

40 Rock

# POPULAR Computing WEEKLY

35p 31 March-6 April 1983 Vol 2 No 13

## This Week

**Dragon software**  
Keith and Steven Brain look at some of the latest software to come on to the market and find there is no defense from the phantom slayer. See page 12.

**Lynx programming**  
Jason Orbaum looks at different ways of using the Lynx's capability for handling one-dimensional numeric arrays on page 31.

**Spectrum sound**  
John Durst presents two machine code routines for creating sound effects on the Spectrum. See page 32.

**BBC magnification**  
Gary Scowcroft explains how to magnify text on a mode 0 screen. See page 29.

**★ STAR**  
April Fool  
Island on  
BBC B. See page 8.  
**GAME★**

## News Desk

### 16K Oric — production delayed

ORIC's wish to manufacture a sub-£100 colour computer will have to wait a little longer to be fulfilled.

The 16K Oric 1 will not now become available until late May or early June.

This setback comes after earlier indications of problems with 16K production (see *Popular Computing Weekly*, March 17). The delay results in part from technical difficulties with the design and in part from increased demand for the 48K machine.

Oric's Managing Director Barry Muncaster explained that, originally, both versions used the same basic design.

"We would have had no problems if the specification of a particular chip had not changed just prior to manufacture," he said.

"This, however, did alter, resulting in us having to completely change the 16K version printed-circuit board design — which, from start-up to pro-

Continued on page 5



### Commodore — 'No' to home-taping

COMMODORE is actively looking at ways of stopping home-copying of its software. With libraries and exchange clubs proliferating, the problem is rapidly growing in importance.

"Stopping individual libraries is very difficult," commented Commodore's Marketing Manager John Baxter. "Industries much larger

than our own — the record and video businesses for example — are trying hard to fight a similar sort of problem and are failing, so there is no easy solution.

"At the end of the day, we have to stop the whole process of home-duplication and the industry must get together and develop a system to fight it."

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**UK101 40K**, new monitor, Eprom board with Basic V, took kit, 48 x 32, screen, over 25 software cassettes. Will sell 32K Ram and enhancements separately, £225 ono. Tel: 051-638 6775.

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# WINDOW ON ANOTHER WORLD



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

## This Week

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## Editorial

The Data Protection Bill, currently  
passing through Parliament, is de-  
signed to protect the public (ie you and  
me) from any governmental misuse of  
information held in computerised data  
banks. In brief, the Bill purports to  
restrict access to information held in  
computers while giving individuals the  
opportunity of checking the validity of  
such information.

This would seem to be a worthy aim  
and, in the absence of any Freedom of  
Information Act, a sensible precaution.  
However, the Data Protection Bill, in  
its present form, is opposed by such  
groups as the British Medical Associa-  
tion, the Law Society and the National  
Council for Civil Liberties.

There are a number of reasons for  
this opposition, chief among them the  
fact that some government computers  
will be exempt from the Bill. Thus,  
information on such sensitive topics  
as immigration, crime and tax will be  
passed freely from one government  
department to another, but will not be  
available to the individuals concerned.

With more and more information  
being held in computers, some sort of  
data protection legislation is obviously  
needed. However, that legislation  
should be linked to a series of safe-  
guards that give the individual a right  
of appeal. Hopefully, the Data Protec-  
tion Bill will be amended to include  
such safeguards.

## Next Thursday

Dare you try your luck in *Death Wall*?  
Do you think you can outwit the compu-  
ter, and prevent yourself from being  
electrocuted, in this all-action game for  
the Dragon 32 by Mark Perry?

Also next week, a review of Vic20  
games by Mike Grace.

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## Home-taping

Continued from page 1

At present, Commodore is looking closely at two possible approaches. "If necessary we can concentrate on Rom software or material on discs with protection systems," he said, "but we are also looking at changing the design of our cassette player to make it incompatible with a normal audio player."

Commodore is in a good position to adopt such a system because both the Vic20 and 64 computers use a dedicated cassette player.

"What we are looking for is a method of using a data cassette in conjunction with our C2N cassette unit in such a way that if you copy the cassette on a domestic recorder you will get a corrupted tape program."

Commodore, along with other manufacturers, is under increasing pressure from public lending libraries who wish to offer a software lending service. Already one library — Thanet — is offering a small-scale loan facility.

## 16K Oric

Continued from page 1

duction, has taken 12 weeks.

"The 16K has had to be viewed, from the manufacturing point of view, as a totally different product," he commented. "This has caused a delay."



Oric MD Barry Muncaster.

Existing mail-order customers who have ordered the 16K machine have been sent 48K models on "extended loan", and they will apparently be replaced when the 16K unit becomes available.

The 16K version is the second of the series to run into production difficulties. A 32K version was announced in November and shelved in January because of a chip incompatibility problem.

## Software boost for Jupiter Ace

ACE owners are soon to get a shot in the arm — a much-needed software transfusion from the machine's manufacturer, Jupiter Cantab.

A range of nine cassettes will be available at the beginning of April, followed by another seven a fortnight later.

Three of the first wave are 19K programs designed to be used in conjunction with a 16K Ram pack which will go on sale at the same time. These are: *Gobbledegook*, *Zombies and Potholes* and an *Othello*-type game.

Five of the remaining six tapes each contain a pair of 3K games: *Moo/Hangman*, *Fish/Flutterer*, *Greedy Gobbler*

*Blow up the World*, *Missile Man/Space Fighter-pilot* and *Overtaker/Brands Hatch*. The last three tapes have been commissioned by Jupiter Cantab from Micromega.

The final tape is *Monitor* — a 3K programming tool to display the content of the memory.

All of the tapes will be available from Jupiter Cantab, 22 Foxhollow, Bar Hill, Cambridge. The 19K programs are priced at £7.95. The others are £5.95.

The 16K Ram pack — available at the end of March — will cost £34.95. A 48K Ram pack will follow a few weeks later and will cost £79.95.

Longer term plans include a

combined RS232/Centronics interface board, available in the summer and priced around £40.

"We are also looking at the possibility of a colour card for the Ace — there is provision for it on the computer," commented Jupiter co-founder Steve Vickers.

However, he denied reports that a new machine is in an advanced stage of development. "Obviously we have got our ideas but we are not intending to bring out another machine this year."

● Stonechip Electronics has launched a 16K add-on Ram pack for the Jupiter Ace machine. Called the Pacer, the unit costs £29.95 and is available by mail-order from Stonechip Electronics, Unit 9, The Brook Industrial Estate, Deadbrook Lane, Aldershot, Hants.

## Spectrum low-cost printer

A PACKAGE has been produced which allows the Sinclair Spectrum to run the Tandy low-cost printer/plotter.

Hampshire-based Softest has developed the hardware/software combination to do the work. For £35 the company will supply the connector and the software to drive the system.

The cassette program is supplied in three parts. The first provides the machine-code to interface the two machines — the so-called hand-shaking

protocol. The second provides a *List* facility. The third gives routines adding commands to the Sinclair Basic used to address the printer from the Spectrum keyboard.

The Tandy CGP-115 four-colour printer offers two modes of operation — text or graphics — uses plain paper of 96mm width in two formats — 40 and 80 character lines — and costs only £149.

Using the Softest interface, the mode, format, pen colour, pen start and stop position and origin may all be selected from the computer keyboard.

Explained Softest's Chandra



Fernando "The Tandy printer/plotter costs about a fifth of the price of its nearest competition, so it seemed logical to interface it with the Spectrum."

Although the Tandy printer has both Centronics and RS232 ports — the Spectrum has neither.

Further details of the interface from Softest, 10 Richmond Lane, Romsey, Hants.

## Prestel adaptor put on ice

PLANS for a Prestel adaptor for the ZX81 and Spectrum microcomputers have been dropped by Sinclair Research.

"The project has not been killed dead — just frozen" said a company spokesman. "The decision has been made not for any technical reason — more because at present we feel there is no market for it. The engineering effort is being fed into other areas."

Micronet 800, the Prestel-based computer database, is working on its own adaptor for the Sinclair machines.

The unit should be available in early May at a price in the £50-£70 range.

The Micronet service was launched at the end of February and now has over 1000 subscribers.



## Donkey Kong treads the boards

BOARD-GAME manufacturer Milton Bradley is moving into the arcade arena.

The company is producing a range of traditional games based on arcade favourites. The first three are Donkey Kong, Pac-Man and Frogger. Berserk, Defender and Zaxxon are to follow shortly.

"We are reversing the current trend and, in so doing, making these games so that the whole family can play them," commented a spokesman for the company.

The games cost £8.50 each. More information from Milton Bradley, 97/107 Uxbridge Road, Ealing, London.

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## C★TECH SOFTWARE

### ZX Spectrum Software

### DRAGON

#### FROGGER AND SPECMAN

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

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

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

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



#### CENTIPEDE

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

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

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



#### GORFIAN

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



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#### FIGHTER PILOT/ CITY BOMBER



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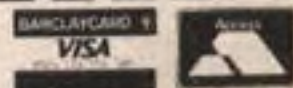
**CITY BOMBER** involves bombing buildings whilst your plane flies lower and lower towards them. All this for the unbelievable price of £5.00.

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## Bugs and all

I have been reading recently of the launch of the ZX Spectrum computer in the United States. According to various reports, the American version will not only be cheaper than in the UK but will be enhanced with such goodies as a three channel sound chip, games cartridge slot, auto-line number, renumber, etc. The American versions of the ZX81 and the ZX printer are also better than the ones we see here.

It seems to me that in the UK we have the first prototype rushed on to the market — bugs and all — followed by weeks of waiting while things are sorted out. Then, the American market has the benefit of a polished and enhanced machine as a result of the UK problems. Surely the enhanced machines should be available on the British market.

Why not, Uncle Clive, why not?

John Bloxham  
18 Lea Close  
Stratford-upon-Avon  
Warwickshire CV37 9JS

## Robot's revenge!

We at East London Robotics generally have a very high opinion of the content of your news pages, but we just have to point out some minor inaccuracies in your Peek & Poke page (March 3-9, "Giving them a plug").

ELR is not "in the process of moving". The move was completed before Christmas. Demand for our memory expansions and Slowloaders has far outstripped our expectations, but we have now managed to reduce the waiting time for an issue two 32K rampack to less than two weeks. We are expecting to deliver the entire backlog of issue one expansions by April 7, when delivery will be available in 10 days. British Telecom has been rather slow in putting in our extra telephone lines, and it has, indeed, been rather difficult to get through. The situation on this is now dramatically improving.

We would not like your

readers to be confused by the brief technical description of a 32K chip set in your magazine's reply. There are more than two decoding chips required, and you fail to mention that issue two spectrums themselves have a number of different variations which can cause complications. East London Robotics is not simply in the business of selling standard chips with a spectacular mark-up. We provide a fitting service at our premises or by post, as well as free help if there are any bugs.

Was the "plug" for our competitors simply revenge for our having failed so far to place advertisements in your excellent paper?

Roger Vellacott  
East London Robotics  
No 11 Gate  
Royal Albert Dock  
London E16

The "plug" for your competitors was simply a matter of informing one of our readers of an alternative source of supply, since he had been unable to contact you. Your decision on whether or not to advertise is immaterial.

## Flawed score . . .

Further to the *Hungry Horace* saga, I am disappointed to report that I have discovered the flaw in the game. My score is now rarely bellow 75,000. Could Psion or Melbourne House recommend a *Poke* or any way of correcting this flaw which has spoiled an otherwise excellent and addictive game?

J S Mellor  
8a Camden St  
Plymouth  
Devon PL4 8NW

## Cowboys and Indians

Yes, another letter concerning software libraries. I am writing in my capacity as a partner in a software club. While I agree with some action being taken against 'cowboy' software libraries, I feel that your magazine should not take sides.

Your editorial (*Popular Computing Weekly*, February 17-23) concerning printing advertisements only from lib-

raries with permission of the software houses is unfair. Our club has been ready to launch for months now, but we have been awaiting replies from the software companies concerned.

We have written to most reputable Vic20 software houses but so far have had only two replies, neither of which had any relevance to our original request for permission to use their tapes. This ignorance from the software houses serves only one purpose: "cowboy outfits" to continue while leaving the more scrupulous libraries out in the cold!

S Greaves  
24 Alton Road  
Aylestone  
Leicester LE2 8QA

I do not think our editorial of February 17-23 was unfair. It seems perfectly reasonable to me to ask all software libraries to obtain permission from the software manufacturers whose tapes they hire out.

While this may seem to discriminate in favour of the less scrupulous libraries, who just go about their business without reaching any agreements, in the long run I am sure it will benefit both software libraries and manufacturers. Sooner or later, the "cowboys" will be brought to account for their actions.

## Remote control

I am very pleased to see that you now include a special page devoted to the BBC. However, please remember that not all these machines are sold for educational purposes and that there is a growing army of "home users".

I would like to see more articles such as "Walking the Wires" (*Popular Computing Weekly*, 24 February-3 March), which actually makes use of the many and varied input/output devices on the model B.

One problem seems to be finding suitable signal devices to plug in to the A/D port. Where, for example, can I get something to convert a temperature or a pressure to 0-1.8 volts? It would also be useful to have something that could switch mains voltage

household appliances or lights on or off by computer control.

D Clapp  
The Croft  
Haseley Kob  
Warwick CV35 7NL

## Memory games

I am a Dragon 32 owner who was very unhappy about the way the Dragon 32 *List* worked. The whole program is just *listed* at great speed (auto scrolling) until you have only 14 lines of text left. With a 200 line program that's not a lot of use (unless you have a photographic memory). Playing at the keyboard I found if you type *List* and *Enter*, the program is then *Listed*. To stop it just type *List* and *Enter* the program; when you want to continue just press any other key.

I hope this information will be of use to your readers who write their own software and have to debug it at the screen.

Ashley Buss  
2 Pembroke Place  
Caversham  
Reading  
Berkshire RG4 0HU

## Foxbat's conversion

I thought that owners of the 16K Spectrum might like to know how to convert *Foxbat* (Vol 2 No 8) to run on their machines. The following alterations should be made:

```
2 CLEAR 32099;LET SS =
0:LOAD""CODE
32100
130 POKE 32190,n
140 LET L = USR 32100
```

in program 1, and in program 2:

```
10 CLEAR 32099
20 LET A = 32100
100 SAVE "HANG ON.."CODE
32100,120
```

I would also like to congratulate Sinclair Research for the delivery of my Spectrum, 28 days exactly, and to Sunshine Books as I ordered *Cruising* on a Monday, and received it on the Wednesday!

R Wynes  
94 The Butts  
Frome  
Somerset BA11 4AF

# April Fool Island

A new game for BBC model B by Nick Wilson

**M**arch 31st: You retire to bed — impatiently waiting for tomorrow in anticipation of all the tricks you will play on your elder brother. You fall asleep happily.

April 1st: You wake up . . . to the sound of waves crashing nearby! Your brother has beaten you to it. He has April-fooled you. You read the note that is pinned to the foot of your bed:

Dear brother, Ha, ha! April fool! I have placed you at one end of this curious island. There is a boat on the far side of the island and you must reach it to stand a chance of returning home. But beware — you must not stray from the maze of paths. You may meet several random obstacles along your way. But don't worry, instructions are there to help you. Perhaps! Good luck — and see you soon, brother.

## Program notes

The program has several smaller programs held inside. These small programs make up the obstacles.

The main loop moves you.

(1) When typing in, use the same line numbers.

(2) Don't put the data onto one line.

(3) Series 1 Roms should change *Peek=227* to *Peek=129* in line 520.

(4) When typing lines 320—430 and 1115—1119 change all 'f's to *Chr\$ 225* and all 'S's to *CHR\$ 226*.

This is achieved by using the copy key. This change is necessary because the printer used for the printout could not print user-defined graphics, so normal letters had to be substituted.





```

LIST
10 MODE1
20 PROCsetup
30 PROCmaze
35 COLOUR1:VDU31,X,Y,226
36 VDU19,2,4,0,0,0
37 COLOUR3
40 PRINTTAB(0,3)"N,S,E ?
":INPUTTAB(7,3)A$
41 COLOUR2
50 IF A$<>"N" AND A$<>"S" AND A$<>"E"
VDU7:GOTO40
55 VDU31,X,Y,225
60 X=X-(A$="E")
70 Y=Y+(A$="N")-(A$="S")
80 PROCcheck
85 COLOUR3
90 IF RND(1)>.4 GOTO 35
100 J=RND(10):IF J=3 AND RND(1)>.5
THEN GOTO 35
105 GOSUB (900+J*100)
110 GOTO 30
200 DEFPROCsetup
210 X=0:Y=10
220 VDU23,225,85,170,85,170,85,170,85,170
230 VDU23,226,24,189,153,126,60,24,36,102
240 VDU23,227,0,0,32,81,138,2,0,0
290 ENDPROC
300 DEFPROCmaze
301 CLS:COLOUR2:FORF=4 TO 20:PRINTTAB
(0,F)STRING$(39,CHR$(227)):NEXTF
320PRINTTAB(0,6)"SSSSIIIIIIII"
330PRINT"SSSSIISSSI"
340PRINT"SSSSIISSSI"
350PRINT"SSSSIISSSI"
360PRINT"IIIIIIIISSSSSI"
370PRINT"SSSSIISSSI"
380PRINT"SSSSIISSSI"
390PRINT"SSSSIISSSI"
400PRINT"SSSSIISSSI"
410PRINT"SSSSIISSSI"
420PRINT"SSSSIISSSI"
430 PRINT"SSSSIISSSI"
440PRINT
445 COLOUR3
450ENDPROC
500 DEFPROCcheck
510 PROCpeek(X,Y)
520 IF peek=227 FORF=255 TO 30 STEP-1:
SOUND&11,-15,F,1:SOUND&12,-15,F-10,1:SOU
ND&12,-15,F-20,1:NEXTF:CLS:PRINT""YOU
FELL INTO THE SEA!":GOTO 900
530 IF X=27 GOTO 800
540 VDU31,X,Y,226
550 ENDPROC
600 DEFPROCpeek(X1,Y1)
610 VDU31,X1,Y1
620 A%=135:peek=((USR&FFF4)AND &FFFF)
DIV &100
630 ENDPROC
800 CLS:PRINT""WELL DONE! YOU HAVE
REACHED YOUR BOAT YOU ARE NO FOOL!!"
805 FORG=1TO100:SOUND1,-15,RND(255),1:
FORF=1TO8:VDU19,0,F,0,0,0:NEXTF,G
810 GOTO 920
900 FORA%=1TO8000:NEXTA%:CLS
910 PRINT""APRIL FOOL ISLAND CLAIMS
YET ANOTHER FOOL!!"
920 PRINT""PRESS ANY KEY"
930 *FX15 0
940 N=GET:RUN
1000 CLS:PRINT""THE HAPPY HIPPO SITS
HERE!"
1010PRINT"HE DOES NOT KNOW HIS NAME"
1020 PRINT"WATCH CAREFULLY AND QUICKLY!"
1030 RESTORE (1080+RND(14)):READ N$
1040 PRINT"PRESS ANY KEY":*FX15 0
1050 N=GET:CLS:PRINTTAB(RND(30),RND
(20)):N$
1055 TIME=0:REPEAT UNTIL TIME>10:CLS
1060 INPUT""WHAT WAS HIS NAME ?" A$:
IF A$=N$ GOTO 1070
1065 PRINT""THAT WAS WRONG! ":PRINTN$:
" CHARGES AND KILLS YOU!":GOTO900
1070 PRINT""CORRECT! PRESS ANY
KEY":*FX 15 0
1075 N=GET:RETURN
1080DATA HARRY
1081DATA NICK
1082DATA SIMON
1083DATA PETER
1084DATA FRED
1085DATA JACK
1086DATA HUGO
1087DATA DAVID
1088DATA ARTHUR
1089DATA JOHN
1090DATA CUTHBERT
1091DATA PAUL
1092DATA MIKE
1093DATA JAN
1094DATA EDWARD
1100 CLS:PRINT"THE DOORS!!!"
1110 PRINT""BEHIND ONE OF THE
DOORS THERE IS A STARVING LION! CHOOSE
CAREFULLY"
1111 COLOUR1
1115 PRINTTAB(0,10)" III III III"
1116 PRINT" III III III"
1117 PRINT" III III III"
1118 PRINT" III III III"
1119 PRINT" III III III"
1120INPUT""WHICH DOOR SHALL YOU GO
THROUGH ",D%:IF D%<1 OR D%>3 THEN VDU11,
11:GOTO1120
1125 D=RND(3)
1130 FORF=4 TO 16 STEP 6:FORG=10TO14:
FORH=1TO200:NEXTH:PRINTTAB(F,G) " ":IF (D
*5-(3-D))=F-1 AND G=12 PRINTTAB(F-1,G)
"LION!"
1131 NEXTG,F:PRINT""
1132 IF D%=D GOTO 1180
1140 PRINT"YOU CHOSE CORRECTLY!":PRINT"
PRESS ANY KEY":*FX15,0
1150 N=GET:RETURN
1180 PRINTTAB(0,20)"YOU ARE DEAD!":GOTO
900
1200 CLS:PRINT"THE CRUSHER!!!"
1210 PRINT""ONLY ONE LETTER WILL STOP
IT!!"
1220 PRINT""PRESS ANY KEY":*FX 15 0
1221 N=GET
1225 CLS
1226 VDU31,20,16,226
1227 C=64+RND(26)
1230 FORF=5TO15

```

Continued on page 11

# MAIL ORDER FOR DRAGON GAMES

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An established software house is looking for original games for the 16/48K Spectrum and BBC. We are particularly interested in arcade games, war games and new ideas — but not variations of established games such as Invaders and Pac-Man.

If accepted, we will package and distribute your program and pay attractive royalties.

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**MS**

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# THE DRAGON DUNGEON

## DRAGON GOODIES

Now that we've shifted the rack out of the torture chamber, we've doubled our storage space and now stock the widest range of Dragon software available from a single UK source.

The Dungeon Master has been persuaded to expand his mingy little Price List and we can now send you a descriptive catalogue (with an outline of each program).

**Latest Book:** 'Dragon Extravaganza' (50 programs!) £4.95.

**Latest Arcade Games:** 'Monster Mine', 'Space Mission' and 'Alien Blitz' — all £6.91. Double value m/c tape 'Gempack IV' ('Sea Harrier' and 'Sub Chase') £6.91. Wizard's m/c specials 'Smash' and 'Evictor' — both £7.

**Latest Utilities:** Accord Data's Light Pen and Pen Draw Programs £9.45. Compusense's DASM Assembler Cartridge £18.95. Automata's 'Dragon Doodles and Demos' £5.

Lots more software on the way!

## TELEWRITER

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Now in stock at the Dungeon, 'TELEWRITER' is undoubtedly the most important program for the Dragon 32 released to date. This is a powerful Word-Processor, with sophisticated editing and file handling facilities and an excellent text capacity (18.5K characters, versus the Vic20 'Wordcraft' capacity of 7K).

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Supplied with full support package, consisting of Reference Manual, Telewriter Tutorial and the brochure 'Moving Basic Programs in and out of Telewriter.'

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We cannot recommend this package too highly at £49.95.



## DRAGON OWNERS CLUB

The Dragon Dungeon Club monthly newsletter, *Dragons Teeth*, is packed with news, reviews and information for the dedicated Dragon-basher. We still need your tips, discoveries, reviews and "beefs" and will send out guidelines and payment rates to those of you who feel up to full-scale articles.

The March issue of *Dragon's Teeth*, due out late February, includes both hardware and software offers and Club Members registering before March 31 will be eligible to purchase Dragon badges and sweatshirt at very special prices.

**Annual membership, including *Dragon's Teeth*, £6 (six-month trial subscription £3.25).**

# THE DRAGON DUNGEON

PO BOX 4, ASHBOURNE, DERBYSHIRE DE6 1AQ. TEL: ASHBOURNE 44626

```

1235 COLOUR RND(3)
1240 PRINTTAB(0,F)STRING$(39,CHR$(225))
1245*FX 15 0
1255 N=GET:IF N=127 CLS:PRINT""CHEAT"
:SOUND1,-15,0,20:FORG=1T01000:NEXTG:PRIN
T""PRESS ANY KEY":N=GET:RETURN
1256 IF N<65 OR N>91 GOTO 1245
1260 IF N=C GOTO 1280
1261 NEXTF:PRINTTAB(0,16)STRING$(39,
CHR$(225))
1265 PRINT""YOU WERE CRUSHED!!":GOTO900
1280 CLS:PRINT""SAVED - YOU WERE LUCKY!"
1290 PRINT""PRESS ANY KEY":*FX 15 0
1295 N=GET:RETURN
1300 REM
1301 CLS:PRINT""BACK TO START!!
(Ha! Ha!)
1310 X=0:Y=10:*FX15 0
1320 PRINT"PRESS ANY KEY":N=GET
1340 RETURN
1400 CLS:PRINT""THE CHARGING 'a'S"
1401 PRINT""YOU MUST AVOID BEING CRUSHED!"
1402PRINT""USE 'Z' + 'X' FOR LEFT+RIGHT"
1403PRINT""PRESS ANY KEY":*FX 15 0
1404 N=GET
1410 Q=20
1415 !&FE00=&10200A
1420 FORF=1T0200
1425 VDU31,Q,10,32:IF F>170 PRINTTAB
(0,31):FORH=1T050:NEXTH:GOTO1435
1429 COLOUR1
1430 PRINTTAB(RND(30),30)"a" a"
1431 COLOUR3
1435 PRINT
1440 Q=Q+INKEY(-98)-INKEY(-67)
1441 Q=Q+(Q=39)-(Q=1)
1445 PROCpeek(Q,10):IFpeek=64 VDU31,Q,
10,42:PRINTTAB(0,0)"YOU WERE CRUSHED!":G0
T0900
1450 VDU31,Q,10,226:FORG=1T050:NEXTG,F
1465 CLS:PRINT"YOU DID IT!":PRINT""
"PRESS ANY KEY":*FX 15 0
1470 N=GET:CLS:RETURN
1500 CLS:PRINT""THE DELTA RAYS "
1501PRINT""KEEP STILL AND HOPE!"
1502PRINT""PRESS ANY KEY":*FX 15 0
1503 N=GET:CLS:VDU31,20,16,226
1510 FORF=1T05
1512 SOUND0,-15,7,255
1513 GCOL0,RND(3)
1515 MOVE RND(1280),0:DRAWNRND(1280),1024:
FORG=200 TO 0 STEP-2:SOUND1,0,6,.5:NEXTG,F
1520 PROCpeek(20,16):IF peek=0 PRINT"YOU
WERE SPIKED!":GOTO900
1530 PRINT""YOU WERE SAFE!":PRINT"PRESS
ANY KEY":*FX 15 0
1540 N=GET:CLS:RETURN
1600 CLS:PRINT""THE SOUND
TESTER!!!!!"
1610 PRINT""YOU MUST TELL ME WHICH
OF THE TWO NOTES IS THE (HIGHEST) !"
1620 PRINT""PRESS ANY KEY TO HEAR THE
NOTES"
1625*FX 15 0
1626 N=GET
1630 A=RND(250):SOUND1,-15,A,10:
FORG=1T03000:NEXTG:C=2:A=A+3:IF RND(1)
>.5 C=1:A=A-6
1635 SOUND1,-15,A,10
1636 FORG=1T01000:NEXTG
1640 INPUT""WAS IT 1 OR 2?"A$
1650 IF VAL(A$)=C GOTO 1680
1660 PRINT""WRONG!!! YOU ARE KILLED!"
:GOTO900
1680 PRINT""CORRECT!!!! YOU ARE
SAVED!":PRINT""PRESS ANY KEY!":*FX 15 0
1690 N=GET:RETURN
1700 CLS:PRINT""TRY TO MEMORISE
THESE NUMBERS":PRINT""PRESS ANY
KEY TO GET THEM!":*FX 15 0
1701 N=GET:S$=""
1702 FORF=1T05:S$=S$+CHR$(RND(9)+48)
:NEXTF
1710 PRINT""S$
1720 TIME=0:REPEAT UNTIL TIME>50
1730 CLS:INPUT""WHAT WAS THE NUMBER",
A$:IF A$<>S$ GOTO 1760
1740 PRINT""CORRECT!":PRINT"PRESS
ANY KEY":*FX 15 0
1750 N=GET:RETURN
1760 PRINT""WRONG YOU ARE KILLED!"
:PRINT""S$" WAS THE ANSWER!":GOTO900
1800 CLS:PRINT""THE GRUESOME
GAMBLER!"
1801PRINT""HE HAS THOUGHT OF TWO NUMBERS
AND YOU HAVE TO TELL HIM IF THE SECOND
WILL BE HIGHER OR LOWER THAN THE FIRST!"
1802 Q=RND(100):Q1=RND(100)
1803PRINT""P.S. The numbers are both
less than 100"
1810 PRINT""Q" IS THE FIRST!"
1815 INPUT""IS THE SECOND GOING TO BE
HIGHER OR LOWER (H/L) "H$:H$=LEFT$(H
$,1):IF H$<>"H" AND H$<>"L" GOTO 1815
1816 PRINT""Q1" IS THE SECOND!"
1820 H$=H$+" ":H$=LEFT$(H$,1):IF
H$="H" AND Q1>Q OR H$="L" AND Q>Q1
GOTO1860
1830 PRINT""YOU WERE WRONG! YOU
DIE!":GOTO900
1860 PRINT""YOU WERE CORRECT! YOU
WIN!"
1870 PRINT""PRESS ANY KEY"
:*FX 15 0
1880 N=GET:RETURN
1900 CLS:PRINT"THE MAD M A T H E
M A T I C I O N!!!!!"
1901 PRINT""YOU WILL HAVE 5 SECONDS
TO ANSWER AN EASY QUESTION!"
1910 PRINT""PRESS ANY KEY TO BEGIN"
:*FX 15 0
1911 N=GET:Q=RND(100):Q1=RND(100):
Q2=Q1+Q:TIME=0
1912 PRINT"" THE SUM IS : "
1913 Q%=0:PRINT""Q:" + "Q1:" = ";
1914 INPUTW$:W=VAL(W$):PRINT""YOU
TOOK "TIME/100" SECONDS"
1915 IF W=Q2 AND TIME<500 GOTO1960
1916 IF W=Q2 PRINT""YOU GOT IT RIGHT
BUT YOU WERE TOO SLOW":GOTO1950
1920 PRINT""YOU GOT IT WRONG!"
1950 PRINT""SO YOU ARE KILLED!":GOTO900
1960 PRINT""CORRECT!":PRINT""PRESS
ANY KEY":*FX 15 0
1970 N=GET:RETURN

```

## Fire, turn and run!

Keith and Steven Brain run the gamut of Dragon software from Wizard War to Deadwood.

Hardly a week goes by now without somebody advertising new Dragon software — and a substantial amount of material has become available since our last review in January. This time we have looked at nine packages, ranging in price from £3.95 to £9.95, and all supplied on cassette.

We had no problem Loading any of them and we were quite pleased with our first impressions of most of them, although we had to force ourselves to stop playing *Monster Mine* and *Phantom Slayer* and delve deeper into the others! Essentially, there were games of skill and games of strategy, so we will consider them in two sections.

First, the games of skill consisting of: *Arcade Action* (*Meteor Run* and *Breakout*) from Apex, *Defense* (no, we have not spelt it wrong, this is another American import!) and *Phantom Slayer* from Microdeal, and last but not least *Monster Mine* and *Dragon Golf* from Gem.

*Meteor Run* and *Breakout* are on the same cassette for £3.95 and, although they were certainly far outstaged by the other games, you must ask yourself what can you expect for that price. If you look at the economics of games costing, you soon realise that 'cheap' cassettes are almost bound to be poor value. Our advice in general is to save up your hard-earned pennies for something better.

### One touch from a Phantom is fatal!

For those of you who are determined to buy a 'cheapie', then *Breakout* is one of the 'golden oldies' of TV games where you hit a ball against a wall to knock bricks out. *Meteor Run* merely involves dodging objects coming up the screen at you. If you are a beginner, then these may be of interest, but you do not have to be too brilliant a programmer to write games of this standard (so why are you buying them instead of writing your own?).

The *Defense* and *Phantom Slayer* cassettes are twice the price at £8 each, but are in a different class altogether, being entirely in machine code and of real arcade standard. Both have been converted from high-class transatlantic Tandy Color Computer software (by the 'rehash' experts Microdeal once again). If you think that conversion of machine code programs is straightforward then try it yourself and prepare for a nervous breakdown, as the Dragon and Tandy Color Computer systems are much more different than they may appear at first sight!

*Defense* is an arcade look-alike played on the high-res screen and requires a joystick. The idea is to destroy the oncom-

ing missiles, repel the flip charges, and halt the fusion bombs to save your outposts from destruction. It features a hi-score table and optional instructions are included in the program. It is a good arcade copy, but our views are a bit jaundiced as we were never that impressed with the original.

*Phantom Slayer* takes place in a very realistic, full-colour, hi-res 3D maze and involves seeking out the dreaded Phantoms before they seek you out! You have a proximity detector, which gives an ominous audible warning of their approach, and a laser pistol. But, be warned that one touch from a Phantom is fatal. As it usually takes more than one shot to kill a Phantom, and your laser pistol takes a few seconds to recharge, we found the best tactic was to fire, turn, and run.

The title sequence is very neat and includes an essential 'demonstration run' through the maze, so you can see what you are up against. Two different maze types are available, together with a training mode (thank goodness!) and three speed levels. We found *Phantom Slayer* particularly addictive and great fun! If you are a real masochist, try this one on a black and white TV where you cannot even see the Phantoms!

Without doubt these offerings benefit greatly from the two-year start of US 6809 machine code software for the Tandy Color over the UK efforts in this field.

*Monster Mine* is another machine code arcade-type game; this time involving travelling upwards from the bowels of a gold mine, collecting cash, and trying to make it to the exit. The only slight problem is that there is a monster on each level which can outrun you! The trick is to run up

when the monsters are on the other side of the screen (they said nonchalantly!)

The whole mine is displayed at once in two dimensions and this game moves fast and is much harder than it looks at first. Although we feel the game itself is not quite as testing as the Microdeal offerings, it is more user-friendly and includes some very nice humorous touches.

*Dragon Golf* has some very stiff competition from the offerings of other software houses on the popular golf theme. Although you can pick your club and your "worst vice" many other factors are not included, and in our opinion it is far from the best version available. It only uses low resolution graphics on the text screen and is neither very original nor very close to the real game.

Our favourite golf program is undoubtedly still the Salamander version with its hi-res display of both fairway and green, neat aiming point system, and careful attention to the rules of the actual game. After the fast movement and hi-res display of *Monster Mine* from the same company (Gem), *Dragon Golf* was rather a let-down and it is hard to justify the price of £7.95.

When we had exhausted ourselves on the 'games of skill', we looked at the strategic side and tried to exercise our brains more than our fingers. The games in this section were: *Tyrant of Athens* from M C Lothlorien, *Strategic Command* from Romik Software, *Deadwood* from A&F Software and *Wizard War* from Salamander. All used a combination of text-screen and hi-res — both *Strategic Command* and *Wizard War* required two joysticks.

Although *Tyrant of Athens* produces an impressive map of Greece and the surrounding countries, it is rather disappointing in that most of the playing is done on the text screen. It involves a combination of the old 'trading' theme and more warlike activities, as you have to decide whether to fight attacking forces, how much seed to plant, how much to spend on 'defence',



and how near you dare get to starving your people.

It seems that dead wood is not always rotten, as the title sequence in the *Deadwood* program gives an impressive display of the old west. Although the game itself only involves the low-res screen, it can be interesting. It is basically a *Monopoly* type program, but not as complicated — do not expect Park Lane and Mayfair standards in this town!

You must deal with the law, tend to your supplies, and keep in with the bank. If you cannot stand any more, you can always retire to the casino! The program offers 1-4 player options and you can define the length of game at the beginning in minutes, so there is no excuse for staying up all night.

## A game for the long winter evenings

The *Strategic Command* cassette contains both the main program itself and a preliminary 'joystick test', the purpose of which is unfortunately not made clear in the instructions. The idea of a rapid joystick test which will determine if your joysticks will function correctly with the program to be loaded is very good, and could save a lot of frustration, so it is a pity that the purpose is not properly explained.

Joysticks should always return values of 0 and 63 at the extreme ends of their travel. However, with cheap joysticks, it is common for the wipers not to reach the end of the potentiometer tracks, so that the full range is not seen — which can cause problems when the programmer has not considered this possibility.

In practice, it is best to try and avoid use



of the extreme values. But, if you have a Basic program using joysticks which does not function correctly, first test your joysticks and, if the extreme values are never reached, then the solution is to *List* the program and alter all the joystick tests to less critical values.

But, back to *Strategic Command* itself, a complex war game played on a hi-res map, which requires you to decide how to build up and deploy your land and sea forces, and then do battle with your opponent, all under joystick control! The rules are explained at length in very small print on the cassette insert and are quite complicated, so this is obviously a game for the long winter evenings when everyone else has gone out. A nice feature is that once you have given a task force an order to

move in a particular direction it will continue to do so until it receives a direct order to the contrary, or collides with something, so you cannot fall asleep playing this one!

When you are close enough to the enemy you can engage in combat; the silhouettes of the appropriate forces are displayed and battle commences, with the computer playing 'umpire' and ultimately deciding the outcome. Other features are mine laying and air reconnaissance of enemy forces. The game is won when (or in our case 'if') you reach the opponent's capital. This was the most expensive game at £9.95 and we feel that, although it offers good sport (and mind-bending potential) to the war-gaming fanatic and those bored by arcade and adventure games, it is too complicated to be easily mastered by youngsters.

*Wizard War* stands out from the others as the most original game in the review, even though it seems to be loosely based on the old 'stone, paper, scissors' game. You are cast as a wizard engaged in tests of strength against another wizard. In each round of the contest, each player must choose from a selection of four different spells randomly drawn by the computer from an armoury of 24.

Most of the offensive spells have either partial or full joystick control, and several factors can affect the success of your spell, apart from the kind of defence your opponent has put up. It even matters what colour the sun is! No wonder a 14-page illustrated 'spell book' is included!

Up to nine players can be accommodated, but if there are more than three players they are split into three teams with each player taking a turn at representing his group. Each team then takes it in turn to battle one of the other teams. This game is highly recommended as a more 'social' antidote to the loneliness of most arcade games.

In conclusion we must say that the general quality of the software was good, and it effectively exploited the potential of the Dragon.

Firm	Program	Cost	Value (1-10)
Apex 115 Crescent Drive South Brighton BN2 6SB	<i>Arcade Action</i>	£3.95	3
Microdeal Deal House Bridges Bodmin Cornwall PL30 5EF	<i>Defense*</i> <i>Phantom Slayer</i>	£8.00 £8.00	8 10
Gem Software 22 Prestwick Drive Bishop's Stortford Hertfordshire CM23	<i>Monster Mine</i> <i>Dragon Golf</i>	£7.95 £7.95	9 3
M C Lothlorien 4 Granby Road Cheadle Hulme Cheadle Cheshire SK8 6LS	<i>Tyrant of Athens</i>	£6.95	6
Romik Software 24 Church Street Slough SL1 1PT	<i>Strategic Command†</i>	£9.95	8
A&F Software 830 Hyde Road Manchester	<i>Deadwood</i>	£6.90	6
Salamander 17 Norfolk Road Brighton Sussex	<i>Wizard War†</i>	£7.95	10

\*Requires one joystick.  
†Requires two joysticks

# OPEN FORUM

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

## Rates

### on Spectrum

The local authority rates, of which about 75 percent pay for education and the remainder other local services, usually go up by

far more than the rate of inflation each year. This program, although written for the Sinclair Spectrum, will run on most microcomputers with minor adaptation.

When you type in the program, enter in the data statements the values appropriate to your house as given by the *Rems*.

When you have entered the program, run it and you will know when the total you have paid in rates will equal what you paid for your house, and in what year your rate bill will equal or first exceed what you paid for your house. (Optionally at this point, complain to your MP.) Save the program on cassette. When you get your rate demand for the next year, add the rate per pound to the data line 80, and run the program again, and save it again on cassette. The prediction will be that much more accurate.

```
10 BORDER 1: PAPER 1: INK 7:
CLS
20 PRINT "Rates"
30 REM Enter here the rateable
value of your house.
40 DATA 219
50 REM Enter here the first
year you paid rates.
60 DATA 1977
62 REM Enter here the cost price
of your house
64 DATA 28500
70 REM Enter here the rate per
pound for each year, starting
with the first. If there is
a revaluation, then scale early
years.
80 DATA 49.69,57.97,73.72,87
.70,99.1,113.1
100 DATA 0
200 RESTORE 80
210 READ RP: LET AVERAGE=0: LET
ENTRIES=0
230 READ RP1
235 IF RP1=0 THEN GO TO 260
240 LET ENTRIES=ENTRIES+1: LET
AVERAGE=AVERAGE+RP1/RP: REM
Average increase
250 LET RP=RP1: GO TO 230
260 LET AVERAGE=AVERAGE/ENTRIES
```

```
300 PRINT "YEAR", "RATES"
310 RESTORE 40: READ RV: READ
YEAR: READ PRICE: LET P=1: LET
TOTAL=0
320 LET FLAG=0: LET FLAG1=FLAG:
RESTORE 80: FOR N=YEAR TO YEAR+49:
REM Insert here the number of
years required.
330 IF FLAG=1 THEN GO TO 350
340 LET RPL=RP: READ RP: IF RPL=0
THEN LET FLAG=1: LET RP=RPL:
GO TO 350
345 GO TO 360
350 LET RP=RP*AVERAGE
360 LET TOTAL=TOTAL+RP*RV/100
: PRINT N, PAPER P: INT (RV*RP/100)
362 IF TOTAL>PRICE AND FLAG1=0
THEN LET FLAG1=1: PRINT "The
total you have paid so far
in rates is more than you paid
for the house."
364 IF RP*RV/100>PRICE AND P=1
THEN LET P=2: PRINT "The
annual rate bill now exceeds
what you paid for your house."
370 NEXT N: PRINT
```

## Rates

by John de Riaz

## Art & Circles

### on Lynx

It took me some time to work out how to create circles on the Lynx, but the final effect was well worth the trouble. These

are good strong circles with glowing colour, and they display the colour and graphics of the Lynx with good effect. I prefer the display on a white *Paper*, but my son prefers it on *Black*. Either way it looks very good.

In Art we tried to imagine what a modern

artist might seek to do. The slight alterations in lines 130 to 150 develop a totally different pattern.

It is well worth experimenting with the basic circle formula — lines 30 to 90 in the Circles program — some of the effects are very good.

```
10 FOR J=0 TO 360 Step 1
20 MOVE 128,127
30 LET X=SIN(RAD(J))
40 LET Y=COS(RAD(J))
50 DRAW 128+X, 127+Y
60 INK RAND(6)+1
10 REM "CIRCLES"
20 CLS
30 MOVE 128,200
40 INK 2
50 FOR J=0 TO 100
60 LET X=SIN(J)*75
70 LET Y=COS(J)*75
80 DRAW 128+X, 128+Y
90 NEXT J
100 MOVE 128,175
110 INK 1
120 FOR J=0 TO 150
130 LET X=SIN(J)*50
140 LET Y=COS(J)*50
150 DRAW 128+X, 128+Y
160 NEXT J
170 MOVE 128,150
```

```
180 INK 4
190 FOR J=0 TO 120
200 LET X=SIN(J)*25
210 LET Y=COS(J)*25
220 DRAW 128+X, 128+Y
230 MOVE 128,225
240 INK 6
250 FOR J=0 TO 150
260 LET X=SIN(J)*100
270 LET Y=COS(J)*100
280 DRAW 128+X, 128+Y
290 END
```

```
10 REM "ART"
20 CLS
30 MOVE 128,200
40 INK 2
50 FOR J=0 TO 100
60 LET X=SIN(J)*75
70 LET Y=COS(J)*75
80 DRAW 128+X, 128+Y
90 NEXT J
100 MOVE 128,128
110 INK 6
```

```
120 FOR J=1 TO 100
130 LET X=SIN(J)*100
140 LET Y=COS(J)*75
150 DRAW 128+X, 128+Y*PI
160 NEXT J
170 MOVE 75,120
180 INK 1
190 FOR J=0 TO 150
200 LET X=SIN(J)*50
210 LET Y=COS(J)*50
220 DRAW 75+X, 75+Y
230 NEXT J
240 MOVE 150,222
250 INK 4
260 FOR J=0 TO 120
270 LET X=SIN(J)*25
280 LET Y=COS(J)*25
290 DRAW 150+X,200+Y
300 NEXT J
310 END
```

Art and circles  
by R White

## Pothole

### on Spectrum

In this program you, as a potholer, have to manoeuvre yourself down into a cave, avoiding the rocks which block your way. The program uses the Spectrum's *Attr* function to find out if you have hit the side

of the cave or a rock, and it also uses *Poke* 23692,255 to fool the Spectrum into scrolling.

1000-1120 Subroutine for when man has hit something  
2000-2060 Instructions  
9000 Data for graphics

### Program notes

1-60 Sets up graphics  
75-84 Prints screen display and scrolls  
86-100 Moves man and checks if he has hit anything

### Graphics notes

80: 32 inverse spaces, graphic B  
84: Graphic A  
1090: Inverse ((7 spaces) "YOU'RE DEAD HA HA" (7 spaces)), 32 inverse spaces  
2020: Shift 0

```

1 RESTORE
2 BORDER 4
3 CLS
10 FOR n=0 TO 7
20 READ a: POKEUSR "a"+n,a
30 NEXT n
40 FOR n=0 TO 7
50 READ b: POKEUSR "b"+n,b
60 NEXT n
65 INPUT "Instructions? (y or n)";a$
66 IF a$="y" THEN GO TO 2000
70 LET k=10: LET p=11: LET sc=0
75 POKE 23692,255
80 PRINT AT 21,0; INK 3; "
21,k; BRIGHT 1; " "; AT
8 THEN PRINT AT 21,k+(INT (RND*4
)+1); BRIGHT 1; INK 0; "Q"
81 PRINT
82 PRINT AT 0,0; "Score=";sc
83 LET sc=sc+1
84 PRINT AT 10,p; BRIGHT 1; IN
K 1; "X"; AT 9,p; SCREEN$(9,p)
85 IF INKEY$("<"5" AND INKEY$("<"
8" AND ATTR (11,p)("<"56 AND ATTR
(11,p)("<"123 THEN GO TO 1000
87 IF INKEY$="5" AND ATTR (11,
p-1)("<"56 AND ATTR (11,p-1)("<"123
THEN GO TO 1000
88 IF INKEY$="8" AND ATTR (11,
p+1)("<"56 AND ATTR (11,p+1)("<"123
THEN GO TO 1000
100 LET p=p+(INKEY$="8")-(INKEY
$="5")
110 LET o=INT (RND*3)+1
120 IF o=1 THEN LET k=k-1
130 IF o=3 THEN LET k=k+1
140 IF k("<"2 THEN LET k=2
150 IF k(">"26 THEN LET k=26
160 GO TO 75
1000 REM hit something
1010 FOR f=1 TO 100
1020 OUT 254,RND*255
1030 NEXT f
1040 FOR f=50 TO -50 STEP -2
1050 BEEP .005,f
1060 NEXT f
1070 CLS
1080 FOR f=0 TO 21 STEP 2
1090 PRINT AT f,0; "
SCORE=";sc"; AT f+1,0; I
NK 1; "
"; NEXT f
1100 INPUT "Score="; (sc); " , And
ther go (y or n)"; a$
1110 IF a$="y" THEN CLS : GO TO
1
1120 STOP
2000 REM instructions
2010 CLS
2020 PRINT AT 0,11; "Pothole"; AT
0,11; OVER 1; "
2030 PRINT AT 3,1; "You are a pot
holer and you must"; AT 5,1; "try
to manoeuvre youre man down"; AT
7,1; "inside a deep cave usings k
eys"; AT 9,1; "5 for left and 8 fo
r right"; AT 11,11; "Good Luck!"
2040 FOR f=1 TO 100
2050 BEEP .05,RND: NEXT f
2060 PAUSE 0: CLS : GO TO 70
9000 DATA 24,90,60,28,24,36,66,0
,64,188,132,130,65,130,122,4
9900 SAVE "Pothole" LINE 1
    
```

Pothole  
by A Boyse

## Twenty ones

### on Dragon

My program is loosely based on pon-toon, the idea is to get as close to 21 as possible without exceeding it. On running the program you will be shown six cards face down; two cards will be turned over as you watch, the third card will remain face down. You are then given the option of placing a bet on your cards. After

placing a bet you are then asked if you want the third card. The bottom three cards will be played against you. Which-ever has the highest score, or if the dealer matches your score, wins.

410 to 750 Puts the symbols according to the card value  
760 to 880 Your score  
890 to 1010 Takes your bets  
1020 to end Dealer's score and finish

### Program notes

Lines  
10 to 110 Set the variables  
120 to 340 Draw the cards face down and the symbols at the bottom of the screen for the *Get* command  
350 to 400 Select the six cards checking for dupli-cates

### Variables

PT,P,P1 take care of your score  
TV, VT, V dealer's score  
D,DD select the card in play  
Y,Z card position on the screen  
ZZE JACK,QUEEN,KING Draw commands  
GG cash in the bank  
GT games played

```

10 CLS
20 PRINT @ 73,"TWENTY ONES"
30 PRINT @ 135"BY JOHN JACKAMAN"
40 PRINT @ 172"2/3/83"
50 SCREEN 0,1
60 DIM C(11,11):GG = 100:GT = 0
70 IF GG < 1 THEN 1220
80 GT = GT + 1:IF GT > 20 THEN 1250
90 PMODE 1,1:PCLS:D = 1:DD = 0:V = 0
100 VT = 0:P1 = 0:PT = 0:P = 0:TV = 0
110 RESTORE
120 FOR I = 25 TO 225 STEP 75
130 FOR J = 10 TO 90 STEP 80
140 COLOR 7,5
150 LINE(I,J) - (I + 50,J + 70),PSET,BF
160 FOR K = 4 TO 48 STEP 8
170 FOR L = 4 TO 70 STEP 8
180 PSET(I + K,J + L,5)
190 NEXT L,K,J,I
200 LINE(0,170) - (254,170),PSET
210 PAINT(1,1),6,7
220 LINE(0,170) - (254,170),PRESET
230 CIRCLE(31,180),4,8
240 CIRCLE(34,180),4,8
250 CIRCLE(32,183),4,8
260 DRAW"BM94,182:C7U1D1R8U1D1
L4U4R1L1D8"
270 CIRCLE(157,180),3,8
280 CIRCLE(160,180),3,8
290 CIRCLE(158,183),3,8
300 CIRCLE(158,178),3,8
310 CIRCLE(219,180),4,7
320 CIRCLE(223,180),4,7
330 CIRCLE(221,178),4,7
340 DRAW"BM216,182:C5R8L3C7D2"
350 CC(1,1) = RND(13):CC(1,2) = RND(4)
360 FOR I = 2 TO 6
370 CC(I,1) = RND(13):CC(I,2) = RND(4)
380 FOR J = 1 TO I - 1
390 IF CC(I,1) = CC(J,1) AND CC(I,2) = CC(J,2)
THEN 370
400 NEXT J,I
410 ON CC(D,2) GOSUB 440,450,460,470
420 N = CC(D,1)
430 GOTO 480
440 GET (27,176) - (39,186),C,G: RETURN
450 GET (153,175) - (165,185),C,G: RETURN
460 GET (153,175) - (165,185),C,G: RETURN
470 GET (214,175) - (226,185),C,G: RETURN
480 READ Z,Y
490 SCREEN 1,1
500 PLAY"P5"
510 PAINT(Z,Y),5,6
520 IF N > 9 THEN 560
530 NN = N/2:NN = INT(NN):NN = NN + 2
540 IF NN <> N THEN N = N - 1:GOSUB 570
550 IF N < 1 THEN N = 1
560 ON N GOTO 760,740,70,720,70,
700,70,680,680,590,620,630,640
570 PUT (Z + 18,Y + 30) - (Z + 30,Y +
40),C,PSET
580 RETURN
590 COLOR 8,5:LINE(Z + 15,Y + 22) - (Z + 15,Y
+ 51),PSET
600 CIRCLE(Z + 30,Y + 36),9,8,2
610 GOTO 740
620 ZZE "C8R10L5D25G3L5H3U3"
:GOTO 650
630 ZZE "BR4C8R4F4D20G2NF3NH2
G2L4H4U20E4":GOTO 650
640 ZZE "C8D25U12E13G13F12"
:GOTO 650
650 LINE (Z + 18,Y + 22) - (Z + 18,Y + 22),PSET
660 DRAW ZZE
670 GOTO 740
680 PUT(Z + 18,Y + 50) - (Z + 30,Y +
60),C,PSET
690 PUT(Z + 18,Y + 10) - (Z + 30,Y +
20),C,PSET
700 PUT(Z + 34,Y + 30) - (Z + 46,Y +
40),C,PSET
710 PUT(Z + 2,Y + 30) - (Z + 14,Y + 60),C,PSET
720 PUT(Z + 2,Y + 50) - (Z + 14,Y + 60),C,PSET
730 PUT(Z + 34,Y + 10) - (Z + 46,Y + 20),C,PSET
740 PUT(Z + 34,Y + 50) - (Z + 46,Y + 60),C,PSET
750 PUT(Z + 2,Y + 10) - (Z + 14,Y + 20),C,PSET
760 IF DD > 0 THEN 1030
    
```

Continued on page 17

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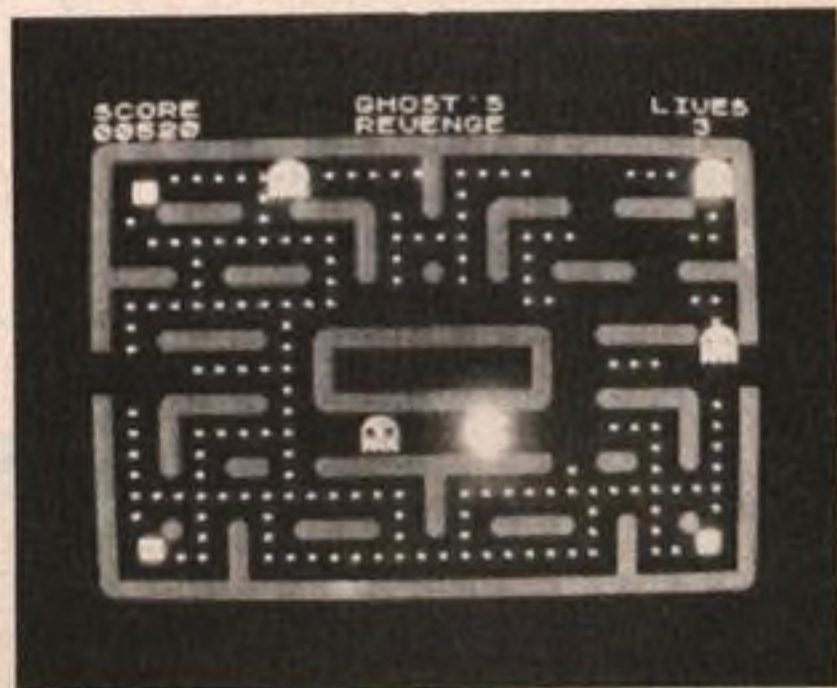
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# OPEN FORUM

```

770 P = CC(D,1):IF P > 10 THEN P = 10
780 PT = PT + P
790 IF P = 1 THEN P1 = 10
800 IF PT = 21 THEN 1020
810 IF PT + P1 = 21 AND D = 2 THEN G =
    25:GOTO 1200
820 '
830 IF PT > 21 THEN 1180
840 '
850 IF D < 2 THEN D = D + 1:GOTO 410
860 IF D = > 3 THEN 1020
870 DATA 25,10,100,10,175,10,25,90,
    100,90,175,90
880 PLAY"P1P1":CLS
890 PRINT"GAME":GT"OF 20 GAMES"
900 PRINT @ 130,"YOU HAVE";GG;"£IN THE
    BANK"
910 PRINT
920 PRINT"YOUR CARDS TOTAL":PT
930 IF P1 = 10 THEN PRINT"INCLUDING THE
    ACE":PT + P1
940 PRINT STRING$(32" *")
950 PRINT @ 289,"YOU'VE SEEN THE CARDS

```

```

HOW MUCH DO YOU WANT TO GAMBLE"
960 PRINT
970 INPUT" ";G
980 PRINT
990 PRINT" IF YOU WANT THE THIRD CARD
    PRESS T OTHERWISE PRESS THE SPACE
    BAR"
1000 QE = INKEY$: IF QE = " " THEN 1000
1010 IF QE = "T" THEN D = D + 1:GOTO 410
    ELSE READ Z,Y
1020 IF DD = 0 THEN DD = 1:D = D + 1:GOTO 410
1030 DD = DD + 1:V = CC(D,1)
1040 IF PT + P1 = < 21 THEN PT = PT + P1:P1 =
    0
1050 IF V > 10 THEN V = 10
1060 TV = TV + V
1070 IF V = 1 THEN VT = 10
1080 IF TV + VT = 21 THEN 1140
1090 IF TV = > PT AND TV = < 21 THEN 1140
1100 IF TV + VT < 21 AND TV + VT > PT THEN
    1140
1110 IF TV > 21 THEN 1200
1120 D = D + 1

```

```

1130 IF DD > 3 THEN 1200 ELSE GOTO 410
1140 PLAY"P1P1":CLS:PRINT @ 258,"YOU LOSE
    ":GG = GG - G
1150 IF TV + VT = < 21 THEN PRINT TV + VT;
    ELSE PRINT TV;
1160 PRINT"PLAY'S":PT
1170 GOTO 70
1180 PLAY"P1P1":CLS:PRINT @ 258,"YOU
    WIN":G 2;"£":GG = GG + (G * 2)
1210 GOTO 1270
1220 CLS:PRINT @ 235,"GAME OVER"
1230 PRINT @ 293,"YOU ARE OUT OF MONEY"
1240 GOTO 1270
1250 CLS:PRINT @ 235,"GAME OVER"
1260 PRINT"YOU WON":GG;"£"
1270 END

```

**Twenty-ones**  
by John Jackaman

## Cat & Mouse

on Vic20

This is a program for the unexpanded Vic.  
You are a mouse at the left of the maze  
and the object is to get out of the other side  
without getting eaten by the hungry cat.  
The mouse is moved by using F1,F7,Z  
and C.

```

100 P=RND(-TI):PC=0:MC=0:D=0:M=0:T=0:S=0
110 SP=32:SS=96:WC=160
120 IN=197
130 CC=102:C=01
140 TP=7680
150 C$=" "
160 DEFFNP(X)=TP+V*44+H*2
180 DIMT(3),M(100)
190 S1=32:S2=32:AS=120
195 HM=9:VM=10
196 GOSUB2000
200 GOSUB1000
210 PRINT"COUNTDOWN:5":TT=TI:D=5
220 IFTI-TT<60THEN220
230 PRINT" "":IFD=0THEN250
240 D=D-1:POKETP+11,D+48:TT=TI:GOTO220
250 PRINTC$
260 T=0:M=0
300 IFTTHEN=0:GOTO360
310 T=1:MC=MC-1:IFMC<0THENMC=3
320 D=PEEK(PC+T(MC))
330 IFD=SPORD=S1ORD=CTHEN360
340 IFMC<3THENMC=MC+1:GOTO320
350 MC=0:GOTO320
360 POKEPC,SP:PC=PC+T(MC):POKEPC,CC
370 IFP=PCTHEN700
400 FORF=1TOS:GOSUB500:NEXT
410 POKEP,SP:P=P+M:IFPEEK(P)=WCORP=
    BETHENP=P-M:M=0
420 IFP=PCTHEN700
430 POKEP,C
440 IFP<HOTHEN300
450 GOTO600
500 D=PEEK(IN)
510 M=0
520 IFD=63THENM=22:RETURN
530 IFD=33THENM=-1:RETURN
540 IFD=34THENM=1:RETURN
550 IFD=39THENM=-22:RETURN
560 RETURN
600 T(0)=1:T(2)=-1:T=0:S=1
610 FORF=0T029:NEXT:POKEP,32
620 IFPEEK(P+T(S))*WCTHEN660
630 IFP+T(S)=BETHEN660
640 IFT=3THENZ$=" ":GOTO800
650 T=T+1:S=S+1:IFS=4THENS=0
660 P=P+T(T):POKEP,C:GOTO610
700 PRINT"YUM YUM"
710 FORF=0T0300:POKEP,C:POKEP,CC:NEXT
720 PRINT"BURP!!":GOSUB2100
730 IFMT=1THENFORF=0T0799:NEXT:GOTO760
740 FORF=TPT08163:IFPEEK(F)=S1THENPOKEF,SP
750 NEXT

```

```

900 T=0
910 GETT$:IFT$<" "THEN960
920 IFT=0THENPRINT" ":GOTO940
930 PRINTZ$
940 PRINT" "":T=1-T
950 FORF=0T0199:NEXT:GOTO910
960 IFT$="N"THENPRINT"J":END
970 IFT$=CHR$(13)THENGOSUB2500:GOTO200
980 IFT$="Y"THEN190
990 GOTO920
1000 REM DESIGN MAZE
1200 PRINT"J":FORF=0T02*VM
1210 PRINTLEFT$( " ",2*HM+3):NEXT
1220 H=INT(HM*RND(1))+1:V=INT(VM*RND(1))+1
1230 P=FNP(X):M=0
1300 POKEP,S2:T=0
1310 IFPEEK(P-44)=WCTHEN(T)=-22:T=T+1
1320 IFPEEK(P-2)=WCTHEN(T)=-1:T=T+1
1330 IFPEEK(P+44)=WCTHEN(T)=22:T=T+1
1340 IFPEEK(P+2)=WCTHEN(T)=1:T=T+1
1350 IFT>1THEND=T(T*RND(1)):M(M)=P:M=M+1:
    POKEP+D,S1:P=P+2*D:GOTO1300
1360 IFT=1THEND=T(0):POKEP+D,S1:P=P+2*D:
    GOTO 1300
1400 IFM=0THEN1500
1410 M=M-1:P=M(M)
1420 IFPEEK(P-44)+PEEK(P-2)+PEEK(P+44)+
    PEEK(P+2)=ASTHEN1400
1440 GOTO1300
1500 V=INT(VM*RND(1))+1:H=HM:HO=FNP(0)+
    1:POKEHO,SS
1510 V=INT(VM*RND(1))+1:H=1:BE=FNP(0)-1:
    POKEBE,SS
1520 P=BE+1:POKEP,C
1530 PC=HO-1:POKEPC,CC:MC=INT(RND(1))*4
1540 T(0)=1+(RND(1)<.5)*2
1550 T(1)=22:T(2)=-22:T(2)=T(0)*-1
1599 RETURN
2000 POKE36879,252
2001 PRINT"XXXXXXXXXXXXXXXXXXXXCAT & MOUSE":
    FORX=1T01500:NEXT
2002 PRINT"XXXXXXXXXXXXXXXXXXXXGUIDE THE MOUSE":PRINT"THROUGH
    THE MAZE":PRINT"BEFORE THE CAT EATS IT"
2003 PRINT"XXXXXXXXXXXXXXXXXXXXMOVE THE MOUSE USING--":PRINT"
    F1-UP F7-DOWN"
2004 PRINT"XXXXXXXXXXXXXXXXXXXXZ-LEFT C-RIGHT"
2005 PRINT"XXXXXXXXXXXXXXXXXXXXPRESS * TO START"
2006 GETTT$:IFTT$=" "THEN2006
2010 INPUT"XXXXXXXXXXXXXXXXXXXXINPUT SPEED(1-5)":S
2020 PRINT"XXXXXXXXXXXXXXXXXXXX1.ORDINARY":PRINT"2.JAILBREAK":
    PRINT"3.HAYFEILD"
2030 INPUT"XXXXXXXXXXXXXXXXXXXXINPUT MAZE TYPE":Q0
2040 IFQ0=1THENS1=SP:S2=SP
2050 IFQ0=2THENS1=224:S2=SP
2060 IFQ0=3THENS1=224:S2=224
2070 POKE36879,27:RETURN
2100 FOREE=1T030
2105 POKE36870,15
2120 POKE36874,111+(EE*4)
2130 POKE36874,0:NEXT
2000 RETURN

```

**Cat and Mouse**  
by Malcolm Forbes

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# OPEN FORUM

## Garden

### on Spectrum

Everything in the Spectrum Garden is coming up roses till the arrival of THEM!

This short program demonstrates the Spectrum's picture making ability from a set routine. The constant use of *Rnd* in

*Plot*, *Draw*, *Print* and *Ink* colour selection ensures a measure of informality and absence of geometric lines.

Line 3 produces two new graphic characters *Poked* into *Udg Chr\$* 144 and 145 from the *Data* in line 4 and subsequently *Printed* in the endless loop of line 13. To ensure the screen is not completely filled these *Chr\$* are randomly overprinted with

*Chr\$* 128 — a blank space. This is done economically by moving the print cursor — *Chr\$* 8 to backspace or *Chr\$* 9 to cursor up, immediately the graphic characters are *Printed*.

The *Rem* statements show where the plants and flowers *Drawing* routines begin. Try resetting the *Border* and *Paper* colour to 0 for maximum colour effect into line 5.

```

1 REM Garden © Maurice Gavin
2 REM #make UDG from CHR$ 144
3 FOR f=0 TO 1: FOR n=0 TO 7:
READ X: POKE USR CHR$ (144+f)+n
X: NEXT n: NEXT f: RESTORE
4 DATA 6,143,21,110,110,21,14
3,6,66,60,24,36,90,219,102
5 BORDER 6: PAPER 6: CLS
6 REM #draw plants
7 FOR n=10 TO 245 STEP 3
8 INK 4: PLOT n,0: DRAW RND#2
0-10,RND#100: NEXT n
9 REM #draw flowers
10 FOR n=1 TO 10: INK RND#4+1:
PLOT n#20+RND#20,30+RND#100
11 DRAW 20,10,500: NEXT n
12 REM #print "THEM!" (UDG)
13 PRINT INK RND#6;AT RND#15,R
ND#30;CHR$ (144+RND#1);CHR$ (8+R
ND#1);CHR$ 128: BEEP .01,-40+RND
#80: GO TO 13

```

Garden  
by Maurice Gavin

## Screen Print

### on ZX81

This is a 42 byte machine code program for the expanded ZX81, it is designed to reside in a *Rem* statement in line 1 of the *Basic* program area, a disassembled listing is provided.

The function of Screen print is to dump the contents of the display file into a series of 22 *Print* statements, each one 32 characters in length. These statements should be in consecutive program lines, beginning directly after the *Rem* at line 1.

To set up the machine code, first enter the machine code loader as shown, and

*Run* it. After the error report appears, lines 20 to 60 can be deleted, and the 22 lines (each of the form (line no.) *Print* "(32 spaces)") entered.

This program can now be used as a subroutine in a larger 'sketchpad' type program, it is executed by the line '*Rand usr 16514*'.

## PROGRAM OF THE WEEK

```

4082 LD HL,40AC
4085 LD A,F5
4087 LD BC,0100
408A CPIX
408C RET PO
408D LD A,(HL)
408E CP 0B
4090 JR NZ,F8
4092 INC HL
4093 EX DE,HL
4094 LD HL,(400C)
4097 INC HL
4098 LD BC,1620
409B PUSH BC
409C LD B,0
409E LDIR
40A0 POP BC
40A1 DEC B
40A2 RET Z
40A3 PUSH BC
40A4 LD B,3
40A6 INC DE
40A7 DJNZ FD
40A9 INC HL
40AA JR F2
21 AC 40
3E F5
01 00 01
ED B1
E0
7E
FE 0B
20 F8
23
EB
2A 0C 40
23
01 20 16
DS
06 06
ED B0
C1
05
08
C5
06 06
13
10 FD
23
18 F2

```

```

1 REM EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
EEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
10 LET A$="21AC403EF5010001EDB
1E07EFE0B20F823EB2A0C4023012016C
50600EDB0C105C8C506081310FD2318F
"
20 LET X=16514
30 POKE X,16#CODE A#+CODE A$(2
)-476
40 LET X=X+1
50 LET A#=A$(3 TO )
60 GOTO 30

```

▲ The Hex Loader

◀ Screen Print: disassembled listing

Screen Print  
by Stephen Hughes

## Sketchpad

### on ZX81

First of all you are asked which character you wish to draw with. Then using the arrow keys, 5,6,7 and 8, you draw in the direction wanted. If you wish to change the character you are drawing with, pressing the S key will ask you for the new one, which you enter and press newline.

If, for any reason, you make a mistake, pressing the R key will enable you to rub-out. After pressing R you control where you rub-out using the arrow keys. The arrow keys will continue to act as rubbing out keys until you press S, where-

upon you input the character you wish to draw with.

If you lose your place (eg, backtracking, rubbing out, etc) press the key marked P!! Don't give up and start again. When you press the key, a black square will appear for a few seconds, showing your position.

If you want to scrub your drawing and start again, pressing G will do just that. Sketchpad will run on a 1K ZX81, but you may experience problems when drawing a border round the screen due to lack of memory.

```

1 CLS
2 LET A = 0
3 LET B = 0
4 INPUT A$

```

```

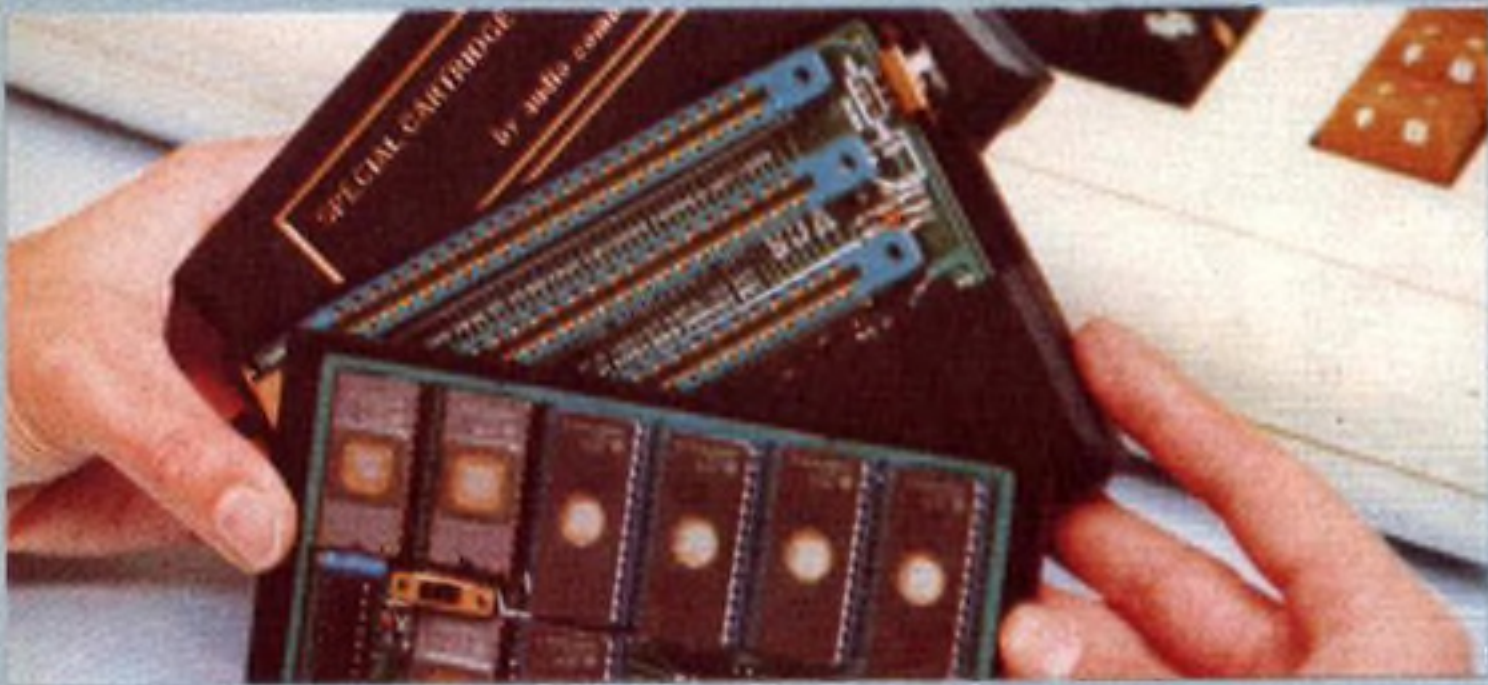
10 PRINT AT A, B; A$
30 IF INKEY$ = "5" AND B >= 0 THEN LET B = B
-1
40 IF INKEY$ = "8" AND B <= 20 THEN LET B =
B + 1
50 IF INKEY$ = "6" AND A <= 20 THEN LET A =
A + 1
60 IF INKEY$ = "7" AND A >= 0 THEN LET A = A
-1
70 IF INKEY$ = "R" THEN GOTO 300
80 IF INKEY$ = "S" THEN INPUT A$
90 IF INKEY$ = "P" THEN GOTO 200
100 IF INKEY$ = "G" THEN RUN
110 GOTO 10
200 PRINT AT A, B; "inverse space"
210 PAUSE 100
220 PRINT AT A, B; ""
230 GOTO 10
300 LET A$ = ""
310 GOTO 10

```

Sketchpad  
by Gordon Cameron



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Fig. 1



Fig. 2

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...y aliens  
...towards your space  
...ly instead  
...ave dual Plasma Disruptors and  
...st Drive haven't you?

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Childs play. HUH! They warned me of the weird packaging,  
the trays, the rods, and all the rest.  
But they didn't say I'd have to stop and control not just one but two  
or even more garbage pods. Then prod them, push  
black, and so lonely, so empty.  
Panic, mustn't panic, but they won't stop, twirling and  
spinning and turning, always turning, towards me, against  
me, at me. And I'm alone.  
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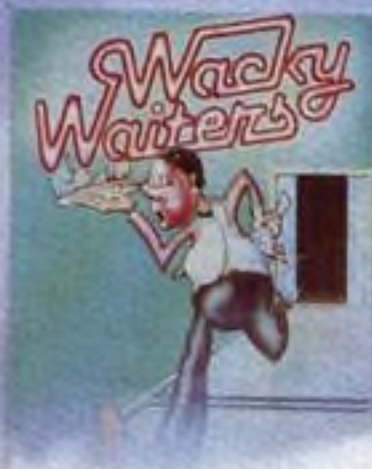
...ips

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**..the name  
of the game**





**..the name  
of the game**

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# OPEN FORUM

## Meteor

### on BBC Micro

This program simulates a game in which you control a trapped space ship in a meteor storm. The ship is out of control and you have only a limited amount of fuel. You can apply reverse thrust to stop it moving forward, rotate it sideways or fire to destroy the meteors. When you hit a meteor or run out of fuel you explode, ending the game.

How many can you hit before you explode? From time to time extra meteors

appear and you can be destroyed if they appear on top of your ship.

This program will just fit in a Model A as it stands. This is because instead of using an array to hold the meteors it pokes their position into some spare memory locations. All variables are integer variables for speed and saving of memory.

The program runs in mode 5 making good use of the sound and graphics abilities of the BBC computer.

#### Variables

A% = used in OSBYTE call  
C% = records your horizontal movement

D% = records your vertical movement  
E% = character presently representing your ship  
F% = fuel  
G% = x co-ordinate of missile  
H% = y co-ordinate of missile  
I% = FOR loop variable  
J% = FOR loop variable  
P% = pointer to next meteor to be moved  
Q% = general purpose variable  
R% = general purpose variable  
S% = score  
X% = your x co-ordinate  
Y% = your y co-ordinate

#### Characters used

225-232 your ship  
233 meteor  
234 missile  
235-236 explosion

```
10*TV255
20MODE7:VDU23:8202:0:0:0:PRINTTAB(10,3)CHR#141CHR#145CHR#157CHR#131
"METEOR STORM "CHR#156"TAB(10)CHR#141CHR#145CHR#157CHR#131"METEOR STORM
"CHR#156
30PRINT""CHR#131"<" ROTATE LEFT""CHR#131">" ROTATE RIGHT""
CHR#131" F" FIRE""CHR#131"D" PREVENT THURST""SPC(4)CHR#131"Press
any key to start game"
40A%=GET:MODE5:PROCA
50VDU29,X%+64+32:(32-Y%)*32-32+16: SOUND1,4,200,80: SOUND0,-15,7,160:
FORI%=2TO480:GCOL0,RND(3):DRAWNRND(I%)-I%DIV2,RND(I%)-I%DIV2:NEXT:FX15,1
60VDU30,10,10: SOUND18,0,0,0: SOUND19,0,0,0:END
70DEFPROCA:VDU23,225,24,60,126,219,153,24,24,60,23,226,31,7,15,29,249,
112,48,16,23,227,24,12,134,255,255,134,12,24,23,228,16,48,112,249,29,15,7,31,
23,229,60,24,24,153,219,126,60,24,23,230,8,12,14,159,184,240,224,248
80VDU23,231,24,48,97,255,255,97,48,24,23,232,248,224,240,184,159,14,12,8,
23,233,0,60,66,65,65,66,36,24,23,234,0,0,0,24,24,0,0,0,23,235,129,66,60,60,60,
60,66,129,23,236,56,16,17,159,249,136,8,28
90VDU19,3,2:0:S%=0:FX=500:COLOUR2:PRINT"Score:"S%"Fuel:"FX:X%=10:Y%=15:
E%=225:C%=1:D%=0:COLOUR3:PROCD:VDUE%:FORI%=0TO39
100Q%=RND(18):R%=RND(26)+3:IFQ%=10ANDR%=15THEN100
110I%?3328=Q%:I%?3368=R%:I%?3408=RND(3):I%?3448=RND(3):PROCB:NEXT
120A%=135:P%=0:ENVELOPE1,9,20,20,20,1,1,1,0,0,0,100,100:ENVELOPE2,1,41,-2,
-1,5,70,60,24,-1,0,-1,120,50:ENVELOPE3,1,41,-2,-1,5,70,60,1,0,0,-1,5,5:
ENVELOPE4,11,0,-2,-1,10,70,60,1,0,0,-1,50,50
130SOUND2,1,160,-1:SOUND3,-8,80,-1:FORI%=0TO7:READQ%,R%:I%?3500=Q%:
I%?3510=R%:NEXT
140DATA1,0,2,0,2,1,2,2,1,2,0,2,0,1,0,0
150PROCD:IFFNA<>E% ENDPROC
160IFF%<=0ENDPROC
170IFINKEY(-104)=0THEN200
180F%=F%-1:E%=E%+1:IFE%=233 E%=225
190C%=E%?3275:D%=E%?3285
200IFINKEY(-103)=0THEN230
210F%=F%-1:E%=E%-1:IFE%=224 E%=232
220C%=E%?3275:D%=E%?3285
230IFINKEY(-51)=-1F%=F%-1:GOTO260
240PROCD:VDU32:X%=X%+C%-1:Y%=Y%+D%-1:Q%=X%:R%=Y%:PROCC:X%=Q%:Y%=R%
250PROCD:IFFNA<>32ENDPROC
260COLOUR3:PROCD:VDUE%
270IFINKEY(-68)=0THEN350
280F%=F%-1:G%=X%:H%=Y%: SOUND1,2,10,2: SOUND0,-12,3,2: COLOUR2
290VDU31,G%+C%-1,H%+D%-1:IFFNA<>32THEN320
300IFG%<>X% ORH%<>Y% VDU31,G%,H%,32
310G%=G%+C%-1:H%=H%+D%-1:IFG%>0ANDG%<19ANDH%>3ANDH%<31VDU31,G%,H%,234:
GOTO290ELSE350
320IFG%<>X% ORH%<>Y% VDU31,G%,H%,32
330G%=G%+C%-1:H%=H%+D%-1: SOUND0,-15,3,5: SOUND1,3,20,2:FORJ%=0TO39:COLOUR1
:VDU31,G%,H%,236:IFI%?3328=G% ANDI%?3368=H% I%?3368=0:S%=S%+10
340COLOUR2:VDU31,G%,H%,235:NEXT:VDU31,G%,H%,32
350VDU30:COLOUR2:PRINT"Score:"S%"Fuel:"FX:FORJ%=1TO8
360P%=P%+1:IFP%=40 P%=0
370IFP%?3368=0THEN360
380Q%=P%?3328:R%=P%?3368:VDU31,Q%,R%,32:Q%=Q%+P%?3408-2:R%=R%+P%?3448-2:
PROCC:COLOUR1:VDU31,Q%,R%,233:P%?3328=Q%:P%?3368=R%:NEXT
390I%=RND(39):IFI%?3368=0ANDRND(4)=1I%?3368=RND(26)+3:I%?3328=X%:PROCB
400GOTO150
410DEFPROCB: SOUND1,-15,RND(255),2:FORJ%=1TO30:COLOUR129:COLOUR2:VDU31,I%?3328,
I%?3368,233:COLOUR128:COLOUR1:VDU31,I%?3328,I%?3368,233:NEXT:ENDPROC
420DEFPROCC:IFQ%=0ORQ%=20ORR%=30ORR%=31 Q%=21-Q%:R%=35-R%:IFR%=32 R%=30
430IFQ%=21 Q%=19
440IFQ%=19ANDR%=31 Q%=18
450ENDPROC
460DEFPROCD:VDU31,X%,Y%:ENDPROC
470DEFPROCE=(USR&FFF4 AND&FFFF)DIV256
```

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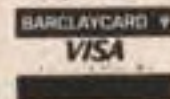
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## Tony Bridge's Adventure Corner



### Fantasy world!

Adventure is now well-entrenched in the world of microcomputers. But nobody really forgets the origins — the legend of the Midnight Programmer, slumped over a hot IBM, toiling away, after hours, in a fantasy world of dungeons and dragons, is well known.

Tracy Kidder, in his best-selling book *The Soul of a New Machine*, includes a fascinating chapter on the beginnings of adventure, as played on the old mainframes. The book is an absorbing account

of the birth of a new microcomputer, and contains short essays on Boolean Algebra and microcode, as well as an hilarious look at some of the practical jokes played by the whizz-kid designers on their bosses and colleagues. Definitely required reading.

What is it like to play the original game on a powerful mainframe? Thanks to a good friend of mine, I have access to a PDP-11/24, and a copy of the original program, as modified for the PDP-11 by Kent Blackett and Roger Coulson. It is written in Fortran, and occupies some 150K of memory.

The adventure starts in a forest — I am standing at the end of a road before a small brick building. A small stream flows out of the building and down a gully. Having entered the building, I find a brass lantern, some food, water in a small bottle, and a bunch of keys. I don't know if any of these will be of use later in the adventure, so I take them all, and go exploring along the stream. I come across a two-inch slit in the stream bed, but I don't know what to do with it, so I carry on.

Stumbling, eventually, upon a steel grate, I use the keys to unlock it, and find myself in a small chamber beneath the grate. I crawl around some dark tunnels, collecting a three-foot black rod, and an

empty wicker birdcage along the way. Going west, I am now confronted by a huge green snake, which refuses to budge . . .

Now it's up to you! Write in to me, and tell me what to do next — I will run all the practical suggestions and print the one that seems to be the best solution. Then we will continue together and see if we can beat the program. I have not gone any further than the Green Snake, so this will be a revelation for all of us!

In the meantime, keep your suggestions for the PCW adventure coming in, and any other thoughts you have on the fascinating world of adventuring.

And don't forget — *never ask a werewolf if he has any change . . .!*

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.

### 3D Graph

on BBC Micro

This program will run on the BBC model A or B, and demonstrates some of the capabilities of the computer. It draws a three dimensional graph of sine between 0 and 180 degrees on one half of the screen, while at the same time scrolling the words "BBC-Microcomputer" up the other half of the screen.

#### Program notes

- 10 Sets the mode.
- 20 Turns off the cursor.
- 30-40 Define foreground colour as magenta and background colour as blue.
- 50 Defines a text screen.
- 60-80 Fills the text window with the words BBC-Microcomputer.
- 90 Loop to draw several sine curves.
- 100 Move the graphics cursor ready to draw a sine curve.
- 110-130 Draw one sine curve and scroll the text screen by printing BBC-Microcomputer.
- 140-150 Make sounds.
- 160-170 Complete loops.
- 180 End of program.

```

10 MODE4
20 VDU23;8202;0;0;0;
30 VDU19,0,4,0,0,0
40 VDU19,1,5,0,0,0
50 VDU28,0,31,18,0
60 FOR A% = 1 TO 33
70 PRINT "BBC-Microcomputer";
80 NEXT
90 FOR B% = 620 TO 1020 STEP 15
100 MOVEB%,B% - (B% - 620)/1.6 - 100
110 FOR C% = 0 TO 400 STEP 8
120 PRINT "BBC-Microcomputer";
130 DRAWB% + C%, B% - (B% - 620)/1.6 - 100
    - C% + 500 * SIN(C%/128) * SIN( (B% -
    620)/128)
140 SOUND1, - 5, (B% - 620)/2 + RND(20),1
    
```

\*\*\*\*\*

## Cruising Challenge

\*\*\*\*\*

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Can you beat the new high score?

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

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

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

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

The highest score sent in so far this month is 9012 from *N Darlow* of Langleigh Road, Ilfracombe, Devon. If you have a higher score, you could still win this month's £10 — but hurry, entries close on March 31

```

150 SOUND2, - 5, (B% - 620)/2 + RND(20),1
160 NEXT
170 NEXT
180 END
    
```

**Notes**

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

3D Graph  
by Nicholas Lloyd

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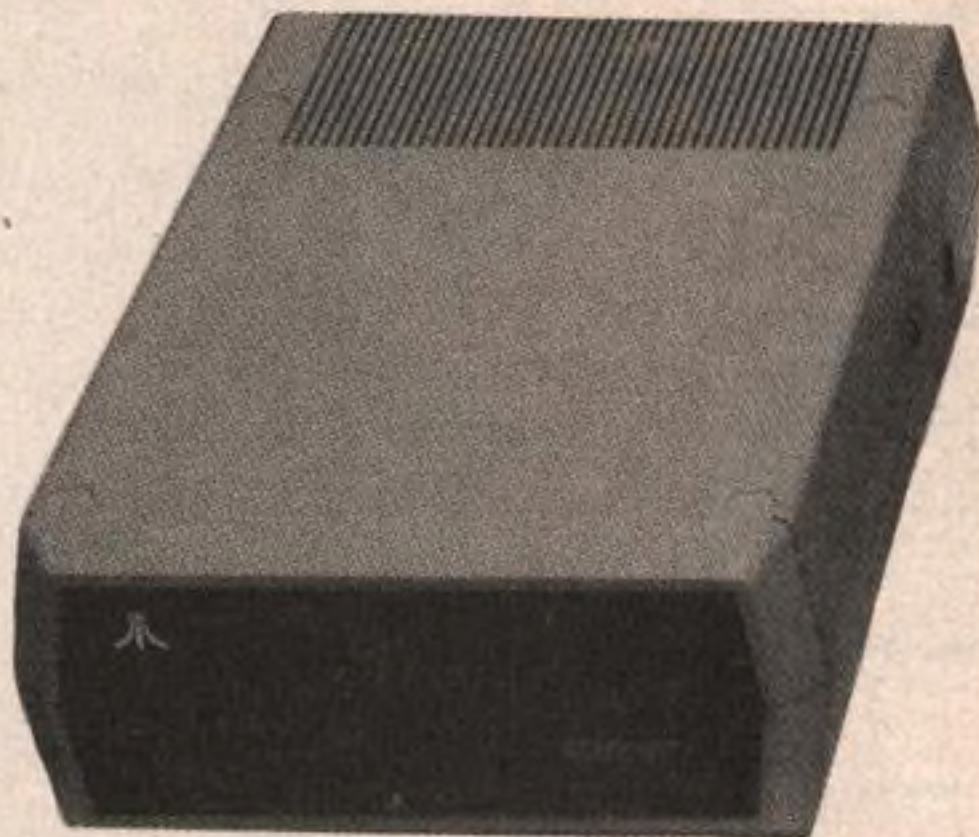
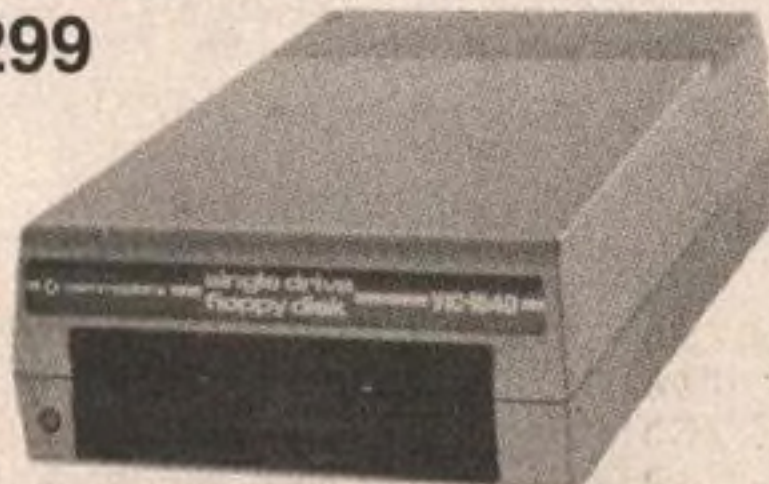
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# Bigger and bigger!

Gary Scowcroft presents a program to magnify text on a mode 0 screen.

This program allows you to position text of any height and width wherever you want on a mode 0 screen.

When Run, the program asks you to input the word you wish to display. Next, you must supply the x and y co-ordinates of the position where you wish to display the text. Finally, you must input the x and y magnification of the word.

If you enter an x co-ordinate that is

greater than 90, then your chosen word is automatically placed in the centre of the line determined by the y co-ordinate. This is achieved by setting the variable *Tab* to -1 (*True*) at line 120, which in turn sets the final parameter in the procedure *Prochar* to *True* in line 150.

If you enter 0 when asked for the x magnification of a word, the program will calculate the word's maximum magnification and display it centrally on the screen.

For speed, the program uses machine code to enlarge the characters. This is initialised at line 60 by *Procassemble*. The procedure *Prochar* calls the machine code

at 340, after storing the appropriate information about the position and magnification of the word. This information is stored in zero page locations by *Procmem*.

The BBC's character set is stored at C000 Hex in the Rom. Each character is made up of eight bytes — the position in Rom of the current character being displayed is calculated in lines 300-310. This information is also stored by *Procmem*.

Lines 70-190 just demonstrate the program and can be deleted, leaving the three procedures, *Prochar*, *Procassemble* and *Procmem*. These can be renumbered and then merged (see page 402 of the new user guide) into other programs to produce title pages and other displays. Do not forget to initialise the machine code at the beginning of the program before using *Prochar*.

## LIST

```

10 REM TEXT
20 REM By Gary Scowcroft
30 REM (c) 1983
40 MODE0
50 VDU 19,0,3;0;0;19,1,4;0;0
60 PROCASSEMBLE
70 REPEAT
80 PROCLEAR
90 INPUT*Word >*A$
100 PROCLEAR
110 INPUT*TAB >*X,Y
120 IF X>90 TAB=-1 ELSE TAB=0
130 PROCLEAR
140 INPUT*Mag. >*x,y
150 PROCHAR(A$,X,Y,x,y,TAB)
160 UNTIL FALSE
170 DEF PROCLEAR
180 PRINTTAB(0,30)SPC(75);TAB
(0,30);
190 ENDPROC
200 DEF PROCHAR(A$,X,Y,x,y,
Autotab)
210 LOCAL BX,CZ
220 BX=LEN(A$)*x
230 IF x<=0 OR BX>79 x=80 DIV LEN
(A$);Autotab=-1
240 IF y<=0 OR y>31 y=1
250 IF Autotab X=(79-LEN(A$)*x)
DIV2
260 IF y+Y>31 Y=32-y
270 BX=X*8+Y*640+&3000
280 PROCMEM(&72,BX)
290 FOR AZ=1 TO LEN(A$)
300 BX=ASC(MID$(A$,AZ,1))-32
310 CZ=&C000+BX*8
320 PROCMEM(&70,CZ)
330 ?&74=x;?&79=y
340 CALL CHAR
350 BX=?&72+256*?&73
360 BX=BX-640*?&79+8*?&74
370 PROCMEM(&72,BX)
380 NEXT
390 ENDPROC
400 DEF PROCMEM(ADZ,NUM%)
410 ?ADZ=NUM% MOD 256
420 ADZ?1=NUM% DIV 256
430 ENDPROC
440 DEF PROCASSEMBLE
450 DIM D% 176
460 FOR PASS=0 TO 2 STEP 2
470 P%=D%
480 COPT PASS
490 CHAR:LDY#0:STY&7A:STY&7E
500 L5:TYA:PHA:LDX#0
510 L3:PLA:TAY:LDA(&70),Y:STA&77
520 TYA:PHA:TXA:PHA:JSR XMAG:LDX#0
530 L4:SEC:LDA&72:SEC#8:STA&72:
LDA&73
540 SEC#0:STA&73:INX:CPX&74:BNE L4
550 INC&7A:LDA#8:CMP&7A:BNE NNL
560 LDA#0:STA&7A:CLC:LDA#120:ADC&
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690 RTS
700 SETBIT:STX&76:LDX#0:LDY#0
710 L1:LDA(&72),Y:STA&75:ASL&75:
CLC
720 LDA&76:ADC&75:STA(&72),Y
730 INC&78:LDA#8:CMP&78:BNE NNC
740 CLC:ADC&72:STA&72
750 LDA#0:STA&78:ADC&73:STA&73
760 NNC:INX:CPX&74:BNE L1
770 RTS
780 J:NEXT
790 ENDPROC

```

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## A Gift From The Gods . . .

Jason Orbaum explains how the Lynx can handle one-dimension string arrays.

It may come as a surprise to some people to know that the Lynx comes with the capability for only single dimension numeric arrays. But, with a little thought these are just as good, if not better, than 2-D arrays.

I had always assumed that to find the amount of memory taken up by the array  $X(A,B)$ , all that must be done is to find  $AB$  (or  $A*B$ ). This is not so. The array  $X(A,B)$  takes up considerably more space than the array  $X(AB)$  (or  $X(A*B)$ ). It is therefore a good technique to use the 1-D array as it saves memory. But what happens when you wish to reach array element  $(X,Y)$  in my 2-D array and realise that you only have a 1-D array?

At the beginning of a program when you wish to *Dim* the array  $A(23,14)$ , you *Dim* the array  $A(322)$  - (322 being  $23*14$ ). If you are lazy, the line reads *Dim A(23\*14)*.

Having done this, you proceed as normal with the program until you reach the line, *IF A(X,Y)=76 Then Gosub 6573*. You might have noticed that it is very difficult to find the element  $(X,Y)$  in the array  $A(322)$ . On reaching this line something along the lines of "Array Error 1062 At Line 438" is printed up. Just change the line to "If  $A(X+Y*14)=76$  Then Gosub 6573" (I would also recommend that a renumbering routine if available is utilised about now). The problem is solved.

Now for the next bit of bad news. The Lynx cannot handle string arrays of any sort.

Let us assume that you wish to *Dim* the array  $X\$(5,10)$  in which no string will be more than 20 characters long. The array required is  $X(5*10*20)$ . Once again, we are multiplying to achieve the required array, but my computer will not let me hold characters in numeric arrays.

To *Load* the array  $X\$(2,8)$  with "Help. I'm stuck!" the line would read "Let  $X\$(2,8)="Help. I'm stuck!"$ . To *Load* the numeric array is a lot more complex and uses the subroutine shown as program one. To use it,  $Z\%$  must be *Loaded* with the string to be stored,  $X$  must be *Loaded* with the  $X$  location in the array and  $Y$  must be *Loaded* with the  $Y$  position in the array. The program assumes that  $ASC(A\%)$  returns the code for the character in  $A\%$ .

### Program 1 (To be used as a subroutine)

```
FOR N=1 TO LEN(Z%)
A$=MID$(Z%,N,1)
A=ASC(A$)
X(Y*100+X*20+N)=A
NEXT N
RETURN
```

This program works on the previously defined array  $X(5*10*20)$ .

Once we have *Loaded* the array, we must extract information from selected areas.

To do this we use a similar routine to the last one. On the *Gosub*,  $X$  must be *Loaded* with the  $X$ -co-ordinate and  $Y$  must be loaded with the  $Y$ -co-ordinate. The extracted string will be returned in the variable  $Z\%$ .

### Program 2 (To be used as a subroutine with program 1)

```
Z%= ""
FOR N=1 TO 20
A=X(Y*100+X*20+N)
A$=CHR$(A)
Z%=Z%+A$
NEXT N
RETURN
```

In program one, line one simply sets up a loop that goes round once for each character in  $Z\%$ . The next line takes a character from the string. For those who do not know how *Mid\$* works, the first parameter is the name of the variable to be worked on. The second parameter is the number of characters down the string that must be counted: ie, in the string "Hello" if the second parameter of the *Mid\$* is three it will count along the string to the first "L". The third parameter tells the computer how many characters from the string to take.

Let us analyse one example. If  $Z\%$  is *Loaded* with "Zebras are great!" then  $Mid$(Z\%,8,3)$  will give "Are" as its answer. The *Mid\$* is telling the computer to count eight characters along  $Z\%$  and return the character and the two to the right of it. If you still are not clear about  $Z\%$  consult your manual. ZX81 owners will have to replace this line with their own equivalent string splicer.

The next line in program one converts the collected character into its Ascii/character code. ZX owners need to change this

to  $A=Code(A\%)$ . This line converts a character that cannot be stored in the array into a number that can be stored.

The fourth line stores the character. The loop is repeated and control is returned to the main program.

The two lines  $A$=Mid$ . . .$  and  $A=Asc(A\$)$  can be replaced with  $A=Asc(Mid$(Z\%,N,1))$  which although it saves memory is much more difficult to explain!

The first line in the extraction routine clears  $Z\%$ ; try missing it out and unless you are very clever you will find the program will not give the desired effects.  $Z\%$  will always be returned with a string 20 characters in length. This can then be spliced about as desired (unfortunately if  $Chr$(0)$  is not a space on your particular machine, then a loop will have to be introduced at the beginning of the program to fill the array with the number of the space character).

Each time the program goes through the loop, it takes the number from the array, converts it into a character and adds that character to  $Z\%$ . On finishing the loop, control is returned to the main program. The line  $A= . . .$  and  $A\$= . . .$  can be replaced with  $A=Chr$(X(Y*100+X*20+N))$ .

So far we have seen for the array  $X\$(A,B)$ , where no string will be more than  $C$  characters long, the array becomes  $X(A*B*C)$ . The fourth line in program one is  $. . . X(Y*(A*C)+X*C+N)=A$ . The third line in program two is  $. . . A=X(Y*(A*C)+X*C+N)$

If you are writing a program in which speed is very important, then it will be futile to use this method as it takes a lot longer. But if memory is drawing thin, and you are not totally speed dependent, then it could be very useful. And to any Lynx owner, it could well be a gift from the gods. ■



# Musical chairs . . .

*John Durst presents two m/c programs which enable you to create your own sound effects.*

Sound effects can do a lot to make a program more interesting. Judicious use of the *Beep* command can produce a range of sounds from a click to a musical phrase.

By using variations of the *For/Next* loop, you can get an impressive selection of burps and twitters. But, you cannot produce a smoothly changing note, nor can you make a note throb — unless you dive into machine code.

Luckily, if you *do* decide to dive in, you will not find yourself in very deep water. Here are two short machine code programs which anyone should be able to write — and which go a good way to extend the range of sounds on offer to the Spectrum user.

The sounds in these programs are generated directly through the machine code instructions. To understand how the programs do this, we need to know a bit

about how the Spectrum sets about generating a sound in the first place.

The Spectrum does its *Beeping* in a very simple way. The internal speaker is connected to one of the output ports of the Z80 processor (see page 80 of the Spectrum manual). When the speaker bit (D4) is set, it activates the circuit and a click is produced at the speaker. By arranging that D4 switches on and off some hundreds of times of a seconds, the ear interprets the clicks as a sound of a definite pitch.

Clearly, with this system, there can be no way, without extra hardware, to modify the waveform and so change the characteristics or the volume of sound. However, there is one thing we can play with and that is pitch; we can (and do, whenever we set up new values for *Beep*) alter the rate of clicks and so change the frequency of the note.

The processor controls the rate of clicks, by counting up to 100, or so, and then outputting a click. Since it counts in terms of micro seconds, it gets to 100 in much less than a hundredth of a second, so it will be producing a note well within the audible range.

Now, suppose we arrange to alter the target figure, which the processor has to count to: eg, if we decrease the number by one, every few times round, what happens? We get a note which changes pitch continuously — which swoops up or down, like a *Swanee Whistle*.

Figure 1 shows a short Basic program which allows you to enter machine code in the Ram. You should reserve a space by altering Ramtop first, of course. I have addressed it to 65001, but you can choose any address you like.

Alongside the listing, you will see a number of addresses which you can *Poke* with different numbers to give different effects. You will find you can get an amazing selection — from a "Zip!", like a ricochet, to a long howl. Naturally, if you alter the start address, you will have to alter the other addresses, pro rata.

Figure 2 shows the machine code listing. There are a couple of interesting

## SWANNEE WHISTLE (Basic Program)

```

1 DEF FN a(n)=(CODE a$(n)-48
AND CODE a$(n)<58)+(CODE a$(n)-5
S AND CODE a$(n)>64)
10 LET a$="F31110D0260A3A4B5C1
F1F1F0EFEEEE10ED794310FE2520F41C1
520E3FBC9"
20 FOR J=1 TO LEN a$ STEP 2
30 POKE 65000+J/2,16*FN a(J)+F
N a(J+1): NEXT J
90 STOP

99 REM **UP & DOWN EFFECT**
100 POKE 65025,28: RANDOMIZE US
R 65001: POKE 65025,29: RANDOMIZ
E USR 65001: GO TO 100
    
```

Figure 1

- FDE9 (Hex) = 65001 (Decimal)
- POKE 65003, pitch
- POKE 65004, span of slide
- POKE 65006, total duration of slide
- POKE 65025,28 — slide DOWN
- POKE 65025,29 — slide UP

## SWANNEE WHISTLE (UP or down)

FDE9	F3	DI	LD	DE,D010
FDEA	11 10 D0	LD	H,0A	
FDED	26 0A	LD	A,(5C48)	
FDEF	3A 48 5C	AAA		
FDF2	1F	AAA		
FDF3	1F	AAA		
FDF4	1F	LD	C,FE	
FDF5	0E FE	XOR	10	
FDF7	EE 10	OUT	(C),A	
FDF9	ED 79	LD	B,E	
FDFB	43	DJNZ	FDFC	
FDFC	10 FE	DEC	H	
FDFE	25	JR	NZ,FDF5	
FDF7	20 F4	INC	E	
FE01	1C	DEC	D	
FE02	15	JR	NZ,FDED	
FE03	20 E8	EI		
FE05	FB	RET		
FE06	C9			

Figure 2

- disable interrupts
- D = number of intervals = span of slide
- E = pitch; H = length of interval = total duration
- border colour into A
- C sets OUT port ON/OFF speaker bit
- INC E = DOWN swoop; DEC E = UP swoop
- enable interrupts



## DOUBLE NOTE (Basic Program)

```

1 DEF FN a(n)=(CODE a$(n)-48
AND CODE a$(n)<58)+(CODE a$(n)-5
5 AND CODE a$(n)>64)
10 LET a$="F33A485C1F1F1F06F00
EFE252006EE10ED7926F02D20F4EE10E
D792EFF10ECFBC9"
20 FOR J=1 TO LEN a$ STEP 2
30 POKE 65000+J/2,16*FN a(J)+F
N a(J+1): NEXT J
90 STOP

99 REM **TEST PROGRAM**
100 FOR I=100 TO 250 STEP 50: F
OR J=1 TO 255
110 POKE 65020,I: POKE 65029,J:
RANDOMIZE USA 65001
115 PRINT AT 10,10;I;TAB 15;J
120 NEXT J: CLS : NEXT I
190 STOP

199 REM **REPEATED NOTE**
200 RANDOMIZE USA 65001: GO TO
200

```

## DOUBLE NOTE

```

FDE9 F3
FDEA 3A 48 5C
FDED 1F
FDEE 1F
FDEF 1F
FDF0 06 F0
FDF2 0E FE
FDF4 25
FDF5 20 06
FDF7 EE 10
FDF9 ED 79
FDFB 26 F0
FDFD 2D
FDFE 20 F4
FE00 EE 10
FE02 ED 79
FE04 2E FF
FE06 10 EC
FE08 FB
FE09 C9

```

```

DI
LD A,(5C48)
RRR
RRR
RRR
LD B,F0
LD C,FE
DEC H
JR NZ,FDFD
XOR 10
OUT (C),A
LD H,F0
DEC L
JR NZ,FDF4
XOR 10
OUT (C),A
LD L,FF
DJNZ FDF4
EI
RET

```

Figure 3

FDE9 (Hex) = 65001 (Decimal)

POKE 65009, duration of note (B)

POKE 65020, note 1 (H)

POKE 65029, note 2 (L)

Figure 4

disable interrupts

border colour into A  
B = duration of note; C sets OUT port

ON/OFF speaker bit  
H = Note 1, pitch

ON/OFF speaker bit  
L = Note 2, pitch

enable interrupts

points to note — in the first place, output port No 254 sets the *Border* colour, as well as driving the speaker (see page 160 of the Spectrum manual). So, to preserve this colour, we collect it from the system variables at 23624 (5C48 Hex) in line FDEF and then push the bits into the positions we require in the next three instructions.

Line FDF7 switches the speaker on and off. When you "XOR" a binary number with another, unmatched bits stay as "1", but all matching pairs of bits are changed to "0". So as the program cycles through, the bit at position 4 (the "1" of "XOR 10") will find itself opposite a "0", which it will change to "1". Next time round, it will find itself opposite this same "1" — so it promptly changes it back to "0". These alternating "1" and "0" signals switch the speaker on and off.

Finally, the first instruction, "DI" — Disable Interrupts — stops the normally continuous process of scanning the

keyboard every 1/50th of a second. If you do not do this, the interrupts superimpose a 50Hz hum on your program and spoil the quality of the sounds you generate. But you must remember to include "EI" — Enable Interrupts — at the end of the program!

The second sound effect program outputs two different notes at once. I had hoped, when I planned the program, that it would play a chord, but it does not work quite like that. Presumably, to sound a chord, you have to superimpose two separate, complete waveforms, rather than two sets of on/off signals at different frequencies. However, the program produces some interesting beat effects, ranging from a sort of rasping twitter to quite a bell-like clang.

As before, Figures 3 and 4 give the listings. I have again placed the machine code at 65001, but you can redirect it to a different address, if required.

The program uses the same system to generate the sound as before. But this time there are two sets of counters, one for note 1 and the other for note 2. It counts down one at a time, on each of them alternately. When one of them reaches zero, it outputs to the speaker, before starting a new round.

The number at address 65009 (FDF1 Hex) controls the number of times the entire program cycles through, before stopping; ie, the duration of the note. Since only the "B" register is used to hold the number, the biggest number it can deal with is 256: if you try to *Poke* anything bigger, you will get a dusty answer. The actual length of the note also depends on the pitch — it will be longer for a deep note than it will be for a high note.

The little program at line 100 of the Basic listing will run through a representative selection of note pairs. They vary quite a lot, but the most effective pairs seem to be notes that are almost identical. ■

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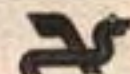
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# It's kids stuff!

*P Yeandle presents a program that will help even young children to draw intricate designs.*

The high power graphics commands on the DRAGON 32 enable intricate designs to be created even by a novice programmer, and this program will extend those facilities to those who do not have any programming ability, notably young children.

After selecting one of the two colour sets, the user can move a coloured line

around the screen merely by pressing the four arrowed keys. Although this may be enough for very young children, there are additional commands to improve the sophistication of the drawing. These are the one key commands:

C Alter the COLOUR of the drawing line. After the C, press one of the number keys 1 — 4, remembering that 1 is the code for background colour and so is

invisible. It can be used to erase lines. The program automatically adjusts for whichever colour set has been selected.

B BLANK the screen for a restart.

P PAUSE the drawing line until another arrow key is pressed.

S Alter the SPEED of the drawing line between 0 (slow) and 9 (fast). The program begins with a medium speed.

R RESET the colour of drawing line at background value for erasing. To start drawing lines again, the colour code needs to be changed.

M MOVE the drawing point to another part of the screen. This assumes the screen has width (0—255 horizontal) and height (0—191 vertical). The 0,0 point is the top left-hand corner. Try this command after you have mastered the others.

E END the program.

Full instructions are available within the program. Happy doodling!

```

10 *****
20 ***      D O O D L E      ***
30 ***              E Y      ***
40 ***      P Y E A N D L E  ***
50 ***              P O O L E  ***
60 *****
70
80 PRINT "DO YOU WANT INSTRUCTIONS - Y OR N"
90 A$=INKEY$:IF A$="" THEN 30
100 IF A$="Y" THEN 520
110 L=12
120 INPUT "COLOUR SET - 0 OR 1" :S IF 3001 OR 3000 THEN 120
130 PMODE 3,1 SCREEN 1,S
140 M(1)=255:M(2)=191
150 D$="" :FCLS:DRAW "BM128,96"
160 A$=INKEY$:IF A$="" THEN 250
170 IF A$=CHR$(8) THEN D$="L1" X=L
180 IF A$=CHR$(9) THEN D$="R1" X=L
190 IF A$=CHR$(10) THEN D$="D1" X=L
200 IF A$=CHR$(94) THEN D$="U1" X=L
210 IF A$="C" THEN 480
220 IF A$="B" THEN 150
230 IF A$="P" THEN D$="" X=0
240 IF A$="E" THEN END
250 IF A$="R" THEN D$="C1" X=0
260 IF A$="M" THEN 350
270 IF A$ <> "S" THEN 320
280 A$=INKEY$:IF A$="" THEN 280
290 IF A$ < "0" OR A$ > "9" THEN 280
300 L=27-(ASC(A$)-48)*3
310 X=L
320 FOR K=0 TO X:NEXT K
330 DRAW D$
340 GOTO 160
350 D$="B" X$=""
360 FOR R=1 TO 2
370 X$=""
380 B$=INKEY$:IF B$="" THEN 380
390 IF B$=CHR$(13) THEN 420
400 IF B$ < "0" OR B$ > "9" THEN 380
410 X$=X$+B$:GOTO 380
420 X$=RIGHT$( "000"+X$,3)
430 IF VAL(X$)>M(R) THEN X$=RIGHT$(X$,2)
440 D$=D$+X$
450 IF R=1 THEN D$=D$+" "
460 NEXT R
470 GOTO 330
480 B$=INKEY$:IF B$="" THEN 480
490 IF B$ < "1" OR B$ > "4" THEN 480
500 D$="C" +CHR$(ASC(B$)+S*4)
510 GOTO 250
520
530 ***      INSTRUCTIONS      ***
540

```

Continued on page 37

# SPECTRUM UPGRADE

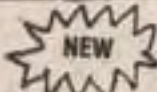
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```

from page 35 550 CLS 6
560 PRINT "          D O O D L E"
570 PRINT@ 64, "THIS IS A DRAWING PROGRAM USING SIMPLE ONE KEY COMMANDS"
580 PRINT@ 160, "TO DRAW HORIZONTAL OR VERTICAL LINES , PRESS THE
APPROPRIATE"
585 PRINT@ 224, "ARROWED KEY."
590 PRINT@ 288, "YOU MAY ADJUST THE SPEED          AT ANY TIME BY
PRESSING "
595 PRINT@ 352, "          FOLLOWED BY ANY KEY 0 - 9"
600 PRINT "          0 SLOW          9 FAST"
610 GOSUB 800
620 CLS 2
630 PRINT@ 64, "C COLOUR CHANGE PRESS A NUMBER          1-4 AFTER IT. NOTE THAT
1 IS"
640 PRINT@ 128, "          THE SAME AS THE BACKGROUND"
650 PRINT@ 192, "P PAUSE"
660 PRINT@ 256, "R RESET - CHANGE COLOUR TO          BACKGROUND TO ENABLE"
665 PRINT@ 320, "          LINES TO BE ERASED."
670 PRINT@ 384, "E END PROGRAM RUN."
680 GOSUB 800
690 CLS 6
700 PRINT "M MOVE DRAWING POINT. KEY NEW          START POSITION AS FOLLOWS -"
705 PRINT@ 64, "          HORIZONTAL (0 - 255)          VERTICAL (0 - 191)"
710 PRINT "PRESS AFTER EACH "
720 PRINT@ 192, "C COLOUR CHANGE. FOLLOW THIS          WITH NEW COLOUR CODE"
730 PRINT@ 256, "          0          1"
740 PRINT " GREEN          1          BUFF"
750 PRINT " YELLOW          2          CYAN"
760 PRINT " BLUE          3          MAGENTA "
770 PRINT " RED          4          ORANGE"
780 GOSUB 800
790 GOTO 110
800 PRINT@ 448, " PRESS TO CONTINUE"
810 A$=INKEY$ IF A$="" THEN 810
820 IF A$="C" THEN 810
830 RETURN
    
```

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**ZX81**, 16K, hardly used, software, £80 ono. Tel: 01-363 0996 (anytime).

**SINCLAIR ZX81**, + 16K, + keyboard + extra repeat key, £60. Software, new, £160. £110. Tel: Hemel Hempstead 54763

**ZX81**, 16K, leads, manual, 8 tapes including Chess, 3D Defender + 4 books + magazines, £70. Tel: Stanford-le-Hope (0375) 671793.

**16K ZX81**, graphics board, inverse module, console, joystick, keyboard, magazines, books, £120 software. Offers over £150. Tel: Johnston 21027, Allan.

**ZX81 16K**, leads + manual, excellent condition + 5 books, 4 mags, 5 games, £70 ono. Tel: 041-644 1367.

### Commodores for sale

**VIC20**, 16K + super expander + tape deck, instructions to Basic part 1 and 2, £340, software included. Gorf + Omega Race. Vic books and magazines. £320. Tel: Swanley 67514.

**VIC20 19K** stack store board, cassette unit, 4 slot M/Board, 4 cartridges, 11 software tapes, intro to Basic 1 + 2 books, joystick, £315. Tel: 01-788 8272.

**VIC20** + cassette deck + dustcover, still under guarantee, books, software, £150 ono. Tel: 021 327 4986.

**VIC20** plus cassette unit, Star Battle, Avenger and Super Lander cartridges, Asteroids-type game, Blitz, and one joystick, £125. Telephone: 01-654 3269 evenings.

**COMMODORE PET 2001**, 8K monitor + 2 cassettes, checked by Commodore dealer with books and games, £185. Tel: Chalfont St Giles 2436.

**COMMODORE PET**, 32K, Basic 4, cassette deck, manuals, dust cover, as new, £425. Tel: 01-363 8901 (after 6 pm) Nick.

**2001 PET**, including tape deck, software, manuals, basic courses, took kit, manual, sound board, hard copies, mags etc, £225, or swap for Atari 400. Tel: 061-973 8846.

**VIC20** cassette recorder + printer, 8K Ram + Hi-res cartridge, mother board, books, dust covers, and printer paper, mint condition, worth nearly £800 will sell £450. Tel: 01-505 3747.

**16K VIC20** + cassette deck, lots of software, Adventure cartridge, joystick, £180 ono. Tel: Preston 0772 744439 or swap for 48K Spectrum + printer.

**VIC20**, 32K + cassette unit, 4 slot M/Brd, with three cartridges, joystick, programs ref guide, Vic revealed, mastering Vic20, books + intro to Basic Part 1, over magazines, including Vic Computing, over £1,000 software, dust cover, £1,500 approx value, sell for £395 ono. Tel: Peter on 01-942 0808 after 5.30 pm.

**VIC20** + tape deck, 3K, 6 games + Beginners Reference Guide + magazines + Myriad, £230. Tel: 01-580 4741, ext 82, 9.30 am to 5.30 pm, Mr C. King. Tunbridge Wells 29157/after 7.30 pm.

**VIC20**, 3K expansion, cassette + joystick + software, 3 months old, still boxed, £175 ono. Tel: 07072-68496 (evenings).

**VIC20** + cassette, books and cartridge, offers. Tel: 01-459 2571 (anytime).

**VIC20**, hardly used, as new, £100. Tel: 01-529 0377.

**COMMODORE 3032 PET** + CZN cassette unit + s/w, £325. Tel: 0205 73605.

**COMMODORE VIC20**, 8K Ram, cartridges, £25. Tel: 0442 58200.

**VIC20**, 16 colours, 4 sound, k/b, 2 languages, leads, s/w, £80. Tel: 01-435 5119 (anytime).

**VIC20**, CZN cassette basic part 1 + 2 prog ref guide 8K Ram, 2 games, 1 maths 2, swap for Spectrum 48K. Tel: 01-856 2623.

**VIC20** + CASSETTE UNIT 3K extra Ram, intro to Basic 1, Vic Revealed, manual, £140. Tel: 01-205 9406.

**COMMODORE 4032**, 12in screen, version 4 Basic, with cassette deck, £450 ono. Tel: 0600 4443 (after 6pm).

### Acorns for sale

**ACORN ATOM**, 12K + 12K, 6522 chip, joystick, colour board, 20 games, £200. Tel: 01-456 3383.

**BBC MODEL B**, 30 hour basic + other books plus leads, software, £400 as new. Tel: 01-520 2664 (any time).

**ACORN ATOM**, 16K + 13K Ram, floating point + m/c monitor/disassembler, in Rom, 300/2400 band tape interface, 3 amp PS + s/w, £135 ono. Tel: 061-775 0209.

**ACORN ATOM**, 12K Ram 12K Rom, all leads, manual, vgc, lots of Arcade s/w, £120 ono. Tel: Billericay 51760.

**ACORN ATOM**, 12K Ram, 16K Rom, PS leads, tapes + listings, £180. Tel: Oxted 4819.

### Ataris for sale

**ATARI 400**, 48K, 2 months old, manuals, Basic cartridge, programme recorder, £110, software, Atari joystick, Arcade type track ball controller, £370. Tel: 0209 890216.

**ATARI VCS**, excellent condition, 7 cartridges Space Invaders, Missile Command, Star Raiders, worth £280, accept £200. Tel: Guildford 38560 (evenings).

**ATARI US** — swap for ZX81 16K + cassette recorder. Tel: Skelmersdale 23209.

**ATARI 400** + cassette recorder, 2 joysticks, £40. Books + software, swap for BBC Model B. Tel: 0253 57146.

**ATARI VCS**, 7 cartridges including Asteroids, Basic programming, £125. Tel: 01-394 0458.

**ATARI 400**, 48K, guaranteed, recorder, Basic, all manuals + books, £130 software, two joysticks, LE stick, original box, £375 only. Tel: 0702 559455 after 5 pm.

**ATARI VCS** + 12 cartridges, including Star Voyager, Laser Blast, Superman, £200 ono. Tel: Newport Salop 812388.

**ATARI 800** system, 48K, disc drive etc, 100 discs, packed with software. New, worth £3,500, 4 months old. Highest offertakes away. Tel: Warrick 498909.

**ATARI VCS** plus 5 cartridges including Space Invaders, Missile Command, offers around £120 or will swap for a ZX Spectrum. Tel: Odiham 3445 after 6 pm.

**ATARI VIDEO CONSUL** with 4 cartridges, Combat, Golf, Space Invaders and Chess, £85 ono. Tel: 0742 682152 (anytime).

**ATARI VCS**, very good condition plus 4 cartridges, £90. Other cartridges for sale at £10 and £15. Tel: 0292 68705.

### Tandys for sale

**TRS 80** pocket computer with printer + charger, case, accessories, £100. Tel: 01-520 2664 (any time).

**TRS 80 Model 3**, two central disc drives, tape deck, all manuals leads, much software on disc + cassette, £1,400, new November. Tel: 01-572 2917.

**TRS 80 Model 1**, level II 16K, cassette deck, progs on cassette all manuals + Mags etc, £175 ono. Tel: 01-572 2917.

**TRS80**, 16K, expansion interface, £150 ono. Tel: Biggin Hill 71740.

**16K VIDEO GENIE**, sound board printer interface, over £200 software, inc word processing, assembler, basic compiler, £250 ono. Tel: 01-586 2925.

### For sale

**KANSAS** + Commodore software, games + programs. Tel: 01-471 7040.

**SWAP** Mansion Adventure for Dragon 32 for any other game, not Star Raiders. Tel: 021-707 0083, weekends only.

**POP COMP WEEKLY** Nos. Vol 1 Nos. 1-36, Vol 2 No. 1-10. Tel: Luton 30170 (evenings — Peter).

**G7000** including 3 cassettes, 3 months old, £70 or swap for Spectrum with laser difference. Tel: 01-876 4628 after 5 pm.

**SWAP OR SELL** 30K Spectrum programs, including The Hobbit, Cruising, Centipede, etc. Tel: (0602) 264851 evenings. Richard.

**VIC20** cartridges to swap for my cassette software. Tel: Karim 01-387 8751, 6 to 10 pm.

**SWAP** Crazy Shoot-out cartridge for any other Atari or Thorn EMI cartridge. Tel: 01-567 9874 after 4.30 pm.

**SOFTWARE** cassettes for Vic20. Offers (10). Tel: Reading 665459.

**SWAP TCR** for any Spectrum software. Tel: Watton 832004.

**VIC20** cartridges for sale, most at half price. Tel: Stevenage (0438) 811634 (6 pm).

**TEXAS T.I.99**, three months old, cassette interface cable, two software cartridges, cassette software + cassette recorder + manuals, £200. Tel: 061-338 2350.

**SWAP JAWBREAKER** + £10 for Thorn EMI Submarine Commander, or Soccer. Tel: 01-567 9874.

**PIRATE COVE** for Adventure Land. Tel: Abson 2477 after 6 pm.

**Z80 SAUCERERS 48K**, Basic Rom-pac. Offers. Tel: 0684 297709.

**SWAP VIC VOODOO CASTLE** for any other adventure game for Vic20. Tel: Swanley 66180.

**VIC20 ROAD RACE CASSETTE**, £4, first letter received, accepted, send no cheques. M. A. Valentine, 101A Underdale Road, Monkmoore, Shrewsbury, Shropshire, SY2 5EF.

**INTERTON VC 4000**, game cartridges, choice of 15, £8 each. Tel: 0429 68374 after 5 pm.

**VIDEO GENIE**, EG3003 with sound + lower case, new, £100 software, with manuals, £85. Tel: Durham 43964.

**3K JUPITER ACE**, as new + demonstration cassette, hardly used, two months old, £80. Tel: 01-399 5835, 4 pm to 9 pm.

**MICROLINE 80 PRINTER** + RS232 interface + forms tractor, current new price £330, yours for £230. Tel: 01-450 2543 before 8.30 am.

**48K SPECTRUM**, new, not used, unwanted gift, £145 ono. Tel: 04574 2293, Manchester area, office hours, Mr Worsley.

**DRAGON 32**, boxed, as new, with leads, 2 joysticks + software, £180 ono. Tel: 0204 40319 (anytime).

**VIC20** cartridges, Road Race, Alien, boxed, almost new, £11 each. Tel: 0723 70023.

**8K RAM CARTRIDGE** + two games for Vic20, £30. Tel: Roger, Colchester 869194.

**ZX81** cassettes, 60, £3 each. Tel: 01-878 6448 (A. Campbell).

**VIC20**. Swap Super Expander for machine code monitor. Tel: 061-445 6630 (after 4 pm).

**ZX SPECTRUM**, software swapping. Tel: Fareham 235929 for details.

**VISICALC** for CBM/Pet disc + chip, hardly used, accept £49 + 4,000 series tool kit, £19. 3000 series tool kit, £19. All perfect. Tel: Chester 675717.

**GOT DIFFICULTY IN GETTING TAPES?** Well, here is Fareham, Portsmouth and Gosport ZX Spectrum Club. Tel: Fareham 235929.

**DRAGON 32** + 2 joysticks + 3 cartridges + 3 machine code cassettes + 2 books, £255. Tel: 01-876 3742 (After 4 pm).

**SUPER EXPANDER** wanted — swap for Sanyo personnel stereo. Tel: Sunbury on Thames 86185, evenings.

**SPECTRUM** software, Spectral Invaders, Orbiter, Schizoids, Night Flite, Meteoroids, £3.30 each or £15 the lot. Tel: 0352 57167.



**CBM 64** + software (games etc), on tape, looks brand new, only 5 weeks old, little used + original boxes, £120. Adventure pack one + two are available in shops, more details. Tel: Wells 0749 74784.

**TEXAS T.1.99 4A** + Extended Basic cartridge, 3 games and cartridges, joysticks, swap for 48K Spectrum. Tel: Luton 54931.

**VIC20** software to swap. Tel: 01-387 8751 6 pm—10 pm.

**VIC20 GAMES**, Adventure Land, Tank Attack, Defender, Chess and more, also programming books, cost £130, asking £80 ono. Tel: Guildford 68641.

**JUPITER ACE** complete with leads, power supply and manual, £70. Telephone King's Lynn (0760) 61598.

**SHARP MZ80B**, + 2 disc drives, P4 Printer, World Star, Mail Merge CPM, mint condition, input/output board, offers. Tel: 042 873 5947.

**COMMODORE 64**, educational games, from £7.95/£15.95. Tel: 01-450 4858.

**VIC20**, software to swap or sell. Tel: 01-387 8751.

**FIDELITY VOICE** Sensory Chess Challenger, 64 programmed book opening + Great Games, 10 levels of play, perfect condition, including case, £180 ono. Tel: 01-600 1200 extn. 274 (day); 01-898 2644 (evenings).

**PART EXCHANGE** Apple II EVRO plus 48K, + disc card, games, etc. Perfect condition for BBC or Sinclair, will collect. Tel: Brighton 508311, Leicester 0533 702472.

**ZX81, 16K**, + instruction book, must be in good condition. Londonderry area. Tel: Londonderry 860831.

**DRAGON 32**, unwanted gift, never used, including £50 games + books, £185 ono. Tel: 0592 759953.

**C2N** cassette unit for Vic20 or Com 64, almost new, £39 ono. Telephone 01-748 8178 (after 4.30 pm, evenings or weekends).

**PRINZTRONIC VC6000** Games Console, nine cartridges, Invaders, Spacewar, £110 ono. Tel: Coalville (0530) 36843 (4 pm).

**SHARP MZ80K**, 48K, dust cover, software, £290 ono. Tel: Camberley 27871 (6 pm).

**SINCLAIR ZX81 16K**, full size keyboard + case, 12" black and white TV training manual + cassette, books, 10 cassettes including Chess + Flight Simulation, £155 ono. Tel: 01-989 8956 (evenings).

**T199/4A**, 2 months old, new accessories, 3 games on cassettes + remote controllers + cassette lead, + extra leaflet, £150. Tel: 01-800 1851.

**DRAGON 32** with 8 months guarantee plus joysticks, book, cartridge, Chess etc plus 3 games, tapes, £200. Tel: (603) 409 534 (evenings).

**HOME COMPUTER** (not ZX81), exchange for Quadrophonic stereo receiver. Tel: (0977) 700702.

**JUPITER ACE**, complete, unused, + all leads, £75 ono. Tel: 051-428 6281 (evenings).

**JUPITER ACE** + 6 games, £75 ono. Tel: 01-450 3449.

**TEXAS** instruments, extended basic language cartridge, excellent condition, £70. Tel: Northwood 22559.

**T199/4A** phc cassette lead with TI Invaders and Munchman cartridges, Texas games cassette, six months old, perfect condition, £140 ono. Tel: Northwood (Middx) 22559.

**COMMODORE 16K** Ram pack + six arcade games, £55. Tel: 0606 75119 after 5 pm.

**SINCLAIR 16K ZX81**, £35. Northwood 22750 (after 6 pm).

**DRAGON 32**, 3 weeks old, £56 of software — Defender, Donkey King, etc, £185 ono. Tel: 01-777 4714 (5 pm).

**VIC20**, m/c your VIC, Commodore cartridge, Programme Reference Guide, VIC Revealed, + 6502 programmes course, £25. Tel: 0892 24486.

**ATARI VCS CARTRIDGE**, Space Invaders, £10 and Laser Blast, £8. Tel: 0264 53600 (anytime).

**DRAGON 32**, 3 months old, as new + software, £160 + Sinclair Printer (unused), £40. Tel: 0622 53710.

**MZ80A**, 48K, much software, magazines, books and other useful items, £295. Tel: 0789 205198.

**ACORN ATOM, 12K RAM** + floating point Rom plus tool kit Eprom, also word processing Rom 6522 via Imp and 64 way expansion sockets, including power supply, dust cover + cassette recorder, original arcade games, £250. Tel: 01-575 5711.

**DRAGON 32**, 2 months old, still under guarantee, joysticks + software, £190 ono. Tel: 01-322 8280 (anytime).

**DAI 48K**, improved keyboard + user mags, £580. Tel: 01-670 5909.

**JUPITER ACE** + manual, leads, etc, £65. Tel: 0228 61587.

**T199/4A**, 9 months old including extended basic etc, etc, all worth £500. Sell £260 ono. Tel: 04865-2887.

**INTELEVISION**, 2 cartridges, Soccer, Galaxy Invaders, £70 ono. 061-624 9279 (5 pm).

**JUPITER ACE**, brand new + demo cassette, leads etc, £65. Tel: Conway 2345.

**SWAP SPECTRUM** m/c Arcade games for any other Spectrum games or adventures. Tel: 06845 65657 (evenings).

**6502 GAMES**. How To Care For Your Computer, A-Z Book of Computer Games, Why Do You Need A Personal Computer? Books for sale, cost £38, sell £16 the lot. Tel: 01-574 4122 (9 am-5 pm).

**FIVE ROLLS ZX** paper, £8 ono. Tel: Manchester 061-330 6406 (6 pm).

**EXCHANGE** your software with me: Send an SAE to: M. A. Valentine, 101a Underdale Road, Monkmoor, Shrewsbury, Shropshire, SY2 5EF.

**20 SPECTRUM** original tapes worth £115 + tapes, include: Hungry Horace, Flight Simulation, Schizoids, Penetrator, Football Manager (phone for full list). Sale price £35 the lot. Phone (05827) 69152, for details.

**12K ATOM**, 12K Rom, + cassette, £100. Tel: 01-885 1207.

**PRINTER/TERMINATE KSR 300**, RS232C interface, 300 cps, tractor drive, 80 column, suit most micros with RS232 interface, £80 ono. Tel: 041-638 5411 weekends only.

**ORIC 1**, 48K, brand new, unwanted gift, £160. Tel: 041-772 8992.

**MATTEL INTELEVISION** with 6 cartridges, 3 months old, £180 ono. Tel: 01-366 1360.

**SWAP** 1-piece mahogany-based guitar for Dragon 32 or similar. Tel: 0235 32435.

**PRINTER**, Seikosha GP80 boxed as new, paper + cable, suit most micros, Beed Atom + Dragon, £170 ono. Tel: 733 4334.

**DRAGON 32**, boxed as new, upgrading, £150. Tel: Cumbran (06333) 65255.

**TANDY** colour computer Project Nemula game, will swap for other cart. Tel: Pelsall 691618.

**MATTELL INTELEVISION** + 3 cartridges inc Lock + Chase, 3 months old, £99 ono. Tel: Letchworth 72250.

# POPULAR Computing WEEKLY

## BACK NUMBERS

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**CENTRONICS 102DC** double header, printer, standard interface, full size 132 column machine. Can be used with standard interface, e.g. Dragon/BBC. £150 with stand. Tel: 01-856 1198.

**GAMES**: First offer for each secures, Vic20 Road Race £4; Number Invaders £4, ZX81 16K Prime Minister £3.50. Pet Number Invaders £5, Spectrum Space Raiders £4. M. A. Valentine, 101A Underdale Road, Monkmoor, Shrewsbury, Shropshire SY2 5EF. (Also Vic20 8K Rampack £40).

**SWAP COMPLETE** Home Base CB set-up for any colour computer. Tel: Bradford 0274-592920.

**DRAGON 32**, as new, + joystick + lots m/c arcade games, + manuals. Cost £265 sell £180. Tel: 061-794 9403.

**TI 99/4A**, all cassette leads + Parsec + Invader Modules + 5 games cassettes + manuals + book, £150. Tel: Cambridge 862439 eves.

**VIC20 S/W** for exchange. 01-387 8751, 6—9 pm.

**SWAP ZX81 GAMES**: Scramble, Hungeroids. Tel: Leeds 788042 (6 pm).

**VIC20 SUPER EXPANDER**, £25 or swap for 8K Ram. Tel: 021-354 4722 (anytime).

**EXCHANGE VIC SUPER EXPANDER** for 8K Ram. Tel: Horndean 595900.

**MICROTAN 65** + Tammex, 8K Ram, Sigforth Eprom, w/l, graphics, Cherry k/b, keypad, games s/w, mini-rack, £150 ono. Tel: 021-445 2468 (anytime).

**SWAP PHARAOH'S TOMB**, multi-screen, 16K, Adventure, for other 16K Adventures (Vic20). Tel: Horsham 721105.

**SWAP** a boxed Sargon II Chess Vic20 cartridge for a Lunar Lander cartridge. Tel: Lisburn (Northern Ireland) 70461.

### Wanted

**WANTED**. Dragon 32 to swap for Vic20 plus cassette deck, joystick, 3 months old, all boxed, books and software. Tel: Fleetwood (Lancs) 4105.

**WANTED**. ZX81 11K, keyboard. Tel: 01-841 2024 (anytime).

**WANTED**. BBC A OR B for cash. Tel: Goosetree, Cheshire (0477) 32053 (anytime).

**WANTED**. Buy, rent or timeshare, TRS-80 MII with exp. drives and printer. Any reasonable offer. Tel: 01-940 2655 (anytime).

**WANTED**. BBC MODEL B with disc interface. Tel: 041-632 5970 (Glasgow).

**INTELEVISION**, sensibly priced please + cartridges to be included. Tel: 01-897 6274, Bruce, evenings.

**WANTED**: Disk drives + Expansion Interface for TRS80 Model I Level 2. Ring: 0633-422328.

**SECOND-HAND PRINTER**, Seikosha GP100A or similar. Tel: 01-942 5026.

**DISC DRIVE** for BBC Model B. Derby area. Tel: 0332 773865.

**WANTED: BBC (B)** with software. Tel: 01-204 4534 (7 pm).

**BBC MODEL B**. Tel: Tellerton 258412.

**ANY COMMODORE, TANDY, SHARP**, will pay £250 ono. Tel: 061 792 5054. Mr Ibrahim.

**VIC PROGRAMS** and other cartridges in exchange for software. Tel: 01-807 6907.

**WANTED**: any Vic cartridges, half price. Winchester (0962) 53240 (6 pm).

**BBC MODEL B**. Tel: Swansea 208940.

**BBC MODEL B**. Tel: Godalming 22267.



## CRASHING BORE!

*Martyn Sudworth of Bristol, writes:*

**Q** I have recently acquired a Jupiter Ace. It does not take long to discover that, with less than 1K of memory available (after the character set, and both the stacks are accounted for), it is insufficient even for Forth.

I therefore tried to fix my ZX 16K Ram pack to the Ace by means of an adaptor (to get the connections in the right order). Nevertheless, the computer crashes with the 16K Ram fitted as soon as it is turned on.

**A** I think you are brave to try a wiring job like this — it must look a bit like spaghetti. Assuming that you have taken note of the end of page 155 of the manual, where it says that the Ram CS and the Rom CS on the ZX81 should not be connected up, then it must, I am afraid, be a wiring mix-up.

While on this subject, D Barlow of Lansbury Drive, Hayes, Middlesex, has tried the same thing with a Memotech 32K Ram pack. He found that the only way he can get the Ace to address this particular pack, is by 'linking out the Rom CS to the Ram CS, on the ZX81 side'. I can only assume that this is because the Memotech memory actually disables the Rom to enable it to read the screen.

D Barlow also asks why, when he has the pack fitted, he gets the result -31879 when he does a test to see how much memory he has left — and would it be possible to fit an ordinary keyboard to the Ace. The reason for the return of -31879 value is given on page 24 of the manual. The numbers 'wrap around', so you get the last address of the 32K

block as, 32767, the next addresses are returned as -32768, -32767 . . . and so on. So you can see that you have almost 33K of User Ram available with this pack fitted.

A normal keyboard could be fitted to your Ace, but it would take a careful analysis of the position of each data and address line.

## UNSTOPPABLE NOISE

*L K Matuszczyk of Trelaw Road, Trelaw, Rhonda, Mid-Glamorgan, writes:*

**Q** I have had a 16K Spectrum since October. When I connected the power supply, I was a bit surprised to hear a loud buzzing noise, which came from the computer. I telephoned Sinclair Research and a young lady told me that the Spectrum does buzz and, as the computer seemed to be OK otherwise, she would not recommend that I return it.

Is it reasonable for the Spectrum to make this noise? I must confess that it irritates me after a while. What causes it, and have you any ideas on how to reduce it?

**A** All Spectrums seem to buzz to a greater or lesser extent. Nevertheless, it does not mean the Spectrums aren't any good — the cause is usually the winding in the modulator. I cannot think of anything you can do to stop the noise.

## IN SHORT SUPPLY

*Lawrence Stevens of Sale, Manchester, writes:*

**Q** I think I am having trouble with the power supply for my Dragon. I have recently moved and now every so often the television screen goes fuzzy (even though it is the same television as before). Occasionally, I get problems with software that I have Loaded on my own and has previously had no faults.

I lent my computer to a friend for a few days, who lives where I used to live. No problems. A local electrical shop said something about a poor power supply in this area and suggested a filter on the power lead. He did not know where I could get one. Do you?

**A** I am a little surprised that he did not know

where to get a filter of some sort, but there is at least one on the market. It is called 'The Plug' and is available from Power International Limited, 2a Isambard Brunel Road, Portsmouth, Hampshire PO1 2DU.

The problem you face is not unique, but as a matter of course I would suggest a wiring inspection of your house.

## THE DREADED WOBBLE

*P H Cooke of East Crescent, Stocksbridge, nr Sheffield, writes:*

**Q** I have noticed several machine code programs that can only be Run on a 1K ZX81, or a machine with less than 3.25K of Ram. I have firmly attached my Ram pack to the back of my ZX81, to stop the dreaded wobble problems. Short of removing the pack, is there any way I can get these programs to Run with the Ram Pack attached?

**A** Yes, and it is tied up with the way the ZX81 stores the screen in the display file. If you have less than 3.25K, then when you first switch on the display file contains just 25 bytes, a Newline character for each line. As material is entered, the display file fills up, from left to right. This is why it is best to keep 1K displays in the left-hand corner of the screen, and also why each line in the display file contains 33 bytes.

If you have more than 3.25K, then 792 bytes will be reserved for the display file; ie, a completely full screen.

The way around your problem is to fool your ZX81 into thinking that it has less than

3.25K of memory. This can be done by lowering Ramtop. When the command New is used, it clears everything in the memory up to Ramtop. If this is lowered, then the machine will be fooled into thinking that it has less memory.

The only way to access information above Ramtop in Basic is by Peek and Poke. If you Poke any address below 20700 into the variables that control Ramtop, you will lower it enough.

The variable that controls Ramtop is 16388/9. 16388 has to be Poked with the low byte of the address you want to lower Ramtop to, and 16389 with the high byte. If you want to lower Ramtop to 1K, then this program will do it:

```
10 LET A = 17407 (The address at
the end of 1K of Ram)
20 LET H = A/256 (This will give the
high byte)
30 LET L = A - INT (B * 256) (This
will give the low byte)
40 POKE 16388,L (Putting the new
value into the systems variable)
50 POKE 16389,H (Putting the new
value into the systems variable)
```

## WORTH THE WAIT?

*A Herbert of Adam Road, London N6, writes:*

**Q** I have heard that Sinclair is going to bring out a new computer quite soon. I was thinking of up-rating from my ZX81 to a Spectrum, but would it now be worth waiting for the new computer?

**A** Lots of speculation on this, but unfortunately, very little by way of hard facts to go on. Probably, the new computer will be more business orientated than the previous machines and flat screen television, and microdrives will probably be included.

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

## Top 10

- |    |  |                   |
|----|--|-------------------|
| 1  | (3) Assembly Language Programming for the BBC Micro, <i>Birnbaum</i> | (Macmillan)       |
| 2  | (1) Enter the Dragon, <i>Carter</i>                                  | (Melbourne House) |
| 3  | (6) Spectrum Machine Language for the Complete Beginner, <i>Tang</i> | (Melbourne House) |
| 4  | (2) Creative Graphics on the BBC Micro, <i>Cownie</i>                | (Acomsoft)        |
| 5  | (—) Mastering the Vic20, <i>Jones</i>                                | (Horwood)         |
| 6  | (4) The Working Dragon 32, <i>Lawrence</i>                           | (Sunshine)        |
| 7  | (7) Programming the Z80, <i>Zaks</i>                                 | (Sybex)           |
| 8  | (—) The C Programming Language, <i>Kernighan</i>                     | (Prentice Hall)   |
| 9  | (5) Compute!'s First Book of Vic, <i>various authors</i>             | (Compute!)        |
| 10 | (—) Mastering CP M, <i>Miller</i>                                    | (Sybex)           |
- (Figures compiled by Watford Technical Books, Watford, 0923 23324)  
(Last week's position in brackets)

# Ziggurat



## A spell on the computer

I have just calculated (on my new clock calculator) that the square root of -81 is 9. I cannot perform any more calculations, because it seems to be jammed: then I notice a tiny E in the upper left-hand corner. If I was an unaware user, I might not notice the E and carry on working.

Richard Skemp (writing in *The Psychology Of Learning Mathematics*, Penguin Books, 1971) notes that problems of learning and teaching mathematics are *psychological* problems, and that before we can make progress in teaching such things as mathematics (and programming?) we need to know much more about ways of learning. He might have added that different people learn in different ways: though some might learn by Papert's methods, some with poor visual imagery might find it almost impossible to learn merely by use of visual methods (psychologists distinguish between imagers and non-imagers — say no more!).

If we think of simple "sums", Skemp notes that "to understand arithmetic is an impossibility, for much of the algebra we learn at school is generalised arithmetic". This is why I believe that it is not possible to be a superior programmer without being in possession of a good *concept* of number (personally, my arithmetic is poor!).

To program is not to use mathematics, in one sense, but to program is to use logic, and logic has its basis in arithmetic.

I also believe that a *good* programmer should have a good command of the English language: when I read some of the so-called books on programming which fill the bookshops, and curse their illiteracy, this is reflected in the utter poverty of many of the programs.

A few years ago an attempt was made to introduce backward adolescents to computers, to see if the new environment could tease out their innate ability. It was reasonably, but not very, successful. It was found that boys who could not add up well played number-guessing games with facility (given time); but the biggest drawback to progress was that, to obtain a list of programs on the disc, one had to type *Catalog*, (it was an American computer) with no *ue*. For some *educated* people confusion ensues, but these boys did not see the problem — they could spell neither version.

I sometimes wonder if the reason why the Sinclair machines have been so successful at so many levels is that they use single keywords entry, so that the user does not have to spell. That a good proportion of software writers cannot spell is obvious from reading the documentation and program output.

One of my worries about the concentration upon computers in schools by the present government is that useful and essential skills may be down-graded merely because of that emphasis. One reaction to this type of argument is "It doesn't matter, before long all input and output will be audio, so people will not need to read or write". I leave you to guess my reaction to that type of attitude!

Finally, back to logarithms: Skemp (writing in 1971, remember) notes, "In these days of electrically-operated calculators and computers, there are some who think that logarithms and slide rules are out of date. But a book of mathematical tables costs pence, a slide rule a few pounds. Whereas an electric calculator costs hundreds of pounds, a computer, thousands."

Boris Allan

# Puzzle

## All square!

### Puzzle No 49

They were laying floor tiles at the local community centre.

"Managed to get this lot cheap," said Ned, indicating the tiles. "We found the kitchen, cloakroom, lobby and committee room were all perfectly square, and measured an exact number of feet along each side. Not only that but the kitchen was six feet smaller along the side than the cloakroom, the cloakroom was six feet smaller than the lobby, and the lobby was six feet smaller than the committee room."

"I see," I replied, spotting a contrived puzzle. "But you haven't mentioned the main hall."

"That'll have to wait," replied Ned. "You see, we only have the exact number of tiles to do the four smaller rooms. To be able to do the hall we would need as many again."

If the hall is also square, and an exact number of feet, what are the sizes of the rooms?

### Solution to Puzzle No 44

If we call the distance from the top of the furthest flag pole to the peg *r*, the height of the poles *p*, the distance of the peg from the nearest pole *x* and the distance between the two poles *q* then, using Pythagoras' theorem:

$$p^2 + (q + x)^2 = (r - \sqrt{p^2 + x^2})^2$$

With a little juggling this becomes:

$$4(q^2 - r^2)x^2 + 4q(q^2 + r^2)x + (q^2 - r^2)^2 - 4r^2p^2 = 0$$

and writing  $s = q^2 - r^2$  gives  $4sx^2 + 4qsx + s^2 - 4r^2p^2 = 0$

Using the program with the values of *p*, *q* and *r*. 10 P=50: Q=75: R=160 20 S=Q↑2 - R↑2 30 A=4\*S: B=Q\*A:CS↑2 - 4\*R↑2+P↑2 40 D=SQR(B↑2 - 4\*A\*C) 50 X1 = (-B+D)/(2\*A):X2=(-B-D)/(2\*A) 60 CLS: PRINT "THE ROOTS ARE:"X1;"AND";X2

This gives the two answers of 19.03 and -94.03. So the peg is 19.03 feet from the nearest pole. The other root refers to a possible corresponding peg 19.03 feet out from the *other* pole.

### Winner of Puzzle No 44

The winners are: Ms P Haynes and Ms C Johnson, of the Upper Fifth, Queen Mary School, Lytham, Lancs, who receive £10.

# Top 10

**BBC\***

1 (6) Planetoids	(Acornsoft)
2 (—) Chess	(Program Power)
3 (9) Snapper	(Acornsoft)
4 (10) Tree of Knowledge	(Acornsoft)
5 (—) Creative Graphics	(Acornsoft)
6 (8) Castle of Riddles	(Acornsoft)
7 (—) Frogger	(A&F)
8 (—) Graphs and Charts	(Acornsoft)
9 (2) Chess	(Computer Concepts)
10 (—) Forth	(Acornsoft)

\*All Model B.  
(Figures compiled by Micro Management Ipswich 0473 59181)

**Vic20**

1 (2) Lazer Zone	(Llamasoft)†
2 (3) Grid Runner	(Llamasoft)
3 (—) Abductor	(Llamasoft)
4 (7) Krazy Kong	(Interceptor Micros)
5 (—) Hopper	(Rabbit)
6 (10) Night Crawler	(Rabbit)
7 (5) Andes Attack	(Llamasoft)†
8 (8) Quackers	(Rabbit)
9 (—) Sargon II Chess	(Commodore)*
10 (9) Traxx	(Llamasoft)†

\*Cartridge. †Requires 8K or 16K.  
(Figures compiled by Vic Centre, London 01-992 9904)

**Spectrum**

1 (3) Penetrator	(Melbourne House)*
2 (7) Vu-3D	(Psion)*
3 (10) The Hobbit	(Melbourne House)*
4 (5) Frogger	(A&F)*
5 (8) Scramble	(Mikrogen)
6 (—) Flight Simulation	(Psion)*
7 (—) Micro Chess	(Artic)
8 (1) Black Crystal	(Carnell)*
9 (8) Galaxians	(Artic)
10 (—) GulpMan	(Campbell Systems)

\*Requires 48K.  
(Figures compiled by Buffer Micro Shop 01-769 2887)

**Atari**

1 (—) Zaxxon	(Datasoft)
2 (—) Chopper Rescue	(Microprose)†
3 (—) Eastern Front	(APX)
4 (1) Defender	(Atari)*
5 (—) Eliminator	(Adventure International)
6 (—) Hell Cat Ace	(Microprose)*
7 (2) Miner 2049er	(Big Five)*
8 (—) Floyd of the Jungle	(Microprose)‡
9 (—) Preppie	(Adventure International)
10 (—) GFS Sorceress	(Avalon Hill)‡

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

**ZX81\***

1 (3) Galaxians	(Artic)
2 (4) Flight Simulation	(Psion)
3 (6) 3D Defender	(JK Greye)
4 (2) Kong Dracula	(Tony Roberts)
5 (—) Maze Man	(Abbersoft)
6 (—) Chess	(Artic)
7 (—) Do Not Pass Go	(Workforce)
8 (—) Mazogs	(Buj Byte)
9 (—) Centipede	(Llamasoft)
10 (—) Oracle's Cave	(Doric)

\*All 16K.  
(Figures compiled by Buffer Micro Shop, London 01-769 2887)

**Dragon**

1 (1) Planet Invasion	(Microdeal)
2 (2) Dragon Trek	(Salamander)
3 (5) Alcatraz II	(Microdeal)
4 (3) Space Race	(Compuserve)
5 (—) Donkey King	(Microdeal)
6 (6) Invaders Revenge	(Microdeal)
7 (—) Champions	(Peaksoft)
8 (—) Attack	(PSS)
9 (7) Ghost Attack	(Dragon Data)*
10 (4) Scarlman	(Microdeal)

\*Cartridge.  
(Figures compiled by Dragon Dungeon, Ashbourne 0335 44626)

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