

A Database Publication

# electron user

Vol. 4 No. 8 May 1987 £1

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on your  
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for the Electron

## News

All that's new in the ever expanding world of the Electron.

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## Disc Menu

This super utility will organise your discs and present you with a ready made menu at the touch of a key.

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## Showtime

Order your tickets here and make a date in your diary for the big show dedicated to Electron and BBC Micro users.

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## Software Surgery

Bring yourself up-to-date with the latest software for the Electron: An arcade adventure, two arcade classics and a sports simulation are reviewed this month.

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More tips, clues and magic spells from our resident wizard as he endeavours to help those stuck in faraway and long-forgotten lands.

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## Hectic Henry

Help Henry the Eighth escape from the maze in this fast action arcade game. Watch out for the monsters lurking behind the hedges in his garden - you'll need nimble fingers and fast reactions if you're to survive.

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## Graphics

The series for budding computer artists delves deeper into the PLOT and looks at the many variations of the Basic command.

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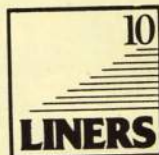
This top selling compilation tape for the Electron has now reached volume four: An offer not to be missed.

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We show how you can scramble files to prevent unauthorised access. Now you can store that confidential information with confidence.

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Correct those spelling errors with this powerful spelling checker.

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The pages you write yourselves. A selection from the many lively, interesting letters you've been sending us over the past few weeks.

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Teach your Electron about the animal kingdom and see the look of surprise on your friends' faces as it holds a most intelligent conversation with them.

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We show how you can use your Electron to measure both heat and light using your Plus 1's analogue to digital converter, a light dependent resistor and thermistor.

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## Bargains galore!

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Managing Editor  
Derek Meakin  
Features Editor  
Roland Waddilove  
Production Editor  
Peter Glover

Art Editor  
Heather Sheldrick  
Reviews Editor  
Chris Payne  
Advertising Sales  
John Snowden

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Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

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# A New Experience for Electron Users



# THE LOST CRYSTAL

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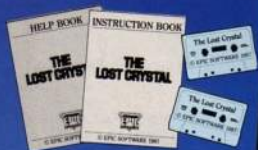
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## Makers struggle to meet demand

**BOOMING** demand for Electron add-ons is causing production problems for manufacturers.

One leading supplier has had to relocate its production lines to the Channel Islands in order to cope with orders from Electron users eager to upgrade their machines.

Gillingham-based Slogger provides a range of Electron enhancements, including the Master Ram Board and Rombox Plus.

It is one of several companies which has been working overtime to fill a flood of orders from the increasingly sophisticated Electron user base.

The crunch for Slogger came at Christmas when, despite help from other local manufacturing firms, production of Rombox Plus couldn't meet the demand.

Now the device, launched

### ***As Electron users upgrade machines***

last July to fill the gap left by Acorn's withdrawal of the Plus 1, is being made in Guernsey – along with other Slogger hardware.

"This is the only way we can guarantee sufficient quantities to meet the market demand", Slogger director Adrian Kearney told *Electron User*.

"The Electron market is so buoyant we have acquired a stock of 2,000 machines ourselves, and foresee no problems finding homes for

them. We are looking at eventually manufacturing all our products in Guernsey, which is becoming a major centre for high tech.

"Manufacturing costs there are very competitive, which will have the effect of helping to keep our prices down.

"And it will enable our Gillingham workforce to spend more time developing new and better products for the Electron".

### ***Music maestro, please***

COMPUTER music maestro Mike Beecher will be centre stage at the forthcoming Electron and BBC Micro User Show in London.

Beecher, whose company Electromusic Research specialises in Midi interfaces and music software, will present a series of demonstrations on stage at the New Horticulture Hall, Westminster during the three-day show.

The company could be springing a surprise soon. He revealed that on the agenda of talks with Acorn will be the possibility of converting some of his programs for the Electron.

Many of the exhibitors who had such a successful show in Manchester in the spring will be at the London show which runs from May 8-10.

A money-saving advanced ticket order form appears on Page 53 of this issue.

## Contest sparks bright ideas

**ELECTRON** comm enthusiasts may soon be able to access Prestel's 300,000 page database through MicroLink.

British Telecom is merging the messaging services of Prestel and Telecom Gold, with which MicroLink is associated.

This will immediately create a 130,000 user base of micro owners able to exchange messages with each other.

SO many people entered the second part of *Electron User's* double competition in March that the process of selecting the winners is still proceeding.

More than 1,000 readers contributed to a bumper postbag for Electron hardware and software producer Advanced Computer Products which donated the prizes, worth more than £500.

Winners of part one of the contest – a five question computer quiz – were

announced in last month's *Electron User*.

But this left about 800 entries for the second half of the competition in which readers were asked to suggest new APC products for the Electron.

Boss of APC John Huddleston, told *Electron User*: "We have been overwhelmed by the response, and that is why it is taking us so long to decide on the winners.

"It would be easy to put all the entries in a hat and

just pull out three of them. But we are treating the competition very seriously – not least because we have been tremendously impressed by the quality of the entries.

"So before we decide who gets the prizes we want to take a long hard look at all the suggestions for new products.

"We're determined, however, to end the suspense and announce the winners in next month's *Electron User*".

# PLUS 1 RUSH FOR THE SHOW

PLUS Ones for the Electron were still being manufactured for sale at the last Electron and BBC Micro User Show long after the doors were opened.

Advanced Computer Products' John Huddleston explained that their production centre had been producing Plus Ones on the Thursday, Friday and Saturday. They were then sent up to Manchester for sale the next day.

The company had only five weeks from signing the deal with Acorn to produce the Plus Ones for the show, but they were determined to get

them there.

A.C.P. also had great success with the 32k advanced battery-backed ram.

"They sold so well I haven't got one left for myself", said Huddleston.

This was just one of the many success stories from this first ever spring Electron and Micro User Show in Manchester.

A record attendance of more than 10,000 people and bumper sales left happy exhibitors with lots of positive leads. Many sold out of special show bargains.

Spurred by the success of

the autumn show, organisers Database decided to move the 1987 date forward. But the success of the spring show surprised even them.

It was an eye-opener for one company which went away vowing to pay more attention to the Electron.

Dataphone was so impressed by the number of disappointed Electron users' enquiries about their products that, said a spokesman: "We really should try to see if we can put something together for the Electron".

And the Electron showed its popularity at the Database Publications stand.

A special offer on back issues of the *Electron User* "did a bomb" according to a salesman.

Viglen, the add-on manufacturer, reported that it had a very good show, with excellent customer response to all its products.

Norwich Computer Services could hardly keep up with demand on the first day, selling out of "show specials" very quickly.

A free draw for a Minivitec Minerva run by Centec attracted more than 3,000 entries. The winner was Steven Askey of Cockermouth, Cumbria.



The Micro Live team Ian McNaught-Davis, Lesley Judd and Fred Harris

## Save Micro Live from death

TELEVISION's only regular computer programme, Micro Live, faces the axe.

But Database Publications, prompted by hosts of letters from readers, is determined to ensure the axe will not fall.

The last Micro Live in the present series was scheduled for the end of March, Head of Continuing Education (Television) at the BBC David Hargreaves said: "The present season of Micro Live is its third. We have decided not to plan a fourth for next winter."

"We want to pause, take stock and think about how we ought to be making the best contribution to our understanding of information technology in the future."

Derek Meakin, head of Database Publications, said: "Micro Live has played a leading role in introducing

the delights of computing to an ever-growing audience.

"To kill the series now, when so many exciting developments are taking place in the whole world of microcomputing, is a retrograde step."

Programme director David Allen said he appreciated Database's concern. "It is a very important area which needs to have continuing exposure on television."

"There is a job to be done in keeping the subject in the general public's eye because it is important for the community and consumer in so many ways."

So, *Electron User* readers, it's time to play your part.

If you want to help save Micro Live, write to: The Controller, BBC 2, TV Centre, Wood Lane, London W12.

## Games update

NEW for the Electron is an arcade shoot-out from Grem-lin Graphics.

West Bank is set in Soft City, a Wild West town. Players must collect money from the citizens and shoot the baddies who try to steal it en route to the bank. Price £9.99.

\*\*\*

AWARD-winning arcade adventure *Starquake* has been launched for the Electron by Bubble Bus Software.

The game features 500 screens. Players control Blob who must scour the caves of an alien planet and amass various items.

The planet's core must be found and filled with the right products in order to stabilise it.

\*\*\*

AN Electron version of its bestselling game *Dunjunz* has been released by Bug Byte.

Players take on the role of a ranger, wizard, barbarian or warrior and work through 25 levels to recover the chalice stolen by the Lord of Darkness. Price £2.99.

\*\*\*

A TRILOGY for the Electron based on the Ket range of adventures has been launched by Incentive Software.

The package incorporates three adventures, Mountains



of Ket, Temple of Vran and the Final Mission.

Players must overcome Vran Verusbel and High Priestess Delphia in a bid to combat attacks on the mountains of Ket. Price £9.95.

**TIPS for aspiring programming stars have been collected into a handbook by software house Superior as part of a spring campaign to recruit writers.**

To coincide with the book's launch the company has released the first in a range of *Superior Collections* for the Electron containing seven hits and one new title.

The compilation features *Syncon*, *Repton*, *Repton 2*, *Karate Combat*, *Deathstar*, *Mr Wiz*, *Smash and Grab* and *Overdrive*. Price £9.95 on tape, £14.95 on disc.

ACORNSOFT ELECTRON BONANZA

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Electron User, June '86

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Acorn User, July '86

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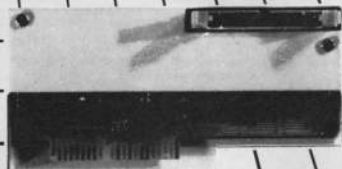
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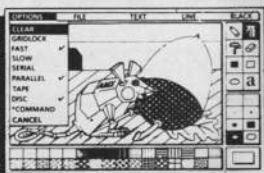
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ICON DESIGNER is an invaluable program for creating and storing icons for use in your OWN programs.

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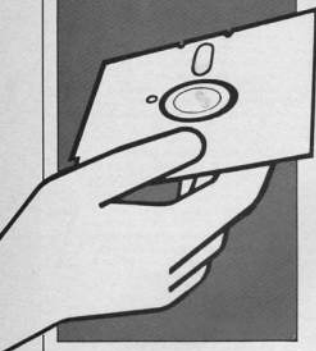
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# Disc Menu can make program selection a snip

**STEVE TURNBULL** cooks up a tasty morsel

**CHOOSING** which program to run from your disc can be time consuming.

You have to type \*CAT and look through the program names. When you've made your choice you have to remember whether it's Basic or machine code.

Finally you have to CHAIN or \*RUN the program to start it. And if you realise that you've chosen the wrong one you have to go through the whole process again.

So why can't you have a program to do it all for you? Well now you can.

Disc Menu takes all the effort out of choosing your program. Once it is on your disc just CHAIN it to get a list of your programs on an easy-to-read menu and you can LOAD, CHAIN, \*LOAD or \*RUN whichever one you want.

The program works on almost any system - Plus 4 DFS, Plus 3 ADFS, Plus 3

DFS and the Cumana Disc Interface with Slogger's SEDFS.

You choose the program you want using the cursor keys and Return, then Menu checks to see if it is Basic, machine code, or perhaps just a text file, and gives you the choice of running or loading it.

Press just one key, and your chosen program is run or loaded ready for you to play or edit.

Type in Menu and save it on to a disc before trying to run it, as the little bit of machine code could wipe out the whole memory if you have made a typing error.

You are now ready to set up your discs. Make sure Menu is loaded into your Electron, put a disc into the drive and type:

```
*BUILD :Boot
CHAIN Menu
```

and press the Escape key.

Now enter:

```
*OPT4,3
SAVE Menu
```

If you are using the Plus 3 ADFS you will have to copy BUILD from the Library on your Welcome disc on to the new disc first.

Repeat this procedure for every disc you want the Menu program on. When you want to use the disc press Shift+Break and the menu runs automatically.

Once you have the menu on screen you can type in a star command. Just press \* and then your command - not forgetting to press Return at the end.

You can insert a new disc - press N and follow the

instructions. If you want to choose a different drive or directory you can do this with a star command.

Use the cursor keys to highlight the file you wish to load and press Return. Menu checks whether the file is Basic, machine code or text and allows you to choose LOAD, CHAIN, \*LOAD or \*RUN (or no action) depending on the type of file.

If when using the ADFS you select a file name which is in fact a directory, the program moves down into the new directory and displays a new menu. To move back up you can use:

\*BACK

Name	Parameters	Action
osargs	A=0 Y=0	Find identifying number of current filing system. DFS = 4 ADFS = 8 Read title of disc
osgbpb	A=5 XY=address of data block A=8 XY=address of data block	Read all filenames in current drive/directory
osfile	A=5 XY=address of data block	Read information about particular file

Table 1: Filing system calls used in Disc Menu

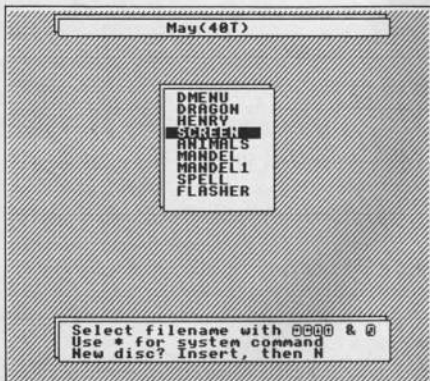


Figure 1: The main menu screen

The program works by reading the names of the files in the current drive and directory, using the standard filing system calls shown in Table 1. The names appear on screen in a window.

When a file is selected the program goes back to the disc and finds out what the load and execution addresses are.

Using this information, it decides, in PROCfuzzy, whether the file is a Basic or a machine code program or a text file.

Choosing the file type uses a system called Fuzzy Logic. Normal logic just deals with things being true or false, and nothing in between: Fuzzy Logic involves some things being more likely or less likely than other things.

PROCfuzzy uses this system to decide the type of

the file you have chosen. It examines the load and execution addresses and changes the values of the variables *text*, *mcode* and *basic*.

For instance, if the execution address is between &8000 and &8100 it is more likely to be a Basic program than machine code or text. But a load and execution address being the same and less than &E00 means the file is more likely to be machine code than Basic.

A special check is made to see whether the file chosen is really an ADFS sub-catalogue.

When you have made your choice the program fills the keyboard buffer with the instructions needed to LOAD, CHAIN, \*LOAD or \*RUN the file and the menu program finishes.

Your Electron then processes the commands in

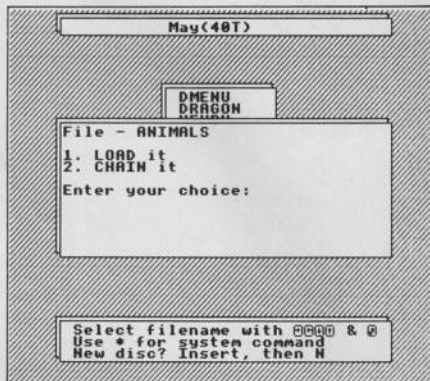


Figure 11: The loading options

the keyboard buffer just as if you had typed the commands in yourself.

And there you have it,

your discs get the professional look, and it is much easier for you to run your programs. ■

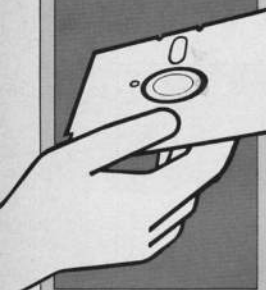
```

10 TS="Electron Disc Menu"
20 AS="S.D.Turnbull"
30 REM (c) Electron User
40 REM-----
50 MODE4:ON ERROR PROC6
60 PROCinit
70 PROCmode(6)
80 ON ERROR PROCerror
90 REPEAT
100 REPEAT
110 PROCread.disc
120 PROCmode(4)
130 PROCch(title$)
140 PROCwindow(3)
150 PRINT "Select filename w
160 PRINT "Use * for system
170 PRINT "New disc? Insert,
180 PROCwindow(99)
190 FOR FX=0 TO files
200 PROCfile.out(FX,bcol,fc
210 NEXT
220 IF file=files file=0
230 REPEAT *FX15
240 PROCfile.out(file,fc,b
250 CX=FWin(curs$+"Nn"+cr$)
260 PROCread.file(bcol,fc
270 IF CX<5 PROCmove
280 UNTIL CX<4
290 IF CX<5 IF CX<8 PROCnew
300 IF CX=5 PROCsystem
310 UNTIL CX=8
320 PROCrun(FX(file))
330 UNTIL okay

340 PROCquit:END
350 ---
360 DEF PROCerror
370 *DIR :B.5
380 IF ERR=17 ENDPROC
390 DEF PROC6
400 ON ERROR OFF
410 PROC
420 REPORT:PRINT "at ";ERR:IE
430 ---
440 DEF PROCquit
450 PROCmode(6)
460 PROCcol(fcol,bcol):*FX4
470 PROCcon:ENDPROC
480 ---
490 DEF PROCcon
500 VOU23,1,1;0;0;0:ENDPROC
510 ---
520 DEF PROCcoff
530 VOU23,1;0;0;0:ENDPROC
540 ---
550 DEF PROCinit:*FX4,1
560 bcol=0:fc=1:bc=4:fc=3
570 mode=4:maxfiles=31
580 DIM ctrl 32,data 512
590 DIM f$(maxfiles),op$(2)
600 osqpb=&FFD1:osfile=&FFD
610 osargs=&FFDA:osword=&FFF
620 dfs=4:adfs=8:file=0
630 sp$="":cr$=CHR$13
640 width=10:length=11
650 VOU8FF17,8827C;88A92;892
660 VOU8FE17,8827C;89292;892
670 VOU8FD17,8827C;88E92;882
680 VOU8FC17,8827C;8FA92;882
690 VOU8FB17,8827C;89A9A;8F2
700 VOU8FA17,82211;88844;822
710 ch$=CHR$252+CHR$253+CHR$
720 curs$=CHR$888+CHR$889+CH
730 PROCcass:ENDPROC
740 ---
750 DEF PROCmode(MX)
760 LOCAL AX
770 VOU22,MX
780 PROCcoff
790 VOU19,bcol,bc;0;
800 VOU19,fc,fc;0;
810 PROCcol(fcol,bcol)
820 mode=MX
830 LX=0:BYX=24
840 RX=39:TYX=0
850 IF mode=4 BYX=31
860 ENDPROC
870 ---
880 DEF PROCcon(t$)
890 LOCAL CX
900 X=(RX-LX-Len(t$))/DIV2
910 PRINTTAB(CX,TYX,t$);
920 ENDPROC
930 ---
940 DEF PROCany
950 LOCAL BX,FX,ZX
960 B=0:FC=0:FC=0
970 PROCcol(bcol,fc)
980 PROCcon("Press any key",V
990 PROCcon:ZX=GET:PROCcoff
1000 PROCcol(FX,BX)
1010 ENDPROC
1020 ---
1030 DEF PROCcol(CX,BX)
1040 COLOUR CX
1050 COLOUR 128+BX
1060 ofc=K+0:bc=0
1070 ENDPROC
1080 ---
1090 DEF PROCch(t$)
1100 PROCfill(8FA,0)
1110 PROCwindow(1)
1120 PROCcon(t$,0)
1130 ENDPROC
1140 ---
1150 DEF FWin(k$)
1160 REPEAT
1170 I=INSTR(k$,GETS)
1180 VDU -7*(I=0)
1190 UNTIL I<>0
1200 =I
1210 ---
1220 DEF PROCread.disc
1230 PROCmode(6)
1240 PROCch("Reading Disc")
1250 system=Fread.system
1260 title$=Fread.title
1270 PROCread.files
1280 ENDPROC
1290 ---
1300 DEF FRead.system
1310 LOCAL AX,FX,YY:XX=870
1320 =USR(osargs)AND&FFF
1330 ---
1340 DEF FRead.title
1350 LOCAL DX,LX,LY
1360 DX=data
1370 ctr(1)=0
1380 ctr(1)=0
1390 ctr(1)=0

```

## Disc Menu listing



### From Page 11

```

1400 ctrl19=0
1410 A2=5
1420 X2=ctrl
1430 Y2=X2DIV256
1440 CALL osqbbp
1450 f2=
1460 IF ?D2=0 "No Title"
1470 FOR L2=1 TO ?D2
1480 IF D2L2=32 IF t2=" ELS
E t2=CHR$(D2L2)
1490 NEXT
1500 IF t2=" t2="No Title"
1510 t2=
1520 ---
1530 DEF PROCread.files
1540 LOCAL O2,F2,L2,t2
1550 D2=data
1560 FOR L2=0 TO 511 STEP4
1570 D2L2=0:NEXT
1580 ctrl19=0
1590 ctrl11=0
1600 ctrl15=maxfiles
1610 ctrl19=0
1620 A2=8
1630 X2=ctrl
1640 Y2=X2DIV256
1650 CALLosqbbp
1660 FOR F2=0 TO maxfiles
1670 f2(F2)="NEXT
1680 f2=0:files=0
1690 IF ?D2=0 ENDPROC
1700 REPEAT f2="
1710 FOR L2=1 TO ?D2
1720 f2=f2+CHR$(D2L2)
1730 NEXT
1740 D2=D2+L2:f2(F2)=f2
1750 f2=f2+1:UNTIL ?D2=0
1760 files=f2:1:ENDPROC
1770 ---
1780 DEF PROCfile.out(N2,B2,F
2)
1790 LOCAL X2,Y2,UX2,V2
1800 UX2=0:V2=0:f2=
1810 PROCcol(F2,B2)
1820 X2=X2DIVlen2=wid
1830 Y2=X2MODlen2
1840 PRINTTAB(X2,Y2)sp$F$N2)
sp$;
1850 PROCcol(V2,UX2)
1860 ENDPROC
1870 ---
1880 DEF PROCmove
1890 IF C2=1 filefile=length
1900 IF C2=2 filefile=length
1910 IF C2=3 filefile=1
1920 IF C2=4 filefile=1
1930 IF file=0 file=
1940 IF file=1 file=files

```

```

1950 ENDPROC
1960 ---
1970 DEF PROCsystem
1980 PROCwindow(3)
1990 PROCcon
2000 INPUT"t2:
2010 PROCoff
2020 PROCch("System Command")
2030 PROCwindow(4)
2040 OSLC1 t2
2050 PROCany
2060 ENDPROC
2070 ---
2080 DEF PROCnew.disc
2090 PROCwindow(2)
2100 IF systemads OSLC1D15
MOUNT"
2110 PROCcn("Insert New Disc
Now",2)
2120 PROCany
2130 IF systemads OSLC1MOU
NT"
2140 ENDPROC
2150 ---
2160 DEF PROCfill(A2,L2)
2170 LOCAL X2,Y2
2180 X2=45000+320*L2
2190 Y2=X2DIV100
2200 CALL fill
2210 ENDPROC
2220 ---

```

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**MicroLink**

```

2230 DEF PROCassem
2240 FOR L2=0 TO 2 STEP 2
2250 p2=450:COPT L2
2260 fill
2270 STX ptr+1
2280 STY ptr+2
2290 STA character
2300 LDY character MOD256
2310 LDY character DIV256
2320 LDA #10
2330 JSR osword
2340 loop1
2350 LDY #7
2360 loop2
2370 LDA definition,Y
2380 ptr
2390 STA &FFFF,Y
2400 DEY
2410 BPL loop2
2420 CLC
2430 LDA ptr+1
2440 ADD #8
2450 STA ptr+1
2460 BCC loop1
2470 INC ptr+2
2480 BPL loop1
2490 RTS
2500 character
2510 BRK
2520 definition
2530 BRK:BRK:BRK:BRK
2540 BRK:BRK:BRK:BRK
2550 :NEXT
2560 ENDPROC
2570 ---
2580 DEF PROCwindow(W2)
2590 wid=width: leng=length

```

```

2600 IF mode=6 ENDPROC
2610 IF W2=1 LXI=5:BYI=1:RXI=
35:TYI=1
2620 IF W2=2 LXI=5:BYI=20:RXI
=35:TYI=10
2630 IF W2=3 LXI=5:BYI=29:RXI
=35:TYI=27
2640 IF W2=4 LXI=1:BYI=30:RXI
=38:TYI=4
2650 IF W2=99 PROCw99
2660 PROCw(8,fcol,12)
2670 PROCw(4,bcol,12)
2680 PROCw(8,fcol,0)
2690 PROCw(4,bcol,0)
2700 VOU28LXBYRXIYI30
2710 ENDPROC
2720 ---
2730 DEF PROCw(O2,C2,I2)
2740 GCOL O2,128+C2
2750 VOU24,LXI=32-O2-I2;(31-
O2)*32-O2-I2;(RXI+1)*32-O2-I2;
(32-TYI)*32-O2-I2;16
2760 ENDPROC
2770 ---
2780 DEF PROCw99
2790 LOCAL CX,F2,V2,W2,XX,Y2
2800 FOR F2=0 TO files
2810 V2=LENF2(F2)+2
2820 IF V2>W2 W2=V2
2830 NEXT:Y2=length
2840 IF files+1<Y2 Y2=files+1
2850 CX=(files+Y2)DIVY2
2860 X2=W2-CX
2870 LXI=19-X2DIV2
2880 AXI=LXI+X2
2890 TYI=7
2900 BYI=TYI+Y2
2910 wid=W2
2920 leng=Y2
2930 ENDPROC
2940 ---
2950 DEF PROCrun($data)
2960 okay=FALSE
2970 IF $data=" ENDPROC
2980 ctrl10=data
2990 ctrl12=0
3000 ctrl16=0
3010 ctrl110=0
3020 ctrl114=0
3030 A2=5
3040 X2=ctrl
3050 Y2=X2DIV256
3060 Y2=USR(osfile)AND&FF
3070 PROCfuzzy
3080 PROCwindow(2)
3090 PRINT"file = $data"
3100 IF type=1 PROCrdir
3110 IF type=2 PROCrtxt
3120 IF type=3 PROCrbas
3130 IF type=4 PROCrcod
3140 IF NOT okay PROCAny:ENDP
ROC
3150 PRINT"Enter your choice
:"
3160 PROCout(op$(F2IN("12"))
3170 ENDPROC
3180 ---
3190 DEF PROCfuzzy
3200 direc=100: text=0
3210 basic=Bcode=0
3220 load=ctrl12 AND&FFF
3230 ok=ctrl16 AND&FFF
3240 PROCdirectory:PROCtext
3250 PROCbasic:PROCcode
3260 IF type=0 IF text>0 code
type=2
3270 IF basic>0 text IF basic>0
code type=3
3280 IF mcode>0 text IF mcode>0

```

```

asic type=4
3290 IF direc=100 type=1
3300 ENDPROC
3310 ---
3320 DEF PROCdirectory
3330 IF systemads IF L2=2 d
irec=100
3340 ENDPROC
3350 ---
3360 DEF PROCtext
3370 IF load=0 OR load=&FFFF
text=text+1:IF exec=&FFFF text
=text+4
3380 IF exec=0 text=text+1
3390 IF load=&8000 text=text-
1
3400 ENDPROC
3410 ---
3420 DEF PROCbasic
3430 IF exec=&8000 IF exec=&8
000 basic=0:basic=0:mcode=mcode-
2:text=text-2
3440 IF load=&8100 IF load=
&8000 basic=0:basic=0
3450 IF load=&8000 basic=0:basic
+1
3460 ENDPROC
3470 ---
3480 DEF PROCmcode
3490 IF load=exec mcode=mcode
+2
3500 IF exec=&8000 mcode=mcode
+1
3510 IF exec=&8200 IF exec=&8
000 mcode=mcode+2
3520 ENDPROC
3530 ---
3540 DEF PROCrdir
3550 PRINT"Directory only"
3560 OSLC1 "DIR $data"
3570 okay=FALSE
3580 ENDPROC
3590 ---
3600 DEF PROCload
3610 PRINT"1. Load it"
3620 PRINT"2. CHAIN it"
3630 op$(1)="LOAD $data"
3640 op$(2)="CHAIN $data"

```

```

3650 okay=TRUE
3660 ENDPROC
3670 ---
3680 DEF PROCrtxt
3690 PRINT"Text only"
3700 op$(1)="op$(2)=""
3710 okay=FALSE
3720 ENDPROC
3730 ---
3740 DEF PROCrcod
3750 PRINT"1. ARUN it"
3760 PRINT"2. LOAD it"
3770 op$(1)="ARUN $data"
3780 op$(2)="LOAD $data"
3790 okay=TRUE
3800 ENDPROC
3810 ---
3820 DEF PROCout(t2)
3830 FOR L2=1 TO LENt2
3840 OSLC1 "X130,B,"STR$ASC
MID$(t2,L2)
3850 NEXT:L2
3860 ENDPROC

```

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# Robotic blockbuster



Program: Plan B  
Price: £2.99  
Supplier: Bug-Byte, Victory House,  
Leicester Place, London WC2H 7NB.  
Tel: 01-439 0666

NOW and again a game appears on the scene that has that something special. This is one of those times and this is most definitely one of those games.

The object is to guide your little robot on a mission through 54 screens which represent the different rooms of a Togrian Computer Complex, destroying the numerous vital parts of the computer as you go.

The golden rule to observe as you make your way from screen to screen, is that if it moves it must be an enemy, so you should either avoid it or instruct your little robot Rambo to blast it out of existence.

For a start it's a little difficult to classify what type of game it actually is, but I suppose Plan B qualifies as a multi-screen, shoot-em-up, arcade adventure maze game.

Each screen shows a room with many different puzzles to solve and nasties to blast. The nasties are different types of security guard robots that attack your drone. Each one causes a varying amount of damage, shown as a drain on your energy level.

Another problem is that the security robots are teleported to the current room and the longer you spend there the more robots are beamed in as reinforcements. In fact if you hang around too long in certain rooms they start to resemble Piccadilly Circus in the rush hour.

You are able to fight back but you'll need to top up your ammunition from time to time, when the chance arises. The energy level of your robot can be restored by maintenance, achieved by collecting the spanners and cans of oil

you'll find on your travels.

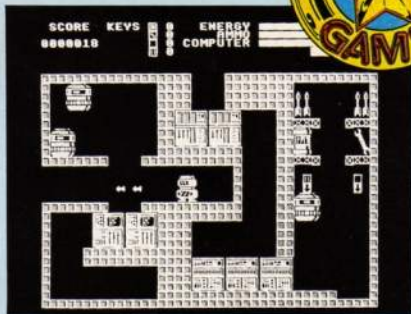
Your passage from room to room is not always as straightforward as it appears. You will need to collect numerous keys and use them to get through locked doors in certain rooms. However, you will soon find that a door will not open if the correct key has not yet been collected.

In addition to the obvious routes through the screens, many of the walls conceal passages which will only be revealed when the wall is shot away. Similarly many of the passages contain barriers which can be destroyed only from a particular position on the screen.

A further complication to those bent on charging through and blasting everything in sight is that stray shots have a nasty habit of always hitting an ammunition dump or oil drum.

While that does not do you any immediate harm it can be very frustrating to battle through a pack of security robots then find yourself without the means to reload.

The game appears to have



something for everyone, from those who enjoy painstakingly producing those complicated maps and diagrams, showing us how to get from A to B in the easiest and most efficient manner, to those who just wish to work off a head of steam and spend an hour or so nasty-blasting.

The only minus point is that all the graphics are in black and white, but the quality more than compensates for this. They are extremely detailed and each screen seems to offer another example of superb design which is almost an artform.

Character movement is super-smooth and at times the action is not just fast, it's lightning fast. Sound effects are fairly good. A neat little tune is played between games, although this can be switched off if it becomes annoying.

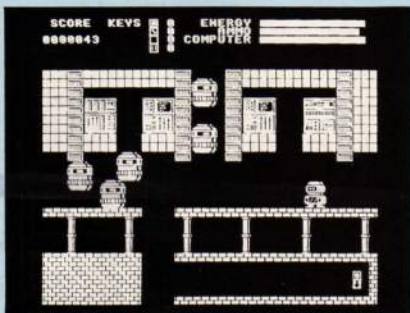
Movement is with the Z and X keys for left and right with the Shift key producing lift up the screen. It's nice to see the Return key being given a rest and this is only used to open a door.

The nasties are blasted with the spacebar. There is also a pause facility which can be useful to examine a screen without being zapped.

The only criticisms are that you only get one life—you then have to restart—and the lack of colour. But Elite proved it's not essential for a first-class game and that's certainly what you have here.

Bug-Byte has given us some very good games for the Electron in the past but this one is a real blockbuster. At this price it has to become a bestseller.

Beejay



Sound	8
Graphics	10
Playability	10
Value	10
Overall	10

## A range with mysteries

Program: *Xor*

Price: £9.95

Supplier: Logotron, Dales Brewery,  
Gwydir Street, Cambridge CB1 2LJ.

Tel: 0223 323656

*XOR* is a maze game that is played over 15 levels with the option of beginning on any – though I suggest you cut your teeth on the first. Each maze has a name which often has a connection with its contents or construction.

The aim is to collect all the masks held within the maze. The number of masks varies from maze to maze, but the total present and the total collected are always displayed on the screen.

Also shown is the number of steps you have taken while exploring the maze – you are allowed up to 1,999. This system is used instead of a time limit.

The maze walls are constructed of brick and cannot be walked through, and some of the passageways are filled with two other types of material, known as Dots and Waves.

Dots can only be passed through when travelling in the horizontal plane and Waves in the vertical: In this way parts of the maze can be cordoned off until approached from the correct direction.

The maze also contains four special characters – as each of these is found a quarter of the maze map is drawn to the right of the screen. This shows the position of all masks, but not the dots, waves or yourself.

The first maze should pose few problems – the fun really begins on level two. The dots and waves are still there, but they have been joined by fish and chickens.

The fish act in a similar way to the boulders in *Repton*, falling when unsupported. The chickens are a different kettle of fish – they “fall” horizontally from right to left.

A blow on the head from either of these characters is fatal, so a path through a pile of both types must be planned carefully.

Maze number four, entitled *Explosive Mixture*, sees the appearance of bombs and bottles of nitro glycerine. The starting point for this level is inside a completely sealed cell – you soon learn that dropping fish or chickens on to bombs causes them to explode, blowing a hole through the nearest wall.

A few words of warning at this point: Don't stand too close to a bomb when detonating it, and always try to clear away any masks that may be near the bomb. You have to collect

every mask to proceed to the next maze, which is pretty difficult when you've atomised half of them.

The Dolls House, maze six, introduces the dolls – harmless characters which continue to move in the direction in which you push them.

Unfortunately they don't detonate bombs, but I found them to be most useful when I wanted to manoeuvre a fish directly over a bomb before dropping it. This is done by lining them up to create a makeshift bridge across which the fish is pushed.

Some of the maze's nastier characters are the frowning masks, which render the maze walls invisible when collected, though all other characters are still displayed. The situation remains this way until you collect another frowning mask.

Very soon you begin to think twice about moving any character at all. The game's designers have been quite ruthless and some of the most harmless looking moves have dire consequences.

There have been dozens of occa-

sions when I have just sat there, staring at the screen, trying to convince myself that there has to be a logical explanation for every puzzle.

Thoughtfully, Logotron has provided an abort key, especially for those occasions when you muck it up.

One very clever feature of the game is the Replay mode which comes into operation when you've lost your second – and final – life, and retraces at high speed every move that you made on the current maze. It can be used to determine at which point you made a wrong move.

What at first appeared to be a very ordinary game is an absolute gem. The number and complexity of the puzzles is overwhelming.

Every Electron owner who wants more than zap and blast should buy this game.

Sound	7
Graphics	8
Playability	10
Value for money	9
Overall	9



## Something really special

Program: *Sphere of Destiny*

Price: £7.95

Supplier: Audiogenic, 12 Chiltern Enterprise Centre, Theale, Berks, RG7 4AA.

Tel: 0734 303663

JUST in at the last minute is *Sphere of Destiny*, the latest game from Gary Partis, author of such notables as *Positron*, *Psycastris* and the vast *Dr Who* and the Mines of Terror on the BBC Micro. The title is perhaps more suited to an adventure, though I assume it derives from the reggae group *Spear of Destiny*.

The idea of the game is simple: Guide a bouncing ball through 60-odd levels of a 3D obstacle course within the allotted time limit. Control is relatively simple – left, right, accelerate, decelerate and jump/bounce.

The action takes place on a five-lane roadway made up of a number of multicoloured tiles, each of which has a different function.

White squares give bonus points, purple ones make you bounce. Green

tiles increase your speed but red bring you to a virtual standstill. Beware the cyan tiles – right becomes left, accelerating slows you down and you're soon totally lost.

Owners of the Spectrum, Atari or Amstrad CPC will notice many similarities with *Trailblazer* from Gremlin Graphics.

*Sphere of Destiny* is a perfect example of the way delicate little refinements can give a game that subtle feel of something really special.

From the rolling demo to the clicking on and off of the keyboard LED as an invitation to enter your name in the 'high score table, *Sphere* bombards you with special effects.

The game features some of the most advanced programming techniques seen on the Electron. Unfortunately I found *Sphere*, like Gary's other recent games, much too difficult.

This is a great pity as he's remarkably good at finding that elusive addictive quality. I still regularly go back to *Psycastris*, but I have rarely completed the first stage. Perhaps



Gary should release his games before he's had a chance to get too good at them – it might give us mere mortals a chance.

I found it particularly ironic that the highly amusing scrolling text featured a message of thanks to someone who had helped make the game "more playable". I only made it to level three a couple of times in a few hundred attempts.

*Sphere of Destiny* is driving me nuts, but I'm sure it'll still be driving me nuts in a year's time.

Chris Murphy

Sound	6
Graphics	10
Playability	8
Value for money	10
Overall	9

## Sloppy simulation

Program: *Ice Hockey*

Price: £2.99

Supplier: Bug-Byte, Victory House, Leicester Place, London WC2H 7NB.

Tel: 01-439 0666

FANCY skimming over the ice and flicking the puck into the opponents' net? That's what's on offer in this team game simulation for one or two players from Bug-Byte.

The rules are all well explained on the cassette inlay and the keys you need to use are displayed on the screen at the start of the game. In fact, it's a well-packaged budget-priced game.

You start with a face-off in the centre and you can see the central third of the rink. If the puck moves to either end the appropriate third of the pitch is drawn. This redrawing is rather sluggish on the Electron and makes the game seem disjointed. There is a permanent on-screen display of the score and the amount of time played.

Ice hockey lends itself to being a computer game. It is only six-a-side and has strict rules about player positions, so the number of characters moving on the screen is limited and

should make for a fast game. Also, a small puck is used rather than a large ball which should help with the speed of drawing.

The playing rules are simple too. There are no throw-ons to cope with as the ball bounces off side walls, and in this well behaved version there are no fouls and no sin bins.

With so many advantages over football, it's a pity that this game does not really work. The players do not glide gracefully over the ice, but jerk about in a manner that would cause real players to fall over on the ice.

There seems to be no way of giving the puck a satisfying thwack up to the other end of the rink. Instead, you can only push it a small distance in front of you.

One of your worst problems is making sure that your computer-controlled teammates do not get the puck. If they do, they run up to the goal and spend the rest of the game not scoring and not passing.

As you try your hardest to wrest the puck from them, the noises (hardly sound effects) will drive you to distraction. You'll wonder where the music promised on the cassette inlay has got to – the suggested keys for music on and off have no effect.



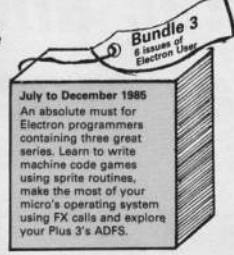
If the opposition get the puck they will run it up the pitch and spend ages failing to score or pass. Once again, the noises are intolerable and the best route out is to quit the game by pressing the Escape key.

It will be small consolation to Electron owners to know that if they load the same code into a BBC Micro, all the problems vanish and the game becomes fast, smooth, musical and much more fun.

I really wonder if Bug-Byte checked *Ice Hockey* on the Electron. I feel sure the company can't have intended to let such a poor game tarnish its reputation.

Rog Frost

Sound	0
Graphics	5
Playability	1
Value for money	2
Overall	3



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### December 1986

**SANTA'S SLEIGH** Help Father Christmas

fill his sleigh with presents in this fast arcade game. **YULE SPELL** Spelling can be fun with this seasonal variation on the old favourite hangman. **POGO** A Logo turtle graphics compiler. **FUNCTION KEY LISTER** Keep track of your function key definitions with this helpful utility. **10 LINERS** Two short but impressive graphics demonstrations.

### November 1986

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### October 1986

**RAT CATCHER** Try your hand at pest control with this fast action arcade game. **MATHS RUN** Put your powers of mental arithmetic to the test with this educational program. **BOS** This on screen editor will take the tedium out of debugging listings and sort out your typing slips. **CROSSWORD** Two programs for crossword lovers – one to design crosswords and the other to help you solve them. **+ BONUS game:** **QUASIMODO'S QUEST** Rescue Esmeralda in this colourful version of the all time favourite.

### September 1986

**CAVERN CAPERS** Blast your way from the depths of the labyrinth to escape from the planet. **DRAW WRITER** A superb utility to translate your on screen graphics to the procedures to create them. **COMPANY COUNT** Work your way up the company pecking order in this educational maths test. **TEN LINERS** Another short but fascinating program. **+ BONUS game:** **ROCKFALL** Go diamond mining in this intriguing multi-screen arcade romp.

### August 1986

**HOWZATI** A vivid recreation of a day's

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### July 1986

**ROYAL WEDDING** Celebrate the royal event with our ingenious sliding block puzzle. **SNAPDRAGON** Two player version of the classic card game. **ATTRIBUTES** Colourful two player strategy game. **FORMATTER** Make your listings easier to read. **DISCS** Extended star commands. **EXTRA COMMANDS** A WHILE... WEND command for your micro. **PLUS** superb digitised picture of Andrew and Sarah.

### June 1986

**FISHING** Enjoy a quite day by the river, and maybe catch your tea as well! **TACTICAL PURSUIT** A two player strategy game played with pawns on a chess board. **MINIBASE** Create an electronic telephone directory. **EXTRA COMMANDS** Add more commands to Basic. **SCREEN DUMP** Multi-tone screens dumps for Epson compatible printers.

### May 1986

**MISSILE JAMMER** Defend the city of Pzina from a missile invasion. **VECTOR LETTERS** Use \*LINE to create double height text. **DEGREES** Convert from Centigrade to Fahrenheit and vice-versa. **CROCODILE TEARS** Spell well or end up as a crocodile's dinner. **ZAP** Blast the marauding aliens. **EXTRA COMMANDS** Adding new keywords to Basic.

### April 1986

**INVASION FORCE** Exciting zap 'em space game. **EASTER EGG HUNT** Seasonal game using compass points. **BACK TO BASICS** Music tutor. **NOTICE BOARD** Text scrolling utility. **SEARCH AND RECOVER** Two routines from the disc archive. **NOTEBOOK** Recursion backwards.

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# Found - the Lost Crystal, and it's a real cracker

IT seems as though we've been waiting eons for the new Epic release, and the numerous false start press releases by Merlin and myself have probably made things even worse.

But now the good news - The Lost Crystal is here. And yes, it was worth waiting for.

I've only had my copy for a few days, but, am already totally hooked and hope the withdrawal symptoms aren't too painful. This is one adventure I am really going to enjoy reviewing.

It has more than 400 locations - on two cassettes - with superb hi-res graphics. With an advanced language interpreter, character interaction, store, continue and auto-save features, this must be the best adventure ever for the Electron.

All I'll say for now is - go out and buy it, you won't be disappointed.

This month has seen the completion of my database of text adventures, which has grown rather like Topsy since I began the task last November.

I have been absolutely amazed at the wealth of adventures available and the numerous oldies which seem to have been lurking in the back storerooms of some large software companies.

I am indebted to many individuals and companies for their time and assistance in the furtherance of this project. But I would like to take this opportunity to give special thanks to Steve Botterill at Superior and Rams Computer Centre for

all the help and software they have given.

I would also like to thank Deborah Phillips, Toby Bedding, Alan Dunwiddie and Ian Watson for their maps and solutions to Castle of Riddles.

However the prize copy of Rebel Planet is winging its way to Andrew Myers, whose solution was not only the first out of my mail bag but was also one of the best maps I have ever seen.

Mick Lovelock has written suggesting that I include a monthly adventurers' dictionary in this section - you know the type of thing: A for Adventurer, B for Bash, C for Call and so on, together with verb lists and synonyms. If you think this is a good idea, please write and let me know.

It's congratulations time, and it appears that the Bastien family has done it again. Well done, 14-year-



old Paul, on officially becoming the first person to complete Superior's Raven-skill.

Next month it is Top Twenty time again. Is your favourite adventure the new No1? Watch this space to find out. So until mazes become straight, happy adventuring!

## OVERTURE AND BEGINNERS

The definition of what is a good adventure is an enigma, as many of its qualities must in essence depend upon the preferences and experience of the individual adventurer.

For many reasons I have a definite preference for long, involved adventures in which the puzzles are totally logical.

As regular readers will appreciate, I also have a particular dislike for random magical elements.

Yet the enormous sales figures of games such as Sphinx Adventure and Classic Adventure tend to suggest that we all find quite different niches. Hence any judgement made by myself or any other critic must therefore, to a large degree, be subjective.

Surely one virtue of any adventure is the construction of good puzzles which will obviously vary in complexity depending upon the difficulty factor of the adventure.

Ring of Time by Kansas

City Software could be classified as a beginner's adventure in which the problems are devious yet logical. There are only 48 locations to explore but numerous, seemingly random objects to discover and utilise.

The latter part of this adventure introduces a clever chaining puzzle using some of the objects you have collected.

A chaining puzzle involves linking different objects or events to achieve a single or multiple task. Hence you arrive at a locked door in which the key can be seen in the lock on the other side.

Hacking or thumping the door will do you no good, and indeed wastes time as your candle burns lower and lower.

But wait... haven't you a piece of parchment in your possession? You know, that piece you found in the Monk's chamber.

That penknife which has been in your pocket since your exploration of the

cottage must surely be good for picking locks. But don't rush into it... think!

**DROP PARCHMENT - PUSH PARCHMENT** under door - **PICK LOCK** with penknife - **PULL PARCHMENT** and you can now lay your hands on that valuable key. So, **TAKE KEY - TAKE PARCHMENT** (it might have another use) and **UNLOCK DOOR**.

On opening the door you discover a sword and a shovel which will be of obvious use in the final stages of the game.

Always **EXAMINE** carefully the rooms and the objects you find on your journey through any adventure. Almost all will have some use - only the cads litter their adventurers with red herrings. And linking objects, as above, leads to success on more occasions than bashing ever will.

Successful adventurers tend to need brains as well as brawn.

Next month I will look at making sense of magic.

## Hampstead Map 4

- Pass the card!
- Force open something locked
- Vote wisely

### HALL OF FAME

#### Arrow of Death 1 – John Tipper

To reveal the secret passage, you must TURN COAT-OF-ARMS three times. EXAM BED then use the sword from the passage to CUT PILLOW. EXAMINE the purse that you find to get the coins, then use them to pay the beggar. He will then leave you an orb, which you can use as a light source.

Get the rope from the courtyard, the hook from the kitchen and the armour from the bedroom. Go to the ledge, TIE ROPE, HOOK ARMOUR, TAKE ROPE and GO LEDGE.

Now PULL ROPE, WEAR ARMOUR and RUB ORB. You will find a serpent when you enter the cave, so KILL SERPENT three times and get the arrowhead.

#### The Time Machine – Chris Lowe

Your first problem is to find Dr Potter's house. This is solved by travelling NORTH, WEST, SOUTH, NORTH. Take and wear the gloves but, ignore the bell because nobody's in.

Go around the side of the house, BREAK and ENTER. EXAMINE the things you can see in the study and TAKE what you find.

In the cellar you should find the Time Machine. The cassette recorder tells you your mission. Once you have entered the Time Machine, the next step is to try to control it. This is where the fun really starts. Don't give up – there are four possible locations which the machine may visit.

#### Enthar Seven – The Boss

You begin your quest at the console of Space Hopper which is spiralling in a fastly decaying orbit about the Earth-like planet, Enthar 7. Don't hang around, your actions must be quick and decisive if you are to avoid oblivion as the heat shields of your craft melt.

GET HELMET – STAND – EXAMINE SCREEN – SOUTH – WEST – EXAMINE SHELVES – EAST – SOUTH – EXAM SOCKET – PLUG TORCH INTO SOCKET – NORTH – NORTH – WEST – PUSH BUTTON.

Save this position, for now the adventure really begins.

### PROBLEMS SOLVED

Being in possession of so many solutions to Castle of Riddles has enabled me to answer a few of the many readers' queries on this puzzler of a game.

A young lady called Alexia appears to always end up dying in the bear's sitting room.

It seems to me that you should SAVE your position upon entering this room and then type SIT three times in order to try out all of the chairs – just like Goldilocks.

Deborah Phillips has collected the tiara, necklace, figurine, vase, coin, portrait, cushion, sculpture, diamond, clock and brooch. Having deposited them in the safe she wonders what is missing. It appears that you have missed the emerald in the winding passage, the mink in the giant's shooting gallery and the onyx in the coloured room maze.

Emma Rutherford, Lorraine Smith and Christopher West have all asked for solutions to the riddles.

If you don't want to risk possibly spoiling your enjoyment of this adventure – or for that matter your

sanity – I suggest you skip reading the next few paragraphs.

● What everyone overlooks? NOSE

● What a rich man has and wants more of and a fat man has but doesn't want? POUNDS

● What gets wetter as it dries? TOWEL

● Little Nancy Etticoat, with a white petticoat, with red nose, the longer she stands, the shorter she grows? CANDLE

● Lives in winter, dies in summer and grows with its roots upwards? ICICLE

● The beginning of eternity and the end of time and space? E

Epic's Wheel of Fortune is still foxing a number of people. Richard Forrow and Craig Rowe can't get past the snake. Try charming it with the Indian pipe and it might disappear into the basket.

Richard is also having difficulty in getting rid of the bird. You should play the music box and see what

## From Page 21

happens.

In Classic Adventure Martin Richardson has never seen the vending machine. Try exploring the maze west of the Long Hall.

He is also exasperated at losing the golden eggs to the Troll - I think the bear is the answer to that problem.

Martin adds that his version of the game crashes when he loses his way in the Hall of Mists.

While on the subject of bugs, a quick phone call to Adventure Soft UK - my castle must be the first in Britain with a gothic trimphone - has settled a few problems with some of the old Adventure International games.

The buckle which crashes many versions of Strange Odyssey is no longer a problem. Brian Howarth has re-coded this adventure, also Pyramid of Doom.

If you have one of these older versions, return it to



Adventure Soft UK for a replacement.

The inability to discover a fourth location on the raft in Savage Island 1, is not a bug but a wicked random number generator. So if any of you are stranded in this adventure you had better keep searching.

Mystery Fun House is causing Matthew Williams all sorts of problems. You

should use the wrench to remove the bolt on the grating. Your shoe holds something useful... and don't try going through locked doors.

Matthew, among many, asks what is my favourite adventure. At the moment it must be a toss up between Robico's Myorem and Epic's Lost Crystal.

I'll let you know which one

gets the decision after I have played the new Epic game a little longer.

Finally, in Rebel Planet, Grant Fernie should use the deltractor to lift the sewer cover and must bribe the museum guard with the chuckling stuff. By the way you should find the resistance movement in the sewers - among other things!

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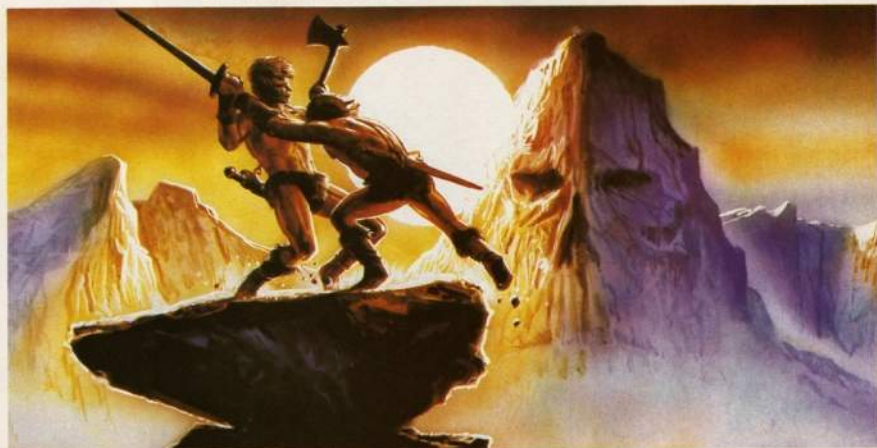
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WHILE taking a stroll through the maze in his garden Henry VIII is attacked by a gang of man-eating monsters and desperately needs your help.

The creatures head straight for him, eating their way through the hedges which form the maze walls. Henry's only defence is to kick bits of hedge at them. If they are caught off guard they are crushed.

There are four diamonds in the maze and 200 points are given for each one kicked into a corner. Watch out though, these crazy creatures find the gems very tasty and will gobble them up given half a chance.

After clearing the screen of monsters Henry has a chance to earn a bonus.

He must run through one of his other mazes at top speed, reaching the exit at the bottom of the screen before a clock counts down to zero.

There are no monsters here, but the control keys are reversed. The quicker he completes his run the bigger the bonus awarded.

This fast and addictive multi-screen arcade game will keep you busy for quite some time, so type in the listing and give Henry a hand.

#### CONTROLS

Z Left  
X Right  
\* Up  
7 Down  
Space Kick hedge

#### PROCEDURES

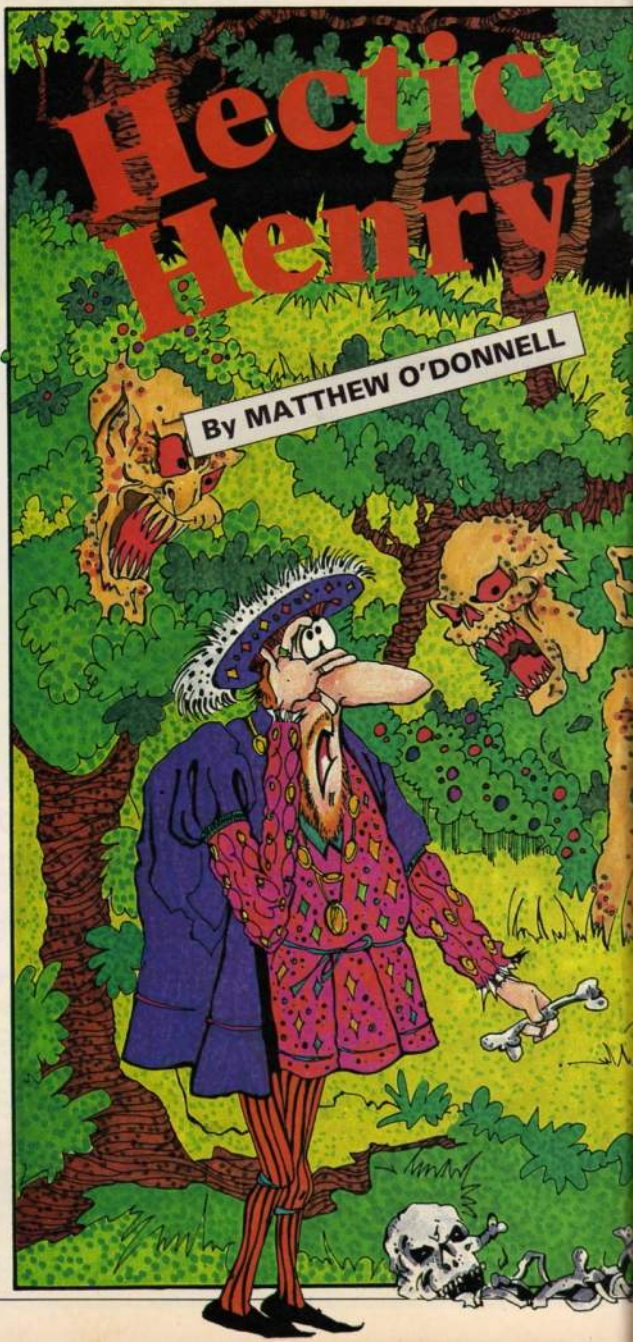
screen Draws the screen.  
M Moves Henry.  
push Kicks a hedge.  
O Moves a monster.  
T Plays the tune.  
instruct Prints the instructions.

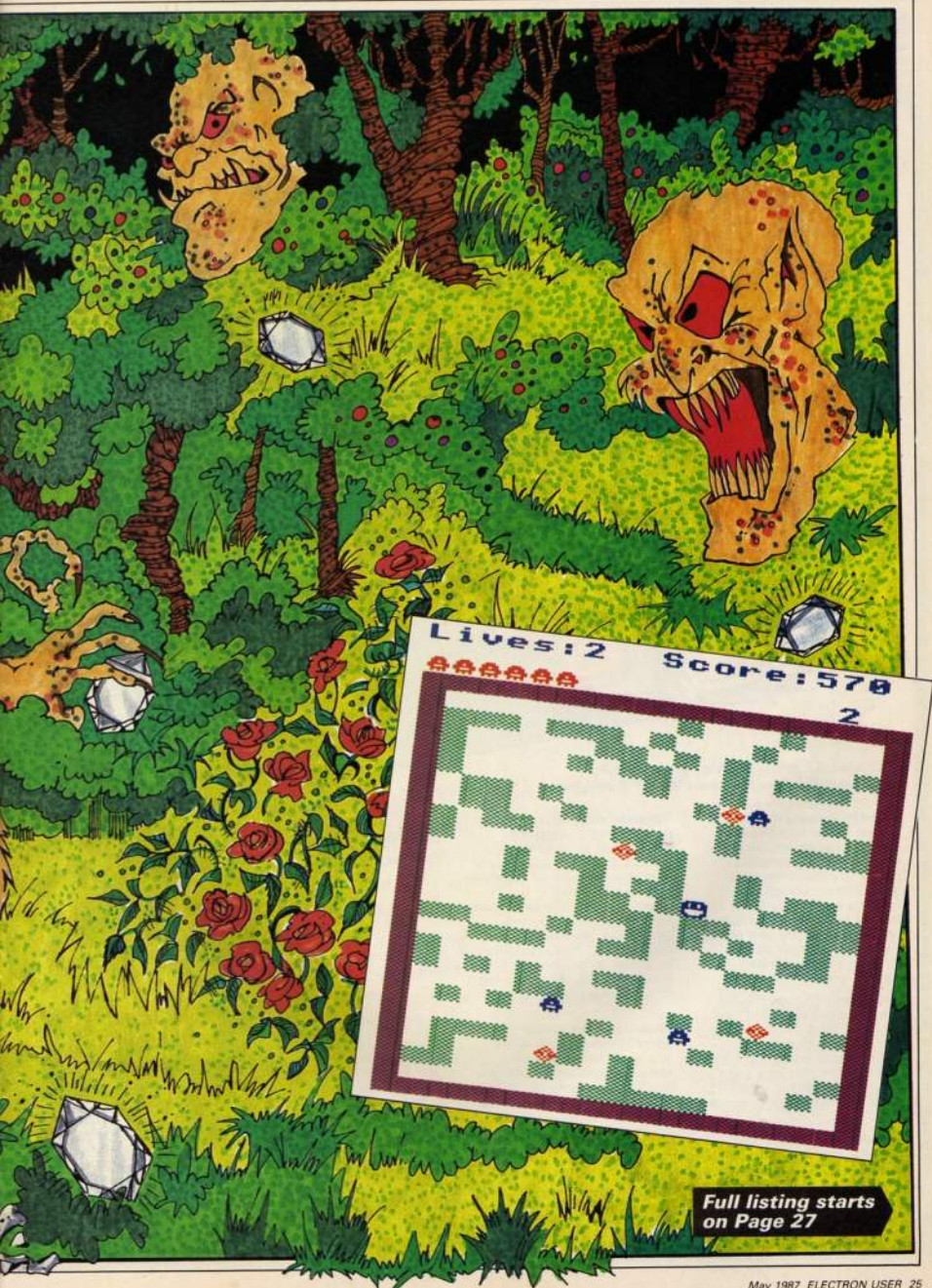
#### VARIABLES

score% Score.  
lives% Lives.  
Z% Screen number.  
X%, Y% Henry's coordinates.  
MON% Number of monsters.  
SC%(10) Hi-Scores.

# Hectic Henry

By MATTHEW O'DONNELL





Lives: 2

Score: 570

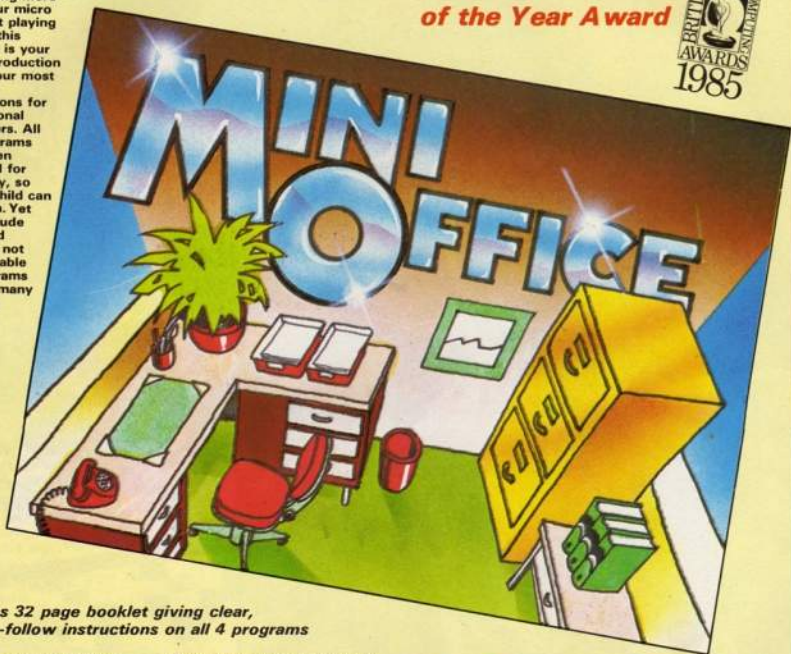
2



Full listing starts  
on Page 27

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**Database:** You use this for storing information, just like an office filing cabinet. Facts you have entered can be quickly retrieved by just keying in a word or part of a word. They can be sorted, replaced, saved for future use or printed out.

**Spreadsheet:** Enables you to use your micro for home accounts or pocket money records. It creates a display of numbers in rows and columns. Continuous updating is possible, and a changed figure can be instantly reflected throughout the rest of the spreadsheet. Your results can be saved, to be used for future updates, or can be fed into its associated program.

**Graphics:** Part of the spreadsheet section, it lets you draw bar charts, pie charts and histograms to give a graphic presentation of your statistics. Helps to give life and colour to the duller figures!

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**TO ORDER TURN TO THE FORM ON PAGE 53**

# Hectic Henry listing

## From Page 25

```

10 REM Hectic Henry
20 REM BY M.O'Donnell
30 REM (c) Electron User
40 ON ERROR:IF ERR=17 RUN:E
LSE MODE6:REPORT:PRINT"at Lin
e":ERR:END
50 DIM BX(10,30),BS(3),SZ2,
DX2,OX2,SCX(10),NS(10)
60 PROCassembler
70 PROCchars
80 FORP1=1 TO 10:SCX(PX)=(1
3-P1)*100
90 IF PX/2=INT(PX/2):NS(PX)
=USER:ELSE NS(PX)="ELECTRON"
100 NEXT
110 MODE4:VDU23:8202:0;0;0;
120 PROCinstruct
130 MODE5:PROCHighscores
140 PROCclear
150 REPEAT
160 LivesZ=3:ZX=1
170 scoreX=0:Fx=1
180 PROCupdate:PROCinit
190 PROCscreen
200 REPEAT
210 RESTORE3600
220 REPEAT
230 FORLX=BT02:PROCT:PROC:M
PROC:PROCO
240 NEXT
250 UNTIL LX=TRUE OR MX=MONX
260 IF LX=TRUE PROCdead
270 IF LX=MONX PROCfinished
280 UNTIL LivesZ=0
290 MODE5:VDU23:8202:0;0;0;
300 PROC
310 IF yq%TRUE PROCinput
320 PROCHighscores
330 PROCclear
340 UNTIL 0
350 END
360 DEFPROCscreen:PROCclear
370 FORW1=0 TO 10:FORW1=3 TO
30:BX(1,X,W1)=0:NEXT
380 IFZX<6:VDU19,3,2;0;
390 IFZX<5:IF ZX<1:VDU19,3,
5;0;
400 IFZX<10:VDU19,3,4;0;
410 PRINTTAB(16,3):ZX
420 IF ZX<5:VDU23,230,254,14
6,182,108,68,124,56,188:ELSE:V
DU23,230,28,62,54,127,99,62,42
,0
430 PROCborder
440 Q=200-(ZX+15):IF ZX<10:Q
=40
450 COLOUR3
460 FORP1=100
470 AX=NRND(17):BX=NRND(24)+4
480 BX(AX,BX)=1:PRINTTAB(AX,
BX):CHR$234
490 NEXT
500 COLOUR1
510 FORP1=104
520 AX=NRND(10)+4:BX=NRND(24)+
4
530 IF BX(AX,BX)=2:PRINTTAB(AX,
BX):CHR$234
540 NEXT
550 IF LX(XX,YX)=0:FORP1=BT02
560 BX(SXTP1,D1TP1)=0:NEXT
570 FORP1=10MON1
580 PRINTTAB(PX-1,3):CHR$230;
NEXT
590 COLOUR2:PRINTTAB(0,1)"Li
ves":LivesX
600 PRINTTAB(9,1)"Score":sc
oreX

```



```

610 PRINTTAB(XX,YX)BS(1)
620 FORI1=BT02
630 PRINTTAB(SX1X,DX1X)CHR
$230
640 NEXT
650 PRINTTAB(7,30)"Ready!"
660 PROCwait(1000)
670 PRINTTAB(7,30)SPC(6)
680 ENDPROC
690 DEFPROCchars
700 VDU23,224,170,85,170,85,
170,85,170,85
710 VDU23,225,126,219,219,25
5,129,129,195,126
720 VDU23,226,0,0,126,219,21
9,189,195,126
730 VDU23,227,126,219,219,25
5,195,129,189,126
740 VDU23,228,129,182,0,146,7
3,0,82,137
750 VDU23,232,28,28,127,127,
28,28,28,28
760 VDU23,233,254,146,182,10
8,68,56,40,108
770 VDU23,234,0,20,42,117,87
,42,20,8
780 VDU23,235,164,164,164,12
8,64,39,24,16
790 VDU23,236,85,85,119,0,25
5,0,0,0
800 VDU23,237,37,33,37,2,252
,0,0,0
810 VDU23,238,36,68,68,68,13
4,126,174,164
820 VDU23,239,221,149,221,14
8,212,0,117,85
830 VDU23,240,98,81,89,145,1
53,1,117,37
840 VDU23,241,0,0,0,0,0,3,28
,32
850 VDU23,242,0,0,0,0,0,255,
0,0
860 VDU23,243,0,0,0,0,0,224,
28,2
870 ENVELOPE1,4,1,-1,0,1,1,0
,126,0,0,-126,126,126
880 ENVELOPE2,0,-30,-20,-10,
200,70,70,0,0,0,0,0
890 FORP1=103:BS(P)=CHR$(P+2
4):NEXT
900 BS=STRING$(17,CHR$224)
910 BS=CHR$235+CHR$236+CHR$2
37+CHR$238+CHR$239+CHR$11+CH
R$238+CHR$239+CHR$240+CHR$8+CH
R$8+CHR$8+CHR$11+CHR$241+CHR$2
42:CHR$243
920 ENDPROC
930 DEFPROCinit
940 X1=10:Y1=10
950 CX=1:IX=0:KX=FALSE
960 V1=0:1
970 IF OX?1:1:SZ?1=16:DX?1=2

```

```

8 OX?1=1:SZ?1=16:DX?1=2
990 IF OX?2=1:SZ?2=16:DX?2=5
1000 IF Fx=1:MONX=ZX+3
1010 IF ZX<5:MONX=(ZX-5)+3:Fx
=2:IF ZX<10 MONX=15:Fx=3
1020 ENDPROC
1030 DEFPROCupdate
1040 FORP=BT02:OX?P=1:NEXT
1050 MX=0:ENDPROC
1060 DEFPROCROC
1070 RX=0:TX=0
1080 IF G8="K":GOTO 1100
1090 PROCJoystick:IF I=1:ENDP
ROC:ELSE:GOTO 1150
1100 IF INKEY(-98):IF KX<1:RX
=1:GOTO1140
1110 IF INKEY(-67):IF KX<17:R
X=1:GOTO1140
1120 IF INKEY(-105):IF YX<20:
TX=1:GOTO1140
1130 IF INKEY(-73):IF YX<5:TX
=1
1140 IF INKEY(-1) OR INKEY(-9
9) OR INKEY(-74):IF BX(KX+RX,
YX+TX)>0:PROCpush:COLOUR2:ENDP
ROC
1150 D=0:IF D=1:CX=1:ELSE CX
=2
1160 IF BX(KX+RX,YX+TX)>0:GOT
O 1190
1170 PRINTTAB(X1,Y1)"
1180 X1=KX+RX:Y1=YX+TX
1190 PRINTTAB(X1,Y1)BS(CX):EN
DPROC
1200 DEFPROCpush
1210 JX=X+RX:KX=YX+TX
1220 IF BX(JX,KX)=1:S=1:COLO
R3:ELSE:S=2:COLOUR1
1230 IF BX(JX+RX,KX+TX)>0:IF
BX(JX,KX)=1:PROCcrush:ENDPROC
1240 REPEAT
1250 PROCwait(16)
1260 PRINTTAB(X1,Y1)"
1270 IF BX(JX+RX,KX+TX)>0:IX=
1:GOTO1370
1280 BX(JX,KX)=0
1290 JX=JX+RX:KX=KX+TX
1300 BX(JX,KX)=5
1310 FORP=BT02:PROCT:IF JX<
SX?P1 OR KX<0:DX?P=100 1360
1320 IF JX<8:SZ?P=16:ELSE SX
?P=3
1330 M1=M1+1:scoreX=scoreX+50
:COLOUR3:PRINTTAB(MX-1,3):CHR$2
32:PROCT:IF MX<2:MONX=DX?P+33
-YX:BX(SX?P,D1?P)=0:ELSE:OX?
PX=0:DX?P=1:SZ?P=0
1340 COLOUR2
1350 PRINTTAB(15,1),scoreX:IF
S=1:COLOUR3:ELSE COLOUR1
1360 NEXT

```

```

1370 IF S=1:COLOUR3:PRINTTAB
(JX,KX):CHR$224:ELSE:COLOUR1:PR
INTTAB(JX,KX):CHR$234
1380 UNTIL LX=1:IX=0
1390 ENDPROC
1400 DEFPROCcrush:BX(JX,KX)=0
1410 COLOUR1
1420 PRINTTAB(JX,KX):CHR$229
1430 PROCwait(56)
1440 PRINTTAB(JX,KX)"
1450 ENDPROC
1460 DEFPROCPROCcheck
1470 IF OX?LX=1 GOTO 1510
1480 E=LX:REPEAT=E+1:IF E=3
E=0
1490 UNTIL OX?E=1 OR E=LX
1500 IF E=LX ENDPROC:ELSE LX=
E
1510 OX=0:WX=0:N1=SZ?LX
1520 UX=DX?LX:VX=ZX+5
1530 IF Fx=1:PROC=ELSE:PROCd
1540 PRINTTAB(NX,UX)"
1550 SZ?LX=SZ?LX+Q:DX?LX=DX?
LX+WX
1560 BX(SZ?LX,DX?LX)=0
1570 PRINTTAB(SZ?LX,DX?LX)CHR
$230
1580 PROCcheck
1590 ENDPROC
1600 DEFPROCdead
1610 *FX=1,0
1620 COLOUR2
1630 PRINTTAB(X1,Y1)BS(3)
1640 PROCwait(200)
1650 AX=6+KX:BX=1024-(YX+32)
1660 GCOL0,0
1670 IF LivesX=1:PRINTTAB(X1,
YX-1):MS
1680 IFH5="Y":SOUND1,2,255,28
1690 FORP=BT0100
1700 PLOT69,AX+NRND(60),BX-NRND
(30)
1710 NEXT
1720 LivesX=LivesX-1
1730 PRINTTAB(6,1):LivesX
1740 IF LivesX=0:BX(10,10)=0:
GOTO1780
1750 PRINTTAB(1,15):OX=92:RE
STORE3720:FORP=109:READOx,Sx:
IF S="R":PRINTAB:ELSE PRINTAB
P;"
1760 IFH5="Y":SOUND1,1,SX,4
1770 PROCwait(230):NEXT:PROCw
ait(2000)
1780 FORP=0 TO 2
1790 IF SX?P<0:PRINTTAB(SX?
P,X1?P)"
1800 PRINTTAB(X1,Y1)"
1810 NEXT
1820 PROCinit
1830 ENDPROC
1840 DEFPROCfinished
1850 IF BX(1,5)=2:scoreX=score
X+200:PRINTTAB(2,6)"200"
1860 IF BX(17,5)=2:scoreX=score
X+200:PRINTTAB(14,6)"200"
1870 IF BX(1,28)=2:scoreX=score
X+200:PRINTTAB(2,27)"200"
1880 IF BX(17,28)=2:scoreX=score
X+200:PRINTTAB(14,27)"200"
1890 COLOUR2
1900 *FX=1,0
1910 IF ZX/3=INT(ZX/3):LivesX
=LivesX+1:COLOUR2:PRINTTAB(6,1
):LivesX:SOUND1,-15,200,2:PROC
wait(1100)
1920 ZX=ZX+1
1930 scoreX=scoreX+LivesX+10

```

## Hectic Henry listing

### From Page 27

```

01:=(Z1+10)
1940 PROCwait(1000):PROCclear
:PROCB
1950 PROCupdate
1960 PROCinit
1970 PROCscreen
1980 ENDPROC
1990 DEFPROC
2000 IF HS="N" ENDPROC
2010 IF ADVAL(-6)<3 ENDPROC
2020 READW,Y%
2030 IF W%>100:RESTORE 3680:
GOTO2010
2040 SOUND1,1,W-56,Y/F%
2050 SOUND1,0,0,0
2060 ENDPROC
2070 DEFPROC
2080 IF RND(2)=1 GOTO 2120
2090 IF SX?LX:XX:IF SX?LX:1:Q
X=1:IF RND(VX)=1:IF SX?LX:1:Q
Q=1
2100 IF SX?LX:XX:IF SX?LX:1:Q
Q=1:IF SX?LX:1:IF SX?LX:1:Q
X=1
2110 ENDPROC
2120 IF SX?LX:XX:IF SX?LX:2:Q
W=1:IF RND(VX)=1:IF SX?LX:5:W
X=1
2130 IF SX?LX:XX:IF SX?LX:5:W
X=1:IF RND(VX)=1:IF SX?LX:2:Q
W=1
2140 ENDPROC
2150 DEFPROC
2160 V=V+1:IF V=5:V=1
2170 IF SX?LX:XX:IF SX?LX:1:Q
X=1:IF RND(2)=1:GOTO 2210
2180 IF SX?LX:XX:IF SX?LX:1:Q
Q=1:IF RND(2)=1:GOTO 2210
2190 IF SX?LX:XX:IF SX?LX:2:Q
W=1
2200 IF SX?LX:XX:IF SX?LX:5:W
X=1
2210 IF QX=0:IF V=1:IF SX?LX:1
Q=1
2220 IF QX=0:IF V=2:IF SX?LX:1
Q=1
2230 IF W=0:IF V=1:IF SX?LX:2
Q=1
2240 IF W=0:IF V=2:IF SX?LX:5
Q=1
2250 ENDPROC
2260 DEFPROC
2270 VDU19,1,5,0;
2280 PRINTAB(10,12):INSTRUCT
ions? (Y/N):REPEAT65=GETS:UNT
IL65="Y" OR GS="N":CLS
2290 IF GS="N" GOTO2400
2300 PRINTAB(11,1):Hectic He
nry!
2310 PRINT"Henry VIII was t
aking a stroll through the
maze in his garden when he was
ambushed by a gang of nan-
eating monsters."
2320 PRINT"Henry can kill t
hem by kicking the hedges a
nd crushing them. The monsters
can eat through any statio
nary hedges."
2330 PRINT"Here are 4 dian
onds hidden in the maze"and
you are given 200 points for
each"one you manage to kick
into a corner of"the maze."
2340 PRINTAB(14,29):Press SP
ACE:REPEATUNTILGET=32:PROCcle
ar:CLS

```

```

2350 PROCclear:CLS
2360 PRINT"In between each s
creen their is a bonus"game
. Henry starts at the top left
of"the screen and must be
guided through"the maze to
the exit at the bottom."
2370 PRINT"There are no mon
sters but the controls"are
reversed. The quicker you comp
lete"this screen the bigger
bonus you get."
2380 PRINT"You are awarded
an extra life every four"scr
eens."
2390 PRINTAB(14,29):Press SP
ACE:REPEATUNTILGET=32
2400 PROCclear:CLS
2410 PRINT
2420 PRINT"Keys: ""Z"";STR
ING6(28,"):"LEFT
2430 PRINT""X"";STRING6(28,")
:"RIGHT
2440 PRINT""*"";STRING6(28,")
:"UP
2450 PRINT"";STRING6(28,")
:"DOWN
2460 PRINT"SPACE/RETURN/SHIF
T:"STRING6(3,"):"KICK HEDG
E"
2470 PRINT"Analogue Joystic
ks may also be used."
2480 PRINTAB(10,29):Sound? (
Y/N):REPEAT65=GETS:UNTIL65="Y"
OR HS="N"
2490 ENDPROC
2500 DEFPROCjoystick
2510 I=0

```

This is one of hundreds of programs now available FREE for downloading on

**MicroLink**

```

2520 IF ADVAL(1)>40000:IF X%
1:RX=1:GOTO2560
2530 IF ADVAL(1)<1000:IF X%
17:RX=1:GOTO2560
2540 IF ADVAL(2)<1000:IF Y%
28:TX=1:GOTO2560
2550 IF ADVAL(2)>50000:IF Y%
5:TX=1
2560 IF ADVAL(0) AND 1 OR ADV
AL(0) AND 2:IF BX(X%+TX,Y%+TX)
=0:PROCpush1:=1:COLOUR2
2570 ENDPROC
2580 DEFPROCstart
2590 PRINTAB(1,27):Press SPA
CE or FIRE-SP(0):to start"
2600 GS="":REPEAT
2610 IF ADVAL(0) AND 1:GS="J"
2620 IF INKEY(-99):GS="K"
2630 UNTILGS<>"
2640 ENDPROC
2650 DEFPROCscore
2660 Y%FALSE
2670 IF score%<500:TX:=ENDPR
OC
2680 FORPX=1 TO 10
2690 IF score%<SCX(PX):T=PX+1
:PX=10:Y%TRUE
2700 NEXT
2710 FORPX=10 TO T STEP -1
2720 SCX(PX)=SCX(PX-1)
2730 NS(PX)=NS(PX-1)
2740 NEXT
2750 ENDPROC
2760 DEFPROCinput

```

```

2770 VDU19,3,4,0;
2780 COLOUR1:PRINTAB(2,1):CO
NGRATULATIONS!
2790 COLOURS:PRINTAB(1,5):Yo
u have earned a"" place i
n the"" hi-score table"
2800 PRINTAB(2,17):Enter you
r name"
2810 COLOUR129:COLOUR2:PRINT
AB(5,13):SPC(9)
2820 PRINTAB(5,13):"
2830 *FX15,0
2840 AX=0:XX=0:YX=0:0000=0
0:0000=0:0:0000=9:0000=32:70
,004:127:CALL&FFF1
2850 SCX(T-1)=score%:NS(T-1)=
50020
2860 PROCclear
2870 ENDPROC
2880 DEFPROChighscores
2890 VDU23,820;0,0,0;VDU19,
3,4,0;
2900 COLOUR128:COLOUR2
2910 PRINTAB(6,1):HI-SCORES"
:fin=1
2920 FORP=1 TO 10
2930 COLOUR1:PRINT""SCX(P)
:SPC(1):COLOURS:REPEATPRINT,
:UNTILPOS=9:COLOUR2:PRINTSPC
(1):NS(P)
2940 NEXT
2950 PROCstart
2960 ENDPROC
2970 DEFPROCcheck
2980 FORH=0TO2:IF SX?HX:XX:I
F D?HX=1:IF D?HX=1:KX=TRUE:
LX=2
2990 NEXT
3000 ENDPROC
3010 DEFPROCwait(wait%)
3020 FORQ=0TOwait%
3030 NEXT
3040 ENDPROC
3050 DEFPROCclear
3060 *674=0:FORW=0TO7:670=W:
CALLclear:NEXT
3070 ENDPROC
3080 DEFPROCAssembler
3090 DIM BA $0
3100 FORP=0 TO 2 STEP 2
3110 PX=BA
3120 COT P
3130 :clear:LDW=50:STA671
3140 LDW=0:STA672:STA673
3150 :load:CLC:LDW=7:ADG=0
3160 STA678:LDW=7:ADG=0
3170 STA678:LDW=7:ADG=0
3180 STA678:Y%INC7
3190 LDW=7:CMPL=0:BNL loop
3200 :add:INC673:LDW=0:STA672
3210 LDW=7:CMPL=0:BNL loop
3220 RTS:3
3230 NEXT
3240 ENDPROC
3250 DEFPROC
3260 OFX=FX:FX=3
3270 COLOURS:PRINTAB(4,14):B
ONUS GAME!
3280 PROCwait(900):CLS
3290 PROCborder
3300 COLOUR2:PRINTAB(2,2):BO
NUS:
3310 PRINTAB(10,28):"BX(18
,28)=0
3320 FORX=1:UNTIL:FORX=5TO28:
BX(X,Y%)+1:NEXT:NEXT
3330 X=1:Y%5:TX=2000
3340 COLOURS:COLOUR129
3350 FORP=8 TO 26 STEP 2
3360 W=RND(13)+2:FORX=1TOW

```

```

-1:PRINTAB(TX,PX):CHRS224:BX(1
%,PX)+1:NEXT
3370 FORX=W+1 TO 17:PRINTA
B(TX,PX):CHRS224:BX(TX,PX)+1:N
EXT
3380 NEXT:COLOUR128
3390 X=1:Y%5:TX=1000:ax=1:b
=0:COLOUR2:REPEAT:CL=CL+1:IF
CL>3:CL=1
3400 PROC
3410 ax=0:bx=0
3420 IF GS="J":PROCbjoy:GOTO3
470
3430 IF INKEY(-98):ax=1:bx=0
3440 IF INKEY(-67):ax=1:bx=0
3450 IF INKEY(-105):ax=0:bx=0
3460 IF INKEY(-73):ax=0:bx=1
3470 PRINTAB(TX,Y%)
3480 X=X+ax:Y=Y+bx:IF BX(
X,Y%)+1:ax=0:bx=0:Y=Y+bx
3490 PRINTAB(TX,Y%):BX(CX)
3500 TX=TX+5:COLOURS:PRINTAB
(8,2):TX="COLOUR2
3510 UNTILX=18 AND Y=28 OR
TX=0
3520 VDU28,4,17,16,15
3530 CLS
3540 IF TX=0:IF X%18:IF Y%<2
8:COLOUR2:PRINTAB(1,1):OUTO
F TIME:ELSE PRINTAB(1,1):BONU
S:"TX:score%:score+TX:"BONU
S"
3550 FORP=0TO2000:NEXT
3560 PROCclear
3570 VDU26:FX=0:Y%
3580 ENDPROC
3590 DEFPROCborder
3600 COLOUR130:COLOUR:FORP=
4 TO 29:PRINTAB(0,PX):CHRS224:
PRINTAB(18,PX):CHRS224:BX(0,PX
)=1:BX(18,PX)=1:NEXT:FORP=0
TO 18:PRINTAB(PX,4):CHRS224:PR
INTAB(PX,29):CHRS224:BX(PX,4)=1
:BX(PX,29)=1:NEXT
3610 COLOUR128:ENDPROC
3620 DEFPROCbjoy
3630 IF ADVAL(1)>40000:ax=1:b
=0
3640 IF ADVAL(1)<1000:ax=1:
bx=0
3650 IF ADVAL(2)<1000:ax=0:b
=1
3660 IF ADVAL(2)>50000:ax=0:b
=1
3670 ENDPROC
3680 DATA88,6,100,12,108,6,11
6,9,120,3,116,6,100,12,96,6,80
,9,88,3,96,10,12,88,6,88,9,
84,3,88,6,96,12,84,6
3690 DATA88,12,88,6,100,12,10
8,6,116,9,120,3,116,6,100,12,9
6,6,88,9,84,3,96,6,100,9,96,3,
88,6,84,9,76,3,84,6
3700 DATA88,18,88,18,128,18,1
28,9,124,3,116,6,100,12,96,6,80
,8,88,3,96,6,100,12,88,6,88,9,
84,3,88,6,96,12,84,6
3710 DATA68,18,128,128,9,1
24,3,116,6,100,12,96,6,80,8,88,
3,96,6,100,9,96,3,88,6,84,9,9
6,3,84,6,88,18,128,128,1
3720 DATA68,100,100,108,108,
116,108,128,108,108,108,108,
116,108,108,108,108,108,108,108

```

This listing is included in this month's cassette tape offer. See order form on Page 53.

# Dot plots for pretty patterns

BY now you should be fairly familiar with PLOT. We've seen how PLOT 4 and 5, followed by the appropriate coordinates, does the same job as our old friends MOVE and DRAW.

From there we went on to learn the difference between relative and absolute coordinates. Next we found out about other PLOTS which allow us to draw in the background colour and even produce dotted lines.

This month we'll be looking at another family of PLOT commands, this time one that allows you to produce single dots. They're shown in Table I.

These are similar to our previous two PLOTS, the ones for drawing solid and dotted lines. In fact, you can produce the codes for single dot PLOTS by adding 64 to the codes we had for solid line PLOTS.

All our families of PLOTS have this in common: They all do the same thing, but in slightly different ways depending on the offset added.

PLOT 5 draws a solid line, PLOT 21 (5+16), produces a dotted line while PLOT 69 (5+64), gives one solitary dot with the coordinates following these being taken as absolute. Table II shows the PLOT codes for each family.

But what use is a single dot you might ask? Well,

## Part fifteen of the Electron graphics series by TREVOR ROBERTS

using a lot of them allows us to produce some rather nice effects, as we'll see in the four programs this month.

We'll start with Program I which produces an outline of a rectangle.

While it's not the most efficient program (can you improve it?), it does show dot PLOTS in action.

Line 20 puts the Electron into Mode 5, the four colour graphics mode. All the coordinates for the rectangle are held in the DATA lines, 100 to 130, and it's from these lines that the READ commands take values.

The first of these, in line 40, puts 300 in x and 100 in y. The PLOT 68 of the next line moves the graphics cursor to point 300,100. This is to be the bottom left corner of our rectangle.

The program now enters the REPEAT...UNTIL loop formed by lines 60 to 90.

This cycles until it meets the rogue data values in line 140.

For each time round the loop another set of coordinates is read into x and y and a solitary dot produced by the PLOT 69 of line 80. The result of all this is an outline of a rectangle.

Ok, so this isn't too spectacular but from it you should be able to see how dots can be used to slowly build up figures.

Program II, effectively a souped-up version of Program I, shows this in more detail.

With this, the body of Program I is put into a procedure, PROCbox. This is called four times between lines 30 and 90 with the intervening:

wait=GETS

just there to hold things up until a key is pressed. Leave them out and see what

happens.

The workings of PROCbox itself should be easily understood. The RESTORE of line 190 just allows the same data to be used each time PROCbox is called. The PLOT 4 of line 140 could be a PLOT 68. Either way the graphics cursor is MOVED to x, y.

Which PLOT code is used to draw which type of line (or dot) depends on the parameter code.

The first time PROCbox is invoked in line 30, code is 69 so we get a dot outline of a

Code	Action
64	Move relative to last point.
65	Draw relative to last point.
67	Draw relative in background.
68	Move absolute.
69	Draw absolute.
71	Draw absolute in background.

Table I: How to get single dots

Solid	Dotted	One dot	Action
0	16	64	Move relative to last point.
1	17	65	Draw relative to last point.
3	19	67	Draw relative in background.
4	20	68	Move absolute.
5	21	69	Draw absolute.
7	23	71	Draw absolute in background.

Table II: PLOTS - the story so far

```

10 REM Program I
20 MODE 5
30 x=0:y=0
40 READ x,y
50 PLOT 68,x,y
60 REPEAT
70 READ x,y
80 PLOT 69,x,y
90 UNTIL x<0
100 DATA 300,100,500,100,700
,100,900,100
110 DATA 900,300,900,500,900
,700
120 DATA 900,900,700,900,500
,900,300,900
130 DATA 300,700,300,500,300
,300,300,100
140 DATA -1,-1

```

Program I

```

10 REM Program II
20 MODE 5
30 PROCbox(69)
40 wait=GETS
50 PROCbox(71)
60 wait=GETS
70 PROCbox(69)
80 wait=GETS
90 PROCbox(5)
100 END
110 DEF PROCbox(code)
120 x=0:y=0
130 READ x,y
140 PLOT 4,x,y
150 REPEAT
160 READ x,y
170 IF x>0 THEN PLOT code,x,y
180 UNTIL x<0
190 RESTORE
200 ENDPROC
210 DATA 300,100,500,100,700
,100,900,100
220 DATA 900,300,900,500,900
,700
230 DATA 900,900,700,900,500
,900,300,900
240 DATA 300,700,300,500,300
,300,300,100
250 DATA -1,-1

```

Program II

# Graphics

## From Page 29

rectangle. Once a key is pressed, the program goes on to summon PROCbox again, this time with a parameter of 71.

Now dots are produced in the same places but these dots are in the background colour. Our outline is effectively erased.

Not for long, though. Another keypress has our dotted rectangle appearing again (code being 69) while yet another has a rectangle of solid lines (code of 5) to finish things off.

Simple as it is, Program II does show the use of various PLOTS inside the same procedure. Can you vary it so that dotted lines appear before the solid ones?

Try using the same idea to

make a line drawing slowly emerge from the background in a series of increasing numbers of dots.

You could even have a go at a simple join-the-dots program, emulating the kind of thing you get in kids' comics. And when you're tired of all that you can go on to our final two programs for this month, Programs III and IV.

Both of these use our dot plots to produce pretty patterns on the screen. Program III just sprinkles a lot of coloured dots all over. To my imagination it's like stars in the sky. If you want to see them twinkle, change line 40 to:

```
40 Logical=RND(16)-1
```

Program IV, while a bit

```
10 REM Program III
20 MODE 2
30 FOR loop=1 TO 200
40 Logical=RND(8)-1
50 GCOL 0,Logical
60 x=RND(1279):y=RND(1023)
70 PLOT 69,x,y
80 NEXT loop
90 VDU 23,1,0;0;0
```

### Program III

more sophisticated, uses the same technique to produce a series of concentric, circular bands of colour. I'll leave it to you to figure out how it does it. Notice the "black hole" in the centre.

Once you've understood how it works – and yes, it can be made faster – exercise your imagination and alter it. It seems just made for palette switching (remember VDU19?). And

```
10 REM Program IV
20 MODE 2
30 VDU 29,640;512;
40 FOR logical=0 TO 7
50 GCOL 0,logical
60 FOR loop=1 TO 100
70 angle=RND(361)-1
80 angle=RND(angle)
90 radius=RND(50)*logical+5
```

### Program IV

how about a message appearing in the centre?

● *That should keep you occupied until next time when we'll be taking another look at yet another set of PLOTS, those dealing with triangles.*

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# More great Electron games

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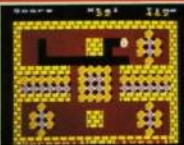
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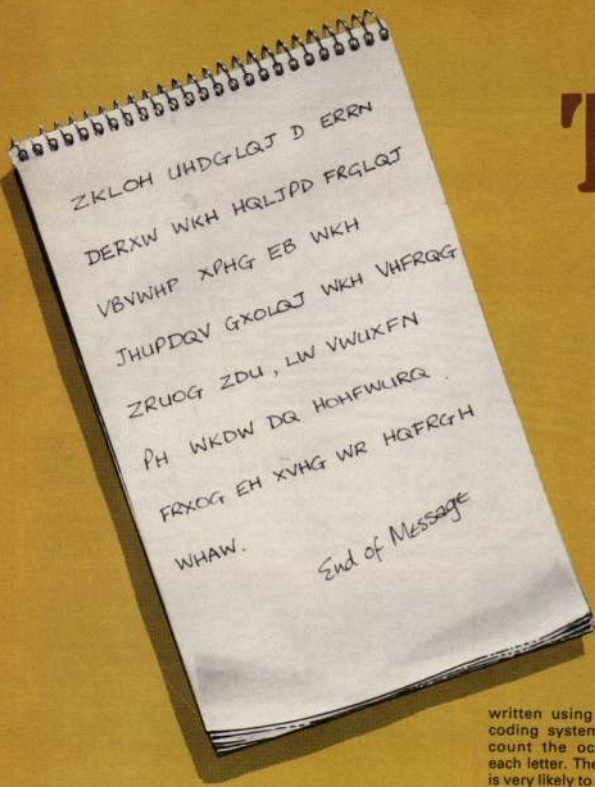
## Volume 4



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**Oxo:** High strategy meets low cunning in a logic game to strain your brain.  
**Missile Attack:** Defend your city from a missile invasion and save it from certain doom.

TO ORDER TURN TO THE FORM ON PAGE 53



WHILE reading a book about the Enigma coding system used by the Germans during the Second World War, it struck me that an Electron could be used to encode text.

This could be used to hide sensitive information and reports stored in word processor files, text files sent down the phone lines or data in computer programs.

Of course, the CIA, NSA and GCHQ have been using computers for code making and breaking for many years, and the system used in this article is comparatively simple.

However, it is still a reasonable way of encoding text, and may well provide you with the inspiration to develop your own coding system.

The simplest method is a substitution cipher, where one letter is replaced by another.

For instance, a simple cipher system might be:

ABCDEF...Z  
BCDEFG...A

where each letter is displaced one to the right - A becomes B, B becomes C and so on.

If we had a word like ELECTRON in plain text, we could put it into code by replacing E with F, L with M and so on, giving us the ciphered word FMFDUSPO.

Anyone who has read the Edgar Allan Poe short story The Gold Bug will recognise this type of code. This method of keeping the meaning hidden is easily defeated, as was shown by the hero in the story.

In most pieces of English text, as long as they're of reasonable length, the most common letter is 'e', closely followed by a, o, i.

So, to crack a piece of encoded text that's been

written using this simple coding system we simply count the occurrence of each letter. The commonest is very likely to be 'e' in plain English. The other letters can also be arrived at by similar means.

More letters can be filled in when several letters have been obtained. For instance, if we have:

Encoded text: FRVJV

Plain text: ?here

the chances are that the word is 'there'. This means that 'r' in the coded text will be 't' in plain text. We can now go through the rest of the encoded text and replace every occurrence of 'r' with a 't'.

As we've seen, this method of encoding text is rather easily broken. It would be better if we could arrange some system such that the first time 'e' turned up in the plain text it was replaced by 'a', the second time 't', then 'x' and so on. In other words, each subsequent occurrence of the letter 'e' is replaced by a randomly selected letter.

# The en Elect

**JOE PRITCHARD p**  
**program to turn yo**  
**into a coding mach**

In this situation, counting the letters won't help the code breaker. Each letter in the text will have been replaced by a random letter each time it occurred in the coded message.

The person to whom the message is addressed must be able to decode it. How can he or she do this if the original message has been scrambled randomly?

The secret is to use a pseudo-random sequence to code the message. This is a sequence of letters or numbers that looks random but is, in fact, predictable from a mathematical equation.

This is exactly how the Electron generates its random numbers. They aren't in fact random at all, just a very complex sequence.

A seed value is used to start off the random number generator and the result is used as the next seed. Each seed will always produce the same pseudo random sequence providing a predictable source of random numbers.

Using this as the basis of a coding system, I have used the Exclusive OR function (EOR), to scramble the text.

This will be familiar to most of you from graphics work and has the following effect on a binary number:

01010110  
EOR 11110010  
10100100

# igmatic ron...

presents a  
your micro  
nine



A one is present in the result only if the two binary digits being EORed are different.

In addition, EORing the result with one of the numbers in the expression gives you the other number in the expression:

```
10100100
```

```
EOR 01010110
```

```
11110010
```

and

```
10100100
```

```
EOR 11110010
```

```
01010110
```

If we have our text in a string we can look up each letter's ASCII code, EOR it with a number and store the

result in a second string. The second string will then contain a coded version of the text.

To recover the original text we simply EOR the coded string with the same number again, and this will recover the original message.

Combine this technique with the random number function and you have a

rather nice coding system.

Program I encodes a string, putting it into *code\$*. As this scrambled text may contain some control characters - ASCII codes less than 32, it's not advisable to attempt to print it.

To use the program, enter a seed value when prompted, the higher the number the better, then type in your text. It will be coded and saved to disc or tape.

Program II loads the file saved by Program I and decodes the string. Simply type in the same seed that

you entered into the encoding program and you will come the original text.

Of course, the users of the two programs need to know the correct seed to code and decode the message. This could be agreed in advance, or based on the day of the week, mother's birthday, and so on.

The code is breakable by quite crude means: Start off with one and go through all the possible seeds until you get an output from Program II that makes sense. However, it might take a very long time with a small home micro like the Electron, though a big number cruncher like the Cray would manage it in seconds.



```
10 REM Program I
20 MODE 6
30 INPUT "What is the seed
number,seed
40 INPUT "Please enter the
text:plain$
50 code$=":random=RND(-seed)
60 FOR letter=1 TO LEN(plain$)
70 char=ASC(MID$(plain$,letter,1))
80 random=RND(255)
90 char=char EOR random
100 code$=code$+CHR$(char)
110 NEXT letter
120 Y$=OPENOUT "message"
130 PRINT#Y$,code$
140 CLOSE#Y$
```

```
10 REM Program II
20 MODE 6
30 INPUT "What is the seed
number,seed
40 plain$=":random=RND(-seed)
50 Y$=OPENUP "message"
60 INPUT#Y$,code$
70 CLOSE#Y$
80 FOR letter=1 TO LEN(code$)
90 char=ASC(MID$(code$,letter,1))
100 random=RND(255)
110 char=char EOR random
120 plain$=plain$+CHR$(char)
130 NEXT letter
140 PRINT plain$
```



# **FRENCH** **on the** **RUN!**



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toughest test  
that a British  
pilot has  
ever had to  
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The year is 1943. As an RAF officer stranded in Occupied France you have one aim — to get back to Britain.

The only way to do this is to try to pass as a Frenchman, but if your French isn't good enough you risk capture and interrogation by the police or even the Gestapo.

Even the simplest tasks — from buying food to taking buses — place you at risk. And to add to your problems you've got limited funds: "Should I hitch a lift or take the train?", "Do I sell my belongings or get a job?"

Whatever you decide to do, time is short. And there are always people willing to denounce you...

French on the Run is that rare combination: A truly educational program that's also a thoroughly enjoyable game. This text adventure not only tests your grammar and vocabulary, but your knowledge of France and the French way of life.

And as your French improves the language problems get harder and the situations become progressively more dangerous. There are four routes to complete in sequence — you need the password from the last before attempting the next. The standard of French required is about O level, though on the last route it rises to just below A level.

And there's a chance for you to try out the French you'll learn in practice: We are offering a **FREE WEEKEND IN PARIS** as a prize to the first person to get back to England alive, having broken a code near the end of the final route.

**For teachers:** French on the Run uses multi-choice questions with randomised distractors, all carefully chosen to illustrate linguistic points or points concerning things French. The program is meant for individual assessment, but can be used just as effectively for classroom work. A sealed envelope contains details of how the secret passwords are created.

DATABASE SOFTWARE

**TO ORDER TURN TO THE FORM ON PAGE 53**

# Slanted Text

## LINERS

WANT to know how to scroll the screen? Den Miller shows you how with an impressive machine code scrolling routine complete with demonstration – all crammed into 10 lines. You can use the code to spice up your own programs or simply sit back and watch the demonstration.

```

** Place your message
e here **** Place yo
ur message here ****
Place your message
here **** Place your
message here **** P
lace your message he
re **** Place your m
essage here **** Pla
ce your message here
****
  
```

```

1 REM Slanted Text
2 DIMQX 80:FORGL=BT01:PL=Q
%
3 COPY0
4 .scroll LDY#1:loop LDA(
  870),Y:DEY:STA(870),Y:INY:INT:
  CPM#B:BNEloop
5 LDY#0:LDA870:STA872:LDA6
  71:STA873:CLC:ADC#1:STA871:LDA
  870:ADC#64:STA870:LDA871:ADC#0
  :STA871
6 LDY#0:LDA(870),Y:LDY#7:5
  TA(872),Y:LDA872:STA870:LDA873
  
```

```

:STA871:LDA870:CLC:ADC#B:STA87
0:LDA871:ADC#0:STA871:CMPI#67B:
  BNEscroll:RTS:}
7 NEXT:READAS:CX#1:XL#0:MO
  DES:VDU23:8202:0;0;0;:REPEAT:}
  871#658:7670:0:PRINTTAB(XL,27)
  MID$(AS,CX,1):CX#CX+1:IFCX=1=L
  ENAS CX#1
  8 XL#XL+1:IFXL=20:XL#0
  9 CALLscroll:UNTIL0
  10 DATA** Place your messag
  e here **
  
```

# Bug

WHAT can you do with a few circles and triangles? Lee Harland shows what can be created with a little imagination. A large, colourful creepy crawlly is drawn followed by a brief message. Take no notice of what it says, the only bug in this program is the one drawn on the screen.

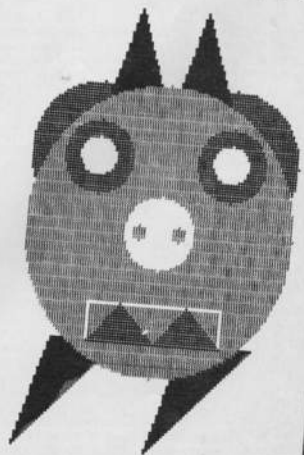
```

1 REM Bug
2 REM By Lee Harland
3 OSCLI"FX16":MODE1:VDU23,
  1,0;0;0;0;:PROCEARS:PROCFEET:M
  OVE500,650:MOVE600,650:PL0T85,
  550,800:MOVE600,650:MOVE700,65
  0:PL0T85,650,800:GC0L0,1:PROCC
  (600,500,200):GC0L0,2
4 PROCC(500,600,50):PROCC(
  700,600,50):GC0L0,0:PROCC(500,
  600,25):PROCC(700,600,25):PROCC
  (600,500,50):GC0L0,1:PROCC(57
  0,500,10):PROCC(630,500,10)
5 DEF PROCCEARS:GC0L0,2:PRO
  CC(700,600,100):PROCC(500,600,
  100):GC0L0,0:ENDPROC
6 DEF PROCFEET:GC0L0,3:MOV
  E450,350:MOVE400,200:PL0T85,55
  
```

```

0,350:MOVE750,350:MOVE650,350:
  PL0T85,600,200:PL0T85,600,200:
  ENDPROC
7 GC0L0,0:MOVE500,400:DRAW
  500,350:DRAW700,350:DRAW700,40
  0:DRAW500,400:GC0L0,2
8 MOVES00,350:MOVE600,350:
  PL0T85,550,400:MOVE600,350:MOV
  E700,350:PL0T85,650,400:G0T010
9 DEF PROC(X,Y,R):LOCALI,
  J:FORI=Y#R TO Y#R STEP-4:J#S0R
  (ABS(R#R-(I-Y)*(I-Y)))>MOVEX-J,
  I:DRAW#J,I:J#NEXT:MOVEX,Y:ENDP
  ROC
10 COLOUR2:PRINTTAB(13,5):
  THERES A ...:PRINTTAB(10,27):
  'IN THIS PROGRAM!':END
  
```

THERES A ...



IN THIS PROGRAM!



# CASTING A SPELL—CHECK

**ROLAND WADDILOVE** continues his series exploring the serious side of programming

In this series we've taken a brief look at some of the more serious software packages available for the Electron.

The first two articles were devoted to word processing using Acornsoft's View and we looked at entering and editing text, formatting and page layout.

Now in this last section of the series on View you'll find a powerful spelling checker, which can be used to proof-read your letters,

notes and documents.

Any errors are highlighted and you have the opportunity to correct any mistakes.

It transfers all the hard work from you to the micro and is the type of boring, repetitive task that computers do best.

Unfortunately, only disc drive owners can use this utility as it simultaneously reads in the text, checks the spelling and writes it out.

Tape owners are limited

to either reading or writing a file, and can't do both at the same time.

Although this utility was written with View files in mind, it will work with many different word processors. For instance, it will quite happily spell check a Mini Office II or Wordwise file on a BBC Micro.

Take a look at the listing. Short isn't it? There aren't any words in the program and it hasn't got a dictionary. In fact you and your

Electron will have to create one. However, it's a lot easier than you might think.

First enter and save the spelling checker. Please note that the program is a Basic listing and runs in Basic, so don't try to load it into View.

Now you need a disc with a View document on that you know is correct — there must not be any spelling mistakes, slips or errors.

Run the spelling checker and reply No when asked if

```

10 REM View Spell Check
20 REM By R.A.Waddilove
30 REM (c) Electron User
40 ON ERROR PRINT:CLOSE#0:
REPORT:PRINT at line %L:END
50 MODE6:HIMEM=TOP+8400:WFX
16
60 PROCassemble:CLEAN
70 PROCinitialise
80 PROCopen
90 REPEAT
100 PROCget-word
110 IF W#<>" PROCsearch:PRO
Write
120 UNTIL done
130 PROCclose
140 END
150
160 DEF PROCinitialise
170 valid$="abcdefghijklmnopqrstuvwxyz
qrstuvwxyzyzABCDEFGHIJKLMNOPQRSTUVWXYZ
TUVWXYZ"
180 COLOUR0:COLOUR129:PRINT
AB0,133:SPC12:View Spell Check
%PC12:COLOUR1:COLOUR128:VDU28
,8,24,39,14
190 HIMEM="*":AT=0
200 PRINT "Load dictionary(Y
/N)?"
210 IF (GET OR 32)<>ASC"Y" E
NDPROC
220 INPUT "name$,name$
230 OSCLI"LOAD "name$"+S
TR$HIMEM
240 ENDPROC
250
260 DEF PROCopen
270 INPUT "File to check",na
me$
280 chan1=OPENIN name$
290 chan2=OPENOUT"Text"
300 done=FALSE:CLS
310 ENDPROC
320
330 DEF PROCget-word
340 W$=""
350 CX=BGET#chan1:IF EOF#cha
n1 done=TRUE:ENDPROC
360 IF INSTR(valid$,CHRSCX)
ELSE BPUT#chan2,CX:GOTO 350
370 W$=W$+CHRSCX
380 CX=BGET#chan1:IF EOF#cha
n1 done=TRUE:ENDPROC
390 IF INSTR(valid$,CHRSCX)
GOTO 370
400 ENDPROC
410
420 DEF PROCclose
430 CLOSE#0
440 PRINT "File checked, pl
ease wait..."
450 PX=8-CB0
460 REPEAT PX=PX+1:UNTIL ?PX
=ASC"%":FX21
470 INPUT "Dictionary name",n
ame$
480 OSCLI"SAVE "name$"+S
TR$(HIMEM)+"*"+STR$(PX+5)
490 ENDPROC
500
510 DEF PROCsearch
520 word$=W$
530 IF RIGHT$(W$,3)="ing" W$
=LEFT$(W$,LENW$-3) ELSE IF RIG
HT$(W$,2)="er" W$=LEFT$(W$,LEN
W$-2) ELSE IF RIGHT$(W$,2)="$
" W$=LEFT$(W$,LENW$-2) ELSE IF
RIGHT$(W$,1)="$" W$=LEFT$(W$,
LENW$-1)
540 IF LENW$=0 ENDPROC
550 $8000=W$:CALL &C00:IF AX
=0 ENDPROC
560 CLS:PRINT"(I)gnore (R)
eplace (A)dd:COLOUR129:COLO
UR:PRINT word$:COLOUR128:COLO
UR:K1=GET OR 32
570 IF K1=ASC"Y" CLS:ENDPROC
580 IF K1=ASC"R" INPUT"Repl
ace with",word$:CLS:ENDPROC
590 IF PX=87030 PRINT"dictio
nary full":ENDPROC
600 SPX=$8000+CHR$(13)+W$
610 CLS
620 ENDPROC
630
640 DEF PROCwrite
650 FOR I=1 TO LEN word$:BP
UT#chan2,ASC(MID$(word$,I,1))
:NEXT
660 BPUT#chan2,CX
670 VDU46
680 ENDPROC
690
700 DEF PROCassemble
710 dict=678:word=$8000:p1=84
48
720 FOR I=0 TO 2 STEP 2
730 PT=8-CB0
740 OPT I%
750 SEI
760 LDX #0
770 .Lc
780 LDA word,X:AND #0F:STA
word,X upper case letters
790 INX
800 CMP #00:BNE Lc
810 .start
820 LDA @06:STA dict:LDA @07
:STA dict+1 HIMEM=start of d
ictionary
830 LDX #0
840 .compare
850 LDX #0
860 LDA (dict),Y:CMP #ASC"W"
:BEQ no-match \end of dictio
nary?
870 .loop1
880 LDA (dict),Y:CMP word,X:
BNE next-word \letters match?
890 INX:INY
900 CMP #800:BNE loop1 \end
of word?
910 LDA #0 \match found
920 .no-match
930 STA @404 \set AX
940 LDA dict:STA p1:LDA dict
+1:STA p1+1 \PX points to afte
r last word tested
950 CLI:RTS
960 .next-word
970 LDX #0
980 LDA #800
990 .loop2
1000 INC dict:BNE here:INC di
ct+1
1010 .here
1020 CMP (dict),Y:BNE loop2 \
find CR
1030 INC dict:BNE compare:INC
dict+1:BNE compare \start nex
t word
1040 J
1050 NEXT
1060 ENDPROC

```

This listing is included in this month's cassette tape offer. See order form on page 53.

you wish to load a dictionary – you haven't created one yet.

Next enter the filename of the document you know is correct and the program will start reading through the text.

As we didn't load a dictionary the checker doesn't know any words and will print the first one it comes to, asking whether it should ignore it, replace it with another word or add it to the dictionary. Press A to add it.

The checker now moves on to the next word. It is unlikely to know this either (unless of course, you've typed the same word twice), and will repeat the prompt. Again, add it to the dictionary.

In fact, since you know that all the words in this file are correct you can simply keep tapping away at the A key, adding all the words to the dictionary.

So as the program reads

through the text it remembers each new word and by the time it has finished it will know a couple of hundred.

When the whole document has been checked you'll be asked to name the dictionary and all the words learnt will be saved.

Your original file remains untouched on the disc. The checker makes a copy called **TEXT** and makes any correc-

tions to it. If you don't need the original version delete it and rename **TEXT**, giving it the old filename.

Run the program again and this time load the dictionary you've just created. Check a new document and add to the dictionary any correct words that the checker doesn't recognise.

Miss-spelt words may be replaced by pressing R, or

ignored by pressing I.

Each time you check a file the dictionary grows and the program becomes more intelligent. The more documents you check the better it becomes.

There is enough room in memory for up to 5,000 words, though of course, it depends on their size and the ram taken up by the disc system.

It is possible to create several dictionaries, and this would be particularly useful for technical reports which may contain specialised terms.

Programmers may like to extend the routine by making it load and search these special dictionaries if a word is not found.

Now with the aid of this valuable utility there's no excuse for spelling errors.

● *Next month we'll move on to something completely different – the programming language Lisp.*

**VARIABLES**  
The alphabet.  
A flag.  
The word to be checked.  
The end of the dictionary.

**PROCEDURES**  
Load dictionary.  
Assemble the machine code.  
Open the files.  
Read a word from the file.  
Close the files.  
Search the dictionary.

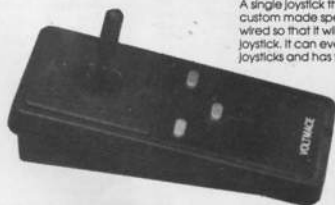
initialise  
assemble  
open  
get\_word  
close  
search

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etship	8.95	Kingdom of Klein	5.95	Bullseyes	7.95	Death Star	7.95	Learn Port	
DICTATIVE GAMES		FIREBIRD		MELBOURNE HOUSE		Region 2	7.95	SLOGGER	
etship Manager	7.95	Star Driver	2.95	Way of Expanding Flat	7.75	Chadai	7.95	Rombor +	
etship	7.95	QILSOFT		Classic Adventure	6.95	Karate Combat	7.95	Rombor	
etship INT:		THE GULF	15.45	Hampstead House	6.95	Goal	6.75	Storefront II	
etship Mission	4.95	GOLEM LTD		Dodgy Garden	7.75	Galactica	6.75	Elkman	
etship		Education I	6.50	MC LOTHLOREN		Ravenscroft	6.45	Starman	
etship		Education II	6.50	Radioacts	6.45	Repton 3	8.45	Starman	
etship	6.95	Fun with Words	6.50	Paras	6.50	Acornsoft Hts Vol I	8.45	Starward	
etship	6.95	Fun with Numbers	6.50	Johnny Rab	6.45	Acornsoft Hts Vol II	8.45	Starward Current	
etship		Jigsaw	6.50	Special Operations	5.95	Superior Hts III Plus 3D	12.95	Printer Rom	
etship		GEMLIN GRAPHICS		Waterloo	8.95	TYNESOFT		16K Sideways Ram	
etship	4.95	Footballer of the Year	8.45	Battlezone	8.95	The Big K.O	6.75	Trek	
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etship	4.95	Heathrow A.T.C.	6.95	Space Shuttle	5.00	Jet Set Willie II	6.75	22500	
etship		Southern Sails	5.95	MICROPOWER		Goal	6.75	T2P1	
etship	2.99	ASL SOFTWARE		Microcomputer Magic	3.95	Commonwealth Games	5.95	T2P2	
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etship	1.99	Caveman Capers	6.50	Swag	3.95	Tynesoft Starter Pack I	6.50	Rom Cartridge	
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etship	1.99	Electron Power Pack	8.75	Killer Gorilla	5.95	Mowatrap	6.90	Wigmor House	
etship	1.99	Thunderstorm II	6.75	U.X.B.	3.95	Five-A-Side Soccer	3.95	Amnouse + Tape containing	
etship	1.99	Thunderstorm III	6.95	Fella/Fell Weavels	3.95	Peg Leg	3.95	PLUS 3 DISCS	
etship	1.99	IMAGINE		Felix in Factory	3.95	Bouncing Bombs	3.95	ACORNISOR'S	
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etship	1.99	Yie Ar Kung Fu II	7.45	Rubbie Trouble	3.95	Caterpillar	3.95	Games Disc I	
etship	1.99	INCENTIVE		Bumble Bee	3.95	Hyperslide	3.95	C.D.S.	
etship	1.99	CONJURE	5.00	MIRRORSOFT		Super Hangman	3.95	Steve Davis	
etship	1.99	Kat Trilogy	4.95	Harrier Strike Force	3.95	3D Maze	3.95	Birdie Barrage	
etship	1.99	Adventure Creator	13.25	Count with Olive	6.95	U.K. P.M.	3.95	KOSMOS SOFTWARE	
etship	2.99	KANSAS CITY		First Steps	7.95	Invader (I.J.K.)	3.95	French A+B	
etship	2.99	Loony Locomotion	4.95	Here/There with Mr Men	6.95	Booze the Brave	3.95	German A+B	
etship	2.99	Ring of Time	4.95	Quick Thinking Plus	5.95	Cytron Attack	3.95	Italian A+B	
etship	2.99	Moon Buggy		Crank Thoughts	5.95	Trek II	3.95	Spanish A+B	
etship	2.99	KOSMOS SOFTWARE		PEAKSOFT		Space Caverns	3.95	Ans. Bach Sen.	
etship	2.95	French Mistress A or B	7.95	The Boss	6.95	U.S. GOLD	11.65	Ans. Bach Jun.	
etship	2.95	German Master A or B	7.95	ROBICO SOFTWARE		Beach Head	6.95	Any Back Sport	
etship	2.95	Spanish Tutor A or B	7.95	Rick Hanson	8.45	Impossible Mission	7.95	7.45	
etship	2.95	Welsh A or B	7.95	Project Thriller	8.45	Crystal Caves	8.95	SUPERIOR SOFTWARE	
etship	2.95	Italian A or B	7.95	Myonem	8.45	Ramp Planet (next adv)	8.95	Superior Hts III	
etship	2.95	German Back Jun. or Sen	7.95	Enbair 7 (5/25) D.F.	8.45	Keyhole	6.95		
etship	2.95	Answer Back Sport	8.95	Note the above disc-AP4 If only		YES SOFTWARE	2.99		
etship	2.95	Identify Europe	6.95	737 Flight Sim	8.95	Golf			
etship		FACTFILE SERIES		SHARDS		etship			
etship		(Used with Answer Back Series)		Operation Satras	6.95				
etship	3.95	Arithmetic (6-11 yrs)	4.25	Woodbury End	8.95				
etship		SPELLING (8-12 yrs)	4.25	Natural History (10+)	4.25				
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etship		20th CENTURY HISTORY (12+)	4.25	Association Football (14+)					
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etship		Treasure Hunt	6.95	Block Busters	6.95				
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etship		Radioacts	6.45	Paras	6.50				
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etship		Waterloo	8.95	Battlezone	8.95				
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etship		Swag	3.95	Gauntlet	3.95				
etship		Jet Set Willie	3.95	Killer Gorilla	5.95				
etship		U.X.B.	3.95	Fella/Fell Weavels	3.95				
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etship		Stock Car	3.95	Rubbie Trouble	3.95				
etship		Bumble Bee	3.95	MIRRORSOFT					
etship		Harrier Strike Force	3.95	Count with Olive	6.95				
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etship		20th Century History (12+)	4.25	Association Football (14+)					
etship		L.C.L.		Mozart French (7 Level)	21.50				
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etship		The Rising of Saladina	4.55	Wychwood	3.65				
etship		The Nine Dancers	3.65	LOGOTRON					
etship		XOR	8.45	MAGNUS SOFT					
etship		Treasure Hunt	6.95	Block Busters	6.95				
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etship		MELBOURNE HOUSE		Way of Expanding Flat	7.75				
etship		Classic Adventure	6.95	Hampstead House	6.95				
etship		Dodgy Garden	7.75	MC LOTHLOREN					
etship		Radioacts	6.45	Paras	6.50				
etship		Johnny Rab	6.45	Special Operations	5.95				
etship		Waterloo	8.95	Battlezone	8.95				
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etship		Swag	3.95	Gauntlet	3.95				
etship		Jet Set Willie	3.95	Killer Gorilla	5.95				
etship		U.X.B.	3.95	Fella/Fell Weavels	3.95				
etship		Felix in Factory	3.95	Felix/Fruit Monsters	3.95				
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etship		Bumble Bee	3.95	MIRRORSOFT					
etship		Harrier Strike Force	3.95	Count with Olive	6.95				
etship		First Steps	7.95	Here/There with Mr Men	6.95				
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etship		PEAKSOFT		The Boss	6.95				
etship		ROBICO SOFTWARE		Rick Hanson	8.45				
etship		Project Thriller	8.45	Myonem	8.45				
etship		Enbair 7 (5/25) D.F.	8.45	Note the above disc-AP4 If only					
etship		737 Flight Sim	8.95	SHARDS					
etship		Operation Satras	6.95	Woodbury End	8.95				
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etship		General Science (14+)	4.25	Know English (12+)	4.25				
etship		Know Scotland (10+)	4.25	Supersoft (14+)	4.25				
etship		20th Century History (12+)	4.25	Association Football (14+)					
etship		L.C.L.		Mozart French (7 Level)	21.50				
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etship		The Nine Dancers	3.65	LOGOTRON					
etship		XOR	8.45	MAGNUS SOFT					
etship		Treasure Hunt	6.95	Block Busters	6.95				
etship		Gold Run	8.95	Bullseyes	7.95				
etship		MELBOURNE HOUSE		Way of Expanding Flat	7.75				
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etship		Dodgy Garden	7.75	MC LOTHLOREN					
etship		Radioacts	6.45	Paras	6.50				
etship		Johnny Rab	6.45	Special Operations	5.95				
etship		Waterloo	8.95	Battlezone	8.95				
etship		MICRODEAL		Space Shuttle	5.00				
etship		MICROPOWER		Microcomputer Magic	3.95				
etship		Jet Power Jack	6.95	Position	6.95				
etship		Swag	3.95	Gauntlet	3.95				
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etship		U.X.B.	3.95	Fella/Fell Weavels	3.95				
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etship		Stock Car	3.95	Rubbie Trouble	3.95				
etship		Bumble Bee	3.95						

**EXCELLENT** though the Plus 1 is, I think there is still room for improvement, and this is shown by the superb add-ons that have been released in recent months.

When Acorn designed it they decided to include an analogue to digital converter.

Although this is almost identical to that built in to the BBC Micro, and may be used for a variety of purposes, probably the most common function is as a simple joystick port.

At the design stage it's difficult to predict exactly what niche a micro will occupy and it was thought that compatibility with the BBC Micro took precedence.

The Electron has turned out to be a superb games micro with some outstanding software.

Hardened arcade addicts demand the best from their equipment, and many prefer the positive feel of a switched joystick to the less precise analogue variety.

A quick action and rapid fire button are essential if you want to wave off marauding aliens to be wiped out.

Unfortunately, the Plus 1 was rather late on the scene, and many games either do not include a joystick option or are designed to use a different interface.

First Byte was the first company to produce a suitable joystick interface and although it does enable you to use the switched variety with many games, it doesn't allow you to plug in a Plus 1.

So you can't take advantage of the Plus 1's main advantages — the multi-purpose cartridge sockets and Centronics printer port. Of course if this is not important then the interface is well recommended by many games players.

In addition, Slogger's own alternative to the Plus 1 — the Rombox Plus, does not have any form of joystick port at all.

Now they have come to the rescue with a cartridge that plugs into the Plus 1 or Rombox providing a 9 pin D socket for Atari-style switched joysticks.

# Interface for arcade addicts

**ROLAND WADDILOVE reviews Slogger's latest offering**



The cartridge is the same size and shape as a View or Viewsheets cartridge and has the socket set into the top.

The operating system rom in the Plus 1 or Rombox must be replaced with a new chip provided by Slogger.

The Plus 1's is easily replaced but, the Rombox can't be opened and you must insert it through the cartridge slots. This is not easy and requires an L-shaped screwdriver.

The new operating system works in a similar fashion to the old rom but, in addition, provides three new functions: The micro always powers up in Basic (normally it is only entered as a last resort), an extended

printer buffer can be set up in sideways ram and the new joystick port is set up.

Unlike the Plus 1's ADC port, the Slogger version is programmable. The joystick's up, down, left, right and fire functions can be made to emulate any key on the keyboard. The joystick pretends to be five keys, for instance, A Z ? \* for up, down, left and right with Return for fire — a common key combination.

The advantage of this system is that it can be used with software that does not have a joystick option.

It will work with all the games published in *Electron User* and a fair proportion of commercial software too.

Providing the program reads the keyboard in the Acorn approved manner,

using INKEY or osbyte &81, you can use the joystick. Unfortunately though, not all games do.

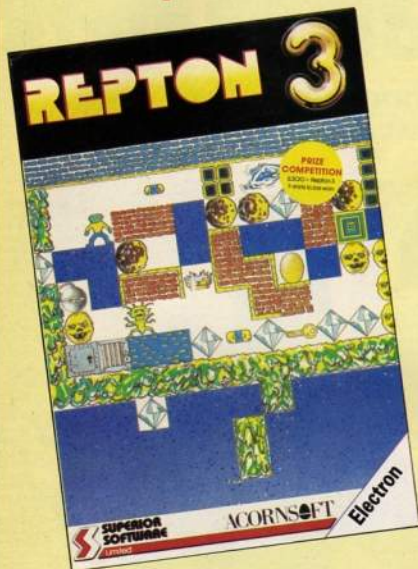
For instance, Superior Software's Deathstar and Bug Byte's Plan B work perfectly using a joystick, yet Syncron ignored it and Audiogenic's Last of the Free wouldn't even load.

To sum up, the joystick interface does not work with all software, I didn't expect it to.

However, it does work with enough to make it well worth saving up for. Bearing in mind these reservations, I can recommend it to all arcade addicts.

Product: Switched joystick interface  
Price: £19.95  
Supplier: Slogger, 107 Richmond Road, Gillingham, Kent ME7 1LX.  
Tel: 0634 52303

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**TO ORDER PLEASE USE THE FORM ON PAGE 53**

# Meet Mandelbrot

**FRACTALS**, recursion and the Mandelbrot set are three related topics which have been cropping up recently on various micros.

They all have their roots firmly embedded in mathematics, and are often used by computer programmers as the basis for generating impressive graphic displays.

What makes them so fascinating is the way in which a simple mathematical formula or algorithm can give rise to a beautiful pattern or picture.

The programming techniques involved are generally quite straightforward and seldom require large amounts of code.

This results in short, neat and structured listings. So the programs, like the maths, are also short and simple.

Fractals are strange beasts, sometimes called monstrous curves. They can be described as lines of infinite length bounding a finite area – a seemingly impossible situation.

Examination of fractals has revealed strange and puzzling behaviour – the closer you look the more detail you see. This unusual nature can be shown by drawing a fractal (really just an approximation), on screen and magnifying it by zooming in on a small section. The more you magnify it, the more fragmented and irregular it becomes.

This behaviour has been used to great effect in several arcade games to create impressive scenery and background landscapes. In one game involving a flying sequence the hills and mountains are simply fractals. The closer you fly toward them the more detail you see.

This clever technique of creating landscapes from simple mathematical formulae saves vast amounts of precious ram, which would otherwise be filled with compressed screen data.

The Mandelbrot set, the subject of the accompanying program listing, is named after Benoit Mandelbrot, who has studied the

## Explore the weird and wonderful world of fractal graphics with ROLAND WADDILOVE

behaviour of one particular class of fractals.

To find whether the point  $a,b$  lies within the set, the following function is applied repeatedly to itself an infinite number of times:

$$\begin{aligned}x &= 0 \\y &= 0 \\x &= x^2 - y^2 + a \\y &= 2 * x * y + b\end{aligned}$$

Monitoring  $x$  and  $y$  reveals that one of two things are likely to happen. Either the function will rapidly grow, eventually ending up infinitely large, or it will remain stable and small.

It can be shown (see The Fractal Geometry of Nature by Benoit Mandelbrot), that all the points within the set are such that:

$$x^2 + y^2 < 4$$

Obviously we can't repeat the process an infinite number of times, life is just too short, so we restrict ourselves to some arbitrary number, say 50. However, the limit condition may be exceeded long before 50 iterations have been completed.

To obtain the impressive screen display shown in Figure 1 what we do is look at the points that lie within and just outside the Mandelbrot set.

The black area represents those points that lie within the set and the colours are generated by measuring how quickly the points outside the set shoot off toward infinity.

The main difficulty experienced by programmers when coding fractal generators is that of achieving a reasonable speed.

The screen in Mode 5 on the Electron is 160 pixels wide by 256 deep. Of course, not all the points lie within the set, but those that do will require the full 50

iterations of the function, which means around 20,000 pixels.

As you can imagine, this could take literally all day to calculate on a small, relatively slow micro like the Electron.

The version presented here is written entirely in machine code for speed, and will generate a full screen display in around two hours.

Enter and run Mandelbrot Set to create the screen shown in Figure 1. If you would like to zoom in on a section you will have to alter the two FOR...NEXT loops in lines 130 and 140, plus *multx* and *multy* in 110.

In general terms the lines are:

```
130 FOR i=a TO b STEP (b-a)/
160
140 FOR j=c TO d STEP (d-c)/
256
110 AX=B:multx=1280/(a-b):mu
1ty=1024/(d-c)
```

The values  $a, b, c$  and  $d$  should be 2 or less, otherwise the function limit will be exceeded straight away.

Also there's not much point in looking at the black

area in the centre of the set, the edges are most interesting.

Remember, the nature of fractals means that you can create an infinite number of different screen displays by zooming in and magnifying sections of the set, so get cracking and explore this fascinating world. ■

```
10 REM Mandelbrot Set
20 REM By R.A.Waddilove
30 REM (c) Electron User
40 MODE 5:FX16
50 VDU19,3,5;0;
60 VDU23,1,0;0;0;0;
70 PROCassemble
80 VDU29,2=1280/2.7;512;
90 VDU23,224,85,170,85,170,
85,170,85,170
100 FOR I=1 TO 31:PRINT TAB
(0,I);STRING$(20,CHR$(224));NEX
T:PRINT CHR$(30);CHR$(1);STRING$(
20,CHR$(224));
110 AX=B:multx=1280/2.7:mult
y=1024/2.8
120 CALL set_up,multx,multy:
CLEAN
130 FOR i=-2.0 TO 0.7 STEP 2
.7/160
140 FOR j=-1.4 TO 1.4 STEP 2
.8/256
150 CALL8000,i,j
160 NEXT
170 NEXT
180 GCOL0;2:MOVED,0:DRAW0,10
23:DRAW1278,1023:DRAW1278,0:DR
AW0,0
190 +FX178,255
200 VDU7,7:FX21
210 +SAVE SCREEN 5800 8000
220 END
```

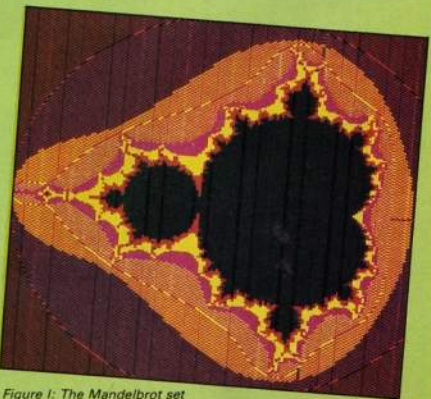


Figure 1: The Mandelbrot set

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Seaside  
Snap



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### HOUSE

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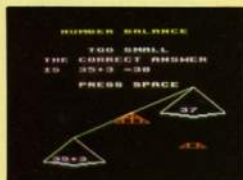
## Ages 5-8

Balance  
Castle  
Derrick  
Fred's Words  
Hilo  
Maths Test  
Mouser  
Number Signs  
Seawall  
Super Spell



### NUMBER SIGNS

Provide the correct arithmetic sign and aim to score ten out of ten



### BALANCE

Learn maths the fun way. Type in the answer to balance the scales

## Ages 8-12

Anagram  
Codebreaker  
Dog Duck Corn  
Guessing  
Hangman  
Maths Hike  
Nim  
Odd Man Out  
Pelmanism  
Towers of Hanoi



### HANGMAN

Improve your child's spelling with this fun version of the popular game



### ODD MAN OUT

Find the word that does not fit – before your time runs out

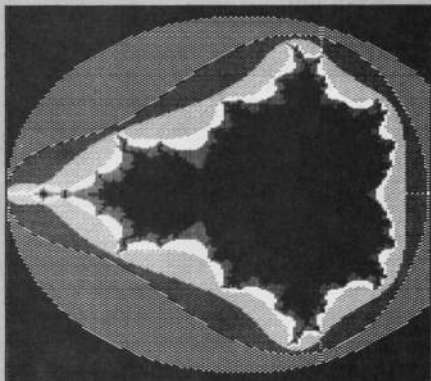
**TO ORDER TURN TO THE FORM ON PAGE 53**

## From Page 41

```

230
240 DEF PROCassemble
250 A1:=B404:B1:=B408:C1:=B40C
260 gcol:=B359:plot.mode:=B350
270 oswrch:=B20E AND &FFFF
280 IntA:=B2A
290 FPA:=B2E:FPB:=B30
300 normalise.FPA:=B4S03
310 zero.FPA:=B4606
320 var.to.FPA:=B4305
330 FPA.times.FPB:=B4613
340 FPA.plus.FPB:=B4508
350 real.to.integer:=B43E4
360 integer.to.real:=B420E
370 negate.FPA:=B407E
380 fpx:=B70:fpj:=B78
390 fpi:=B80:fpj:=B88
400 x2:=B90:y2:=B98
410 multx:=B60:multy:=B68
420 n:=B50
430 FOR pass=0 TO 2 STEP 2
440 PI:=B900
450 COPT pass
460 LDA B601:STA B40:LDA B60
2:STA B4C:JSR var.to.FPA lmp
ack i into FPA
470 LDX #7
480 .loop
490 LDA FPA,X:STA fpi,X lxt
ore i
500 DEX:BPL loop
510 LDA B604:STA B40:LDA B60
5:STA B4C:JSR var.to.FPA lmp
ack j into FPA
520 LDX #7
530 .loop
540 LDA FPA,X:STA fpj,X lxt
ore j
550 DEX:BPL loop
560 JSR zero.FPA
570 LDX #7
580 .loop
590 LDA FPA,X:STA fpx,X:STA
fpy,X lzero.x and y
600 DEX:BPL loop
610 LDA B8:STA n lzero n
620
630 .repeat lstart loop
640 LDX #7
650 .loop
660 LDA fpx,X:STA FPA,X:STA
FPB,X lstore x in FPA/FPB
670 DEX:BPL loop
680 JSR normalise.FPA:BEQ ze
ro1
690 JSR FPA.times.FPB lFPA=
FPA*FPB (x*y)
700 JSR normalise.FPA
710 LDX #7
720 LDX #7
730 .loop
740 LDA FPA,X:STA x2,X lxt=
x*x
750 DEX:BPL loop
760 LDX #7
770 .loop
780 LDA fpy,X:STA FPA,X:STA
FPB,X lstore y in FPA/FPB
790 DEX:BPL loop
800 JSR normalise.FPA:BEQ ze
ro2
810 JSR FPA.times.FPB lFPA=
FPA*FPB (y*y)
820 JSR normalise.FPA
830 .zero2

```



```

840 LDX #7
850 .loop
860 LDA FPA,X:STA y2,X lxt=
y*y
870 DEX:BPL loop
880 LDX #7
890 .loop
900 LDA fpy,X:STA FPA,X lFP
A=FPA*FPB
910 LDA fpx,X:STA FPB,X lFP
B=FPA*FPB
920 DEX:BPL loop
930 JSR normalise.FPA:BEQ ze
ro3
940 JSR FPA.times.FPB lFPA=
FPA*FPB
950 .zero3
960 LDX #7

```

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**MicroLink**

```

970 .loop
980 LDA FPA,X:STA FPB,X lco
py FPA to FPB
990 DEX:BPL loop
1000 JSR FPA.plus.FPB lFPA=F
PA+FPB (2*x+y)
1010 LDX #7
1020 .loop
1030 LDA fpj,X:STA FPB,X lFP
B=j
1040 DEX:BPL loop
1050 JSR FPA.plus.FPB lFPA=F
PA+FPB (2*x+y+j)
1060 LDX #7
1070 .loop
1080 LDA FPA,X:STA fpy,X lxt
ore new value of y
1090 DEX:BPL loop
1100 LDX #7
1110 .loop
1120 LDA x2,X:STA FPB,X lFPB
=x*2
1130 LDA y2,X:STA FPA,X lFPA
=y*2
1140 DEX:BPL loop

```

```

1150 JSR negate.FPA ly2=-y2
1160 JSR FPA.plus.FPB lFPA=F
PA+FPB (x2-y2)
1170 LDX #7
1180 .loop
1190 LDA fpi,X:STA FPB,X lFP
B=i
1200 DEX:BPL loop
1210 JSR FPA.plus.FPB lFPA=F
PA+FPB (x2-y2+i)
1220 JSR normalise.FPA
1230 LDX #7
1240 .loop
1250 LDA FPA,X:STA fpx,X lxt
ore new value of x
1260 DEX:BPL loop
1270 LDX #7
1280 .loop
1290 LDA x2,X:STA FPB,X lFPB
=x*2
1300 LDA y2,X:STA FPA,X lFPA
=y*2
1310 DEX:BPL loop
1320 JSR FPA.plus.FPB lFPA=F
PA+FPB (x2+y2)
1330 JSR normalise.FPA
1340 JSR real.to.integer lIn
ta=INT(FPA)
1350 LDA IntA:CMP #4:BCS done
1360 INC n:LDA n:CMP #50:BEQ
done
1370 JMP repeat
1380 .done
1390 LDA n lset colour
1400 CMP #3:BCS colour7
1410 LDY #2:LX #BFB:BNE set.
gcol lGCOL 2,1...red/black
1420 .colour7
1430 CMP #3:BCS colour6
1440 LDY #2:LX #BFB:BNE set.
gcol lGCOL 2,2...yellow/black
1450 .colour6
1460 CMP #4:BCS colour5
1470 LDY #3:LX #BFB:BNE set.
gcol lGCOL 3,3...white/black
1480 .colour5
1490 CMP #5:BCS colour4
1500 LDY #3:LX #BFB:BNE set.
gcol lGCOL 3,1...yellow/red
1510 .colour4
1520 CMP #7:BCS colour3
1530 LDY #1:LX #BFB:BNE set.

```

```

gcol lGCOL 1,2...white/yellow
1540 .colour3
1550 CMP #9:BCS colour2
1560 LDY #0:LX #BFB:BNE set.
gcol lGCOL 0,3...white
1570 .colour2
1580 CMP #15:BCS colour1
1590 LDY #0:LX #BFB:BNE set.
gcol lGCOL 0,2...yellow
1600 .colour1
1610 CMP #50:BCS colour0
1620 LDY #0:LX #BFB:BNE set.
gcol lGCOL 0,1...red
1630 .colour0
1640 LDY #0:LX #B00 lGCOL 0
,B...black
1650 .set.gcol
1660 STY plot.mode:STX gcol
lGCOL Y,X
1670 LDA #25:JSR oswrch:LDA #
69:JSR oswrch lPLOT 69
1680 LDX #7
1690 .loop
1700 LDA fpi,X:STA FPA,X lFP
A=i
1710 LDA multx,X:STA FPB,X l
FPB=x multiplier
1720 DEX:BPL loop
1730 JSR FPA.times.FPB lFPA=
FPA*FPB (mult*x)
1740 JSR normalise.FPA
1750 JSR real.to.integer lIn
ta=FPA
1760 LDA IntA:JSR oswrch:LDA
IntA+1:JSR oswrch
1770 LDX #7
1780 .loop
1790 LDA fpj,X:STA FPA,X lFP
A=j
1800 LDA multx,X:STA FPB,X l
FPB=y multiplier
1810 DEX:BPL loop
1820 JSR FPA.times.FPB lFPA=
FPA*FPB (mult*y)
1830 JSR normalise.FPA
1840 JSR real.to.integer lIn
ta=FPA
1850 LDA IntA:JSR oswrch:LDA
IntA+1:JSR oswrch
1860 RTS
1870
1880 .set.up lunpack i,j mul
tipliers
1890 LDA B601:STA B40:LDA B60
2:STA B4C:JSR var.to.FPA lmp
ack multx into FPA
1900 LDX #7
1910 .loop
1920 LDA FPA,X:STA multx,X
1930 DEX:BPL loop
1940 LDA B604:STA B40:LDA B60
5:STA B4C:JSR var.to.FPA lmp
ack multx into FPA
1950 LDX #7
1960 .loop
1970 LDA FPA,X:STA multx,X
1980 DEX:BPL loop
1990 RTS
2000 J
2010 NEXT
2020 ENDPROC

```

This listing is included in  
this month's cassette  
tape offer. See order  
form on Page 53.

# BACK TO BASICS

Part nine of **TREVOR ROBERTS'** down-to-earth series

## The ins and outs of INPUT

If you cast your mind back to what we did last month, Program I should cause you no problem.

```
10 REM Program I
20 INPUT "What's your name? " name$
30 INPUT "What's your age? " age
40 PRINT name$ " is "age" years old."
```

The first line is just a REM, giving the program a title so we can refer to it. The next two lines use the keyword INPUT, the Basic command we met last time.

This does two things. First it prints out the message in inverted commas, telling you that the program wants you to do something. Notice that the inverted commas aren't displayed, they're just there to mark the beginning and end of the message.

It then takes whatever you type in at the keyboard and puts it into the variable at the end of the INPUT statement.

Hence line 20 looks at the keyboard and puts whatever you enter into name\$. Line 30 again looks at the keyboard and places what it finds there in age. Line 40 just prints out your name and age.

One thing to bear in mind is the type of variable associated with an INPUT. In Program I, name\$ is obviously a string variable and so anything you type in will be taken as a string. In line 30 age is a numeric variable.

What happens if you inadvertently give name\$ a number and age a string? The answer is to try it and see.

Suppose I'd meant to answer the prompts with Trevor and then 36 but made a mistake and put in my age first and then my name. The result is that the program displays:

```
36 is 0 years old
```

What's happened is that the Electron has taken the 36 and put it into the string variable name\$ with no problems.

Now you and I know that 36 isn't a proper name but the Electron doesn't and will accept it quite happily. The 36 is treated as a string, which means that you can't do maths with it.

However, when it comes to putting Trevor into age it has problems. While it can accept 36 as a string, it can't figure out how to treat Trevor as a number. So what it does is ignore it and place a 0 into age. Hence the statement that:

```
36 is 0 years old
```

## Good sense in going a little loopy \*\*\*

### It's all the same

WHILE Program I isn't very useful it does show the way INPUT works. And you can imagine how once the program has got the details of age and name it could go on to use them instead of just displaying them.

However, rather than just take one name, any useful program would take a lot of them, doing the same things over and over. But how do we do it? Take a look at Program II:

```
10 REM Program II
20 PRINT "*";
30 PRINT "*";
40 PRINT "*";
50 PRINT
```

It's not hard to see that it will produce a line of three asterisks:

\*\*\*

If you can't get it to do that, you've probably left off the semicolons at the ends of lines 20 to 40.

The final PRINT is just there to move the cursor to a new line. Leave it out and see what happens.

Now while printing a line of asterisks is hardly what we buy a computer for, it does illustrate some problems that can occur when we try to do things over and over.

Suppose we wanted to print a line of 30 asterisks one at a time (don't ask me why). You'd need 30 PRINT statements to do it. A lot of program for very little output.

If you look at Program II you'll see that lines 20, 30 and 40 are identical. Wouldn't it be nice if we could just tell the Electron to print \* three times, rather than have to use the same thing in three different lines? And this can be done. After all, what else is Basic FOR?

## Over and over again

WITHOUT more ado, try running Program III:

```
10 REM Program III
20 FOR loop=1 TO 3
30 PRINT '*';
40 NEXT loop
50 PRINT
```

You'll find that you get our three asterisks again. How has this happened? There's only one PRINT in the program, at line 30. Yet somehow it's produced three asterisks. Why?

The answer lies in the lines on either side of the PRINT statement. These tell the Electron to perform whatever comes between them three times.

What happens is that the Electron comes to line 20 and finds a FOR. Being a clever beast, it knows that somewhere, later in the program, there's going to be a NEXT that matches up with

this FOR. It also knows that whatever comes between them is to be repeated a certain number of times.

These two keywords, FOR and NEXT, work in tandem to mark off the lines that are going to be done more than once and form what is known as a loop.

While these may mark off the bit of program that's to be repeated, they don't tell the Electron how many times. This is left to the TO which is always found on the same line as the FOR.

It makes use of a loop control variable, in this case named loop. This is given a range of values it can take, in this case from 1 to 3, going up in ones. Hence loop is 1, then 2, then 3. And for each successive value of loop the lines between the FOR and the NEXT are performed. Hence our three asterisks.

## Making it formal

FOR, TO and NEXT combine to make the most complicated BASIC structure we've met so far. They make the pattern:

```
FOR variable=start TO finish
body of loop
NEXT variable
```

Here variable is any numeric variable and is known as the loop control variable because it controls the number of times the loop cycles.

In Program III we used the name loop. We could have used fred or x but loop is better as it is meaningful. And meaningful variable names make our programs a lot easier to read.

The variable start stands for a whole number, as does finish. As the loop progresses, so variable will increase in value by 1 for each cycle and each time the line or lines between the FOR and the NEXT are performed.

The NEXT (followed by variable as a label) marks the end of the code that is to be repeated.

## Yet one more time

PROGRAM IV shows another loop in action.

```
10 REM Program IV
20 FOR loop=1 TO 5
30 PRINT "loop number ";loop
40 NEXT loop
```

Line 20 holds the FOR that starts things off. From this we can see that loop is to vary from 1 to 5. As this happens, the body of the loop is repeated five times.

In this case the body of the loop consists of just one line. This prints out the current value of loop, effectively labelling each cycle of the loop.

When the Electron first executes line 20, loop has the value 1. Line 30 then prints out:

loop number 1

and the program reaches line 30. It's here that the NEXT sends the Electron back to the line with the FOR. But first it increases the value of loop by 1, making it 2.

At this point the Electron checks 'is see if loop is within the values specified by the TO. In this case it is, so the program carries on. The next time it reaches the NEXT loop is incremented to 3, the range is checked and on it goes.

Eventually loop is increased to 6. Now this is obviously out of the specified range, 1 TO 5. The program now ignores the body of the loop and carries on from the first line after the NEXT. In this case there isn't one and the program ends. Try running it again after adding:

```
50 PRINT "At the end loop is ";loop
```

This should prove that loop is increased until it's out of range.



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# Micro Messages

## The shape of things to come

I WAS pleased to read the comment in the March 1987 issue of Electron User regarding the accent on games. I have every issue of the magazine but was about to let my subscription run out.

However, I have noted and welcome the new Hardware Projects and View word processing series.

May I suggest that you continue in this direction by following up with series with the Viewsheets spreadsheet and Viewstore database?

Also could you include (for us less experienced), articles which would convert Acornsoft home and educational programs from cassette to Plus 3 disc?

Titles such as Personal Money Management, Desk Diary, Graphs and Charts, Watch Your Weight and Business Games I find excellent, but slow to load.

I am sure that you could now get the approval from Acornsoft to help develop their software in order to have the sort of workstations that were envisaged for the Electron.

In hope of good things to come I have just renewed

my subscription. How about it? — G. Stevenson-Galvin, Ashbourne, Meath, Eire.

● In the next section of the Serious Software series we will be discussing the language Lisp and this will be followed by a look at Viewsheets.

Transferring software from tape to disc is illegal and we would soon be in hot water if we published a utility that did this for you.

### Cutting REMarks

REGARDING Trevor Robert's remarks on the REM statement in the March 1987 issue of Electron User, he omitted to point out that although a computer ignores a REM, it does consume space in memory.

While it is vital to include REMs when programming

(to show others how your mind was working), it is equally vital to remove them from the working program. Otherwise you will be left wondering why a comparatively simple program won't work (out of memory), as I was recently.

It did work excellently — when we had removed almost 1700 REMs thoughtfully left in by the trainee programmer. And that was on a 1Mb micro: It is even more important on computers with tiny memories like the Electron.

Also, REMs can appreciably slow a program down. Hence it is not true to say "they do not affect the program" — R.H. Hill, Woodford Green, Essex

● You are right, REMs do affect programs to a small extent. Too many will make a listing unnecessarily long, perhaps even to the point of crashing the micro or sig-

nificantly slowing it down. Too few will make the program unreadable.

It's a simple matter of common sense when deciding where, when and how many to use.

### Disabling the Plus 1

ON my last holiday in the UK I bought Slogger's Master Ram Board and I must say that I am very pleased with it. The increase in memory, especially in 80 column mode using View and Viewsheets, and the Turbo speed make the Electron quite powerful.

I found one bug though, to disable the Plus 1 the program you published:

```
*FX 163,128,1
?B212=B06
?B213=Bf1
?B2AC=0
```

still works in normal mode. In Turbo or 64k mode when the Slogger OS 2.00 is active you have to change these values. The following routine should be used:

```
*FX163,128,1
?B212=B55
?B213=Bf2
?B2AC=0
```

— J.M. van der Heijden, Haarlem, The Netherlands.

### Printer commands

I RECENTLY bought a printer made by C. Itoh Electronics Inc. I have been faced with a problem though: When attempting to list programs all the text is printed on one

## Creating a BOOT! file

AFTER reading the article on the Rombox Plus in the November 1986 issue of Electron User, I decided to buy it along with the AP4, even though the article did say that problems may occur with this combination.

On receiving the package I hurriedly attached it to the micro, following the instructions in the booklets supplied.

After switching on and typing in \*HELP the Electron told me that the AP4 was not on. I sat for hours trying to fathom out what was wrong but, with no luck.

While packing the Rombox away to send it back to Slogger the little plastic seating on which the

AP4 sat fell out. Wondering if this could help I unpacked everything and set it up again. Hey presto! It worked.

On closer inspection with the other rom cartridge slot, the AP4 was not inserted properly because this plastic seating was too high. Since then everything has worked perfectly.

On swapping discs with a friend who owns a BBC Micro I found a IBOOT program. However, it would not work on the Electron.

Please could you or any of the readers help by writing a IBOOT program for the Electron with the AP4.

I have been reading your magazine for a year now

and think it is great. Keep up the good work. — Allan Inness, Stockton, Cleveland.

● Most IBOOT files simply CHAIN another program on the disc, such as a menu.

The IBOOT program on your friend's BBC disc probably worked but it is quite likely that the program it CHAINED only runs on a BBC Micro.

Here's how to create a simple IBOOT file — enter:

```
*BUILD :BOOT
CHAIN "MENU"
<Press Escape>
*OPT4,3
```

Now you can press Shift+Break and the file called MENU will automatically load and run.

## From Page 47

line, resulting in a horrible black mess.

I have bought Mini Office and have found that when responding with an N to the question "Does your printer have automatic line feed?", it works perfectly.

I wonder if you could help me by informing me which commands are used to print out listings correctly. — Mark Goulding (age 14), Bradford, W. Yorks.

● This is quite a common problem, but fortunately one that is easily cured. Simply enter:

\*FX6

before listing the program. Many printers have a block of DIP switches inside the case enabling you to set up the printer for different micros and typestyles. One of them will be to set automatic line feed.

If you switch this on you won't need to enter the FX command before printing. Every printer is different and you'll have to consult your manual to find the exact location and correct switch.

## File transfer

I OWN an Electron with Plus 3, Plus 1 and View. I am currently considering buying a Master Compact.

However, I have many lengthy View files on single sided Plus 3 discs, which I want to keep. Will I be able to load them successfully on the Master Compact? — A.P. Green, Hitchin, Herts.

● The Master Compact can read Electron discs and is supplied with View on disc. You shouldn't have any problems at all transferring your files to your new micro.

## Electron Elite

I AM writing to ask a question about Elite because while I was at school I read something in a magazine that puzzled me.

To relieve the boredom at lunch time I was reading a

**WHAT would you like to see in future issues of Electron User?**

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**Stockport SK7 5NY.**

magazine for the Spectrum. Knowing that I have a copy of Elite for my Electron, my friend showed me a section of tips on how to play Elite. I came to the conclusion that the Spectrum's version is almost exactly the same as the Electron's.

However, I came across a section that spoke about a number of special missions incorporated in the game.

This took me totally by surprise as I had never heard of such missions before. None of my friends who have BBC Micros, Electrons or Spectrums have either.

Does the Electron version of Elite have these missions? I realise that it does not have any suns that could go nova but, I have received two or three "Right On Commander" messages.

Perhaps someone reading Electron User has heard of or, even been on such a mission in Elite? — Julian Stiles, Huntingdon, Cambs.

● The Electron version of Elite does not have missions but the BBC Micro version does.

## Disc protection

AT last I have found a way of protecting my ADFS discs: Using a disc toolkit look at track 0, sector 2 of an unwanted disc with a couple of programs on. Those with ACP's ADT can use \*DEX.

The first byte, the character before the H of Hugo, is interesting as it holds the number of files on the disc. Make a note of this number and replace it with another.

Save the sector and do a hard break — Control+A+Break and \*CAT the disc. The catalogue will not come

up and a "Broken Directory" error message is printed instead.

Now turn the micro off and on. Use the disc sector editor again and place the original number just before the H of Hugo. Save this, \*CAT and the catalogue comes up again.

If you do this with valuable discs keep the original numbers in a safe place. — Steve Forrester, Sevenoaks, Kent.

## Printer control

ON February 27, 1987, I purchased a second-hand Amstrad DMP 2000 printer without a manual after reading your review in Electron User, August 1986.

On connecting it to my Electron I encountered a problem. The paper would not feed forward when Return was pressed so everything I typed was printed on one line. In your review you had not mentioned this.

When I tried to use View it did the same. I used the printer driver in the same issue but, the printer still did not work properly.

Eventually I looked in the Mini Office manual. There I found the command \*FX6. I tried this and bingo!, everything worked perfectly.

View now works but with a lack of print styles. I hope this will be of use to any people who are having similar problems with their printers. — Julian Robinson, Coventry, West Midlands.

● There is nothing wrong with your printer or Electron, it's just a lack of communication. Either your printer can decide when to

feed the paper, or your micro can.

In your case neither were producing paper feed instructions and the text was printed all on one line.

You can set one of the DIP switches on the back of the printer so that it produces automatic line feeds or alternatively the Electron can be told to produce them using \*FX6.

## Future shock

I MUST congratulate you on your excellent publication, which I have found of great help since purchasing my Electron a year ago.

After reading your review of Tynesoft's Future Shock I bought a copy, only to find it had no loading instructions.

After approximately 40 minutes I found that CHAIN got things moving. After some time the game loaded but did not reveal any instructions.

By experimenting with the keys I found Z and X move Glob the Blob left and right but, without knowing what he is supposed to be avoiding or collecting, the game became quite boring.

On writing to Tynesoft I received a short note telling me to take the packaging apart and read the reverse side of the cover where the loading instructions are hidden. There is no indication anywhere on the outside packaging as to their whereabouts.

These showed that the correct method for loading was CHAIN"LOADER". After loading the game again I came across the pull-down information screens, one of these being the puzzle, which I have been totally stumped by.

Can anybody tell me what relevance this has in the game? Whatever I do seems to make no difference at all.

Is it me, or is it due to the lack of information supplied with this game that makes it so frustrating? Did your reviewer experience any of the problems I have come across?

Also as the game was

loading it mentioned that a cheat mode was built in but how do you find it?

Is there anybody who can help me with my problems? — A.F. Middleton, Canning Town, London.

● This type of software packaging is standard and having reviewed many similar packages the reviewer automatically took the cover out to read the instructions. It is quite normal to find the instructions on the back of the cassette insert and nearly all games are run with CHAIN™.

Can any readers help with some playing tips?

## Driven to distraction

LIKE Mr Storey — *Micro Messages* March 1987 — I too had my frustration with the printer driver program in *Electron User*, August 1986.

It was my own fault and everything worked perfectly once I realised the loading procedures, as you described in your answer to his letter.

I am surprised that no mention has been made of the error in line 810 concerning NLQ — it prints out bold. I altered it to:

EQUD 80B10FF7B

I am very new to this fascinating hobby but, sorting out this problem (it was wrong on cassette too), was an enjoyable exercise.

The screen dump programs from the June 1986 issue of *Electron User* which I received along with the Printer Driver are equally excellent.

After trying out the exercise in the magazine I decided to print a screen and, because it was on my lap, I chose the title page of *Fishing* from the same issue. Inserting:

505 CALL 890F

printed the screen. — P.H. Keen, Crewes.

● The printer driver listing is correct. However, the sequence of control codes may not suit every printer. For instance, the code to set

bold on one printer may in fact, set underline on another.

The article accompanying the program describes how to change the listing to suit your own printer.

## Word processing

IS the Centronics GLP printer compatible with the *Electron*, as it is with the BBC *Micro*?

I have seen it advertised in *The Micro User*, your sister magazine, and I think it is a suitable printer for me.

Also, I don't know which cartridge to buy — View word processing or *Viewsheets* spreadsheet. I need to write letters, print out songs and so on. — David Lewis, Cwmbran, Gwent.

● The Centronics GLP is compatible with the *Electron* and you shouldn't experience any problems. View is probably the better cartridge.

## For future reference

I WOULD like to thank you for a first class and instructive magazine. The articles are most informative and not clogged up with too many advertisements.

I should also like to congratulate both ACP and *Slogger* for their continued support of the *Electron*, an

excellent micro by any standard.

I have owned my *Electron* for about 15 months now but, realise I have only used a fraction of its capability. It is an intriguing piece of electronics.

I have added a Plus 1, an ACP Plus 4 and use View frequently. I have recently had *Slogger's* Master ram board installed and added a Centronics GLPII printer.

The gradual build up cost wise, has been helpful and has enabled me to add additional facilities as and when I needed them and the cash became available.

*Electron User* is a mine of information and the more I use the computer the more I seem to be referring to back issues for information that I previously did not fully understand.

Such is the case for the last 12 month's issues, I have had to list my own index for future reference.

The new series of articles by Joe Pritchard — *Hardware Projects* — will undoubtedly be very useful for extending the *Electron's* usage.

I, too, am a radio amateur and would very much like to apply the micro to that field to a greater extent. This could be the basis of a good article and probably of great interest to a wide group of your readers.

Keep up the good work, and thanks again for an excellent and instructive magazine. — Herbert F. Knott, Wantage, Oxon.

● We are always on the lookout for interesting, well-written articles so, if you are

using your *Electron* in an unusual or novel way, why not write and tell us about it?

## More screens

I'M sure there are many others besides myself who have completed all nine screens of Acornsoft's *Magic Mushrooms* and would enjoy the extra 27 I have devised myself.

A lot of time and effort has gone into these and they are more varied and challenging than the original ones.

If anyone is interested in my screens please send an SAE for details. — Alan Davidson, 32c Imperial Drive, Airdrie, Scotland. ML6 9EQ.

## Chess challenge

ON the recommendation of *Micro Messages*, *Electron User* February 1987, I bought *Colossus 4 Chess*.

Now retired, I have been playing chess at club level for over 40 years and over the past three have sampled several chess computers and home computer chess programs.

However, until last year I have never had a worthwhile game from any of them. I have an *Electron* with second processor and when I read the review of *Colossus 4* I decided to buy it.

I am delighted and find it provides a real challenge at club level.

My only disappointment is that with the *Electron* version I am unable to save my games. I would like to know if there is any way I can load the BBC *Micro* version which includes a disc/tape save facility, on to my *Electron* E2P.

Hoping you can come up with a solution. Again, congratulations to Martin Bryant on a great chess program! — John Smellie, Glasgow.

● We haven't tried the BBC *Micro* version on the *Electron* but, we suspect it won't run.

ALL programs printed in this issue are exact reproduction of listings taken from running programs which have been thoroughly tested.

However on the very rare occasions that mistakes may occur corrections will be published as a matter of urgency. Should you encounter error messages when you type in a program

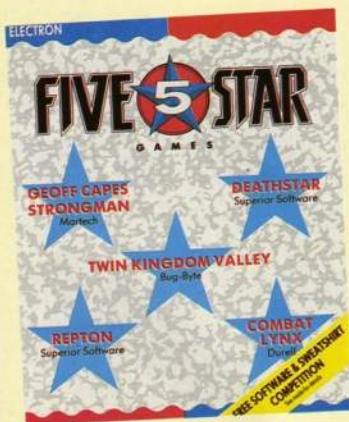
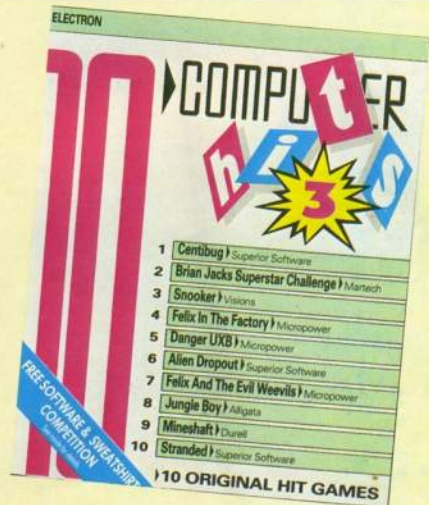
they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the mail pages.

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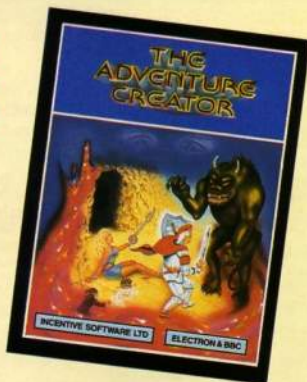
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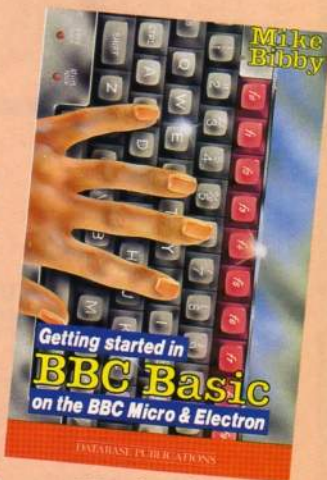
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After just an hour's work your micro will impress you with an expert's detailed knowledge of all kinds of animals – try it on your friends and watch their amazement as your Electron holds an intelligent conversation with them.

When the program is run you'll be asked if you wish to load the animals learnt last time and add to the information already acquired. Of course, if this is the first time it has been used you'll have to answer No.

You'll be told how many animals your Electron knows and the object of the game is to try and think of one it hasn't heard of before.

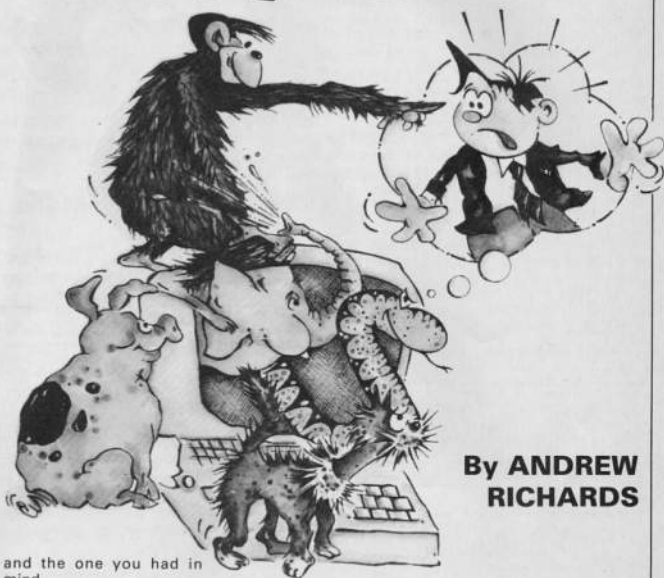
When you start this will be easy, as it only knows two. However, things will soon change, and it will become more and more difficult to catch your micro out.

When you've thought of an animal tap the spacebar and the Electron will ask a series of questions to which you answer either yes or no – press Y or N. Has it got four legs? Does it live at the North Pole? – and so on.

It will then try to guess the animal. If it is correct you can have another go and try to catch it out with a different beast.

What makes this program so fascinating is that when it is wrong the Electron will ask you to teach it – through questions and answers – the difference between the animal it was thinking of

# ANIMALS



By **ANDREW RICHARDS**

and the one you had in mind.

For instance, suppose you were thinking of a robin and your Electron thought it was a blackbird.

When it narrows the subject down to a bird it should ask: "Has it got a red breast?". If it has it must be a robin.

Next time you think of a bird it will remember this fact and ask if it has a red breast. So it learns as you play – and there is enough room for around 100 animals. There's plenty to teach it, so get cracking and turn your micro into an expert to rival David Attenborough.

## The Animal Game

What question could I ask to tell the difference between a robin and a blackbird?

=>Has it got a red breast?

What would the answer be for a robin (Y or N)?\_

### VARIABLES

key\$	Key pressed.
QS(100)	Questions asked.
question	Question number.
AS(100)	Animals known.
won	Number of games won.
lost	Number of games lost.

### PROCEDURES

assemble	Gives three colours in Mode 6.
initialise	Dimensions arrays.
score	Prints score.
question	Asks a question.
guess	Guesses the animal.
save	Saves the animals learned
load	Loads the animals learned last time.

**Full listing starts on Page 56**

# Animals listing

## From Page 55

```

10 REM Animal Game
20 REM By Andrew Richards
30 REM (c) Electron User
40 ON ERROR GOTO 1720
50 MODE 6
60 PROCassemble
70 PROCinstructions
80 PROCinitialise
90 REPEAT
100 PROCscore
110 REPEAT
120 PROCquestion
130 IF key$="Y" j=YX(i)
140 IF key$="N" j=NX(i)
150 UNTIL j<1
160 PROCguess
170 IF ans$="Y" PROCwin ELSE
PROClose
180 PROCanother
190 UNTIL key$="N"
200 PROCsave
210 PRINT "OK...":*FX4
220 END
230
240 DEF PROCcolour(CX)
250 RESTORE 300
260 FOR I=1 TO CX
270 READ A,B
280 NEXT
290 colour71=A:colour76=B
300 DATA 84,17,80,21,80,17,2
0,21,20,17,16,21,16,17
310 ENDPROC
320
330 DEF PROCassemble
340 *FX13,4
350 FOR i=0 TO 2 STEP 2
360 PT=6000
370 OPT i
380 PHP:PHA:TXA:PHA:TYA:PHA
390 LDA #16:STA &FEB8
400 LDA #17:STA &FEB9
410 LDY #244
420 .pause
430 LDY #5
440 .loop
450 DEY:BNE loop
460 DEX:BNE pause
470 .colour
480 LDA #80:STA &FEB8
490 LDA #17:STA &FEB9
500 PLA:LAY:PLA:TAX:PLA:PLP
510 RTS
520 J
530 NEXT
540 76220=600:76221=6C
550 ENDPROC
560
570 DEF PROCinitialise
580 CLS:*FX16
590 DIM A$(100),AS(100),YX(1
00),NX(100)
600 won#lost#0
610 YX(1)=1:NX(1)=-2
620 QS(1)="Has it got 4 legs
?"
630 AS(1)="a dog":AS(2)="a
pider"
640 question1:animals=2
650 PRINT TAB(8,5)"Do you wa
nt to load the animals" (lear
n last time? (Press Y or N))
660 IF FNget$="Y" PROCload
670 CLS:COLOUR0:COLOUR129:PR
INT "The Animal Game :COLOUR
1:COLOUR128
680 VDU28,0,24,39,3

```



**The Animal Game**  
**I know 12 animals.**  
**I have won 15 and lost 10 games.**  
**Think of an animal, then press**  
**space when you are ready....**

```

690 *FX14,4
700 ENDPROC
710
720 DEF PROCwin
730 PROCcolour(2)
740 won#won+1:VDU7
750 PRINT TAB(8,5)"Tippee I
got it!"
760 ENDPROC
770
780 DEF PROClose
790 PROCcolour(3)
800 questionquestion+1
810 lost=lost+1
820 animalsanimals+1
830 SOUND1,-15,0,20
840 PRINT TAB(8,4):*FX202,4
8
850 INPUT "I give up!" "What
animal is it",get$
860 IF LEFT$(get$,2)<>"an" A
ND LEFT$(get$,2)<>"a" get$="a
"get$
870 AS(animals)=get$
880 CLS:PROCcolour(5)
890 PRINT "What question cou
ld I ask to tell the differe
nce between AS(animals) and
"AS(-j):"TAB(8,7):*FX202,48
900 INPUT "=>get$
910 IF get$="?" get$=CHR$(AS
C(get$)+AND &DFF+RND$(get$,2)
920 IF RIGHT$(get$,1)<>"?" g
et$=get$+"?"
930 QS(question)=get$
940 PRINT TAB(8,12)"What wou
ld the answer be" for "":COLO
UR129:COLOUR0:PRINT "AS(anima
ls)":COLOUR128:COLOUR1:PRIN
T "Y or N)?"
950 ans$=FNget
960 IF ans$="Y" YX(question)

```

```

=animals:NX(question)=j ELSE
YX(question)=j:NX(question)=a
nimals
970 IF key$="N" NX(i)=questi
on ELSE YX(i)=question
980 ENDPROC
990
1000 DEF PROCscore
1010 PROCcolour(6):VDU7
1020 PRINT "I know :animals;
animals."
1030 PRINT "I have won :won;
and lost :lost; games."
1040 PRINT TAB(8,5)"Think of
an animal, then press" space
when you are ready...
1050 REPEAT UNTIL GET
1060 j=1
1070 ENDPROC
1080
1090 DEF PROCquestion
1100 i:=VDU12,7
1110 PRINT QS(i);
1120 key$=FNget
1130 ENDPROC
1140
1150 DEF PROCguess
1160 CLS
1170 PRINT "Are you thinking
of "AS(-j):"?
1180 ans$=FNget
1190 ENDPROC
1200
1210 DEF PROCanother
1220 COLOUR129:COLOUR0:PRINT
"Do you want to continue?":
COLOUR128:COLOUR1
1230 key$=FNget:CLS
1240 ENDPROC
1250
1260 DEF PROCsave
1270 CLS:*FX13,4

```

```

1280 PRINT "Do you want to s
ave the animals?";
1290 IF FNget$="N" ENDPROC
1300 PRINT
1310 file=OPENOUT "Data"
1320 PRINT# file,question,ani
mals,won,lost
1330 FOR i=1 TO question
1340 PRINT# file,YS(i),YX(i),
NX(i)
1350 NEXT
1360 FOR i=1 TO animals
1370 PRINT# file,AS(i)
1380 NEXT
1390 CLOSE# file
1400 ENDPROC
1410
1420 DEF PROCload
1430 PRINT "Searching for da
ta..."
1440 file=OPENIN "Data"
1450 INPUT# file,question,ani
mals,won,lost
1460 FOR i=1 TO question
1470 INPUT# file,YS(i),YX(i),
NX(i)
1480 NEXT
1490 FOR i=1 TO animals
1500 INPUT# file,AS(i)
1510 NEXT
1520 CLOSE# file
1530 ENDPROC
1540
1550 DEF PROCinstructions
1560 *FX4,1
1570 PRINT TAB(7,3)"THE ANI
MAL GAME ***"
1580 PRINT "In most educatio
nal programs I try to teach
you something, with this progr
am you have to teach ME."
1590 PRINT "You have to thin
k of an animal and I have to
try to guess it by asking you
"questions."
1600 PRINT "You can only ans
wer yes or no (press Y or N),
to the questions and if I gue
ss wrong then you have to tel
l me what question I should
have asked."
1610 PRINT "Press a key to s
tart...";
1620 REPEAT UNTIL GET
1630 ENDPROC
1640
1650 DEF FNget
1660 REPEAT:*FX21
1670 get$=CHR$(GET AND &DFF)
1680 UNTIL INSTR("YyNn")=get$
1690 PRINT get$;
1700 =get$
1710
1720 REM Error
1730 MODE6:*FX13,4
1740 CLOSE#0:*FX4
1750 IF ERR#17 GOTO200
1760 PRINT:REPORT:PRINT at
line "ERR
1770 OSCLI"KEYB LIST"&STRSERL
"i"
1780 *FX21
1790 *FX138,0,128

```

**This listing is included in this month's cassette tape offer. See order form on Page 53.**

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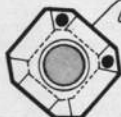
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THIS month we'll continue where we left off last time and see how we can use a potential divider to measure light and heat. But, before we start this month's project, the Analogue to Digital Converter must be calibrated.

What we need to do is measure the ADC's output for a given input, say one volt. This will enable us to interpret the results of our experiments more accurately.

The most convenient way to calibrate the ADC makes use of VREF. This should be a steady 1.8V – it does vary a little, but not enough for us to worry about at the moment.

The simple circuit shown in Figure I should first be set up. Now enter and run Program I.

```
10 PROGRAM I
20 value=0
30 FOR I=1 TO 200
40 value=value+ADVAL(1)
50 NEXT I
60 PRINT INT((value/200)
/256)
```

The result printed is the ADC value that corresponds to an input of 1.8V – scaled down to a more convenient size by dividing by 256. The value output by the ADC for an input of 1V will be 1.8V

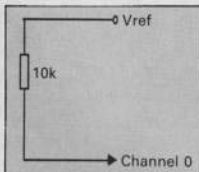


Figure I: Calibrating the ADC

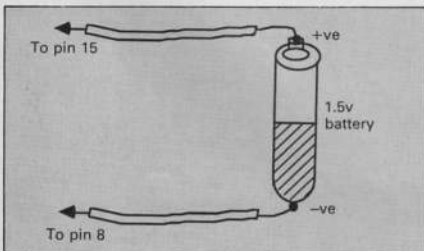


Figure II: Calibrating the ADC using a battery

value. Now we can calculate the value for any input.

There is an alternative approach available if you've got access to a voltmeter. Take a 1.5V battery, measure its output accurately then connect it to the ADC input channel as shown in Figure II.

It is essential that you make sure the voltage of the battery is less than 1.8V, otherwise you may damage your Plus 1.

The same calculation as before can then be carried out but this time with the voltage displayed by the meter replacing the 1.8V of VREF.

Now that we've calibrated the ADC let's put it to good use. We'll see how to make up a circuit that allows us to detect changes in light levels.

Clearly, we're going to need some sort of transducer to convert the light into some parameter that can be measured by our ADC.

Last month we saw how the ADC measures electrical voltage and that changes in resistance could be converted into a voltage by employing a potential

divider. What we require is a resistor whose value varies with the intensity of light shining on it.

Such components do exist – they're called light dependent resistors (LDRs). These components are resistors whose value varies from a low resistance in bright light to a very high resistance in the dark.

Figure III shows a typical LDR used to represent them in circuit diagrams.

We'll be using an LDR called the ORP12 in our experiments. This common component is available from many mail order companies for less than a pound, (try Tandy, part number 276-116A).

It responds to light fairly slowly in electronic terms and a change of resistance in the LDR due to a change in light from absolute darkness to very bright light can occasionally take a second or so to accomplish. Hardly fast in our world of

microprocessors.

There are faster light sensitive components which work in a slightly different fashion and we'll look at these in a future article. For now though, the simple LDR will allow you to have quite a lot of fun.

They are most sensitive to light in the visible spectrum, like our eyes, but they can also detect infra-red radiation. This is light that lies beyond the red end of the spectrum and is given off by hot objects such as the sun, fires or light bulbs. You can't see it but you can certainly feel it on your skin.

So much for the theory, now let's get on with the project. Figure IV shows a circuit for use with an ORP12 LDR. You can see that it's a simple potential divider circuit like that used last month except that one of the fixed resistors has been replaced by the ORP12.

Figure IV also shows one way of mounting it. Make

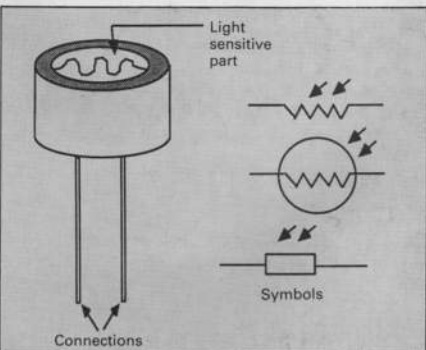


Figure III: Light dependent resistors

# Hardware Projects

sure there are no short circuits between the wires.

There are two important points to note:

- Don't be too heavy handed with the soldering iron as LDRs are a little more sensitive to heat than other resistors.

- A quick inspection of the LDR will show that the wires come out of the back of the device and that they're not rigid. Don't wobble them around or you'll find that they break off at the case.

The simple circuit in Figure IV can be tested using Program II. Plug the circuit into the Plus 1's analogue port, turn on the Electron then enter and run the listing.

```
10 REM PROGRAM II
20 REM LDR test
30 REPEAT
40 PRINTTAB(10,10);
ADVANCE(1)/256;SPC(5)
50 UNTIL FALSE
```

You should be able to vary the number shown on the screen by varying the intensity of the light shining on the LDR. A bright window, electric light or torch can be the light source. Wave your hand between the light source and the LDR and watch what happens – you should see a slight variation in the output.

You should find that the LDR is sensitive to light falling on it from quite a wide angle. Figure IV shows how you can make it sensitive to direction – simply wrap a piece of card round to prevent stray light falling on it.

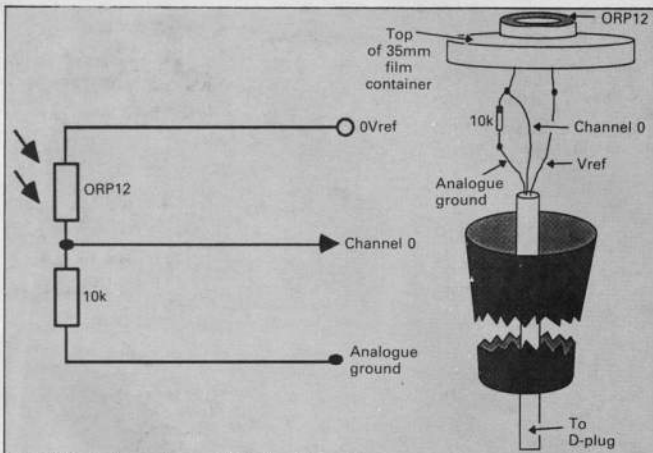


Figure IV: A simple circuit using a light dependent resistor

You can also put a lens in the front to increase its sensitivity, but that's more complex than it sounds and is beyond the scope of this article.

Once you've constructed a circuit like this it can be used for many different applications. For instance, I built one to count the number of times a model train went round a circle of track. A trivial task really but, it does show how flexible LDR circuits are.

There are many such counting applications, from the number of times a door is opened to a simple burglar alarm. Or, how about a sunshine recorder – put an LDR sensor where it will get maximum sunlight and program your Electron

to take a reading every 10 minutes or so. The resulting figures can be printed or stored on disc or tape for later reference.

Moving on now, though not changing the topic entirely, a similar component to the LDR is the thermistor – a heat sensitive component. The resistance of a thermistor depends on its temperature, so it can be used to measure or detect changes in temperature.

There are two main groups of thermistors: Positive Temperature Coefficient (PTC) and Negative Temperature Coefficient (NTC).

PTC thermistors resistance increases as the temperature rises while, NTC thermistors' resistance increases as it falls.

We'll be using a thermistor called the VA1055S – shown in Figure VI along with a suitable circuit for using it. Its resistance is 15,000 ohms at 25 degrees Celsius but drops to just a few hundred ohms at 150 degrees.

It's an NTC type thermistor and Rapid Electronics (Tel. 0206 272730) can supply them by mail order for less than £1. It's part number 61-0100 in their catalogue.

You can employ the same program we used with the LDR. Try it and see what sort of readings you can obtain.

The thermistor isn't a terribly sensitive transducer and it's not too good at detecting small temperature changes. There are other devices that are more suitable for such applications.

If you wish to use it to measure liquid temperature, for instance a cup of coffee, you'll have to ensure that the thermistor leads don't get wet as this would change its resistance. Figure VII shows how one can be enclosed within a test tube.

We've been beaver away with hardware for quite a while now so, let's develop our software. We've already seen in an

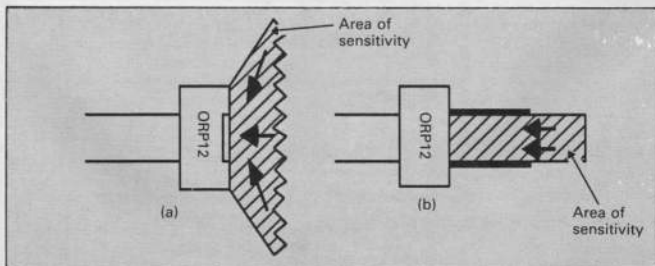


Figure V: Making the LDR sensitive to light direction

# Hardware Projects

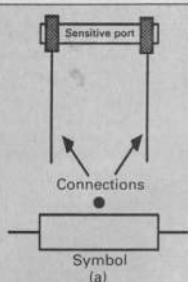


Figure VI: Using a thermistor

## From Page 59

earlier article that each analogue channel takes 10mS to convert. With four channels each one is converted once every 40mS. However, this isn't as fast as it sounds.

There are a couple of FX calls that enable us to

change the speed of conversions.

\*FX16,n allows us to turn off ADC channels that we're not using.

So, if all the channels but one were switched off, the remaining channel would be converted every 10mS – four times faster than normal. A value of  $n=1$

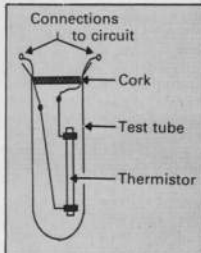
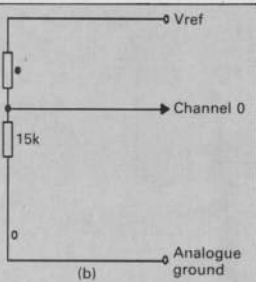


Figure VII: Using a thermistor to measure the temperature of liquids

reads channel 0 only,  $n=2$  reads channel 0 and 1,  $n=3$  reads channels 0,1 and 2 and  $n=4$  reads all of them.

\*FX190,n allows us to speed up the conversion time from 10mS to around 5 or 6mS. We do, however, lose a little accuracy. A value of  $n=0$  is the standard conversion speed, and

\*FX190,8 is the fast version.

● Next month's article will be software oriented. Our programs will use these two FX calls to allow you to draw graphs of analogue inputs on the screen. I'll also be mentioning some of the pitfalls that you may encounter when writing software to read the ADC.

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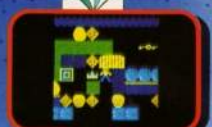
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OVERDRIVE

## A New Concept in Compilations

The Superior Collection Volume 3 features one brand new game, Synchron, together with 7 of Superior Software's classic hits for the Acorn Electron.

**Synchron** is a fast-action game set against a backdrop of an enormous graphically-detailed scrolling landscape. The landscape is, in total, 1024 times the size of the screen. You must endeavour to complete 16 hair-raising missions; in each mission you have to collect a number of power cylinders, land your spacecraft on a runway with each cylinder in turn, and finally locate and bomb the HQ Building. Whilst skilfully manoeuvring your spacecraft between the defence pylons and force-fields, you are attacked by alien spacecraft and missiles launched from the land bases. A superb game, worth at least £7.95 in its own right.

Here's what the computer press said about some of the other titles on this compilation package:—

**REPTON:** "This is an astounding game reaching new heights in Electron arcade adventures." ... ELECTRON USER

**REPTON 2:** "Repton 2 is better than anything I've played on the BBC Micro or Electron. Brilliant!" ... ACORN USER

**DEATHSTAR:** "Deathstar is a super fast, all action arcade classic. It's the sort of game that you can't put down ... The graphics are excellent and the scrolling is very smooth in all four directions. The pace is fast and furious even on the starting screen. This action packed game is recommended for all arcade gamers." ... ELECTRON USER

**SMASH AND GRAB:** "As usual with Superior products the graphics are excellent, with a good use of colour and no flicker. I expect this game will have you rolling with laughter. I certainly did.

Instructions	95%	Awarded ★★★★ (Top Rating)"
Playability	95%	
Graphics	100%	
Value For Money	100%	

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