etc, etc, cash offers. Tel: Yateley 872310.

VIC20 CARTRIDGES and cassettes for sale, most at half-price. Tel: 574 4122.

VIC20 Choplifter Rom cartridge, swap for either Commodore machine code monitor or 8K Ram pack. Tel: 021 458 4475.

COMMODORE 64 games, buy or swap or part exchange your Commodore 64 games. We sell Commodore 64 games for £2.95 — £6.95. We have two brand new games, No. 1 Robot Craze, No. 2 3D Starship Entry, each for £6.95. Tel: 01-450 4858.

SWAP DRAGON 32, Alcatraz 2 for Donkey King cassette. Tel: 061 7992036.

TEXAS TI994A with cassette lead. Parsec Rom cartridge, 2 cassettes in original packaging with guarantee, £115 ono. Tel: Sheffield (0742) 361722.

SHARP MZ80K, six languages word processor, 100 program library, £390. Tel: Tewkesbury 297579.

VIC20 PRINTER + Vicwriter cartridge, £160. Tel: Northwich 2155.

PIRATE'S COVE cartridge for Vic20 — swap for other adventure cartridges. Tel: 01-952 4749 after 4.30 pm.

£130 WORTH of Vic software in Bugbyte, Impact, Interceptor and Llamasoft. Will accept £100 or sell separately. Tel: 021-7043915

EXCHANGE YOUR SOFTWARE with me. Send sae to M. A. Valentine, 101A Underdale Road, Montmoor, Shrewsbury, Shropshire SY2 5EF

TANDY mini-disc drives, three available, £195 each or £500 for all three. Tel: 0630 83783.

SWAP BINITONE HI-FI for a 16K or 48K Spectrum. Tel: 061-740 9861.

JACKPOT FRUIT MACHINE, for unexpanded Vic20, four reels, hold, sound + large graphics, just £3.99. Phil Macdonald, 43 Freshwater Drive, Hamworthy, Poole, Dorset.

INTELLIVISION, 11 cartridges, sell £150 or exchange 48K Spectrum, Dragon. Tel: 01-368 8465.

DRAGON 32 games cartridges, Meteoroids, Berzerk and American Football. As new, cost £20 each, will accept £15 each. Tel: 01-878 6936 (Richmond).

BOOK 'BYTEING DEEPER' into YOUR ZX81, including 37 programmes for unexpanded ZX81. As new condition, cost £4.95 new, will accept £2.80 including postage. Tel: Gadebrook (0923) 89482.

GREAT COMMODORE 64 ARCADE + educational games. Prices from £2.49-£6.95. Tel: 01-450 4858.

SWAP ATARI 800 + 410 program recorder, joysticks, manuals, including De-re Atari programmers, etc, 5 months old, for similarly equipped BBC computer. Tel: Eastbourne 641719.

ITT 20/20 (APPLE), 48K Ram, £300. Tel: 01-451 0520.

TI LCD PROGRAMMER CALCULATOR, few hours use only, £32. Tel: 01-451 0520.

SHARP MZ 80K, 48K Ram, 8 months guarantee left, re-set button, excellent condition, £275 ono. Tel: 802 3038.

ABS COMPUTER INSURANCE PROGRAM, central processor with 64K byte (32K words of memory), 10.6 mega-byte disc-drive, high-speed band printer, 240 lines per minute, 3 VDUs, offers. Tel: Slough 25496.

FOR SALE 48K UPGRADE for issue one Spectrum, £25. Tel: 061-225 8054.

SWAP VIC20 + cassette unit + 16K Ram + over £90 of books and software for an Atari 400 + cassette unit + basic cartridge + software. Tel: Gullane 842613.

AVENGER CARTRIDGE for Vic20, £8.50. Tel: Stevenage 811634 after 7 pm.

SWAP JUPITER LANDER + Adventureland for any Audiogenic cartridges. Tel: Pipegate 297.

TI 99 4A with mini-memory line by assembler, extended basics, joysticks, Grammer for Beginners + tape cable, £240. Tel: 01-515 7962.

MENTOR Z80 DEVELOPMENT SYSTEM, including power supply, £65. Tel: 061-428 7312 anytime.

CASSETTE OF UNEXPANDED VIC20, 13 games on it, including Blitz, £5.50. Tel: 207 0926.

VIC20 SOFTWARE, cartridges + cassettes, most half price, including Gorf, Jelly Monsters, Star Battle + Lazerzone. Tel: 574 4122.

SPECTRUM SOFTWARE, all top games on one cassette for £10. Games include Football Manager, Cyber Rats, Maze-man, Battle of Britain, 3D Tunnel, Avenger and many more, for only £10. Tel: 0555 71076.

MANY ARCADE GAMES, £3.50 for each one or £25 the lot, 6 games altogether. Tel: Wilmslow 522375.

JUPITER ACE, two months old, 3K Ram + introduction to Forth + seven extra programs, £70. Tel: Woking 65978.

SWAP SPECTRUM GAMES for others. Tel: 0622 61917 after 4 pm, ask for Ian.

INTELLIVISION with nine Rom cartridges for £160 ono. Tel: 01-310 8109 after 5 pm.

SHARP PC 1211 with manuals, cassette unit + two games tapes, £40. Tel: Mr Rodgers 0742 34427 daytime.

UK 101 8K, cased, £80 ono. Tel: 01-987 1660. Ask for Len, after 6 pm.

Wanted

WANTED, DRAGON COPY-KAT TAPE, exchange anything from my large and varied collection of cassette software. Details Staines 58707 after 6 pm.

WANTED, ONE COPY of the first issue of *Dragon User*, can anyone sell me one? Send to Hugh Barr, Seagull Cottage, Waterloo, Brekish, Isle of Skye, or tel: (04712) 437.

WANTED, MZ 80K, cash for reasonable offer. Tel: (Nelson, Lancs) 0282 68715.

7-SLOT ARFON BOARD with lead for Vic20 in exchange for Stack 4 slot mother board + cash. Tel: Lichfield 53344.

WANTED, ANY BACK ISSUES of computing magazines, preferably for Spectrum. Tel: Rhymney 0685 841561.

WANTED, ZX SPECTRUM 48K, + printer, cash paid. Tel: 09285 63052.

WANTED, GRID RUNNER for unexpanded Vic. Tel: Banbury 720640.

WANTED, 16K RAM for ZX81, £10. Tel: 0249 812038.

WANTED, 16K RAM for Vic20. Tel: 01-205 9649 (after 6 pm).

WANTED, ZX printer for under £20 (condition not important). Tel: Roy, 579 0065.

WANTED, Atari cassette unit + software, especially Defender + Miner 2049er. Tel: Ascot 21160.

DRAGON 32s REQUIRED, £130 for each sound machine, immediate decision, I will arrange collection/despatch. Details to A. Ellis, 22 Turnarean Road, St Austell, Cornwall PL25 5NX.

WANTED: Vic20 with extras, £120 available. Tel: Brenchley 3685 (home), or 01-211 3127 (work).

WANTED to buy or exchange, BBC Model A or B. Dunstable (0582) 68829.

SPECTRUM, 48K, wanted, also software if available, fair price paid for example in excellent condition. Tel: 01-897 6274, evenings.

PARKER Star Wars cartridge for Atari VCS in exchange for Demon Attack. Tel: 04862 70318.

WANTED: BBC B software to swap. Tel: 0256 71 2754.

LYNX, brand new, must be still under guarantee, £170 — £200. Tel: 04 862-70318.

WANTED: ZX Printer. Tel: 0622 61917 after 4 pm.

WANTED any Acetronic cartridges, price depends on age and condition. Tel: Bourne End, Bucks, 23797.

WANTED — Zaxxon game for the Atari 400. Will swap for another game or will pay cash. Tel: 01-989 8138 evenings and weekends.

ZX80s wanted, £10. Tel: 0904 769025.

Cruising/Blind Alley

Cruising

The highest score sent in so far this month is 9968 from Carl Doran of Skidby Mill, N. Humberside. Entries for this month's competition close on May 31.

Blind Alley

The highest score sent is so far is 32465 from Jonathan Farmer of 34 Cramond Park, Edinburgh. Entries for this month's competition close on May 31.

EXTEND SPECTRUM BASIC

WITH

WHITE NOISE and GRAPHICS £5.95

A collection of Machine Code routines to add over 20 extra commands to Basic. These give total control over the screen via a window which can be scrolled (in eight directions), inverted, cleared, bordered and shaded (thus extending the normal range of colours). White Noise produces true explosions, gunshots and other sound effects, includes many other routines. Supplied with a comprehensive manual.

SUPER SOFTWARE PLUS KEEN PRICES MAKE OUR GAMES TAPES FOR YOUR SPECTRUM GREAT VALUE AT ONLY £4.95 EACH

1. **MONGOOSE** and **BEAR ISLAND** — 16K or 48K
   Fast and furious Arcade action
2. **REVERSI** and **POKER DICE** — 16K or 48K
   Games of skill and luck
3. **TIME-LINE** and **TASKS** — 16K or 48K
   Superb 16K Machine Code adventure and mind stimulating games
4. **MAGIC CASTLE** — 48K only
   Gripping adventure in Machine Code, rescue the Princess but beware of vampires and booby traps

SAE FOR FURTHER DETAILS
DEALER ENQUIRIES WELCOME

GILSOFT

30 HAWTHORN ROAD, BARRY
SOUTH GLAMORGAN, CF6 8LE
Tel: 0446 736369

Gilsoft are pleased to announce, that as a result of an agreement with Kempston Micro Electronics, our Softlink I Adaption Tape for the Kempston Joystick will in future be produced and marketed by Kempston's new software firm, Kempsoft. All prospective purchasers should now order this item from:

KEMPSOFT, 180A BEDFORD ROAD, KEMPSTON, BEDFORD

NEW RELEASES

PRACTICAL USES

Author, Adrian Dickens

It seems almost impossible to believe that there could be room for another book on the Spectrum. However, Melbourne House obviously think they have found a gap and have just issued the *Spectrum Hardware Manual* by Adrian Dickens.

This 112 page book is intended for those who like to find practical uses for their micros. It includes instructions for building joysticks and connecting a full-sized keyboard.

The author of the book is not one of the well-known computer "names" who seem to produce dozens of books a year. He is a 21-year-old engineering student at Churchill College, Cambridge.

The book includes full circuit diagrams and discusses the workings of each component.

Book *Spectrum Hardware Manual*
Price *£5.95*
Micro *Spectrum*
Supplier *Melbourne House*
Glebe College
Station Road
Cheddington
Leighton Buzzard
Bedfordshire

BEETLE CHASE!

AWA software is a new name in games software. One of its first releases is a maze game for the Spectrum.

In a vaguely *Pacman*-like scenario, you are chased around a maze by beetles whose eggs you are trying to steal (serves you right, I would say). If you survive, there are more difficult mazes to follow.

Program *Beetlemania*
Price *£5.50*
Micro *Spectrum 16/48K*
Supplier *AWA Software*
50 Dundonald Road
Didsbury
Manchester M20 0RU

MAZE HUNT!

Personal Software Services is one of those software houses still offering new programs for the ZX81.

Ghost Hunt requires you to gobble your way through a maze, chased by ghosts and defending yourself with power pills. No prizes at all for guessing the arcade game on which it is based.

The game requires 16K and is written totally in machine code.

Program *Ghost Hunt*
Price *£3.95*
Micro *ZX81 16K*
Supplier *Personal Software Services.*
452 Stoney Stanton Road
Coventry CV6 5DG

PLANE CRASH

While the ZX81 is well suited to the limited requirements of text adventures, it would not be anybody's first choice for an adventure featuring graphics.

Nevertheless, Computer Rentals has issued precisely that — a graphic adventure for the 16K ZX81.

Called *Escape from Manhattan*, it sounds very much like the scenario for the film *Escape from New York* — the President's plane has crashed in Manhattan, which is not a prison complex, and you have to rescue him.

The game is written by Nigel Taylor whose youth — he is 13 — is becoming the norm these days.

Program *Escape from Manhattan*
Price *£3.50*
Micro *ZX81 16K*
Supplier *Computer Rentals*
140 Whitechapel Road
London E1

GIANT CRABS!

Mysterious Island is a graphic adventure for the 16K Vic which actually involves 30K of program.

The game is split into two halves — you only *Load* part 2 once a secret codeword has been discovered from part 1.

The game features various nasties like giant bees and crabs. For those who complete the game, there is the promise of a "personalised award" from the manufacturers.

Program *Mysterious Island*
Price *£9.90*
Micro *Vic 20 16K*
Supplier *Mr Micro*
69 Partington Lane
Swinton
Manchester M27 3AL

GLOBAL INFO

Information on the entire world, including every sovereign state, language, regime and military alliance, is offered by *World Info* from Wimsoft.

This program is designed for those who need background facts to prepare news stories, articles, essays, etc.

In order to use this program you will also need Cambell Systems *Masterfile* into which *World Info* is loaded as a datafile.

Program *World Info*
Price *£5.00*
Micro *Spectrum 16/48K (16K is reduced version)*
Supplier *Wimsoft*
20 Brookside Road
Wimborne Minster
Dorset BH21 2BL

MOVING ON

Windrush Micro Systems is a company that has previously specialised in the upper ranges of the 6809 market.

It has now moved into the Dragon market with *Dragon Mace*, a cartridge which is an "Editor/Assembler/Monitor" package.

The cartridge comes complete with an 80-page explanatory booklet. It is intended for those who are proficient at Basic and who wish to move on to assembly language.

Program *Mace*
Price *£29.95*
Micro *Dragon 32*
Supplier *Windrush Micro Systems*
Worstead Laboratories
North Walsham
Norfolk NR28 9SA

A CLEAR PATH

New Generation Software has something of a cult following amongst Spectrum owners. There will be much interest, therefore, in its latest release.

The game is called *Knot in 3D* — a dreadful pun since the game most obviously is in 3D and this fact is crucial to playing the game.

You rush through empty space, leaving a green/yellow trail, while you are pursued by up to four chasers which leave red/blue trails. Since the space is enclosed, the trails become increasingly *Knotted* and it becomes even more difficult to find a clear path.

Program *Knot in 3D*
Price *£5.95*
Micro *Spectrum 48K*
Supplier *New Generation Software*
Freepost BS3433
Oldland Common
Bristol BS15 6BR

EVIL TACTICS

DK' Tronics was, until recently, best known for its range of hardware for the Spectrum and ZX81. However, in recent months it has released a growing range of software.

One of the most recent releases is *Spawn of Evil*. Although this game features both lasers and aliens, it is unlike traditional "shoot em up" games. The instructions alone take up one side of the cassette.

Your objective is to destroy the "spawn" before they have a chance to complete their complex breeding cycle and evolve into their most vicious form.

Doing well in the game is partly a matter of firing lasers and the like, but it is also a matter of seeking out the aliens at their breeding grounds and destroying them at the most opportune moment — a matter of some tactical thought.

The program was written by Don Priestly, author of Bug-Byte's *Mazogs* for the ZX81.

Program *Spawn of Evil*
Price *£4.95*
Micro *Spectrum 16/48K*
Supplier *DK' Tronics, Unit 2*
Shire Hill Industrial
Estate
Saffron Walden
Essex

UNUSUAL EXTRAS

The Black Hole is the first release for a new company, Quest Microsoftware, which has just entered the highly competitive Spectrum software market.

Although basically a "spaceship against aliens game", it does offer a number of unusual extras — you have to avoid not only the aliens but also a black hole, which affects the behaviour of your various weapons of destruction.

The game, which has been developed by ex-defence industry programmers is claimed to be very addictive and, as an added incentive, cash prizes are being offered for the highest scores.

Program *The Black Hole*
Price *£5.50*
Micro *Spectrum 16/48K*
Supplier *Quest Microsoftware*
119 The Promenade
Cheltenham
Gloucestershire
GL50 1NW

MONEY-BAGS!

Mysterious Mansion is claimed to be an adventure game with a difference. The difference being that a joystick is used to move yourself around the various locations.

Your objective is to search for 10 bags of money which are hidden around the mansion — danger lurks in the form of several killer ghosts which you must avoid.

Program *Mysterious Mansion*
Price *£5.00*
Micro *Vic20 + 3K*
Supplier *C P White (Services)*
52 Northfield Avenue
West Ealing
London
W13 9SY

BOWLED OUT!

Coppice Software is a Lincolnshire based software company which has branched out from the Apple to the Dragon 32 in supplying software.

The first release in the Dragontree collection is *Bowling*, a computer simulation of the popular tenpin bowling alleys.

The game features the same rules as the original, with "spares" and "strikes" as well as a choice of bowling ball.

Program *Bowling*
Price *£4.95*
Micro *Dragon 32*
Supplier *Coppice Software*
7 March Street
Kirton Lindsey
Gainsborough
Lincolnshire DN21 4PH

BASIC MATHS

Cottage Software specialises in educational software for the BBC. The firm has just issued a range of five cassettes which aim to teach basic mathematical skills to children.

The first of these — *MUL-TABS* — features a multiplication table learning program followed by a test. Incentives to do well are in the form of congratulatory messages and graphics displays.

The other packages offer anything from castles to rabbits to bananas as counting aids for the child.

Program *MUL-TABS*
Price *£7.50*
Micro *BBC A/B*
Supplier *Cottage Software*
Heather Cottage
Selly Hill
Whitby
North Yorkshire

FLIGHT PATH

Nightflight from Salamander is one of the first Flight Simulation programs for the Dragon 32.

You are in command of a single-engined light aircraft. Once you have managed to take off, you can manipulate the controls to perform various sophisticated aerial manoeuvres like banks and rolls.

The ultimate challenge is to land the plane successfully using only the landing lights for guidance.

Program *Nightflight*
Price *£7.95*
Micro *Dragon 32*
Supplier *Salamander Software*
17 Norfolk Road
Brighton
East Sussex BN1 4AA

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, 19 Whitcomb Street, London WC2 7HF.

Ziggurat

Brave new world

"The unleashed power of the atom has changed everything save our modes of thinking, and thus we drift toward unparalleled catestrophes," thought Albert Einstein. I am not a member of CND, nor a supporter, but I do think that Einstein's pessimistic views are only too apposite.

I am not a unilateralist, but I do believe in a certain human dignity, a human dignity which seems to have become easily submerged in computing.

Recently I read a letter which complained about an advertisement from a group of "peace" programmers: the author of the letter said that, if he saw such an advertisement again, he would not read this magazine again — politics should play no part in computing. Apart from the fact that to be in favour of peace does not need to be party political — all are in favour of peace — to try to pretend that computing (and information technology) are of no political significance is to be simple-minded.

We cannot disguise from ourselves (or can we?) that computing occurs in the world, is a highly important aspect of that world, and is going to become more important. I suppose that, for those who do not wish to see, there is no relation whatsoever: the Japanese project to produce fifth generation computers, and the reluctance of both the UK and the USA to join them, is not at all political. But, as I said earlier, my interest is not really in people who fool themselves into thinking that politics and computing are unrelated: I wonder what effect computing has had, and is having, upon our dignity as humans.

Some of you may have seen the extremely worrying *Horizon* programme recently, about Artificial Intelligence and the promoters of AI in academia and elsewhere. I was very worried by the attitudes of these supporters; and I was left with the distinctly unpleasant feeling that a fair proportion of them were more in love with their machines than they were with humanity. To hear one highly influential professor, the future with computers would approach perfection, because the computers would provide answers to all our problems.

The machines would not allow us to be so silly as we have been in the past.

If for *machines* we substituted *master race*, it would sound rather silly, even rather extremist: perhaps deluded. Perhaps they are not the only ones who are deluded into forgetting common humanity.

During the Falklands conflict there appeared several repulsive programs; I seem to remember ones with the inspiring titles *Argie-Bargie* or *Bomb Buenos Aires*: titles which were an insult to common humanity. There can be no comparison between that rather good little game (often copied) *Bomber* or *Blitz*, which is not a concentrated expression of spleen, aimed to cash in on a cheap sensation. What self-respect can we have, if we purchase games in such bad taste?

" 'War Plan Alpha-5. This is not a drill.' You must fly through the stiff Russian defences — Mig fighters and surface-to-air missiles — to the target city, bomb it and return home." From: *B-1 Nuclear Bomber*, £11.95 on cassette, by Avalon Hill for Atari.

"Each year you must decide to allocate some resources into massive espionage efforts to locate enemy bases and industrial centres or concentrate effort into producing more engines of nuclear destruction. Victory is determined by population remaining and world political opinion." From: *Nukewar*, £11.95 on cassette, by Avalon Hill for Atari.

Whereas I have enjoyed playing many war-like games (eg, chess, battleships, noughts and crosses . . .), I feel there must be something wrong about the glorification of destruction embodied in some (highly over-priced) games. Compared to these games, even *Space Invaders* seem cuddly.

Most computer books, and most computer software, are — in my opinion — overpriced: when will people stop being mesmerised by the computer and when will *value* become a relevant criterion for computer add-ons? Value will become more important, and obnoxious games might not find a market, when people begin to see computers for what they are: very important, but no excuse to forget we are people. ■

Boris Allan

Puzzle

A tangled web

Puzzle No 56

Down at the bottom of the garden, Socrates the spider was looking for lunch. The object of his gastronomic attention was a tender young mayfly, who was dozing on top of a beanpole.

From where Socrates was standing, he could either cross the ground and then climb the beanpole, or he could go a distance of one foot to where a six foot length of cobweb was stretched tightly between the top of the pole and the ground, as in the illustration.

By an unerring instinct, Socrates knew that either way the distances were equal.

What is the height of the beanpole?

Solution to Puzzle No 51

The smallest number possible is:
10112359550561797752 80-
898876404494382022 4719

If you tried to solve the puzzle by testing numbers sequentially, then you will still have a long way to go!

The solution is found using long division mathematics, ie:

```
    1
9 ) 9XXXXX . . .
    9
    --
    0X
```

The first *X* must be the first digit in the answer and the long division proceeds until the last number divided is 81; ie, 9 * 9.

The Basic program used is:

```
10 LET A = 9
20 LET N = INT (A/9)
30 PRINT N;
40 IF A = 81 THEN STOP
50 LET A = (A - N * 9) * 10 + N
60 GOTO 20
```

Winner of Puzzle No 51

The winner is: D Warner, Heath Farm Road, Ferndown, Dorset, who receives £10.

Top 10 Top 10 Top 10 Top 10

Dragon

1	(1)	Donkey King	(Microdeal)
2	(5)	Pimania	(Automata)
3	(2)	Dragon Trek	(Salamander)
4	(3)	Champions	(Peaksoft)
5	(—)	Bonka	(Morrison)
6	(8)	Planet Invasion	(Microdeal)
7	(4)	Katerpillar Attack	(Microdeal)
8	(—)	Night Flight	(Salamander)
9	(—)	Star Jammer	(Salamander)
10	(—)	Ring of Darkness	(Wintersoft)

(Figures compiled by Dragon Dungeon, Ashbourne 0335 44626)

Spectrum

1	(7)	Spawn Of Evil	(DK'Tronics)
2	(6)	Assembler/Editor	(Picturesque)
3	(—)	Monitor	(Picturesque)*
4	(—)	M Coder	(PSS)*
5	(—)	Froggy	(DJL)
6	(4)	Knights Quest	(Phipps Associates)*
7	(6)	ETX	(Abbex)
8	(—)	The Hobbit	(Melbourne House)*
9	(5)	Black Crystal	(Carnel)*
10	(—)	Ship Of Doom	(Artic)*

*Requires 48K.

(Figures compiled by Buffer Micro Shop, London 01-769 2887)

Atari

1	(4)	Zaxxon	(Datasoft)
2	(2)	Miner2049er	(Big Five)*
3	(1)	Hellcat Ace	(Microprose)†
4	(—)	Zork 1	(Infocom)‡
5	(—)	Zork 3	(Infocom)‡
6	(5)	Astrochase	(First Star)†
7	(—)	Preppie	(Adventure International)
8	(—)	Pac-Man	(Atari)*
9	(—)	Pharaoh's Curse	(Synapse)†
10	(—)	Protector 2	(Synapse)†

*Cartridge. †32K cassette. ‡32K disc.

(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

Vic20

1	Asteroids	(Bug-Byte)
2	Panic	(Bug-Byte)
3	Alien Blitz	(Audiogenic)
4	Arcadia	(Imagine)
5	Wacky Waiters	(Imagine)
6	Cosmiads	(Bug-Byte)
7	Introduction to Basic Part 1	(Commodore)
8	Amok	(Audiogenic)
9	Blitz	(Commodore)
10	Introduction to Basic Part 2	(Commodore)

(Figures compiled by Boots & Co, London)

BBC*

1	(1)	Rocket Raid	(Acornsoft)
2	(3)	Planetoid	(Acornsoft)
3	(5)	View	(Acornsoft)†
4	(—)	Snapper	(Acornsoft)
5	(—)	Monsters	(Acornsoft)
6	(4)	Wordwise	(Computer Concepts)†
7	(—)	Chess	(Computer Concepts)
8	(—)	Tree Of Knowledge	(Acornsoft)
9	(—)	Logo 2	(Computer Concepts)
10	(9)	Creative Graphics	(Acornsoft)

*All model B.

(Figures compiled by Micro Management, Ipswich 0473 59181)

ZX81*

1	(4)	Do Not Pass Go	(Workforce)
2	(6)	Black Crystal	(Carnel)
3	(8)	M Coder	(PSS)
4	(1)	Froggy	(DJL)
5	(5)	Krazy Kong	(PSS)
6	(—)	Maze Death Race	(PSS)
7	(—)	ZX Compiler	(Silversoft)
8	(—)	The Fast One	(Campbell Systems)
9	(—)	Cosmic Guerilla	(Quicksilva)
10	(3)	ZXAS Assembler	(Bug-Byte)

*All 16K.

(Figures compiled by Buffer Micro Shop, London 01-769 2887)

Books

1	(2)	Enter the Dragon, *Carter*	(Melbourne House)
2	(3)	Mastering the Vic20, *Jones*	(Sigma)
3	(6)	The BBC Micro — An Expert Guide, *James*	(Granada)
4	(1)	Spectrum Machine Language for the Absolute Beginner, *Tang*	(Melbourne House)
5	(9)	Spectrum Hardware Manual, *Dickens*	(Melbourne House)
6	(4)	Assembly Language Programming for the BBC Micro, *Birnbaum*	(Melbourne House)
7	(—)	Vic Programmer's Reference Guide, *Commodore*	(Commodore)
8	(10)	Programming the 6502, *Zaks*	(Sybex)
9	(—)	Compute!'s First Book of Vic, *various authors*	(Compute!)
10	(—)	6809 Assembly Language Programming, *Leventhal*	(Osbourne)

(Figures compiled by Watford Technical Books, Watford 0923 23324)

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